



20731
May 2000

Volume two

Designing Household Survey
Questionnaires for Developing Countries
Edited by Margaret Grosh and Paul Glewwe

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Lessons from 15 years of the
Living Standards Measurement Study

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The World Bank

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“Household surveys are essential for the analysis of most policy issues. This book has carefully assessed recent experience and developed today’s best-practice technique for household surveys. Indeed, much of this technique was developed and pioneered by the authors. This book is clear, systematic, and well structured. It is also wise and scholarly. It will be indispensable to anyone involved in carrying out or analyzing household surveys, and thus it is required reading for all those who wish to take evidence seriously when they think about policy.”

—Nicholas Stern, senior vice president, Development Economics
and chief economist, the World Bank

“This book is an ambitious undertaking, but it quickly exceeded my expectations. It has many strengths: ...comprehensiveness, ...emphasis on practical application, ...and a sense of balance. For both my domestic and international survey research, this volume will serve as a valued reference tool that I will consult regularly.”

—David R. Williams, professor of sociology and senior research scientist,
Survey Research Center, University of Michigan

“This is a comprehensive guide to planning household surveys on a range of socioeconomic topics in developing countries. It is authoritative, clear, and balanced. The work is a valuable addition to the library of any survey statistician or data analyst concerned with socioeconomic surveys in the developing world.”

—William Seltzer, former head,
United Nations Statistical Office

Household survey data are essential for assessing the impact of development policy on the lives of the poor. Yet for many countries household survey data are incomplete, unreliable, or out of date. This handbook is a comprehensive treatise on the design of multitopic household surveys in developing countries. It draws on 15 years of experience from the World Bank’s Living Standards Measurement Study surveys and other household surveys conducted in developing countries.

The handbook covers key topics in the design of household surveys, with many suggestions for customizing surveys to local circumstances and improving data quality. Detailed draft questionnaires are provided in written and electronic format to help users customize surveys.

This handbook serves several audiences:

- **Survey planners** from national statistical and planning agencies, universities, think tanks, consulting firms and international organizations.
- Those working on either **multitopic** or **topic-specific** surveys.
- **Data users**, who will benefit from understanding the challenges, choices, and tradeoffs involved in data collection.

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Washington, D.C. 20433, U.S.A.

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First printing May 2000

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ISBN:0-19-521595-8

Library of Congress Cataloging-in-Publication Data has been applied for.

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Foreword

Multitopic household surveys have become an indispensable instrument for understanding development. They are fundamental to serious microeconomic analysis of the incentive and distributional aspects of policy, and therefore to the analysis of most policy issues. Researchers draw on them to test behavioral theories. Policymakers need them to assess public interventions. The development community uses them to locate the poor. Developing countries, without adequate household survey data, are forced to make policy decisions in an environment with many blind spots, where crucial information can be seen only dimly or not at all.

Household surveys are also expensive, both in terms of money and institutional capacity. Ultimately their value depends on their design and execution. Errors in their design or execution are wasteful, and can lead to policies that are harmful to the poor. It is therefore important to design and implement surveys correctly from the outset.

Margaret Grosh and Paul Glewwe have put together one of the most comprehensive and informative documents ever written on the design, implementation, and use of household surveys in developing countries. If you are engaged in any of these tasks, this book is essential reading.

The household surveys treated in this book truly are multitopic surveys, covering such topics as household size and composition, education, health, anthropometry, fertility, income and consumption, employment, agricultural production, household enterprises, transfers and nonlabor income, savings and credit, housing, the environment, migration, and time use. The editors have greatly increased the value of the basic approach by incorporating chapters on community data, panel data, and the allocation of resources within the household.

As the World Bank and other development organizations increase their efforts to reduce poverty and raise living standards in developing countries in the 21st century, the need for comprehensive, reliable and up-to-date information on economic and social conditions in these countries will be greater than ever. The vast store of knowledge in this book will contribute significantly to meeting this need. Failure to use this knowledge will consign policymakers to making their decisions without adequate information for many years to come, while systematic use of this knowledge will do much more for the poor than the innumerable speeches made and summits convened on their behalf.

Lyn Squire
Director, Global Development Network
World Bank

Acknowledgments

A project of this size and scope depends on many people playing many roles. Space limitations preclude us from naming all of the hundreds of people who made contributions along the way, but we would like to acknowledge some of the most important.

The authors of the individual chapters deserve thanks for their gracious willingness to go through many rounds of revisions, spread over a longer time than anyone originally envisioned. Producing a book on the design of multitopic questionnaires requires much more cooperation among authors and several more iterations than does the standard edited volume. We are extremely grateful for the forbearance of the authors in this difficult process. The authors themselves were helped by a large number of peer reviewers. They are recognized in the individual chapters, but we would like to extend our thanks to them here as well.

Much of the work in these volumes was based on past practice in LSMS and other household surveys including, but not limited to, the World Fertility/Demographic and Health Surveys, the RAND Family Life surveys, the Social Dimensions of Adjustment surveys, and several special topic surveys such as household budget surveys, water and sanitation surveys, housing surveys, and time use surveys. While the authors pulled together the lessons from past experience, it is also important to acknowledge the irreplaceable contributions made by the thousands and thousands of household members who served as respondents, the dozens of agencies that implemented

the surveys, the many agencies that provided technical assistance and funding, and the academic participants who provided advice and criticism over the years.

The project as a whole was strongly supported from original vision to final printing by our immediate manager for most of that time, Emmanuel Jimenez, who provided us with useful technical input and a great deal of enthusiasm, patience, and bureaucratic support. We also greatly appreciate the support of his directors, Lyn Squire and Paul Collier. The project was primarily financed by a grant from the World Bank Research Committee (679-61), managed by Greg Ingram and administered by Clara Else.

Many people reviewed the book and project as a whole. We greatly appreciate these contributions by Pat Anderson, Jere Behrman, Elisa Lustosa Caillaux, Courtney Harold, John Hoddinott, Anna Ivanova, Alberto Martini, Raylynn Oliver, Prem Sangraula, Salman Zaidi, and three anonymous reviewers. To have input on the project as a whole from these outsiders was very helpful. In addition, participants at three workshops held at the World Bank, plus various training events sponsored jointly by the World Bank and the Inter-American Development Bank, critiqued the project while it was in progress.

In the course of creating the book, Diane Steele answered questions from all authors on the details of LSMS data sets. Fiona Mackintosh edited early drafts and helped to transform the disparate chapters into a single

ACKNOWLEDGMENTS

whole. Lyn Tsoflias provided us with valuable research assistance. Word processing and conference logistics were ably handled by Thomas Hastings, Patricia Sader, Jim Schafer, and Daniel O'Connell. Questionnaire layout was mastered by Thomas Hastings, Andrea Ramirez, and Heidi Van Schooten. Contracting support from Liliana Longo, Selina Khan, and Patricia Sader was timely and organized. The final editing, layout, and design were handled dextrously by Meta de Coquereaumont, Wendy Guyette, Kate Hull, Daphne Levitas, Heidi Manley, Laurel Morais, and Derek Thurber, all with

Communications Development Inc. Communication with the World Bank's Publications Committee and with the publishers and printers was efficiently handled by Paola Scalabrin and Randi Park.

Finally, effusive and endless thanks to our families and friends who put up with the excessively long hours that we spent on this project, who cheered and calmed us through the frustrating times, and who helped us to bring this long project to a successful conclusion without completely losing track of other important aspects of our personal and professional lives.

Contributors

Harold Alderman	World Bank
Jere R. Behrman	University of Pennsylvania
Indu Bhushan	Asian Development Bank
Kimberly Chung	Michigan State University
Angus Deaton	Princeton University
Elizabeth Frankenberg	RAND
Nobuhiko Fuwa	World Bank
Paul J. Gertler	University of California, Berkeley
Paul Glewwe	World Bank and University of Minnesota
Margaret Grosh	World Bank
Andrew S. Harvey	St. Mary's University, Halifax, N.S. Canada
Hanan Jacoby	World Bank
Shahidur R. Khandker	World Bank
Anjini Kochar	Stanford University
Robert E.B. Lucas	Boston University
Stephen Malpezzi	University of Wisconsin
Andrew D. Mason	World Bank
Andrew McKay	University of Nottingham, United Kingdom
Donald C. Mead	Michigan State University
Juan Muñoz	Sistemas Integrales
Raylynn Oliver	Consultant, World Bank
Thomas Reardon	Michigan State University
Elaina Rose	University of Washington
Julie Anderson Schaffner	Fletcher School of Law and Diplomacy, Tufts University
Kinnon Scott	World Bank
Maria Elena Taylor	St. Mary's University, Halifax, N.S. Canada
Wim P.M. Vijverberg	University of Texas at Dallas
Tara Vishwanath	World Bank
Dale Whittington	University of North Carolina at Chapel Hill

Volume 2

Part 3

Additional Modules

14 Environmental Issues

Dale Whittington

The purpose of this chapter is to examine what information is needed and can realistically be collected in a household survey (such as an LSMS survey) to support sound environmental policy analysis. Previous LSMS surveys have contained few questions specifically designed to gather household information on environmental issues and concerns, so this area is something of a clean slate. The challenge is to establish what data are most needed to allow analysts to conduct environmental policy analysis, then to establish what are the best questions to include in LSMS-type surveys to gather these data.

The job of designing environmental questions to be included in LSMS and similar surveys is different in two important ways from the task of designing (and redesigning) questions on other topics. First, the number of important policy issues that fall under the umbrella of “environment and natural resources policy” is very large. They include issues as diverse as air pollution, contamination of drinking water, soil degradation, rainforest loss, national parks, watershed management, fisheries, wildlife conservation, urban sanitation, acid rain, ozone depletion, global warming, hazardous waste disposal, misuse of pesticides, mineral depletion, and malaria control—and this is by no means an exhaustive list. No single household survey can query respondents in depth about their knowledge of, attitudes toward, and practices regarding all of these environmental issues or even a substantial number of these issues. Thus the designers of LSMS-type surveys must set priorities and ask questions about only a limited number of environmental issues.

Second, analyzing environmental policies typically requires a thorough scientific understanding of how

physical and biological systems function and how human interventions can alter natural and manmade processes. This understanding can be gained both from creative theorizing and the testing of theories with rigorous experiments and from personal experience. Survey designers should carefully consider what information about environmental issues households might know that would be of policy relevance. Without the resources or training to carry out scientific experiments, ordinary people may not be well informed about the causes or consequences of some environmental problems, which means that some of their actions may have unintended and unanticipated results. Thus household surveys are not the most appropriate way to collect the information required to develop a rigorous understanding of the physical and biological aspects of environmental systems. However, they are generally considered a good and appropriate means of collecting data for the investigation of human behavior.

Because the level of households’ scientific understanding of environmental issues may vary greatly

from location to location, it may be appropriate to ask some questions in one location but not in another. Thus the approach taken by this chapter is to introduce a set of environment modules that illustrate the types and range of questions that can be included in an LSMS-type survey. These modules, presented in Volume 3, cover important environmental issues in urban and rural areas. The modules also collect data on households' attitudes toward the environment and perceptions of urban air quality and on their use of water services, sanitation services, and fuel. In addition, the modules cover the willingness of households to pay for improved water services in both urban and rural areas, for improved sanitation in urban areas, and for the improvements in urban air quality that would result in better health outcomes. And the environment modules are designed to collect the data needed to estimate household's rates of time preference—in other words, the relative value that a household places on costs and benefits at different times. Designers of future LSMS-type surveys can choose the submodules most relevant to the circumstances in the country of the survey, then modify and customize them as needed to match the policy goals of the survey.

The first section of this chapter summarizes some of the most important environmental policy issues and the tasks involved in environmental policy analysis. The second section discusses what data are needed to analyze these policy issues and what kinds of data LSMS and similar surveys are best suited to collect. The third section introduces the draft environment modules (provided in Volume 3), and the fourth section both explains why these modules were crafted the way they were and points out important issues that are likely to arise when these modules are administered.

Environmental Policy Issues

The basic message of the 1992 United Nations Conference on Environment and Development was that the environment is an important factor in successful economic and social development. Raising per

capita well-being requires that environmental resources—air, water, and land, and the life that depends on them for existence—be managed and conserved in wise ways. This means that governments and individuals must think carefully about the most appropriate use of the capital stock of both nonrenewable and renewable resources over time, and that policies, projects, and regulations must be chosen and implemented in ways that produce the desired environmental, economic, and social results (Pearce and others 1994, chapter 1).

The sound selection and implementation of environmental policies requires that analysts design various policy alternatives and then work out how these alternatives will affect various groups of people (or other affected parties) in terms of several important criteria.

Table 14.1 presents a simple classification of issues in terms of the spatial range of the problem (which can be anything from very local to global) and the extent to which the resource in question is renewable (like fish or forests) or nonrenewable (like oil or copper). Renewability here refers only to the physical characteristics of the resource; all renewable resources are ultimately exhaustible in the sense that they can be overused and thereby extinguished. Determining the extent of the impact of the problem (whether local, regional, or global) depends not only on the location of the resource but also on its significance. For example, a tropical forest can be considered a global resource if its value is global.

Households naturally know more about some kinds of environmental problems than about others. LSMS-type surveys should attempt to collect information on the important environmental problems about which respondents are best informed. In general, respondents are likely to be most knowledgeable about the damage that they suffer from the degradation of air, water, and land resources, as well as about the local, renewable resources that they use and depend upon for their livelihood and sustenance—such as local forests, fisheries, and groundwater (see the upper left cell in Table 14.1). Local communities often have extensive

Table 14.1 The Classification of Environmental Policy Issues

	Local	Regional	Global
Renewable resources	Local water sources and fisheries; local forests; groundwater systems; fuelwood	Shared water basin systems; airsheds	Ozone layer; major tropical forests; genetic information
Nonrenewable resources	Mineral deposits; oil, coal	Shared natural gas reservoirs	

Source: Author's examples.

experience in dealing with local pollution problems and managing renewable resources. Such communities may be equally experienced in dealing with local, non-renewable resources, but it is more likely either that the local population does not use these kinds of resources or that these resources are owned or controlled by only a small number of individuals. In either case local people would have little knowledge of these resources to share with the survey interviewers.

As the spatial scale of the environmental management problem increases, ordinary people are less likely to understand how the full ecological system operates. This does not mean that households fail to understand the costs they bear from the degradation of such environmental resources as air and water. For example, upstream users of a river may not fully appreciate the costs that they impose on downstream users due to the flooding of the river basin that causes deforestation and soil erosion. However, the downstream users are likely to fully understand the damages imposed upon them. It is even more likely that people will not fully understand how their actions may exacerbate global environment problems such as global warming or the depletion of the ozone layer. Thus the answers that respondents give to questions about such global issues are likely to be less informed and less useful to analysts than their responses to questions about environmental problems that are closer to home.

Property Rights and the Causes of Environmental Degradation

Environmental economists have developed a powerful conceptual tool for identifying the causes of environmental degradation, with important implications for the design of the environment modules of household surveys. This tool is the analysis of property rights. One potential role for the environment modules is to collect information that will enable analysts to determine the property rights regimes that govern important natural resources and find out whether conditions exist for the efficient allocation of property rights.

A property right is an entitlement on the part of an owner to a resource or good that can be socially enforced. In most countries an entitlement to use or consume a natural resource is qualified by various legal and customary restrictions embodied in law or in the prevailing moral code. In many situations environmental problems arise because property rights are not clearly assigned, because the benefits and costs arising from

ownership of natural resources do not accrue to the owner, because owners cannot transfer property rights to another owner in a voluntary exchange, or because there are no penalties to prevent others from encroaching on or taking over an owner's property rights.¹

In many places the rights to land or to a natural resource (for example, the atmosphere and much of the world's oceans) are not allocated or defined at all. Even where property rights exist, they may not be enforceable so that in reality an open access situation exists—creating a risk that the resource may be over-exploited. Households may be the best source of information on the prevailing property rights to local renewable resources.

Environmental Assets as Economic Inputs

Another insight afforded by environmental economics is that environmental assets are capital just as much as are machines, roads, or factories. Information from household surveys can be quite useful for establishing the economic value of environmental assets such as drinking water supplies and forestry products. Because capital stocks are needed to sustain development, the overall maintenance of such stocks is an integral part of a sound environmental and economic policy. A tropical forest has a great many ecological functions, a large number of which have economic value. For example, the forest protects the watershed system; if the forest is removed, the watershed system will be damaged (to varying degrees depending on what land-use system replaces the forest). At the global level the ozone layer protects humans from unhealthy amounts of ultraviolet radiation, so damage to the ozone layer is dangerous to human health and productivity. Just as sound development planning requires an understanding of the value of traditional capital assets, such planning also requires information on the value of environmental assets.

Taking Account of the Environment When Appraising Development Projects

The environment provides many inputs to economic activities, and the residuals from production processes can affect the environment. In order to carry out sound project appraisals, analysts need to value both these inputs and residuals properly and price them accordingly. For example, if energy prices fail to reflect the pollution damage associated with energy production and use, the goods produced using that energy will be underpriced.

When appraising projects, analysts must bear in mind that the prices of environmental inputs affect project returns. The proper pricing of inputs and outputs can be seen as a way of designating property rights or extending existing property rights, as can regulatory measures such as environmental quality standards. Sound pricing policy requires that policymakers know the value of environmental goods and services. If the policymakers fail to include nonmarketed environmental services in their calculation of that value, the opportunity costs of development projects will be wrongly defined and measured. For example, if a rural development project involves destroying a tropical forest, it is necessary to factor the forgone benefits of the tropical forest into the calculation of the project's economic rate of return.

In the past the techniques used to appraise development projects have been criticized because of their failure to account for environmental values in the same terms as the costs and benefits of conventional development. This can make the costs and benefits of conventional development seem more concrete than environmental gains and losses. What is quantified appears more important than what is not quantified, and development costs and benefits are traditionally measured in monetary terms while environmental costs and benefits have not often been valued in such terms.

Project appraisal techniques have also been criticized for discriminating against the interests of future generations by discounting the future costs and benefits of environment degradation or conservation. This is also a failure of valuation because it implies that conventional project appraisal techniques fail to adequately account for future values.

Specific Tasks in Environmental Policy Analysis

Data from household surveys can help analysts perform three of the tasks associated with good environmental policy analysis:

- Diagnosing and measuring environmental problems.
- Investigating the causes of environmental problems.
- Designing policy alternatives and evaluating the impact that these policies may have on the problems.

This section discusses these three tasks in turn.

DIAGNOSING AND MEASURING ENVIRONMENTAL PROBLEMS. Data from household surveys can help analysts explore an environmental "problem condition," a

state of affairs about which the public or technical experts may be concerned. For example, the household survey might yield statistics on fuelwood usage that indicates that local forestry stocks are rapidly being depleted. The data can help decisionmakers answer two basic questions: what is the condition that is causing the concern and how important is it?

Tabulating household survey data can show whether or not a problem condition exists. For example, household surveys often collect information on whether or not a household has access to an improved water source such as a private connection or a water pump. If members of the household have access to an improved drinking water source, they are said to be "covered." Simple "coverage" statistics from household survey data can be tabulated to calculate the percentage of a population that has access to an improved drinking water system.² If a significant percentage of the population is not covered, the analysis will have revealed a problem condition to which policymakers should pay attention. Most environmental policy analysts in both industrialized and developing countries use household survey data in this way.

Many of the questions in non-LSMS household surveys addressing environmental issues have asked respondents about their household's use of an environmental resource or the damage that members of the household may sustain as a result of various kinds of degradation of the local environment. Analysts can then use these data to draw inferences about problem conditions. However, survey planners should word questions on the household's use of resources so that responses can be used for more analytical tasks than simply describing a problem.

In addition to providing information on resource use, household surveys can collect information on households' knowledge of, attitudes toward, and practices regarding a wide range of environmental conditions and natural resources. This information can also help analysts describe and diagnose problems. In many cases very simple questions about the ownership of a natural resource can provide important information to analysts that helps them explore ways of managing natural resource problems. (This is in part because households' willingness to pay for capital improvements often depends upon the households' perceptions of who holds the property rights for the facilities.) For example, the policy of the government of Tanzania is to transfer the ownership of most village-

level capital facilities (like water supply systems) back to communities. The government conducted a household consultation survey in August 1995, which revealed that households were aware of the government's policy. The respondents appeared to have accepted the notion that their water source was owned by the community; only 9 percent believed that it was owned by the central or district government (Table 14.2). Interestingly, however, in some communities, a few respondents seemed not to have noticed that the property rights to water sources had been relinquished to the state in the first place.

INVESTIGATING THE CAUSES OF THE PROBLEM.

Investigating the causes of environmental problems requires asking a more complex series of questions than the ones needed to collect descriptive information. For example, questions about water use in almost all household surveys ask respondents what water source their households use. This may be adequate for describing a problem, but it is not sufficient for investigating why a household chooses a particular water source for a specific purpose. To do this, analysts must be able to model the choices that households make among existing water sources, for which they need information on all of the water sources to which a household has access, not just the source(s) that they have chosen.

When government policies are the cause of environmental problems, household surveys may not seem to be a particularly useful research tool because respondents might be reluctant to criticize government policy. However, asking respondents simple questions about their preferred way to receive a service or pay for a service may reveal some underlying problems. For example, respondents can be asked to say whether they would prefer a new community water supply system to be managed by the ministry of water, a community-based utility, or a private contractor. If no one chooses the ministry of water, this may reveal past failures on the part of government providers.

DESIGNING POLICIES AND EVALUATING THEIR IMPACTS ON ENVIRONMENTAL PROBLEMS. Decisionmakers must choose which among proposed policies are better than others. The criteria on which a choice is judged are the valued (or disvalued) features of these policies. The conditions measured, such as coverage of the water

Table 14.2 Respondents' Perceptions of Who Owns the Local Water Source (Tanzania, 1995)

Perceived holder of property right	Percentage of respondents
Central government	3
District government or council	6
Village council or ward development committee	58
Those who live near the water source	7
Those who use the water source	18
An individual	4

Source: Human Resources Development Pilot Project I, World Bank, AF2PH. Systematic Client Consultation, August 1995.

supply, are of concern because they are valued or disvalued. Surveys can help understand what is valued and track changes in those conditions.

For example, in a recent survey in Marracuene, Mozambique (Pinheiro and Whittington 1995), an analysis of respondents' social and environmental priorities suggested that people were most concerned about the lack of drugs and supplies delivered to (purchased by) the hospital. This tells analysts what is valued and suggests possible conditions to track. One way to measure impact would be to track drug supplies in hospitals, which would require data from the hospitals. Another possible method would be to measure the change in the percentage of respondents that still reported the supply of drugs was their top priority after a policy intervention designed to address this problem was implemented; this method would require household data.

Household surveys can collect information that can be used to assess which among the proposed policy alternatives are best. The surveys can support a variety of analytic approaches. For example, analysts trained in disciplines other than economics, as well as members of the public, often define criteria for policy evaluation in terms of specific problem descriptions and these individuals' understanding of the causal relationships that relate policy alternatives to outcomes. Such criteria tend to be less abstract, more explicit, and, for some people, easier to understand than economic criteria. They may include indicators of public health, exposure to pollutants, respondents' subjective perceptions of environmental amenities and conditions, and physical indicators of access to services such as water supply and sanitation. Surveys can provide noneconomists and members of the public with this kind of information—information that these individuals find useful in policy discourse about policy alternatives.

Surveys can also provide data that economists need for a formal economic appraisal of the costs and benefits of different policy alternatives. Economists typically propose that an all-encompassing criterion of increased human well-being (or preference satisfaction) be used to evaluate different policy alternatives. The valuation task is to determine how much better or worse off individuals are (or would be) as a result of a change in environmental quality or public health conditions. There are four approaches analysts can use to estimate economic values of environmental quality changes; all four require data from household surveys.

THE CONTINGENT VALUATION APPROACH. This approach involves simply asking people how much they would be willing to pay to ensure that a particular improvement in environmental quality is made. This is known as the “stated preferences” or “contingent valuation” method.³ It has also been called the “direct approach” because people are directly asked to state or reveal their preferences. This approach measures precisely what the analyst wants to know—the strength of an individual’s preference for the proposed change—and could be used not just for nonmarket goods and services but also for market goods. This approach would be ideal if analysts could be certain that the respondents would fully understand the change in environmental quality being offered and that they would answer the questions truthfully. However, analysts worry whether the intentions that respondents state in contingent valuation surveys before a change will accurately describe their actual behavior after the change when they face no penalty or cost associated with a discrepancy between the two behaviors.

THE SURROGATE MARKET APPROACH. Because of these concerns about the “contingent valuation” method, economists have traditionally used a second approach for measuring the value of nonmarket goods and services such as those provided by many environmental assets (for example, air quality). This is known as the surrogate market approach. In this technique, economists try to find a good or service that is sold in markets and is related to the nonmarket service. Thus the individual reveals his or her preferences regarding both the market and nonmarket service when he or she purchases the market good. For example, when deciding what house to buy or apartment to rent, an indi-

vidual may consider many factors including the size and age of the house, its proximity to schools, shopping, and place of employment and possibly also the air quality in the neighborhood. The value of improved air quality can be estimated by doing a careful analysis of such transactions in the housing market. This surrogate market method is also known as the “hedonic property value model.” Other surrogate market methods are the travel cost model, the hedonic wage model, and avertive behavior technique.

All of these surrogate market methods rely on the behavioral trail left by individuals as they make decisions that affect their lives, since people are assumed to reveal their preferences through their behavior. The estimates of the value of nonmarket goods are based on information about what people actually did and on a set of assumptions about why they did what they did, rather than on what the people said they would do under a set of hypothetical conditions.

This second approach has its own disadvantages and limitations. For example, it is not feasible to use surrogate market methods to estimate the value of a new good or service or of a change in environmental quality that has not yet been experienced. This is because there are no previous instances in which people have been offered a new level of environmental quality and revealed their preferences for it. Even when a nonmarket good or service has been available for some time, there may not yet have been any significant changes in its quality, making it impossible to infer how people in an area would value a change in environmental quality. Finally, to implement any of the surrogate market methods, analysts must interpret and value individuals’ decisions within a theoretical framework. As a result, their estimates of value will depend upon a series of assumptions that remain largely untested.

Information from household surveys is essential for the implementation of surrogate market approaches. Data must be collected on respondents’ behavior and the determinants of their choices. For example, using the hedonic property value model requires data on the following variables: respondents’ rent or the value of their houses, the characteristics of respondents’ housing units (such as square footage, lot size, quality of construction, and access to infrastructure), and neighborhood characteristics (such as crime rate, quality of local schools, distance of respondents’ dwellings from public facilities and environmental amenities, and local air quality).

THE DAMAGE FUNCTION APPROACH. In order to estimate the value of changes in environmental quality that reduce individuals' well-being, an analyst can attempt to determine the damages an individual will suffer. A deterioration in environmental quality can cause a loss of productive assets or a loss of earning power. An individual can be restored to his initial state of well-being by being compensated in either money or other goods or services, by the amount of the loss. This is termed the "damage function" approach. The damage function and surrogate market techniques are both termed "indirect" valuation approaches because neither relies on people's direct answers to questions about how much they would be willing to pay (or accept) for a change in environmental quality.

In the damage function approach analysts seek to determine the monetary losses that an individual incurs in terms of both expenditures made to cope with the damage and residual losses after such expenditures have been made. Information from household surveys is often necessary but usually not sufficient for implementing the damage function approach to valuation. Household surveys may not be able to provide all the information required because respondents may not have sufficient knowledge about the health damages associated with different kinds of environmental pollution. Therefore, LSMS-type surveys are not an appropriate tool for collecting the data to implement this valuation approach, although household data can play a partial role in supporting such analysis. In addition, a thorough implementation of the damage function approach requires information on pain and discomfort that is difficult to collect in a general household survey. For example, a case of malaria causes an individual to suffer three main types of losses: monetary expenditure on medicine, lost wages or reduced productivity from not being at work, and pain and discomfort. It is relatively straightforward to use household surveys to collect information on monetary expenditures for medicines and lost wages. However, asking a respondent to put a monetary value on pain and discomfort requires questions that are much more carefully designed.

THE BENEFIT TRANSFER APPROACH. The fourth approach to obtaining estimates of the value of environmental goods and services takes a somewhat different tack. Rather than developing new estimates of the value of environmental goods or services, analysts find

estimates of value for the same or similar goods or services that have already been derived in other locations, then transfer these estimates into their analysis, possibly after adjusting them to match the prevailing circumstances in the location in question. Analysts can transfer estimates of value that were made using any of the approaches described above. This approach is termed "benefit transfer." The data from an LSMS-type survey can be used in a benefit transfer calculation, but such data are not sufficient in themselves to conduct such calculations, and the benefit transfer approach is not discussed further in this chapter.

Data Requirements for Environmental Policy Analysis

Household surveys cannot gather all of the information that may potentially be relevant for environmental policy analysis. While open-ended questions can be very useful for identifying environmental priorities and attitudes, LSMS-type surveys are not the appropriate place for such questions. And because LSMS samples are usually nationally representative with only a few households in each of many different neighborhoods, watersheds, or ecological zones, such samples are not appropriate for investigating local problems. It can be difficult to design questionnaires that contain all of the questions pertinent to each different setting, and there are often not enough sample households in each area to yield reliable data.

Nevertheless, LSMS and similar survey data can be used in the analysis of a wide variety of environmental issues. Thus it is important to have a clear sense of the priorities for data collection using LSMS-type surveys. This section of the chapter presents conclusions about how best to use LSMS-type surveys to support environmental policy analysis.

In urban areas of developing countries, the main environmental policy questions are "What is the optimal (appropriate) level of environmental quality?" and "How stringent should environmental standards be?" In most urban areas in developing countries, the most important environmental standards are those for the quality of air, water, and sanitation.

In rural areas the most pressing environmental issues are often in the water and sanitation sector, and are often location-specific. The main "green" problems in developing countries—deforestation, soil erosion, and desertification—are found in rural areas. The

destruction of habitats and loss of biodiversity frequently arise from deforestation, especially when farmers encroach on protected areas. Siltation of rivers and streams and loss of agricultural productivity often accompany soil erosion. In general, the study of these problems is best done with samples designed to study the local area only. Therefore it is not recommended that national LSMS-type surveys be used to study such topics.

In both urban and rural areas, LSMS-type surveys are most useful as a source of information about: households' environmental priorities and perceptions, households' use of natural resources, and the monetary benefits to households of pollution control and infrastructure provision.

Measuring Environmental Priorities and Perceptions

LSMS and similar surveys can be an effective tool for measuring households' perceptions and rankings of general and specific environmental problems. Many previous (non-LSMS) surveys have asked people what they considered the most important environmental problems in their neighborhood, their province, and their country. Respondents have often been asked to rank a list of problems or issues from most to least important.

The environmental draft modules provided in Volume 3 include two modules that can be used in LSMS surveys to examine households' general environmental priorities: module 1 (for fielding in urban areas) and module 2 (for fielding in rural areas). Both of the modules contain a list of problems that can be found in many locations. Because the purpose of these modules is to identify which environmental problems are most important in the view of the respondents, it does not matter if some of the items on the list are not of particular concern in a specific survey situation. (The list of issues will generally be easier to standardize for urban than for rural areas.) If certain items of importance in the country surveyed are missing, designers can easily add these items to the modules.

Another draft module, module 3, illustrates how LSMS surveys can be used to measure environmental attitudes and perceptions. This module focuses on urban air quality but could be adapted to cover other environmental issues.

Measuring Households' Use of Natural Resources

LSMS-type surveys can also be used to collect information on households' use of natural resources. In

both urban and rural areas it is recommended that priority be given to collecting information on water and sanitation practices and household fuel use. These activities are relevant in almost all locations and circumstances, and it is relatively easy to collect data on them in household surveys. Also, having information on these activities is vital for analysts to develop a critical understanding of environmental conditions.

The draft modules in Volume 3 include three modules covering households' use of natural resources that household survey designers can include in their survey if interest in the topic is significant: one on water use (module 4), one on sanitation practices (module 5), and one on fuel use (module 6). Modules 4 and 5 are based on extensive field experience and have been well tested. Module 6, on fuel use, has not been field tested and is included here for purposes of illustration. Survey designers will need to carefully revise and pretest module 6. It would be natural for survey designers to put these modules next to the housing module; if very short versions of these modules are used, survey designers might even include them in the housing module.

Modules 4 and 5, on water and sanitation, appear quite long, but in the large majority of cases it will take 20 minutes or less for interviewers to complete both modules. These water and sanitation modules are substantially different from the modules on the same topics that were used in previous LSMS questionnaires and in almost all other multitopic household surveys that have been used in developing countries. In the current draft modules questions are included on each possible water source and each sanitation practice, whether or not they are used by the household surveyed. (In fact, in many locations households often use two or three sources of water.)

There are two principal reasons for this approach. First, household water use practices in developing countries are often much more complex than such practices in industrialized countries. In situations in which a significant number of households use multiple water sources for different purposes in different seasons, asking questions about each water source is the most systematic, accurate way to determine actual conditions and practices. Analysts may know little about existing water use practices, and initial assumptions often turn out to be wrong.

A second reason for this systematic approach is to better understand why different households choose

different water sources for different purposes. To model households' water source choices, analysts need to know the attributes of the water sources that were not chosen as well as the attributes of the sources that were chosen. Modules 4 and 5 collect information on both sets of attributes.

The designers of many LSMS-type surveys will not be able to include such a lengthy water use module due to budget limitations or due to fears that the questionnaire will become too unwieldy. However, there are several options for shortening the water use module.

First, if the distinction between rainy and dry seasons is not pertinent to the country studied, the separate sets of questions for each season may be omitted. The wording may then be changed in the remaining set. For instance, Questions 2–5 could become “how would you judge...” rather than “in the rainy season, how would you judge...” and the corresponding questions on the dry season (Questions 6–10) could be dropped. Similarly, Questions 21–23 could be reworded to be more generic, and Questions 24–26 could be dropped.

Second, in some instances the module can be shortened by dropping any potential water sources that no one seems to use (though this might be difficult in a national survey). In many developing countries, every kind of water source is used somewhere in the country. Nevertheless, few households have access to many different sources. For example, modern, well-to-do neighborhoods in cities may use only piped water, whereas urban slum dwellers may have access only to public wells, taps, or vendors and poor rural residents may have to rely on springs or surface water. If only a few sources pertain to each household, the amount of time needed to administer the module will be much shorter than if each household uses many sources.

Third, there is the possibility of moving some of the quality and price questions, such as Questions 2–10 and 13–16, to the community questionnaire. This will work best when the community questionnaire is filled out for each primary sampling unit or community and when these units are geographically compact. If a unit is defined as the few blocks around an urban household, the water sources available to each household in the unit will tend to be very similar. In contrast, if the unit is defined as the entire city, the answers to questions about water sources in the community question-

naire will not necessarily reflect the choices available to the survey's sample households.

It should also be noted that by placing quality questions in the community questionnaire, survey designers make the implicit assumption that all households' evaluation of the quality of water is the same—that what looks good to one individual looks good to all and that what tastes bad to one tastes bad to all.

The fourth approach to shortening the module would be to have it consist only of the questions about the principal water sources (for example, private connections and public taps) and the summary section at the end.

In cases in which the goal is very limited descriptive analysis of living standards, very limited information on resource use can be placed in other sections of the questionnaire; water and sanitation questions can be included in the housing module, and fuel use questions can be included in either the housing module or the consumption module. To illustrate these options, resource use questions are presented in all three of these modules. In any real survey the questions should be coordinated. For example, questions on use of and expenditure on electricity are in the housing module introduced by Chapter 12 rather than at the end of module 6C of this chapter (which would be another alternative for their placement).

Placing a Monetary Value on Changes in Environmental Quality

The problem with using LSMS-type surveys to value nonmarket environmental costs and benefits is that respondents in the sample are likely to be drawn from throughout the country where the survey is being fielded, whereas many environmental problems are location-specific. Thus for an LSMS-type survey to be useful it must put a value on outcomes that are common to many locations.

On the other hand, one advantage of LSMS and similar surveys is that extensive data are collected on the socioeconomic characteristics of households. These and other potential covariates can be used to model the determinants of the value that households put on environmental improvements and to model how environmental considerations influence various choices that households make.⁴

The fact that environmental problems and the way people react to them are often location-specific can be a problem when using household survey data in

revealed preference models (such as the travel cost and the hedonic property value models) to value changes in environmental outcomes. Therefore, it is difficult to design a standard set of questions on the different ways in which households adapt their behavior in accordance with environmental stresses that can be used uniformly for a nationwide sample of households.

However, there is one simple type of question that can be asked in all household interviews in a nationwide sample, and the answers to questions of this type can be used to estimate the economic value of environmental improvements. Rather than analysts attempting to infer the effect on housing values of, say, improved water service or improved air quality, interviewers can ask respondents about these matters directly. The following questions are examples of how this could be done:

- For households that rent and have a private water connection: How much would this apartment/flat/house rent for if it did not have a private water connection?
- For households that rent and do not have a private water connection: How much would this apartment/flat/house rent for if it had a private water connection?
- For households that own their dwelling unit and have a private water connection: How much would this apartment/flat/house sell for today if it did not have a private water connection?
- For households that own their dwelling unit and do not have a private water connection: How much would this apartment/flat/house sell for if it had a private water connection?

However, the author believes that the most promising way in which household survey data can be used for environmental valuation is to use a stated preference (or contingent valuation) approach to measure both households' willingness to pay for improved water and sanitation services and the value that households place on the improvements in health outcomes resulting from improvements in the environment (for example, urban air quality). From the author's perspective, the potential benefits of including contingent valuation modules would far outweigh the costs involved, and this is an intriguing new avenue for survey designers to consider. It must be emphasized, however, that the contingent valuation method is controversial within the economics profession; many economists feel that this method is unlikely to yield

reliable or accurate estimates of economic value (see Box 14.1).

In practice there are two main ways to use a stated preference approach. The first is to ask respondents to value a program or policy that was designed to improve environmental quality. (What is meant by a program is an activity or set of activities designed to alleviate a problem. For example, a program to improve air quality might include a variety of regulatory and investment actions such as prohibiting the use of lead in gasoline, installing stack gas scrubbers on certain industrial facilities, establishing a system of tradable emission permits, and improving mass transportation.) The survey interviewer would describe the program or policy and its consequences to the respondent, then ask the respondent to value the program or policy. A variety of elicitation procedures are available for survey designers to choose from in phrasing the questions.

The second way of using a stated preference approach is to ask a respondent to value certain environmental outcomes without providing specifics about the policies or programs that will be used to achieve these outcomes. For example, a respondent may be asked to value the public health benefits of improving the quality of drinking water without the interviewer explaining the treatment technologies that would be used to do this.

Both approaches have advantages and disadvantages. If respondents are asked to value specific policies or programs, it is not clear that they will understand or believe that the program will achieve the benefits described. Also, the respondents' answers to such questions reflect not only their willingness to pay for the benefits that they receive from the program but also their willingness to pay for the benefits that others receive. Some policy analysts would prefer to have data on the former but not the latter.

On the other hand, questions designed to ask respondents to value outcomes directly (without knowing about the policies or programs that will be used to achieve these results) may appear more abstract to respondents and thus be more difficult to answer. Also, this method prevents policymakers from learning whether respondents perceive the specific institutional and financing arrangements for improving environmental quality as likely to be effective and fair.

In fact, both ways of using a stated preference approach are likely to work well in the case of

Box 14.1 Criticisms of the Contingent Valuation Method

Over the last decade the contingent valuation method has become the most widely used nonmarket valuation technique in the world. Perhaps in part because of its popularity, this method has no shortage of critics. Probably the majority of professional economists view the contingent valuation method with considerable skepticism if not downright hostility. There have been three broad types of criticism of the contingent valuation method; I will briefly summarize each in turn.

1. Estimates of economic values based on the contingent valuation method are unreliable and inaccurate.

The most common criticism of the contingent valuation method is that it yields unreliable and inaccurate estimates of the economic value of gains and losses (Diamond and Hausman 1994; Diamond and others 1993). Some people argue that respondents do not give accurate answers to contingent valuation questions, giving three main reasons:

- Respondents intentionally give inaccurate answers to valuation questions.
- Respondents have no incentive to answer contingent valuation questions accurately and thus do not do so.
- Respondents are easily confused by the way contingent scenarios are crafted and the kinds of questions typically asked, and thus give inaccurate or widely varying answers depending on the context.

These reasons for inaccurate responses are not in a formal sense mutually exclusive, and many critics of the contingent valuation method freely cite them all as justification for rejecting contingent valuation estimates of economic values. But it should be noted that each of these reasons is based on somewhat different notions of a typical respondent.

Respondents who intentionally give inaccurate answers can carefully discern the purpose of the contingent valuation survey, and quickly develop a strategy for answering questions that will further their self-interest and thus foil the contingent valuation researcher. Their responses are thus subject to "strategic bias," which critics believe renders these responses essentially useless as measures of economic value. Despite the widespread belief among economists that respondents answer contingent valuation questions strategically, there is little empirical evidence that they do so.

Respondents in the second group again perceive their self-interest, but in this case quickly determine that it is not worth the energy or mental effort to think carefully about the questions being asked. They thus act rationally and preserve their mental powers, waiting until a more important problem comes along that is worthy of their full attention. This line of criticism bears careful consideration. It is certainly true that respondents do not have strong incentives to answer contingent valuation questions accurately. Critics of the contingent valuation method are thus quite right to ask whether respon-

dents will answer contingent valuation questions as if they were faced with a real budget constraint when in fact they are not. Proponents of the method have not offered a systematic theory of how respondents answer contingent valuation questions, so there is no convincing theoretical reason to believe that respondents answer accurately. This criticism calls attention to the need for empirical evidence on whether respondents answer contingent valuation questions accurately and reliably. However, the fact that there is no theory to explain why respondents would answer accurately does not mean that they do not do so.

Respondents in the third category are confused by the way the words in the contingent valuation survey are used and by the context given to the good or commodity described in the contingent valuation scenario (Kahneman and Knetsch 1992; Kahneman, Knetsch, and Thaler 1990). Respondents often need a frame of reference or a basis for comparison in order to value the quantity of the good or service offered in a contingent valuation scenario. Critics of the contingent valuation method are correct that people can have considerable difficulty judging the quantity of a good described without being given a context for assessing whether the amount is large or small. This is likely to be a particularly serious difficulty when respondents are asked open-ended valuation questions such as, "What is the maximum amount you would pay for good x?" Respondents' insensitivity to the quantity of a good or service offered in a contingent valuation scenario has become known as the "embedding problem."

There is also considerable evidence from a wide range of psychological experiments that people's answers to questions are influenced by the initial quantities or prices offered. There is little reason to think that contingent valuation surveys would be free of such anchoring effects, and indeed it is common to find such evidence.

There is little doubt that these embedding and anchoring problems exist in at least some contingent valuation surveys, and careful contingent valuation work requires that practitioners test for the existence of such phenomena. If they are found, such phenomena add considerable uncertainty to an assessment of the accuracy and reliability of the data, and certainly need to be discussed. In some cases it is possible for a contingent valuation researcher to adjust estimates of economic value to account for such biases in the data.

2. Contingent valuation researchers often ask the wrong question.

The second line of criticism is that the contingent valuation method as practiced has been used to answer the wrong question. There is wide recognition within the economics profession that the conceptually correct measure of a welfare

(Box continues on next page.)

Box 14.1 Criticisms of the Contingent Valuation Method (continued)

change may be either an individual's willingness to pay or willingness to accept compensation, depending upon whether the change is viewed by the individual as a loss or a gain in well-being (Cohen and Knetsch 1992; Knetsch 1990; Rutherford, Knetsch, and Brown 1998; Vatn and Bromley 1994). There has not, however, been a similar acceptance of the overwhelming empirical evidence that has accumulated over the past two decades that the difference between willingness to pay and willingness to accept compensation measures is large—people value losses 2–4 times more than gains—and is not the result of income effects or transaction costs. Economists still often assume that willingness to pay and willingness to accept compensation are (or should be) practically equivalent.

Many contingent valuation researchers have used willingness to pay valuation questions when in fact willingness to accept compensation questions would have been the conceptually correct approach. Some contingent valuation researchers have done this because they believed there should be no difference between willingness to accept compensation and willingness to pay; others have favored willingness to pay questions for reasons of practicality and expediency. (It is often quite difficult to obtain meaningful answers to questions that ask a respondent about the minimum levels of compensation he would accept.) However, neither of these is an adequate rationale for asking the wrong question (and thus estimating the incorrect concept of economic value), and critics of the contingent valuation method are quite right to call attention to this mistake in the way the contingent valuation method is sometimes practiced. However, this is not strictly speaking a criticism of contingent valuation itself. This problem could be addressed if contingent valuation practitioners used willingness to pay measures where these were the conceptually appropriate measure of economic value, if the practitioners were able to adjust or benchmark willingness to pay measures to convert them to reasonable estimates of willingness to accept compensation values in situations where willingness to accept compensation was the correct measure of economic value, and if the practitioners were able to successfully measure willingness to accept compensation when appropriate.

3. *The use of the contingent valuation method is ethically inappropriate.*

The third type of criticism of the contingent valuation method is that it is an ethically flawed method of data collection because it treats respondents as subjects rather than as active participants in the planning process. From this perspective, contingent valuation is just an example—albeit an egregious one—of a class of "extractive" data collection methods that

includes all types of household surveys. This line of criticism comes largely from sociologists, anthropologists, and other advocates of more participatory approaches to development planning. It is rarely heard from economists because if one accepts the criticism, it cuts with even more force on other nonmarket valuation techniques such as the travel cost method, hedonic property value models, and the marginal productivity approach. Indeed, the basic thrust of this criticism applies to all formal economic analyses of individuals' demand for goods and services, including cost-benefit analysis and project appraisal. Economists typically rely on survey and experimental approaches for gathering data and use theoretical models of human behavior to interpret such data rather than consulting with people themselves about the policy and project matters at hand.

Proponents of participatory techniques also make the argument that if the powers that be do not want to relinquish their authority, and want data on individuals' demand for goods and services for planning purposes (as opposed to actively involving households in the planning process and empowering them to make their own decisions), a variety of participatory techniques will provide more accurate data on demand than do the contingent valuation method or other survey methods. This is in line with the second class of criticism above. There have been few direct empirical comparisons of demand estimates using both the contingent valuation method and more participatory data collection techniques; the few that have been done suggest that the two data collection approaches can give quite different results, although they are inconclusive as to which yields the most accurate and reliable estimates (Davis and Whittington 1998; Davis 1998).

It is important to note that the criticisms of the contingent valuation method do not all suggest that the contingent valuation data will overstate or inflate the economic value of gains and losses. Critics of the widespread use of the willingness to pay structure of contingent valuation questions in fact contend that contingent valuation practice understates economic values. Advocates of participatory data collection methods make no claim about the direction or magnitude of the mistakes they believe the contingent valuation method will make. Most of the critics who argue that contingent valuation will yield inaccurate and unreliable results seem to believe that the contingent valuation method will yield overestimates of demand. But even here the direction of alleged bias is often inconclusive. For example, if respondents answer contingent valuation questions strategically, they might either understate or overstate their willingness to pay for a good or service, depending on how they believed their answer would affect the provision of the good or service by the government or another authority.

improved water supply services, because private water connections and reliable water services are largely private goods in the sense that their benefits accrue principally to the households that receive them. Moreover, these benefits are more immediate and obvious than, for example, the effect of some pollutants on the lungs. It is likely that both kinds of contingent valuation approach will become easier and more effective as they are used more often in LSMS and similar surveys.

Volume 3 contains five environmental modules that illustrate the ways in which a stated preference approach could be used in an LSMS-type survey. Modules 7 and 8 are designed to measure households' willingness to pay for improved water services in urban and rural areas. Module 9 is designed to measure households' willingness to pay for improved sanitation services, and Module 10 measures households' willingness to pay for improved health and other outcomes from improved urban air quality. Module 11 illustrates how a contingent valuation approach can be used to collect data for estimating individuals' rates of time preferences for nonmarket goods. Even more than Modules 1–6, Modules 7–11 will probably have to be adapted to suit local or regional conditions.

These environmental valuation modules need not be used for all respondents in an LSMS-type survey. Survey designers may use a module designed to estimate the value that households place on improved water services only in one region of a country where water problems are known to be particularly acute. Similarly, the air quality module should generally be restricted to large urban areas and perhaps even to specific urban locations. In this context, how urban areas are defined will depend upon the extent and magnitude of the environmental problem; multiple definitions might be used in a single survey. For example, sanitation problems can be severe in small communities, while air quality problems are most likely to be a serious concern in much larger cities.

An important complication in the design of standardized modules for valuing improved water and sanitation services is that these values depend upon what alternative sources of supply exist and on how much they cost. Therefore, the survey questions must usually be designed to reflect specific housing and water and sanitation conditions. For example, valuation questions must generally be phrased differently for homeowners than for renters. Similarly, questions about the value of

improved water or sanitation service must typically be phrased according to the level of service that the respondent already has. This means that the interviewer must determine the respondent's housing tenure and water and sanitation service level in order to skip to the appropriate valuation question.

In the first section of this chapter it was noted that the way environmental policies and programs were appraised in the past has been criticized on the grounds that it failed to take into account these policies and programs' future costs and benefits, thus discriminating against the interest of future generations. However, little information is currently available on individuals' own rates of time preferences. Module 11 uses a simple contingent valuation approach to ask questions that will yield the information necessary to impute individuals' rates of time preferences (Cropper, Aydeté, and Portney 1994). This module has been used successfully for this purpose in Uganda, Mozambique, Indonesia, Bulgaria, Venezuela, Ethiopia, and Ukraine (Poulos and Whittington 2000).

If any of these stated preference modules are administered in a specific location within a country, analysts can use benefit transfer methods to estimate environmental values in other locations. However, because benefit transfer methods have only recently begun to be used to value nonmarket goods, the procedures for dealing with common problems have not been standardized.

Estimating Physical Effects of Environmental Degradation and Physical Benefits of Pollution Control

In industrialized countries household surveys have often been used to implement a damage function approach to valuing changes in the quality of the environment, including measurement of the impact of air pollution on people's health. In developing countries household surveys have been used to measure the impact that a lack of drinking water and sanitation facilities has on people's health. The question arises whether LSMS and similar surveys are an appropriate vehicle for either of these purposes. In the opinion of the author of this chapter, the answer depends on which aspects of environmental health analysts wish to study and on how the sample for the LSMS-type survey is drawn.

For example, household surveys are not an efficient technique for measuring the impact of environmental pollution on a particular health outcome,

particularly when this health impact is a rare event (for example, mortality). The problem is that too many resources must be spent in order to find too few cases in which the environmental pollution has caused a health effect. When the health outcome in question is more common, two primary questions remain: whether the sample will provide enough variation in the environmental variable studied (for example, ambient air pollution levels) and whether the environmental variable can be measured at a low cost.

Thus it is not generally advisable to use household surveys for environmental epidemiology. For measuring the impact of water and sanitation interventions on waterborne disease, for example, a case controlled study is usually preferable to a household survey unless the sample size of the survey is very large. Some household surveys have been used to study air pollution; the most successful of these have been prospective studies in which each household kept a diary of any respiratory problems and illnesses suffered by its members. However, LSMS-type surveys are not generally organized in a way that permits respondents to keep such diaries. Another problem is how to measure the ambient air quality experienced by respondents during the period when the diaries are kept. One way that analysts could use this kind of data from a household survey would be to perform a cross-sectional study in which they correlate symptoms indicative of chronic respiratory problems with air pollution levels. Such studies can be useful, but require that either indoor or outdoor air pollution be measured for all people in the sample.

Box 14.2 summarizes some of the main points discussed thus far in this chapter. The principal environmental policy issues that can be addressed in household surveys include urban and rural water and sanitation quality, urban air quality, and household use of natural resources such as fuel. Considerable information can be collected in LSMS-type surveys that is relevant for environmental policy analysis, including the damages that households suffer from environmental degradation, households' attitudes toward and priorities for the environment, households' rates of time preferences, and the economic value of environmental quality changes. However, Box 14.2 also points out that some important environmental issues are difficult to analyze using household data. These include global issues about which households may have little understanding,

Box 14.2 Environmental Policy Issues and Household Survey Data

Environmental policy issues that can be addressed using household survey data

- Urban and rural water and sanitation
- Urban air quality
- Household fuel use

Information relevant for environmental policy analysis that can be collected using household surveys

- The damages that households suffer from environmental degradation of air, water, and land resources
- Household use of local renewable resources such as forests, fisheries, and groundwater
- Households' priorities for environmental improvements
- Households' willingness to pay for some kinds of environmental quality improvements
- Households' rates of time preferences
- The extent of problem conditions (such as households' access to improved water supplies)

Environmental issues that are difficult to analyze using household survey data

- Global environmental issues about which households may have little understanding

Environmental issues that can only be analyzed using specialized data

- Property rights regimes for local environmental and natural resources (such as ownership of natural resources)
- Localized natural resource management issues

households' environmental attitudes and preferences that can only be captured through the use of open-ended questions, and environmental health problems that occur only rarely in a population.

Box 14.3 summarizes some cautionary advice about which of the draft modules presented in this chapter are new and untested. Household survey designers are again warned that the contingent valuation modules (modules 7–11) need to be carefully adapted to country conditions and also need to be pretested. Implementing the contingent valuation modules also requires more extensive training of interviewers. The household fuel use module (module 6) has not been pretested.

On the other hand, the modules on general environmental priorities (1 and 2) and on household water and sanitation use (4 and 5) have been used extensive-

Box 14.3 Cautionary Advice

- *How many of the draft modules are new and unproven?* None of the environmental modules have yet been used as part of an LSMS survey. The household fuel use module is untested and is likely to require careful field testing and subsequent modification. Module 3 (environmental attitudes toward and perceptions of urban air quality) has only been used once in a large survey and may require extensive modification in other locations.
- *How well have the modules worked in the past?* The modules on general environmental priorities (modules 1 and 2) have been tested in numerous surveys dealing with households' water and sanitation conditions in many developing countries. They have worked very well and should present no major problems. The modules on household water use and sanitation have also been thoroughly tested in many countries. They may need to be modified to fit a particular country situation (for example, in a region where the distinction between rainy and dry seasons is not important). Nevertheless, survey planners are unlikely to experience many problems with these modules, either in their long or short versions. Different variations of the valuation modules (modules 7–11) have also been used in household surveys, though not in LSMS surveys, in many countries.
- *Which parts of the modules most need to be customized?* The contingent valuation scenarios and elicitation procedures in the contingent valuation portion of the valuation modules (modules 7–11) have not been tested in LSMS-type surveys. In particular, referendum elicitation procedures and split-sample experiments have not been tried in LSMS-type surveys, and interviewers will need to be given special training in these methods. However, single-purpose contingent valuation surveys have become increasingly widespread in developing countries during the past 10 years. Thus there is nothing novel about asking respondents in developing countries such hypothetical questions about environmental goods and services.

ly all over the world and should work well with only minor modifications to fit local circumstances.

Questionnaire Modules

Box 14.4 lists the 11 environment modules introduced in this section; all of these modules are presented in Volume 3. Two general implementation issues are also discussed in this section: who should be interviewed and how urban areas should be defined in the context of the environmental modules.

Who Should Be Interviewed?

It is recommended that only one respondent per household answer the questions in the environmental modules. The respondent should be either the head of household or the spouse of the head of household. Particularly for the contingent valuation modules, the interviewer should speak to someone who has the authority over the finances of the entire household.

It is suggested that the interviewer should simply ask to speak to the head of household or the spouse of the head of household—whichever of these two people agrees to be interviewed becoming the selected respondent. (It is not a problem if the head of household and the spouse of the head of household are interviewed together and answer the questions jointly.) In some countries this approach may result in most respondents being male heads of household. However, in practice it is usually relatively easy to obtain a sizable percentage of female respondents. In most surveys that have used this procedure, there has been close to a 50/50 split between male and female respondents. This has allowed analysts to test whether the gender of respondents affects the answers they give in the environmental module.

How Should Urban Areas Be Defined?

This chapter has recommended that the contingent valuation modules for air quality be fielded in urban

Box 14.4 List of Standard Environment Modules

- Module 1 General environmental priorities (urban)
- Module 2 General environmental priorities (rural)
- Module 3 Environmental attitudes and perceptions about urban air quality
- Module 4 Household water use—attitudes and practices (include in housing module)
- Module 5 Household sanitation—attitudes and practices (include in housing module)
- Module 6 Household fuel use—attitudes and practices (include in housing module)
- Module 7 Households' willingness to pay for improved water services (urban)
- Module 8 Households' willingness to pay for improved water services (rural)
- Module 9 Households' willingness to pay for improved sanitation services (urban)
- Module 10 Households' willingness to pay for health outcomes from improved urban air quality
- Module 11 Stated preference module for imputing individuals' rates of time preference for nonmarket goods

rather than rural areas. The definition of “urban” in this context needs to be an operational one—not a definition used only by a country’s statistical bureau. Most (but not all) cities with severe air pollution are larger than the statistical office’s standard definition of an urban area. Survey designers need to be careful to field the contingent valuation module on air quality only in urban areas that have an air pollution problem rather than in all urban areas of a certain standard population size. Even some large cities do not have an air pollution problem, and it would be a waste of resources to field this module in such cities.

In contrast, the urban sanitation modules will be pertinent in smaller urban areas. Special codes may be required on the household identification page of the questionnaire to designate the sorts of urban areas to which the different modules apply. The wording of the first questions in the modules presented here would be changed to match that nomenclature.

Comments on the Contingent Valuation Modules

The most innovative aspect of the proposed modules for the environment are the contingent valuation questions.⁵ These portions of the questionnaire are designed to determine the economic values that households assign to environmental quality or infrastructure changes. Ten years ago only a handful of very rudimentary contingent valuation studies had been conducted in developing countries; at the time, conventional wisdom was that such studies simply could not be done. The problems associated with posing hypothetical questions to low-income, possibly illiterate respondents were assumed to be so overwhelming that it was not even possible to try to pose such questions. However, these days many environmental and resource economists and policy analysts working in developing countries assume that contingent valuation surveys are straightforward and easy to do.

Bilateral donor agencies and the international development banks increasingly use contingent valuation techniques in project and policy appraisals as part of their everyday operations work. The contingent valuation method was initially applied in developing countries primarily in two areas: water supply and sanitation (Whittington and others 1988, 1990, 1993; McConnell and Ducci 1988; Briscoe and others 1990; Altaf and others 1993; Singh and others 1993) and

recreation, tourism, and national parks (Grandstaff and Dixon 1986; Shyamsundar, Kramer, and Sharma 1993; Menkhous 1994; Hadker and others 1995). However, the areas of application are growing rapidly and now include surface water quality (Choe, Whittington, and Lauria 1996), health (Swallow and Woudyalew 1994; Alberini and others 1995; Whittington, Pinheiro, and Cropper 1996), and biodiversity conservation (Moran 1994).⁶

Some contingent valuation analysts believe that it is easier to administer high-quality contingent valuation surveys in many developing countries than it is in industrialized countries. Response rates are typically very high in developing countries, and respondents will often listen to and consider the questions posed to them. Also, interviewers are inexpensive in developing countries relative to their cost in industrialized countries. Thus the costs of a contingent valuation survey administered in a developing country are typically an order of magnitude lower than the costs of a survey with a similar sample size in an industrialized country. This means that larger sample sizes and more elaborate experimental designs can be used in contingent valuation surveys in developing countries.

There are also likely to be less data on the benefits of different kinds of environmental policies in developing countries, which means that the marginal value of data obtained from contingent valuation surveys is likely to be large. Therefore it seems both feasible and desirable to use the contingent valuation method in developing countries to evaluate a wide range of environmental projects. However, this does not mean that conducting contingent valuation surveys in developing countries is easy. There are numerous issues that arise in conducting contingent valuation surveys in developing countries that must be given careful attention to ensure that high-quality data are obtained. It may be worth considering hiring an experienced contingent valuation consultant to help to prepare modules, since implementing the contingent valuation method requires expertise beyond the usual know-how needed to formulate and administer the other modules of the questionnaire.

This section of the chapter discusses some of the issues that have arisen and some of the lessons that have been learned during the past 10 years of administering contingent valuation surveys in developing countries. The discussion covers five basic issues: explaining a contingent valuation study to nonecono-

mists, interpreting respondents' answers to contingent valuation questions, setting referendum prices, constructing joint public-private contingent valuation scenarios; and addressing ethical problems involved in conducting contingent valuation surveys. This list is not meant to be exhaustive, but it will hopefully provide survey designers with insights into some of the issues involved in including contingent valuation modules in an LSMS-type survey.

Explaining a Contingent Valuation Study to Noneconomists

The first difficulty that survey designers may face when fielding a contingent valuation survey in a developing country is to explain the contingent valuation method to government officials and survey interviewers. The concepts of economic value and "maximum willingness to pay" (or minimum compensation that a respondent is willing to accept) are often difficult to transmit to noneconomists. In order to include open-ended willingness-to-pay questions in the survey questionnaire, survey designers need to ensure that the language used captures the notion of the maximum amount an individual is willing to pay.

Unfortunately, this can be particularly difficult to translate. For example, in a contingent valuation survey conducted in Haiti (Whittington and others 1990), a respondent reacted to an early version of an open-ended contingent valuation question by asking one of the interviewers, "What do you mean the maximum I would be willing to pay? You mean when someone has a gun to my head?" In fact the interviewer was trying to determine the maximum amount that the respondent would be willing to pay for the proposed (or hypothetical) good or service in the context of the existing institutional regime within which individuals are free to allocate their personal financial resources. Contingent valuation analysts would like to measure the amount of income that the household could give up after obtaining the goods and services from the project that would leave the household just as well-off as it would have been had the project never been implemented.

One particularly common source of confusion relates to the distinction many noneconomists make between a household's willingness to pay and ability to pay. It is important that interviewers clearly understand that the purpose of a valuation question is to determine what respondents would do if they had to make a real economic commitment. In other words, the objective of a valuation question is to determine how much respondents are both willing and able to pay.

The classification scheme presented in Table 14.3 can be used to clarify this point. As shown, the total population of respondents can be envisaged as four groups. The respondents of cell 1 say they would make a real economic commitment if the consequences of the contingent valuation scenario could be delivered—and have sufficient income to make such a commitment. The respondents of cell 2 are able to pay but not willing to do so—presumably because they prefer to spend their money on other things.

The respondents of cell 3 would like to purchase the commodity but cannot afford to do so. It is this group that typically causes noneconomists the most confusion. The argument is often made that individuals in this third group would like to purchase the proposed good or service if their income was higher but, in their current financial circumstances, they are not able to pay. Noneconomists often want to classify these respondents as "willing to pay," but contingent valuation researchers must emphasize that for the purposes of the study such individuals must be categorized as not willing to pay (in other words, not willing and able).

The respondents defined by cell 4 consist of individuals who cannot pay and say that even if they could pay for the hypothetical good or service, they would not. These people should be classified as not willing to accept the contingent valuation scenario.

The important point to recognize is that demand for a proposed good or service is not likely to be a function solely of income. Increases in households' income may at times have a negligible effect on the households' willingness to pay for a specific good or service.

Table 14.3 Willingness and Ability to Pay

	Respondent is willing to pay for the hypothetical good or service	Respondent is not willing to pay for the hypothetical good or service
Respondent is able to pay for the hypothetical good or service	Willing and able (Cell 1)	Able but not willing (Cell 2)
Respondent is not able to pay for the hypothetical good or service	Willing but not able (Cell 3)	Not able and not willing (Cell 4)

Source: Author's examples.

Interpreting Respondents' Answers to Contingent Valuation Questions

One of the reasons why many economists and analysts have been skeptical about the feasibility of conducting contingent valuation surveys in developing countries is these analysts' presumption that it will be difficult to understand and interpret respondents' answers to abstract (or hypothetical) questions. Such worries are often well founded, and care is needed when drafting these questions.

Analysts had problems in interpreting preliminary responses to the valuation questions in a contingent valuation survey conducted in Semarang, Indonesia (Whittington and others 2000). The contingent valuation survey was designed to determine whether a household would vote in favor of having water and sewer lines installed in its neighborhood if everyone in the community had to pay a specified assessment fee (whether or not they connected to the new lines). In addition, the survey was designed to determine whether the household would choose to connect to such lines if a given monthly tariff were charged.

After the first couple of days of the pretest of the contingent valuation questionnaire, the survey designers discovered that everyone was saying "yes" to every question, regardless of the assessment fee or monthly tariff offered them. So they stopped pretesting and held a meeting with the team of interviewers to try to find out why this was happening. During the course of a lengthy discussion it became clear that respondents were in fact answering "yes, but ...," then giving many different qualifications to their answer. The interviewers informed the survey designers that, in Indonesia, these were all polite ways of saying "no." The designers then developed a coded list of the many

ways in which a respondent might answer the valuation questions by saying "yes, but ..." but essentially meaning "no."

Table 14.4 presents this list of different ways to say "no" and the number of times respondents gave each "yes, but" answer to the valuation question about whether the respondent's household would want to be connected to the new water and sewer lines if a specified monthly tariff were charged. For example, of the 164 answers that were recorded as "no," 52 respondents (32 percent) answered "Yes, but I cannot afford it." Another 18 percent said, "I agree, but the costs are too high." These "yes, but" responses—50 percent of the total number of "no's"—seem clearly negative and correctly classified as "no."

However, another 30 percent of the respondents said, "I need to know others' opinions about the program before I decide." The interviewers assured the survey designers that this was again simply a polite way of saying "no," but the designers thought that this answer seemed reasonable. The respondents might simply have needed time to think about their decision, and discussing the matter with their neighbors would have been a reasonable way to analyze the pros and cons of the proposed project (Whittington and others 1992). Thus it was less clear that this response should be assigned to the "no" category than it was in the case of the previous two types of answers.⁷ Other answers listed in Table 14.4 also seemed ambiguous and uncertain. Therefore, the designers came to believe that the proportion of respondents they had placed in the "no" category for this valuation question was probably too high. Although they had followed their interviewers' guidance in coding the answers, they subsequently came to believe that their analytical results probably

Table 14.4 Description and Frequency of Different "No" Responses, Semarang, Indonesia

Description of response	Number of times recorded	Percentage of responses
I cannot afford it	52	32
I need to know others' opinions about the program	49	30
I agree, but the costs are too high	30	18
Yes, if the costs are reduced	11	7
I have many expenses, children... (and so on)	8	5
I agree, but the current situation is satisfactory	6	4
I agree, but I do not want to pay in advance	4	2
Yes, if the payment period is extended	2	1
Yes, if participation is mandatory	1	< 1
I can pay, but I want to avoid rumors about my wealth	1	< 1
<i>Total number of verbatim responses</i>	<i>164</i>	<i>100</i>

Source: Whittington and others 2000.

underestimated the number of households that would have agreed to be connected to the water and sewer lines.

This example illustrates how careful analysts must be in interpreting respondents' answers to valuation questions in a cross-cultural context and how important it is to pretest a contingent valuation questionnaire.

Setting Referendum Prices

One commonly used way of asking valuation questions in a contingent valuation survey is the referendum elicitation procedure. In this method the questions are often couched in terms of voting, as in a referendum; for example: "If the improvement in air quality that I have described were to cost your household \$50 in higher taxes, would you vote for it?" To use this procedure the survey sample is randomly split into several different subgroups. The interviewers present the respondents in each subgroup with a different hypothetical price for the good or service in question. Thus a person in one subgroup may be told that the price of a service would be \$50, while a person in another subgroup is told that the price would be \$100. Analysts use the responses to construct values for the whole sample.

Many contingent valuation researchers feel that the referendum approach is the best way to ask a respondent for information about his or her willingness to pay because this approach presents the respondent with a realistic, easy-to-answer question. Moreover, it is not obvious how a respondent would answer a referendum question if he or she wanted to give a biased answer in order to influence the results of the study (or advance personal goals). For example, if the maximum a respondent would pay for an environmental quality improvement were \$10 per year and the referendum question asked the respondent if he or she would vote for a plan that would cost households like his or hers \$5 per year, the respondent would not have any obvious incentive to give an untruthful answer. If the respondent indicated an unwillingness to vote for the plan, the plan's chances of being implemented might be reduced. It is in this sense that some contingent valuation researchers term the referendum approach "incentive-compatible." A respondent might hope to have the plan implemented and not have to pay even the \$5 per year, but it is not obvious why answering "no" to a referendum question that posed a price of \$5 per year would increase the chances of this

happening. Although the merits of referendum-type questions are still being debated,⁸ most contingent valuation practitioners favor using only one or two such questions in order to reduce the possibility of eliciting biased responses.

This split-sample technique is routinely used in U.S. surveys. While professional interviewers in the United States are familiar with the use of this technique, this is not the case in many developing countries, and the interviewers in such countries will want to understand the reason for the split-sample experiment.

In the past when referendum-type elicitation procedures have been used in contingent valuation surveys in developing countries, the designers of these surveys have often made the mistake of specifying too narrow a range of prices. They have tended to set the highest referendum price too low and the lowest price too high, making it difficult for analysts to estimate "good" valuation functions. This tendency to use too narrow a price range is understandable because extremely high and extremely low prices often lack credibility. If the amount that an interviewer mentions to the respondent lacks credibility, the respondent is unlikely to answer the question on the basis of the price asked.

In order to increase the credibility of the contingent valuation results, it is generally advisable that the highest price used be rejected by 90 to 95 percent of the respondents. If the frequency distribution of respondents' values is known, using such a high price is not efficient (Alberini 1995a, 1995b; Kanninen 1995), but in developing countries it is useful to show that setting prices high enough will cut off demand for the good or service. Nevertheless, survey designers tend to be reluctant to set the highest referendum price at a high enough level to do this, partly because it is embarrassing for interviewers to have to mention such an unrealistically high price to respondents. Respondents often take the contingent valuation scenario very seriously, and if the interviewer implies that the hypothetical good or service will cost the highest referendum price, they may be acutely disappointed that the good or service would be so expensive.

This problem is exacerbated in countries with a highly unequal income distribution. Interviewers often complain that asking about such a high price is silly because everyone knows that the sample households cannot afford to pay such a high price, which makes the interviewers look insensitive or uninformed. Thus in some situations a very high price may

not be plausible to respondents and may thus cause them to doubt the credibility of the entire scenario. This problem is compounded if there is a tendency of respondents to say “yes” to whatever question the interviewer asks (“compliance bias”). However, in these circumstances it is even more vital to prove that demand will be cut off if a sufficiently high price is charged.

Survey designers often set the lowest price too high because the agency funding the survey often wants to use the results to help it set the prices it will charge and may not be interested in learning about the extent of demand for the good or service at prices lower than those it intends to charge. Thus, for the funding agency, asking part of the sample about a very low price may seem like a waste of resources.⁹

In addition, like prices set too high, prices set very low can make interviewers seem uninformed and undermine the credibility of the contingent valuation scenario. One implication of this is that the survey needs to include questions that aim to find out why respondents would reject a very low price. Another implication is that survey designers should explicitly recognize that many projects have negative effects on some people; thus designers should expect some respondents to be unwilling to pay for the services that a project will (hypothetically) provide. Some goods or services described in contingent valuation scenarios may have little or no value to some respondents. An improved water supply system will threaten the business of water vendors; such respondents will never accept the contingent valuation scenario, no matter how low a price is hypothetically charged for the service.

Constructing Joint Public-Private Contingent Valuation Scenarios

Many of the contingent valuation surveys conducted in developing countries have been concerned with estimating the demand for infrastructure services. In one important respect, the contingent valuation scenarios required for such surveys are considerably more complex than those used in contingent valuation surveys about environmental quality improvements in industrialized countries. In order to understand household demand for infrastructure services such as improved sewers or piped water supply, it is often necessary to model two household decisions jointly.

First, a household must decide whether to support the collective decision of a community regarding

whether or not its members are willing to share some of the capital costs of a project. For example, consider an investment in sewer lines. If it could be assumed that all households in a particular neighborhood would connect or could be forced to connect to new sewer lines if they were installed, it would not be necessary to elicit a collective decision on whether the lines should be installed. However, if this could not be assumed, a fiscally responsible sewer authority could not bear the financial risk of installing such expensive infrastructure without some form of payment guarantee. This means that the authority would need some assurance that, if the sewer pipe were laid in a neighborhood, households would pay a predetermined amount for this infrastructure improvement, whether or not they agreed to be connected. From the agency's financial perspective, each household in the neighborhood would be required to pay a share of the sewer network installation costs (whether or not the household obtained a connection) because the value of its property would increase simply by having the option to connect in the future.

Second, a household must decide whether it will connect to such infrastructure if it is installed. Because many infrastructure projects have positive externalities and public good characteristics, it is plausible that a household would vote in favor of a project and agree to pay some share of the capital costs even if it decided not to use the service immediately. Because these two decisions are conceptually interrelated, the contingent valuation scenario needs to inform the respondent about the terms and conditions of both public and private components of the deal to enable the respondent to make an informed choice. In practice this means that a lot of information may need to be conveyed to respondents—typically necessitating the use of photographs and drawings.

Also, respondents are likely to have numerous questions about the proposals. Thus it is vital to use highly trained, well-informed interviewers who can easily respond to questions from respondents. It is also generally inadvisable to allow interviewers to deviate from the script of the questionnaire in an ad hoc manner. The interviewers should be instructed to give the information provided in the questionnaire script in a different form if the respondent does not initially understand it. In some cases survey designers may need to develop contingencies that help interviewers deal with particular inquiries that are rarely raised by respondents.

Ethical Problems in Conducting Contingent Valuation Surveys

Two ethical issues arise in the implementation of the contingent valuation method; neither of these issues has received the attention it deserves. The first issue concerns the use of a referendum elicitation procedure. Because this method entails giving different subgroups of respondents in the survey sample different prices for the same hypothetical good or service, it may sometimes cause confusion and spread misinformation about the real costs of addressing a problem that may be of great public concern.

For example, a referendum question was used in two recent contingent valuation studies conducted for the World Bank (Pinheiro and Whittington 1995; Whittington and others 2000). In a contingent valuation survey conducted in November 1994 that was designed to estimate households' demand for improved water services in a small town in Mozambique, five different prices were randomly assigned to different subgroups of respondents. In June 1995 the study team returned to the town where the survey was conducted to brief a group of local government officials and community leaders on the results of the contingent valuation survey. During the ensuing group discussion, one neighborhood leader said that he had talked to many respondents after their interviews and that he did not understand why different households were asked to pay different prices. He said that it did not seem fair or necessary to charge one household more than another for a water connection. The mistaken impression that different households in the community would be charged different prices for a water connection seems to have been one outcome of the contingent valuation survey. Thus the use of a referendum approach with different prices may have increased public uncertainty and confusion about the costs of improved water services in this small Mozambique town.

In July 1995 a contingent valuation survey of a few hundred households was conducted for the World Bank in three areas of Semarang, a city of 1.2 million people on the north coast of Java, Indonesia. The survey was administered in three districts of the city. The leader of each neighborhood unit had to be informed about the survey by higher-level community leaders before the survey could take place. After the leaders' permission was secured, a team of interviewers and a field supervisor was sent into the neighborhoods to interview all of the sample households in a relatively

short time (generally two to three hours). In this way respondents would supposedly have little time to discuss their interviews with one another before they had all been conducted. However, in one community the neighborhood leader dropped in on an early interview unannounced and heard the referendum price offered the respondent. This price happened to be the highest of the four prices used, and the neighborhood leader became concerned. He quickly spread word throughout the neighborhood to answer "no" to the valuation question because he felt that the improved water and sanitation program offered in the contingent valuation scenario was simply too expensive.

Obviously, this problem arose partly because the field supervisor and the interviewer were unable to exclude the neighborhood leader from a supposedly private interview (although, in fairness to them both, this is not a easy thing to do in Indonesia). However, it also illustrates how quickly information can spread in a close-knit urban community, how seriously some community members may take the information presented to them in a contingent valuation scenario, and how easily a community can be confused by the use of different prices and by other aspects of split-sample experiments.

Contingent valuation experts may argue that any such misinformation is the fault of the survey designer, who is supposed to craft language that informs respondents that the choice is "just" hypothetical. Respondents are usually told to "suppose" or "imagine" the choice described, and that the choice is not actually or necessarily going to be offered. This nuance is often lost in translation; in some cases the conditional subjunctive may not even be translatable. The interviewers' disclaimer may also be false in the sense that a project is actually being considered and is thus not hypothetical at all.

A good contingent valuation scenario is designed to be realistic and taken seriously by respondents. In practice, the more seriously respondents take the choice put to them, the less hypothetical the scenario is likely to seem to them. This is particularly true for goods and services with large use values that are commonly provided by the government, such as water supply services. The less hypothetical the provision of the good or service described in the contingent valuation scenario, the more likely the different referendum prices will confuse serious public discussion of the issue at hand.

Contingent valuation researchers generally assume that they will sample large populations and thus that there will be little chance that one respondent will talk with another, so any misinformation communicated to a relatively small number of respondents about a hypothetical good or service will not be widely discussed and will not influence public debate. However, in small towns, villages, or urban neighborhoods in developing countries, this assumption is often unwarranted. Even in large capital cities, a sample of 1,000 to 2,000 households is not too small to avoid the discussion of the contingent valuation survey by many people, including some who may be knowledgeable about the problem addressed in the survey or who will be influential in deciding how it should be solved.

The issue of spread of misinformation arises not only with the prices used in the referendum elicitation method but also many with other features of split-sample experiments, including the scenarios used. A contingent valuation survey in support of the State of Alaska's case against Exxon in the Exxon-Valdez oil spill is one of the finest, most professional contingent valuation surveys conducted to date (Carson and others 1992). In this survey a contingent valuation scenario was crafted that described an oil spill prevention program with two main components: the requirement that oil tankers be accompanied by escort ships while in the Valdez Straits (to reduce the chances that the tankers inadvertently drifted onto nearby rocks) and the use of an oil spill containment technology called a "Norwegian sea fence" that could be used in the high seas of Prince William Sound. Respondents in the survey were asked whether they would vote for or against a rapid response oil spill containment force in Prince William Sound that would deploy these escort ships and the Norwegian sea fence if the implementation of the plan would cost their household a specified amount of money. Although the "Norwegian sea fence" technology did exist, it was not as large or effective as was indicated by the contingent valuation scenario. The survey interviewers told respondents that the Norwegian sea fence was more effective than it actually was so that the respondents would not reject the scenario as implausible.

A second ethical issue concerns how honest one should be about the institutional regime contemplated for delivering the "hypothetical" goods or services. In developing countries, the contingent valuation

scenarios used in such surveys may not be strictly hypothetical. If the donors and governments that fund the contingent valuation surveys judge the results to be credible, the findings will likely be used in policy decisions. This movement from hypothetical to "real" contingent valuation scenarios raises a host of ethical concerns.

From a theoretical perspective, it is not possible to value a project independent of how it is to be paid for or independent of the institutional regime assumed to be in place when the project is implemented. As long as people have preferences with regard to various aspects of how a project is carried out, such preferences need to be taken into account. The fact that valuation estimates are context-specific has nothing to do with the contingent valuation method itself, although the contingent valuation method does give survey designers substantial control over what assumptions they can make about the institutional arrangements for the delivery of the hypothetical good or service. Revealed preference valuation approaches generally accept the prevailing economic, political, and institutional context within which the data were generated.

Notes

The author would like to acknowledge Maureen Cropper at the University of Maryland for her significant contributions to this chapter.

1. Of course, not all environmental problems are caused by poorly defined property rights. Many analysts have found government failure itself to be a pervasive force causing environmental degradation.

2. "Improved" water sources are the result of modifications to the natural source to increase the quality or quantity of water. They do not, however guarantee that the water is clean. Piped water, for example, is always considered an improved source, but the water that pipes carry may need additional treatment before it is safe to drink.

3. The contingent valuation method is a survey technique that attempts to elicit information about individuals' or households' preferences for a good or service. Respondents in a survey are asked a question (or series of questions) about how much they value a good or service. The technique is termed "contingent" because the good or service is not necessarily going to be provided by the interviewer or analyst. Thus, the provision of the good or service is hypothetical.

The contingent valuation method can be used to obtain values of pure public goods, goods with both private and public characteristics, and private goods. It is often used to assess households' preferences for goods or services for which a conventional market

does not exist. For a brief introduction to the contingent valuation method see Pearce and others (1994), chapter 7. For more in-depth presentations see Mitchell and Carson (1989) and Cummings, Brookshire, and Shultze (1986).

4. LSMS surveys typically provide a rich set of possibilities for covariates, and in practice only a few such covariates are usually needed for the analysis of the contingent valuation data. The specific variables used to explain a respondent's answers to contingent valuation questions depend on the theoretical demand model employed. Most models would use the following minimum set of explanatory variables: household income, household assets, and respondent's education, gender, and occupation (and perhaps religion).

5. The material in this section is drawn from Whittington 1998.

6. See Georgiou and others (1997) for additional references and an annotated bibliography.

7. Assigning "I need to know other people's opinions" answers to the "no" category is consistent with the recommendations of the report of the U.S. National Oceanic and Atmospheric Administration's Expert Panel on the Contingent Valuation Method (Arrow and others 1993). This assignment practice is followed in many large contingent valuation surveys conducted in the United States. For further discussion and a theoretical treatment of ambiguous or "don't know" responses in contingent valuation studies, see Wang (1997).

8. The principal alternatives in contingent valuation surveys would be to ask a single open-ended question—"How much would you be willing to pay?"—or to ask a series of questions that honed in on a particular answer. For example, a respondent would be asked, "Would you be willing to pay \$500?" If he said no, he would be asked: "Would you be willing to pay \$100?" If he said no again, a price of \$50 might be mentioned. If the respondent said yes to \$100, he would be asked if he would pay \$300. The questions would be asked three or four times until the price the respondent would pay was bracketed by a higher price that he would not pay and a lower price that he would pay.

9. A contingent valuation expert is generally engaged by a client organization to estimate both the benefits of a project and how these benefits would change if different prices were charged. At the time that a contingent valuation survey is undertaken, the researcher typically does not know the actual cost of the project, either because the cost analysis is being done simultaneously or because several different kinds of project or levels of service are being considered. Thus the results of the contingent valuation survey may be used to inform the design process.

If the client organization has already decided which specific project will be implemented, it may also have decided in general terms what it will charge. In this case the client may use the results of the contingent valuation survey to get an accurate prediction of revenues. Using low referendum prices to gain accurate estimates of

the benefits received by households may serve little purpose from the client's perspective and may even be deemed wasteful.

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15

Fertility

Indu Bhushan and Raylynn Oliver

Data from Living Standards Measurement Study (LSMS) surveys have been used extensively to study the determinants of fertility, contraceptive use, and child mortality and to inform policy on these issues. Data on fertility and related topics are often also useful for analyzing labor market and schooling decisions.

Among past LSMS surveys there is considerable variety in the methods used for collecting fertility data and in the criteria used for selecting respondents. Most LSMS surveys have included a fertility module to collect information on fertility, child mortality, contraceptive use, and reproductive health.¹ In the LSMS surveys that did not contain a fertility module, the designers often included a few questions on these issues in the health module. Thus the fertility data collected in LSMS-type surveys can vary from just a few questions—usually about the number of children ever born to the respondent—to detailed information on the respondent’s experience of maternity, child mortality, marriage, contraceptive use, and use of reproductive health services. This chapter presents short and standard fertility modules based on the cumulative experience of using data from LSMS surveys and Demographic and Health Surveys to analyze fertility and child mortality.

The chapter provides an overview of fertility and child mortality issues and makes recommendations about how to collect the necessary data in an LSMS or similar multi-topic survey. The first section discusses the key policy issues related to fertility and child mortality outcomes. The second identifies the data needed

for empirical analysis of these issues. The third section presents short and standard draft fertility modules, and the fourth section contains annotations to those modules and guidance to survey designers on how to customize modules to the circumstances in the country where their survey is to be fielded.

Policy Issues

Public policy can influence fertility and child mortality outcomes by affecting prices, resource constraints, and even individuals’ preferences. Some factors that influence fertility and child mortality—the availability of health services, and health conditions in the community—are beyond the control of the household. However, most fertility and child mortality outcomes are determined by individuals reacting to opportunities and to changes in their environment by delaying marriage, using contraception, and spacing births.

Data from an LSMS-type survey can yield national estimates on levels, trends, and distribution of fertility and child mortality outcomes. Analyses of the data can provide policymakers with key information on the determinants of fertility and child mortality and enable comparisons of various policy options. In particular, the

data can be analyzed to quantify relationships between policy variables and important fertility, child mortality, and contraceptive use outcomes. In conjunction with information on the costs of various policy alternatives, these quantified relationships can be used to identify policies that will most effectively achieve desired outcomes. Also, data gathered in the fertility module can be used as control or explanatory variables in the analysis of other aspects of household behavior, such as labor force participation (Behrman and Wolfe 1984) or human capital investments (Pitt and Rosenzweig 1990).

Information about the levels, trends, and distribution of fertility and mortality variables across socioeconomic, geographic, and ethnic groups can be used to quantify demographic outcomes and thus set policy priorities. (See Box 15.1 for a list of important fertility and child mortality variables.) For example, while child mortality may not be high in a given country as a whole, it may be a problem that needs to be addressed among certain socioeconomic groups or in certain geographical areas.

There can be substantial differences in the importance of the many issues involving fertility and child mortality variables across regions of the world (Table 15.1). In many Sub-Saharan African countries high fertility and child mortality rates are a major concern. In many countries in East Asia a preference for sons is an important issue. And different countries within a region may have different policy priorities.

Box 15.1 Fertility and Child Mortality Variables

The following fertility and child mortality variables are important to policymakers and can be collected in LSMS-type surveys:

- Family size.
- Total fertility rate.
- Birth rate.
- Contraceptive use.
- Unmet need for contraception.
- Age at first marriage.
- Age at first childbirth.
- Abortion rate.
- Use of prenatal care.
- Breastfeeding practice.
- Spacing of births.
- Infant mortality rates (deaths before one year of age).
- Child mortality rates (deaths before five years of age).

Policy Issues Concerning Fertility

Policymakers need to address two different types of problems related to fertility. The first problem is that women may not bear the number of children they want. A woman may bear more children than she wants if she lacks basic reproductive knowledge, if she has no access to modern contraceptives, or if her status within the household is too weak for her to assert her will. A woman may bear less children than she wants due to restrictive population policies or infertility.

The second problem is that even if a woman has the number of children that she desires, that number may be too large (or too small) from the point of view of society as a whole. This may happen if there are externalities from childbearing decisions such that other members of society bear costs (or reap benefits) when women bear children.²

In many countries throughout the world high population growth is a significant concern. Therefore, in recent years most discussion and research has focused on devising effective policies to remove the barriers that prevent a woman from having fewer children and to create incentives for women to reduce their fertility. For example, policies that encourage the schooling of girls and increase income-earning opportunities for women increase the cost of a woman's time—possibly leading to reduced fertility. The impact of schooling levels and employment opportunities on women's fertility depends on the prevailing economic and social conditions in a country (Cochrane 1979; Ainsworth 1989; Ainsworth, Beegle, and Nyamete 1995; Pitt 1995).

In many countries with high fertility rates policymakers are especially interested in the impact of contraceptive use. High levels of *unmet need for contraception* in a country may suggest that family planning services should become more client-oriented (Bongaarts and Bruce 1995; Robey and others 1996). If contraceptives are expensive, of poor quality, or unavailable, introducing policies that affect the price, availability, and quality of modern contraceptive methods can remove an important obstacle to reducing fertility rates (Feyistan and Ainsworth 1994; Thomas and Maluccio 1995; Oliver 1995; Beegle 1995).

Another aspect of fertility that often interests policymakers is the interaction between the household's decisions about family size and its other decisions, including those about human capital investments such as expenditures on children's health and schooling. Such interactions are the subject of studies by Pitt and

Table 15.1 Variations in Demographic Outcomes by Region, 1995

Region	Population (millions)	Total fertility rate (per woman)	Infant mortality rate (1,000 births)	Life expectancy at birth (years)	Child mortality rate (1,000 births)	Areas of potential policy concern
Sub-Saharan Africa	583.3	5.7	92	52	157	<ul style="list-style-type: none"> • High fertility • Large unmet need for contraception (spacing) • High-risk births • Reproductive health (adolescents) • High child/infant mortality • High adult mortality due to AIDS
East Asia and the Pacific	1,706.4	2.2	40	68	53	<ul style="list-style-type: none"> • Aging population (old age security) • Strong preference for sons
South Asia	1,243.0	3.5	75	61	106	<ul style="list-style-type: none"> • High fertility • Large unmet need for contraception • High-risk births • High child/infant mortality • Strong preference for sons
Europe and Central Asia	487.6	2.0	26	68	35	<ul style="list-style-type: none"> • High abortion rate • Low contraceptive use
Middle East and North Africa	272.4	4.2	54	66	72	<ul style="list-style-type: none"> • High fertility • Large unmet need for contraception • High-risk births • High child/infant mortality
Latin America and the Caribbean	477.9	2.8	37	69	47	<ul style="list-style-type: none"> • Inequalities in access to family planning and health care

Source: World Bank 1984, 1993, 1997a and 1997b.

Rosenzweig (1990), Montgomery, Kouame, and Oliver (1994), and Benefo and Schultz (1994).

One fertility issue that has been difficult to influence through public policy is the preference of some parents (mostly in parts of Asia, the Middle East, and North Africa) for male children. A distorted gender ratio is emerging in many East Asian countries, probably due to strong parental preference for sons and a decrease in family size. Technologies that can identify the sex of the fetus and the consequent wide prevalence of sex-selective abortions have contributed greatly to this trend (Park and Cho 1995). The implications of this distortion in the gender ratio are only beginning to be understood.

Policy Issues Concerning Mortality

Since 1960 *infant* and *child mortality rates* have decreased steadily in developing countries sometimes even in the absence of improvements in nutrition, housing, and income. Much of this decrease is attributed to better medicines (particularly antibiotics), public health interventions such as immunization, diarrhea control programs, and safe motherhood initiatives (World Bank 1993). However, levels of infant and child mortality are still high in many countries, and most developing countries have high infant and child mortality rates in specific population groups.

Reducing infant and child mortality is an objective of virtually every developing country government. The policy options for achieving such a reduction include implementing appropriate medical and public health interventions, improving water and sanitation services, and disseminating accurate information both within and outside the education system. Research on the determinants of infant and child mortality at the household level can reveal other policy interventions that would reduce infant and child mortality, such as mother's schooling (Benefo and Schultz 1994).

Policy Issues' Implications for LSMS Surveys

The multisectoral nature of LSMS surveys makes them suitable for modeling the determinants of fertility and child mortality and related behavior. (The fertility and mortality issues that can be analyzed using data from LSMS surveys are summarized in Box 15.2.) Many other demographic issues, such as the abortion rate, female genital mutilation, and child fostering, are also important areas for policy research in certain countries. Questions to cover these issues are not included in the draft questionnaire module presented here, but the addition of some specific questions would enable an LSMS survey to collect the data necessary to analyze these issues. However, including such questions in

countries where they are not appropriate or relevant could upset respondents and unnecessarily lengthen the interview.

Some limitations of LSMS data are described in Box 15.3. The relatively small sample size of LSMS surveys (2,000–5,000 households) makes it difficult to collect enough data for analysts to explore issues that are not common throughout the population. Disaggregating demographic rates by region or socioeconomic status and measuring rare events such as maternal mortality require samples much larger than those typically used in LSMS surveys. Another limitation of LSMS data is that they usually do not contain enough variation in macroeconomic and policy variables to analyze how those variables affect fertility.

During the planning stage, designers should consider other existing data sources. A recent national census or demographic and health survey can often provide very precise national (and sometimes regional) estimates of fertility outcomes. Existing data on health and family planning facilities may make the collection of such data unnecessary.

Even in countries where a Demographic and Health Survey has been carried out, it is usually still appropriate to include a fertility module in an LSMS survey. While demographic and health surveys yield data on levels and trends for important demographic indicators, they do not provide enough information on

household characteristics and behavior to enable analysts to study the underlying causes of these levels and trends and how policy can influence these outcomes. Also, few Demographic and Health Surveys collect data on community-level variables and services, though the inclusion of community questionnaires in these surveys is under consideration. In contrast, LSMS-type surveys collect data on a much broader set of explanatory variables at the household level, including land holdings, productive assets, mother's height, and parents' schooling. They also collect community-level exogenous variables that are influenced by policy, such as the availability, quality, and price of public services.

Thus LSMS survey data are suitable for analyzing the determinants of demographic outcomes and for informing policies. Analyzing demographic outcomes using LSMS data can provide insights into household behavior that will help policymakers decide on appropriate policy interventions.

Data Requirements for Policy Analysis

Analyzing the relationship between policy variables and demographic outcomes is complicated by the fact that those outcomes are not directly chosen by individuals. People make decisions about contraceptive use and immunization that affect the probability of a birth or a death, but the actual number of births and deaths

Box 15.2 Fertility and Child Mortality Issues That Can Be Analyzed Using LSMS Data

Determinants of fertility and contraceptive use: specifically, the roles played by

- Schooling.
- Income.
- Price, availability, and quality of contraceptives.
- Labor market conditions.
- Information, education, and communication programs.
- Other socioeconomic factors.

Determinants of age at first childbirth and age at marriage.

Quality-quantity tradeoff in demand for children

- Interaction between child health or mortality and family size or birth interval.
- Interaction between child schooling and family size or birth interval.

Efficient targeting of government programs through identification of underserved areas and groups.

Effectiveness of various components of programs—such as outreach services—relative to clinic-based services.

Impact of cost recovery on the use of family planning and reproductive health services.

Determinants of infant and child mortality: specifically, the roles played by

- Parents' schooling.
- Income.
- Other socioeconomic variables.
- Public health interventions.
- Water and sanitation programs.

Existence of gender gaps in infant and child mortality.

Prevalence of breastfeeding.

Other issues: abortion, female genital mutilation, child fostering.

Box 15.3 Issues That Are Difficult to Analyze with LSMS-Type Data

- *The impact of macroeconomic policy changes on demographic behavior.* With LSMS data it is difficult to achieve enough variation in the macroeconomic variables for a given sample to measure macroeconomic policy impacts.
- *Levels of and trends in demographic variables for small geographical or socioeconomic categories of the population.* LSMS samples are too small to measure these levels and trends. National census or demographic and health survey data may be more appropriate sources for this information.
- *The impact of regulatory and legal reforms on demographic behavior.* With LSMS data it is difficult to achieve enough variation in the variables representing legal and regulatory reforms across a sample.
- *The causes and dynamics of parents' preferences for sons.* More qualitative and anthropological research is required to analyze this issue.
- *How living arrangements may have changed due to declining fertility, changing inheritance patterns, and migration to urban areas.* Analyzing these issues would require time-series data over a long period of time.

is also influenced by chance and other factors beyond the control of individuals or households. Infertility is one example; high prevalence of childhood diseases in the community is another.

Analysts can inform public policy by attempting to provide data that answer the following three questions (DaVanzo and Gertler 1990):

- How do specific behavioral choices affect fertility and mortality outcomes?
- What determines these behavioral choices?
- How can these choices be influenced by policy?

To design effective policies it is important to know the answer to each of these questions. For example, to address child mortality policymakers must first understand how the use of a particular medical technology—say, child immunization—affects child mortality. Then they need to know what makes individuals decide to take advantage of related interventions. For example, if knowledge about the availability of immunization services is found to be significantly related to use of these services, then a publicity campaign may be more effective than an expansion of service in increasing immunization rates.

Epidemiological research can throw light on the first question, the relationship between a behavioral choice (such as an immunization) and a demographic outcome (such as child mortality). However, appropriate economic models and econometric methods are needed to help policymakers understand the determinants of behavioral choices and the policies that may affect those choices. Unfortunately, in practice, research is beset with conceptual and data-related problems. Some of these problems can be avoided by linking policy variables directly to demographic outcomes. While this relationship, known as a reduced-form relationship, does not show exact causal mechanisms, it can indicate the net effect of a given policy.

To analyze household behavior and outcomes, economists use behavioral models that assume that households make rational decisions. (See Chapter 26 on econometrics for a detailed explanation of this economic model and reduced form relationships.) Most economic models of fertility and mortality are based on a model in which households are both producers and consumers, following the seminal work of Becker (1960). In this framework children and health are “produced” by the household using the time of its members and other inputs such as purchased food and health services. Households are assumed to allocate their limited time and economic resources to maximize their welfare or utility. The household derives utility from children and health just as it does from other goods or services. For a given set of preferences (in other words, a utility function), prices, and income, household production theory explains how households decide the number of children they want, the level of health status they want to maintain, and the basket of inputs they will use to achieve these goals. The household’s demand for children, health, and inputs would change if changes occurred in market prices or in household preferences, income, or other household variables. This model guides the analyst in selecting the variables required for analysis.

Data Needs for Fertility Analysis

Public policy can be informed by the answers to the three questions shown above. In theory it should be possible to answer each question separately using household survey data. In practice most research involves estimating reduced-form relationships for which the fertility variable of interest is determined by a set of explanatory variables. This approach raises the following questions:

- What fertility variables are of interest to policy-makers in the country being studied?
- Which explanatory variables should be included in the estimation of the reduced form relationship?

This section proposes a set of variables that should be collected as part of the fertility module of LSMS and similar multi-topic surveys. The variables are summarized in Box 15.4.

FERTILITY VARIABLES OF INTEREST. The central phenomenon of interest in fertility research is fertility itself. Fertility can be measured in two ways: cumulative fertility and recent fertility. The most frequently used variable for cumulative fertility is the number of children ever born.³ Although cumulative fertility can be an appropriate dependent variable for some analytical purposes, there are two problems with this measure. First, cumulative fertility is influenced by socio-economic factors through all of the respondent's reproductive years prior to the survey, and data on many explanatory variables (such as household income, community wage rates, and the availability of health and contraceptive services) may not be available for

previous years. Second, cumulative fertility may be less sensitive to policy changes than recent fertility. Therefore, measures of recent fertility, such as the number of children born in the previous five years, whether the respondent is currently pregnant, or whether she has given birth in the previous year, are often more useful for policy analysis. However, collecting complete birth histories from respondents increases the accuracy and completeness of the data and increases the analytical possibilities of the resulting data set.⁴ Moreover, a few questions are usually enough to find out the number of children ever born to a respondent.

Many women use modern contraceptive methods to control their fertility. Because the most frequently analyzed proximate (direct) determinant of fertility is *contraceptive use*, this variable is of great interest to policymakers. The use of contraceptive methods is under the control of a woman (or another household member such as the woman's husband) and is, therefore, an endogenous variable. Several measures of contraceptive use can be investigated, including whether the woman has ever used contraception, whether she is currently using contraception, and whether she has

Box 15.4 Important Variables for Fertility Analysis

Fertility outcomes

Cumulative fertility

- Children ever born

Recent fertility

- Children born in the past five years
- Current pregnancy
- Birth in the past year

Other fertility-related endogenous variables

Contraceptive use

- Current use (method-specific)
- All current and previous use (method-specific)

Age at first marriage

Age at first childbirth

Number of abortions

Breastfeeding practice

- Duration of breastfeeding for last birth
- Current breastfeeding status

Length of postpartum abstinence

Current pregnancy status

Fertility preferences

Desire to have additional children

Desired fertility (ideal)

Unmet need for contraception

Explanatory individual and household characteristics

Mother's schooling

Mother's age

Household income and other household resources

Ethnicity and religion

Schooling of other household members

Explanatory community characteristics

Region and degree of urbanization

Prices

- Local wage rates (for adults and children)
- Food and non-food prices
- Formal and informal interest rates

Information, public education, communications

- Availability of TV, radio, and newspapers
- Use of media for family planning messages
- Family planning informational campaigns

Health services

- Price, availability, quality

Family planning services

- Price, availability, quality

Schools

- Price, availability, quality

used contraception within the past 12 months. Also, depending on the policy options being analyzed, it may be desirable to estimate the use of a specific method, the use of each method separately, or the use of modern methods relative to traditional methods or no method at all.

Which variable is the dependent variable depends on the objective of the analysis. For example, if the aim is to examine how the availability of family planning facilities affects contraceptive use, current use may be the most appropriate dependent variable because accounting for all current and previous use might include contraception used before the facility in question existed. In countries where a variety of methods are available and rates of usage are rather high, use of individual methods may be analyzed. On the other hand, use of any modern method could be estimated to examine contraception use in countries with low utilization rates. It may be of interest to measure households' "knowledge of" various methods if publicity campaigns have been part of recent public policy.

Again, contraceptive use data can be gathered in a few questions or in a complete set of questions on individual methods. Gathering more data requires more interview time but also provides analysts with more options for research. Contraceptive prevalence and the most important policy issues in the country will determine the level of detail of data needed.

In countries facing an AIDS epidemic, it may be worthwhile to expand the questionnaire to gather data on men's and women's sexual behavior—including number of sexual partners—as well as adult mortality. This would be a substantial expansion of the questionnaire and is not, therefore, discussed further here. For more information see Ainsworth (1992), Dehenesse, Caraël, and Noumbissi (1996), Cleland and Ferry (1995), and Filmer (1997). See also the discussion of the health module introduced in Chapter 8.

Other variables related to fertility analysis are age at first marriage, current breastfeeding practice (or the length of time for which the last child was breastfed), and number of abortions. Demographers identify these variables as proximate determinants of fertility. While it is tempting for many analysts to use these variables directly to explain fertility, they are clearly the result of household decisions. Analysts may wish to estimate their determinants in order to explain various aspects of fertility that may of themselves be of interest to policy-

makers, but these variables should not be considered exogenous explanatory variables in regression analysis.

FERTILITY PREFERENCES. Many economic models of fertility propose that parents' desired fertility—how many children they would like to have—is an important determinant of fertility. It is useful to collect data on a household's desired fertility so that analysts can forecast medium-term changes in fertility and measure the prevalence of unwanted births. Recently, fertility preference data have most often been used to analyze the much-debated question of how family planning programs affect fertility, focusing on the magnitude of unwanted fertility and the unmet need for family planning (Pritchett 1994). However, whether and how desired fertility can be measured accurately are contentious issues. Early attempts to measure fertility preferences used questions about ideal family size, such as: "If you could start over again, how many children would you like to have? How many sons and how many daughters?" Such questions have a number of theoretical and empirical shortcomings. The responses may be ambiguous, as respondents may be reluctant to name an ideal family size smaller than the size of their existing family. Furthermore, the risk of child mortality is not made explicit in these questions; presumably respondents did not factor children's deaths into their ideal family size, although in practice they may need to bear more children than their desired family size because of the high rates of child mortality in many developing countries. In practice, many respondents provide non-numerical answers such as "It's up to God," which are not useful in empirical work. Finally, respondents may have compositional preferences (for example, wanting at least one boy or at least one child of each sex) that affect family size but are not captured in questions about desired family size. Demographic and Health Surveys typically ask questions about whether the respondent's last child or current pregnancy was wanted, but the answers to these questions involve many of the same problems. Also, these questions yield no information about women who have never been pregnant. Another approach is asking about the respondent's desire to have additional children, which may yield information on potential demand for contraception or for future fertility. However, the responses would still be subject to many of the problems listed above.

The unmet need for contraception is the difference between women's stated fertility preferences and

their actual contraceptive behavior. In the demographic literature women who are sexually active and fertile are categorized as having an unmet need if they are not currently pregnant or amenorrheic, do not want any children, and are not using contraceptives. Women who are currently pregnant with an unwanted pregnancy and amenorrheic women who did not want their last child are also classified as having an unmet need. To measure unmet need as defined above, it is necessary to find out three aspects of fertility preferences: the respondent's preference concerning her future childbearing, whether her last child was wanted, and whether her current pregnancy is wanted. These questions suffer from the weaknesses listed above. In addition, it is important to stress that when a woman has an unmet need for contraception, it cannot necessarily be assumed that she has an unmet demand for contraceptive services. Even if she has a strong desire to have no more children, a woman may not want to use contraceptives because of financial, religious, or other constraints.

EXPLANATORY VARIABLES. One of the most important policy variables in fertility analysis is mother's schooling, as this variable represents the opportunity cost of having children—in other words, the potential household income lost during the time that the woman spends caring for her children. In addition, years spent in school are usually years that are not spent bearing children. Many studies suggest that schooling may also have a socializing influence. Different measures of schooling, such as years in school or highest level completed, may capture the different ways schooling affects fertility decisions. Which measure of schooling to choose depends on the objective of the analysis and on the data available. Diplomas or literacy, rather than years in school, may make an important difference in people's labor market decisions and income opportunities. The highest level of schooling attained by a woman may reflect the socializing influences of schooling better than the number of years spent in school. (See Chapter 7 for a detailed discussion of how to measure schooling.)

Obviously, the number of children ever born depends in part on mother's age. Since it is standard practice to collect age data for all household members in LSMS surveys, this variable should always be available.

In economic models, household income is an important determinant of household decisions. Only

some LSMS surveys collect household income data, but all LSMS surveys collect household expenditure data, and total household expenditure can serve as an indicator of household income. (Collecting and using expenditure and income data are discussed in detail in Chapters 5 and 17.) A household's income is the result of its decisions about the labor market participation of its members, which are made jointly with fertility decisions. To use household income as an explanatory variable, it may be necessary to use data on nonlabor income of household members or other instrumental variables that are exogenous to the fertility decision. (Instrumental variables and related econometric issues are explained in Chapter 26.)

Parents' birthplace or place of residence may be correlated with their fertility desires. Variables that signify ethnicity and religion can also be included to control for the effect of household preferences on the demand for children. It is important to collect information on the religious affiliation and ethnicity of households. The schooling of household members may also influence their preferences for number of children.

An important community-level variable is degree of urbanization. This is an indicator of the general cost of living, availability of services, economic activity, and prevailing cultural mores. Local prices of essential goods and local wage rates may also be important determinants of fertility outcomes. However, to be useful, the data on prices must not vary with the quantity demanded by the consumer; otherwise the data will be contaminated by consumers' purchasing choices (Schultz 1984). It is best to collect information about wages and prices directly in community-level surveys, although if necessary wage and price information can be obtained indirectly by aggregating household-level information. (See Chapter 13, on community and price data, for details about how this information should be collected.)

Perhaps the most important variables for policy analysis are those pertaining to the price, availability, and quality of schools, health services, and family planning services. Prices have a direct effect on how much the services are used by the household. The availability and quality of services also affect how much they are used because these factors help determine services' costs and benefits to a household. Data on prices, availability, and quality should be gathered in facility or community questionnaires. To be useful for analy-

sis, the data must be available for all households, not just those that use the services. (Chapter 13, on community and price data, describes ways of collecting this information and illuminates difficulties involved in doing so. Chapters 7 and 8 present questionnaires about schools and health care facilities, respectively.)

One problem with using community-level data to understand the determinants of fertility outcomes is that community services may be affected by unobserved community characteristics that also directly affect fertility outcomes. For example, communities that emphasize the quality of their children's lives (as opposed to the quantity of children) may better attract public or private medical or family planning facilities because of higher demand or greater willingness to pay. This would overestimate the impact that these facilities have on fertility; the true impact in this case would be the other way around—the effect of reduced fertility on the attraction of such facilities. Correcting for this problem is difficult and often requires panel data. (For examples of such corrections see Rosenzweig and Wolpin (1986) and Pitt, Rosenzweig, and Gibbons (1993). A more detailed discussion of this general issue is found in Chapter 23 on panel data.) Nevertheless, LSMS-type surveys should attempt to gather community-level data on the range and quality of the available services, including the number of hours and days during which the services are available, the quality and type of services provided, the qualifications of the service providers, inventories of drugs and medicines, and the number of years that the services have been operating (see the health care facility questionnaire introduced in Chapter 8).

A final set of policy-relevant community-level data that can be collected in LSMS surveys relates to information, public education, and communications activities, including variables such as the availability of TV, radio, and newspapers in the community; the use of media for family planning messages; and the information available on family planning. Public information campaigns operate on several levels. Politically, they help set the policy agenda and elicit the commitment of political leaders. Institutionally, they can train service providers and provide individuals with information about available services and changes in public attitudes and preferences.

Some analysts are also interested in men's knowledge, attitudes, and practices regarding reproduction and contraception. However, most previous LSMS surveys have not gathered fertility and contraceptive

use information from men. Collecting this information from men can be problematic for several reasons. In some countries men frequently are not members of the same household as their wives, and the fertility preferences and contraceptive practices of a husband may not be directly related to the fertility of his wife.

Demographic and Health Surveys sometimes include questions about male knowledge, attitude, and use. If it is important for LSMS data to be comparable with Demographic and Health Survey data, it may be necessary to administer the fertility preference and contraceptive use sections of the LSMS fertility module to men as well as to women. This would significantly increase the length of the fertility module and should only be considered when there are obvious benefits from comparability. In countries with a high prevalence of AIDS, condom use is an important issue independent of fertility issues; it may be useful in these countries to gather information on condom use from all sexually active adults.

Data Needs for Child Mortality Analysis

The data requirements for analyzing mortality policies depend on which population group is of interest to analysts and policymakers. Some studies may focus on infant mortality while others may focus on child mortality. While each of the three general questions posed above about economic demography research can be answered separately using household survey data, almost all relevant policy questions can be answered by estimating reduced form relationships for which the mortality variable of interest is determined by a set of exogenous explanatory variables.

As with fertility, this approach raises two questions:

- What mortality variables are of interest to analysts and policymakers?
- Which explanatory variables should be included in the reduced form relationship?

This section proposes a set of variables that determine mortality—variables that should be collected as part of the fertility module of LSMS and similar multi-topic surveys.⁵ The variables are summarized in Box 15.5.

CHILD MORTALITY VARIABLES OF INTEREST. Even in countries with high levels of infant and child mortality, mortality is usually a rare event. Thus it is important to understand how to measure it accurately. It is usu-

ally necessary to analyze cumulative mortality over a relatively long time. As a result, child mortality experienced in the entire lifetime of a mother (either in terms of the total number of her children who died or the proportion of all her children who later died) is often used as the dependent variable. Age of children at death is crucial in defining the dependent variable for mortality analyses. The definition of the dependent variable depends on whether neonatal, infant, or child mortality is to be analyzed. Inaccurate recording of the age at death, in particular the “heaping” of observations at one month and one year, makes it difficult to measure infant and child mortality.

Variables related to mortality include: high-risk births (births to very young or very old mothers and births for which the interval between births was short), low birth weight, use of and expenditure on maternal and child health care, delivery circumstances (such as where the baby was delivered, what medical personnel attended the birth, and whether there were any complications during the delivery), and child immunization. High-risk births can be measured from the data on mother’s age and birth history that are collected in the fertility module. Fertility modules can also collect information on the use of prenatal health care and breastfeeding, but only for the most recent births.⁶ Data on respondents’ use of and expenditure on health care are often collected in the health module, but only for the past 4 weeks or the past 12 months, and not for children who have died. Data on the circumstances of the delivery could also be collected in the fertility module, but, again, only for the most recent births. Immunization data could be collected for all children in the birth history section. However, again, the accuracy of data is questionable for children born more than three years prior to the survey—especially for children who died young.

EXPLANATORY VARIABLES. Virtually all of the variables that determine fertility also determine mortality, including age, sex, and schooling of household members; household income and other household resources; and ethnicity and religion. Additional explanatory variables for mortality include health practices in the home and households’ water sources. While questions about sources of drinking water have often been collected in the housing module of previous LSMS surveys, questions about households’ health habits have rarely been included. In future surveys it

Box 15.5 Important Variables for Mortality Analysis

Mortality outcomes

Number of children that died (under one year, under five years)
Proportion of children ever born that died (under one year, under five years)
Age of children at death

Other mortality-related variables

High-risk births (very young or old mother, short birth interval)
Low birth weight
Use of and expenditure on maternal and child health care
Water source, use of water, expenditure on water
Health practices (washing hands, storing food, use of drugs, alcohol, and tobacco)
Delivery circumstances
Child immunization

Explanatory individual and household characteristics

Household composition
Age, sex, and schooling of household members
Household income and other household resources
Ethnicity and religion
Housing characteristics (water source, toilets, sanitary conditions)

Selected community characteristics

Region and level of urbanization
Environment

- Climate (rainfall, temperature, and altitude)
- Prevalence of major diseases
- Water supply
- General sanitary conditions (sewage facilities and waste disposal)

Government programs

- Spray for malaria
- Purification of water sources

Information, public education, communications

- Availability of TV, radio, and newspapers
- Use of media for health messages
- Communication campaigns

Prices

- Local wage rates
- Food and non-food prices
- Formal and informal interest rates

Health services

- Availability, type, quality, and fees

would not be difficult to include questions on both of these topics in the housing and health modules.⁷

In general, variables related to environment are not under the behavioral control of household members unless the members migrate. Environmental variables include climate (rainfall, temperature, and alti-

tude), water supply, prevalence of major diseases, and general sanitary conditions (sewage facilities and waste disposal). These kinds of data can be gathered in the community questionnaire, although some may have to be collected from other sources, such as meteorological records. (For details see Chapter 13, on the community and price questionnaires.)

Environmental variables usually do not vary across small geographical areas. However, they may vary considerably over time. Therefore, environmental data should be collected each month or each season, and perhaps over more than one year. At a minimum the community questionnaire should ask about two different seasons, such as the wet season and the dry season. However, the structure of the LSMS-type surveys and the limits of empirical work make it difficult to include environmental data that correspond to the time and place of each child's life and death. This limitation must be borne in mind when interpreting the estimated impact of environmental variables.

Government programs that provide health services or subsidize the prices of medicine and services affect household behavior by changing the cost to households of using these services. Government-designed public education programs can also affect behavior, encouraging people to behave in ways that are good for their health by changing perceptions of the benefits of various actions.

Policymakers are often interested in the impact that these government programs have on household behavior. But measuring this impact is complicated by the fact that such programs are rarely located randomly throughout the community but instead have been placed in specific areas—for example, in areas where need appeared to be greatest. If the programs are located in places with the worst health problems, analysts may see a negative correlation in the general population between health and the existence of government programs. If services are concentrated in affluent neighborhoods for political reasons, a measured correlation may capture the effect of high income on health and thus overstate the impact of the health services. To accurately measure the impact of government programs, analysts need to have some information about the criteria used to distribute government services. (For a more detailed discussion, see Chapter 8 on health, Chapter 26 on econometrics, and Chapter 23 on panel data.)

The following data on the health services provided by both the public and the private sector are essen-

tial for estimating the determinants of infant and child mortality:

- How far an individual has to travel to obtain services (distance and travel time).
- How frequently services are available (days per month, hours per day).
- What types of services are available (primary care, maternal and child health care).
- What types of procedures can be performed at the service center (for example, major surgery or caesarian sections).
- Quality of service providers (qualifications and experience, behavior toward patients).
- Quality of the facility (cleanliness, electricity, water quality, refrigeration).
- Whether emergency transport is available.
- Whether essential drugs and supplies are available and properly stored.

While some of this information, such as travel times and hours that a facility is open, can be collected in the community questionnaire, most of the information can only be collected in a health facility questionnaire. (See Chapter 8 for a draft facility questionnaire and a detailed discussion of how to use information from such a questionnaire in empirical work.)

Data on public health programs (such as campaigns to encourage childhood immunization, diarrhea management, and safe motherhood) are also important policy variables for mortality analyses. Although these programs are implemented through existing health care facilities, data about them are best collected in the community questionnaire; further information can be collected in a health facility questionnaire.

Draft Modules

This section provides two draft modules for collecting data on fertility and child mortality in LSMS surveys: a standard module and a short module. Due to the multisectoral nature of the surveys, the fertility module cannot be as detailed as it might be in a single purpose survey. The recommendations in this section have been made with the following strictures in mind:

- The design of the fertility module should ensure a minimum level of comparability with data from previous surveys in the country, especially previous LSMS and Demographic and Health Surveys.

- The information collected should be relevant for policy analysis.
- Information unlikely to be used often in analysis should not be collected.
- The module and its methodology should be designed to ensure that the data collected are of high quality.

The standard module is organized in three sections: maternity history, reproductive health, and contraceptive use. The short version omits the questions about breastfeeding and abortion and the detailed questions on methods of contraception.

The length of the questionnaire is an important consideration in survey design. Table 15.2 presents estimates of the number of questions per woman for the short and standard versions.⁸ Estimates are also presented on the questions per household depending on whether one woman or all eligible women are surveyed.

In most cases the module will need to be modified to ensure that the questions asked and the information provided are appropriate to the prevailing circumstances in the country where the survey is to take place. Box 15.6 presents cautionary advice on the extent to which the draft module has not been proven in the field and on which sections will require the most customization. The following section of this chapter provides detailed comments and explanatory notes to guide survey designers in modifying the draft fertility module.

Explanatory Notes on Design of the Draft Fertility Module

The household roster of the LSMS survey is organized so that all women in the household can be linked to the head of the household. Each woman can also be linked to her husband and, when the standard version of the household roster is used, to her children if they are also members of the household. In addition, data about women that are gathered in the fertility section can be linked to data about the same women collected in the education, health, and employment modules

Table 15.2 Number of Questions in Fertility Module

Version	Questions per woman	One woman per household	All eligible women
Standard	26.6	20.0	28.5
Short	16.9	12.7	18.2

Source: Authors' calculations using data derived from Macro International Inc. 1992a and 1992b.

of the questionnaire. If any of the latter three modules are abridged significantly, questions may need to be added to the fertility module to ensure that the necessary information is collected for women of childbearing age. The reader may refer to the list of explanatory variables in Boxes 15.4 and 15.5 to verify that the other modules in the questionnaire collect the information needed to analyze fertility and mortality.

In most previous LSMS surveys the fertility module has been administered to women ages 15 to 49 (inclusive). Survey designers can modify these criteria for the fertility module if conditions in the field allow only married women to be interviewed or if it is clear that there is substantial sexual activity and childbearing among girls younger than 15. In many previous LSMS surveys the fertility module has been administered to one randomly selected woman of childbearing age in each household. Doing this reduces interview time but also results in women in large households being underrepresented in the resulting data.⁹ Alternatively, the fertility module

Box 15.6 Cautionary Advice

- *How much of the draft module is new and unproven?* Most of the draft module has been used in the majority of past LSMS surveys. Part B on Reproductive Health is a slight expansion of what was usually included (most previous LSMS surveys gathered data only on each woman's most recent birth. The questions on desired fertility (Questions 21, 25 and 32–34 in Part A) have not been used in previous LSMS surveys, but they have been used in many Demographic and Health Surveys.
- *How well has the module worked in the past?* The data from the fertility module have been used widely. Including all births in the past three years in the reproductive health section should increase its usefulness. Data on breastfeeding is difficult to use and interpret for reasons discussed in the final section of the chapter.
- *Which parts of the module need to be customized?* Throughout the module, care must be taken to ensure that the language used in the questions is sufficiently precise to elicit accurate responses without making the respondent unnecessarily uncomfortable. Questions 26 and 27 on first sexual intercourse are the most obvious example. Similarly, in some situations it may be unnecessary or impossible to ask questions on abortion (Questions 30 and 31). The questions on contraceptive use will require the most customization. Methods and sources should include only those available in the country.

could be administered to all women of childbearing age in a household. To do this, multiple copies of the fertility modules should be included in the questionnaire or additional fertility modules should be made available to interviewers. In practice, interviewing two or three eligible women per household would address sampling considerations and be much simpler than including all eligible women. Survey designers might wish to refer to a recent census to estimate the number of copies of the module that would be required for the average household.

The draft module presented in the previous section was designed to be administered to women. If data on knowledge about, attitudes toward, and use of contraceptives are also to be collected from men, this can be done by duplicating Part C of the module, on contraceptive use, and perhaps the fertility preference questions from Part A of the module.

The rest of this section describes the different parts of the draft fertility module and clarifies the design and purpose of many of the questions.

Part A: Maternity History

This section contains questions about each birth, including the child's name, sex, birth date, survival status, and age at death if the child died. The section also collects the ID code of all children living in the household and the highest level of schooling for all children who are not household members. (Schooling for children who are household members can be obtained from the education module.)

It is important to acquire a complete maternity history because this provides analysts with information not only about a woman's cumulative fertility but also about her recent fertility and infant mortality. Survey designers need to ensure that:

- All live births and deaths are identified.
- The number of children ever born can be reconciled with the answers given in the maternity history section.
- The date of each birth is recorded.
- The age of death for each child that died is recorded.

A4–A7. These questions determine whether a woman should answer the maternal history and reproductive health questions. In order to ensure that all pregnancies are counted (even those that ended in an early miscarriage) and all births are counted (even if the child lived only a short time), interviewers should be trained to probe in depth to find out whether the answers to these

questions are really “no.” It is conceivable that interviewers might purposely record a negative response for these questions in order to avoid administering the sections that follow. Therefore, supervisors should pay special attention to checking these questions.

A8. The question asks for the name of the child even if the child is dead, since the association of a name makes it easier for the child's mother to recall the details asked for in the questionnaire. In addition, it is easier for the interviewer to refer to a child by name in the later parts of the questionnaire. It is recommended that the maternity history should be recorded starting with the firstborn child. Mothers find it easier to recall various details if the maternal history is discussed from the first birth to the latest birth, rather than starting with the latest birth and going back to the first birth (Shyrock and Siegel 1976).

A11. Supervisors should instruct interviewers never to leave the question on date of birth blank. Even if the respondent does not remember the child's exact date of birth, interviewers should help them recall the year, and hopefully the month, by providing some important reference dates and by asking them if they remember in what season of the year the birth took place. Survey designers should prepare a list of reference dates relevant to the country for which the survey is being planned.¹⁰

A13. This question collects information on the age at which children died. In order to increase the accuracy of measurement of infant and neonatal mortality, the time units used vary according to the age at death.

A16. This question on the highest level of schooling attained by the child is included in the birth history to ensure that this information is collected for children who do not live in the household. This information is essential for analyzing issues related to the “quality-quantity tradeoff.” The list of applicable schooling codes should reflect the local education system and should be the same as those used in the education module. For children who do not live in the household, the ID code can be used to obtain the same information from the education module.

A19. After recording the maternal history, interviewers should count all of the recorded births and deaths

and use question A20 to confirm that no birth is missed.

A21, A25, AND A32–A34. These questions collect information on women’s fertility preferences regarding their last child, last pregnancy, and future fertility. Analysts need the answers to these questions to estimate unmet need for contraception. However, some or all of the questions could be excluded depending upon the policy priorities of the country where the survey is to be fielded. This is a section of the questionnaire that will require extensive field testing to verify that the questions are easily understood and worded sufficiently delicately. If “I don’t know” or “It’s up to God” are common responses, these questions may not elicit useful information, and including them will only frustrate both interviewers and respondents.

A23. This question deals with a woman’s current pregnancy status, which is an important piece of information for many types of demographic analyses. For example, in studying the determinants of current contraceptive use, analysts may want to exclude pregnant women.

A27. This question has been included to determine the age at which the woman began having sexual relations. The exact wording of this question should reflect existing cultural norms in the country. In some cultures marriage does not take place until after the birth of the first child, so “age at marriage” would not be the relevant question. Field testing will reveal the appropriate way to phrase the question. It may appear inconsistent to ask questions about marital status near the end of the module, after having asked about childbearing. However, experience has shown that collecting information about the respondents’ age at the time of their first marriage at the beginning of the survey may embarrass respondents and thus hamper the smooth flow of the interview.

A28–A31. These questions on miscarriages and abortions, can yield useful insights into these aspects of fertility. Questions about abortions are included because abortions reflect women’s fertility preferences. In some countries, survey designers may wish to include more abortion-related questions, such as the type of facility where the abortion took place, the type of provider, the length of the pregnancy before the abortion, and how much the procedure cost. However, because in many countries these will not be the most important

issues, questions about these issues have been excluded from the short module. In some countries, respondents will consider any questions on abortion inappropriate; in these countries such questions should be excluded from the questionnaire.

Part B: Reproductive Health

This section should be administered only to women who have had at least one live birth in the previous three years. It contains questions on prenatal care, assistance during delivery, the place of delivery, and breastfeeding. In most previous LSMS surveys, such questions were asked about the last live birth before the survey. The draft module presented earlier gathers data on up to three births and on the woman’s utilization of prenatal and postnatal care services—allowing analysts to study the effectiveness and utilization of those services. Information is collected only for births in the previous three years in order to limit the interview time, and because it may be harder for respondents to remember such details about earlier births.

B3–B4. These questions ask about prenatal care. In order to gather the information requested in this section, interviewers should be trained in the definition of prenatal care so, if necessary, they can clearly explain this concept to respondents.

B5–B6. For questions on the place of birth and who assisted at the birth, the lists of responses should be modified to reflect the full range of local options.

B7–B9. These questions deal with breastfeeding, which not only contributes significantly to infant health but also delays the return of the mother’s menses. The information collected in questions B7–B9 is useful for determining the prevalence of breastfeeding. However, an accurate measure of the nutritional value of breastfeeding would require information on weaning foods and more detailed information on breastfeeding. Moreover, deducing the contraceptive effect of breastfeeding is very difficult and would require much more detailed information. And the quality of data on breastfeeding is suspect because it may be difficult for respondents to recall exactly when the child was completely weaned. It may be advisable to drop these questions from the module. This entire section has been removed from the short module.

Part C: Contraceptive Use

This section should be administered to all respondents. It should gather information on each woman's knowledge of, current use of, lifetime use of, source of, and payment for contraceptives. This section will almost certainly need to be modified to reflect the conditions in each particular country. As the draft module collects information about contraceptive use by method, the list of methods included should reflect those that are used and available within the country where the survey is to be fielded. In countries where contraceptive use is exceptionally low, it will not be useful to ask all of the questions about each method. In some countries it will suffice to ask about a woman's knowledge and use of modern versus traditional methods. In others it will be sufficient to ask about the woman's knowledge and use of any method, with a follow-up question asking her to specify which, if any, method she uses or has used. If contraceptive use is widespread and policymakers wish to know more about it, the survey may need to collect more detailed information on, for example, the length of time for which a woman used each method, her complete contraceptive use history, or more detailed information about her source of, expenditure on, and willingness to pay for contraceptives.

Questions relating to a woman's knowledge of contraceptives may require interviewers to prompt respondents. In some cultures women may be embarrassed to acknowledge that they know about contraceptives. Also, some women may not understand questions about contraceptives. The evidence from Demographic and Health Surveys is that reported knowledge of contraceptive methods is significantly higher when respondents are prompted.

Notes

1. Data collected in a standard LSMS survey are not appropriate for analyzing adult or adolescent mortality. See Ainsworth (1992) for a description of an LSMS survey on adult mortality conducted in Africa.

2. If high population rates put pressure on public resources, the number of children desired by households may be higher than is socially optimum. On the other hand, the desired number of children be less than is socially optimum. For example, pension schemes may become insolvent if the ratio of future pensioners to future workers is high.

3. Children ever born is the number of children born live to a woman, including children who died after childbirth.

4. Survey designers may also wish to collect such information from women who are past childbearing age. This issue is discussed later in this chapter.

5. In general, past LSMS surveys have not included a separate mortality module. Data on infant and child mortality are best collected in the same place as data on fertility, since analyses of fertility should include children who died at an early age. Deaths among school-age children are very rare, so rare that the relatively small sample sizes of LSMS-type surveys effectively preclude using these data to analyze mortality of school-age children.

6. Information is collected only for the most recent births because, generally, respondents' ability to recall details of all births is very limited.

7. See Chapters 8, 12, 13, and 14 for detailed discussion of the information collected in the health, housing, community, and environment modules of the survey.

8. Estimated number of questions is calculated using the responses to similar questions in the Egypt and Ghana Demographic and Health Surveys. There are fewer questions in the "one women per household" column because some households have no women of reproductive age.

9. Evidence from Sub-Saharan African countries shows that randomly selecting one woman from each household reduces the interview time by about 30 percent without biasing the descriptive analyses. However, it considerably reduces the size of the sample, especially in the case of young women, for whom the reduction may be as large as 50 percent. Thus, if resources permit, it is best to interview all eligible women in each household.

10. In Annex V, Grosh and Munoz (1996) present an example of a list of historical events of local importance to which interviewers can refer to help respondents identify the date of a particular event.

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16

Migration

Robert E. B. Lucas

Collecting migration information has not been a high priority in past LSMS surveys. Yet both internal and international migration have pervasive effects throughout most economies, with policy implications for many issues that are central to LSMS and similar multi-topic surveys—issues regarding labor markets, income generation, consumption smoothing, the environment, education, and the provision of community services and facilities.

Government policies affect migration flows by altering the factors that people take into account when they decide to relocate. In addition, the economic effects of government policies—including effects on both efficiency and income distribution—depend on migration patterns.

Policy Issues Concerning Migration

Several important policy issues arise from the interaction between policies and migration outcomes. This section scans these issues, for both internal and international migration, and identifies the kinds of information policymakers need to make well-informed policy decisions.

Internal Migration

Internal migration is common in many developing economies. According to the October Household Survey conducted in 1994 by the Central Statistical Office of South Africa, 2.3 percent of South Africa's adults moved from one place to another in a single year. The 1990 census for Thailand showed that about 8 percent of the country's population moved during

1985–90; this figure did not include seasonal migrants. Three LSMS surveys in the past decade—in Ghana, Pakistan, and Vietnam—also show a high percentage of people in developing countries moving from one location to another. The survey in Vietnam revealed that 23 percent of Vietnamese adults live in a place other than the place where they were born. Equivalent figures from surveys in Ghana and Pakistan were 35 percent and 53 percent, respectively.

MIGRATION AND EMPLOYMENT. Much of economists' interest in migration has focused on labor migration: reducing the supply of labor in one labor market while increasing the supply in another. Normally, workers move from a place where wages are low to a place where wages are high. To the extent that higher wages reflect higher worker productivity, migrants who succeed in increasing their wages have also enhanced their productivity. However, many factors limit the geographical mobility of workers, including the expense of moving, a preference for staying at home, and limited information about job alternatives.

How responsive are population movements to earnings and employment opportunities? Answering

this question can provide valuable insights into a number of important issues:

- If the geographical dispersion of productive activities changes—as a result of, say, trade liberalization or economic growth in the absence of reform—will large wage increases be necessary to induce workers to move to the new jobs?
- If a job creation program is undertaken in urban areas, how many migrants can be expected to move for every job that is created?
- If a rural development program succeeds in enhancing rural earnings, will this limit the number of people who move out of rural areas? Or is young people's attraction to urban areas strong enough that they will move anyway?
- How far are workers willing to move to obtain a job in a rural works program?
- What are the important constraints on people's geographical mobility? Could certain policies alleviate these constraints?

If workers are unwilling to relocate elsewhere, even for much higher wages, policymakers may wish to consider moving the jobs to the workers. On the other hand, it is strongly suspected, at least in some industries, that firms benefit greatly from being located close to other firms—particularly firms in the same line of production. And significant economies of scale can be achieved where infrastructure is provided in one place to serve a group of companies.

MIGRATION AND JOB SEARCH. Workers may be able to conduct a job search more effectively if they have already moved to the area where they are looking for a job. This simple fact can have profound implications for the economic efficiency of migration. To illustrate these implications it is useful to review the Harris-Todaro (1970) framework.

Suppose urban wages are relatively high and open urban unemployment is rife, while wages in rural areas are low but workers can find productive work. For a rural worker to find a more lucrative urban job, he or she must generally move into town and remain unemployed while searching for a job. Any policy initiative that creates urban jobs may attract so many more workers into town that the unemployment rate may actually rise, while total GDP may fall as workers are pulled away from productive rural employment.

But just how essential is relocation for finding a job? Is it less necessary for people with family mem-

bers in town already or people in rural areas located close to a town? And does accepting an interim job, such as casual work in the informal sector, reduce a person's chance of finding a good long-term job? Data on these largely neglected issues would be very useful to policymakers.

MIGRATION, POVERTY, AND INCOME DISTRIBUTION.

Migration has the potential to alter income distribution in a number of ways. Over time migrants may become more socially mobile than nonmigrants. Migrants' departure from some areas and arrival in others may affect the income distribution within those areas. The distribution of resources within a family may be altered by the departure of some members; indeed, family units—among which income distribution is frequently measured—may be greatly transformed by migration.

A number of key questions must be answered to understand the effects of migration on poverty and income inequality.

- To what extent is social mobility enhanced by migration? To what extent do migrants' earnings rise more rapidly than the earnings of people who do not relocate (including people native to the place of migration)? Do migrants succeed in moving up the job ladder?
- Are migrants drawn disproportionately from low-income, middle-income, or high-income families? It might be assumed that the poor are more likely to migrate because they have few prospects at home, yet the wealthy may be in a better position to pay the expenses of moving (and of acquiring education—which makes it easier to find work elsewhere).
- Do migrants send remittances to their families, or vice versa?¹ Are poor families likely to receive more or fewer remittances from their migrant members than rich families? Migrants from poor families might be expected to have an interest in supporting their family members, but migrants from wealthy families may have a greater vested interest in pleasing their parents, because these migrants may hope to inherit their parents' wealth.
- To the extent that migrants from poor families do not send remittances home, does this leave the family members who stay behind (and who may be elderly or incapacitated) in poverty? Does the departure of migrants compel remaining family members to work longer, harder hours?

- How does migration affect the wages in areas from and to which migrants move? Migration generally alters the incomes of people in areas of both in-migration and out-migration—nonmigrants as well as migrants. However, these effects are not straightforward. The departure of skilled people presumably boosts the earnings of locals with skills similar to those of the migrants. And in the long run, this trend encourages the next generation of locals to acquire these skills. On the other hand, the departure of skilled people from an area can either help or hurt wages of less skilled people, depending upon the nature of production in the area.
- How is the process of trickle-down development shaped by migration? The creation of industrial jobs in urban areas may or may not benefit poor rural families, depending on who is induced to migrate to town, whether they send remittances to families in rural areas, and how these factors affect local wage-setting.

To understand the above questions, policymakers need information about social mobility, the income classes from which migrants are drawn, patterns of remittances and their relation to poverty, and the effects of the arrival and departure of migrants on local labor markets.

MIGRATION AND RISK. Migration may be one important way for families to mitigate inherent economic risks. By sending a family member to a place where times of economic misfortune do not normally coincide with such times at home, the family can spread out its risk over two different sets of circumstances, thus diminishing total risk. A household located in a frequently drought-stricken rural neighborhood might send a migrant member to an urban area that is not drought-stricken but has an uncertain job market.

The concept of migration to mitigate risk raises a number of questions:

- Is out-migration more frequent from areas where inherent risk (such as drought, flood, and disease) is especially common?
- Do migrants tend to move to locations where economic misfortunes are unlikely to occur at the same time as they do at home? For example, does migration as a result of marriage occur especially frequently between places where economic misfortunes are unlikely to occur at the same time? (See Rosenzweig and Stark 1989.)

- Do migrants send more remittances when conditions in their original household are temporarily worse? Conversely, do migrants receive more remittances from their original household when they suffer a temporary setback?
- Are families with members who have moved away from home better able to smooth their consumption during periods of adversity?
- In times of economic adversity, are remittances smaller and less frequent when insurance is available or other transfers (such as social security) are available?

MIGRATION AND INFRASTRUCTURE. Migrants may be attracted to certain places by the existence of infrastructure and facilities. However, this can cause the facilities to become overcrowded. In such circumstances policymakers may build new facilities or improve existing facilities in areas with high population densities; this is especially probable when economies of scale will lower the costs of providing many services. On the other hand, the existence of improved facilities may attract even more migrants, leading to more overcrowding. Thus it may be better to improve facilities in less crowded areas, encouraging migrants to move there rather than to high-density areas.

When policymakers establish a new town, expand a settlement, or promote a settlement scheme, they make important decisions about where to locate facilities. The policymakers must consider: Are these strategies cost-effective? How much migration is there to such areas and from which population groups?

To answer these questions it may be valuable to find out how important the existence of public facilities is for people's migration decisions. If public facilities are important factors, analysts need to account for this when evaluating the impact of the facilities on households' living standards. If sick migrants are attracted to a village with a health clinic, and sick inhabitants of this village choose not to leave, the population of the village may end up with worse health than the population of a village without such facilities. The relationship between migration and transport facilities is complex and not yet well documented. It is not clear whether the existence of cheap and easy transportation between towns and the countryside promotes or curtails out-migration from the rural sector. The existence of reliable transportation makes it easier for rural dwellers to market their products in

town, but it also heightens competition by making goods from town available in local rural areas. It is therefore not clear how easier transportation affects the relative prices of local goods, whether such transportation encourages the production of labor-intensive goods, and what the consequences are for rural employment. Moreover, the existence of reliable transportation encourages migration by reducing the costs to a migrant of both moving to a town and making subsequent visits home. However, reliable transportation also allows rural dwellers to commute to urban areas to take advantage of urban employment opportunities and facilities—while continuing to reside in the country.

Improving transportation in rural areas may also make it easier for workers to move around and change jobs within the rural sector. This can affect rural-urban movements in a number of ways. If it is cheap and easy for workers to move from one village to a different village, the arrival of migrant workers in the second village may cause wages there to decline—encouraging subsequent migration to urban areas. The ability of workers to move between rural locations may offer families the opportunity to insure themselves against economic shocks by locating members in two different rural locations as well as by sending some members to urban areas. And improving transport between rural areas can increase returns to rural capital (notably on trucks or other vehicles)—possibly encouraging workers to migrate from rural areas to towns so they can save money to invest in their home area.

For policymakers to understand the interrelation of migration and transport patterns, they need community-level information on the availability, cost, and quality of transport (preferably for goods as well as people), as well as household-level information on migration patterns.

Finally, the strong link between migration and educational facilities is worthy of separate mention. People may migrate in order to have access to better schools. In turn, the level (and possibly content) of the education achieved by migrants and nonmigrants may affect migration patterns, both by shaping their attitudes and by presenting them with employment opportunities. Enhancing education in rural areas is an important way of enabling rural workers to land jobs in urban areas. But because tertiary education is remunerated far better in towns than in rural areas, few college graduates tend to return to rural areas. While this

may lead to a kind of “brain drain,” any evaluation of the returns to rural education should also take into account the benefits to those whose education enabled them to migrate from these areas.

SOCIAL IMPLICATIONS OF MIGRATION. Social implications of migration are often important to policymakers. Three aspects of migration’s social implications are mentioned here.

First, migration can separate married couples, possibly resulting in social tension and reduced fertility. Separation of a husband and wife may also impoverish a spouse left at home, although this depends greatly on remittances received by the remaining spouse and on production conditions at home. Policymakers are interested in knowing how often families relocate as one unit, how often migration results in families being reunified, and what the economic circumstances are for family members left behind when household heads or other key members of households migrate.

A second set of issues arises from the role played by social and kinship networks in facilitating migration. Having kin in town may make it much easier for a migrant to find an urban job by providing him or her with a place to stay on arrival and generally making the new context less alien. Thus, when analysts are examining the role played by other factors in promoting or constraining migration, they should control for the existence of social and kinship networks.

Third, in many countries one of the principal reasons for relocating is local violence—war, political unrest, or crime. Documenting such causes of displacement can identify the people who most need relief, and lead to measures—such as enhanced law enforcement—that will address the underlying causes of this violence.

International Migration

To a large extent, international migration and internal migration are driven by similar forces, forces that yield similar consequences. However, international migration raises several major policy issues not raised by internal migration.

While immigration is subject to controls in virtually every country in the world, the efficacy of these controls varies enormously. Therefore, one major set of policy issues involves the imposition, efficacy, and nature of immigration controls. Does

making controls stricter simply raise the rate of illegal immigration? Are penalties against the employers of illegal immigrants effective or do they simply encourage discrimination against all aliens? Does trade protection encourage industries that employ many immigrants, whether legal or not? Do immigrants undercut the local wage? Do foreign workers catch up with locals in terms of their career trajectories, and what is the role of language in influencing this? Do foreign students stay on to work in the country where they studied? Do family members of immigrants work, or do they receive income from state aid and public expenditures?

Fortunately, very few governments attempt to impose direct emigration controls. Indeed, some governments actively seek to export workers and have implemented programs providing training, information, and even credit for workers interested in emigrating. Several countries have offered exchange and interest rate incentives, along with tax breaks, to encourage emigrant workers to send remittances back home (through legal channels). It is important to examine the efficacy of such programs.

Finally, there is the issue of the “brain drain” of educated and skilled workers from developing countries to developed countries. Since the gap in earnings between most developing countries and developed countries is very large, it is unrealistic to expect developing countries to generate sufficient wage incentives to keep these workers from emigrating. Thus the principal policy issue at stake is the design and financing of the educational system. Policymakers will likely want to know about the educational background of emigrants, who financed their education, and whether such emigrants return home or continue to send remittances back to their families at home.

Data Requirements

By no means are there straightforward answers to all of the policy questions regarding migration, even when ideal data exist with which to analyze them. But a well-designed household and community survey can provide useful insights into many migration issues.

This section discusses the methodology involved in collecting migration histories in large-scale household surveys like LSMS surveys and outlines the data that must be gathered to analyze specific migration

policy issues. Some of these data must be gathered from other modules of LSMS surveys.

Collecting Migration Histories: Methodological Issues

The United Nations manual on measuring internal migration defines a migrant as “a person who has changed his usual place of residence from one migration defining area to another . . . during [a given] migration interval” (United Nations 1970). To understand what this means in practice, three concepts must be defined: “usual place of residence,” “migration defining area,” and “migration interval.” Depending how these terms are defined, migration can mean any stay away from home, from a visit with a relative in the same village to an irrevocable break with the migrant’s home in which he or she moves to another region of the country or world.

In most contexts the “migration defining area” is taken to be an administrative unit such as a province, district, county, township, or village. Anyone who, within a specified time, changes his or her “usual residence” across the boundary of such a unit is defined as a migrant. The key elements that help survey designers decide which administrative unit to use as the migration defining area in a given analysis are the heterogeneity of each administrative level and the focus of the analysis. If the province were chosen as the “migration defining area,” this would mean that any rural-urban migration within each province would not be recorded. Thus, if the purpose of the analysis is a study of rural-urban migration and if provinces are heterogeneous (in other words, contain both rural and urban areas), it is inappropriate to choose the province as the migration defining area. Analysts and policymakers may even be interested in knowing about changes in residence within the boundaries of a given city (for example, from a squatter area to a planned neighborhood) so they can analyze access to different facilities. In this case, the migration defining area would need to be the city sector. On the other hand, village-to-village migration may not be particularly relevant to a labor market study if the rural labor market in a particular province is well-integrated.

In the draft migration module it is suggested that survey designers should adopt movement between villages, towns, or other similar units as the basis for collecting migration information. This is often called place-to-place migration. Using this definition has the advantage that it generally also permits analysis of

movement between broader administrative units (such as districts or provinces), provided the location of each place is appropriately identified in the data set made available to analysts. On the other hand, using place-to-place migration does rule out the possibility of analyzing residential mobility within towns or villages.

The draft migration module suggests defining the “usual place of residence” as any place where someone lived (meaning slept and ate) for three months or more at one time. This avoids the complications that can arise when individuals, having a sense of allegiance to their original home, give that location as their “usual residence” even though they neither slept nor ate there during the reference period. The choice of “three months or more at one time” is admittedly arbitrary but is likely to rule out short-term visits for social, business, religious, or vacation purposes.

A “migration interval” that is perhaps the most commonly used in surveys is time since birth. In surveys using this interval, respondents are asked where they were born and are defined as migrants if this “migration defining area” differs from the place where they are living when interviewed for the survey. Since major moves are comparatively rare in the lives of most people, using time since birth has the advantage of maximizing the chances of observing a migration. On the other hand, it has the disadvantage that it does not establish a rate of migration per unit time. Thus there are good reasons to collect information for at least two points in a person’s migration history—his or her initial location and his or her location at some fixed point in time.

Note that the initial location does not necessarily correspond with the person’s place of birth, which is the location used by some other surveys. When the birth takes place in an urban hospital but the mother and infant soon return home to their village, the place of birth is less relevant for most purposes than the baby’s initial residence. For this reason, the draft migration module asks about the baby’s initial residence rather than about his or her place of birth.

TWO WAYS TO COLLECT MIGRATION INFORMATION.

There are two different ways to approach the process of collecting migration information. Either the interviewer can ask each person at the sampled dwelling about his or her migration history, or the interviewer can ask the resident members of the household whether others have migrated from their household.

In this chapter, the first approach will be called the resident migration history approach and the second will be called the absentee approach. Both approaches have some strengths and some limitations.

Perhaps the greatest limitation in using the resident migration history approach is that it relies on respondents’ knowledge and recollection of the households they have left. Another weakness of this approach is that no information is collected about emigrants even though such information can be of great interest to analysts and policymakers. A major strength of the resident migration history approach is the ability to collect information about the migrant’s experiences directly from the migrant. On the other hand, using the absentee approach also relies on the respondents’ knowledge and recollection—in this case about who has left the household. Another disadvantage of the absentee approach is that when entire families migrate, the new occupants of their old dwelling are unlikely to possess much information about them. However, a major strength of the absentee approach is that information about the household and community from which the person migrated will be more accurate than any comparable information collected using the resident migration history approach.

The draft migration module presented in this chapter is designed to allow survey designers to adopt either (or both) of the approaches. In the absentee approach, a person who has migrated from the sampled dwelling is defined using a set of people associated with the household. In particular, three sets of these “associates” are defined:

- Nonresident surviving parents of each household member (in section B of the standard household roster) and nonresident children of household members (in section C of the standard roster).
- Additional people identified on the extended roster, where this is applied (see Chapter 6).
- The head of household. In the draft standard roster introduced by Chapter 6, the head of household is always defined as a household member even if he or she has been absent for the whole of the previous 12 months. If the household head has been absent for at least 6 of the previous 12 months and has not been present for the previous 7 days, then the head is also treated as a household associate.

If a particular associate is not present at the time of the interview, information about that associate should be collected from his or her spouse, parent, or

adult child or from the household head. (Note that the associate may be present even if he or she is not actually a household member, if he or she has been living with the family intermittently.) Absentee migrants from a household are associates who at some point lived continuously at the dwelling for three months or more but who now live in another place.

An associate might have migrated from another dwelling where he or she lived with the family surveyed, after which time the family moved to its current residence. In such a case the associate might be considered a migrant from this family even though he or she has never lived in the family's current dwelling. A question covering this eventuality is included in the draft standard migration module.

PANEL DATA. The fact that analysts and policymakers are often interested in information about migrants and their households both before and after migration suggests that panel data may be appropriate. However, it can be difficult to trace individuals when—as in LSMS-type surveys—dwellings, not individuals, are the units of study. When out-migration occurs between rounds of the survey, either the migrants must be traced or data about the migrants must be collected from remaining residents to maintain the original panel of individuals.

Although tracing is not ruled out as a possibility in Chapter 23 on panel data, tracing can be an expensive process and is often unsuccessful. If tracing is rejected as a possibility in the design of a survey, it may be critical in later rounds of the panel survey to collect information on absentees. If individuals who do not appear in later rounds have migrated from the household, the economic situation of the household can be compared, say, before and after the migration. Similarly, absentee information might be used to compare the employment of individuals before and after they migrate. However, as Chapter 23 recommends, it is better to allow several years to pass between the rounds of the survey; otherwise very few migrations will have occurred between rounds.

RECALL PERIOD. Since major moves are comparatively rare events for most people, using a short recall period to collect migration information is not likely to yield many instances of migration. Moreover, most migration occurs among young adults, which means that using a short recall period would fail to capture the

migrations that older people may have made in their youth.

As a result, almost all surveys that include a migration module have used a person's entire lifetime as the recall period. This raises the question of the reliability of migration data recalled over a long period of time. A recent study by Smith and Thomas (1997) addressed this question. The authors compared the recalled migration histories of individuals each of whom was interviewed in two rounds of the Malaysia Family Life Survey, with 12 years having passed between the rounds. The study did not aim to find out whether the initial information given by the respondents about their migration histories was correct; instead it aimed to discover whether information they gave in the later round of the survey corresponded accurately with the information they had given 12 years earlier. The authors concluded that "respondents tend to remember salient moves, those linked with other important life events such as the start of a marriage, the birth of a child, change in a job and moves that lasted for a long time. In contrast, migrations that dim in memory as time passes are typically short duration or local moves. . . . When collecting complete lifetime histories, it would seem prudent to focus on longer-term moves, leaving shorter-duration and circular moves to be captured in a supplemental module on all migrations that have taken place in, say, the last year or two" (Smith and Thomas 1997). Thus this study has at least two important implications for the design of migration surveys. First, the study suggests that people's memories of their main migration events do not deteriorate substantially over fairly long periods of time. Second, the study suggests that it might be more reliable to gather partial migration histories in which data are collected on a person's major moves than to attempt to glean this person's complete migration history.

PARTIAL VERSUS COMPLETE MIGRATION HISTORIES. In very peripatetic societies, collecting a complete migration history can become cumbersome, even if information is only collected on long-term moves as Smith and Thomas suggest. This is particularly true since, although many people never move, those who move once often move several times. In consequence, the draft migration module is designed to collect information on only a limited number of major migrations.

The short and standard versions of the module focus on the most recent move, the first move (if dif-

ferent), and the location of all the residents of the sampled household five years previously. If a resident was born abroad, this resident is asked when he or she initially arrived in the country of the survey. The expanded version of the module includes additional questions about whether the resident ever lived abroad and where the resident lived just prior to marrying. The first question of the expanded module, which asks about any past time living abroad, is designed to permit analysis of the post-migration experience of returned emigrants.

Establishing where a person lived before he or she got married makes it possible for analysts to examine such issues as risk-spreading through marriage (marrying into a family from a place where times of economic misfortune are unlikely to coincide with such times at home) or peer-group learning about contraception (in which a marriage partner's information and attitudes about contraception may have been shaped prior to marriage by people from his or her original home). See Rosenzweig and Stark 1989, Munshi and Myaux 1997.

The expanded version of the module additionally asks for a brief migration history of each household associate, using essentially the same categories of moves as the categories used in the short version of the questionnaire for household members.

The Causes of Migration

There are two approaches to collecting information about why people migrate. The first and simplest approach is to ask migrants why they moved. Many surveys have used this approach, and some questions along these lines are incorporated in the draft migration module. However, this approach has some critical shortcomings. Migrants may have had to weigh several different factors in deciding to move. Asking them to identify only one (albeit the most important) may cause analysts to miss other contributing factors. On the other hand, migrants may find it difficult to rank several contributing factors in order, let alone to ascribe weights to each reason. Moreover, why migrants moved is only part of the question; at least as important is why nonmigrants did not move. Yet such questions are rarely, if ever, posed—partly because they require respondents to be extraordinarily introspective.

Given these limitations, most economists have preferred to rely on a second approach, known as the “revealed preference” approach. In this approach, the

circumstances (age, education, family background) of migrants are contrasted with the circumstances of nonmigrants. Most econometric analyses of the causes of migration use some form of discrete regression analysis (such as probit or logit) to relate whether or not a person has moved to a list of potential explanatory variables.²

MOVERS AND STAYERS. Migration can be studied using partial migration histories. For example, it is possible to study rural-to-urban migration by examining a sample of people who initially lived in rural areas and distinguishing those who have stayed from those who have moved to urban areas.³ However, an alternative distinction is occasionally made between those who have stayed in a particular location and absent household associates who are reported by other household members to be in an alternative “migration defining area,” say, in a town or abroad. In either case it is possible to distinguish moves to various locations—abroad, to a city, to a town, within the rural sector—instead of focusing on a simple mover-stayer dichotomy (see Lucas 1985, Falaris 1987, Pessino 1991, and Vijverberg 1995). Other possibilities include distinguishing moves across administrative boundaries, although it is less apparent how this would be useful to policymakers.

A person's initial location is usually interpreted to be their location at birth or shortly after birth. However, “initial” can also refer to some fixed point in time—say, five years before the survey. As will be seen in subsequent sections, specifying a short time interval has some advantages in terms of measuring explanatory factors. However, choosing a short time interval means that only a small number of migrations will be able to be studied. In less mobile societies, this small sample may make it impossible to perform any effective analysis of migration flows.

MEASURES AFFECTING MIGRATION DECISIONS: GENERAL CONSIDERATIONS. The theoretical and empirical literature suggest several key factors that are likely to influence people and households in deciding whether or not to migrate.⁴ Some of these key components are:

- Personal attributes, such as age or gender, that influence attitudes toward moving.
- Differences between earning opportunities and job prospects at home and in alternative locations.
- Prior movement of family members (and possible reunification of a family).

- Marriage.
- Distance and cost of relocating.
- Access to information and relocation networks.
- Ability to finance costly moves.
- Possession of assets that are difficult to transfer.
- Family strategies to minimize economic risks.
- Availability and quality of facilities at home and in alternative locations.⁵
- Economic inequality and relative standing in the community.
- Incidence of violence, disease, or disasters.
- Migration controls and incentives, especially on international migration.

Ideally, analysts would like to have information on all of these components, if only because omitting some measures might suggest patterns of association that are actually spurious. Yet largely because of a lack of data, no existing study incorporates all of these elements. At one extreme, the revealed preference approach to studying the causes of migration uses a multivariate approach to relate the migration outcome to as many potential explanatory variables as are available in the data, while bearing in mind the dangers of omitted terms. At the opposite extreme, it is possible to do much simpler cross-tabulations that relate the migration outcome to specific measures from the above list. This would yield instructive insights into what motivated people to migrate, although it would not produce results that could be safely interpreted as causal.

The other modules in volume 3 contain many of the elements listed above, although not necessarily in an ideal form for studying migration. This is not because of inadequacies in the draft modules but rather because of two main problems in understanding migration. First, when the migration occurred sometime in the past, the relevance of information collected at the present time to understand that past outcome is debatable.⁶ Second, since migration often implies a change of household and always involves a change of community, collecting information on a migrant's current household and community will not yield information on any factors that prompted the move.

These two problems need to be borne in mind in the following discussion, which will cover each of the explanatory categories listed above. In some instances questions in the draft modules will yield plausible proxies for factors that analysts would like to measure; in other cases the data need to be collected within the migration module.

PERSONAL ATTRIBUTES. It is well established that the propensity to migrate varies systematically with certain personal attributes such as age, gender, and education. To some extent, it is likely that these patterns reflect differences in employment opportunities. For example, it is frequently supposed that young people migrate more often because they have a longer lifespan over which they can reap the benefits of finding a new job and that better educated people possess superior information about job opportunities. However, available evidence suggests that personal attributes also play an independent role in influencing migration decisions. Thus it is likely that young (and single) people are simply more footloose and that education tends to widen people's horizons.

It should also be noted that the interpretation of some of these factors depends upon which migration measure is in question. If migration is measured relative to a person's birthplace, the cumulative chance of having migrated will generally rise with the person's age. On the other hand, if migration is measured by any location changes in the previous five years, the chance of migration will probably rise with the person's age until his or her late twenties, after which it will decline. Whatever the interpretation, these personal attributes are important explanatory factors that should generally be included in any analysis of migration. Data on these attributes are available from both the household roster and the education modules.

EARNINGS AND EMPLOYMENT STATUS. It is necessary to measure job and earning opportunities at home and in alternative locations in order to study the role that these opportunities play in migration decisions. However, measuring these factors involves at least two fundamental difficulties.

First, the draft employment module introduced by Chapter 9 does not inquire into what employment opportunities individuals perceive will be available to them if they relocate elsewhere. The reliability of responses to such questions would be very dubious so this should not be seen as a shortcoming of the employment module. The most common—if still rare—technique for addressing this problem is to simulate earnings (and, less frequently, employment opportunities) in alternative locations. This simulation can be done by performing a regression analysis of earnings on personal characteristics within various categories of location such as rural areas, capital cities,

and other urban areas.⁷ The results of this analysis can be used to project what earnings each person would have received in the alternative locations based on his or her characteristics.⁸ One major drawback to this approach is that the same personal attributes may influence not only migration decisions but also earnings and employment status, making it difficult for analysts to distinguish among these effects.

The second fundamental difficulty with this approach is the problem mentioned above regarding the time frame for measuring employment opportunities. Sjaastad (1962) viewed migration as an irreversible investment decision and argued that the appropriate measure of employment opportunities was the discounted stream of future lifetime earnings that migrating may bring to the migrant. At the opposite extreme, the decision to migrate may be seen as instantaneously reversible, in which case the only relevant employment opportunities are those available at the moment the decision is made. Yet neither of these two approaches has been taken in the literature on migration decisions. Instead, most studies have made a very strong, tacit assumption: that information about the labor markets at the time of the survey is a reasonable proxy for the employment opportunities people will consider when deciding whether to move. When labor market conditions in the relevant locations are relatively stable, this assumption is somewhat plausible. But in most situations this assumption becomes less reasonable as more time passes—indicating that it is preferable to analyze only recent migrations in relation to current employment opportunities.

LSMS-type surveys are designed to collect certain pieces of information that can enrich this area of investigation in a couple of ways. First, the draft standard migration module asks questions about a person's employment just before and after his or her most recent move. Second, the recall period in the retrospective section of the expanded version of the draft employment module introduced by Chapter 9—five years—is the same recall period that was used in questions about respondents' location in the draft migration module. Moreover, the short version of the draft migration module asks respondents how long they have lived in their current place of residence. This means that it is possible to use data on time since the last move in a simulation of earnings, in recognition of the fact that migrants may take some time to realize their full earning potential in a new location.

The time dimension of this problem suggests that panel data may be a solution. However, as has already been noted, it is not possible to use panel data to track respondents' employment histories unless the migrants can continue to be included in the sample in later rounds of the survey, perhaps through tracing. In principle, an alternative would be to collect information on the employment of absentee household associates in later rounds of the survey. However, it seems unlikely that interviewers could glean much reliable information on the earnings of absentee household associates from the remaining family members, although the remaining family members may at least know whether or not the absentee is employed.

In summary, how earnings differentials and the probability of finding employment (formal or informal) affect the rate of migration is an important factor in several areas of policymaking. These effects are crucial for evaluating the geographical integration of the labor market. And knowing the rate of migration may help analysts study the paradoxical possibility that urban job creation programs may create unemployment by prompting more migrants to move to the place where the jobs are being offered than the program can accommodate (see Harris and Todaro 1970, Stiglitz 1969, Corden and Findlay 1975, Smith 1983, and Fields 1989). However, in practice, the technical problems of simulating employment alternatives mean that it can be difficult to obtain reliable and precise estimates of whether and how people migrate in response to employment opportunities.

PRIOR MIGRATION OF FAMILY MEMBERS, MIGRATION TO REUNITE A FAMILY, AND RELOCATION AFTER MARRIAGE. The location of an individual's family members may play several different roles in influencing his or her decision to migrate. First, if other family members have already moved to a new area, they may be able to give prospective migrants useful information about what opportunities are available, help them make contacts in their attempt to find a job, and provide them with a cheap place to stay (Carrington, Detragiache, and Vishwanath 1996). Second, it is common for family members or a spouse to move to join a migrant in a new area in order to reunite the family or couple. Third, in many places it is common at the time of a marriage for at least one partner to migrate to live with the other (Rosenzweig and Stark 1989).

It is important to control for these forces or analysts may attribute a person's decision to migrate to the prospect of employment opportunities in a new place rather than to the real reasons for migration. However, there is still little literature dealing with these factors. As a first step, it may be desirable to include among the explanatory variables whether a spouse, spouse-to-be, or other close relative (perhaps a child, parent, or sibling) already lives in the contemplated destination of the prospective migrant.⁹ This information can be gathered in two places in the draft migration module.

In the case of a person who has not yet migrated, the issue is whether this person has family members living elsewhere. This will be ascertained through questions about the location of household associates, questions that are even in the short version of the migration module. In the case of migrants, what matters is whether a relative preceded them; this will be found out from the migration histories of any of the migrant's relatives who may live in his or her new household. The possibility exists that a relative preceded the migrant but has since moved on, or does not live in the same dwelling as the migrant. Thus the standard version of the draft migration module incorporates some specific questions about family and friends who already lived in the migrant's destination prior to the migrant's move.

To supplement this approach, migrants are asked if they migrated because they got married or because their parents moved. In addition, in the standard version of the questionnaire, migrants are asked with whom they stayed on arrival at the migration destination, who helped to pay their settling-in costs, and how they found their initial job. The lack of comparable measures for nonmigrants precludes the use of these measures as explanatory terms in regressions to study migration outcomes. It is envisioned that the answers to these questions will simply be tabulated to present frequencies of the different responses that were given.

DISTANCE, INFORMATION NETWORKS, AND THE COST OF RELOCATING. Many studies have found that long distances between the present location and the potential migration destination are negatively correlated with the incidence of both internal and international migration (Schwartz 1973; Lucas 1975; Molho 1995; Greenwood 1997). Thus it is important to control for distance when analyzing other causes. However, distance can also be a proxy for several underlying causes.

At least three elements are commonly assumed to be associated with distance: transport costs, the availability of information about job opportunities, and the extent to which a migrant feels estranged from home (in other words, the psychological costs of moving). Policymakers are mainly interested in the role of transport costs, which will be examined later when the role of facilities as a cause of migration is discussed. For now, it may be noted that reductions in the costs of transport (and communication) can have an impact on the other two correlates of distance by giving the migrant more access to information and by diminishing the psychological costs of relocation. Isolating these other two correlates of distance can be quite difficult, and their policy implications are less obvious. In some places governments have attempted to promote migration by providing information on certain destinations, although these initiatives appear to have had little effect.¹⁰ The idea that the further away a person is from a place, the less he or she is likely to know about it has been offered as an explanation for the common phenomenon of step-migration (first from a village to a town and later from the town to a metropolitan area). However, this theory remains untested and its policy implications are not obvious (Pessino, 1991).

In principle, it ought to be possible to find out from respondents what information is available to them about potential migration destinations. The correlation between this information and whether there are family members or groups of a similar ethnic origin at these destinations might then be explored; however, it is not clear what policy purpose such analysis would meet. Another approach might be to collect information in the community questionnaire on whether there has been previous migration to specific destinations from the community studied. The problem with this is that it is dangerous to use past migration to explain current migration; both may be shaped by the same underlying factor, in which case there is no direct causal connection. It may be as well to collect data on both distance and the availability of transport without attempting to disentangle the other correlates of distance.

This raises the question of how to measure distance. There are several issues involved. The first issue is between which two points distance should be measured. The solution depends on what kind of migration is analyzed. In the case of rural to urban migration, the

distance that needs to be measured is the distance from the migrant's rural place of origin to the town. For the migrants themselves, however, the key question is how far they moved. To calculate this distance, analysts ideally need information on migrants' place of origin. For this reason (among others), the standard version of the draft migration module includes questions about the migrant's specific place of origin and not just about his or her province of origin. On the other hand, for rural inhabitants who have not moved to a town, the relevant distance might be the distance from their present dwelling to the nearest town of a certain size.

The second issue to be settled is the difference between measuring the distance between two places as a straight line and measuring it in terms of the route that must be taken to travel from the first place to the second. Depending on the topography of the country, there may be a substantial difference between these two measurements. Generally, it makes sense to measure distance in terms of the actual travel route, although it may be more difficult to measure distance this way than to measure it as a straight line.

A third issue will arise if confidentiality considerations dictate that analysts cannot be given data on the places where the interviews were conducted. In these circumstances, only the staff of the statistical office will be able to calculate such measures as the distance to the nearest town or how far migrants moved from their original places of residence—since statistical office staff are the only people with access to the confidential information on specific interview sites.

ASSETS AND FINANCING MIGRATION COSTS. Two key aspects of wealth and unearned income are worth considering: the ability of migrants to finance costly moves and how people's migration decisions are affected by owning assets that are difficult to transfer geographically.

Clearly, well-off families find it easier to pay the expenses of moving than do poor families. However, if these well-off families have high levels of unearned income, they may feel less pressure than other families to relocate to gain access to jobs that pay more than they earn already. Therefore, several authors have suggested that the propensity to migrate may initially rise with the wealth (or unearned income) of a family and subsequently decline at higher income levels.¹¹ This hypothesis has attracted particular attention in the context of more costly international migration, but has

not yet been satisfactorily proven (Cornelius and Martin 1993; Faini and de Melo 1994; Hatton and Williamson 1994; Lucas 1999). What is clear is that the income class of migrants is well worth studying, as it has profound implications for how migration will affect income distribution.

It is important to collect information on the composition of a household's assets as well as on the total value of these assets, because owning certain assets can sometimes give individuals a disincentive to migrate. There are several reasons why families or individuals may find it difficult either to take specific assets with them when they move, or to rent or sell these assets. For example, the owner of an asset may possess specific information that makes the asset more valuable to this person than to others, yet he or she may not be able to share this information (Manove, Papanek, and Dey 1987). A landowner may know how best to operate his own land and find it difficult to explain this information to others (Rosenzweig and Wolpin 1985). It may be difficult for an owner to supervise a vulnerable asset from far away, and the asset may also lack a rental or sale market.¹²

There may also be other explanations for observed correlations between asset composition and migration outcomes. Measurement errors in evaluating assets could generate such patterns. Finally, the policy implications of analyzing the composition of assets as potential explanatory variables for migration are not clear other than the possibility that, for some, government policy could affect the relative price of assets or indicate the absence of a credit market (Morrison 1994).

An important issue to be considered is the appropriate measure of wealth to include in an analysis of the causes of migration. For most migrants the relevant information is likely to be the wealth of the family with whom he or she lived prior to migrating.¹³ In the case of nonmigrants what matters is the wealth of their current household. The wealth of a migrant's previous household is not measured elsewhere in LSMS surveys, but the wealth of the current households of both migrants and nonmigrants is thoroughly measured in the agricultural, household enterprise, and savings modules. Another alternative is to classify a household's wealth in terms of its level of consumption as collected in the survey's consumption module.

A distinction must then be made between analyzing respondents' migration histories and analyzing information about absentee migrants. While the

wealth and/or income of the absentee migrant's new family can be well documented, it is unlikely that a migrant who has left his or her parents' home will be able to provide much detail about his or her parents' assets or income at the time when the migrant left the original household.¹⁴ Even if the migrant were head of the household at the time he or she migrated, it is unreasonable to expect him or her to remember details about the assets the family owned at that time, particularly if the move occurred many years previously. Therefore, the expanded version of the draft module is designed to collect only some very broad indicators of family wealth at the time of migration. These include whether the migrant's family owned land or operated a household enterprise and whether the family was relatively well-off, about average, or poor at the time the migrant left. To gather comparable measures for nonmigrants, data from the agriculture, household enterprise, and consumption modules could be used.

FAMILY STRATEGIES TO MINIMIZE ECONOMIC RISKS. It used to be the case that analysts of internal migration concentrated on studying the risks involved in trying to find a job in town (Todaro 1969). However, these days it is increasingly recognized that in many contexts, living in the rural sector involves even greater economic risks (Stark and Levhari 1982). Families may attempt to spread their risk by sending some of their members to various other locations to minimize the chances that an economic downturn will happen in all of these different places at the same time. In this way, the different household members can insure one another against economic shocks.

There are two important policy reasons to include risk minimization in analyses of the causes of migration. First, omitting this factor may create false impressions of the role played by other policy-influenced variables. Second, the extent to which households are exposed to risk can be affected by government policies. For example, irrigation projects, crop and animal disease programs, and efforts to induce farmers to adopt risky new technologies can each alter the extent to which those who work in agriculture are exposed to risk. Social insurance (typically confined to towns) and relief efforts can mitigate risks.

In order to explore such questions, it is necessary to obtain some measures of economic risk. A distinction should be made between measurements properly

gathered at the household level and measures that should be gathered at the community level.

Many decisions made by households affect their exposure to risk. Risk may be reduced by investing in assets that can be liquidated if it becomes necessary to smooth the household's consumption, while risk may increase if a household adopts new agricultural technologies or installs private irrigation schemes. If a household has taken risks, it has a considerable incentive to insure itself by sending some household members to live and work elsewhere. This can also work in reverse; sometimes households may take risks precisely because their migrant members offer some degree of insurance. Also, some families may take less care to avoid negative outcomes when they feel they can rely on their migrant members for insurance—a phenomenon known as moral hazard. In addition, those households that adopt risky strategies may care less about risk than those that do not and may, thus, be less interested in insurance.

These complexities are part of the reason why analysts have yet to examine family risk-taking as a cause of migration. Nevertheless, the various modules presented in this book collect the data necessary to carry out this analysis. The agricultural module contains questions on irrigation, on what agricultural technologies a household has adopted, and on what agricultural assets it has that can be used to smooth consumption. The household enterprise module contains questions on other kinds of household assets. In some surveys the consumption module may contain questions that make it possible to analyze actual consumption smoothing. (Surveys with panel data are an example.) At least in principle, examined in conjunction with data on the incidence of absentee migrants from these households,¹⁵ these data allow analysts to study whether households that have exposed themselves to higher economic risk encourage more of their members to migrate.

At the community level, there are also a number of factors that influence the economic risks faced by households and may thereby encourage household members to migrate. Section 8 of the draft community module introduced by Chapter 13 suggests collecting data on several of these factors, such as the incidence of floods, droughts, earthquakes, epidemics, and crop diseases in the previous five years. Using the data on absentee migrants, it should be feasible to examine whether more migrants leave communities where

such incidents are common than leave other communities.¹⁶ This analysis is facilitated by the fact that, in contrast to household-level risk factors, most of these community-level risk factors are highly unlikely to be affected by migration.

In principle, analysts might also like to know the incidence of risks in the various locations to which a potential migrant might consider moving and to know whether disasters occurred in these locations at the same time as in the potential migrant's home area. The problem with this is that the community survey would have to be administered in communities other than those in which the sampled households were located, which is not feasible. However, in some instances, useful measures can be assembled from secondary sources. For example, if meteorological records exist both for the communities where the sampled households are located and for other communities, variability in recorded rainfall can be used as an alternative measure of weather risk.

FACILITIES. Another community-level variable that can affect migration is the availability of various facilities such as schools, health clinics, and transportation. To examine this relationship, analysts need community-level data on the existence of these facilities. Additional useful information would include the average distance that people must travel to get access to these facilities, how much is charged for the use of these facilities, and the quality of the various amenities that the facilities provide. Sections 3, 8, and 10 of the draft community questionnaire introduced by Chapter 13 are designed to collect information on schools, health clinics, and transportation—three kinds of facilities that are likely to affect migration. As noted earlier, the role that good rural transport plays in promoting or discouraging migration is complex and may depend in part on whether improving transport encourages household farms or enterprises to adopt cash crop production and small-scale manufacturing. The section of the draft community questionnaire on employment opportunities collects information on these elements.¹⁷

As was mentioned above, the community questionnaire is administered only in communities where the sampled households are located. As a result, analysts can only examine whether the existence of these facilities attracts migrants by studying the respondents' migration histories. If analysts are interested in study-

ing the role that the lack of such facilities plays in encouraging people to out-migrate, they must examine the data on absentee associates. In both cases, the analysts can enrich their analysis using data on the age of the education and health facilities from the draft community questionnaire; such age data reveals if the facilities were available at the time of the migrant's departure from the community.

However, in neither case can analysts draw on data on differences between facilities located at origin and destination. Partly because of this lack of data, the draft migration module includes a question asking migrants whether gaining access to more and/or better facilities influenced their decision to relocate. Again, secondary sources may supply useful data on the schools or health facilities that are available in various places; provided that specific places (as opposed to just the district or the region) are coded, this data can be merged into the data set after the survey. Where place names are not coded, secondary data can still be merged, by using averages for the relevant district or region. These averages could be derived from the relevant community questionnaires administered within each region. However, using such averages is clearly inferior to having data on specific places, as the averages are a less precise measure. The averages can also be particularly misleading when the districts or regions in question are very heterogeneous. (For example, some villages may have secondary schools while other villages in the same region have no schools at all.) These arguments in favor of coding specific places (which is done in the standard version of the draft migration module) also apply to merging data on rainfall or other risk components into the data set, as was discussed above.

ECONOMIC INEQUALITY. Several recent studies have emphasized the possibility that migrants' decisions to relocate are affected by their relative economic standing in the community (Stark and Taylor 1991). Investigating this possibility requires community-level data on prevailing economic inequality, which would permit analysts to establish where a potential migrant's household appears on the spectrum. Given a sufficient number of household observations within each primary sampling unit, the relative standing of a given household can be estimated from the household-level data. However, analysts must also take into account the household's likely standing in the community to which it is contemplating moving.¹⁸ This is not possible with

a typical LSMS survey. At best, LSMS and similar surveys provide analysts with data on the present standing of each household in the sample. This can be regarded as a factor that prompted absentees to leave or persuaded migrants to move in, but not as both a push and a pull factor in any individual's decision.

DISPLACED PERSONS. Although the number of displaced persons is estimated to be very high globally, only a few economic studies of the causes of migration have taken into account the factors associated with this phenomenon (Schultz 1971; Barkley and McMillan 1994; Morrison 1993). This could easily lead analysts to make erroneous assumptions about other causes. In addition, if high out-migration rates are observed in places devastated by violence and crime, there may be some potential for stemming this migration by reinforcing law and order. To begin to tackle this subject, analysts need information at the community level on the rate of crimes, violence, or incidents of civil unrest. Invaluable information of this type is often available from official records or from NGOs. Such secondary data can best be merged with the survey data if the specific place of origin—not just the region of origin—of each migrant is coded. This will make it possible for analysts to study the extent to which migrants move from unstable places to more tranquil places.

MIGRATION CONTROLS AND INCENTIVES. Most countries impose immigration controls. Ideally, analysts would like to know the legal status of each immigrant—both to check the efficacy of the controls and to examine the experience of undocumented immigrants in using facilities and finding jobs in the labor market. A few countries have attempted to impose internal migration controls.¹⁹ In these countries analysts may be interested in finding out how often people are granted or refused a permit to relocate. However respondents may not wish to answer such questions truthfully, and attempting to collect such information may compromise the remainder of the survey by alienating respondents in the sampled households. As a result, the draft migration module does not address this issue at all.

On the other hand, some countries have offered incentives to their workers to encourage them to emigrate—usually as guest workers (such as migrant workers in the Persian Gulf). Such incentives can include state-funded training, subsidized relocation costs, and state-sponsored recruiting. An important

policy question is whether, all other things being equal, the recipients of these benefits are more likely to emigrate than other people. The expanded version of the draft migration module includes a few questions about absentee emigrants that might be useful in circumstances where such incentive schemes are important. These questions deal with whether the absent emigrants received state-funded training, how their relocation costs were financed, and whether they were recruited by the private or the public sector. Tabulating these data should make it clear who benefits from such programs where the programs exist. However, even with these data, it is not possible to discern how much additional emigration these programs may have caused since there is no information on whether people who did not emigrate were denied access to emigration incentives.²⁰

Analyzing the Labor Market Implications of Migration

It is crucial in any study of migration to analyze labor market implications. Important issues include migrants' absorption into the labor market, the effects of migration on the labor market outcomes of non-migrants, employment patterns of immigrants, migrants' skills, commuting to work, and job searches.

ASSIMILATING MIGRANTS INTO THE LABOR MARKET.

The dynamics of migrants' absorption into the labor market have attracted particular attention in migration literature. Analysts of international migration have examined whether the earnings of immigrants are lower than the earnings of natives with comparable experience and education and, if so, whether the gap closes over time and whether immigrants eventually overtake natives.²¹ In countries from which many guest workers migrate overseas, critics often express concern about how returning emigrants can be assimilated back into the labor market of their home country and whether their sojourn abroad enhances their productivity on their return. However, these issues have not yet been thoroughly researched.

Analysts of internal migration have demonstrated considerable theoretical interest in the question of whether rural-to-urban migrants tend to make a transition from informal sector employment to formal sector employment after working in town for a while (Todaro 1969; Harris and Todaro 1970; Fields 1975; Mazumdar 1981). Employment opportunities in the formal sector (and workers' concomitant upward

social mobility) are a key incentive for people who live in rural areas to move to the city. However, there are few empirical studies that address the issue of transition into the formal sector (Banerjee 1983; Lucas 1985; Vijverberg and Zeager 1994; Marcouiller, de Castilla, and Woodruff 1997).

Issues of migrants' employment transition and assimilation can be studied using data on migrants' employment histories, employment data on a cross-section of migrants who have arrived in the urban area or from abroad at different times, or panel data on employment. There are tradeoffs involved in using the first two kinds of data. Employment histories can contain recall errors. On the other hand, employment histories are preferable to comparisons among a cross-section of individuals, for which unobserved differences may be the real cause of employment differences. Using panel data can circumvent both of these difficulties, although there is always a danger that in a very mobile population the panel will become biased—unless migrants are traced or data on the employment status of absentees are collected in later rounds.

Whatever kind of data are collected, it is possible for analysts to relate the earnings and employment status of migrants and the probability of them having changed their employment status (unemployed to employed or informal to formal employment) to the amount of time since the migrants moved, their biographical information (gender, age, education, country or region of origin, and mother tongue), and, often, their prior job experience.²² Regardless of whether analysts use data on migrants' employment histories or compare individuals at different stages since migrating, it will be necessary to collect some retrospective employment information, to measure migrants' prior employment experience, and to establish whether the migrants moved from unemployment to employment or from the informal sector to the formal sector. The draft migration module collects this information; additional questions on previous employment experience are included in the draft employment module (Chapter 9).

THE IMPLICATIONS OF MIGRATION ON THE LABOR MARKET OUTCOMES OF NONMIGRANTS. Much of economists' interest in migration focuses on how labor migration reduces the supply of labor in one labor market and increases the supply in another. To some

extent, wages adjust to these movements, although the incidence of unemployment may change instead. Thus important questions arise about what effect in-migration and out-migration have on the wages of other workers and whether the level of unemployment changes both in the place from which people migrate and in the places to which they move. These questions are relevant both to international migration (which may or may not depress the wages of native workers) and to internal migration (which, in the case of rural-to-urban migration, could increase the number of the urban unemployed). What kinds of workers migrate may influence the answers to these questions. Skilled immigrants may enhance the productivity of natives and, hence, raise their earnings. And the departure of skilled people from a community may prompt other community members to invest in their own training.

To understand how migration affects wages and unemployment, analysts need to understand how wages are determined in various labor markets and how the demand for workers changes in response to changes in wages. They also need to know what decisions local workers make—decisions about the number of hours they choose to work, the extent of their participation in the labor force, and whether they will take additional training courses in response to wage changes (Chapter 9).

A few empirical studies examine the effects of migration on changes in the labor supply and the implications of such changes for wage formation (for a review see Friedberg and Hunt 1995). Some of these studies use time-series data to examine the evolution of mean wages as migration varies over time. However, such time-series analyses can suffer from the fact that the observed mean wages include the earnings of migrants (after their arrival at their destination or before their departure from their original location). This makes it impossible to discover what effect migration has on natives' earnings (Greenwood, Ladman, and Siegel 1981; Garcia-Ferrer 1980; Salvatore 1980; Lucas 1987; Faini and Melo 1994). Cross-sectional studies of this issue have examined the wages of natives and related them to intercity variations in the number of in-migrants. However, a distorted picture can arise in these studies simply because migrants presumably prefer to locate in high-wage cities. A very few studies have attempted to adjust for this "reverse causality" by relating present in-migration flows to in-migration flows in the past. But such cor-

reactions are not entirely satisfactory since in the past people may have migrated to cities that today offer exceptionally high wages (Altonji and Card 1991; LaLonde and Topel 1991; Pischke and Velling 1994; Hoddinott 1996). Another approach is to examine the earnings of natives according to whether their occupation employs a large number of in-migrants; however, such studies may be very sensitive to the degree of heterogeneity in each occupation (Friedberg 1997).

Data for cross-sectional studies (either of the intercity or interoccupational type) can be collected in the kinds of surveys presented in this book. The draft migration module in this chapter identifies individuals as migrants or natives; the remaining data necessary for analyzing labor market issues can be collected in the employment module (Chapter 9).

PATTERNS OF IMMIGRANT EMPLOYMENT. Policymakers are interested not only in understanding the dynamics of the employment of immigrants but also in finding out immigrants' sectoral employment patterns. As noted in the first section of this chapter, if the sectors that employ significant numbers of immigrants receive effective government protection from import competition or receive any form of government subsidy, this is tantamount to encouraging immigration.²³ A simple cross-tabulation of employment by sector and by residence status (immigrant or native) would clarify the picture of these sectoral patterns.²⁴

MIGRANTS' SKILLS. The first section of this chapter mentions several reasons why policymakers are often interested in migrants' skills. How much natives earn depends on the skills of people who migrate into their area, and the "brain drain" effect relates directly to the skills of emigrants. An LSMS-type survey measures several dimensions of skill, including the quantity (and sometimes the quality) of migrants' education, how much and what kind of formal training they have received, their prior job experience (from their employment history), and—in surveys that incorporate aptitude tests—their inherent skills.²⁵ Descriptive data on these measures for migrants (including international as well as internal migrants) relative to non-migrants could be very useful to policymakers.

COMMUTING TO WORK. Commuting is of special interest in the study of migration, because policymakers may be able to influence the circumstances under

which commuting represents a viable alternative to migration. Commuting from a village to a town is not the only kind of commuting with importance for policymaking; policymakers must also understand the difficulty of reaching work from remote urban slums. Moreover, understanding the dynamics of commuting within rural areas may be crucial for establishing the extent to which rural public works projects can create employment. The draft employment module presented introduced by Chapter 9 contains relevant questions on commuting to work, the answers to which will enable analysts to compile some cross-tabulations on who is commuting and who instead works within their own community. It might be particularly interesting to compare this information with data from the community questionnaire on the availability of transport. Researchers may also be interested in exploring whether a worker's decision to seek or accept a job outside of his or her immediate environment depends on whether it is possible for the worker to commute or whether he or she will have to relocate. To date there seems to be no well-developed framework for analyzing this.

JOB SEARCH. The process of searching for a job and how migration is linked to this process is poorly documented and little understood. (For what documentation exists see Banerjee 1983, 1984b, 1991; Banerjee and Bucci 1994, 1995; Fields 1989; Lucas 1985.) Yet the ability to conduct an effective urban job search while still in a rural area affects both production efficiency and income distribution—in important ways. One of the very important implications of the Harris-Todaro (1970) model is that urban job creation and wage increases may cause people from rural areas to move to cities without having a job, under the assumption that it will be easier for them to look for a city job once they are already located in town. On the other hand, there is a considerable amount of anecdotal evidence—if little systematic information—showing that many rural-to-urban migrants find an urban job before they relocate (Banerjee 1991). In practice, it seems likely that some migrants find a job before migrating, while others migrate to urban areas in search of a job.

It is useful for policymakers to understand what differentiates these two groups. Are people with contacts in town more likely to find a job before moving? Are better educated people more likely to find a job

before moving, either because they have access to more job opportunities or because having more education enables them to access and process relevant information more effectively? Are people from villages near towns more likely to find a job before moving than people from more distant villages (especially since they may be able to commute into the city to search)? Do people who find a job before moving conduct their urban job search while being unemployed in the village?²⁶

To help analysts study these issues, the standard version of the draft migration module includes questions that ask migrants how long after migrating they started working and whether they were already offered their job before moving. It would then be possible to relate this information to the migrants' education, whether they had family members or other acquaintances already in the town, the distance to their previous home, whether they visited the present town to look for a job prior to moving, and their employment status (especially, whether they were unemployed) prior to migrating.

Analyzing the Implications of Migration for Income Distribution

To perform a complete analysis of migration's effects on income distribution, a wide range of links must be analyzed. While computable general equilibrium models are sometimes used to simulate the interactions arising from some of these links (Adelman and Robinson 1978), household survey data alone can certainly yield useful insights into a number of the key elements involved.

THE ECONOMIC STATUS OF MIGRANTS' FAMILIES. Are migrants more likely to come from rich or poor families? Does this pattern differ depending on the type of migration involved (such as rural-to-urban migration, rural-to-rural migration, or international migration)? How is the employment status of migrants influenced by the income class of their home family? In particular, are rural-to-urban migrants from poor households more likely to be unemployed than migrants from wealthier households? The answers to these questions are critical for building a picture of the effects of migration on income distribution, yet the information that has been collected to date, in previous LSMS surveys or elsewhere, is very limited.

So what sort of analyses are feasible using household survey data? Measures of each household's stan-

dard of living can be computed from data gathered in the consumption module (Chapter 5). The standard version of the draft migration module presented in this chapter includes questions about whether each household associate ever lived with the sample household, the present location of each associate, and each associate's principal current activity. When these sets of measures are available, it is possible to cross-tabulate the type of migration (and employment status) of people who have left a particular family with that family's standard of living.

One weakness of this analysis is that the family's standard of living may have been affected by the departure of the migrant. If panel data are available, the family's living standard before the person left can be measured directly using data from the first round of the survey. In the absence of panel data, it is useful to find out what the family's standard of living would have been had the person not left.²⁷ This requires an understanding of how the living standard of the remaining family members is altered by the departure of migrants.

THE EFFECT OF THE MIGRANT'S DEPARTURE ON THE FAMILY'S LIVING STANDARD. There are several aspects to the question of whether the remaining members of a migrant's family experience a lower or higher standard of living as a result of the migrant's departure. While living with the family, the migrant may have consumed more or less than he or she contributed to the family income. In addition, if the migrant sends money back to the family, this means that not all of the migrant's income is lost to the household. Remittances from the migrant (or simply the implicit insurance offered by migrant members) may enable the family to make extra investments—increasing the income-generating potential of the remaining family members.

On the other hand, the migrant's departure could cause remaining members of the household to lose access to certain productive assets. For example, the migrant might rent out some land that he or she owns. Alternatively, women left behind in a household may be denied access to communal assets because social norms decree that only men can use them. The remaining members may be induced to work harder than they did before the migrant left—either to offset the loss of income previously generated by the migrant or because the migrant's departure would otherwise leave productive assets idle. However, if the

departure of the migrant means that a greater burden of child care or other non-income-earning activities is laid on remaining household members, they may not have time to do this extra work.

The various modules of LSMS surveys are designed to gather data that can be used to calculate the net outcome of these effects directly, even with a single cross-section of data. However, having panel data would be particularly helpful in this respect. If analysts had panel data on consumption, they would be able to find out if consumption per person fell more in families from which a migrant departed between panel rounds than in families from which no one left.²⁸ Indeed, it would be possible to find out in which kinds of families (rich or poor) this happened, and for which kinds of migrant (for example, household heads or adult children of elderly parents). Without panel data, analysts can only establish whether per capita consumption is lower among households that a migrant has left. Considerable care is then necessary to address the statistical pitfalls of reverse causality—the chance that the person's migration was actually caused by the family's low consumption level.²⁹

Even if the consumption levels of remaining family members stay the same, these members may still be worse off if since the migrant's departure they have had to work harder to sustain their consumption level; workload must be considered an aspect of living standards.

The employment, household enterprise, agriculture, and time-use modules in this book are designed to collect data on both work outside the home and work in household enterprises and family-run agricultural enterprises. But for the present purpose, the standard version of the employment module offers sufficient information on the employment activities of household members.

Having panel data from the employment module would be very useful because it would allow analysts to relate any changes in the amount of time that each family member allocates to various employment activities to the migration of a household member. With only one round of data, analysts are restricted to comparing time allocation in families that a migrant has left with time allocation in families that no one has left (while controlling for other factors likely to affect these time allocation decisions).³⁰

DEALING WITH A TRANSITORY INCOME LOSS. The earlier discussion of the causes of migration noted that

families sometimes send their members to places where their potential for generating income will not be affected by local fluctuations in income levels. If this insurance strategy is effective, analysts should expect to find that families with migrant members living elsewhere are better able than other families to weather local fluctuations in earnings and thus maintain their consumption levels during both good and bad times. One key factor in a family's capacity to do this is whether the migrant member is sending them money—an issue that will be discussed in the next subsection. In the meantime, the question is how household survey data can be used to explore whether households with migrant members are better able to smooth their consumption than other households.

Panel data are probably the best kind of data for exploring this issue, but some analysts have used data from surveys that have interviewed households more than one time during the year to examine how families smooth their consumption across different seasons of the year (Paxson 1993). Nevertheless, the information about household associates that the draft migration module provides is sufficient for analysts to relate any consumption fluctuations to the number of migrants who have departed from the family, as well as to the migrants' relationship to the household and current place of residence (Kochar 1995). In forming this relation, it is important to consider other key factors that may also affect consumption smoothing (see Chapter 5) as well as the potential for reverse causality—that excessive fluctuations in consumption actually prompt migrants to leave.

Analyzing Remittances

Remittances between migrants and their original households have several policy implications (some of which were mentioned in the first section of this chapter). Policymakers need to know if the creation of high-paying urban jobs benefits the rural poor because the workers send remittances to their families in rural areas (Stark, Taylor, and Yitzhaki 1986, 1988). Also, they need to know whether families insure themselves against local income shocks by sending family members to live in areas unlikely to be affected by the same shocks (Lucas and Stark 1985, Hoddinott 1994). Another issue of crucial interest to policymakers is whether the existence of government and private transfer programs causes migrants to send less money back to their family, in the belief that the family will receive help from these programs instead (Cox and Jimenez 1997).

Remittances sent by migrants to a household with which they used to live—or from that household to the migrant—are only one of many different kinds of private interhousehold transfers (one example being remittances between individuals and families who have never lived together). A large number of these other transfers may also need to be considered in analysis. To address this issue, it seems practical for analysts to examine the transfer relationships between a household and the entire set of people who have been identified as household associates. Some of these household associates (possibly including former family members) will send nothing to the household, and the household will send nothing to some of its associates. Analysts need to know not only what kinds of associates send transfers to a household but also what kinds do not. This is why the transfer section of the miscellaneous income module is designed to collect data on transfers—both in cash and in kind—between the family and its household associates (see Chapter 11).

TRANSFERS AND INDIVIDUAL HOUSEHOLD ASSOCIATES.

Several factors influence the likelihood of associates sending transfers to a particular household. These factors include whether the associates ever lived with the family and how long they have been away, how closely the associates are related to household members, whether the associates have established their own family elsewhere, and how much the associates earn. Data on a migrant's relationship to the members of his or her original household should be available from the roster and extended roster. However, data on the other factors are not available elsewhere in typical LSMS-type surveys. Therefore, the standard version of the draft migration module includes some questions about household associates, such as whether they are now married and living with a spouse and/or children, whether they ever lived at the family dwelling and when they left it, whether they are employed, what kind of work they do, and where they currently live. These data (together with information from the roster and education modules about each associate's age, gender, and education) can be used to estimate an associate's earnings—making it possible to analyze transfers in relation to earnings.

TRANSFERS RECEIVED BY RICH AND POOR FAMILIES.

Policymakers may want to know whether rich or poor families receive more transfers from household associ-

ates (including absentee migrants). Answering this question requires measuring the household's prosperity. The family's current consumption level presumably depends, to some extent, on the level of transfers that it receives, which means that using current consumption as an indicator of the family's prosperity would be misleading. If household income data are available, an alternative measure of the family's prosperity might be total household income minus any transfers from associates (see Chapter 17 on the relative merits of collecting income data). But even this measure can be misleading, because receiving transfers may affect decisions family members make about working.

A third alternative is to measure what assets the family has that can be used to generate income. These assets can include not only physical assets such as land or household enterprise assets but also human capital assets such as level of educational attainment of adult members of the household (which influences these members' earning potential). Data on these income-generating assets are collected in the agriculture, household enterprise, and education modules.³¹ This third alternative could be extended to incorporate components of household income unlikely to be affected by current transfers from associates, such as pensions or social security payments. Incorporating these components would enable analysts to explore the hypothesis that families receiving benefits from government and private transfer programs are less likely to receive transfers from migrant relatives.

TRANSFERS AND RISK. Analysts may also be interested in relating transfers from associates to whether the family has a temporary loss of income for a reason beyond its own control. For example, does the family receive more transfer income from migrant relatives when the major earners in the household become ill? This can be studied by relating data on net transfers to data on workers being ill and unable to work. (See the health module introduced by Chapter 8 and the labor force participation section of the employment module introduced by Chapter 9.) Similarly, if a community suffers from drought, flood, or crop disease, agricultural income may decrease but transfers may increase. (See the history and development section of the community questionnaire introduced by Chapter 13.)

INVESTMENTS AND TRANSFERS. One issue that often arises regarding transfers is whether the recipient fam-

ily invests the money it receives. However, this question is irrelevant.³² If part of the cash transferred was spent on an investment item, this does not imply that the transfer has caused a net increase in the family's investments; the family may have been prepared to make that investment anyway using an alternative source of cash. In addition, even if the migrant does not send any transfers the family may invest more or adopt riskier productive activities in the knowledge that the migrant's location elsewhere provides the family with a financial safeguard. And if a family invests its transfer income—for example, by buying land—this does not imply that investment in the whole economy has risen; investment in the whole economy is affected by how the seller of the land spends the money that he or she makes from selling it.

If analysts nevertheless wish to obtain cross-tabulations of households' agricultural investments and adoption of advanced agricultural technologies against the level of transfers received by the household, they can do so using LSMS-type survey data. (See Chapters 18 and 19 on household enterprises and agriculture.)

REMITTANCE INCENTIVE PROGRAMS. There are at least two major difficulties involved in asking whether emigrants took advantage of tax breaks or exchange and interest rate incentives to send more money back to their home country. First, information may not be reliable; collecting information about taxes is notoriously difficult, and it is not possible to ask respondents whether they brought in money through the black market. Second, it can be difficult to analyze whether those who take advantage of the incentive programs would have remitted more anyway.³³ Therefore, the draft migration module does not contain questions about whether absentee emigrants took advantage of remittance incentive programs.

Analyzing Migration and Family Structure.

The composition of a cohabiting family can be altered not only by births and deaths but also by the arrival and departure of members. When these arrivals and departures come from migration (and not merely a change of residence within a town or village), migration and family composition become intimately associated. Since almost all existing measures of income distribution and poverty are based on the cohabiting family, these measures are influenced by migration's effects on family composition.

One recent study noted that when panel data on households are available, it is possible to find out whether high-income or low-income households are more likely to split up—either through the migration of some members or through the establishment of a second household in the same location (Foster and Rosenzweig 1996). It is important for analysts to know whether high-income or low-income households are more likely to split up because if some of the members of rich households leave and take assets with them, these households may not appear to become much wealthier over time, but the total wealth of the original group of household members may have increased substantially. As important as this line of analysis may be, the methodology for performing it is very much in its infancy.

Perhaps the most obvious way people join a family is through marriage. In many cases marriage involves the migration of one or both partners. Yet it is too simple to view marriage as the cause of migration. The decision to marry and the decision to migrate, while difficult to disentangle statistically, should be viewed as both discrete and interdependent (Behrman and Wolfe 1985).

As mentioned in the first section of this paper, the importance of reunifying families is a concern of social policymakers. This concern has certainly shaped immigration policy in a number of countries. Conjugal separation resulting from migration may be of particular concern to policymakers, as may the effects of parental absence on child care. The draft migration module collects data on the location of household associates. Combined with information on family members currently living in the household, these data can be used to study the likelihood of married couples living apart, along with such issues as the likelihood of small children having absent, migrant parents. Descriptive data on these phenomena can be informative, even though there is not yet a specific framework to more comprehensively analyze these factors (see, however, Banerjee 1984a).

Using Household Survey Data to Address Policy Issues.

The extent to which satisfactory answers can be found to questions about migration and migration policy varies considerably, depending in part upon the state of current methodology. The extent to which data from the draft migration module can address migration issues depends heavily on whether certain data are gathered in other modules in the survey. (Such data

will be discussed in the next subsection.) Box 16.1 summarizes questions that can be addressed using a well-designed LSMS-type survey as well as issues that cannot be tackled as effectively. This box has been prepared under the assumption that necessary data from other modules will be available.

Links with Data from Other Modules.

Migration affects and is affected by many aspects of individual and family behavior. As a result, the analysis of migration is extremely dependent on links with other modules of the surveys. Which modules are included in a given survey and which are excluded determines the aspects of migration that can be analyzed with resulting data. Links with other modules are summarized in Table 16.1. In addition, Table 16.1 itemizes the questions within the migration module that make it possible for specific issues to be analyzed. The relative importance of data from the other modules is categorized as follows:

- *Required.* A link without which analysis is impossible.
- *Recommended.* A link that is extremely desirable for analysis but not utterly indispensable.
- *Other.* A link that would be useful, typically for extended or complete analysis.

Most of the table's references to other modules should be self-explanatory. However, three references deserve separate mention. "Roster (B+C)" refers to sections B and C of the standard household roster; these sections collect information on the nonresident parents and children of household members. "Additional roster questions for associates" refers to the questions in the draft migration module that are to be included in the roster section so as to gather information on household associates. And "secondary data" refers to data on communities in which the community questionnaire has not been administered. Secondary data about such communities—data on, say, available facilities or incidence of drought—must be gathered from secondary sources (such as administrative data from government ministries) after the household survey has been conducted.

The key to merging secondary data with data on individuals is the coding of specific place names mentioned in the migration histories. Where place names are not coded, secondary data can still be merged, for example using averages for the relevant district or region. However, using such averages is much less

accurate than coding specific places. The averages can be particularly misleading when districts or regions are heterogeneous with respect to the measure merged.

Table 16.1 also broadly indicates how well specific migration issues can be analyzed given the collection of appropriate data from migration and other modules. Ranking the analysis potential of these issues, from "excellent" to "not possible," is intended to reflect the remaining limitations of the data, the difficulties involved in analyzing each issue, and how meaningful the results will be for different areas of understanding. Separate rankings are provided for the short, standard, and expanded versions of the migration module. The rankings differ where significant additional material is incorporated into the standard and/or expanded versions that is not included in the short version.

New and Unexplored Areas of Analysis

A number of the areas of possible analysis mentioned in this section are not yet well-developed—with some still very much in their infancy. Nevertheless, collecting enough data in these areas to construct cross-tabulations can be very helpful to policymakers. And having such data may eventually help analysts develop more rigorous approaches to some of these little-explored issues. Such issues include:

- Whether the prior migration of family members, family reunification, and marriage are causes of migration.
- Whether information networks influence the decision to migrate.
- Migration costs and their effect on migration decisions.
- The link between economic risks and migration decisions.
- The influence of facilities on migration decisions.
- The effects of violence and displaced persons on migration.
- The role of commuting as a possible alternative to migration.
- The link between migration and job search.
- The income class of migrants' families.
- The effects of out-migration on family living standards.
- Consumption smoothing and migration.
- The relationship between migration and investment and transfers.
- Migration and family structure.

Box 16.1 Policy Issues That Can and Cannot Be Analyzed Using Household Survey Data**Issues that can be addressed with household survey data***Migration patterns*

- What are people's most recent moves?
- What are people's five-year place-to-place histories?
- What are people's lifetime place-to-place histories?
- Is there step-migration? What is it like?
- Is there return migration? What is it like?
- What are the patterns of immigration?
- What are the patterns of emigration?

Causes of migration

- How do earnings and employment opportunities affect population movements?
- What are the important factors that limit geographical mobility?
- Can constraints on mobility be addressed through policy actions?
- Does having wealth enable more family members to migrate by making migration more affordable?
- Are migrants more likely to leave a community in which their relative economic standing is low?
- Are migrants attracted by good infrastructure facilities?
- How important are local violence and unrest in inducing departure?
- Do good transport opportunities promote migration or relieve the necessity to migrate? Under what circumstances?
- To what extent is the propensity to migrate less in communities far away from migration destinations?
- How important are family reunification, the prior migration of family members and friends, and relocation upon marrying as determinants of migration?
- How is the decision to migrate affected by the existence of considerable economic risks in the initial location and limited economic risks in the destination location?

Social mobility and migration

- How great are the economic returns of migration?
- Do the incomes of immigrants eventually catch up with the incomes of natives?
- Do the incomes of internal migrants eventually catch up with the incomes of local nonmigrants?

Poverty incidence, income distribution, and migration

- Do migrants come from richer or poorer families?
- Do the remaining members of migrants' families work harder?
- Are the remaining family members enriched or impoverished by the departure of migrant household members?
- Do migrants transfer more money to richer or to poorer families?

Migration and economic risk

- Is out-migration more common from areas with more substantial inherent risks (such as drought, flood, and disease)?
- Do migrants send more remittances when conditions at their original home are temporarily worse?
- Are families with migrant members living away from home better able to maintain consumption levels through difficult times than families without such migrant members?
- Do migrants reduce the amount of remittances they send back to a home facing economic adversity when insurance or other transfers (such as social security) are available?

Social issues and migration

- To what extent does migration result in conjugal separation?
- How important is local violence as a cause of migration?
- How is family structure affected by the arrival and departure of migrants?

Brain drain and emigration

- What is the educational background of emigrants?
- Who finances their education?
- Do emigrants return home? If not, do they continue to send transfers?

Immigration

- Does trade protection encourage industries that are major employers of immigrants?
- Do immigrants undercut local wages?
- Do foreign students stay on to work in their host countries?
- Are family members of immigrants employed?
- Do family members of immigrants receive state aid and spending?

Employment and migration

- How do immigrants and internal migrants find their first job in a new place?
- Do immigrants and internal migrants improve on their initial employment (better pay, greater stability, full-time)?
- What are the effects of immigration and internal in-migration on the earnings and job prospects of local nonmigrants?

Issues for which household survey data are of limited use

- What are the relative costs of moving jobs to workers rather than moving workers to jobs?
- Do strict controls increase the rate of illegal immigration?
- Are penalties on the employers of illegal immigrants effective, or do they simply encourage discrimination against all aliens?
- How effective are policy incentives to encourage transfers from abroad?

Table 16.1a Migration Module: Requirements and Links with Other Modules, Short Version

Aspect	Migration module questions	Additional roster question for associates	Links with other modules			Ability to analyze
			Required	Recommended	Other	
Patterns of migration						
<i>Individual data</i>						
Most recent move	1-9		Roster			Excellent
Five year place-to-place history	1-13		Roster			Excellent
Lifetime place-to-place history	1-7		Roster			Excellent
<i>General trends</i>						
Step-migration	1-13					Good
Return migration	1-13					Excellent
Immigration	1-4, 14		Roster			Excellent
Emigration		1-6	Roster (B+C)	Extended roster		Excellent
Causes of migration						
<i>Methodology</i>						
Self-reported causes						Not possible
Mover-stayer definitions	1-13					Excellent
<i>Cause</i>						
Personal attributes			Roster	Education		Excellent
Earnings and employment			Roster; Employment	Education		Good
Family and marriage		1-6	Roster (B+C)	Extended roster		Fair
Distance and transport	8-9		Community			Fair
Wealth and finance			Consumption		Agriculture, Household enterprise	Poor
Risks	8-9		Community	Secondary data	Consumption, Agriculture, Household enterprise	Fair
Facilities	8-9		Community	Secondary data		Fair
Economic inequality			Consumption			Poor
Violence	8-9		Community	Secondary data		Fair
Controls						Not possible
Labor market implications						
Effects on natives	1-9, 14		Roster; Employment	Household enterprise		Fair
Assimilation of migrants	1-4, 14		Roster; Employment	Household enterprise		Excellent
Immigrant employment patterns	1-4, 14		Roster; Employment			Excellent
Migrant skills	1-14		Roster; Education	Employment		Excellent
Brain drain		1-6	Roster (B+C)	Extended roster		Poor
Commuting	1-14		Community; Employment			Good
Job search and transition						Not possible
Income distribution						
Income class of migrants' families		1-6	Consumption	Miscellaneous income, Employment		Good
Effect of migration on family living standards		1-6	Roster (B+C), Consumption	Employment, Extended roster		Good
Consumption smoothing		1-6	Roster (B+C), Consumption	Extended roster		Good
Remittances and family income		1-6	Miscellaneous income, Roster (B+C), Consumption	Extended roster	Agriculture, Household enterprise	Fair

Table 16.1a Migration Module: Requirements and Links with Other Modules, Short Version (continued)

Aspect	Migration module questions	Additional roster question for associates	Links with other modules			Ability to analyze
			Required	Recommended	Other	
Remittances and risk		1-6	Miscellaneous income, Community, Employment, Roster (B+C)	Extended roster		Good
Remittances and individual migrants		1-6	Miscellaneous income, Roster (B+C)	Extended roster		Good
Policies to promote remittances						Not possible
Investments and remittances			Miscellaneous income, Agriculture, HH Enterprise, Roster (B+C)	Extended roster		Fair
Marriage, migration, and family structure		1-6	Roster, Roster (B+C)	Extended roster		Fair

Source: Author's evaluation of the migration module.

Table 16.1b Migration Module: Requirements and Links with Other Modules, Standard and Expanded Versions

Aspect	Migration module questions	Additional roster question for associates	Links with other modules			Ability to analyze	
			Required	Recommended	Other	Standard module	Expanded module
Patterns of migration							
<i>Individual data</i>							
Most recent move	1-11		Roster			Excellent	
		1-10	Roster (B+C)	Extended roster			Excellent
Five year place-to-place history	1-11, 36-40		Roster			Excellent	
		1-10	Roster (B+C)	Extended roster			Excellent
Lifetime place-to-place history	1-6		Roster			Excellent	
		1-10	Roster (B+C)	Extended roster			Excellent
<i>General trends</i>							
Step-migration	1-11, 36-40		Roster			Good	
Return migration	1-11, 36-40		Roster			Excellent	
Immigration	1-11, 41		Roster			Excellent	
Emigration		1-10	Roster (B+C)	Extended roster		Excellent	
Causes of migration							
<i>Methodology</i>							
Self-reported	12-14					Fair	
Mover-stayer defined	1-11, 36-41					Excellent	
<i>Cause</i>							
Personal attributes			Roster	Education		Excellent	
Earnings and employment			Roster, Employment	Education		Good	
Family and marriage	15-17	1-7	Roster (B+C)	Extended roster		Excellent	
Distance and transport	10		Community			Good	
Wealth and finance		27-35	Consumption		Agriculture, Household enterprise	Poor	Good
Risks	10		Community	Secondary data	Consumption, Agriculture, Household enterprise	Excellent	
Facilities	10		Community	Secondary data		Excellent	
Economic inequality			Consumption			Poor	
Violence	10		Community	Secondary data		Excellent	
Controls						Not possible	

(Table continues on next page.)

Table 16.1b Migration Module: Requirements and Links with Other Modules, Standard and Expanded Versions (continued)

Aspect	Migration module questions	Additional roster question for associates	Links with other modules			Ability to analyze	
			Required	Recommended	Other	Standard module	Expanded module
Labor market implications							
Effects on natives	1-11, 41		Roster, Employment	Household enterprise		Fair	
Assimilation of migrants	1-11, 41		Roster, Employment	Household enterprise		Excellent	
Immigrant employment patterns	1-11, 41		Roster, Employment			Excellent	
Migrants' skills	1-11, 41-47		Roster, Education	Employment		Excellent	
Brain drain		12-16	Roster (B+C)	Extended roster		Good	Excellent
Commuting			Community, Employment			Good	
Job search and transition	18-35		Roster			Excellent	
Income distribution							
Income class of migrants' families		1-10	Consumption	Miscellaneous income, Employment		Good	Excellent
Migration effect on family living standards		1-10	Roster (B+C), Consumption	Employment, Extended roster		Good	
Consumption smoothing		1-10	Roster (B+C), Consumption	Extended roster		Good	
Remittances and family income		1-10	Miscellaneous income, Roster (B+C), Consumption	Extended roster	Agriculture, Household enterprise	Fair	
Remittances and risk		1-10	Miscellaneous income, Community, Employment, Roster (B+C)	Extended roster		Good	Excellent
Remittances and individual migrants		1-10	Miscellaneous income, Roster (B+C)	Extended roster		Excellent	
Policies to promote remittances						Not possible	
Investments and remittances		1-10	Miscellaneous income, Agriculture, HH Enterprise, Roster (B+C)	Extended roster		Fair	
Marriage, migration, and family structure		1-10	Roster, Roster (B+C)	Extended roster		Good	

Source: Author's evaluation of the migration module.

The Migration Module

Three draft versions of the migration module are presented in this section. Notes pertaining to a few specific questions in these draft questionnaires and some general issues of definition in relation to the questionnaire are contained in the notes on the migration module (the final section of this chapter).

Principal additions to the standard version of the module not included in the short version are:

- Job search and the employment transition associated with the migrant's most recent move.
- Coding of the migrant's place of birth and place of previous residence.
- The reasons for the migrant's most recent move and the role of amenities in affecting the migrant's decision to move.

- Whether the migrant had family or other contacts in the new area prior to his or her most recent move.
- The educational attainment of household associates (for brain drain analysis).
- The current principal economic activity of household associates.
- The family members with whom associates live.
- Whether associates lived with the household in a previous dwelling.

The main suggested additions to the expanded version of the module not included in the standard version are:

- Whether each household member ever lived abroad.
- The location of a member's residence prior to marrying.

Box 16.2 Cautionary Advice

- *How much of the draft module is new and unproven?* The draft migration module differs substantially from the migration modules that were included in previous LSMS surveys. Even the short version of the module is designed to collect more information on respondents' migration histories than previous surveys, which usually collected only a portion of a migration history (such as the migrant's province of birth and previous residence). Many censuses and surveys have collected information on migration histories, and there is at least some evidence that recall data on major migration moves is reasonably reliable. Collecting information on household associates is new to LSMS-type surveys, although data on nonresident parents and children of household members have frequently been collected within the roster portion of previous LSMS surveys. Also, other kinds of surveys (such as the Botswana National Migration Survey) have successfully collected migration information on this "absentee" basis. Indeed, most of the components of the standard version of the draft migration module have been successfully adopted in other contexts. However, a few aspects of the expanded version are new, including the questions on the wealth of the migrant's original family and the migration histories of nonresident associates.
- *How well has the module worked in the past?* The data gathered on migration in previous LSMS surveys have not been studied very extensively, but this may be because LSMS surveys to date have collected only extremely limited information on the subject.
- *Which parts of the module most need to be customized?* Whether the list of household associates should include people on an extended roster (as opposed to just nonresident parents and children of household members) may depend upon the specific social setting as well as on how these data are likely to be used in analysis. Where analysts are planning to study interhousehold transfers, the list of associates may need to include absent spouses of household members and, in many societies, members' siblings. In contexts where emigration is a comparatively rare event, the questions on brain drain could easily be omitted. In places where internally displaced persons and international refugees are of particular concern, it may be appropriate to add some related questions to the draft migration module outlined here (as well as to the community questionnaire).

- The wealth of the family with which the member lived prior to his or her most recent move.
- More details on the migrant's employment before and after his or her most recent move.
- More details on emigration (for brain drain analysis).
- The migration history of household associates.
- Whether associates ever lived in the place where the interview is taking place.
- More details on the current employment status of associates.

The standard version is the form recommended in most contexts. The expanded version incorporates some additional questions that are specific to particular contexts or useful for extended analyses. The short version may be used in surveys for which migration is a low analytical priority. Appended to each version is a set of questions to be included in the household roster module (which is discussed in detail in Chapter 6). These questions gather data about household associates that can extend the analysis of migration in essential ways.

Which version of the module designers include in their survey should depend on prevailing local circumstances. In countries that send large numbers

of guest workers overseas, survey designers may want to include the expanded version of the emigration section. They may also wish to include the questions in the expanded module about whether the person ever lived abroad—making it possible for analysts to study the experiences of emigrants who have returned.

Notes on the Migration Module

It is important to clarify some issues about the draft module, relating to both general definitions and specific questions.

General Definitions

A "place" normally refers to a concentration of dwellings. For migration purposes an entire metropolitan area, including its immediate suburbs, might be considered one place, even though this definition would rule out the possibility of analyzing migration within metropolitan boundaries. Similarly, an entire village (and its associated land area) is normally considered a place. However, where settlement is very diffuse, survey designers will need to define the concept of a place very carefully prior to fielding the migration

module; preferably this definition will follow some notion of a community. (See Chapter 13 for a discussion of the concept of communities.)

To analyze place-to-place migration effectively, the place of current residence must be identified as precisely as possible. At the very least, analysts need to know a comparatively small administrative area (such as a district or county) in which the place of interview is located, as well as whether this is an urban or rural place. Without such information, analysts cannot observe patterns of migration among administrative areas or between urban and rural areas. Where confidentiality rules permit, it is desirable for the name of the town or village where the interview was conducted to be revealed. Knowing the town name allows more effective merging of secondary data, more accurate recording of distances, and more detailed examinations of place-to-place migration. In most previous LSMS surveys, it has been possible to release the names of the places where the interviews were conducted.

Throughout the draft migration module, to “live” somewhere means to eat and sleep in this place for three months or more. In some societies people distinguish between “staying” in a place—meaning eating and sleeping there—and “living” in a place—meaning owing allegiance to that place. In these cases the more appropriate term to use is “staying.”

The term “province codes” is used throughout the draft migration module. These codes should refer to small areas. In some countries “county” or “district” may be a more appropriate term. Interviewers must be provided with guidelines about what constitutes an “urban” area in a country.

“Household associates” are all the living people identified in Section B and C of the household roster: that is, all living parents and children of household members who are not themselves members of the household. The additional questions for household associates should also be asked about a head of household who has been absent for more than three months, even if this person is still considered a household member. If an extended roster is applied—identifying spouses, siblings, or other relatives of household members who are not themselves members—these people should also be included on the list of household associates. The ID number referred to in the associates section of the migration module is the ID number these associates were given in the household roster module.

Short Version

The comments in this section explain questions in the short, standard, and extended versions of the draft module.

2. If the interviewee has lived in this place for more than one period of time, interviewers should establish and record how long the person has lived there since he or she last stayed in another place for three months or more.
3. The purpose of this question is to find out where the person first lived. This does not necessarily refer to the person’s place of birth; the birth may have occurred in a hospital or while the mother was traveling.
12. It is best to reword this question so it refers to a well known national event that occurred around five years earlier.

Standard Version

2 AND 3. Questions 2 and 3 are the same as questions 2 and 3 of the short version; see notes above.

5. Place names will usually need to be coded after the initial interview. The main purpose of question 5 is to merge information about specific places, such as distance to the current place of residence, amenities available, incidence of disasters, or variability of rainfall. If a country can be divided into a small number of provinces or regions and the above measures vary little from place to place within the “province,” the code for each province can be printed immediately below the question, and no coding will need to be done after the interview. If the place is not coded until after the interview, it is useful to obtain a set of codes that are disaggregated to the level of the district or the county.

8. Interviewers should be careful to enter the person’s age, not the year in which his or her move occurred.
10. Question 10 is similar to question 5 of the standard version; see notes above.

12. Enter the single most important reason for moving to the current place of residence.

32. If the answer to question 32 is more than 60 hours or less than 10 hours, the interviewer should make sure the

respondent has understood that the time period being examined is one week (not one month or one day).

34. This question refers to the number of people who worked for the interviewee's firm or employer—not the number of people who worked at his or her plant or job site.

8 (QUESTIONS TO ADD TO ROSTER). The head of the household (and sometimes even the entire household) may have lived in another dwelling within the previous five years. If this is the case, question 8 of the additional questions for household associates should establish whether the associate lived with the household (head) at that time.

Expanded Version

When the expanded migration module is used, two questions need to be inserted into the standard version of the household roster module immediately following the question on marital status. The first question, "Where did you live during the three months before you were first married?" should use answer codes for provinces and foreign countries. The second question, "Was the place where you lived just before you were first married an urban area?" should use the answer codes "1" for yes and "2" for no. If a respondent has been married more than once, the second question refers to his or her first marriage.

Notes

The author is very grateful to Gary Fields, John Harris, Julie Schaffner, and the members of the LSMS authors' workshop for substantive comments on earlier drafts. Fiona Mackintosh provided invaluable editorial contributions. Special thanks are due to Paul Glewwe and Margaret Grosh for the major and patient role they played in shaping this chapter.

1. In this chapter the term "remittances" refers to private inter-household transfers of money or goods.

2. Such relationships are often referred to as micro migration equations, in contrast to macro migration studies—which (often using cross-tabulations of census data) analyze the proportion of a population that has migrated.

3. One weakness of adopting such a simple dichotomy is that some people may have moved into town and then returned to the rural area prior to sampling. Note also that if migration abroad is to be studied on this basis, emigrants who are identified as household associates need to be included in the sample.

4. See Lucas (1997, 1998) for surveys in the context of internal migration in developing countries.

5. The term "facilities" is used in this chapter to refer to a set of amenities that are available in a given place, such as elementary schools, health clinics, or services providing clean drinking water or electric power.

6. This issue probably becomes more severe the further back in time the analysis goes, which is a good reason to analyze more recent migration decisions—assuming there are enough recent migration outcomes to make such an analysis feasible.

7. These earnings and employment opportunities should include the informal sector as well as wage employment (Fields 1975; Mazumdar 1981). This means that data from the household enterprise module are needed to estimate the labor component of informal self-employment earnings (see Chapter 18). In addition, it is conceivable that personal attributes have quite different effects on earnings in the informal sector. If so, there is a need for a separate study of these earnings patterns as well as of the forces that affect distribution of workers between the formal and informal sectors.

8. In the more sophisticated approaches, it is explicitly recognized that the choice of location is endogenous to this process; hence, an attempt is made to correct for positive or negative selection. In other words, migrants may differ in ways that are not reflected in the measured attributes alone. See Falaris (1987) and Pessino (1991).

9. It may also be interesting to control for whether potential migrants have other friends and family in the location to which they are considering moving. However, collecting this information is more complex—partly because of the difficulty of being precise about "knowing" someone. Information about friends and more distant relatives is not collected in the draft module.

10. See Fuller, Lightfoot, and Kamnuansilpa (1985) for description and analysis of such an attempt in Thailand.

11. Some analysts have hypothesized that precisely the opposite holds: that the propensity to migrate is lowest in the middle-income range. See Connell and others (1976), Banerjee and Kanbur (1981), and Stark and Taylor (1991).

12. Social assets (such as local networks) may also tie individuals to a specific location, although to date this has not been tested in a very systematic way. See Jagannathan (1987).

13. This distinction has been neglected in the few empirical studies that have attempted to examine the role of wealth in promoting or limiting migration. An even more complex issue arises when one takes into account the wealth of the migrant's extended family—from which migrants borrow in some societies. See Ilahi and Jafarey (1995).

14. Note, however, that panel data on households can help bridge this gap by providing data on wealth in the early round and data on subsequent migration in later rounds.

15. For residents who have a migration history, the appropriate measure is really the economic risk faced by the family from which

they migrated. The migration draft module does not collect data on this measure because of the likelihood that respondents will have difficulty remembering such information accurately.

16. Note that this is not true for data on resident migration histories, where the appropriate community data would refer to the community that the migrant left behind, on which data are not collected.

17. Using data from the price questionnaire, it may be possible to study the indirect effect of better transport (and hence easier access to external food sources or markets) on prices (such as food grain prices); the resultant price changes can also affect migration.

18. There is some difficulty in defining the relevant reference group for social standing—particularly in larger settlements (Stark and Taylor 1991).

19. This has been the case in China and Vietnam, and was the case in South Africa under apartheid.

20. In places where studying and evaluating emigration incentive programs is important, additional questions might be inserted into the migration module asking non-emigrants whether they applied for specific forms of state emigration aid and whether these applications were successful.

21. This issue has received a lot of attention in the United States, where it has played an important role in debates over immigration policy (Borjas 1987, 1994).

22. A remaining problem is that migrants with unsuccessful employment experiences may choose to return home or move on elsewhere, which would leave analysts with a distorted impression if they studied only the remaining migrants. It may be possible to correct for this distortion using data from the migration histories; however, this issue has not yet been systematically addressed.

23. Studies in the United States and Europe have shown that heavily protected industries tend to be the major employers of immigrants. This is not quite the same as testing whether protection encourages immigration, but it is part of the picture. See Abowd and Freeman (1991) and Faini and Venturini (1993). On Malaysia see Martin (1994).

24. In contrast, it seems unlikely that sanctions imposed on employers can easily be examined using household survey data, partly because of a lack of variation in the coverage of the legislation but also because respondents are unlikely to answer questions about illegal employment practices honestly.

25. See Chapter 7 for a discussion of measuring skills.

26. Herzog, Schlottmann, and Boehm (1993) studied data from industrialized countries on migration and job searches; these data included an analysis of the net effect of migration on the duration of the migrant's period of unemployment.

27. There have been some studies along these lines. See Stark and Taylor (1991).

28. Note, however, that consumption per capita can fall even though each remaining person may be consuming more. This is

entirely feasible if the migrant received a disproportionate share of consumption.

29. The problem of reverse causality is not entirely removed by the availability of panel data; people may be persuaded to migrate by the prospect of their consumption falling in the future.

30. For references and a discussion see Chapter 9 on employment.

31. Indeed, there is an additional interest in relating transfers from household associates to the availability of such assets, as it is possible that people send transfers in the hope of eventually inheriting the assets, although in the long run even the possession of such assets can depend on transfers too.

32. See Lucas (1988) for a discussion in the context of guest worker emigration.

33. Note that this difficulty is not entirely removed in a panel survey when a change in policies occurs between rounds of the survey. It is still possible that those who plan to increase their remittances the most are more likely to take advantage of the new incentives.

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17

Should the Survey Measure Total Household Income?

Andrew McKay

Income is clearly a variable of critical importance in the household economy, as it provides the resources to finance current consumption and to undertake any savings. Households can derive their income from many different sources, which can be classified into factor income (payments received by households or their members in return for supplying factors of production that they own, such as labor or land) and non-factor income (net transfers received from sources outside the household that do not need to be repaid). Total household income is the sum at the household level of these diverse sources, and represents the total purchasing power available to a household in a given time period. This chapter reviews the importance of being able to measure total household income in LSMS and similar surveys in circumstances where consumption data are also being collected (including all circumstances described by this book). The relative importance of measuring total household income clearly has substantial implications for questionnaire design.

When full LSMS surveys have been fielded in the past, they have collected sufficiently detailed information on the dimensions of household living standards to enable analysts to estimate the level and composition of both total income and total consumption expenditure. In principle, having estimates of both total consumption and total income is useful for measuring and analyzing households' living conditions, both in their own right (for example, for studying poverty) and as explanatory variables for other important characteristics of households and their members (for example, nutritional outcomes). In practice, analysts have used the consumption data gathered in LSMS surveys far more often than the income data. There seem to be two reasons for this (Lipton and Ravallion 1995; Deaton 1997). First, most analysts believe that in developing and transition economies, household con-

sumption can be measured more accurately and comprehensively than household income. Second, much of the analysis of household surveys has focused on living standards and poverty, and there are widely accepted theoretical reasons for using consumption-based measures rather than income-based measures to analyze living standards. The validity of these arguments is considered in the first section of this chapter as well as in Chapter 5 on consumption.

Given that consumption data are always collected in LSMS surveys, is it worthwhile to also try to estimate total household income, bearing in mind the inevitable extra costs involved in collecting the additional data? The version of the questionnaire used in the original LSMS surveys in Côte d'Ivoire and Peru, which collected enough information to enable analysts to estimate total household income, was consid-

ered too expensive or not necessary in some places, where a “stripped down” version was used instead. In these cases (which have included the surveys in Bolivia, the Kyrgyz Republic, and Nicaragua), the resulting data set is not sufficiently detailed to enable analysts to construct reliable (or, in some cases, any) estimates of total household income.¹ Although all previous LSMS surveys have collected data on the income of those in wage employment, several surveys have not gathered data on household income from agricultural or nonfarm enterprises. In these circumstances analysts have inevitably had to measure living standards using consumption data. Thus the question arises: what is lost by not being able to estimate total household income, given that estimates of total household consumption are available?

In considering the issue of whether or not to measure total household income, two general points should be borne in mind. First, if survey planners have already decided to include specific modules on household agriculture and nonfarm enterprises, the marginal costs of collecting the additional information required to measure total household income are likely to be very small. Second, even if it is judged in any situation that relatively little is lost by not being able to estimate total household income, it can still be very useful for analytical purposes to collect information on some specific components of household income.

The following five sections consider in detail the issue of whether or not LSMS surveys should aim to measure the level and composition of total household income. In the first section, the benefits of estimating total income are discussed. The second section considers what is involved in measuring total income. The third section considers experience from recent LSMS surveys and other sources. The fourth section considers the costs involved in measuring total household income. The fifth section makes an overall evaluation of the evidence and indicates what conclusions can be drawn.

What Are the Benefits of Being Able to Measure Total Household Income?

In assessing the benefits of being able to measure household income, the first question to address is who is likely to use this information in their analysis. In the case of most surveys, there is a wide range of potential users ranging from those who need rapid, descriptive

information for immediate policy purposes (including officials in the statistical office and elsewhere in the government) to those who require more detailed information in order to conduct careful, in-depth research that will later have policy implications. Because users in the latter category need different types of information than users in the former category, it is important for survey designers to find out in advance which of these groups is most likely to use the data from the survey; this will influence the level of detail and precise content of the data that the survey collects (which will vary from country to country). For the purposes of this chapter it is assumed that the data will be used by the research community both within and outside the country and also that the data will meet the short-term needs of government policymakers.

As stated above, total household income is of interest both in its own right and as an explanatory variable for other household- or individual-level variables. In other words, total household income can be thought of either as an output measure for the household (for example, in studying poverty) or as an input measure (for example, as one of the determinants of a household’s willingness to send its children to school). In either case, having a measure of aggregate household income is useful primarily because of its close relationship to the household’s standard of living. For some analytical purposes knowing the composition of total household income can be as useful as knowing its level, but the implications for collecting data are the same in either case.

There are at least three main arguments for collecting the data needed to estimate total household income: total household income can be used to measure households’ standards of living; it can be used to understand determinants of poverty; and it can be used to estimate household savings. These arguments are considered in the following three subsections, after which other uses for income data are considered.

Total Household Income Can Be Used to Measure Standards of Living

When analysts have a measure of a household’s total income, this provides a means of measuring the household’s standard of living. This may seem to be the most obvious reason for collecting data on household income because a household’s standard of living is closely associated with the income it receives. However, as was noted above, total household con-

sumption can also be used to measure living standards, and this can be calculated relatively straightforwardly from the data gathered in an LSMS-type survey. Thus two questions arise. Is there any reason to prefer income-based standard of living measures to consumption-based measures? If not, do income-based measures provide sufficiently useful complementary information to the consumption-based measures to justify estimating them as well?

Regarding the first question, it is widely held that consumption-based standard of living measures are preferable to income-based measures (Deaton 1997; Lipton and Ravallion 1995), at least for developing and transition countries. Two justifications are commonly given for this. The first (equally valid in developing and industrial countries) is that a household's consumption level is more directly and closely associated with its current standard of living than is its current income. Income is certainly the means of financing consumption, but it is consumption that provides utility, the economist's measure of a person's welfare. According to this view, income can be thought of as an input while consumption is more closely associated with the output that is being measured (although Sen 1985 shows that consumption also has limits as a standard of living measure). Moreover, current income is often volatile from one year to another, being subject to significant shocks. This is especially the case for households that are engaged predominantly in self-employment activities or that are very reliant on transfers from either public or private sources. According to permanent income or life-cycle models, current consumption is usually significantly more stable than current income, given that it can be smoothed to some extent by saving and dissaving/borrowing.² As a result, current consumption bears a closer relationship than current income does to a household's permanent income or long-term standard of living, even when current income is reliably estimated. This remains true even when households cannot borrow to smooth their consumption because of the lack of effective credit markets.

The second justification (see, for example, Deaton 1997) is the perception that, in developing countries, estimates of total household consumption tend to be more accurate than estimates of total household income, a view based both on empirical evidence and a priori assumptions.³ The empirical evidence for this view will be discussed in the third section of this chapter.

If these points are valid, and they are quite compelling, they constitute a strong argument in favor of using consumption-based measures of standards of living instead of measures based on income, at least in developing and transition countries. However, even after accepting this, are there any reasons for analysts to use income-based measures of standards of living as well? One reason is that analysts can use the income-based measure to check the accuracy and validity of the consumption-based measure, although this is only useful if the two measures are consistent within a reasonable order of magnitude. A second reason is that for some households current consumption level may not be an accurate measure of long-term sustainable standard of living, even if current consumption level is an accurate measure of current standard of living. A household facing a major reduction in income may respond by selling some of the assets it needs to generate income—a move which may be costly to reverse and may reduce its future income levels. If the household's income does not return to its previous level, this sort of response is not sustainable indefinitely. In these circumstances, the household's current income might be as good a measure of its standard of living as its current (unsustainable) level of consumption. Analysts often wish to study such households that may not currently be poor but may become poor in the future, but they cannot easily identify these households unless comparable information is available on both income and consumption.

A third and more complex reason for using income-based standard of living measures is to distinguish between transitory and chronic poverty—an important distinction for studying the dynamics of poverty and directing assistance to those who most need it. Making this distinction requires that data exist for two different points in time. Panel data are not always available and can be problematic to use even when they are available (see Chapter 23 on collecting panel data and Ashenfelter, Deaton, and Solon 1986), but, to some extent, this distinction can be considered using data from repeated cross-sectional surveys. Using panel data from South India, Chaudhuri and Ravallion (1994) argued that consumption-based standard of living measures do not necessarily identify the chronically poor more accurately than income-based measures. They argued that although current incomes of households tend to be more volatile over time than current consumption levels, if current incomes display sufficient

co-movement (positive correlation) across households in the sample then observations of current income in a single cross-section might more accurately give the appropriate ranking of households according to their long-term standards of living. This was indeed so in the South Indian case studied by Chaudhuri and Ravallion; in that case current income data were more effective in distinguishing the long-term or chronic poor from the transitory poor. This evidence is no more than suggestive; the validity of the argument will certainly depend on the extent and nature of any measurement error in the income estimates.

In summary, a standard of living is a complex concept that cannot satisfactorily or comprehensively be measured by a single indicator. For most purposes, consumption-based standard of living measures are probably superior to income-based measures, at least in developing countries. However, if income can be measured with sufficient accuracy, income-based measures offer analysts information about household welfare that goes beyond what is offered by the consumption measures. This can be particularly important for studying the dynamics of poverty.

Total Household Income Can Be Used to Understand the Determinants of Poverty

In looking at living standards, analysts are interested not only in who is poor and who is not, but also why some households are poor and others are not. While consumption data are probably the best way to answer the first question, they can only partly address the second question. Ultimately analysts also need to know about the source of a household's purchasing power—in other words, its income—and the determinants of this. Thus data on total household income and its components can be very helpful in understanding the determinants of poverty. Data on household income also allow analysts to gauge the likely effects on households of policy changes, many of which affect household income directly.

An important starting point is to find out from where households derive their income. Many households in developing or transition countries receive their income from more than one source (for example, from a combination of agricultural income, wage income, and interhousehold transfers). This means that analysts need to know not only a household's income level but also the sources from which this income is derived. When analysts have data on the composition

of a household's income and on the household's poverty status, they can identify which income sources are characteristic of poor households and they may be able to discover some possible reasons for this relationship. For example, they might find that poor households have low economic returns to the activities in which they are engaged (possibly reflecting the nature of the household or the nature of the activity) or that they are not engaged in any economic activity (for example, due to unemployment or nonactivity) and thus rely on interhousehold transfers. Without data on total household income, it is hard for analysts to find out which of these situations applies and to identify the underlying reasons. Having data on household consumption alone would not provide this information. Also, having data on the time household members devote to different economic activities (available from the employment module) is not enough to inform analysts about the economic returns to those activities and hence their importance as sources of household income. While having these time use data is desirable, it is not a substitute for knowing the income derived from these different activities. That some types of activities have lower economic returns than others is a central factor in understanding poverty.

Of course, it is possible to model the determinants of living standards by looking at the relationship between a household's standard of living, as measured through consumption, and the characteristics of that household. A number of studies have done this. For example, this was done in regression-based studies of the determinants of household living standards by Glewwe (1991) using the results of the 1985 Côte d'Ivoire Living Standards Survey, and by Coulombe and McKay (1996) using the results of a similar Living Standards Survey in Mauritania. This approach makes it possible to identify which factors (demographic factors, the education level of the economic head, and so on) are associated with households with a high standard of living. However, many of the factors that influence a household's standard of living do so by affecting its income level. Moreover, certain factors are likely to be more important for some types of income than for others; for example, a person's level of education may have a greater influence on his or her wage income than on his or her self-employment income. Also, the point remains that the relationship between consumption-based standard of living measures and the types of variables that analysts might want to con-

sider as determinants of standard of living is indirect, operating through income. Where possible, modeling the determinants of different categories of income (for example, wage income and agricultural income) would enable analysts to have a clearer understanding of the causes of poverty.

To examine this relationship, analysts need data on each of the major components of household income because the factors that influence the levels of the different sources of income are typically different. For example, wage income is likely to be influenced by human capital variables, while income from agriculture is influenced by (among other things) the use of inputs to production (including land size and quality) and the price and composition of outputs. When data are available on the sources of household income, analysts can make a much closer mapping of the welfare level of a household and the individual determinants relevant to each of the household's income sources. This presupposes that sufficiently accurate estimates of household income are available.

It is crucially important that analysts and policymakers understand the determinants of a household's standard of living to guide them in choosing the most effective policy measures to raise the living standards of particular poor or vulnerable groups and to protect these groups from the adverse effects of a recession.

Total Household Income Can Be Used to Estimate Household Savings

A reliable estimate of total household income enables the estimation of household savings as the difference between household income and household consumption over a given period of time.⁴ This is clearly desirable, as there is relatively little reliable information in many developing and transition countries about the levels of household savings, much less their determinants. Many existing estimates of household savings are derived from the national accounts at an aggregate level and are often of highly questionable reliability.

The critical issue here is whether estimates of the flow of household savings derived in this way from LSMS and similar surveys will be sufficiently reliable. For instance, it must be ensured that the estimates of both total household income and total household consumption relate to the same period of time and that inflation does not make them incomparable (as it might if the recall period were different in each case and if the inflation rate were quite high; see the third

section of this chapter for further discussion of this). Second, calculating household savings as the difference between two large figures (household income and household consumption), each of which may be subject to significant measurement error, means that the estimate of savings is liable to be affected by the measurement errors contained in both estimates. This becomes even more serious if the income and consumption estimates are subject not just to random measurement error but also to bias. In this case, the differential in the bias between the income and consumption estimates will affect the estimate of savings. Worse still, the magnitude of the bias and of any random measurement error might vary systematically according to the type of household, which would be a problem for analysis, econometric or otherwise.

Despite these problems, modeling the determinants of savings at the household level is a highly attractive goal and has been attempted, for example, by Deaton (1992) based on data from the Côte d'Ivoire Living Standards Survey. Nevertheless, significant questions need to be raised about whether the estimates of household savings obtained in the manner described above are sufficiently reliable to make econometric or other analysis of them meaningful. The answer is likely to vary from case to case.

It is true that estimating total household income is not strictly necessary for estimating the flow of household savings, as these data can be collected in other ways—for example, by asking respondents a direct question about how much their savings changed in the previous year. (This was done in the third round of the Ghana Living Standards Survey.) Another way (which may yield more accurate information than asking respondents directly) is to collect data on the changes in assets held by the household. This option is discussed in some detail in Chapter 20 on savings in this volume. However, in order to use this approach to estimate household savings, the questionnaire must be designed to collect comprehensive data on the household's acquisition and sales of a full range of assets. As argued in Chapter 20, it is very unlikely that this approach will yield more accurate estimates of household savings than if this measure is computed by deducting total consumption from total income. Therefore, if analysts want to be able to use the survey to measure flows of household savings, it is necessary for the survey to measure total household income.

Data on the Income of Household Members Can Be Used to Study Intra-household Issues

Having data on total household income is also useful for a number of other analytical purposes. Among these, having data on the income earned by different household members can be useful for analyzing intra-household issues. The simple neoclassical model of the household assumes that the household's total income is shared equally among all of its members and that the household makes consumption choices according to a single, well-defined set of preferences, but it is widely recognized that the reality is likely to be different (see, for example, Haddad, Hoddinott, and Alderman 1997). There is a class of important policy questions that cannot be addressed within this aggregated household framework and that require information on what is happening within the household (for example, the distribution of income and consumption). To address such issues it can often be highly desirable to collect consumption data at the individual level, but collecting such data tends to be difficult and also very expensive. For these reasons (and as argued in Chapter 5 on consumption), LSMS surveys tend not to collect extensive individual-level consumption data. Therefore, consumption data are not very useful for analyzing intra-household issues in this instance.

Anthropometric data are commonly used to examine intra-household dynamics in practice. As argued in Chapter 10 on anthropometrics, it is highly desirable that anthropometric data be collected as part of LSMS-type surveys. These data are useful for analyzing intra-household issues, even though some analysts feel that they are only trustworthy for young children (see discussion of this issue in Chapter 10). Irrespective of this, it can be useful to collect information on income at the individual level (as far as is possible given that some household production is joint and is not necessarily easily attributable to individual household members) to supplement the anthropometric data in studying some intra-household issues. Hoddinott and Haddad (1995) have used individual-level income data from the Côte d'Ivoire Living Standards Survey to investigate whether the share of household income earned by female household members affects the consumption pattern of the household.

Other than this, the individual-level income data gathered in previous LSMS-type surveys have not been widely exploited, but there is a lot of potential for using them in both descriptive and more in-depth

analysis—for example, to estimate the contributions of different members to household income, the different economic activities in which different members are involved, and the different returns to these activities. However, there are some limitations to what kinds of analysis can be done with these data. Neither children nor old people within the household can be included in such analysis because they are unlikely to earn much, if any, income. Also, as was mentioned above, it can be difficult to attribute to any one individual the income from household activities that involve more than one member—although this might be attempted if the analyst knows which household members are engaged in a given self-employment activity and the number of hours they devote to it. Such information is generally collected in the employment module (presented in Volume 3).

Some analysis of this type could probably be conducted without an estimate of total household income. However, if analysts want to look at the distribution of purchasing power among household members (and the extent to which income pooling takes place), they clearly need data on all of the components of the household's income, with as many of these data as possible at the individual level.

Income Data Can Be Used to Measure Economic Activities Not Adequately Covered by Existing Statistics

Data from LSMS surveys can be used to address statistical issues beyond those for which they were explicitly designed; in particular they can help improve and develop existing aggregate and sectoral statistics. In many low-income developing countries, a serious dearth of statistical information on important facets of their economy (such as the informal sector and subsistence agriculture) raises questions about the quality of national accounts and sectoral statistics, with obvious implications for analysis. In such circumstances the income data available in LSMS and similar surveys may be better than those currently used to measure such activities. The LSMS data may be used to improve existing aggregate and sectoral data, as well as to construct or update social accounting matrices.

This is not by itself a sufficient argument for seeking to measure total household income in a household survey. However, it may be a valuable side-product where such data have been collected, one that has been underexploited in the past. One example of LSMS data being used to improve government statis-

tics is in measuring and studying the informal sector in Ghana using data from the Ghana Living Standards Survey (Coulombe, McKay, and Round 1996). While household survey data may not be the ideal source, and while it is necessary to consider the possibility of income underestimation in such surveys, the resulting estimates in this instance still appeared to be better than those that had been used previously. Comparable instances are likely to arise elsewhere.

Data on the Composition of Household Income Can Be Used to Define Socioeconomic Groups

In analyzing standards of living and related questions, it is invariably desirable to disaggregate households into groups according to various criteria in order to compare the different groups with one another and explore the reasons for any variations within and between each group. The obvious and economically relevant criterion by which households can be disaggregated is the main economic activity of the household, which, for convenience, is referred to here as the socioeconomic group of the household. There are various ways to define the main economic activity of the household. One common procedure is to classify households according to the activity of the economic head of the household (raising the issue of how the economic head should be defined). Another more direct and probably more meaningful criterion is the household's main source of income. While this is often the same as the activity of the economic head, it is not always, and, when it is not, it is probably the more appropriate criterion to use. The most obvious way to find out the household's main source of income is to collect data on a household's income by its main components (appropriately defined) and identify which source is most important. For this purpose, what matters is that the data on the composition (more than the level) of the household's income is reasonably accurate. A third, less attractive alternative is to identify the type of activity to which household members devote the most time, using information normally collected in the employment module of the questionnaire (see Chapter 9 on employment).⁵

Again, the fact that data on total household income and its composition can be used to define meaningful socioeconomic groups is not by itself sufficiently compelling to warrant collecting data on all household income. Clearly, though, where these data are available, it would be sensible to use them to define socioeconomic groups.

Summary

A number of potentially important uses for income data have been set out in this section. Some of them require reasonably reliable estimates only of the level of total household income, while others require accurate information on the composition of household income. Some uses are more important than others. Ultimately, though, the most compelling argument for having data on the level and composition of total household income, assuming it can be estimated with sufficient reliability, is the information these data can yield for understanding poverty and how poverty is affected by policy changes.

What Is Involved in Measuring Total Income?

This section considers the question of what precisely measuring total household income is likely to involve. First it addresses the conceptual question of what analysts are trying to measure. Then it discusses what measuring household income involves in practice and what problems can arise.

Conceptual Issues Involved in Measuring Household Income

A useful framework for thinking about measuring total household income (as well as household consumption) is offered by a system of household accounts that summarizes the production, consumption, and accumulation activities of households in three separate but related accounts. (These accounts are production, current, and capital accounts, respectively; see Johnson, McKay, and Round 1990, as well as UNSD 1993 and Ruggles and Ruggles 1986 for analogous concepts at the macro and aggregate levels.)⁶

DEFINING HOUSEHOLDS. The issue of how to define a household is discussed in detail in Chapter 6 on the household roster. However, in the context of measuring household income, it is appropriate to recognize that in developing and transition countries, many households, such as agricultural households and households that run household enterprises, may be production units as well as consumption units; furthermore, the best way to define a household as a production unit may not be the best way to define it as a consumption unit. This can be an important difficulty in practice, as Devereux 1992 shows based on fieldwork in northern Ghana. It is clearly important that a

consistent definition of the household is applied throughout the survey. If this definition is based on the consumption unit, the income from the household's production activities needs to be related to the same unit, which is not a trivial exercise.

AN OPERATIONAL DEFINITION OF INCOME.⁷ As discussed above, in broad terms households and household members earn "income" by supplying factors of production that they own to productive activities and by receiving current transfers. With regard to factor income the fundamental issue that arises is the definition of productive activities, which can be particularly problematic in developing countries given that markets are often underdeveloped and so much economic activity takes place outside the market. Thus, while it is possible to start from Hicks' (1971) definition of production as "any activity directed to the satisfaction of other people's wants through exchange," this must be interpreted sufficiently broadly to include various forms of nonmonetized exchange such as barter and wage payments in kind. Even this expanded interpretation of Hicks' definition of production fails to take into account household own-account activities in which the household produces a good or service that is a close substitute for one available on the market but consumed by the household itself. The most obvious example is subsistence agricultural production, although some nonagricultural self-employment activities also include an element of production for the household's own consumption—for example, the construction of furniture or sewing garments for the household's own use. Natural habitat utilization—collecting and gathering items from natural sources—should also be allowed for in a measure of total household income where this is important.⁸ Note that where each of these imputations is included in a measure of total household income, they must also be included in the measure of total household consumption.

An extended definition of production used by Hill (1979) considers production to be any activity that can be carried out with comparable results by an economic unit other than the one that actually carries it out. Under this definition, not only subsistence production but also a whole range of additional service activities performed within the household can now be regarded as productive, including childminding, food preparation, and fetching firewood or water. Moreover, such activities can be quantitatively impor-

tant in estimating total household income, which may change the analyst's perceptions of poverty and inequality among households.⁹

However, in practice, household production is generally defined less broadly than Hill's definition because too many measurement problems can arise with this ideal concept. Thus, while own-account production of goods within the household is usually included in a practical definition of production, own-account production of services within the household (such as childminding) is usually excluded. This is the case in the latest System of National Accounts and is also consistent with previous LSMS surveys. Therefore, this chapter, in accordance with the consumption chapter (Chapter 5), assumes that it is impractical to try to cover service activities conducted within the household in the estimation of total household income (or consumption) because of the practical problems involved in valuing these activities.¹⁰ Finding ways to overcome such problems is nevertheless an important priority for future research.

Factor income can be defined as the payment received by a household for supplying factors that it owns (such as labor, land, and capital) to a productive activity. This definition holds whether this productive activity is carried out by the household or by an institution or individual outside the household and whether the payment is made in cash or in kind. There are three main types of factor income: wage income, rental income, and self-employment income. (These categories can obviously be disaggregated further in specific cases.) Wage income is received in return for the supply of labor services; rental income is received in return for the supply of land, capital, and other assets; and self-employment income is typically a return both to labor supplied by household members and to other factors these members own, such as land or capital.

Transfers can be received from various sources, including firms, government agencies, other households, and nongovernmental organizations of various types (any of which may be domestic or foreign). Only current transfers (such as interhousehold transfers of cash or food) and not capital transfers (such as inheritance of land or receipt of a loan) should be regarded as income.¹¹ In practice it can be difficult to distinguish between current transfers—a source of income for the household—and capital transfers. For example, when a household receives a transfer from another

household, this may or may not involve an obligation (implicit or explicit) to repay. Also, a dowry may fall into either category depending on what form it takes.

VALUATION. For market transactions, goods are usually valued in accordance with prevailing market prices—in other words, those prices actually paid or received by the household.¹² Valuation is much more problematic in the case of imputed transactions. When the household's productive output is exchanged by barter, the most appropriate way to value the goods received in return is presumably to use local market prices. A similar principle would hold for wage income received in kind.

However, in both cases, the question arises whether the consumer (purchasing) or producer (selling) price should be used. (The same question also arises in the valuation of nonmarketed household production such as goods produced by the household for its own consumption; see the discussion of this issue in Chapter 5 on consumption). Using the consumer price will typically yield a different valuation than using the producer price. Using the consumer price may be more appropriate for measuring welfare (given that an analogous good purchased on the market would be valued at its market price), but inconsistencies can arise. If some of the output of the household's production were sold in the market, it would be valued at the producer price. Yet a higher valuation is placed on exactly the same output when it is consumed by the household. Moreover, there is the problem that the household's own produced food is unlikely to be a perfect substitute for that purchased on the market.

Similarly, if both food that a household produces for its own use and food that it produces to sell on the market were valued at the producer price (which would be sensible from a production point of view), the household's consumption of its own production would be valued differently from the same goods purchased by the household on the market, which would be valued at the consumer price. This appears inconsistent from the point of view of measuring welfare. The consumer and producer prices can be thought of as representing upper and lower bounds, respectively. Neither valuation is clearly superior to the other. For reasons discussed in more depth in Chapter 5 on consumption, the proposed consumption module asks respondents to value their consumption of their own

production themselves. Given that this will be difficult for respondents to do, they are not told which valuation principle to use. However, since they are also asked to quantify their own consumption, the resulting data set will contain the information necessary to compare the implicit unit value of the household's consumption of its own production with data from the agriculture and consumption modules on the unit value of sales and purchases of the corresponding commodity in the market. This is important because if different respondents used different principles to value their consumption of their own production, estimates of total household income or consumption (which would include these data on the household's consumption of its own production) would not be comparable without being adjusted to account for the use of these different valuation principles. Since unit value information would be available in the data set, this adjustment could be made if necessary.

SUMMARY. A theoretically valid concept of household income should include an appropriate and consistent valuation of factor income from all productive activities, whether they are carried out entirely within a household or for another institution outside the household. Such a concept should also include a valuation of all current transfers received by the household, whether in cash or in kind. Table 17.1 reflects the above discussion in setting out the types of income components on which information should be collected in the survey questionnaire. Some of these components involve imputation; where they do, exactly analogous imputations are required to estimate total household consumption. (Table 17.1 provides details of this.) If analysts are interested in intrahousehold behavior, it may be desirable to collect information on which individuals are involved in each activity and to what extent, on who receives the income, and on who controls its use.

Estimating Total Household Income in Practice

Many household surveys have aimed to collect the information necessary to estimate total household income, including the LSMS surveys conducted in Côte d'Ivoire, Ghana, Nepal, Pakistan, Peru, and Vietnam. However, the difficulties involved in measuring household income should not be underestimated. Even if respondents are willing to answer all of the questions asked and do so as honestly as possible, the

Table 17.1 Measuring Total Household Income

Income component	Data that must be collected
Income from wage employment	Wage income in cash Wage income in kind * Bonuses
Household agricultural income	Revenue from the sale of crops Revenue from the sale of processed crop products Revenue from the sale of animal products Consumption of self-produced food * <i>Minus</i> Expenditure on inputs for crop cultivation Expenditure on inputs for producing processed crop products ^a Expenditure on livestock inputs Depreciation of agricultural capital equipment
Nonfarm self-employment income	Revenue in cash from sale of output Revenue in kind from sale of output Consumption of own produced output (where appropriate) * <i>Minus</i> Expenditure on inputs Depreciation of capital equipment
Imputation for commodities obtained from natural sources*	Food commodities * Nonfood commodities (where not otherwise included) *
Actual and imputed rental income	Income from renting out household assets Imputed rent of owner-occupied dwellings *
Income from private interhousehold transfers	Income from private interhousehold transfers in cash and kind (where no repayment is expected)
Other income	Various miscellaneous income (income from pensions, unemployment benefits)

* Elements that should also be included in an estimate of total household consumption

a. Excepting products supplied by the household itself.

Source: Data compiled by author.

myriad of income sources households can have makes it difficult to be sure that all income sources for a given household have been identified. For example, some sources of income may be very casual or infrequent, and, therefore, the respondent might not think to mention them in response to questions about wage employment or nonfarm enterprises, either of which may be taken by the respondent to refer to more formal or more sustained activities.

Respondents may genuinely not know their income from certain activities, especially self-employment activities for which they often do not keep accounts. Indeed, the concept of income in an accounting sense or in the sense used by economists may be quite foreign to respondents. This need not be a problem, but it means that it will generally be necessary to estimate some components, such as income from self-employment activities, indirectly. For income from self-employment activities it will probably be necessary to collect information on revenues and input expenditure separately (as reflected in Table 17.1). The wide variety of forms in which households can receive transfer income may mean that some sources are simply not included in the questionnaire.

(The sources excluded may not be very important overall but may be very important for a small number of households.) Another important issue is that where respondents are asked to make imputations, such as placing a valuation on wage income received in kind, it may be very difficult for them to do so.

Estimating total household income in accordance with Table 17.1 involves collecting information on at least the following four elements: income from wage employment; agricultural income; nonfarm self-employment income; and nonlabor income. Given the very different nature of each of these income sources, the data necessary to estimate them will almost certainly be collected in different modules within the questionnaire. The natural place to collect the data necessary for estimating income from wage employment is the employment module. Data on income from household agriculture and nonfarm enterprises can naturally be collected in the modules devoted to these topics, while data on nonlabor income can be gathered in one or more short modules designed with the principal aim of identifying such income and estimating its magnitude. This is essentially the model that was followed in the early LSMS questionnaires as well

as in many other household surveys that have collected the information needed to estimate household income.

When survey designers are deciding how to collect these income data, they need to recognize the potential complexity of the household economy, which is relevant to all four of the major components of household income outlined above. Household members may be engaged in more than one wage employment activity, simultaneously or sequentially, during the reference period or periods. The household's agricultural activities may involve cultivating several different crops as well as keeping livestock—and may thus involve various inputs. Households may also run more than one nonfarm enterprise. Thus a large and complex questionnaire is needed to ensure that all of this information is collected, even though large parts of the questionnaire may be irrelevant for many households (for example, because they do not farm), which will make the interviewers' burden less daunting than it appears at first sight.

This means that a questionnaire collecting total income data must contain both an agriculture module and a nonfarm enterprise module. When survey planners already intend to include both of these modules because the information they contain is of interest in its own right, the data collection implications of aiming to estimate total household income are modest. The proposed standard versions of the employment, nonfarm enterprise, and agriculture modules (introduced in Chapters 9, 18, and 19) collect information on income from wages, nonfarm enterprises, and agriculture. Therefore, measuring total household income simply requires that a module on transfers and other nonlabor income is included in the questionnaire (see Chapter 11).¹³ However, if survey planners do not include the standard agriculture and nonfarm enterprise modules, analysts will not be able to measure total household income. Another possibility is to try to collect information on self-employment income directly in the employment module. The employment module in many previous LSMS surveys asked individuals about their cash earnings from the self-employment activities they reported. Combining this information with data on the household's consumption of its own production could yield an alternate estimate of income from self-employment activities. The cost of adding a couple of extra questions on earnings from the self-employment activities of house-

hold members is very small compared with the cost of adding whole modules on household agriculture and nonfarm enterprises, which makes this seem an attractive option in some cases.

However, how accurate can respondents be in reporting their self-employment income? The informal nature of most self-employment activities means that the vast majority of respondents probably do not keep accounts for these activities. Moreover, since most self-employment activities involve both expenditure on inputs and revenue from the sale of outputs, both of which may include imputed as well as cash elements, it is very difficult to see how a respondent can answer a single question about their self-employment earnings from a given activity in a particular reference period (for example, the previous seven days). The situation is even more complex when the self-employment activity involves more than one household member working together and members are asked individually about their earnings from the self-employment activity; in such cases it will be problematic to attribute the total profit of the activity between them. However much time is saved by estimating self-employment income this way, the reliability of the responses obtained must be open to serious doubt, more so than most other questions in the questionnaire. (This view is consistent with the opinions of the authors of the employment, agriculture, and nonfarm enterprise chapters.) The author of this chapter strongly recommends against estimating income from self-employment this way, whether or not the questionnaire includes the agriculture and nonfarm enterprise modules.

Another important practical issue is the recall period used to measure the different components. Because household income is complex, data should be gathered component by component in such a way that analysts will subsequently be able to add the different income components together to compute a household's total income, to analyze the implications of the composition of a household's income, or both. However, the most appropriate reference period to use for each component of income is not necessarily the same. (See the specific chapters for discussion of appropriate recall periods for estimating each component of income.) It is appropriate to collect wage income data on a weekly recall basis, as the short recall period will hopefully make the responses more accurate. However, a weekly recall period is clearly inap-

appropriate for collecting data on transfers and other nonlabor income, which may be received by only a small number of households, and may also be received infrequently. For these components a longer recall period, perhaps 12 months, may be more appropriate. A more complex issue is the appropriate recall period for the self-employment income components, especially for agriculture. In agriculture, revenues and input expenditure are likely to be made at different points in time throughout the agricultural season. Moreover, the agricultural season is the natural reference period during which respondents can be expected to supply information about their revenues and input expenditure. This can cause a number of difficulties in practice. The agricultural season does not correspond neatly with the calendar year. The agricultural season may vary from one part of the country to another or from one crop to another. And while it may be desirable to interview all agricultural households at a similar point in the agricultural season (for example, after the harvest), this is likely to cause problems in the interview schedule. Chapter 19 on agriculture discusses these questions in more detail.

The key point is that data on different components of income are usually collected using different reference periods, which analysts need to take into account when adding the data together to calculate total household income. Of course, a similar problem arises in estimating total household consumption, given that it is desirable to use different recall periods for collecting data on consumption of different items to reflect different frequencies of consumption. However, the problem is more serious in measuring total income, in particular because of the desirability of using the agricultural season as the reference period for collecting data on income from this source. The agricultural season cannot easily be converted into the calendar month or year basis on which the other components of income can be computed, and the appropriate conversion factor may vary from situation to situation.

The need to use different reference periods for gathering data on different components of both income and consumption can make it difficult to compare estimates of total income and total consumption. Making this comparison is absolutely essential for measuring household savings (by subtracting total household consumption from total household income) and is necessary for many other analytical

purposes (see the first section of this chapter). The problem of a lack of comparability is most likely to arise in countries that are experiencing high or moderately high inflation or that are affected by large seasonal variations in prices throughout the year. In these countries, respondents would most likely value transactions that took place within a 12-month recall period at the prices prevailing at the time of the transactions, whereas they would probably value transactions that took place within a recall period of the previous week at current prices. While the values of both kinds of transactions can be expressed on a comparable basis (say, monthly or annually), there is a potential source of error in adding them up because of the different valuations used due to the difference in recall periods from component to component.

An additional problem in comparing total income and total consumption in a high-inflation economy is that the “average recall period” used for the income modules is probably longer than the one used for the consumption modules. Correcting for this problem is not straightforward, as it requires detailed information, ideally by locality, on the variation of prices during the period when the survey is conducted and the preceding year (or whatever is the longest recall period used in the survey). It may be especially difficult to make this correction for self-employment income, given that sales revenues have probably been received and input expenditures incurred by the household at different—and usually unknown to the analyst—intervals throughout the reference period. Any measurement of this kind is difficult in economies with high inflation rates or intrayear variability in prices, and this applies to all monetary variables, including consumption as well as income.

How Successfully Has Income Been Measured in Developing and Transition Countries?

How successfully have household surveys in developing and transition countries measured total household income? There is a wealth of experience on this question; this section will focus on recent experience in developing and transition countries, particularly in instances where data from LSMS surveys have been used to calculate total household income.

As noted above, there is a widespread perception that estimates of total household income derived from household surveys conducted in developing and tran-

sition countries are often unreliable—and certainly less reliable than estimates of total household consumption derived from the same source. This could be because the questions relating to income are less accurately answered than those relating to consumption; it could also be because information on consumption is more fully and more comprehensively collected than data on household income. If income information were not collected as comprehensively as consumption information, income is likely to be underestimated relative to consumption. If the problem were inaccurate answering, this might or might not lead to an understatement of income.

Why Income Appears More Difficult to Calculate Than Consumption

There are a number of reasons why this perception is so widespread. First, income is a much more sensitive topic to ask people about than expenditure. Respondents may have an incentive to understate their income in a survey interview, especially if they fear that the information may be used for tax purposes (notwithstanding assurances to the contrary). This is obviously a problem in developed countries as well as in developing and transition countries, but it may be more acute in the developing and transition countries given the significantly greater importance in these countries of self-employment income (which is easier to understate than wage income).

Second, as has previously been observed, respondents may genuinely not know how much income they make, especially in their self-employment activities. Measuring self-employment income is difficult even in developed countries, and higher proportions of households in developing and transition countries are generally engaged in work for themselves. However (aside from the above incentive to underreport income), the situation is further complicated in developing and some transition countries by the general absence of written accounts for household production activities. As noted above, it may be necessary to take an indirect approach by asking about as many financial details as possible and computing an income figure from these bits of information. However, this is likely to require collecting quite a lot of information. Moreover, the accuracy of estimates computed as the difference between total revenues and total input expenditure must be open to some doubt as both of these estimates may contain significant measurement errors.

A third point is that it may be more difficult for a survey to identify and cover all prospective sources of a household's income comprehensively than to cover consumption comprehensively. This may be due to a reluctance on the part of respondents to report certain types of income or to the fact that the questionnaire does not prompt respondents to provide information on certain sources of income, so the respondents do not remember or report them. Respondents may not feel the need to report their most casual or infrequent income-earning activities and will obviously be very reluctant to report any of their activities that may be of dubious legality (or downright illegal). Respondents may also be reluctant to reveal their receipt of transfers and other nonlabor income. To some extent this syndrome is inevitable, but survey planners should ensure that it does not reflect problems in the design of the questionnaire or in its implementation. A poorly designed questionnaire may fail to ask about (or fail to prompt the respondent sufficiently about) a wide enough range of informal activities, or the interviewers may ask some of the questions in such a way that the respondent feels uncomfortable answering them.

The questionnaire cannot include questions on every conceivable source of household income, just as it cannot include questions on every type of consumption expenditure. However, when the sources of household income are more diverse than the categories of household consumption, as is the case in most developing or transition countries, it is invariably easier to collect comprehensive consumption data than comprehensive income data. Having said that, many key difficulties, such as the identification and valuation of nonmarket transactions, arise in both cases.

Consequently, the difficulties involved in calculating total household income, especially self-employment income and transfers, should not be underestimated. So how much confidence can analysts have in the estimates of income derived from household surveys? Are there any good practices that would increase the reliability of these estimates? At the outset it should be recognized that there are few objective tests of the reliability of income (or consumption) data derived from household surveys. Even comparing them with apparently similar data from national accounts can be fraught with difficulty, as discussed in detail in Chapter 5 on consumption. Conceptually,

household income and consumption rarely have an exact equivalent in national accounts. Even when estimates from national accounts and estimates from household surveys are of similar orders of magnitude, this in itself does not prove the accuracy of the household survey estimates. Clearly, when they are highly dissimilar, this suggests that the estimate from at least one source is seriously inaccurate, but this does not help analysts to identify which is the more accurate. It is certainly not appropriate to assume that the national accounts estimates are necessarily more accurate.

Evidence on Accuracy of Income Estimates

Some criteria based on household survey data alone can give clues as to the possible accuracy of estimates of household income. One straightforward issue is the relative consistency of estimates of household income and consumption. While individual households save or dissave in any given time period, estimates of total household consumption and total household income

can generally be expected to be of similar magnitudes. While the household sector may save (or dissave) in any given time period, the magnitude of such savings or dissavings relative to income or expenditure can be expected to be relatively small.

Table 17.2 provides summary information on the magnitude of estimates of total household income and consumption derived from a number of recent household surveys in several countries. Table 17.3 provides similar information (in a different format) for a 1995 income and expenditure survey in Belarus (not an LSMS survey).

The information presented in these tables has been summarized greatly, so it should be interpreted with great care. There is a different reason for the apparent success or failure of each survey to yield the data necessary to estimate total household income, and it is impossible to do proper justice to each of these stories here. The surveys from which the estimates of household income and consumption have been com-

Table 17.2 Comparing Estimates of Income and Consumption, Selected Household Surveys

Country	Survey	Mean total annual income per capita	Mean total annual consumption per capita	Ratio of per capita income to per capita consumption	Mean per capita annual savings (income minus consumption)	Correlation between per capita annual income and consumption
Bulgaria	Integrated Household Survey 1995 *	46.02	50.32	0.915	-4.30	0.178
Côte d'Ivoire	Enquête Permanente auprès des ménages (EPAM) 1985 *	186.5	294.8	0.633	-108.3	0.688
	EPAM 1986 *	242.8	276.8	0.877	-34.0	0.849
	EPAM 1987 *	236.6	286.7	0.825	-50.2	0.800
	EPAM 1988 *	220.9	246.2	0.897	-25.2	0.600
Ghana	Ghana Living Standards Survey Round 1 (GLSS 1), 1987-88 *	61.0	87.0	0.701	-26.1	0.406
	GLSS 2, 1988-89 *	69.2	107.9	0.641	-38.7	0.598
	GLSS 3, 1991-92	118.8	208.9	0.569	-90.1	0.540
Jamaica	Jamaica Survey of Living Conditions 1993 *	26326	28308	0.930	-1982	0.412
Pakistan	Pakistan Integrated Household Survey, 1991 *	7682	7871	0.976	-188.8	0.151
Peru	Encuesta nacional de hogares sobre medicion de niveles de vida, 1994 *	2423.4	2176.2	1.114	247.2	0.675
South Africa	South Africa Integrated Household Survey, 1993 *	9903.8	6961.4	1.423	2042.4	0.229
Venezuela, R. B. de	Encuesta de Presupuestos Familiares, 1988-89	19.63	32.49	0.604	—	—
	Encuesta Social, 1991-92 *	96.33	69.68	1.382	—	—

* LSMS surveys.

— Not available.

Note: Bulgaria: thousands of Lavy; Côte d'Ivoire: thousands of CFA; Ghana: thousands of Cedis; Jamaica: Jamaican dollars; Pakistan: Rupees; Peru: Soles; South Africa: Rand.

Source: Bulgaria, South Africa: computed from estimates of household income and expenditure on LSMS Web site; Côte d'Ivoire, Ghana, Peru: computed by author from raw data; Jamaica: based on Handa 1995; Pakistan: based on estimates of household income and expenditure constructed by the World Bank; Republica Bolivariana de Venezuela: based on Scott 1994.

Table 17.3 Average Monthly Cash Income and Cash Consumption Expenditure of Households in Belarus, Ranked by Quintile of Cash Income

Quintile of cash income	Average cash income (thousands of Belarussian rubles)	Average cash consumption expenditure (thousands of Belarussian rubles)	Ratio of cash income to cash expenditure (percent)
Lowest	427	700	61
Second	780	1,064	73
Third	1,100	1,349	82
Fourth	1,527	1,725	89
Highest	2,625	2,795	94

Source: Martini, Ivanova, and Novosyolova 1996, table 3.

puted are all different and not all are LSMS surveys. The various estimates of household income and consumption have been computed by different authors, and there may be some differences in the concepts and methods used to derive them (as well as in the survey information on which they are based).¹⁴ When the data are computed by the author from a primary source, the figures reported in the table are all computed over the same households (those for which estimates of both total income and total consumption can be computed). It is assumed that this is also the case where the information is derived from secondary sources. In the case of the Republica Bolivariana de Venezuela, information was not available to compute the ratio of average income to average consumption, the average magnitude of household savings, or the correlation between income and consumption. However, the average magnitudes of income and consumption are broadly comparable in all instances.

The extent to which the estimates of household income and consumption are consistent varies significantly from country to country. It is clear that in some surveys—Pakistan, Peru, South Africa—the estimates of household income and consumption are broadly consistent, which implies credible household savings or dissavings rates. Of course, as noted above, the possibility remains that both household income and household consumption expenditure are overestimated or underestimated to similar extents, though this is unlikely to be substantial unless there is an overestimation or underestimation of a component common to both household income and consumption (for example, consumption of self-produced food).

By contrast, some of the other surveys—Belarus, Ghana, the 1985 Côte d'Ivoire survey, and the 1988–89 *Encuesta de Presupuestos Familiares* or Income and Expenditure Survey in the Republica Bolivariana de Venezuela—yielded estimates of total household income that were substantially below the correspon-

ding estimates of household consumption. In such instances it is very unlikely that the shortfall can be explained by dissaving by the household sector because the magnitude of the difference between income and consumption is much too great. Consequently, in these cases it does appear that there has been a significant underestimation of income, a significant overestimation of consumption, or both. As suggested above, comparing these estimates with estimates of private consumption expenditure from the national accounts does not always help analysts to tell whether income or consumption is more accurately estimated.¹⁵ The general arguments set out above suggest that the differences stem more from underestimating income than from overestimating consumption, although even if this is true (an issue that will be considered further below) the explanations may differ from case to case.

In several other surveys on which information is presented in Table 17.2—Bulgaria, Jamaica, and the 1987 and 1988 Côte d'Ivoire surveys—it was found that, on average, households spent in excess of their income for the year in question but that the implied magnitudes of dissavings were within the range of plausibility in general. Of course, in these kinds of cases, analysts must always test the credibility of the implied dissavings rate by comparing the survey estimates with other evidence pertinent to the country and time period in question. Underestimation of income and overestimation of consumption expenditure may still have occurred in these surveys but if so they occurred to much less of an extent than in the cases of Belarus, Ghana, the 1985 Côte d'Ivoire survey, and the Venezuelan *Encuesta de Presupuestos Familiares*.

In the case of the Republica Bolivariana de Venezuela, the estimates of household income obtained from the *Encuesta Social* (Social Survey) are significantly greater than the estimates of expenditure derived from the same source, even after removing outliers (Scott 1994). This is in sharp contrast to the estimates derived

from the 1988–89 *Encuesta de Presupuestos Familiares*. However, the questionnaires for the two surveys were very different, and in the *Encuesta Social* consumption, the data for which were collected at a relatively aggregated level, appears to have been significantly underestimated. Therefore, it is difficult to say how accurately household income was estimated in this survey.

The discussion so far has focused entirely on the mean values of estimates of total household income and consumption (or savings). However, mean values are significantly affected by outliers and other extreme values,¹⁶ and looking only at mean values implies losing a lot of information. The extent of correlation between total household income and household consumption also provides useful information, even though it does not identify cases of underestimation. Household income and consumption are never perfectly correlated across households; most theories of consumption (for example, the permanent income hypothesis) explicitly suggest this will not be so. However, the two criteria should produce a broadly similar ranking of households, implying that they are significantly positively correlated.¹⁷ For the instances in Table 17.2 where a correlation coefficient can be computed between total household income and consumption, this indeed appears to be the case, even in cases where household savings appear to have been significantly underestimated (for example, the 1985 Côte d'Ivoire survey and the Ghana surveys).

Thus recent experience measuring total household income in household surveys in developing and transition countries does not suggest that the objective of measuring total household income using data from multipurpose household surveys should be abandoned. However, the experience is certainly mixed, and in some of the surveys there is strong evidence of underestimation of income, overestimation of consumption, or both. As discussed above, a priori considerations suggest that underestimation of income is probably a much larger factor than overestimation of consumption, but is there any empirical evidence to back this up? If so, what might be causing this underestimation of household income?

The point has already been made that the explanations for problems of this nature may differ from case to case as each survey experience has its own story. So what are the possible explanations for the unbelievably big gaps between household income and consumption in the three cases referred to above? To

explore any obvious explanations for these and make consequent recommendations for future LSMS surveys, it is possible to draw on the work of various analysts who examined some of these surveys to see if any evidence could be found to suggest that income was less accurately estimated than consumption. Judging the relative reliability of estimates of total household income and consumption based on information mainly from within the survey is clearly a partly subjective exercise. There is no clear objective basis for assessing whether the underestimation of income or the overestimation of consumption is predominantly responsible for the apparent underestimation of household savings in these instances. However, survey results, combined with background information about the countries in question, can offer some clues.

In the case of Belarus, Martini, Ivanova, and Novosyolova (1996) found that 67.7 percent of households reported income levels below their consumption levels and that 9.7 percent reported income levels that were less than half their reported consumption levels. Moreover, they found that the relationship between average rates of dissavings and the quintile group to which a household belonged differed radically depending on whether quintiles were defined by income or by consumption. When income was used to define quintile groups, households in the lowest quintile dissaved the most, and the average rate of dissaving fell in each higher quintile group (see Table 17.3). Yet when consumption was used to define the quintile groups (not reported here), the average proportion of income dissaved increased significantly with the quintile; those in the lowest quintile actually had a positive savings rate. Although total household income and consumption should both be legitimate measures of the standard of living, which one of them is chosen clearly affects the appearance of the relationship between savings and the standard of living. (Of course, this is partly because one of the two variables used in measuring savings is also used to define the quintile groups.)

However, this does not indicate whether income or consumption is more reliably estimated. In the case of Belarus there are good reasons to assume that income was significantly underestimated. Martini, Ivanova, and Novosyolova argued that anecdotal evidence and casual empiricism suggest widespread informal economic activity in the Belarus economy, yet in the survey very few people reported having sec-

ond jobs, doing occasional work, or running a household business. These informal activities may have gone unreported due to the way the questionnaire was designed or the way survey interviewers did or did not prompt respondents to report such activities. A more likely explanation may be that a large number of respondents were unwilling to reveal such information. If this is the case it is likely to be very difficult to measure total household income with any accuracy.

The example of the surveys conducted in Ghana is interesting because having more than one round of data means that the data sets can be compared with one another, and because the third round was collected using a different questionnaire design from the one used in the earlier rounds. Making comparisons between the different rounds can yield useful clues about whether household income or consumption is more accurately estimated. Where similar or identical surveys are conducted close to each other in time, analysts would not expect (in the absence of a clear explaining factor) radical changes in the composition of income or consumption expenditure or in the nature of poverty. When the first two rounds of data from the Ghana Living Standards Survey (which were collected using identical questionnaires) were compared, evidence emerged that the composition of income is much more unstable than the composition of consumption. More compellingly, the geographical pattern of poverty, which changes gradually from one round to another when consumption data are used to measure living standards, was seen to have dramatically changed when income data were used to measure living standards (Coulombe and McKay 1995). These sharp changes are hard to understand. Income data suggested that the capital city, Accra, had the highest incidence of poverty in the country (out of five localities) in the first survey round but the lowest such incidence in the second round (the following year). Coulombe and McKay argue that the apparent geographical pattern of poverty based on income data was counterintuitive (for example, in its implication that the northern savannah region is one of those least affected by poverty) and contradicted most other standard of living measures. What this strongly suggests, therefore, is that the raw data used in measuring total household income were significantly less accurate than those used to measure household consumption in this case. Indeed in this case it appears that the nature of underestimation of income varied from one locality to another or from one component to another.

It seems clear that the underestimation of household savings in the Ghana surveys reflects an underestimation of household income much more than it reflects an overestimation of household consumption. There are a number of other arguments that support this view and explain why the underestimation of income was apparently much more of a problem in Ghana than in neighbouring Côte d'Ivoire (with the exception of the 1985 survey), where a very similar questionnaire was administered. As was discussed earlier, high rates of inflation are likely to lead to an underestimation of income relative to consumption. Ghana had an average annual inflation rate of around 22 percent between 1988 and 1992 (the approximate period covered by the surveys), while rates of inflation in Côte d'Ivoire were much more modest. Moreover, self-employment income, one of the hardest components to measure, is a more important source of household income in Ghana than in Côte d'Ivoire.

The estimates of household savings derived from the 1988–89 *Encuesta de Presupuestos Familiares* in the Republica Bolivariana de Venezuela are clearly underestimated, but it is difficult to determine whether income underestimation is predominantly responsible for this. For example, it is very difficult to compare the levels of household income and consumption in the 1988–89 *Encuesta de Presupuestos Familiares* with those of the *Encuesta Social* conducted in 1991–92 because there was a high rate of inflation between these two periods, because the questionnaires were significantly different, and because the *Encuesta de Presupuestos Familiares* was conducted only in urban areas while the *Encuesta Social* was nationwide. As in Ghana, the high inflation rate may suggest that income underestimation is at the root of the problem.¹⁸

Thus, in the cases where household savings have most obviously been underestimated, the underestimation of household income seems much more likely to be responsible for this than the overestimation of household consumption. The reasons for the underestimation of household income differ from case to case, although high inflation rates (where applicable) may be a significant common factor. Difficulty in estimating self-employment income is also likely to be a common factor; however, it is worth noting that this is a problem experienced by developed countries as well as developing countries (Atkinson and Micklewright 1983 for the United Kingdom; Branch 1994 for the United States). The difference though is that such

incomes are often much less important in developed countries than they are in developing and transition countries. This is one reason why developed country experience with measuring household incomes is often more successful than that of developing and transition countries.

Overall, however, the empirical evidence reviewed in this section suggests that large-scale underestimation of household income is not inevitable. Many surveys have managed to collect sufficiently accurate data for analysts to measure total household income, which is without doubt a complex variable to measure. It is indeed probable that total household consumption can be estimated with greater accuracy than total household income. But many questionnaires have collected consumption data in more detail than income data anyway. Notwithstanding this, there is no basis for general and universal pessimism about the possibility of measuring income, even if doing so is a relatively complex and risky business.

What Costs Are Involved in Measuring Total Household Income?

The cost of a survey designed to collect the data needed to measure total household income depends on the amount and level of detail of the information to be collected. Collecting a large amount of information means using a long questionnaire. A long questionnaire demands long interviews, which lead to high costs. And if the survey budget is fixed, a long questionnaire requires using a smaller sample, which reduces the extent to which resulting data can be disaggregated. An additional disadvantage of having to conduct long interviews is that interviewees may become tired and bored and, thus, less careful about the accuracy of their answers.

These points are general and apply to all sections of the questionnaire, and the reader should bear them in mind throughout this volume. However, they have specific implications for designing a questionnaire to measure total household income. To illustrate this, it is useful to compare a situation in which the questionnaire is designed to measure total household income with a situation in which it is not. In broad terms, two different scenarios can be considered.

When survey designers have already decided to include both an agriculture and a nonfarm enterprise

module in the survey for analytical reasons, there are likely to be few extra costs involved in adding the elements needed to measure total household income. In a survey of this kind, data on income earned from wage employment both in cash and kind are generally collected in the employment module (introduced in Chapter 9). Other data needed to calculate total household income are collected in the standard versions of the nonfarm enterprise and agriculture modules (introduced in Chapters 18 and 19).¹⁹

Thus all that would need to be added to the questionnaire would be a module to collect data on income from transfers and other nonlabor income (see Chapter 11). The designers of the survey may have decided to include a module on transfers and other nonlabor income in the survey anyway, because these income sources are of interest in their own right. Even if they were not, the costs of including transfers and other nonlabor income would be modest. In previous LSMS questionnaires, modules on transfers and other nonlabor income have tended to account for only about two pages in an approximately 70-page questionnaire. And the time taken to administer these two pages will generally have been proportionately less than the time to administer other sections, because many of the questions would not have applied to respondents who did not receive a particular kind of income. Even the long versions of a transfers and other nonlabor income module (introduced in Chapter 11), which might amount to four questionnaire pages, would not take much more time to complete; as before, many of the questions would not be applicable to a majority of households.

However, when survey designers do not plan to include one or both of the agriculture and nonfarm enterprise modules, it becomes necessary to add at least abbreviated versions of these modules to the questionnaire to ensure that the survey yields the data needed to calculate total household income. This substantially increases the cost of fielding the survey. The short versions of these modules do not yield enough information to allow the estimation of income from these sources. However, adding the standard versions of these modules simply for the purpose of estimating income from these sources cannot be justified, given the major extra costs that would be involved. When these modules are included, it should be primarily because they are of interest in their own right.

In such circumstances it is easy to see why survey designers may wish to include the questions on

income from self-employment in agriculture and non-farm activities directly in the employment module. The costs of collecting this information are very much smaller. However, for reasons set out in the second section of this chapter, data collected in this way may be of dubious value and thus have very limited analytical interest. Therefore, it is not recommended that data on self-employment income be collected in this way despite its low costs (especially as these costs may be even higher than expected because of the difficulty respondents can be expected to have in answering these questions or providing meaningful responses). Thus, where survey planners have decided not to include the agriculture and nonfarm enterprise modules in their surveys, they should abandon the objective of measuring total household income.

Evaluation and Conclusions

The collection of information needed to measure total household consumption is regarded as indispensable in a questionnaire designed to study the living standards of households and their members. The collection of comprehensive data on household income is less fundamental because it is possible for analysts to compute measures of poverty, to relate poverty to the characteristics of households, and to relate consumption-based measures of standards of living to social variables (such as school attendance and use of health facilities), without any information on income.

Yet there are serious limitations to the extent to which it is possible to understand poverty without data on income. Understanding the reasons for poverty and understanding its dynamics requires information not only on the economic activities of household members (and the amount of time they devote to them) but also on the income earned from these activities. This is the most important reason to collect data on household income—but it is by no means the only one. Moreover, the experience of recent household surveys demonstrates that some surveys appear to have successfully yielded the full range of data needed to calculate income reasonably accurately, despite the fact that they generally devote more interview time to collecting consumption data than to collecting income data.

It is of course riskier than collecting consumption data, as there is no guarantee of the reliability of the resulting data. Collecting comprehensive data on

household consumption expenditure is already a major exercise, and it is probably more difficult to collect the data needed to measure a household's income. In some countries respondents may be very unwilling to supply information on their sources and levels of income, however much assurance of confidentiality they are given. In light of this, and since there are really no shortcuts in collecting income data, not all survey planners may choose to collect such information. For example, those planning surveys in countries with limited household survey experience may choose not to collect the data needed to calculate total household income. Alternatively, they may choose to collect such data only in certain rounds of a sequence of household surveys.

For reasons of cost and difficulty, the most basic multipurpose household surveys are unlikely to collect the information required to estimate total household income and thus will probably not include agriculture and nonfarm enterprise modules and will include only a limited employment module. However, there are serious limits to the usefulness of these surveys, both for policy purposes and for in-depth analytical work. This is especially so in poorer countries where a majority of the population—and an even greater majority of the poor—are likely to be engaged in agricultural or nonfarm self-employment activities. Standard LSMS-type questionnaires should collect the data necessary to estimate household income and do so properly. Where the resulting estimates of household income are reasonably accurate, these estimates should be used more widely in analysis than has been the case to date.

Notes

The author gratefully acknowledges the helpful comments of many people on the issues covered by this paper, in particular William Cavendish, Paul Glewwe, Margaret Grosh, John Hoddinott, Alberto Martini, Jeffery Round, Julie Anderson Schaffner, and participants in the World Bank workshops held as part of this project in April 1996 and June 1997.

1. Many of these surveys do collect information on income from self-employment activities in their labor modules, which might appear to be a suitable substitute for the estimation of income from household agriculture and nonfarm enterprise modules. However, the accuracy of these estimates of self-employment income is open to serious question. As will be discussed later in this chapter and as is accepted in the specific chapters on these topics, this book rec-

ommends strongly against trying to estimate household income from agriculture and nonfarm self-employment in this way.

2. Strictly, according to permanent income theories, consumers aim to smooth the marginal utility of their wealth rather than their consumption, and this can differ due to, for example, lifecycle effects (Blundell and Preston 1994). Thus their consumption may not be perfectly smoothed. However, consumption is still likely to be a better measure of a household's permanent income and long-term welfare status than is current income.

3. Some authors argue that in developed countries it may be easier to measure household income than household consumption expenditure (for example, Goodman and Webb 1995 make this argument in the context of the United Kingdom). Even if this is true for developed countries—and this claim is not beyond dispute—it is unlikely to be true in most developing countries given the much greater importance of self-employment and nonlabor income in these countries and given that their tax systems are generally less developed.

4. Some past LSMS surveys have also collected information on the stock of household savings (as opposed to the flow in any one year). However, respondents tend to be wary of questions on such a sensitive topic, and it may be that these LSMS surveys only yielded information on savings within the formal financial sector. See Chapter 20 on savings.

5. This was the problem faced by Coulombe and McKay (1996) in trying to identify socioeconomic groups using data from the LSMS survey in Mauritania. Because the income data from this survey were regarded as very unreliable and not suitable for identifying socioeconomic groups, they instead used data from the labor module to identify socioeconomic groups based on the economic activity to which the household devoted most time. This is clearly not ideal for a number of reasons, but it does offer a possible way to identify socioeconomic groups from survey data where the survey designers decide not to collect comprehensive income data.

6. Note, though, that certain marginal differences arise between estimating variables at the micro level, which is of interest here, and estimating them for macro purposes (for example, in national accounts).

7. This discussion draws significantly on Johnson, McKay, and Round (1990).

8. For some households, natural habitat utilization can be a significant productive activity. Based on data collected in the Shindi ward in rural Zimbabwe, Cavendish (1999) estimates that the value of commodities gathered from natural sources on average accounts for 35.2 percent of household income.

9. For example, if fetching water is regarded as productive and imputed as a household income, it must also be imputed as a household consumption expenditure.

10. Information on the amount of time that household members devote to such service activities within the household would, however, be available from the time use module (introduced in Chapter 22). The difficulty in practice is in placing a meaningful value on this time.

11. When a household inherits land, this directly and immediately increases the value of assets owned by the household, and thus is a capital rather than a current transaction (even though it may lead to higher income in the future). While loans provide a household with purchasing power in the short term, they also establish liabilities that need to be repaid; thus, loans should not be regarded as income.

12. It is true that market price valuation will not necessarily represent “true” welfare valuations when markets fail, but in practice there are no real alternatives to doing this. In any case, this distinction is of little importance to the household, which is interested in income only as a means of financing its present or future consumption.

13. In surveys whose consumption module collects information on natural resource utilization, this should also be included in the measure of income. As explained in Chapter 5 on consumption, data on natural resource utilization are not collected in the standard consumption module due to the fact that a nationwide, multitopic household survey may not be suitable for collecting such information, which may be highly locality-specific.

14. Some of these estimates of household income may have been estimated using data on estimated household income from agriculture and nonfarm enterprises that were yielded by direct questions on self-employment income, a procedure not recommended in this book. The estimates for Côte d'Ivoire, Ghana, and Peru, which were computed from the raw data, did not use the answers to these questions about self-employment earnings.

15. For example, for the case of Ghana, an attempt to compute a comparable estimate of private consumption per capita from national accounts data produced a figure halfway between the estimate of total household income and the estimate of total household consumption. Such a comparison is inevitably quite crude and approximate, given the different definitions applied in the national accounts and in the household survey.

16. An alternative procedure would be to look at the mean values of income and consumption having excluded the highest and lowest, say, 5 percent of values. However, such an analysis could not be conducted in all of the cases reported in Table 17.2. In the cases where it was successfully conducted (for example, as done by Scott 1994 for the Republica Bolivariana de Venezuela, excluding the top and bottom 5 percent of the distribution), the broad conclusions have appeared not to change markedly.

17. It is true that there is a significant element of the estimates of household income and consumption that is common to both (for example, consumption of own-produced food). Repeating the calculations of correlation coefficients for measures of income and

consumption excluding these common elements obviously gives lower correlation coefficients, but the correlation remains significant in most cases.

18. Altimir (1987) found that the estimates of household income obtained from a much earlier round of the *Encuesta de Presupuestos Familiares* in the Republica Bolivariana de Venezuela corresponded quite closely to the national accounts estimates of household income. However, it is not clear that this applies to the more recent surveys and, as argued in the text, national accounts estimates are not necessarily an objective standard of accuracy.

19. Where survey designers feel it is important to include households' use of natural resources in the estimate of total household income (and consumption), they are likely to have already included these issues in the consumption module of the questionnaire as necessary elements in the calculation of total household consumption. See also Chapter 5 on consumption.

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18 Household Enterprises

Wim P. M. Vijverberg and Donald C. Mead

In most Living Standards Measurement Study (LSMS) questionnaires there is a module exploring the dynamics and activities of nonagricultural household enterprises (which, for simplicity, are referred to in this chapter as “household enterprises”). This module gathers information on the portion of a household’s income and employment derived from nonagricultural self-employment. More extensive versions of the module have also collected information on the variability of income and employment over time, the impact of the economic environment on household enterprises, and the involvement of household enterprises with credit and commodity markets.

The first section of this chapter explores the contribution that household enterprises can make to economic development and the ways in which government policies can enhance that contribution. The second links these policy issues to specific data needs. The third section translates these data needs into a model questionnaire, and the fourth section provides some explanatory notes about the model questionnaire.

The Role of Household Enterprises in Economic Development

This section provides an overview of the role of household enterprises, detailing their prevalence, their characteristics, and the contribution that they make to economic development. The section then discusses the determinants of successful household enterprises and the kinds of information policymakers need to encourage the growth of these enterprises.

The Role of Household Enterprises in the Development Process

In most developing countries, a very large number of people participate in household enterprises. About one-half of the households sampled in previous LSMS surveys were found to operate one or more nonfarm enterprises (Moock, Musgrove, and Stelcner 1990; Vijverberg 1992, 1998). Other studies in several countries in Sub-Saharan Africa have indicated that 15–25 percent of adults in these countries are involved in such activities (Mead 1994). In most countries the majority of household enterprises are owned and operated by women. In many countries the population is growing faster than the number of new job openings in the public sector and in larger enterprises, so the role of household enterprises is expanding.

WHAT ARE THE CHARACTERISTICS OF HOUSEHOLD ENTERPRISES? Most household enterprises fall into one of two major categories. Many—probably the majority—of these enterprises generate only mini-

mal income that is barely sufficient to enable their owners to survive. Such enterprises are sometimes referred to as survivalist enterprises. These enterprises are often operated on a part-time basis, either year round for only a few hours a day or full-time during only certain periods of the year. Sometimes survivalist enterprises are only one of several income-generating activities operated by an individual or the household, in which case their contribution to household welfare is essentially supplementary. Often survivalist enterprises are run by women, who combine them with their other household responsibilities. Examples of typical survivalist enterprises are food preparation, sewing, shoe shining, and street vending.

Other household enterprises, sometimes referred to as *microenterprises*, have a very different role in the development process. These enterprises generate incomes that are substantially higher, and often well above the poverty level. While survivalist enterprises rely almost exclusively on unpaid family members (and often consist of one person working alone), microenterprises are more likely to use hired workers. Microenterprises usually have more complex and sophisticated production and marketing systems than do survivalist enterprises, and are more likely to be the sole source of income for a household. Examples of microenterprises are furniture making, manufacturing, and wholesaling.

Survivalist enterprises and microenterprises make different potential contributions to household welfare and to the development process. As such, the two types of enterprises also differ in what kinds of programs support them and in how they respond to policy changes.

There are many households that for one reason or another do not operate a nonfarm enterprise. From both a descriptive and analytical perspective, it is interesting to examine why some households operate enterprises and others do not. For example, do the households not currently operating an enterprise engage in other, more lucrative activities? If these households were to start up enterprises, would the enterprises earn more or less profit than the ones currently in operation? Policies aimed at improving the performance of current enterprises may also prompt other households to start up enterprises. Policymakers should not only be aware of this possibility but also be able to quantify the magnitude of this response.

WHAT CONTRIBUTIONS DO HOUSEHOLD ENTERPRISES MAKE TO HOUSEHOLD WELFARE? Household enterprises contribute to improving household welfare in two key ways: by generating income for those who work in the enterprise (whether they work as owner-operators or as employees) and by creating employment.

In the view of many analysts and policymakers, the principal contribution of household enterprises to household welfare is the generation of income for the household. This includes cash income (cash receipts minus the cash expenses required to produce these receipts) and in-kind income (the net value of products or services produced by the enterprise and consumed within the household or of products bartered with others). A few key questions need to be addressed:

- How much income does the enterprise generate for the household? Is this income sufficient to lift the household out of poverty?
- How steady and reliable is this income? Income flows that are highly variable over the year or that can cease unpredictably contribute less to household welfare than do flows that are regular and reliable.
- Which households receive this income? An income flow is more or less important as a source of welfare depending on how well-off the recipients are and what alternative income sources are available to them. While survivalist enterprises often yield only small returns, their contribution can be extremely important. Since survivalist entrepreneurs are frequently very poor, even small increases in these people's incomes can contribute tremendously to their welfare. And since large numbers of people are engaged in such activities, survivalist enterprises can mean a great deal for welfare overall.
- How is household enterprise income distributed, among both employees of enterprises and different household members? Does the distribution of household income differ depending on whether the entrepreneur is male or female? How is the income spent, and what proportion is saved? Who spends and who saves? All of these questions are important because the existence of a household enterprise can have a significant impact on household allocation for food, schooling, health care, and savings—and on which household members benefit most from the way money is allocated.
- In what ways do returns to labor vary by locality, sector, and the characteristics of the entrepreneur

(such as his or her gender, education, experience, and skills)?

- Is income measured per year or per day? For many purposes it is important to account for the time dimension of both income received and labor input required to produce this income—and thus to express income in terms of hours or days worked. An activity that yields high income per hour but only provides an opportunity to work a few hours each month makes a contribution very different from that of a full-time activity that provides a lower income per hour.

Household enterprises not only contribute to household welfare by providing income but also by providing a source of employment. The household enterprise sector employs a substantial portion of the labor force. It is important to know just how many people household enterprises employ and how this number changes over time due to sectoral growth as well as seasonality. The key questions here are:

- How many people work in the enterprise? How much does employment in the enterprise vary by season? Is the work part-time? If so, does this mean working only a part of each day or a part of each week? Is the work a form of moonlighting?
- What are the characteristics of the people engaged in the enterprise? Does the enterprise employ unskilled, semiskilled, or highly skilled labor?
- How has the enterprise changed over time? What are the employment growth patterns for different types of enterprises?

It is important to look not only at the number of people who work in household enterprises but also at the characteristics and overall quality of their jobs. An important distinction must be made between owners and unpaid family workers on one hand and paid employees on the other. In most countries, more than 80 percent of those who work in household enterprises are either enterprise owners or unpaid family help. Policymakers need to know how many and which members of households participate in the work of enterprises, just as they need to know who receives the income these enterprises earn. Policymakers also need to know how many people from outside the household are employed in the enterprise. Once these things are known, it becomes clear who is helped and who is hurt by policy that impacts household enterprises.

Another key issue is the wage levels of people in the household enterprise labor force. Of all the people

working in household enterprises, how many earn an income below the minimum wage? How many earn an income at least twice the minimum wage? If possible, such questions should be asked in dynamic terms, examining the patterns of income earned in jobs that have come into existence during a given period—for example, the most recent calendar year.

Such time-specific analysis is particularly useful for exploring the impact of changes in policy or changes in the macro economy. Having access to this time-specific wage information would enable analysts to explore the hypothesis that many new and productive jobs are created in household enterprises at times when other sectors are expanding at either the local or the macro level. Employment in household enterprises may also grow at times of macroeconomic stagnation, but most of these new employment openings are likely to yield only marginal returns. Understanding the dynamics of household enterprises can be of considerable importance in clarifying what can and cannot be done by policymakers to promote the growth of productive employment among household enterprises.

The Determinants of Successful Household Enterprises

When enough information about household enterprises has been gathered, it becomes possible to present a profile of the country's household enterprises, including the number of enterprises, the income and employment that they generate, and the patterns of change in employment. It should be possible to present all this information broken down by location, sector, enterprise size, and gender of the owner. Such a profile constitutes the raw material for exploring to what extent these enterprises create income and jobs. Using the knowledge gained from this process, policy interventions can be devised that create a favorable climate for the household enterprise sector.

HOUSEHOLD- AND ENTREPRENEUR-SPECIFIC FACTORS.

Two sets of factors that can influence the success of an enterprise are the characteristics of the entrepreneur and the characteristics of his or her household. The relevant characteristics of an entrepreneur include education, training, experience, and family background (for example, the profession of his or her parents). Relevant household characteristics include what other activities household members engage in; these activities can determine how the enterprise is organized and how many resources household members allocate to it.

People involved in household enterprises usually have other demands on their time (such as child care, cooking, fetching water and firewood, farming, or other paid jobs). In order to devote time to working for the enterprise, they must juggle these responsibilities. In some cases the household enterprise is a seasonal activity undertaken only during slack times when other demands on household labor are less pressing.

Household enterprises can also affect the range of other household activities. In some households an enterprise is a safe and reliable source of income that allows households to invest more in other activities—activities that might yield higher returns but also carry a higher risk of failure. These kinds of decisions may have a gender dimension. To make this point with a caricature of an example, a low-risk household enterprise may be a low-productivity activity (in textiles or food) performed by women that generates a low but steady income. A household makes investments in riskier but more profitable household enterprises (in manufacturing or wholesale) run by the men of the household. In other circumstances the household may use profits from a household enterprise to cover cash expenses of the household's farming activities, which in turn provide food for the household. In this case the household enterprise enables the operation of the farm which, in turn, is critical for the household.

Having data about household- and entrepreneur-specific factors can help policymakers identify the most appropriate kinds of assistance to support. This assistance may include general education, vocational training, or specialized management training (such as accounting, bookkeeping, or quality control). Having information on these characteristics may also help policymakers channel assistance to the clients who will make the best use of it.

MARKETS. Participation in markets allows households to specialize. This specialization can lead to efficiency and economies of scale for the economy as a whole, boosting productivity, income, and standards of living. However, such specialization is hindered when markets for inputs (labor, capital, land, raw materials) or outputs (the distribution system) function poorly. It is difficult to operate an enterprise when supplies (either of inputs or of consumer goods) are sporadic and unreliable, when demand for the enterprise's output is sporadic, or when prices (of inputs, outputs, or items for daily living) fluctuate too much. At one extreme, a

household might specialize in only one particular function, such as carving backs for chairs; at the other extreme, a household might be fully self-reliant, producing all its own inputs and making no market transactions at all. All enterprises face challenges related to their position along this continuum.

In surveys in several countries, household entrepreneurs have frequently indicated that the most important problem they face is insufficient markets for their products (Liedholm and Mead 1995). This problem may arise when an enterprise serves a local market with too few customers; indeed many of the less successful enterprises sell only to neighbors in slow-growing, restricted, and localized markets. If this is the case, owners of the household enterprises could arrange to sell their goods in different locations or through different marketing channels, which is what more dynamic enterprises do.

Insufficient markets also arise when household enterprises are not producing the exact type of goods that consumers want to buy. In such cases owners may try changing the design of the product (possibly by incorporating new technologies), improving quality control procedures, or changing the management of the enterprise. Policymakers can provide information about distant markets, organize meetings with distribution networks in distant markets, ensure smooth operation of transportation networks (Vijverberg 1998), provide training courses on quality control technology, and the like.

Research into markets for household enterprises must address a few basic questions:

- To what degree do household enterprises participate in markets? How developed are these markets?
- Where do household enterprises obtain capital equipment, inputs, and hired labor?
- Through what channels do household enterprises sell their output? How reliable are these channels?
- Are enterprises that participate more extensively in markets more profitable? Have the existing policies regarding markets helped improve household enterprise performance?

LOCATION AND INFRASTRUCTURE. As factors influencing the success of household enterprises, location and access to infrastructure are related since some locational factors are heavily influenced by the availability of roads or communications facilities. It is important to know not only where an enterprise is located but

also the degree of dynamism in the market at that location and how effectively that location is served by infrastructure linking it with other markets. Access to utilities (such as water, electricity, and telephone lines) and to adequate workspace are also important factors. Questions exploring these issues are normally included in other modules of the LSMS survey; see Chapter 13 on the community questionnaire and Chapter 12 on housing.

FINANCIAL SYSTEMS, SAVINGS, AND CREDIT. There are probably more programs to assist household enterprises in the area of credit than in all other areas combined. It is particularly important, therefore, to know how household enterprises interact with the financial system and how these interactions may be strengthened. Household enterprises are among the actors that exert a demand for credit. Households with accumulated savings are among the actors that create a supply of credit. Financial institutions (for example, banks and moneylenders) are intermediaries between the demand and supply sides of the credit market.

Since the LSMS is a household survey, it cannot directly explore issues relating to how financial institutions operate. For example, it cannot be used to examine lending decisions of financial institutions and why they may choose to give priority in their lending to certain categories of borrowers. The household enterprise module can, however, throw useful light on ways in which existing enterprises have financed their original and current stock of fixed and working capital—whether from an inheritance, from savings, or from loans. It can also be used to find out the extent of entrepreneurs' desire and need for credit.

In recent years new roles and operating procedures have been developed for financial institutions that lend to microenterprises (Otero and Rhyne 1994). When financial institutions have adopted these new approaches, the flow of credit to household enterprises has increased substantially and entrepreneurs have had more opportunities both to borrow and to save. There is general agreement in the development community that information about these new approaches should be spread as rapidly as possible among financial institutions. In monitoring the effects of the new lending programs, it is important to find out who is helped by the programs, to what extent they are helped, and what new binding constraints emerge. Since own finance is the principal source of

funding for most household enterprises, it is also important to know more about what entrepreneurs do with their savings.

Once again, it is vital to consider intrahousehold dynamics in examining the issue of finance, savings, and credit. Who has responsibility for managing a household's financial assets? If profits are earned, how are decisions made about how they are used? Who within a household has access to credit? The answers to these questions may depend on the division of authority between the genders or between generations (for example, between fathers and sons). Some aspects of household dynamics are explored in the household enterprise module, while others are addressed in other modules of the survey (see Chapter 24 on intrahousehold allocation).

REGULATORY AND LEGAL REFORMS. Some people have argued that instituting regulatory and legal reforms can lead to a surge of new activity in the household enterprise sector. This line of reasoning is somewhat less popular today than it was five years ago as research has led many to question its significance. However, it remains an important consideration in some countries, particularly in situations where enterprises seek to grow in both size and complexity (Mead 1995). It would be interesting to determine to what degree enterprises abide by existing rules and regulations and to what degree entrepreneurs feel constrained by these factors.

OTHER ASPECTS OF MACROECONOMIC POLICY. Most small enterprises pay few taxes, although they often pay fees, purchase licenses, or pay indirect taxes on the inputs they purchase. However, once enterprises grow beyond a certain threshold, they become subject to substantially higher taxes. The foreign exchange regime may make imports artificially cheap, but when these imports are allocated administratively rather than through the market, small household enterprises may find it hard to compete with larger domestic producers because the latter have better access to (administratively allocated) cheap imported inputs. In addition, household enterprises may have to compete with imported finished products that are artificially cheaper. The significance of these and other similar macroeconomic policy constraints appears to differ greatly from one country to another (Young 1993).

To analyze the impact of a change in policy, it is necessary to trace the effects of the change over time,

both in the external environment and in the enterprise's response to the change. It is possible to trace these effects to some extent by asking respondents retrospective questions about when specific changes took place in the enterprise. This approach has serious limitations, however, since the respondents may have forgotten relevant details. Here panel surveys, which return to the same set of enterprises on a regular basis to ask up-to-date questions, hold a distinct advantage. (The advantages of panel data for studying household enterprise are elaborated later in this chapter.)

Policymakers must know the answers to two key questions regarding household enterprises and macroeconomic policy:

- How has the success of different types of household enterprises been affected by the policies and projects that are in place in particular localities and at particular points in time?
- How do changes in the existing policies and projects affect the success of different types of household enterprises?

A better understanding of the impact of various policies could make an important contribution to improving program and policy design. The task of program design is beyond the immediate purview of LSMS surveys. However, by throwing some light on the kinds of constraints facing household enterprises, LSMS surveys can be of considerable help to project designers in the World Bank and other development institutions. LSMS analysis may be country-specific, time-specific, or both, and should take into account such factors as the dynamism of the local economy, the self-reliance of households, the involvement of different household members in the productive activities of the household, the market participation of household enterprises in the region, the type of technology used by each enterprise, and the social culture (in the household or community) within which entrepreneurs make decisions.

Household Enterprises and Other Sectors of the Economy

Household enterprises have an impact beyond the household in two key ways. First, household enterprises use as inputs the products or services of other enterprises. Thus the expansion of a household enterprise creates a new demand for other enterprises' outputs. When a household enterprise expands its use of small oil seed presses, new markets open up for farmers growing oil seeds. Such indirect demand effects are often called backward linkages.

Second, the products or services of household enterprises are inputs for other activities. The expansion of a household enterprise increases the supply of inputs to other enterprises. If a household enterprise sells pesticides, it increases the availability of this input to small farmers. Such supply effects are often called forward linkages.

Researchers must ask:

- To what extent does a given household enterprise produce demand and supply effects (backward and forward linkages) that enable other enterprises to prosper?

Household surveys can shed light on this question only if detailed information is collected about the nature of products and services bought and sold.¹ Supply linkages become clearer if entrepreneurs report in detail what their output is and to whom they sell it. Demand linkages require similar detail on the purchases made by entrepreneurs. Also needed is general information about the structure of the local economy and about ways in which particular household enterprises might contribute to other productive activities in the region (see Chapter 13 on the community questionnaire). Clearly, the overall data requirements for analyzing this issue are substantial. The multi-topic nature of the LSMS questionnaire, which limits the amount of questions that can be asked on any given topic, may make it difficult to justify the depth of inquiry needed to address these questions.

In a cruder way, LSMS surveys may help address a related key question:

- To what extent and in what sectors does a household enterprise benefit from the establishment of a large company in its proximity?

When a large company (a corporation, parastatal enterprise, joint venture, or multinational corporation) moves into a particular area, it can have a significant impact on local household enterprises. This impact can be either positive or negative. The company may displace some of the demand for these enterprises' products. It may raise local incomes and thus increase demand for the products. It may cause local wages to increase.

An additional question might be raised that could qualify answers about a company's impact on local enterprises: Why did the company select this particular location? If government officials gave the company special incentives to pick this location, why? Was it because wages were low, because there was a local unfulfilled demand for the company's products, or

because there was already a thriving private sector? Might the success of household enterprises near a large company signify the company's decision to locate near household enterprises that were already profitable? Might the lack of success of household enterprises near a large company signify the company's decision to locate where the household enterprises could easily be displaced? The point is that the external market environment cannot always be taken as given. In studying the economic performance of small enterprises, it is appropriate to ask whether the presumed determining factors (as listed in previous sections of this chapter) are truly given or are determined simultaneously alongside enterprise performance.

Summary

Box 18.1 summarizes the major policy issues discussed in this chapter. Because LSMS surveys are based on a sample of households (as opposed to a sample of

enterprises) it is possible to consider only the impact of policy on small-scale private enterprises.

A number of the issues listed in Box 18.1 are descriptive; others refer to a causal relationship. A descriptive analysis of the small enterprise sector is useful because the amount of reliable information about household enterprises is so small. To understand causal phenomena (including interesting policy variables) goes several steps further. Not only are good data needed, but the many causal factors must be identified, accurately measured, and related to enterprise performance variables in appropriate ways. While economic science has made progress in these areas, much remains to be learned.

Data Issues and Data Needs

A number of issues must be kept in mind when collecting LSMS data about household enterprises. These issues include:

Box 18.1 Policy Issues and LSMS Data

Issues that can be analyzed using LSMS data

- The number of household enterprises in the economy.
- Sectoral and locational characteristics of household enterprises.
- Income generated by household enterprises.
- Relationship between poverty and household enterprise income.
- Variability and seasonality of household enterprise income.
- Income earned by hired labor in the small-scale private sector.
- Magnitude and structure of employment in household enterprises.
- Seasonality in household enterprise employment.
- Patterns of employment growth in the small-scale private sector.
- Determinants of household entrepreneurship.
- Determinants of household enterprise income levels.
- Patterns of education, training, and experience among household enterprise entrepreneurs.
- Impact of training programs provided by government and business organizations (on, for example, product design, quality control, marketing techniques, and management) on performance of household enterprises.
- Marketing patterns for inputs and outputs and their impact on enterprise performance.
- Role of locational factors and access to infrastructure in enterprise performance.
- Financing sources and impact of credit markets.
- Impact of the regulatory and legal regime on enterprises.

- Impact of other macroeconomic policies (such as tax policies) on household enterprise performance.
- Interactions between household enterprise performance and other household activities.
- Household enterprise performance over time.

Issues that are difficult to analyze with household survey data

- Impact of the distribution of enterprise income on consumption patterns within a household. (This requires detailed data on the allocation of each kind of income among household members and on the role of each member in household spending decisions.)
- Links that enterprises have with other sectors of the economy. (This would require an analysis of inter-enterprise commodity flows in a local economy. Very detailed household enterprise data would be useful but information on the local economic structure would still be needed.)
- Impact of regulatory and legal reforms. (This would require cross-country or time-series data to show variations in the type of regulation across the samples observed.)
- Impact of macroeconomic variables (such as foreign exchange availability or market openness) on the small-scale private sector. (This would require cross-country or time-series data to show variations in the macroeconomic variables across the samples observed.)
- Impact of culture, location, and level of development on how much income and employment an enterprise generates. (This would require cross-country or time-series data to show variations in culture and level of development, both of which are usually constant within regions.)

- Target population.
- Fluctuations in enterprise activity over time.
- Panel data on enterprises.
- Enterprise income, sales revenue, and expenditures.
- Business assets.

Target Population

LSMS surveys are designed to collect information about a random sample of households. By using a random sample of households, do LSMS surveys necessarily capture a random sample of enterprises? This is an important question, as it is vital that an analysis of household enterprises be based on such a random sample. Every enterprise in the population must have an equal (or at least a priori known) likelihood of being selected. The LSMS survey design targets households rather than enterprises, meaning that every household has an equal probability of being selected. If the survey collects data on every enterprise associated with the households in the survey, the survey design guarantees that each household enterprise also has an equal chance of being selected (as explained below).

In LSMS surveys, a nonagricultural household enterprise is defined as a household-operated business that performs any activity for the purpose of earning an income, with the exception of sale of agricultural crops or livestock products from a household farm.² Because public and parastatal enterprises, corporations, and cooperatives are not associated with any one household, they are not included in LSMS samples. Thus LSMS survey samples capture only the private, noncorporate sector.³

An alternative way to acquire information about the private productive sector is an enterprise survey. Because these surveys draw their enterprise samples from registration or address lists,⁴ these surveys (unlike LSMS surveys) do include larger enterprises and corporate, public/parastatal, and joint-venture enterprises. However, they tend to overlook unregistered and itinerant enterprises as well as the many household-based enterprises that do not appear on any registration or address lists. LSMS survey samples, on the other hand, do tend to capture these unregistered private productive activities. Thus neither enterprise nor household surveys yield complete (and hence fully random) samples of the total productive nonagricultural sector.

Sampling Considerations

There are several other potential problems regarding the randomness of the LSMS sample—problems which if not addressed properly could bias the statistical results and policy recommendations derived from the data.

SEVERAL ENTERPRISES PER HOUSEHOLD. Some households operate more than one enterprise. Typically about 25 percent of the households that operate a nonagricultural enterprise operate more than one and 5 percent operate more than two.⁵ It might be tempting to reduce costs by letting an interviewer determine on the spot which of a household's enterprises is the "most important," and collecting information only on that enterprise. This was the method used by the Peru LSMS surveys of 1990 and 1991. However, if only the "important" enterprises in multi-enterprise households are surveyed, the smallest family enterprises are likely to be systematically excluded. To ensure a random sample the interviewer must either survey all of the enterprises operated by the household or record the number of enterprises in the household and randomly select one or two enterprises from the full list. (Enterprise weights can be adjusted after the data are entered.)

There is a compelling reason for surveying all of the enterprises. To precisely measure household living standards, all of a household's components must be measured, including all of the enterprises operated by its members.

JOINT OWNERSHIP OF ENTERPRISES. About 5 to 7 percent of enterprises are owned jointly by two or more households. Since the partners in such enterprises live in different households, information about the enterprises could be collected at any one of those households. If the number of partners living in different households is n and the probability of selecting any household is p , the probability of selecting a particular jointly owned enterprise equals np . In analysis, jointly owned enterprises should be given a weight equal to $1/n$ while enterprises owned by a single household are given a weight of 1. To make this weighting possible, it is important that the LSMS questionnaire ask respondents for the number of other households in which other owners of the enterprise live.⁶

NONRESPONSE. The sample of enterprises generated in an LSMS survey suffers from several problems of non-

response. One form of nonresponse occurs when a household either cannot be found or refuses to answer. A second form of nonresponse is the collection of household enterprise data from the wrong household member. To collect accurate information about an enterprise, an interviewer must try to address the relevant questions to the member of the household who actually operates the enterprise.

How often does nonresponse happen? The 1991 Pakistan survey provides the best indication since entrepreneurs were questioned in both the first and second rounds of the survey. In both rounds, between 5 and 10 percent of households could not be found or refused to answer. According to percentages from the Côte d'Ivoire (1985–88), Ghana (1987–88), and Vietnam (1992–93) surveys, for about 5 percent of enterprises the respondent was someone other than the entrepreneur.

Fluctuations in Enterprise Activity over Time

There are two ways to find out if a household is operating a household enterprise. The first way is to ask whether the household is currently involved in any nonfarm activity on its own account with the intent to earn an income. This establishes the number of household enterprises currently in operation. The second way is to ask whether the household is involved in any such activity or has been so involved during the past 12 months. This method includes not only household enterprises currently in operation but also any enterprises that were in operation during the previous year but are not operating currently—which amounted to between 10 and 25 percent of the sample in Vietnam, Pakistan, and Ecuador.

These two approaches generate two different samples of enterprises, with an important difference between them. The second approach captures the enterprises that have gone out of business during the previous 12 months as well as those that are seasonal and not operating at the time of the interview.

Is it necessary to survey enterprises that are not in operation at the time of the interviewer's visit? Yes, for three reasons. While the living standard of a household can be measured by evaluating current stocks of human and physical capital, standards of living are also measured by flows, particularly of consumption and income.⁷ Because both stock and flow variables are affected by temporal and temporary variations, it is reasonable to inquire about the household's experi-

ences during the recent past—say, the past month or the past 12 months. (This approach is also used in Chapter 8 on health, Chapter 9 on employment, Chapter 19 on agriculture, Chapter 5 on consumption, Chapter 11 on transfers, Chapter 21 on credit, and Chapter 20 on savings.) In some cases survey questions are used to account for fluctuations in the status of an issue (such as the consumption of occasionally purchased commodities); in other cases survey questions are used to establish a trend (such as whether the household borrowed or saved money).

The income generated by some enterprises follows seasonal patterns. LSMS surveys should seek to find out both the level around which the income fluctuates and the amount of variation. Measuring income at only one (often nonrandom) point in time during the year is insufficient because this does not allow seasonal variations to be distinguished from the general level of profitability. An interview may even occur out of season when an enterprise is not in operation—and lead to the incorrect conclusion that the interviewed household is not involved in any household enterprise activity.

It might be interesting to know what kinds of households are most likely to operate enterprises—in other words, to exhibit signs of entrepreneurship. To study this question, it is necessary to survey all activities that a household conducts on its own account, not only at the time of the visit but also over a recent time period such as the past year or the past two years. The time factor is important because it can indicate whether a household's failed business was once a useful source of income or had always been a sinkhole. Either way, a trend exists that cannot be seen by documenting only the current involvement of a household's members in a farm, in a household enterprise, or in wage employment. Surveying failed household enterprises can be as meaningful for documenting the transitions in a household as is, for example, surveying changes in household composition.

If the activities of an enterprise are seasonal, an interviewer should ask when it carries out these activities and for how long. This will help researchers and policymakers understand the fluctuations in local labor markets and income and consumption patterns during the year. When an enterprise is not in operation for reasons other than seasonality, it is useful to inquire how long ago the enterprise was last active, why it is not currently in operation, and if and when the entrepreneur anticipates starting it up again.

In any line of questions about past household enterprise activities it should be noted that in countries where inflation has been high—say, more than 30 or 40 percent per year—an entrepreneur's responses about monetary values of past revenues and expenditures probably lose some accuracy.

Panel Data on Enterprises

The issue of how enterprises change over time leads to the question of how much can be learned by collecting panel data (see also Chapter 23 on panel data). Panel data may be useful to track the increasing role of household enterprises over time in many countries. Repeating LSMS questionnaires with unrelated samples in various consecutive years may help researchers examine the role of small enterprises in the economy both in recessionary times and in times of rapid economic growth. Yet while using unrelated samples allows one to describe an aggregate degree of change in household entrepreneurship, more information can be gained if the same households are visited more than once. Researchers can then observe which households and household members have been more responsive to changing external conditions. Has the response been better from poor or wealthy households? From men or women? From better-educated or less well-educated entrepreneurs (Schultz 1975)?

While there is a definite benefit to panel data, one must keep in mind that a panel study consisting of, say, four rounds generates data at only four points in time. (For that matter, the same is true for repeated cross-sectional household surveys.) Between those four points in time the economic environment changes for a variety of reasons. And it is difficult to identify which economic factors affect the performance of the enterprise: does enterprise performance change because of a changing regulatory environment, a macroeconomic policy variable, a structural market phenomenon?

Unless there is a dominant event during the operation of the panel questionnaire, the researcher is able to describe responses of household enterprises but—without other relevant information—not exactly to what they respond. Suppose the legal minimum wage is raised. Household enterprises might be expected to reduce their hiring of labor. Yet comparing the hiring practices of enterprises before and after a minimum wage hike does not show a clear correlation unless one

can rule out all other external influences including changes in credit markets, output prices, foreign exchange rates, and tax rates.

On the other hand, if each round of a panel questionnaire collects information about the wages that household enterprises pay hired workers (or would have to pay them if they hired any), and if these wages vary between enterprises (in different areas—say, communities), one may estimate the impact of any wage increase on household enterprise hiring practices. An increase in the minimum wage is merely one example of a wage increase.

Panel data have value in both static and dynamic economic environments. Even in static environments, luck or errors of judgment often cause the performance of enterprises to take turns for the better or for the worse. While some households continually invest in their enterprises, others let their capital wear out until it is no longer very useful. These choices cause changes in income and employment that affect the household. Panel data help analysts see whether enterprises' lean years are temporary or permanent, how likely certain survivalist enterprises or microenterprises are to succeed, and the long-term impact of credit restrictions on enterprises. Panel data can also be used to explore changes in the universe of enterprises—for example, to identify enterprises that have closed since the last round of questioning. This may make it possible to find the former owner to ask why the enterprise shut down and what the owner has been doing since. And the use of panel data opens up new possibilities for analyzing interactions among different activities within a household, particularly in terms of profit allocation among different household members and activities.

When panel data are collected, survey costs may be high. However, these costs can be reduced if the entire questionnaire is not administered to the household each round (or year). Yet because the household enterprise module contributes information that is essential for determining a household's living standards, one may wish to administer at least the short version of the questionnaire to each enterprise, along with questions that gather information about enterprise turnover. And given the flexibility that characterizes good entrepreneurship, it is recommended to gather the full amount of information at least every two years. (This will sufficiently account for the lag in the impact of any policy.)

Enterprise Income, Sales Revenue, and Expenditures

Ensuring the accuracy of the data on enterprise income is the most challenging part of the enterprise module. The income yielded by an enterprise can be measured in two ways: directly by asking the owner, or indirectly by subtracting expenditures from sales revenue. The following discussion focuses on the sales revenue and expenditures variables as well as the variable for enterprise income.

SALES REVENUE. At a minimum, an LSMS questionnaire should inquire about recent revenue and revenue over the previous 12 months. (For enterprises not operating when a questionnaire is administered, only the 12-month question is asked.) This strategy is based on two ideas. First, an entrepreneur is likely to give more accurate answers about his or her enterprise's recent economic performance than about its past economic performance—so even if the recent period is not representative of the events throughout the year, information provided about this period will be of higher quality and therefore be useful to researchers. Second, it is useful to have information about an enterprise's patterns of revenue over a longer period of time, even if the respondent is less than perfectly accurate in his or her recall.⁸

Comparing figures reported for recent revenues with reported figures for 12-month revenue may reveal wide variations when both recent and 12-month revenue flows are expressed in monthly values. Recent revenue in the Pakistan survey was less than half the 12-month revenue for 12 percent of the currently operating enterprises and more than double the 12-month revenue for 4.9 percent of them. In Vietnam, recent revenue was less than half the 12-month revenue for 7.9 percent of household enterprises and more than double the 12-month revenue for 18.2 percent. The two measures of revenue occasionally differ tenfold or more.

Several factors may explain the difference between recent and 12-month revenue flows. High inflation may distort people's memory of past monetary values; business cycles may cause fluctuations in enterprise performance; respondents (or interviewers) may be unclear about the length of the reference period that applies to the questions asked; respondents may have difficulty recalling a 12-month revenue figure; and seasonal factors may play a role. In the hope of avoiding these problems, the revenue section of the

model questionnaire in this chapter asks for many details.

Still, it is useful to have some yardsticks against which to evaluate revenue responses. A simple yardstick might be the following. After inquiring about recent revenue, the interviewer asks, "Has your business made more sales since my last visit than in the two weeks before that visit?" and gives the respondent the choice of three answers—more sales, fewer sales, or about the same number of sales. This question appeared in the Vietnam questionnaire. Indeed, it happened that some entrepreneurs happily stated that they had made "more sales" but actually reported a smaller figure, or vice versa. This may highlight possible inaccuracies in the reported sales, but it is also possible that the entrepreneur is not responding correctly to the question itself. It is therefore imperative to incorporate other yardsticks with which one can examine the accuracy of the revenue data. (The section below on enterprise income will return to this issue and propose solutions.)

The questionnaire must distinguish among different kinds of revenue: cash receipts, in-kind payments for goods and services, and home consumption.⁹ Typically, fewer than 10 percent of the entrepreneurs indicate that they have received in-kind payments. For slightly more than 25 percent of the enterprises, respondents report some home consumption.

ENTERPRISE EXPENDITURES. To measure enterprise expenditures on inputs, a questionnaire must contain, at a minimum, a grid describing expenditures on a specified list of inputs, with the following kinds of questions for each input item: "Q1: During the past 12 months, did you purchase ...?" "Q2: How much did you usually pay for ...?" "Q3: How often did you pay for ...?"¹⁰ These questions do not yield particularly good data, for three reasons. First, there is substantial variation in how many items, and what types of items, are listed by entrepreneurs. In existing LSMS data sets most entrepreneurs mention one, two, or three items, and some mention none—with wide variation in the items that are mentioned. Certain items may be used but not purchased; respondents often mention purchases of either raw materials or items for resale but rarely both, regardless of whether their enterprises are in manufacturing, restaurant services, or the retail trade; and few enterprises report expenditures on electricity, fuel, or

water, even in sectors where they ought to be common. Of course, differences in production techniques may explain some of the variation.

The second difficulty with these data is that an item purchased by an enterprise may well be shared with the household and with other enterprises.¹¹ If sharing takes place, there is measurement error in both household consumption expenditures and enterprise expenditures (or in the value of expenditures in the two enterprises involved). The third problem with the data is that when an enterprise receives inputs (such as electricity, water, or the use of tools) from a household or from other household enterprises, the entrepreneur does not report the use of these inputs because there has been no purchase. For an analysis at the household level, this is problematic since both the value of household consumption expenditures and the value of household income are overstated by the value of the inputs received by the enterprise. For an analysis at the enterprise level, this causes expenditures to be understated while revenue is unaffected—making the enterprise seem very efficient.

The three problems are related, and can be solved in one stroke by ensuring that the questionnaire carefully accounts for the use rather than just the purchase of inputs. The questions should reflect the fact that usable inputs can be acquired by purchasing them, by borrowing them from relatives, friends, or household members, by picking them up if they are discarded or free (such as firewood or packaging materials), or by receiving them as gifts. Accounting for input use in the questionnaire will also yield more information on each enterprise's involvement in formal markets, since some of the above methods of input procurement are nonmonetary market transactions that substitute for purchase in formal markets.

ENTERPRISE INCOME. In principle, enterprise income is defined as the difference between an enterprise's revenue and expenditures. In every existing LSMS data set, enterprise income is highly variable across enterprises, with large outliers at both the positive and the negative ends of the spectrum.¹² Table 18.1 shows the percentage of enterprises in various LSMS data sets with negative calculated profits—enterprises that lost money even before the values of family labor and assets were taken into account. At least in some countries, these percentages are implausibly high. Is this a real phenomenon or is measurement error to blame?

There are four sets of clues. First, the most extreme examples are found in Côte d'Ivoire and Ghana, where the questionnaires were administered in the mid-1980s. The results from Ecuador, Pakistan, Tanzania (1994), and Vietnam are more recent and are more plausible, suggesting that questionnaire design had improved, interviewer training was better, and interviewers were more alert to potential misreporting. However, the percentage for Peru (1985) is low as well.

Second, Vijverberg (1992) found that in Côte d'Ivoire and Ghana negative profits occurred in enterprises regardless of the entrepreneur's education and regardless of whether the interviewer spoke with someone other than the entrepreneur. Third, among the seven countries listed in Table 18.1, the percentage of enterprises with negative profits appears to be lower in countries with a higher general education level. It is indeed plausible that general numeracy among the population improves the accuracy of household questionnaires. Fourth, while it is possible that enterprise income is extremely variable over time, it is hardly plausible that such a large percentage of enterprises would tolerate negative cash flows for long.

All in all, the clues show that the income figures are probably skewed toward the negative. The lesson to be learned is that the questionnaire should be designed so that it yields accurate information and also enables researchers to cross-check reported revenue and expenditure figures with the answers to some other direct or indirect questions.

One such check is accomplished by including the following question: "After making purchases for the

Table 18.1 Percentage of Enterprises with Negative Profits, Selected LSMS Surveys

Country of survey	Type of profits computed	Percentage of enterprises with negative profits
Côte d'Ivoire ^a	Food commerce	63.5
	Nonfood commerce	38.7
Ecuador	Last month	19.0
Ghana ^a	Commerce	63.5
	Food manufacturing	56.0
Pakistan	Recent	24.9
	Normal	21.1
Tanzania	Recent (or else normal)	29.2 to 35.5
Vietnam	Since last visit	13.7
	Past 12 months	14.9

a. Profits refer to profits received since interviewers' last visit if the enterprise was in operation at the time of the previous interview, during the past 12 months if it was not.

Source: Vijverberg 1992.

business, is there usually any money left? If so, how much?" In recognition of the fact that enterprise and household monies are sometimes intermingled, it is also useful to ask: "Do you use part of the money you get from this business for yourself or for your household? If so, how much?"¹³ "Net revenue" is defined as the respondent's estimate of the amount of money taken from the business for household use plus the value of the household's consumption of the output of the enterprise (Vijverberg 1992).

In an ideal data set, net revenue should be the same as profits calculated from other data in this module (in other words, total revenues of the enterprise minus total expenses). However, experience with past LSMS data is sobering. Table 18.2 shows the dispersion of enterprise revenues for Vietnam. Enterprises are divided into five quintiles, first according to their net revenue and then according to their calculated profits. The table shows the cross-tabulation of these two group values. If data measures were accurate and consistent, each of the diagonal cells (those on row 1, column 1; row 2, column 2; and so on) would contain one-fifth of the enterprises. Instead, the lower left and upper right corners show significant numbers of enterprises where one income measure is high and the other is low. Three-quarters of enterprises in the first column would run at a loss if judged by their accounting profit, even though some of their owners stated that they have a substantial sum left over for household

use. In terms of actual money values, only 40 percent of the enterprises' profit and net revenue values are within 25 percent of each other; for another 20 percent of the enterprises, one value is less than twice the other. While some net revenue values are large, they are not nearly as extreme as profits seem to show. And net revenue values correlate more closely with business asset values than do profits.¹⁴

Two conclusions may be suggested by the findings. One is that because of the great difficulty in precisely estimating enterprise income from a household survey such as the LSMS, it may be better to save time and energy by concentrating on simpler measures—even while recognizing them to be incomplete and imprecise. A second, opposite conclusion is that because many of the most important policy issues relating to household enterprises require accurate estimates of enterprise income, even more energy should be devoted to collecting the most accurate possible estimates of income earned by these enterprises.

If the decision is made to aim for a simpler measure that is not fully precise but that is more easily understood (and therefore more likely to yield meaningful results), this might mean paying only cursory attention to various types of transfers between an enterprise and other household activities. It would then be possible to develop the principal expense and revenue categories such that they could be compared during the course of the interview and presented to respondents to

Table 18.2a Comparing Net Revenue and Recent Profit, Vietnam

Rank for net revenue	Quintile rank for recent profit					Total
	1	2	3	4	5	
1	7.71	5.93	2.71	1.87	1.78	20.00
2	4.25	8.27	4.21	1.96	1.31	20.00
3	2.90	4.44	6.92	3.36	2.48	20.09
4	2.62	1.03	5.65	7.29	3.36	19.95
5	2.52	0.33	0.51	5.51	11.07	19.95
Total	20.00	20.00	20.00	20.00	20.00	100.00

Source: Authors' computations.

Table 18.2b Comparing Net Revenue and 12-Month Profit, Vietnam

Rank for net revenue	Quintile rank for 12-month profit					Total
	1	2	3	4	5	
1	7.93	8.54	2.00	0.71	0.75	19.93
2	3.57	8.86	4.68	2.11	0.82	20.04
3	3.00	1.64	9.93	3.57	1.86	20.00
4	2.46	0.54	2.93	10.64	3.46	20.04
5	3.04	0.43	0.46	2.96	13.11	20.00
Total	20.00	20.00	20.00	20.00	20.00	100.00

Source: Authors' computations.

ensure that, in broad terms, their values are indeed comparable. The standard version of the questionnaire presented in this chapter has taken this route.

Another approach in an abbreviated LSMS might be to ask questions only about net revenue, without separating revenues from expenditures. (For further discussion see Chapter 17 on measuring total household income.) While this may seem likely to yield enterprise performance information at least as accurate as the information yielded by separate gross revenue and detailed expenditure questions, it is probably less accurate. Why? In essence, the entrepreneur's response to a net revenue question is an educated guess, informed by his or her knowledge about the revenues and expenditures the enterprise incurs, by a desired income level, or by his or her perceived consumption expenditures. The response ought to be related to the performance of the enterprise, but there is no guarantee that it is.

In addition, the detailed revenue and expenditure questions provide other important insights about the entrepreneur's business environment (for example, the degree to which the enterprise participates in the market) that could be influenced by public policy. Independent of the accuracy of the income estimates, both the gross revenue/expenditure questions and the net revenue questions contribute useful information and should be retained.

It may be possible to check on the accuracy of income estimates by asking detailed questions about inventories. When an entrepreneur states the value of his or her inventory, the interviewer can ask how many business days this inventory will provide for. However, it is important to note that inventories are a more meaningful concept when an enterprise is currently in operation. A seasonal enterprise or an enterprise that has ceased operating is less likely to carry an inventory, and even if it does carry one, the inventory is unlikely to be reconcilable with any particular rate of production or sales.

Another possible check could be to ask questions about variations in business sales. The interviewer would ask the entrepreneur to describe both daily variations in the sales of the enterprise and how the revenues of the enterprise relate to monthly expenditures. In this way the entrepreneur would be prompted to reveal his or her estimate of the enterprise's cash expenditures.

The most effective method to collect more accurate data would be a quick, on-the-spot conversion of

an entrepreneur's responses into monthly figures of total revenue, total expenditures, and net enterprise income. The interviewer would immediately be able to verify these calculations with the entrepreneur and make any necessary corrections. However, calculating these figures requires a large number of data items, and would be difficult to do manually. To solve this problem, the interviewer could be provided with a laptop computer loaded with software that contained a fully coded questionnaire. As he or she entered the respondent's answers to the questions into the computer, another piece of software would automatically and immediately use the data entries to calculate revenues, expenditures, and income of the enterprise in question. This process is known as "computer assisted personal interviewing." (The questionnaire software would contain all skip patterns, which would have the additional advantage of reducing skip errors as well.) Of course, computer assisted interviewing has costs as well as the benefit of increasing data accuracy. Using laptop computers for fieldwork is expensive, makes supervision of interviewers more difficult than in the present system, and requires interviewers who are more skilled.

Employment in the Enterprise

A variety of facts are needed to explore employment-related policy issues. First, it is necessary to identify which household members are employed by the enterprise and how much work they do. This allows analysts to relate the characteristics of household members—such as age, migration status, any illness, and level of schooling—to the operation and performance of the enterprise. Next, details must be collected regarding any paid workers, apprentices, and nonhousehold unpaid workers in the enterprise. What skills do these workers have? How much are they paid? How many are male and how many female? How much time do they devote to working in the enterprise? After these details have been collected, the survey should establish the size of the enterprise's work force over the past few (say, up to five) years—and perhaps also past characteristics of the work force (although this is very demanding on the respondents). These data will show growth in employment, which can be related to the characteristics of the entrepreneur and the household. Finally, while seasonal employment patterns are likely to follow seasonal sales patterns, it is nevertheless helpful to ascertain patterns of employment in the enterprise over one year.

In order to save time and money, it may be tempting to collect work information about household members in the employment module (see Chapter 9). This strategy, followed in previous LSMS questionnaires, has been problematic. In all but two cases surveys collected information about hours of family labor in the employment module, during the first visit of the interviewer to the household.¹⁵ To allow researchers to link data from the enterprise module with the responses of household members to questions about their economic activities, many surveys (such as those in Vietnam and Ghana) have asked entrepreneurs to report the names of the household members who work in the enterprise; the interviewer recorded the ID numbers associated with these names. In principle researchers could use this information to consult the employment module and extract the relevant enterprise labor information. In practice this is not so easy. It is not immediately clear whether the researcher should look at those members' main or secondary jobs during the previous week (or during the previous year). What if two or more of a family member's jobs match? What if the family member claims to work in a different industry? What if the family member does not report any hours of work in self-employment? If a household operates two enterprises in the same industry, and both entrepreneurs claim that member as having worked for them, with which enterprise should a given family member be linked? What if other family members claim to work in self-employment in the same industry as the enterprise, but the entrepreneur does not report employing them? Both conceptually and practically, there are likely to be numerous matching problems that will be very time-consuming to sort out.

The questionnaire in this chapter is inspired by the Pakistan and Ecuador formulations. Unlike previous LSMS surveys, the Pakistan questionnaire did not have an employment module. Instead it asked about hours of work at the same time that it explored wage employment, farm labor, and work in family enterprises. Both the Pakistan and Ecuador questionnaires required the entrepreneur to list ID numbers and working hours of all of the household members who work in his or her enterprise. This prevented many of the matching problems from arising.¹⁶ The household enterprise module in the Ecuador questionnaire asked entrepreneurs for the ID numbers and hours of work of the household members who worked for the enterprise.¹⁷

The standard questionnaire in this chapter contains employment (and labor seasonality) questions within the enterprise module. This avoids any matching problems. And if necessary, responses that an entrepreneur gives in this module can be cross-checked against responses that individual household members give in the Chapter 9 employment module (although such a cross-check is subject to the timing and matching problems mentioned above). The questions are designed to have the same reference period as the income information in Part C of the employment module.

The expanded questionnaire additionally asks whether and how much the enterprise paid to members of the household for their labor—a line of questioning that sheds light on intrahousehold income distribution. The short version of the questionnaire reverts to old practice, asking only for IDs of household members working in the enterprise.

Business Assets

Business assets are an important determinant of enterprise performance. Enterprise performance can be measured not only by labor productivity or by the absolute amount of income generated but also in terms of the percentage return to investments in the enterprise. And an enterprise's start-up and subsequent performance depend heavily on the entrepreneur's ability to acquire the assets needed to be competitive in the sector. If one of the purposes of a particular survey is to investigate the credit needs of small-scale private enterprises, it is important to collect information about business assets.

Business assets come in two forms: fixed assets and inventories. Fixed assets include land, buildings, tools, machinery, furniture, and vehicles used by the labor force. Inventories consist of raw materials, intermediate goods that need to be further processed, and finished products ready for sale. Finished products are especially important for trading enterprises but can also be significant for manufacturing enterprises.

Current enterprise performance is determined by the business assets in use at the moment. Therefore the questionnaire must focus on the typical value of assets in use during the reference period. Recent enterprise income can be analyzed using the current value of business assets. To analyze income over the past 12 months, more information is needed: the value of current business assets as well as sales and purchases dur-

ing the past 12 months.¹⁸ While it matters when these sales and purchases took place, asking for such dates is too burdensome in a multi-topic LSMS survey. Rather, assuming that sales and purchases took place on average a half year ago, the typical value of business assets in use over the past 12 months may be approximated by

$$\frac{[\text{current value of assets}] + [\text{value of assets sold}]/2 - [\text{value of assets purchased}]/2.}$$

For land and buildings, one might also ask whether the enterprise made any expenditures on improvements; these may be counted as assets purchased. Note, though, that the usual quantity of inventories is difficult if not impossible to measure; the questionnaires outlined in this chapter ask only for current values.

For many purposes, the most important question about fixed assets is not so much what assets are owned by the enterprise but rather what assets it uses. An entrepreneur may rent, own, or borrow assets from a neighbor or relative or from another enterprise operating in the household. Experience with previous LSMS data sets indicates that a significant proportion (about one-fourth) of household enterprise owners report owning no assets, and those that do own assets often share them with household members or with other household enterprises; this is particularly the case with vehicles.¹⁹ If an asset is shared, it contributes not only to the income of the enterprise that owns it but also to the income of other enterprises or to general household welfare. In light of this fact it is necessary to devise a way to account for the complex sources and uses of business assets; for one possible method see the expanded version of the questionnaire.

Policy Variables

Variables must be collected that indicate the extent to which enterprises are involved in formal and informal credit markets—both in receiving credit from sources (such as suppliers and banks) and in extending credit to others—and on what terms the credit is provided. In addition, the questionnaire must ask about the various forms of (noncredit) professional assistance that an enterprise might have received—for example, in product design, quality control, management techniques, or bookkeeping.

It is hard to measure the impact of regulatory reform on household enterprises if all enterprises are

subject to the same (national) regulations. However, if the LSMS survey is administered in a country where local regulations vary across localities, these areas are particularly valuable targets for information gathering. In most cases it is important to know whether entrepreneurs abide by regulations that should, in principle, apply to them. It may also be important to find out from entrepreneurs whether they are aware of the regulations and whether they have sought to act on them. The expanded questionnaire in this chapter contains one example of such questions, regarding enterprise registration.

It is equally difficult to measure the impact of macroeconomic variables. The draft questionnaire asks about the incidence of taxes; this question could be expanded to fit local conditions. Entrepreneurs could also be asked about what opportunities they have to purchase foreign currency, their experience in buying imported commodities (inputs), and the competition they face from imported products.

The community questionnaire should contain questions about community characteristics that affect the performance of the enterprise. Such characteristics include roads, other infrastructure (such as railroads, waterways, telecommunication systems, market centers, and utility services), and the presence or absence of banking and credit organizations. In addition, government and business associations should be asked in the community questionnaire about the nature of their enterprise assistance programs (both direct and indirect). For specific examples of such questions see Chapter 13 on the community questionnaire.

Still more data are needed if all the policy questions outlined in the first section of this chapter are to be addressed. The amount of exposure that members of the household have had to entrepreneurship may be an important determinant of the household's decision to start up an enterprise. This exposure may have come from parents or other kin of household members. It may also have come from friends, but the influence of a circle of friends is harder to measure in a standardized manner across a sample. Moreover, causality may be difficult to establish; does friendship with other entrepreneurs stimulate someone to start an enterprise, or does the operation of an enterprise cause the entrepreneur to rub shoulders with other entrepreneurs?

Does receiving an inheritance prompt people to start up an enterprise? To answer this question, it is necessary to ask a question about when a household

inherited major amounts of wealth—a question that would need to be posed to all households, and not only in the context of the household enterprise module. Data about the receipt of an inheritance could then be analyzed together with the data from the enterprise module about the age of the enterprise.

It would be useful to measure the way an enterprise has grown in the past, both in terms of income (of both the enterprise and its employees) and in terms of employment. Retrospective information about employment is less likely to be tainted by recall errors than retrospective information about income because the employment information is less detailed and easier to recall. However, most enterprises employ only one or two household members; in such cases, growth is evident more in their work effort and in the income that the enterprise generates than in employment creation. The draft questionnaire in this chapter asks about the number of people employed by the enterprise one and two years previously and also over the previous 12 months (to measure both seasonality and trend growth).

Another policy question concerns the impact of human capital on household enterprise performance. The human capital of household members is measured in the education section of the core LSMS questionnaire (Chapter 7); the household enterprise module asks which household members work for the enterprise. No previous LSMS survey has asked for information about nonhousehold workers beyond what number is employed by the enterprise. The draft questionnaire asks how many of an enterprises' workers have reached a certain level of schooling and how many of them are "skilled" in the eyes of the entrepreneur. This "skill" measure is somewhat subjective, but it is impossible to measure in a more precise way given the great diversity among household enterprises in most developing countries.

Finally, in order to measure the distributional effects of household enterprises within a household, the questionnaire must include questions about who received money from the enterprise and how they (or the household at large) spent it. Some household members may be explicitly paid by the entrepreneur; others may receive implicit pay when they spend a part of the enterprise's revenue for consumption purposes, to meet either their own or the household's needs. It is therefore difficult to get an exact accounting of the distribution of all enterprise income among

household members. (In any case, it is unlikely that any household survey will ever measure consumption expenditures at the level of individual household members.)

The impact of income earned from household enterprises on household consumption patterns can be measured by correlating household expenditures in certain consumption categories with the earnings that the entrepreneur and those members of the household who are explicitly paid to work for the enterprise bring into the household. Questions on these measures are included in the model questionnaire. To make this analysis complete, it is necessary to have a full accounting of every kind of income for each household member, including wage earnings, farm income, pensions, remittances, and interest income. For a more elaborate discussion of these issues see Chapter 24 on intrahousehold transfers.

Summary

Table 18.3 summarizes the data requirements implied by the policy issues and research questions outlined in the first section of this chapter. The table refers to specific questions by their number in the expanded version of the questionnaire. The last column of Table 18.3 highlights the need for data collected in other modules of the LSMS questionnaire.

The prospects for analysis with data generated by the short, standard, and expanded versions of the model questionnaire are rated from not possible to poor to fair to good. In all cases it must be remembered that the sample is of small-scale enterprises, and excludes corporations, public/parastatal and foreign enterprises, and most joint ventures. As always the quality of the analysis depends heavily on the quality of the data, which is influenced in crucial ways by how well the interviewers are trained and how well they are supervised in the field.

Draft Module

The expanded version of the household enterprises module contains the most complete but also the most demanding list of questions. The standard version of the module, which abbreviates this list, does not permit analysis of some of the policy questions but still attempts to provide good measures of important data such as enterprise income and employment (see Table 18.2). The short version, even more abbreviated, aims to col-

Table 18.3 Household Enterprises Module: Requirements and Links with Other Modules

Issue	Short version	Standard version		Expanded version		Data needed from other sections
	Prospect for analysis	Prospect for analysis	Module questions	Prospect for analysis	Module questions	
1. Number of enterprises	Good	Good	B:1, 3; C:6–7	Good		
2. Sectoral and locational characteristics	Good	Good	B:3; C:4; E:1–3	Good		
3. Measuring enterprise income	Fair	Good	C:5–6, 8; D:27–28, 36–37, 46–47, 53–55; E:4–13, 19–26, 29, 34, 36–44; F:2–4, 14, 19–21, 26–27, 33–34; G:22–23; H:1–3, 6–11, 31–40	Good	F:10–13, 15–18, 22–25	
4. Poverty	Fair	Good	All of issue 3	Good	All of issue 3	Core: household consumption expenditures
5. Variability and seasonality in income	Good	Good	E:27, 29–30, 34, 36–39; H:31–33	Good	E:28, 31–33	
6. Earnings of hired labor	None	Fair	D:24–28, 32–37, 43–47	Good	D:29–31, 38–40, 48–50	
7. Employment	Fair	Fair	D:1–6, 9–11, 14–17, 21, 24–26, 32–35, 41–45	Good	D:18, 29–31, 38–40, 48–58	
8. Seasonality in employment	None	Poor		Good	E:35	
9. Employment growth	Poor	Poor	E:30, 36–39	Fair	D:56–57; E:31–33, 35; G:39	
10. Entrepreneurship	Poor	Poor	B:3; C:3–5; E:26–27, 29–30	Fair	A:1–2; B:2; H:14–16	Community: infrastructure; Core: human capital
11. Determinants of income	Fair	Fair	All of issue 3; C:3–4; G:1–3, 21–23, 29–33, 37–38; H:1–2, 6–9	Good	All of issue 3; G:7–20, 24–28; H:17	Community: infrastructure; Core: human capital, size and value of residence
12. Education, training, and experience	Good	Good	B:4; C:3; D:4, 15	Good	A:1–2	Core: employment history, human capital, training, apprenticeships
13. Impact of government training programs	None	None		Fair	All of issue 3; G:0–39; H:17	
14. Marketing patterns	None	Poor	E:27, 30; F:1–4, 19–21	Good	E:33; F:5–6, 10–18, 22–24; H:4–5, 12–13	
15. Location and infrastructure	Fair	Fair	All of issue 3	Fair	All of issue 3; B:2; H:14	Community: infrastructure
16. Finance and credit markets	None	None		Good	E:14–16; F:7–9; G:34–36; H:23–30	Core: household credit; Community: private sector description; Credit: interest rates, individual credit
17. Regulation and enterprise performance	Poor	Fair	All of issues 3 and 7; F:26–27	Fair	All of issues 3 and 7; F:28–32; H:14	
18. Macroeconomic policy and enterprise performance	None	Fair	All of issues 3 and 7; D:53–55; F:33–34	Fair	All of issues 3 and 7; D:51–52; H:18–25	
19. Enterprise performance and other household activities	Good	Good	All of issues 3 and 7	Good	All of issues 3 and 7	Depends on issue to be studied
20. Enterprise performance over time	Good	Good	All of issues 3 and 7	Good	All of issues 3 and 7	
21. Intrahousehold interactions	Poor	Fair	All of issue 3	Good	All of issue 3; F:12–14, 18–25; G:7–15, 24–28; H:41	Depends on issue to be studied
22. Extrahousehold linkages	None	Poor	G:21–23	Poor	E:17; G:16–18	Community: private sector description

Table 18.3 Household Enterprises Module: Requirements and Links with Other Modules (continued)

Issue	Short version	Standard version		Expanded version		Data needed from other sections
	Prospect for analysis	Prospect for analysis	Module questions	Prospect for analysis	Module questions	
23. Legal reform	None	Poor	All of issues 3 and 7; D:53–55; F:26–27	Fair	All of issues 3 and 7; D:51–52; F:28–32	
24. Macroeconomic variables	None	Poor	All of issues 3 and 7; D:53–55; F:33–34	Fair	All of issues 3 and 7; D:51–52; H:18–25	
25. Culture, location, development	Fair	Fair	All of issues 3 and 7; C:4	Fair	All of issues 3 and 7	Core: urban/rural residence, ethnicity, religion; Community: culture

Source: Author's evaluation of the household enterprise module.

lect information on enterprise income, value (as measured by assets), and employment statistics—primarily for the study of other household-related issues.

Each version of the household enterprise module is divided into the same eight parts, which are labeled A through H. The three versions are related and have many questions in common. In some cases the core questions are restated in the different versions of the questionnaire.

The respondent for parts A and B of the module is the head of the household. For the rest of the module—used if the household operates an enterprise—the respondent for each enterprise should be the person in charge of the enterprise or the person most informed about the enterprise. (This person generally works in the enterprise, although in exceptional cases, such as illness, he or she may not.)

As was mentioned in the previous section, it is essential to gather information about all the enterprises within any given household. Part B of the proposed questionnaire allows up to six enterprises to be listed, along with the industries in which they operate, the household members most informed about and/or in charge of their day-to-day operations (often referred to as the “entrepreneurs”), and the sequence numbers (1, 2, . . .) that the interviewer assigns to enterprises within a household. Parts C through H of the module are used to inquire about the enterprises. These parts contain a grid for three enterprises; if a household operates more than three enterprises, the interviewer must enter information about the fourth, fifth, and sixth enterprises onto another household questionnaire form.²⁰

Table 18.4 summarizes the content of each part of the questionnaire. To get a good grasp of the purpose of questions and skip patterns, it is highly recom-

mended to study the questionnaire in combination with the annotations provided in the last section of this chapter.

As a whole, the expanded version is probably too long to be administered in one LSMS survey. While the expanded version contains questions on every issue discussed above, not all of these questions should all be posed to respondents at the same time. A careful selection of topics of interest should limit the length of the questionnaire.

The standard and expanded versions of the questionnaire follow the same basic format. The short questionnaire follows a somewhat different design, making it difficult to generate a customized version that, in length, is somewhere between the short and standard versions.

Table 18.5 shows average numbers of questions asked in the household enterprise module of an LSMS survey. The column labeled “per enterprise” counts the average number of questions asked of an enterprise; the column labeled “per household” shows the average

Table 18.4 The Parts of the Household Enterprise Module

Part	Respondent	Topic
A	Household head	Household exposure to entrepreneurship
B	Household head	Existence of nonagricultural enterprises
C	Entrepreneur	General information about the enterprise
D	Entrepreneur	Employment of household and nonhousehold labor
E	Entrepreneur	Operation schedule; sales revenue
F	Entrepreneur	Input use and expenditure
G	Entrepreneur	Business assets
H	Entrepreneur	Inventories; enterprise start-up; assistance programs; exposure to international markets; enterprise debt; trade credit; enterprise income

Source: Authors' summary of the household enterprise module.

Table 18.5 Average Number of Questions in the Household Enterprise Module

Part/Type of question	Survey items	Expanded version		Standard version		Short version	
		Per household	Per enterprise	Per household	Per enterprise	Per household	Per enterprise
A							
Exposure	A1–A2	5.40	n.a.	0.00	n.a.	0.00	n.a.
B							
Enterprise existence	B1–B4	2.64	3.00	2.04	3.92	2.04	3.92
C							
General characteristics	C1–C9	2.94	5.65	2.94	5.65	2.94	5.65
D							
Household labor	D1–D19	4.38	8.43	3.52	6.78	1.70	3.28
Nonhousehold labor	D20–D50	2.03	3.90	0.85	1.64	1.11	2.13
Minimum wage	D51–D52	0.65	1.25	0.00	0.00	0.00	0.00
Social security	D53–C55	0.83	1.60	0.83	1.60	0.00	0.00
Labor growth	D56–D57	1.04	2.00	0.00	0.00	0.00	0.00
<i>Part D total</i>		<i>8.93</i>	<i>17.18</i>	<i>5.20</i>	<i>10.02</i>	<i>2.81</i>	<i>5.41</i>
E							
Type of enterprise	E1–E3, E17	2.08	4.00	1.56	3.00	0.00	0.00
Trading enterprise	E4–E13	5.04	9.70	5.04	9.70	0.00	0.00
Credit	E14–E16	0.43	0.83	0.00	0.00	0.00	0.00
Revenue	E18–E26, E29, E34, E40–E44	5.15	9.90	5.15	9.90	4.18	8.05
Interrupted operation	E27–E33	0.42	0.80	0.21	0.41	0.00	0.00
Seasonal labor	E35	6.76	13.00	0.00	0.00	0.00	0.00
Seasonal revenue	E36–E39	7.80	15.00	7.80	15.00	7.80	15.00
<i>Part E total</i>		<i>27.68</i>	<i>53.23</i>	<i>19.76</i>	<i>38.01</i>	<i>11.98</i>	<i>23.04</i>
F							
Resources	F1–F6, F20–25	23.53	45.25	10.47	20.13	0.96	1.85
Credit	F7–F9	1.29	2.49	0.00	0.00	0.00	0.00
Registration	F26–F32	2.22	4.27	0.60	1.15	0.00	0.00
Other taxes	F33–F34	0.65	1.25	0.65	1.25	0.00	0.00
<i>Part F total</i>		<i>27.46</i>	<i>53.26</i>	<i>11.71</i>	<i>22.53</i>	<i>0.96</i>	<i>1.85</i>
G							
Business assets	G1–G33, G37–G39	28.46	54.74	18.59	35.76	7.88	15.15
Credit	G34–G36	0.31	0.60	0.00	0.00	0.00	0.00
<i>Part G total</i>		<i>28.77</i>	<i>55.33</i>	<i>18.59</i>	<i>35.76</i>	<i>7.88</i>	<i>15.15</i>
H							
Inventory	H1–H3, H6–H11	2.55	4.90	2.55	4.90	1.04	2.00
Markets	H4–H5, H12–H13	1.46	2.80	0.00	0.00	0.00	0.00
Start-up	H14–H16	1.56	3.00	0.00	0.00	0.00	0.00
Assistance	H17	2.60	5.00	0.00	0.00	0.00	0.00
Macro variables	H18–H22	1.72	3.30	0.00	0.00	0.00	0.00
Debt	H23–H26	0.83	1.60	0.00	0.00	0.00	0.00
Customer credit	H27–H30	1.07	2.05	0.00	0.00	0.00	0.00
Enterprise income	H31–H49	4.52	8.70	4.52	8.70	1.66	3.20
Use of income	H41	0.52	1.00	0.00	0.00	0.00	0.00
<i>Part H total</i>		<i>16.82</i>	<i>32.35</i>	<i>7.07</i>	<i>13.60</i>	<i>2.70</i>	<i>5.20</i>
<i>Total for all parts</i>		<i>120.64</i>	<i>220.00</i>	<i>67.31</i>	<i>129.49</i>	<i>31.31</i>	<i>60.22</i>

n.a. Not applicable.

Source: Authors' estimation based on experience with previous LSMS surveys.

Box 18.2 Cautionary Advice

- *How much of the draft module is new and unproven?* In its basic design, the household enterprise module provided here follows the same approach taken in many previous LSMS surveys. The module contains parts that inquire about the general operation of the enterprise, its revenues and expenditures, its work force, and its assets. In many ways, however, the module attempts to collect information in more precise detail than has been achieved before. This is true in particular with respect to sales, expenditures, employment, and seasonality.
- *How well has the module worked in the past?* Past household enterprise modules have produced somewhat questionable income data. The current revisions to this module aim to improve the reliability of the enterprise variables. This will be done by: dealing with seasonality and the confusion it creates for answering questions about averages and 12-month totals; asking the trading enterprises a set of questions on sales and expenditures on raw materials that is more suitable to their context; more carefully accounting for the use of inputs and business assets; and asking for several cross-check measures, by which the

accuracy of measured enterprise income may be judged. Even with these changes there is no guarantee that data will improve. At a minimum, though, implementing the recommended questionnaires will inform future work on the design of household enterprise surveys, which is still a new field of research.

- *Which parts of the module most need to be customized?* Several parts particularly need to be customized to country-specific circumstances. In Part D, questions referring to apprenticeships may not apply, and social security systems must be mentioned by name according to the country's governmental structure. In Part E, units of measurement for articles should be specified according to local custom, providing suitable codes for weight and content measures; also, in some countries the list of possible buyers may differ from what Part E provides. In Part F, questions concerning licensing problems and practices may be made more country-specific, and survey designers should include a specific example of a tax levied on small businesses. In Part G, one question about documents of ownership may need to use a specific local terminology.

number of questions one household is asked in the household enterprise module; this average accounts for all households regardless of whether they have an enterprise.

The proportions of respondents branching off at each skip point (D20, D51, and so on) is calculated based on responses to similar questions in the Ecuador (1993), Pakistan (1991), and Vietnam (1992) LSMS surveys, to the extent that this is possible; a substantial number of questions in the standard model are new. However, the most important assumptions are the following:

- Of all households, 30 percent operate one household enterprise, 8 percent operate two, and 2 percent operate three. If the size of a sample were 10,000 households, this would yield 5,200 nonagricultural enterprises.
- Eighty-five percent of the household enterprises are actively operating at the time of the interview.
- On average, 1.5 family members work in each enterprise.
- Fifteen percent of enterprises employ someone from outside the household.
- A typical enterprise reports using inputs from three of the seven input categories listed in part F. Half of these inputs are purchased.
- A typical enterprise reports using business assets from four of the eight business asset categories list-

ed in part G. Sixty percent of these assets are owned by the enterprise.

It is important to note that questions E35 and E36, which record employment and income by month, are recorded for every month (totaling 13 for E35 and 12 for E36) rather than as a single question each. While this adds substantially to the total number of questions, questions E35 and E36 are not onerous to administer.

Annotations to the Draft Module

This section explains the motivations behind the questions so that researchers may better customize the model questionnaire to fit the circumstances of the country they are studying. The explanations in this section will also assist interviewers in implementing the survey in the field.

Each group of questions is described in turn. Occasionally an alternative format is discussed. The question numbers refer to the expanded version.

Part A: Household Exposure to Entrepreneurship

A1–A2. These questions seek to establish whether there is a pattern of entrepreneurship in the family. All households should answer these questions so that it becomes clear which households are most likely to

operate a household enterprise. It might be useful to include this part of the household enterprise module in the part of the LSMS questionnaire where general household background information is gathered. This would increase the response rate on the part of households that do not operate household enterprises.

Part B: Establishing the Existence of Nonagricultural Enterprises

B2. For households that do not operate an enterprise, this question asks for reasons why. (Households that do operate an enterprise will be asked an almost identical question in part H: question H14.) This question allows insights into how households cope with obstacles to private entrepreneurship.

B3–B4. At several points in the household enterprise module the interviewer will refer back to information gathered in B3–B4—information concerning either the enterprise being surveyed or other enterprises in the household (see C1, C3, F13, F23, G9, G12, and G25). Because the interviewer must have ready access to the names and enterprise code numbers of each enterprise in the household, it is recommended to record the responses to B3–B4 on a fold-out piece similar to the household roster. The answer to C9 should also be recorded on this fold-out piece.

B3. The interviewer (or the person coding the responses) must have access to the International Standard Industry Classification.

B4. This question identifies who should be the respondent for the enterprise module. The respondent should be the member of the household most knowledgeable about the enterprise and/or the person in charge of the enterprise. (In this chapter this person is often referred to as the “entrepreneur.”) The interviewer must make every effort to schedule an appointment with this person.

Part C: General Information

C1–C2. In exceptional cases the interviewer may have to conduct the interview with a household member other than the entrepreneur. If so, the interviewer should at least report who the actual respondent is so as to indicate the credibility of his or her responses about the enterprise.

C3. This piece of information might show the level of technology, amount of experience, or degree of success (longevity) of the enterprise.

C4. Location of operation is one way to distinguish the type of an enterprise. Is the enterprise likely to be a significant contributor to the economy, or is it a subsistence enterprise?

C5. If the enterprise operates from within the home, the home is a business asset, although not typically reported as such in Part G. For this question to be meaningful, the value and size of the home should be measured elsewhere in the questionnaire. The value of the home as a business asset depends on the proportion of the home used for business, the amount of time that the rooms in the home are used by the business (see questions E19, E26, E29, and E34), and the value of the home.

C6–C7. These variables help adjust the sampling weight for an enterprise.

C8. This question aims to reveal the amount of enterprise income flowing to the household.

C9. This is a very important question; the answer is used several times as a filter, directing the interviewer to different parts of the questionnaire later on. (See questions D2, D20, E8, E11, and E18.) Because the question is so often referred to, it is recommended that the answer to C9 be recorded on a fold-out piece similar to the piece for the household roster, along with the answers to questions B3–B4.

Part D: Employment

D2. Questions D3–D13 are addressed to currently operating enterprises and questions D14–D19 are addressed to enterprises not currently in operation. Although these sets of questions are parallel, merging them creates difficult skip patterns.

D3–D4. The respondent is usually also one of the family members working in the enterprise. The phrasing of question D3 implies that the entrepreneur will automatically be listed. If the entrepreneur does not work in the enterprise, the responses to D5 and D10 will be “0.” All household members should be listed in D3–D4 before the interviewer proceeds with D5–D13 for each person in turn.

The names are recorded here for use by the interviewer; there is no need to code them into the computer. The IDs will be used by researchers to link the personal characteristics (for example, age, educational attainment, and sex) of workers to enterprise performance.

D7–D8. Although household members receiving these payments will view them as earnings, analysts of intrahousehold allocation of enterprise income will view them as a portion of enterprise income.

D9. The researcher must assume that during the previous 12 months, people responding to this question have contributed the same number of hours per day and received the same payment as they did during the past two weeks. (It is necessary to ask about the total number of weeks because it is not wise to assume that all household members who ever worked for the enterprise during the 12-month period worked for the entire 12 months.)

D12–D13. Just as for questions D7–D8, household members receiving these payments will view them as earnings, but analysts of intrahousehold allocation of enterprise income will view them as a portion of enterprise income.

D13. After all the enterprise workers have been questioned, the interviewer can skip to D20. (Questions D14–D19 refer to enterprises not in operation at the time of the interview.)

D14–D15. As in question D3, the phrasing of question D14 implies that the entrepreneur will automatically be listed. If the entrepreneur does not work in the enterprise, the response to D16 will be “0.” All household members should be listed in D14–D15 before the interviewer proceeds with D16–D19 for each person in turn.

The names are recorded here for use by the interviewer; there is no need to code them into the computer. The IDs will be used by researchers to link the personal characteristics (for example, age, educational attainment, and sex) of workers to enterprise performance.

D18–D19. Although household members receiving these payments will view them as earnings, analysts of

intrahousehold allocation of enterprise income will view them as a portion of enterprise income.

D20. This question is a filter that starts the portion of the module dealing with nonhousehold labor. Questions D21–D40 are addressed to currently operating enterprises and questions D41–D50 are addressed to enterprises not currently in operation. These sets of questions are parallel, but merging them creates difficult skip patterns.

D22. This question is used as a check on the answers to questions D32 and D33.

D23. This question is used as a check on the more detailed question D24. An important note: if the entrepreneur states in D23 that the enterprise did not employ nonhousehold labor during the past 14 days, it would be awkward to ask question D24. Instead, the interviewer should enter “0” into D24 without asking and follow D24’s skip pattern to D33.

D24–D26. If there is no apprenticeship system in the country, the second answer row should be dropped. If the number of workers in a specified category in D24 is 0, the interviewer should skip to D33, which asks about work effort over the last 12 months only.

D27–D28. If apprentices and unpaid nonhousehold workers never receive any compensation in the country of the study, these questions need not be asked (in which case question D27 disappears altogether).

D29–D31. These questions are designed to yield information about the personal characteristics of the nonhousehold labor force. They should help establish labor demand patterns for various demographic groups. The schooling cutoff of six years is arbitrary and should be adjusted to an appropriate level for the country of the study. If there is no apprenticeship system in the country, D30 may be replaced with a suitable question related to the training of unskilled workers.

D32. For enterprises that employed workers in the specified category during the previous 2 weeks, this question is the only measure of these workers’ efforts during the previous 12 months. The assumption is that days per week, hours per day, and payments per worker are similar for the 2-week and 12-month periods. If the enter-

prise employed workers in the specified category during the previous 2 weeks, no further questions will be asked about the previous 12 months; the interviewer should turn to the worker category in the next column.

D36–D37. If apprentices and unpaid nonhousehold workers never receive any compensation in the country of the study, these questions need not be asked (in which case question D36 disappears altogether).

D38–D40. These questions are designed to yield information about the personal characteristics of the non-household labor force. They should help establish labor demand patterns for various demographic groups. The schooling cutoff of six years is arbitrary and should be adjusted to an appropriate level for the country of the study.

D41–D50. This block of questions, about nonhousehold labor for enterprises not currently operating, is parallel to D21–D22 and D33–D40 taken as a block. The sets of questions are written out separately since skip patterns in a merged block of questions would be confusing.

D51–D52. These questions address the effect of minimum wage legislation on the wage paid in the small-scale private sector. They measure the degree to which the entrepreneur feels bound by the legal minimum wage. Whether the enterprise pays minimum wage or higher can be deduced from questions D26–D27, D36–D37, and D46–D47 (although these questions include the values of in-kind benefits).

D53–D55. These questions collect information about the social security coverage of all workers and about payments made by each enterprise to the social security system. If greater detail is desired, these questions may be merged into the household labor grid and the two nonhousehold labor grids. The precise phrasing of the questions should be adjusted according to the prevailing circumstances in the country. These questions establish the coverage of potentially important social security legislation.

D56–D57. These questions help measure how much an enterprise has contributed to employment growth. These are the only retrospective questions in the module; retrospective responses about employment are

considered more reliable than retrospective responses about income.

Part E: Revenues and Operation Schedule

E1–E3. These questions describe types of enterprises by their output. Together with E17 they provide information about the extent to which enterprises generate demand and supply effects, and in which markets they do so. Another option would be to specify in detail some (perhaps up to five) commodities produced by the enterprise—as was done in the Ecuador 1993 survey. This option was not chosen because such information would be tremendously time-consuming to code and analyze.

Note that these questions do not substitute for B3 (on type of industry). While B3 allows the respondent to specify a single industry, a substantial number of enterprises are involved in more than one of the three economic sectors. The skip pattern associated with the answer to E3 ensures that only enterprises involved in trade can respond to questions E4–E16.

E4–E10. This set of questions aims to compute the typical gross profit margin on resold items (that is, items that are not modified in any way before being resold). Since many traders sell more than just five items, the responses to E5, E9, and E10 cannot be used to compute total revenue from sales in trading. However, since profit margins may differ between items, the interviewer has to inquire about the five most important items—computing the typical gross profit margin as a weighted average across these five items. The gross profit margin can be applied to expenditures on purchasing items for resale (questions E12–E13) to estimate the enterprise's revenue from sales. Later in the questionnaire, questions E20 and E35–E38 will record total (cash) revenue from sales; these numbers should correspond with the sales figures derived from E12–E13 and the gross profit margin. As such, E20 and E35–E38 can be thought of as accuracy checks on the responses given to E4–E13, and vice versa.

A substantial number of enterprises are probably involved in both trading and production-and-sales activities. For these enterprises, E20 and E35–E38 are a mixture of revenues—so E21 and E39 will serve as accuracy checks for E4–E13, and vice versa.

It is important to note that the gross profit margin only represents the difference between purchase and sale prices of resold items. To compute enterprise income, other cost components must still be deducted.

E4. Writing down the information requested here will help the next five questions go smoothly. It is not intended to be coded.

To ensure the best possible responses, the interviewer should list all the items first, before asking questions E5–E10 for each item. The idea is that traders list five of their most frequently traded commodities. They may be reluctant to list these once they understand what questions the interviewer is going to ask them about the commodities.

E5–E6. These questions ascertain the trading margin for the five items that the enterprise purchases for resale. The aim of these questions is to find out from the entrepreneurs how much they spend to purchase these items and how much they think they can sell them for.

E7. Items for resale can be purchased in bulk (for example, by the bag) and sold by the piece. Since each entrepreneur may be working with different units (for example, different-size bags), it is necessary to ask him or her the relationship between the unit of purchase and the unit of sale. In exceptional cases, items for resale can be purchased in smaller units than they are sold. In such cases the interviewer is instructed to adjust the unit recorded in question E6.

E9. Based on this question and on questions E5–E7 it is possible to compute sales revenue and expenditures on items of resale.

E10. Based on this question and on questions E5–E7 it is possible to compute sales revenue and expenditures on items of resale.

E11–E13. Questions about expenditures on items for resale are relevant only for enterprises involved in trading. As the questions at the beginning of Part E deal with trading anyway, it is proper to ask about such expenditures here rather than in Part F. Note that traders in business assets such as dealers in cars, bicycles, and furniture (see Part G) should report their expenditures on these commodities here, because the commodities are used for trading rather than for operating the trading enterprise.

E14–E16. When an enterprise buys goods with intent to resell, a portion of the goods may be purchased on

credit. If this is the case, an analyst of credit markets will want to know what percentage of the goods were purchased on credit (E14), how the creditor was paid back (E15), and what the terms of credit were (E16). Concerning the terms of credit, one would really like to know the (implicit) interest rate, but finding this out would require several more questions: were you charged interest; what was the interest rate; if you had purchased these goods with cash, would you have been able to purchase them at a lower price; if so, how much lower? Without such questions the analyst has to impute the customary regional interest rates that have been uncovered in the credit module of the questionnaire (see Chapter 21 on credit).

E17. The customer base helps describe the enterprise and its growth potential.

E19. This question makes it possible to compute enterprise revenues on a daily basis. This can be compared to the income that waged or salaried workers earn. It is possible to go further and ask how many hours per day the enterprise was open for business; the model questionnaire has skipped this question for reasons of brevity.

E20. These are receipts from sales for cash or credit.

E21. The answer for pure trading enterprises will be 100 percent. The answer for pure manufacturing or service enterprises will be 0 percent. The target of this question is enterprises that mix trading with other activities.

E22–E23. Besides cash or credit sales, some 10 percent of enterprises also receive payments in the form of goods or services. In addition, the products that the entrepreneur has used to purchase inputs should be counted as in-kind sales revenue. The value of such products counts both as a cost and as a revenue item.

E26. Currently operating enterprises have not necessarily been in operation for all of the previous 12 months. Measuring annual income requires this question and information about income flows. See E37–E44 for a more detailed explanation.

E28–33. This should be used only for enterprises that are not currently operating.

E29. This question is parallel to question E26 for currently operating enterprises. Measuring annual income of non-operating enterprises requires this question and information about income flows. See E37–E44 for a more detailed explanation.

E30–E33. Taken together, this series of questions should yield insights into the dynamics of economic activity and employment fluctuations in the enterprise.

E34. This question is asked of both operating and non-operating enterprises. It establishes their rate of economic activity over the past 12-month period. This makes it possible to convert annual or monthly enterprise income into a daily rate, which is then comparable to the income that waged or salaried workers earn.

E35. This question establishes seasonality and trends in employment opportunities in an enterprise. The grid is set up with the 12 calendar months listed over two years. If the interview takes place in May, the interviewer should fill in entries for January to May of the current year and May to December of the previous year. An alternative system would be one row of 13 cells, with the last cell referring to the current month, the next-to-last cell referring to the previous month, and so on until the first cell refers to 12 months earlier. However, references to specific months seem easier to interpret.

It is important to note that the question asks for information for the full previous 12-month period. These data enable analysts to compute year-to-year change in employment, indicating the employment trend, and month-to-month change in employment, measuring seasonality around the trend.

E36–E39. The sales pattern revealed by question E36 will probably resemble the pattern of employment over the 12 months. Most entrepreneurs are probably better informed about employment variations than about monthly fluctuations in sales revenue. On the other hand, many enterprises employ only one or two household members, with no monthly variation. In the case of these enterprises, income fluctuation will be the most useful piece of information about seasonality (other than the enterprise shutting down out-of-season). The level of detail implicit in questions E36–E39 is intended to focus the entrepreneur and to enhance the accuracy of his or her responses.

E40. The answer for pure trading enterprises will be 100 percent. The answer for pure manufacturing or service enterprises will be 0 percent. The target of this question is enterprises that mix trading with other activities.

E41–E42. Taken together with the responses to questions E22 and E23, these questions will measure annual in-kind sales revenue. Question E42 refers to payments during a month with “average” sales (as defined in question E36). For the sake of brevity, the questionnaire does not repeat this question for months with “high” or “low” sales. The analyst must assume that in-kind sales revenue either varies proportionally with cash sales revenue or remains relatively constant.

E43–E44. Taken together with questions E24 and E25, these questions will measure the annual value of home consumption. Like question E42, E44 refers to a month with “average” sales (as defined in question E36).

Part F: Input Use and Expenditures

F1. This question begins a section on generic expenditures. Trading companies may not need to report on all items here, because their major expenses may already have been captured in questions E10–E11. Question F1 establishes whether an item is used. The list of items does not include rental, maintenance, taxes, and fees. Rental and maintenance are expenses related to tangible business assets, and taxes and fees are addressed separately in F26–F34. None of these four expense categories fits the set of questions posed in F2–F25 very well. For the same reason, some questions are blocked out for the insurance expense category.

F2. This question establishes the purchase of an item, which is different from its use.

F3. Expenditures during the previous month are easiest for the entrepreneur to remember. The previous month is used rather than the previous two weeks (as for recent sales revenue) because expenditures fluctuate both with and ahead of surges in sales revenue. Measuring expenditures by month may smooth these fluctuations somewhat.

F4–F6. These questions attempt to measure expenditures on an annual basis, linking them to the level of

sales as established in questions E36–E39. This link may reveal both “lean” and “fat” months in the year-round activity of the enterprise. Also, by linking expenditures to the agricultural calendar, these questions yield additional insights into the workings of the local economy.

F7–F9. If some inputs are bought on credit, an analyst of credit markets will want to know what proportion of the inputs are bought on credit (F7), how the creditor is paid back (F8), and the terms of credit (F9). Concerning the terms of credit, one would really like to know the (implicit) interest rate, but finding this out would require several more questions: were you charged interest; what was the interest rate; if you had purchased these goods with cash, would you have been able to purchase them at a lower price; if so, how much lower? Without such questions, the analyst has to impute the customary regional interest rates that have been uncovered in the credit module of the questionnaire (see Chapter 21 on credit). In this questionnaire questions F7–F9 have been blocked out for electricity, water, insurance and other inputs, all of which are unlikely to have been purchased with credit. Local conditions may differ, of course, in which case modifications should be made.

F10–F11. The entrepreneur may have acquired some items in exchange for some of the enterprise’s output. The entrepreneur may not think of this action as purchasing the item, but it is an expense nonetheless.

F12–F13. The entrepreneur may obtain some items from another enterprise in the household. If so, the other enterprise should indicate this in its responses to F22–F23. Most households operate only one enterprise, but in households where several enterprises are in operation, each enterprise’s expenditures must be taken into account in order to accurately measure performance.

F14. The household may provide the enterprise with some of its inputs. While in this questionnaire the value of household-provided inputs is not ascertained separately from the value of “free” inputs in other categories (F12 and F15–F17), it might be appropriate to insert a question in order to account fully for intra-household flows.

F15–F17. These questions refer to three remaining categories—“gifts” from outside the household, zero-

cost items, and “other” items. Existing LSMS surveys have never before included questions about these categories, so it is not clear how frequently these categories are relevant. What is known is that in many existing surveys enterprises have reported making relatively few purchases of the inputs they might logically be expected to use given the industry in which the enterprise operates.

F18–F19. These questions establish the value of items that were not purchased or acquired in exchange for enterprise products. Even if this value is positive, the direct cost to the entrepreneur was zero—although there may have been indirect costs in terms of labor and goodwill or direct costs to produce goods in another enterprise of the household. The fact that these items cost nothing to this enterprise may increase the profitability of the enterprise, but it remains to be seen whether this enterprise improves its efficiency by using them. (This is an example of the distinction between private profitability and social returns.)

F20–F21. The household may use some of the items acquired by the enterprise. These questions aim for a full accounting of both the profitability of the enterprise and the consumption of the household.

F22–F24. These questions ask about inter-enterprise flows of inputs, so that each enterprise’s profitability can be accurately measured.

F25. This question verifies the responses of the entrepreneur regarding shared resources.

F26. This question begins a section on the registration of the enterprise with government authorities (F26–F32). This may be a sensitive question for the entrepreneur, so the question is phrased to appear as if the interviewer is only interested in the expenses related to registration of the enterprise rather than in the registration itself.

F27. The researcher may want to cross-check the registration expenses reported here with common registration fees reported by governmental agencies. The entrepreneur’s figures may be higher if he or she includes any necessary bribes in responding to this question.

F28–F32. These questions are posed to entrepreneurs who have not registered their enterprise. The questions aim to find out how much entrepreneurs know about registration requirements and costs and whether registering an enterprise has disadvantages from the household's point of view. In some cases it might make sense to modify the response codes to F32 to reflect practices in the country of the study. It might also be appropriate to add questions about the amount of time required for registration—for registered enterprises, unregistered enterprises, or both.

F33–F34. It is recommended that the questionnaire list several examples of taxes that enterprises may have to pay. This will depend on the tax code in the country.

Part G: Business Assets

G1. The following set of questions establishes the total value of the business assets in use. These assets must be used as part of the production process. An enterprise that trades business assets should list the assets that it owns for the purpose of trading under questions E4–E13. For example, a car dealer may keep six cars, five of which are for sale (and should be listed under E4–E13) and one that he drives around for his own business (and should be listed here). Even if he is willing to sell this particular car as well, one car is still a business asset because he always uses one of his cars for his own business.

G2. The first source of asset use is ownership at the time of the survey. Questions G32–G39 deal with purchases and sales of assets. Current ownership is not equivalent to use during the past 12 months. Question G2 acts like a filter; if the answer is “No,” the interviewer should skip to question G20.

G3. If ownership of an item is shared with another enterprise, the entrepreneur of that other enterprise is likely to report this asset as well. Using question G3 together with question G5, a data analyst can ensure that business assets within the household are not double-counted even if several enterprises report them. The data could be made a little more user-friendly by adding a question after G3: with which other enterprise is ownership shared?

G4–G5. For the large business assets categories, these questions establish whether a partner's ownership has legal weight and who legally owns the assets. These

questions are motivated by the concern that in many countries women are less likely to formally own the assets of their enterprises. This may have implications when women entrepreneurs apply for credit as well as implications for intrahousehold allocation patterns. For more information see Chapter 21 on credit and Chapter 24 on intrahousehold analysis.

G6. Current market value is a reasonable way to value a business asset that has been purchased at one time in the past.

G7. Ownership of an asset does not necessarily mean that other enterprises do not use the asset.

G8–G13. Assets may be used by another enterprise in the household; if so, the other household enterprises should also report this in G24–G25. However, it is quite possible that some entrepreneurs fail to mention assets that they borrow from other household enterprises, especially if they own one of the other enterprises. Responses of the entrepreneur who owns the asset help establish the value to the other household enterprises of having access to this asset.

G14–G15. The household may borrow an asset (such as a vehicle). This is an intrahousehold transfer; it reduces the opportunity for the asset to be used for the enterprise and increases household consumption.

G18–G19. The purpose of these questions is to ensure that the entrepreneur has plausibly accounted for the use of his business assets.

G21–G23. One way an enterprise can use an asset without owning it is to rent it. In all previous LSMS surveys, rental questions were listed under expenses. This questionnaire places rental expenses among business assets. To conserve space, “rental” is also interpreted to mean borrowing from a neighbor or relative for free (in which case question G22 would be answered with “0”).

G24–G25. A second way an enterprise can use an asset without owning it is to borrow it from another enterprise in the household. The other enterprise will report the value of this asset and for how long it is lent out.

G26–G28. A third way to use an asset without owning it is to borrow it from the household itself. Here, the

value of the asset must be ascertained—unless this has already been reported in the modules on housing (Chapter 12) or consumption (Chapter 5).

G29–G30. Maintenance expenses constitute some of the costs of using tangible business assets (apart from their implicit rental cost). In previous LSMS surveys, maintenance questions have always been listed under expenses. By relating maintenance to specific assets, this questionnaire should prompt more accurate responses from entrepreneurs.

G32–G33. If an enterprise has acquired assets during the previous 12 months, this implies that the value of its business assets at the beginning of the year was lower than it is at the time of the survey and that the enterprise's ownership (and use) of assets varied during the course of the year. To relate business assets to enterprise income, it is necessary to measure business assets during the year rather than at the end of the year as is done in question G2. The questions about asset acquisitions and sales attempt to establish the value of assets for a more meaningful period of time. For an even fuller accounting of asset use, a question could be added about the date of acquisition. However, since the asset categories are fairly aggregative, several acquisitions may have occurred, making a question about date of acquisition ambiguous. The model questionnaire assumes that any acquisitions occurred in the middle of the previous 12-month period.

G34–G36. If the acquired business assets have been bought on credit, an analyst of credit markets will want to know how much of the purchase was financed with credit (G34), how the creditor was paid back (G35), and what the terms of credit were (G36). Concerning the terms of credit, one would really like to know the (implicit) interest rate, but finding this out would require several more questions: were you charged interest; what was the interest rate; if you had purchased these goods with cash, would you have been able to purchase them at a lower price; if so, how much lower? Without such questions, the analyst has to impute the customary regional interest rates that have been uncovered in the credit module of the questionnaire (see Chapter 21 on credit). In this questionnaire, questions G34–G36 have been blocked out for furniture, tools, and other durable goods, all of which are unlikely to have been purchased with cred-

it. Local conditions may differ, of course, in which case modifications should be made.

G39. Asking why assets were sold gives researchers a glimpse into the dynamics of the enterprise.

Part H: General Business Conditions

H1–H5. These questions deal with raw materials.

H1–H2. Questions H1–H2 measure the enterprise's inventory of raw materials. Question H1 is phrased in the present tense because, as a stock, inventories ought to be measured at one point in time. However, if the enterprise is not in operation at the time of the interview, the question is not entirely appropriate. To ask for inventories one year previous to the survey produces the same problem (along with causing potential recall problems) since some enterprises were not in operation one year previously. Another way to phrase the question—"In the last month that the enterprise was in operation, what was the inventory of raw materials?"—is equally useless, because the enterprise was winding down. Asking the question in the present tense establishes a definite time and makes recall easy. It might then be appropriate to assume that enterprises not currently in operation typically maintained an inventory of a size similar to those of their competitors in the industry.

H3. This question is as much a check on the response to H2, about inventory, as it is a check on reported levels of sales (E20, E37–E39). Aberrations in either inventory or sales should show up in the responses to question H3 and its parallel questions, H8 and H11.

H6–H8. These questions are about inventories of items requiring further processing (or intermediate inputs). Question H8 is a check on enterprise sales. The comments on questions H1–H3 also apply here.

H9–H13. These questions refer to products ready for sale—either products purchased by traders (as question H12 implies) or products produced by the enterprise. Question H11 is a check on sales revenue. The comments on questions H1–H3 also apply here.

H14. It is important to ask about more than one problem for enterprise startup, because the primary problem may be an internal household problem and thus not

amenable to policy solutions. B2 is an almost identical question for households that do not operate enterprises.

H15. This question illustrates how lack of start-up capital can be a barrier to entering an industry. If the total sum of money needed is large, few households will be able to afford starting a new business. The response to this question may need to be adjusted for inflation, according to the age of the enterprise (C3).

H16. The source of money is always an issue for both households and policymakers. Stimulating entrepreneurship requires understanding how an individual finances the start-up of his or her enterprise. Thus it is important to gather full information on all sources of finance. Hopefully, three sources will cover most situations.

H17. Does the entrepreneur receive any assistance from government or business organizations? It is difficult to be more specific in these questions and yet maintain enough generality; to increase specificity the questionnaire could be modified to incorporate local assistance programs. The effectiveness of such programs could then be evaluated by relating the responses here to the profitability of the enterprise.

H18–H22. The list of macroeconomic variables to which the entrepreneur is exposed can be expanded to fit the conditions of the country of the survey. Openness of domestic markets and access to imports are a starting point. Depending on the industries in which they operate, entrepreneurs may or may not have to deal with markets or imports.

H23–H25. These questions deal with the financial security of the enterprise. When the debt level is high and the weekly or monthly payments are large in comparison to the cash flow, the enterprise is in trouble.

These questions allow investigation of the relation between financial security on the one hand and seasonal trends, regional economic characteristics and macroeconomic conditions on the other. If similar information can be extracted from the household credit module, these questions might be omitted (see Chapter 21 on credit).

H26–H30. The enterprise itself may also extend credit. This set of questions measures how much credit is extended to the enterprise's customers (H27–H28)

and how credit obligations are fulfilled (H29–H30). H29 and H30 are parallel to similar questions about the entrepreneur's own use of credit (E15–E16, F8–F9, G35–G36).

Questions H26–H30 are interesting, as credit and product markets may be linked. There is little survey-based information about the involvement of small-scale entrepreneurs in the credit market.

H31–H33. This set of questions asks about fluctuations of daily sales revenue. These questions are placed here, away from section E of the module, in order to check the revenue responses in section E.

H34–H35. As was evident in Table 18.1, many enterprises seem to be losing money. This question examines whether the entrepreneur is aware of this or whether, instead, his or her responses to questions on sales and expenditures are possibly erroneous.

H36. Here the entrepreneur is asked to report his monthly expenses as a check on his or her responses in Part F (which were used to derive monthly expenses). Responses here should include rental and maintenance expenditures and possibly purchases of business assets—all of which are covered in Part G.

H37–H40. These questions are an independent check on enterprise income. Questions H37–H38 are asked in acknowledgement of the fact that the budgets of the enterprise and the household sometimes blend into each other. Questions H39–H40 let the entrepreneur make an estimate of the (cash) profitability of his or her enterprise. To derive enterprise income, it is still necessary to add consumption by the household of the products of the enterprise (E25, E44).

H41. This question gives an insight into how the entrepreneur uses his enterprise's income. While some operate enterprises to furnish their household with an income, others may operate enterprises with the goal of making investments in schooling, land, or a new business. Reinvesting in the present business is another form of saving.

Additional Annotations to the Standard Questionnaire

D16–D26. Here the structure of the questionnaire differs somewhat from that of the expanded version. Questions D16–D21 are to be answered by entrepre-

neurs who currently employ nonhousehold labor, and questions D22–D26 are to be answered by entrepreneurs whose enterprise is currently not in operation or who have employed nonhousehold labor in the past 12 months but not in the past 14 days.

G1. Even though the standard questionnaire does not attempt to distinguish use of tangible business assets from ownership of these assets, G1 is the best introductory question to this section. It allows the interviewer to ask about all assets in use by the enterprise before launching into more detailed questions. Moreover, “use” covers both owning and renting, details of which will be asked for specifically in questions G2–G4 and G5–G7. It also indicates whether the entrepreneur had access to assets even if he or she neither owned nor rented them.

Additional Annotations to the Short Questionnaire

D4, D9, D14. These questions record the number of family members working in an enterprise. While the standard and expanded versions of the household enterprise module also record the number of hours worked by family members, the short version needs a link with the employment module for time allocated to work in nonagricultural self-employment activities. This is a difficult link to make, as the Côte d’Ivoire (1985–1988), Ghana (1988–1989), and Vietnam (1992) surveys have shown. If the needed time allocation information is not collected in the employment module, these questions may as well be omitted.

E4–E7, E14–E17. These questions are retained in the short version because nonmonetary transactions and intrahousehold consumption constitute a significant part of the sales revenue of a small number of enterprises.

E10–E13. These questions make up 15 of the 60.22 questions asked, on average, of an enterprise. The answers to these questions make it possible to compute an estimate of annual sales revenue and provide information about the seasonal nature of the enterprise. If it were necessary to shorten the questionnaire even further, these questions could be replaced with the following: “During the past 12 months that your business was in operation, how much money did it receive from sales of its products, goods, or services?” Question F3 could be rephrased as follows: “During the past 12 months, how much have you spent in total on the purchase of inputs (labor, raw materials, items

for resale, transport, electricity, water, fuel, rental, maintenance, taxes, registration fees, and insurance)?”

With these changes, Table 18.5 would also change. *Revenue* in Part E of the table would total 4.70 questions per household and 9.04 questions per enterprise, and *Seasonal Revenue* in part E would total 0.00 questions per household and 0.00 questions per enterprise. The overall number of questions would total 24.03 questions per household and 46.22 questions per enterprise. But the tradeoff for this time saving would be a loss of precision in the estimate of annual enterprise income and a loss of information on seasonality.

F2. Grouping all expenditure categories into a single aggregate undoubtedly reduces the accuracy of the reported statistic. The only alternative is to collect the detailed kind of information that the standard version gathers—although the standard version records inputs purchased rather than inputs used (as in the expanded version).

G1–G2. These questions aim to estimate the value of the enterprise as measured by its business assets. To shorten the questionnaire even further, these asset categories could be grouped into a single aggregate, but this is not advisable because the asset value of the enterprise represents household wealth, which ought to be measured carefully in any LSMS questionnaire.

G3–G6. Deleting these questions would save 1.22 questions per household and 2.35 questions per typical enterprise. The tradeoff for this time savings would be that less would be known about the dynamics of the enterprise and the household.

Notes

The authors appreciate comments by participants of the LSMS workshops, in particular Paul Glewwe, Margaret Grosh, and Julie Schaffner.

1. The model questionnaire presented in this chapter does not provide sufficient detail to answer this question; the question cannot be answered unless the list of products bought and sold is further disaggregated.

2. Referred to in this chapter simply as a “household enterprise.” This definition represents a break from tradition; in earlier LSMS questionnaires, a food-processing household business that did not purchase any raw agricultural ingredients was not classified as a household enterprise but rather as an extension of the household’s farming activity.

3. One question is what the smallest scale of operation is that should be sampled. Should a household that butchered one animal, processed its skin and sold it for money be sampled? Should the survey include someone who once received some money for fixing a car or for transporting some commodities in his truck to a neighboring town? A reasonable criterion for inclusion in the sample is whether the activity was purposefully intended to earn an income rather than an incidental event of daily life.

4. An enterprise survey can also be carried out on a door-to-door basis, with interviewers asking at each household or place of business whether there is a nonfarm enterprise in operation at that location, and, if so, administering the enterprise questionnaire. If the sample is built on the basis of household enumeration lists or a complete enumeration of all activities in a random sample of localities, this type of enterprise sample will be the same as the LSMS survey. If the sample is drawn up by visiting places of business, it will include larger enterprises that are not captured by household-based surveys. Using this approach carries the risk that enterprises with a variable location (such as taxis, fishing enterprises, and some vending activities) may be undersampled.

5. Estimated from LSMS surveys in Côte d'Ivoire (1985–1988), Ghana (1987–1989), and Vietnam (1992–1993).

6. In some cases the enterprise's organizational structure may be such that one household owns it, perhaps by virtue of providing financial start-up capital, while another operates it. The first household would not describe itself as operating an enterprise, while the second may see itself as working for the first household rather than as operating the enterprise. This could lead to a nonrandom sample of enterprises even though the sample of households was randomly selected. This is presumed to be rare.

7. Not all flows are of living standards concepts. Some are of changes in stocks; for example, saving is a change in the asset position of the household.

8. A few surveys have used a different set of questions. The early questionnaires for Côte d'Ivoire, Peru (1986), and Ghana skipped the 12-month revenue question if the entrepreneur gave his recent revenue. This meant that it was impossible to compare the revenue responses with one another. The Peru (1990 for Lima only and 1991) and Ecuador questionnaires asked only about revenue received during the last month of operation, which of course was the current month if the enterprise was in operation at the time of the second visit.

9. The Pakistan questionnaire also separated out receipts from subcontracting. Few entrepreneurs reported any such receipts, but for those who had some receipts, subcontracting was an important part of business operations. Note, though, that receipts from subcontracting should already be covered by cash sales receipts.

10. These questions have been used in virtually all LSMS questionnaires. This footnote documents additions and modifications

that have been tried. The Vietnam and Pakistan questionnaires added the possibility of barter to question 1. Several questionnaires added other family businesses as candidates for sharing the purchased inputs. The Ecuador questionnaire asked for the value of the last purchase rather than the usual purchase in question 2. While most questionnaires included expenditures on wages in their list of input categories, the Ecuador, Peru (1990), and Peru (1991) questionnaires included a question about wage payments to be asked immediately after the entrepreneur indicated that he paid for outside help. The obvious advantage of this strategy is that it eliminates the possibility of entrepreneurs reporting that they pay their workers but failing to report any wage payments or reporting wage payments but reporting that they do not pay their workers. The Ecuador questionnaire listed expenditures on raw materials and articles for resale right after the series of revenue and home consumption questions instead of treating this as a regular business expense. This seems illogical and has the potential to confuse both the interviewer and respondent. The Pakistan survey distinguished inputs purchased weekly or more often from those purchased less frequently. It is not clear that anything substantial is gained with this information. The Pakistan questionnaire added two other questions—one asking whether the item was purchased by cash or credit (and if by credit, whether the supplier or someone else extended the credit), and the other asking whether the entrepreneur had ever encountered shortages of the item. These are interesting questions, although they did not yield much variation of answers. Except for purchases of raw materials and items for resale, virtually all transactions were in cash. The model questionnaire in this chapter draws from these experiences.

11. Virtually all LSMS questionnaires contain: "Q4: Does your household use this ...?" By itself, this question contains little information; the value of what is shared remains unknown. The researcher only knows for sure that the enterprise uses less of the input than question 3 reports. Moreover, this question 4 refers only to inputs purchased and shared with others. There is no mention of the possibility that the enterprise receives inputs (such as electricity, water, or the use of tools) from the household or from other household enterprises.

12. Detailed tabulations show that in every data set there are some enterprises that have expenditures in the lowest quintile and revenues in the highest quintile, thus apparently generating huge positive profits, and others for which the reverse is true.

13. The first question was in fact used in the Ghana, Vietnam, and later Côte d'Ivoire questionnaires; the second question occurred in the Ghana questionnaire. Interviewers were not permitted to accept negative answers to these questions, but in fact only a few entrepreneurs answered "0."

14. It is possible to put a positive twist on these figures. About 80 percent of the enterprises were either along the diagonal or in

the next adjacent quintile. This is not to minimize the fact that, in terms of absolute values, the agreement between the two measures is not good.

15. In a few questionnaires the interviewer was instructed to check the responses about the economic activities of household members, as reported in the employment module, to determine whether the household appears to be operating a nonagricultural enterprise, even if household members report that they do not. Presumably the interviewer will probe more vigorously if he suspects that an enterprise exists.

16. A remaining problem with using this approach is the time gap between the first visit, when these questions are asked, and the second visit, when the rest of the enterprise information is collected.

17. This strategy would have solved all matching problems were it not for two other shortcomings: these questions were asked only if the enterprise employed more than one worker including the entrepreneur, and IDs and hours were ascertained for no more than four family members. Because of the first shortcoming, the hours that household members worked were still unknown for two-thirds of the enterprises, and the second shortcoming meant that information was missing for enterprises employing five or more family members. The Peru (Lima 1990; 1991) questionnaires asked for the total number of hours worked in the enterprise by all workers, but, like the Ecuador questionnaire, they did so only if other members besides the entrepreneur worked in the enterprise. This shows how carefully questionnaires must be designed in order to yield user-friendly data.

18. This is preferable to asking about the ownership of assets at any time during the previous 12 months; ownership at any time during the past year does not imply usage during the entire year, as some assets are bought or sold during the year.

19. In Pakistan, 13 percent of all assets are shared with the household or another enterprise; in Ecuador this figure is around 40 percent.

20. A similar strategy was followed by LSMS teams in Ecuador. The Ecuador (1994) questionnaire allowed for responses about two

enterprises, but interviewers were instructed to fill out an extra questionnaire form if a given household operated more than two enterprises, and to inform their supervisors that they had done so.

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19

Agriculture

Thomas Reardon and Paul Glewwe

Promoting sustainable growth in agriculture can reduce rural poverty and increase employment and welfare in both rural and urban areas in developing countries, for five reasons. First, agriculture is a major source of household income and employment in most developing countries, both directly, through own-farm production and agricultural wage labor, and indirectly, through activities that use farms' outputs or that provide products and services to farmers. Second, the poor benefit disproportionately from the welfare and employment gains brought about by agricultural growth because the majority of poor people in the developing world live in rural areas (World Bank 1995). Third, the types of crops and livestock produced by farmers and the farming techniques that they use affect the health, nutrition, and environmental conditions of families living both in rural areas and in nearby cities, through their ecological impact on farmland and on forests, wetlands, and rivers. For example, farmers who are unable to increase the productivity of their existing land may extend their cultivation into forests and other ecologically sensitive areas in order to maintain or increase their incomes. Fourth, the agricultural sector affects welfare and employment in urban areas because of its influence on food prices, wages, the input costs of the food and fiber processing industries, and the balance of payments. Finally, if serious problems develop in the agricultural sector (such as a drought that induces a crop failure), many rural dwellers will migrate to urban areas to seek work, which leads to overcrowding and increased unemployment in urban areas.

Agriculture is usually defined in the national accounts of developing countries as the set of activities involved in the production of annual and perennial crops (including trees for timber) and the production of livestock. This set of activities can be broadened to include hunting, fishing, and the gathering of wild flora and fauna. In this chapter, the narrower definition of agriculture is used for the purposes of making recommendations on the design of the agriculture module in Living Standards Measurement Study (LSMS) surveys.

In particular, the agriculture module presented in this chapter includes only the activities of the farm that involve crop (annuals and perennials) and livestock production. It omits hunting, fishing, and gathering activities as well as the processing of agricultural products. Those activities can be treated as nonfarm enterprise activities and, therefore, should be included in the household enterprise module of an LSMS or similar multitopic survey (see Chapter 18 for further details).

In past LSMS surveys the agriculture module has often been the longest module in terms of both pages and interview time. The agricultural module has generally had three objectives: measuring net income from the household's production of crops and livestock; measuring the value of household agricultural assets such as land, animals, and equipment; and measuring the household's use of agricultural services such as extension programs, cooperatives, and veterinary services (Ainsworth and van der Gaag 1988). Despite the length of these agricultural modules, the data collected in them have been analyzed less often than the data from almost all the other modules of the surveys containing them. Fewer than 10 percent of all of the publications that analyze LSMS survey data have used data from the agriculture module either directly or indirectly (Jolliffe 1995). One explanation for this is that in almost all developing countries, researchers have found it difficult to find out about the survey, to get access to the data, and to find the time and funds to study the data. Addressing these problems is beyond the scope of this book (see Blank and Grosh 1999). Another possible reason for the underuse of data from previous agricultural modules is that the data collected were not useful to researchers. If this were indeed the case, it suggests that the agricultural module should be revised to ensure that it collect data that are much more useful for policy analysis. The purpose of this chapter is to advise survey designers on how to accomplish such a revision.

The first section of this chapter lays out the most important agricultural policy issues in developing countries, including some links between agricultural issues and other topics on which data are usually collected in LSMS and other multitopic household surveys. The second section discusses the data needed to analyze these issues, as well as measurement concerns related to those data. The third section introduces three versions of a draft agriculture module. (The modules themselves are presented in Volume 3.) Each version is designed to gather information at a different level of detail; the choice for a given survey will depend on the degree of emphasis that survey's designers wish to place on agriculture. All of these versions must be adapted to reflect the agricultural conditions and policy issues in the country where the survey is to be implemented. The final section of this chapter consists of annotated notes to specific questions or submodules of the draft module.

Agricultural Policy Issues in Developing Countries

In many developing countries the agriculture sector is changing rapidly, and in multiple ways. Yet policymakers and analysts often know very little about these changes because up-to-date, reliable data on agriculture are scarce. This lack of information can lead policymakers to adopt inefficient or inequitable policies and may also cause them to miss some opportunities to implement policies that can raise household welfare.

Well-designed multitopic household surveys can help policymakers by providing them with accurate data on agriculture and related activities, on nonagricultural activities, and on the characteristics of both agricultural and nonagricultural households (and the communities in which they live). These data can then be analyzed using either "descriptive analysis" (statistical analysis of correlation among variables, usually reported in graphs and tables) or "causal analysis" (econometric analysis to measure causal relationships), as explained further in the second section.

This section presents the most important policy issues in the agricultural sector in developing countries. The first subsection describes current patterns and trends in agriculture in developing countries. The next subsection briefly reviews the agricultural outcomes that are of greatest interest to policymakers. The remaining subsections each discuss one of the four different kinds of agricultural policies, focusing on issues that are highest on the policy agenda.

Current Patterns and Trends in Agriculture in Developing Countries

Four broad trends have profoundly influenced agriculture in developing countries in recent decades and are likely to prompt still more changes in the years ahead.

First, land in the developing world has become increasingly scarce as populations have grown. As a result, agriculture in most developing countries has changed from being "extensive" (increasing production by bringing more land under cultivation) to being "intensive" (increasing production by raising the productivity of the land already under cultivation). This is true even in Africa where, until recently, land scarcity was usually not an issue (Binswanger and Pingali 1988). Policymakers need to know more about this inevitable move toward intensive cultivation, including

whether it is leading to land degradation, water pollution, or other environmental problems—all of which can undermine long-term growth. They also need to know whether the poor have access to modern inputs—such as chemical fertilizer—that enable them to raise the productivity of their current landholdings.

Second, the agriculture sector is rapidly becoming commercialized in many countries and thus is increasingly linked to the urban and export sectors. At the same time, farmers in many countries are partially diversifying their activities by producing fewer staple crops and investing in dairy farming, livestock farming, and the production of fruits and vegetables. Policymakers need to know which farming households are making these changes and which households face barriers that prevent them from doing so. They would also like to know which diversification activities are most productive.

Third, environmental degradation has become a major problem in most developing countries. Degradation problems include land degradation in the form of soil erosion, the reduction of soil nutrient levels, loss of tree and bush cover, and the salinization of soils from intensive irrigation. Another problem is the runoff of farm chemicals into water sources, which occurs mainly in areas where a “green revolution” has taken place (in other words, where high-yielding seeds, chemical fertilizer, irrigation, and sometimes pesticides are being used intensively). In some countries a loss of biodiversity has become a problem, while in other areas (such as the West African Sahel) inadequate use of chemical fertilizers and manure have exacerbated problems of soil degradation as farmers cultivate their farmland more intensively in order to produce enough to survive.

Fourth, technological developments in recent years have greatly affected agriculture in many developing countries, and even more rapid change is on the horizon. To the extent that new agricultural technologies—“green revolution” technology, biotechnology advances such as genetic modification of plants to enhance disease resistance, integrated pest management, and new types of agricultural equipment—are adopted by farmers, they affect agricultural productivity. It is important for policymakers to understand what determines whether farmers adopt these new technologies. Policymakers also need to know how the emergence of new institutions such as farmers’ organizations and contract farming (in which agroin-

dustrial firms contract with farmers to supply crops) can affect the agriculture sector.

In addition to these four trends, a key characteristic of agriculture is that it has always been subject to recurring “exogenous shocks” that affect farms and farm families. Examples of such shocks are new crop diseases, periodic pest infestations, floods, droughts, epidemics (of which AIDS is a recent example), and civil war. Since agriculture is inherently a risky activity, it is essential for policymakers to understand how farm households deal with these risks.

Agricultural Outcomes that Interest Policymakers

As a frame of reference for the rest of this chapter, it is useful to identify the agricultural phenomena that are of greatest interest to policymakers. In this paper they will be referred to as the “basic agricultural outcomes.” These outcomes are:

- Production of crops, livestock, and related byproducts.
- Use of inputs in the production processes, including physical inputs, labor, and capital.
- Technologies adopted and technology packages used by agricultural households.
- Marketing activities that agricultural households undertake to sell their products.
- Profits (net incomes) earned by households from their agricultural activities.
- Investments that households make in agriculture, such as the purchase of equipment and the improvement of land.
- Nonincome welfare indicators of agricultural households, such as child nutrition, school enrollment (of children), and household amenities.
- Environmental phenomena that are affected by agricultural activities.

Policymakers are interested in these basic agricultural outcomes for many reasons. The total production of food and nonfood agricultural products has a large impact on the national economy and on the welfare of the population as a whole, particularly in developing countries where many households derive a large proportion of their income from agriculture. The use of inputs is also of crucial importance, since the extent to which a household uses inputs efficiently will affect its net income. Also, each input has an opportunity cost; if it had not been used in agriculture, it could have been used elsewhere in the economy. The relationship between total production and inputs depends greatly on the technology used, which in turn depends on the

availability of different technologies and their associated inputs; in most cases policymakers would like to encourage the adoption of new technologies so that inputs are used more efficiently.

Marketing activities are important for ensuring that food and nonfood products are brought to urban areas. They also affect agricultural exports, which can have a major impact on a country's balance of payments. Agricultural profits contribute to households' incomes and to their welfare as measured by nonincome indicators (such as health and education outcomes), and current investments in agriculture are clearly important for future production. Finally, the environmental consequences of agricultural activities are important policy issues in many developing countries.

Government policies affect these basic agricultural outcomes (as well as other more specific ones) by influencing their determinants. The most important determinants of agricultural outcomes are:

- The prices that farmers face for both inputs and products (which can be affected by taxes, subsidies, and exchange rate policies).
- Past investments that agricultural households have made in their stocks of productive capital, including human capital.
- The technology available to farming households.
- Farming households' access to credit.
- Information and extension services available to farmers.
- Large-scale investments in infrastructure, such as transportation and irrigation networks.
- The institutional environment in which households operate (such as the system of land tenure, insurance opportunities, and laws).
- The risks and uncertainty faced by farming households such as price variations, weather variability, crop diseases, and harmful pests.
- Any direct taxes, such as income taxes, for which farm families are liable.

Four different kinds of policies—macroeconomic policies, sectoral policies, policies that affect the institutional environment, and public investment programs—affect agricultural (and even nonagricultural) households by altering one or more of these determinants of agricultural outcomes. However, the way in which these policies affect agricultural outcomes is often ambiguous, and, even when it is clear, economic theory reveals little about the magnitudes of the effects of specific policies. Therefore, some empirical

work will be necessary to provide information useful to policymakers. The remaining subsections review the current state of knowledge about how these four kinds of policies affect agricultural outcomes, and emphasize areas where further empirical research is needed.

Macroeconomic Policies

Macroeconomic policies are very broad economic policies that are always implemented at the national level and affect not only agriculture but also many other sectors of the economy. The four macroeconomic policies that can have strong effects on agriculture are exchange rate policies, trade policies, banking and credit policies, and the overall size of the government budget.

EXCHANGE RATE POLICIES. Exchange rate policies influence, and in some countries completely determine, the value of foreign currencies in terms of domestic currency, directly affecting the domestic prices of all agricultural inputs and products that are imported or exported. To reduce trade deficits, governments often devalue their currency when it is thought to be overvalued, since overvalued currencies discourage exports while stimulating imports. Such currency devaluations can increase the prices that farmers receive (in terms of domestic currency) for their export crops and will also tend to raise the prices of any crops produced by farmers that are also imported. Currency devaluations can also have a negative effect on farm incomes if farmers depend on imported inputs, since a devaluation will usually increase the domestic price of those inputs. These general effects of changes in the exchange rate on the prices faced by farmers can be counteracted by sectoral policies. For example, the government can set the domestic prices of specific agricultural inputs and products and not adjust these prices after a devaluation. Such sectoral policies are discussed further in the next subsection. A final issue regarding exchange rate policies is the extent to which exchange rates are allowed to fluctuate over short periods of time. The government can smooth out these fluctuations—for example, by setting a fixed exchange rate in terms of U.S. dollars and maintain the same rate for several years. This kind of policy may reduce the risks borne by farmers through reducing fluctuations in the prices that they face.

TRADE POLICIES. Trade policies usually take the form of tariffs and various nontariff trade barriers. Examples

of nontariff barriers on agricultural goods are grades and standards related to food quality, food safety, and the environmental effects of food production. Reducing export taxes, nontariff barriers that discourage exports, and tariffs imposed by importing countries should make the production of export crops more profitable. In contrast, reducing import tariffs and nontariff barriers that discourage imports have a more ambiguous effect on agricultural households; such reductions tend to increase competition from imported agricultural products but can also reduce the prices of imported agricultural inputs. Nontariff barriers can also limit the technology available to farmers. For example, phytosanitary regulations—rules on importing plant matter—can limit the access of farm households to imported seeds, and chemical standards can limit these households' access to imports of certain chemicals, such as DDT. The standards that apply to the goods exported by developing country producers can also influence the use of inputs, many of which are associated with technologies commonly used by farmers in developing countries. For example, if Mexican producers want to export to the U.S. market, they cannot use as much of certain kinds of pesticide as they can use on goods that they produce for the Mexican market. Finally, nontariff barriers in the household's own country, such as import quotas and domestic component regulations, can limit farmers' access to imported agricultural inputs.

BANKING AND CREDIT POLICIES. The availability of credit and the terms on which credit is available can have a large impact on the activities of agricultural households. At the national level, policies that affect credit are set by finance ministries and central banks. A nationwide tightening of credit can increase the interest rates that farmers face, while changes in banking regulations can make credit either more or less accessible. Of course, the impact of national banking and credit policies can be altered by sectoral policies such as special programs within the ministry of agriculture that provide banking services to rural areas.

SIZE OF THE GOVERNMENT BUDGET. In many developing countries fiscal deficits are a serious problem. Governments often seek to reduce these deficits both by reducing spending and by increasing taxes. In many cases the emphasis is on reducing public spending. From the perspective of farmers, broad reductions in

government spending can mean reduced price supports for outputs and lower price subsidies for inputs, as well as reductions in other kinds of government programs that benefit agricultural households, such as extension services and agricultural research stations. Similarly, policies that increase taxes can reduce farmers' income either directly (for example, through an income tax) or indirectly (through taxes that affect prices). As with nationwide banking and credit policies, the specific ways in which spending is cut or taxes are increased determines the actual effect on agricultural households. This again leads to sectoral policies.

SUMMARY. The discussion of macroeconomic policies can be summarized in terms of the following specific policy questions:

- How do exchange rate policies affect the prices of agricultural inputs and products and the variability of those prices?
- How do tariffs and nontariff trade barriers affect the availability of agricultural inputs and the prices farming households face for inputs and outputs?
- How do national banking and credit policies affect agricultural households' access to credit and the terms on which credit is available?
- How do across-the-board reductions in spending and increases in taxes affect direct taxes, prices for agricultural inputs and products, and the availability of programs that benefit farmers?

There are no simple answers to these questions, because agricultural systems vary widely across developing countries, and even within a given country the characteristics of farming households can vary enormously. For example, devaluations can increase the income of producers of export crops, but may have little effect on farming households that produce mainly food crops for subsistence. Thus the answers to these questions will vary from country to country and by the different types of households within each country.

In general, these effects of macro reforms on agriculture have not been adequately studied. Much of the literature on the impact of macroeconomic policies focuses on the impact of exchange rate policies, particularly the effect of exchange rate devaluations. Another strand of the literature focuses on general price liberalization—the removal of price controls and other policies that influence prices such as subsidies and taxes on specific products. Evidence from rural areas in a variety of African and Latin American coun-

tries suggests that a concentration of market power and market entry barriers tends to produce greater price instability when prices are liberalized, while devaluation has an ambiguous effect on farm profitability (Reardon and others 1997). Overall, much more research needs to be done on the impact of macroeconomic policies on rural households.

There is also a literature that focuses on the macroeconomic policies that are typically included in structural adjustment programs. The evidence in this literature tends to be quite mixed. For example, some authors have found that structural adjustment programs have had positive effects (Sahn 1994), while other authors have found that these policies have generally negative effects (Taylor 1993), and still others have found a mixture of positive and negative effects (Commander 1989; Duncan and Howell 1992). The variety of results in the literature suggests that the effects of macroeconomic policies in a given country depend on the characteristics of that country, which in turn implies that LSMS and similar multitopic surveys are useful sources of information for illuminating the potential effects of these policies in specific countries.

Sectoral Policies

Sectoral policies differ from macroeconomic policies in that they focus directly on a given sector, such as agriculture, and are often designed and implemented by the appropriate ministry—in this case the ministry of agriculture. Sectoral policies for agriculture include taxes and price subsidies for specific agricultural inputs and products, marketing boards that purchase agricultural outputs and sell agricultural inputs (in some cases monopolizing these markets), regulations that govern prices of both agricultural inputs and outputs, agricultural extension services, programs that provide credit for farming households or promote new agricultural technologies, and public investments in agricultural infrastructure and research.

Sectoral policies in agriculture can be closely related to macroeconomic policies. Price subsidies for certain agricultural products or inputs may be designed to counteract the impact of general tariffs or an exchange rate devaluation. Alternatively, the government's attempts to reduce macroeconomic budget deficits may reduce spending on price subsidies or on the provision of agricultural services. At times it may not be clear whether a given policy should be classified as a macroeconomic policy or a sectoral policy,

but this is mostly an issue of semantics; there is no need to rigidly classify each policy as one or the other.

There are many different kinds of policies in agriculture at the sectoral level. They can be grouped into policies that directly affect the prices of inputs and products (such as price subsidies, taxes, and price floors and ceilings), programs that directly provide technology, information, and specialized services to farmers, and policies that affect the availability of credit to farmers.

POLICIES THAT AFFECT THE PRICE OF AGRICULTURAL INPUTS AND PRODUCTS. A wide variety of sectoral policies can affect the prices for agricultural inputs and products. Taxes can raise (and price subsidies can lower) the prices of agricultural inputs. In some countries all marketing (and even production) of certain inputs is controlled by marketing boards, which are sometimes referred to as parastatal corporations. Agricultural products can also be taxed or subsidized, and in some cases all marketing is controlled by a national agency. Some governments decree price floors or ceilings, although it is not always possible to enforce such regulations. These policies can affect not only prices but also fluctuations in prices. For example, the government may be ready to purchase specific agricultural products at guaranteed minimum prices, which will reduce the price fluctuations faced by farmers. Some policies that affect the prices of inputs and outputs depend on aid received by the government. For example, the government may sell food or fertilizer received as aid in order to reduce food or fertilizer prices in some areas. Of course, macroeconomic exchange rate and trade policies can also affect prices, so the overall effect will be determined, roughly speaking, by the sum of the effects of macroeconomic and sectoral policies.

AGRICULTURAL EXTENSION SERVICES. Ministries of agriculture often provide a variety of agricultural extension services to farmers, such as basic agronomic information, information on new types of technology, visits by extension agents to farms to investigate specific problems, advice on the use of pesticides and herbicides, and vaccinations and other services for farm animals. Some ministries of agriculture are also involved in the production of new technology at agricultural research stations. Agricultural extension agents may periodically visit farming households whose

members might otherwise never visit an extension center. Many of these services are undoubtedly quite useful to farmers, but others may not be. Some of the advice provided may even have a negative impact on the welfare of agricultural households. Obviously, until policymakers understand the effects of these different services, they will not know which services to expand and which ones to reduce or eliminate.

Another issue is how much to charge for agricultural extension services. While economic theory provides clear reasons to subsidize some services, such as the provision of information, other services may not need to be heavily subsidized and could even be made more widely available if some element of cost recovery were introduced. A related issue is the distribution of the benefits and costs of agricultural extension services. Do they reach the poorest households? Who ultimately pays the costs of providing these services? For an interesting discussion of these issues and research evidence to date see Purcell and Anderson (1996).

POLICIES THAT AFFECT THE AVAILABILITY OF CREDIT. While macroeconomic policies clearly affect credit markets, the ability of farmers to invest in working capital is affected by a variety of policies implemented by ministries of agriculture at the sectoral level. In many countries governments have directly offered credit to agricultural households—with mixed success at best. For recent reviews of past experience see Besley (1994), Yaron (1994), and Zeller and Sharma (1998). In some countries access to credit has been increased by the development of rural bank programs operated by nongovernmental organizations (NGOs) such as the Grameen Bank in Bangladesh, yet the success of NGO programs has also been mixed (Morduch 1999; Rahman 1999). Economic theory shows that credit markets can suffer from a variety of market failures, including problems of moral hazard and adverse selection in risky environments with incomplete information. Economists' understanding of credit markets has increased substantially in recent years due to both research and innovations in credit institutions. It is important for policymakers to know how credit policies and programs affect capital formation in agriculture so they can design effective policies and create a policy environment that promotes the development of efficient credit institutions.

This discussion of sectoral policies leads to the following specific policy questions:

- What impact do interventions that are intended to change the prices of agricultural products actually have on prices, and what is the impact of any price changes on basic agricultural outcomes?
- What impact do different agricultural extension services have on basic agricultural outcomes?
- What prices, if any, should be charged for agricultural extension services, and how are the benefits and costs of those services distributed among farm households?
- How do credit policies and programs in the agriculture sector affect the availability of credit to agricultural households and the development of private credit institutions?

As with macroeconomic policies, there are no simple answers to these questions because of the enormous variation in both agricultural systems and sectoral policies in developing countries. The individual effects of most sectoral policies (such as taxes, subsidies, and price controls) on output or input prices are unambiguous, and the effect of price changes on household welfare and agricultural output is also well known. That is, increases in output prices raise output and household welfare, while increases in input prices have the opposite effect. However, the magnitude of these effects are usually not known, which implies that the size of the benefits are unknown, and the benefits may not be worth the costs. Moreover, when several policies are implemented simultaneously—such as when a structural adjustment program is implemented that removes many sectoral policies designed to influence prices—the overall impact on farm production and household welfare is uncertain.

The literature on sectoral policies is large and cannot be easily summarized. Nevertheless, it is clear that many questions remain unanswered. Some observers argue that sectoral policies designed to alter market prices are inherently distortionary and inefficient, and thus should be removed (Schultz 1978). Yet the empirical evidence has revealed several cases where the elimination of sector-level interventions did not lead to the expected outcomes. For example, in some countries the supply of fertilizer and seed from private merchants increased much less than expected after the elimination of fertilizer and seed marketing boards, which had depressed prices for these inputs (Rukuni 1996; Dembele and Savadogo 1996; Rusike and others 1997). Other studies have claimed that the government has an important role to play in developing mar-

kets for agricultural outputs. For example, some economists have argued that fertilizer markets in Africa are plagued by a series of fundamental problems and idiosyncrasies such as risk, seasonal demand, high transport costs, underdeveloped financial markets, and cash-constrained farmers (Barrett and Carter 1999). Thus, while it is true that fertilizer subsidies and domestic fertilizer production schemes have suffered from fiscal unsustainability and problems of implementation in Africa, it also appears that private markets in rural Africa may not operate in ways that some policy advisors expected they would. It may be that governments need to invest in improving transportation infrastructure before private markets can function well (Ahmed, Falcon, and Timmer 1989; Rusike and others 1997). If better agricultural data can be collected in LSMS and similar multitopic household surveys, more light may be shed on this question.

Policies That Affect the Institutional Environment

Institutional policies primarily concern changes in the “rules of the game,” such as land tenure rules, contracts, and so on. Systems of land tenure are particularly important. In some countries, land rights in many rural areas are determined by traditional systems that may discourage efficient use of the land. One example of this is the designation of some land as community grazing areas for livestock, which usually leads to overgrazing of that land. As land constraints grow in many countries, there is a tendency to formalize land titling in response to increased competition for land.

In other countries the distribution of land is highly unequal, which may also encourage inefficient use of agricultural land. This is particularly the case in countries with “dual” agriculture sectors—where a small number of very large farms coexist with large numbers of very small farms, as in Brazil, Central America, Mexico, South Africa, and Zimbabwe. In these countries potential or actual land redistribution (land reform) has prompted heated political debate. Policymakers need to know how land reform programs have affected or could affect the concentration of landholdings, farmers’ access to land, income distribution, and the incidence of poverty. A particularly contentious issue in this context is the effect that land reform and redistribution have had on farming productivity, capital to labor ratios, and the welfare of rural households.

Government policies also have direct effects on contract enforcement and, more generally, on the rule

of law in rural areas. Examples of such policies include regulations specifying the acceptable range of rights and responsibilities in contracts between agroindustrial firms and farms, establishment and regulation of government-managed crop insurance and drought insurance schemes, and the establishment of civil court systems for land disputes.

The most important policy questions regarding the institutional environment in developing countries are:

- What impact do traditional forms of land tenure have on basic agricultural outcomes, and what can government policies do to overcome inefficient outcomes or to change the system of tenure?
- How politically feasible is major land redistribution in countries where the distribution of land is highly unequal, and what impact will such redistribution have on basic agricultural outcomes and on the distribution of these outcomes across households?
- What policies, regulations, and enforcement mechanisms can governments implement to promote the rule of law, and how does the rule of law affect basic agricultural outcomes?
- What programs can governments implement to provide insurance directly or to promote the provision of insurance in the private sector, and how do these insurance schemes affect basic agricultural outcomes?

The focus of recent empirical research on the effects of institutional change on basic agricultural outcomes has been on changes in land institutions, particularly land tenure policies and land redistribution. In recent decades land redistribution from collective farms to individual households has occurred in many socialist or formerly socialist countries, such as Eastern Europe, China, and Vietnam. Land redistribution has been limited in other developing countries. Recent empirical evidence on the effects of land titling—providing more “formal,” and thus more secure, land tenure—is mixed. In some countries researchers have found that more secure land ownership increases productive investments in land (see Place and Hazell 1993 and Migot-Adholla, Hazell, and Place 1990 for evidence from Rwanda and Ghana). But this was not the case for Kenya; Migot-Adholla, Hazell, and Place (1990) found that the relationship between tenure and land improvements was weak because farmers already felt secure in their use rights under the traditional land use system. Overall, the

impact of more formal titling appears to depend in part on the kind of system that is being replaced and the kind of investment or farm practice examined. (For example, long-term investments were more sensitive than short-term investments to land insecurity.)

There is a fair amount of empirical evidence on whether smaller farms are more productive, which is a key issue concerning land redistribution policies. In India, for example, Bardhan (1973) and Deolalikar (1981) show that smaller farms have higher land productivity but lower labor productivity. They point to the greater labor intensity of smallholder farms as the reason. Empirical studies tests in Africa (Carter and Wiebe 1990 on Kenya; van Zyl, Binswanger, and Thirtle 1995 on South Africa) also find an inverse relationship between farm size and land productivity. Another example is Barrett (1996), who shows an inverse relationship for rice farmers in Madagascar. On the other hand, larger farmers could in theory compensate for less family labor per hectare by using hired labor, nonlabor variable inputs, and capital to meet or surpass land productivity on small farms. Adesina and Djato (1996) show this for large rice farms in Cote d'Ivoire, and Rao and Chotigeat (1981) show it for large farms in India. Smaller farms may also have lower land productivity because their more intensive farming fatigues and degrades the soil, yet a zone with better soils might attract more farmers, giving rise to smaller farms with better yields than in other zones.

Almost no research has been done on the rule of law and the agriculture sector in developing countries, and only a small amount has examined insurance markets. Crop insurance is sometimes available for large commercial farms, but administrative costs usually prevent it from being offered to small family farms. For an introduction to crop insurance in developing countries see Gudger (1990).

Public Investments

Public investment policies include investments in physical infrastructure—such as transportation, communication systems, electric power grids, and large-scale irrigation schemes—and investments in basic social services, particularly in schools and health clinics. From the viewpoint of economic theory there are many reasons why such investments should be financed (though not necessarily implemented) by the government. Many infrastructure investments, such as roads and canals, are public goods in the sense that an

additional person can use them at little or no cost to others and it is difficult to prevent people from using them. Others, such as education and health care, may have significant benefits in the form of externalities; that is, they may provide benefits to members of society beyond those that directly use the service. Some large physical infrastructure projects, such as irrigation and electric power grids, may have large economies of scale, which is another reason for government involvement. A final argument in favor of government involvement is imperfect information; for example, residents in remote rural areas may not be aware of the benefits of education or modern medical treatments.

Investments in transportation such as roads, railroads, water transportation, ports, and air transportation can have a dramatic impact on markets—and particularly on market prices—by linking local markets more closely with regional, national, and international markets. Similarly, modern communications infrastructure (such as postal service, telephones, radio, television, electronic mail, and even satellite connections) also links markets more closely with each other and can facilitate the flow of useful information to farming households, including information on prices, new technologies, insurance opportunities, and procedures for obtaining government assistance. Finally, government investments in electric power generation and large-scale irrigation projects can have an enormous impact on households' welfare and agricultural productivity.

Government investments in basic social services, particularly schools and health facilities in rural areas, can also affect agricultural productivity and household welfare. There is a large literature that shows how better health and higher education make agricultural workers more productive (see Strauss and Thomas 1995 for a recent literature review). As explained in Chapters 7 and 8, there are sound economic reasons for governments to invest in these services. Of course, policymakers need to make decisions on the extent and nature of these investments based not only on their impact on agricultural outcomes but also on their impact on other outcomes.

Thus the two specific policy questions regarding public investments and agriculture are:

- What impact do government investments in transportation, communications, electric power generation, and large-scale irrigation schemes have on basic agricultural outcomes?

- What impact do government investments in schools and health services (clinics, hospitals and public health services such as immunizations) have on basic agricultural outcomes?

The bulk of recent empirical work on the impacts of infrastructure development on agriculture points to positive effects on the rate of commercialization and productivity growth. For a recent review of the literature see Raisuddin Ahmed and Cynthia Donovan (1992). For investments in social infrastructure see Strauss and Thomas (1995), who address, among other things, the impact of nutrition and education on agricultural productivity. Again, the literature usually finds positive impacts, but in some studies the link is weak or even nonexistent.

Analytical Approaches, Data Needs, and Data Collection Issues

The policy questions presented in the previous section cannot be resolved by appealing to economic theory. They can be answered only by examining data using appropriate empirical research methods. However, collecting data is not easy, and quite often the data available are insufficient for answering important policy questions. LSMS and similar multitopic household surveys can provide policymakers with detailed, accurate information that can be used to understand the impact of current trends and proposed policy changes on the agriculture sector. How well they do so depends on the type of survey data collected and on the methods used to gather and analyze the data.

This section draws on the methods used by agricultural economists and other researchers to assess what data are needed to answer the policy questions raised in the first section. The first subsection, drawing on economic theory, discusses the behavior of agricultural households and links this to the agricultural policy issues. The second subsection continues the discussion by explaining what data are needed to provide answers to the various policy questions. The third and final subsection shows how the required data are collected in practice, emphasizing the difficulties involved and recommending practical solutions whenever possible.

An Economic Approach to the Behavior of Agricultural Households

Ultimately, policymakers would like to know the impacts of different policies on the basic agricultural

outcomes of interest. But before considering in detail the kinds of data needed to assess these impacts, it is useful to consider how agricultural households behave and how government policies can affect their behavior.

Agricultural economists and agronomists often think of agricultural activities in terms of a production process or production function. When various inputs are combined in certain ways using a certain technology, the result is the crops and animals (“outputs”) that agricultural households produce. These products can either be consumed by the household or sold to others. The overall value of these activities to each household can be measured as farm profits (net agricultural income), which include not only earnings from selling products but also the value of products that the household consumes. Households can invest some or all of the income generated by agricultural activities (as well as income from other sources) in ways that will increase their agricultural production in the future.

How do agricultural households decide what to produce, what inputs to use, and related choices? Economists often portray households and their members as organizing their activities to maximize some kind of utility function.¹ Their utility (“happiness”) is higher when they consume more goods and services and lower when they increase the amount of time they spend working. Given this situation, agricultural households organize their crop- and livestock-producing activities in ways that increase farm productivity and economize on the amount of time that household members spend working on these activities. This may involve more than the organization of agricultural activities; for some households it may make sense for one or more members to find employment in nonagricultural activities, since that may provide the household with more income than would be the case if those members worked in agriculture.

Agricultural economists have developed mathematical models of the behavior of farm households that provide useful insights for doing empirical research (see Singh, Squire and Strauss 1986). One lesson from these models is that it is important to distinguish factors that are beyond the control of the household from outcomes that can be determined, at least in part, by the household. Some examples will make this distinction clear. In general, households and individuals have no control over prices of agricultural inputs and outputs, the technological packages available, or access to credit. In contrast, households typically do

have control over the crops that they plant, the amounts of inputs that they use, and the time they spend working in agriculture. Given the factors beyond their control, which economists often refer to as *exogenous* variables, and family characteristics (such as amount of land owned, education levels of family members, and family size), farm households make decisions about the things they can control, which economists refer to as *endogenous* variables.

In general, all the basic agricultural outcomes presented in the first section are endogenous: they are determined, at least in part, by the decisions of rural households. Rural households decide what crops they will grow, what animals they will raise, and how much of each input (including their own labor) to use. The amounts of crops and animals that households produce are partially under their control; they can increase production by bringing more land under cultivation and using more inputs. However, other factors, such as weather, also affect production.

Rural households also decide what technologies to use, whether and where to market some or all of their crops, and what kinds of long-term investments to make in agriculture. These decisions affect household profits from agriculture. In addition, rural households decide how much time, if any, each member should work in nonagricultural activities, and rural households make many decisions about nonwork activities related to health, nutrition, education, and other areas. Finally, the activities of rural households can affect the environment, the last basic agricultural outcome presented in the first section. For example, intensive use of fertilizers and pesticides can have negative environmental consequences.

How do government policies affect these basic agricultural outcomes? In general, they do so by altering the exogenous variables that households face. The following variables are exogenous and play important roles in determining basic agricultural outcomes:

- Prices for agricultural products and agricultural inputs.
- Weather, pest infestations, and crop diseases.
- The availability of different kinds of agricultural technologies.
- The availability of agricultural extension services and the prices charged for them.
- Physical and social infrastructure.
- Taxes.
- The availability of credit and the terms of that credit.
- Market conditions for buying, selling, and renting land.
- Traditional land tenure arrangements.
- Institutions for enforcing contracts and settling land disputes.
- Opportunities to purchase insurance.

Nearly all government policies affect households by influencing one or more of the exogenous variables listed above; very few government policies directly affect the (endogenous) basic agricultural outcomes.² Consider the macroeconomic policies discussed in the first section. Exchange rate policies affect agricultural households solely through the prices that the households face for their inputs and outputs. Thus to understand the impact of exchange rate policies it is necessary to know how a specific exchange rate policy affects prices and how these prices affect the different agricultural outcomes.

Tariff and nontariff policies also affect farming households, primarily through the prices that the households face. These policies can also restrict the access of farm households to new technologies. And trade barriers occasionally work in other ways. A quota system for an imported agricultural input, such as fertilizer, may be accompanied by a distribution mechanism not governed by price, such as rationing. In this situation the rationed fertilizer can be thought of as a “service” provided by agricultural extension centers. Yet flexibility is needed; because rationing can take so many different forms, other types of rationing may require a different approach.

By definition, credit policies at the macroeconomic level affect the terms and availability of credit. They may do so directly (for example, by establishing government-run credit institutions) or indirectly (for example, through regulations on private banks and other private lending institutions).

Finally, general reductions in spending and increases in taxes can affect both agricultural and nonagricultural prices by reducing subsidies or increasing taxes on specific items. Taxes can also affect rural households (and often urban households) more directly—for example, through a general income tax.

Many sectoral policies also affect prices. In particular, subsidies, commodity taxes, price controls, and marketing board policies almost always affect rural households by altering the prices that these households face. The pricing of agricultural extension services is another sectoral policy that works through

prices. Sectoral credit programs affect both the availability and terms of credit. The government can also increase the availability of extension services—and in the long run the availability of technology—by establishing agricultural research stations. And some tax policies in the agriculture sector may also have direct effects (that is, effects that do not work through prices); an example is a tax on agricultural land.

Policies that affect the institutional environment and public investment policies have both direct and indirect effects on the exogenous factors that agricultural households face when making decisions about their various activities. Any policy that affects traditional forms of land tenure will have major implications on the land markets and tenure arrangements that agricultural households face. The same is true for land redistribution policies. Such policies can have indirect effects (for example, changing the price of land) and direct effects (for example, by outlawing specific forms of land tenure or requiring larger landowners to sell some of their land). Policies that affect the rule of law, such as the establishment of a legal apparatus for enforcing private contracts, can also have direct and indirect effects. A direct effect would be that contracts become enforceable, and an indirect effect would be a change in prices due to the increased contract enforcement. Insurance policies affect the terms and availability of insurance, and they may do so directly or indirectly. Finally, direct investments in either physical or social infrastructure alter the opportunities available to households either directly (for example, through a new road that reduces the wear and tear on vehicles owned by the household) or indirectly through prices (for example, as the new road provides better access to distant markets).

In discussing how these four kinds of policies (macroeconomic, sectoral, institutional, and public investment) affect the exogenous variables and how these variables in turn affect the basic agricultural outcomes, it is useful to distinguish between two cases. In the first case the policy affects households indirectly by influencing one or more intermediate variables, such as prices or the availability of technology. In such cases there are two separate questions. The first is: How does the policy affect prices or the availability of technology? The second is: How do changes in prices or in the availability of technology affect households' basic agricultural outcomes? Data analysts sometimes answer the first question by making simple assumptions or

“back of the envelope” calculations. For example, they may estimate that reducing a tariff on an imported agricultural input will reduce the domestic price by the same amount that the tariff was reduced. In many cases this approach may be too simplistic. A better approach would be to use data from sources other than a household survey to answer this question—for example, to use macroeconomic time-series data on exchange rates and domestic prices. Neither of the two approaches uses household survey data.

In contrast, household survey data are crucial for answering the second question. Since this book focuses on the design of household surveys, the rest of the chapter will focus on what is needed to answer the second question, which is relevant for a range of important macroeconomic and sectoral policies. For example, in examining the effects of exchange rate policies, the discussion will focus on how changes in the prices of traded inputs and outputs affect agricultural outcomes, rather than on how changes in the exchange rate affect prices. To answer the first question researchers need to consult the appropriate literature, which in general does not make use of household survey data (two examples are Krueger et al 1992 and Barrett 1999).

The second case concerns government policies that directly affect households' basic agricultural outcomes. A good example of such policies are agricultural extension services provided by the ministry of agriculture. In this case the analysis is simpler because household survey data can be used to examine the (direct) impact of such policies on the phenomena of interest.

The next subsection explains two ways to use LSMS-type household survey data to analyze agricultural policy issues and describes in detail how to collect the data needed for both types of analysis.

Analytical Methods and Specific Data Needs

Research methods for analyzing the relationship between the exogenous variables affected by policies and basic agricultural outcomes can be divided into two types: descriptive analysis and causal analysis.

DESCRIPTIVE ANALYSIS. The main objective of descriptive analysis is to describe what is occurring without rigorously explaining why it is occurring. The methods used are simple calculations of various shares and levels, so the biggest challenge is not doing the analy-

sis but obtaining sufficiently accurate data. Simple descriptive statistics can be used to answer many different questions of interest to policymakers, such as:

- What crops are agricultural households growing, and how does this vary in different types of agricultural households?
- What are the net farm incomes (profits) of different types of agricultural households?
- What agricultural inputs, such as fertilizer, irrigation, pesticides, and farm equipment, are used by different types of farming households?
- How does access to and use of agricultural extension services vary among households?
- Which rural households are making investments in agriculture, and what form do these investments take?

There are two reasons why simple descriptive statistics are useful for policymakers. First, the better informed policymakers are about the basic characteristics of the agricultural sector, the better prepared they will be to make day-to-day policy decisions. Second, descriptive statistics can be used to obtain estimates of who currently benefits from specific government policies. For example, data on which households obtain information from (or are visited by) agricultural extension agents show who benefits from agricultural extension services. Similarly, data on who obtains loans from government credit programs help show the distribution of benefits from those programs.

Simple descriptive statistics can also show which households currently benefit from programs that affect the prices of agricultural inputs and outputs. For example, price subsidies for a particular crop benefit only the farmers who grow that crop, and the benefit any individual farmer receives is proportional to the amount that he or she grows. Thus information about which households grow each crop, and how much they grow, can be used to estimate the distribution of the benefits provided by both current and proposed price subsidies (Deaton 1989). Similar calculations can be done for price subsidies on agricultural inputs (such as fertilizer and insecticides) and for taxes on either inputs or outputs. Other policies that affect the prices of agricultural inputs and outputs—such as tariffs, exchange rate devaluations, and price controls—can also be evaluated.

While such descriptive analysis is useful, it is important to keep in mind that these estimates are approximations because they do not account for the

behavior of agricultural households. For example, data on which households currently grow a particular crop do not show precisely who might benefit from a reduction in a tax on that crop (which would increase the prices received by farmers), because households that are not currently growing the crop may decide to do so to take advantage of the new policy. Moreover, some of the households that are currently growing the crop may decide to increase their production of it, while others may hold their production constant. Thus statistics on how much each household is currently producing will not fully reflect who will benefit—nor the extent of the benefit—from a tax reduction. An even more difficult problem is that many policies affecting prices benefit consumers as well as producers. For example, if the supply of a taxed crop is quite elastic while the demand is not, the market price will fall, so most of the benefits of the tax cut will accrue to consumers rather than to producers.

Descriptive analyses of agricultural issues that are of interest to policymakers require data on all of the basic agricultural outcomes listed above, plus data that can be used to classify households into different socioeconomic categories. Therefore, the agriculture module should collect the following kinds of information:

- The amount of each crop produced and of each type of livestock produced (including any crop or animal byproducts).
- The amount of purchased inputs used (including fertilizer, herbicides, insecticides, fungicides, seeds and seedlings, and irrigation services) and the household's use of credit and agricultural extension services. Information on the amount of labor used (including both household members and hired labor) may yield a clearer picture of the agricultural sector but is not necessary for making rough estimates of the impact of government policies.
- The technologies used by each household, including high-yielding varieties of particular crops or new types of capital equipment.
- The marketing activities of agricultural households, including how much of their crop and livestock production was sold and to whom it was sold.
- The net income (profits) that households earn from their agricultural activities.
- Households' investments in agriculture, both in terms of their current stock (ownership of farm machinery, irrigation equipment, farm tools, buildings, and land), and recent additions (purchases of

these items plus building construction and land quality improvements).

No mention was made here of welfare indicators such as consumption expenditures, health status, and school enrollment. Information on welfare should be collected in other modules of the household questionnaire such as the consumption, education and health modules. Similarly, data on how environmental outcomes may be affected by agricultural activities should be collected in the environment module. However, if the survey does not include an environment module, it may be necessary to collect this information in the agriculture module. See Chapter 14 on the environment for a detailed discussion of how to collect such data.

The definitions of most of the data listed above are quite clear. However, the calculation of net farm income (profits) merits a brief discussion. This variable is the value of agricultural outputs minus the value of the corresponding agricultural inputs. The values of outputs and inputs used can be obtained directly or derived from quantity and price information. As discussed further below, collecting data on quantities can lead to difficulties if respondents are only able to provide answers in local units, but their responses need not be converted into national or international units if the price data are also expressed in local units. The price information can be obtained from either the household questionnaire or the community questionnaire. Two points should be kept in mind when designing the survey. First, the set of outputs and inputs consists of both those that are sold for (or purchased with) cash and those that are given (or received) in kind; market prices can be used to impute the value of the in-kind inputs and outputs. Second, to calculate total net farm income it is not necessary to know which inputs were used on each farm product, although calculation of net farm income for each product would require such information.

In summary, for descriptive analysis, it is only necessary to collect data on the phenomena of interest. In most cases there is little need to collect price data unless analysts wish to see how prices vary among different geographical areas or socioeconomic groups. However, experience with past LSMS surveys has shown that data survey designers initially thought would not be useful for analysts have often later proved to be of considerable analytical interest. Thus if possible the survey should aim to collect a broad range of information.

CAUSAL ANALYSIS. While descriptive analysis can be quite useful for policy discussions, it has serious limitations. In particular, it cannot be used to explain household behavior. This is why estimates that use descriptive methods to show who benefits from government policies are only approximations. More generally, descriptive information cannot be used to examine the causes of various phenomena of interest, such as the impact of additional inputs on farm productivity and the reasons why some households plant certain crops, use certain inputs, or adopt certain technologies, while others do not. Understanding the causal relationships between inputs and outputs and the determinants of household behavior requires causal analysis, in which analysts use econometric and statistical methods (most commonly, regression analysis) to explain why households make the choices that they do.³ Ultimately this information can be used to estimate how existing government policies affect households' activities and well-being, and to predict the likely effects of any new policy options that may be under consideration.

When analyzing agricultural issues, two kinds of causal relationships can be estimated: structural relationships and reduced form socioeconomic relationships. The most important example of a structural relationship is the agricultural production function—the physical relationship between outputs (crops, animals, and their byproducts) and inputs (including those controlled by households, such as labor, fertilizer, and land, as well as random factors outside the control of households, such as rainfall and pest infestations). Strictly speaking, production functions do not depend in any way on the characteristics of households. Thus production functions contain no information about household behavior.

The second kind of causal relationship, a reduced form relationship, shows how exogenous variables affect the different basic agricultural outcomes (all of which are endogenous). Since these relationships all involve choices made by households, they depend on each household's characteristics, such as how many people belong to a household and the household's utility function. This kind of causal relationship does measure household behavior. While a production function is the same for all kinds of households, a reduced form relationship can vary among different types of households because it depends in part on their characteristics.

Some examples may make the distinction between structural and reduced form relationships clearer. A production function is a technological relationship between inputs and outputs. It can be thought of as a “formula” that shows how much output is produced by combining different sets of inputs. One input may be fertilizer, or even the labor of household members, but the relationship between inputs and outputs is completely unaffected by whether a household uses fertilizer or how it uses its own labor; the relationship itself is not affected by household behavior. In contrast, one example of a reduced form relationship is the determinants of the amount of labor that a household devotes to agricultural activities. This can also be thought of as a formula, but in this case the parameters of the formula may depend on household characteristics such as the relative weights on leisure and consumption in a given household’s utility function.

Estimates of these two types of causal relationships can be used to answer policy questions such as:

- How much, and how quickly, do changes in the prices of agricultural products and inputs affect the production of exported and nonexported crops, the use of agricultural inputs, and other basic agricultural outcomes?
- How do different agricultural extension services affect farmers’ output, use of inputs, incomes, and productivity?
- How does the availability of credit affect the use of agricultural inputs, the adoption of new technologies, capital investments, and other basic agricultural outcomes?
- How do traditional forms of land tenure and investments in physical infrastructure affect crop production, households’ incomes from agricultural activities, and other agricultural outcomes?
- What is the causal relationship between farm size and farm productivity, and how does farm size affect other basic agricultural outcomes?
- How do policies that promote the rule of law and enforcement of contracts affect households’ agricultural activities?
- What impacts do different types of investments in physical infrastructure have on the marketing of crops, use of purchased inputs, adoption of new technology, and other basic agricultural outcomes?
- How does the educational level attained by farmers (which can be thought of either as a distinct input

or as a factor that modifies the contribution of other inputs) affect the farmers’ productivity, the crops that they grow, the inputs they use, the technologies they adopt, and other basic agricultural outcomes?

Econometric methods can be used to estimate structural relationships such as production functions, as well as reduced form relationships. Estimates of production functions can be used to answer the fifth and eighth questions above, on the impacts of education and farm size on farm productivity. Estimates of reduced form relationships can be used to provide answers to the other six questions listed above. One useful reduced form relationship is the “profit function.” This shows how much profit a farm household can make given certain input and output prices (which are clearly exogenous), household assets such as farm size or capital holdings (which can be considered exogenous in the short run), and other household characteristics.⁴ Profit functions are particularly useful because they can be used to derive estimates of functions that show how the supply of outputs and the demand for inputs are affected by these same variables (Sadoulet and de Janvry 1995).

Two things must be borne in mind when considering causal analysis. First, more data are needed to do causal analysis than to do descriptive analysis. Unbiased estimation of reduced form relationships requires that the analyst have data on all of the variables that affect the basic agricultural outcome of interest. For example, if an analyst is interested in finding out how the price of fertilizer affects the amount of fertilizer used, data are needed not only on the price of fertilizer and the quantity used but also on everything else that determines the use of fertilizer, including the prices of other agricultural inputs (pesticides, herbicides, and hired labor), the prices of the crops on which the fertilizer may be used, the availability of credit, the education level of adult household members, the prices of other crops (and even of animals), rainfall and other weather conditions, the land, machinery, and other types of capital owned by the household, and so forth. Basically, data are needed on almost all of the exogenous variables listed at the beginning of this section. Collecting such data is not easy, and almost always requires a long and detailed agricultural module.

The second thing to realize about causal analysis is that many problems can lead to biased estimations of

these relationships. If data are missing on some causal factors, the estimates are likely to suffer from omitted variable bias (see Chapter 26 for further explanation of this point). A classic example of omitted variable bias is the inability to observe the managerial talent of the farmer (see Griliches 1957). Suppose analysts want to estimate a production function for a certain crop and that they are particularly interested in how the use of fertilizer affects productivity. Suppose as well that those farmers with more managerial talent are both more productive, all else being equal, and more likely to use fertilizer. If a regression is estimated without accounting for the impact of managerial talent, it will overestimate the impact of fertilizer on output because part of the impact measured is the impact of managerial talent, which is positively correlated with use of fertilizer. The “simple” solution to this bias is to include all of the variables that are needed, but it is not always possible to collect data on some of the causal factors.

Estimates of causal relationships also suffer from such other potential problems as measurement error in the variables (which affects both structural and reduced form relationships) and the endogeneity of the explanatory variables (which affects only structural relationships such as production functions). These econometric issues are discussed in detail in Chapter 26; suffice it to say here that these problems are serious ones that constantly plague empirical researchers. However, many of the problems (including measurement error and omitted variable bias) can be minimized if detailed data are collected and appropriate procedures are used to ensure data accuracy. The following subsection provides advice on how to collect such data.

In summary, the data required to undertake causal analysis include data on all of the basic agricultural outcomes that are of interest and all of the exogenous factors that determine these outcomes. These exogenous factors include prices for agricultural products and agricultural inputs, various “shocks” (such as weather, pest infestations, and crop diseases), the availability of technology and of extension services (and any prices associated with their use), physical and social infrastructure, taxes, the availability and terms of credit and insurance, the characteristics of the local land market, traditional land tenure arrangements, and the country’s institutional capacity for enforcing contracts and settling disputes. Collecting data on these

exogenous factors is always a challenge, which implies that a long agricultural module will be needed to undertake rigorous causal analysis.

Table 19.1 summarizes relationships between the policy issues raised in the first section and the data needs discussed in the second section. It also shows the varying ability of the three different versions of the agricultural module (which are introduced in the next section) to supply the data needed to answer each question.⁵ As discussed above, several of the policy questions in the first section can be broken into two parts: the impact of a specific policy on prices or technology availability and the impact of prices or technology availability on basic agricultural outcomes. In Table 19.1 such questions are similarly divided. For example, the table has no question on the impact of exchange rate policies on basic agricultural outcomes, but it does have a question on the impact of exchange rates on prices and a question on the impact of prices on basic agricultural outcomes. In addition, the table includes several policy questions raised in in this section’s discussion of policy questions that can be answered by using descriptive analysis.

Some Difficulties and Some Potential Solutions

Collecting data on the variables discussed above is often complicated by the complexity of the production process and by the great variety of agricultural producers in developing countries. Farms vary in size from small garden plots in Russia to giant grain farms in Argentina. Farms also vary in the extent to which they are connected to markets, and in the degree to which they are privately or collectively owned. Moreover, within any given rural household one often finds a bewildering array of common and individual plots (the latter often controlled by different household members) with a variety of crops grown on each plot.

Because of these complexities, the agricultural module of a multitopic survey must be carefully designed to reflect the prevailing circumstances of the agricultural sector in the country where the survey is being fielded, often within the constraint of a limited survey budget. This subsection examines several specific issues involved in the collection of agricultural data and provides practical advice on how to resolve them. It begins by broadly distinguishing between situations in which it is relatively easy to collect agricultural data and situations in which it is relatively hard to do so.

Table 19.1 Policy Issues, Methods of Analysis, and Household Survey Data

Policy issue	Data needed	Adequacy of data from		
		Short version	Standard version	Expanded version
Policy issues that can be addressed using descriptive analysis of household survey data				
What crops and livestock are being grown by different types of agricultural households?	Quantities of crops and livestock grown (household questionnaire) plus data from other modules for classifying households.	Good	Very good	Very good
What are the net farm incomes (profits) of different types of agricultural households?	Net income earned from agricultural activities (household questionnaire), plus data from other modules for classifying households.	Poor	Good	Very good
What agricultural inputs are used by different types of farming households?	Quantities of agricultural inputs used (household questionnaire), plus data from other modules for classifying households.	Fair	Very good	Very good
How does access to and use of agricultural extension services vary among households?	Existence of extension services (community questionnaire) and use of those services (household questionnaire), plus data from other modules for classifying households.	Very good	Very good	Very good
Which rural households are making investments in agriculture, and what form do these investments take?	Purchases of capital goods and land (household questionnaire), plus data from other modules for classifying households.	Poor	Fair	Good
What agricultural technologies are being used by different kinds of agricultural households?	Use of hybrid seeds, new types of capital equipment, and specific farming methods (household questionnaire), plus data from other modules for classifying households.	Poor	Good	Good
How does access to and use of credit vary among households?	Local sources of credit (community questionnaire) and use of credit (household questionnaire), plus data from other modules for classifying households.	Poor	Good	Good
How do marketing opportunities and activities differ across different households?	Distance to nearest local and periodic markets and means of transportation to get to them (community questionnaire), marketing activities (household questionnaire), plus data from other modules for classifying households.	Fair	Very good	Very good
How are the benefits of price subsidies to inputs and outputs distributed across different households?	Amounts of outputs produced and amounts of inputs used (household questionnaire), plus data from other modules for classifying households. Rough estimates of change in prices due to policies must be assumed or obtained from other kinds of data.	Good	Very good	Very good
Policy issues that can be addressed using causal analysis of household survey data				
How do changes in the prices of agricultural products and inputs affect production of crops, use of inputs, and other basic agricultural outcomes?	Reduced form estimates, which have the basic agricultural outcome as the dependent variable. The most important explanatory variables are prices of inputs and outputs (price questionnaire and household questionnaire); plot, farm, and household characteristics (household questionnaire); and community characteristics such as physical infrastructure and access to extension services (community questionnaire).	Fair	Good	Very good
How do different agricultural extension services affect farmers' output, use of inputs, incomes, and productivity?	Reduced form estimates, with the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot, farm, and household characteristics (household questionnaire); and community characteristics such as access to extension services (community questionnaire).	Fair	Good	Very good

(Table continues on next page.)

Table 19.1 Policy Issues, Methods of Analysis, and Household Survey Data (continued)

Policy issue	Data needed	Adequacy of data from		
		Short version	Standard version	Expanded version
How does the availability of credit affect capital investments, use of agricultural inputs, adoption of new technologies, and other basic agricultural outcomes?	Reduced form estimates, with the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot, farm, and household characteristics (household questionnaire); and community characteristics such as access to, and terms of, locally available credit (community questionnaire).	Fair	Good	Very good
How do traditional forms of land tenure and investments in physical infrastructure affect crop production, households' incomes from agricultural activities, and other agricultural outcomes?	Reduced form estimates, with basic agricultural outcomes as the dependent variables. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot characteristics (including type of tenure) and household characteristics (household questionnaire); and community characteristics such as the nature of traditional tenure arrangements (community questionnaire).	Fair	Good	Very good
What is the causal relationship between farm size and farm productivity?	A production function, the estimate of which will require data on all inputs, including plot size, and the output of interest (all from the household questionnaire)—and may require prices (from the household or community questionnaire) or other instrumental variables.	Poor	Fair	Good
How does farm size affect basic agricultural outcomes?	Reduced form estimates, which will have the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot size, other plot characteristics, and household characteristics (household questionnaire); and such community characteristics as physical infrastructure and access to extension services (community questionnaire).	Fair	Good	Very good
How do policies that promote the rule of law and enforcement of contracts affect households' agricultural activities?	Reduced form estimates, with the basic agricultural outcomes as the dependent variables. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot characteristics (including any relevant contract information) and other household characteristics (household questionnaire); and such community characteristics as the local legal system and its degree of enforcement (community questionnaire).	Poor	Fair	Fair
What impacts do different types of investments in physical infrastructure have on marketing of crops, use of purchased inputs, adoption of new technology, and other basic agricultural outcomes?	Reduced form estimates, with the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot characteristics and other household characteristics (household questionnaire); and such community characteristics as physical infrastructure (community questionnaire).	Fair	Good	Very good
How do farmers' levels of education and health status affect their productivity?	A production function requiring data on: all inputs, including education and health of household members, and all outputs (household questionnaire)—as well as prices (from household or community questionnaire) or other instrumental variables.	Poor	Fair	Good

Table 19.1 Policy Issues, Methods of Analysis, and Household Survey Data (continued)

Policy issue	Data needed	Adequacy of data from		
		Short version	Standard version	Expanded version
How does the availability of insurance affect capital investments, the use of agricultural inputs, the adoption of new technologies, and other basic agricultural outcomes?	Reduced form estimates, with the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot, farm, and household characteristics (household questionnaire); and such community characteristics as access to, and terms of, insurance opportunities (community questionnaire).	Poor	Fair	Good
How do farmers' levels of education and health status affect other agricultural outcomes?	Reduced form estimates, which will have the basic agricultural outcome as the dependent variable. The most important explanatory variables are: prices of inputs and outputs (price questionnaire and household questionnaire); plot characteristics, health and education status of household members, and other household characteristics (household questionnaire); and such community characteristics as physical infrastructure and access to extension services (community questionnaire).	Fair	Good	Very good
Policy	Comments			
Policy issues that cannot be addressed using household survey data				
Impact of exchange rate policies on prices of agricultural inputs and outputs and on the variability of these prices		Requires times series data on exchange rates and local prices.		
Impact of tariff and nontariff trade barriers on prices of agricultural inputs and outputs		Requires times series data; studies of results from other countries might also be useful.		
Impact of national and sectoral credit policies on the availability of credit from private sector providers		Would require a survey of private providers of credit, and perhaps even a series of surveys over several years. See Chapter 21 for further discussion.		
Impact of sectoral price subsidies and taxes on prices of agricultural inputs and outputs		Would require time series data on taxes, prices, and subsidies. In theory, several household surveys over many years could provide the price data.		
Impact of government policies on traditional forms of land tenure		Would require a special survey focusing on traditional forms of land tenure. A more sociological or anthropological approach might be useful. See Chapter 25 on collection of qualitative data.		
Political feasibility of land redistribution		Could require a multidisciplinary approach. See Chapter 25.		
Impact of investments in social infrastructure (health and education) on social outcomes		Dealt with in Chapters 7 (education) and 8 (health).		

Source: Author's summary.

The subsection then discusses the implementation of the survey, including issues that are important because they determine the extent to which measurement errors creep into the data as the data are collected.

EASY-TO-SURVEY VERSUS HARD-TO-SURVEY AGRICULTURAL SITUATIONS. In some countries the organization of the agriculture sector is fairly straightforward, which simplifies the design of the agricultural module. In contrast, the organization of the agriculture sector in other countries is more complex, which can greatly complicate the design of the agricultural module. Box 19.1 presents characteristics of farms that tend to make them easy or hard to survey. In general, in “hard” situations it is necessary to gather data at a

more disaggregated level (for example, by plot rather than by entire farm and by season rather than by calendar year) to minimize the chances that the data will suffer from serious measurement error.

Countries (or areas within a country) where farms tend to be easy to survey are mostly in non-highland, non-semiarid Asia, in non-highland Latin America, and in the cash crop zones of Africa. With a few exceptions, these countries are in less poor areas of the developing world. Many of these countries also have a strong National Agricultural Research System (NARS) and reliable national farm surveys.

Countries (or areas within a country) where farms tend to be hard to survey are more commonly in those parts of Africa outside cash-crop areas, in highland Asia

Box 19.1 Easy-to-Survey versus Hard-to-Survey Situations*Characteristics of an easy-to-survey situation*

- Farmers grow rice and wheat.
- Farmers specialize in a few crops or types of livestock.
- The farm economy is highly monetized and commercialized.
- Standard units (such as hectares and kilograms) are widely used.
- Each farm has only a few plots.
- The plots are spatially concentrated.
- There is a literate adult in the household.
- Agriculture is irrigated.
- Where there are many livestock, they are kept in fenced-in areas.

Characteristics of a hard-to-survey situation

- Farmers grow tubers, bananas, roots, and coarse grains.
- Farmers typically produce many different products, including both crops and livestock.
- The farm economy is only partially monetized and commercialized.
- Nonstandard (local) units of measurement are widely used.
- Each farm has many plots.
- The plots are spatially dispersed.
- There is no literate adult in the household.
- Farmers rely solely on rainfall for irrigation.
- Many livestock are kept in open pastures.

Source: Authors' summary.

and Latin America, and in parts of semiarid South Asia. Because these tend to be the poorest areas of the developing world, national farm surveys are less likely to exist in those countries. Yet agriculture is often the largest economic sector in such countries, and thus has a disproportionately large impact on economic growth, nutrition, poverty, and the environment.

SURVEY UNIT AND CHOICE OF RESPONDENT. Once survey designers have established the extent to which the country surveyed is an “easy” or “hard” case, they must choose the unit of analysis for the agriculture module. In most developing countries agricultural households work on several different plots of land, so the question regarding the unit of analysis is whether data should be collected for the farm as a whole or separately for each plot or field. A related issue is which household member should be the respondent. Should the same person

respond to questions about all plots and crops or should the individuals in charge of each plot or crop respond separately to questions about the plots or crops for which they are responsible?

A prominent feature of most hard-to-survey situations is that farmers grow crops on a large number of plots. For example, in the 1996 Nepal LSMS survey the typical farm household had five or six plots.⁶ Similarly, in the 1985–86 Peru LSMS survey, 7 to 10 plots were common, and most households had 10 to 15 plots in the 1981–85 Burkina Faso survey by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Typically such multiple plots are managed by several different plot managers, many of whom manage more than one plot.

The agriculture modules in most previous LSMS surveys gathered information using the whole farm, rather than the plot, as the unit of analysis, with the “most knowledgeable” person at the household level as the sole respondent. In countries where easy-to-survey agricultural circumstances predominate, this approach may work reasonably well for collecting data that can be used to calculate basic agricultural outcomes (such as net farm income) for the whole household. However, this approach is unlikely to work well in countries characterized by hard-to-survey agricultural circumstances, where each agricultural household has many plots on which many different crops are grown—with different inputs and practices used on different plots.

There are several reasons why collecting data at the plot level, as opposed to the “whole farm” approach, is preferable in hard-to-survey situations. First, using the plot as the survey unit reflects the natural flow of a conversation between an interviewer and a respondent. Experience with farm management surveys has shown that farmers usually refer to each plot as they describe the tasks undertaken and the crops produced; they refer to the whole farm only when discussing the purchase of inputs (Matlon 1988). Forcing respondents and interviewers to collect data at the farm level may lead to significant errors in the data.

Second, gathering data on each plot yields more observations and more variation in the data, both of which allow for more precise estimation of farm production functions and other agricultural relationships. Third, plot-level data are very useful for examining intrahousehold allocation issues (see Chapter 24 for a

full discussion). A fourth reason to collect data at the plot level is that on any given farm, plots usually differ in terms of land quality, the degree of land degradation and erosion, and other characteristics such as the degree of slope or whether the plot is situated on a hill, a valley, or a plain. It is important to control for these differences when estimating production functions, and it is more difficult to control for these differences when the data are not disaggregated by plot. A fifth and final reason to collect plot-level data is that this approach keeps all options open for future data analysis. Researchers can aggregate the plot data to the level of the whole farm, whereas they would not be able to disaggregate whole-farm observations to the level of the plot.

There are also good reasons for interviewing the manager of each plot rather than choosing only one respondent per household. First, the operator of each plot is most likely to know specific details about the size and quality of the plot, and about how much time each household member has spent working on various tasks on that particular plot. Second, spreading the burden of completing the agricultural module over several different respondents avoids placing too much of that burden on a single respondent.

The advantages of using the plot as the unit of observation must be weighed against two possible disadvantages. The first is that gathering more detailed data may lengthen the time needed to complete the interview. Yet this disadvantage may be more apparent than real. Respondents in farm surveys in developing countries often provide answers plot-by-plot even when the agricultural module is designed using a "whole farm" approach—forcing the interviewer to add up the responses on the spot to produce the "total" numbers required by the questionnaire. When this is the case, there may be little difference in the interview time, and reducing the measurement error generated by ad hoc aggregation on the part of the interviewer would probably be worth the modest amount of extra time needed to complete a plot-by-plot agricultural module. Moreover, the interview time could be reduced by collecting detailed plot-level data only for a subsample of plots while collecting a much smaller amount of information for the remaining plots, as was done in the 1995 LSMS survey in Northeast China.⁷

The second possible disadvantage can occur when some farm activities (for example, the purchase of pes-

ticides) are handled by a single household member instead of by the plot managers. If the questionnaire is carefully field-tested, it should become clear where this is occurring; in such cases the questionnaire should be designed to ask a single respondent (the household member best informed on the subject) the questions on these topics. This was the approach taken in the 1996 Nepal LSMS survey.

The implication of this discussion is that when surveys are implemented in countries with hard-to-survey agricultural sectors, they should collect data at the plot level. In fact, collecting plot-level data is also reasonable for easy-to-survey situations, since there are few disadvantages to collecting such data. All LSMS surveys that collect detailed information on outputs and on use of labor and nonlabor inputs should do so for each plot, and the manager of each plot should be the respondent for all questions concerning that plot. This is crucial if the data are to be used in production function analysis. It is less essential if only rough observations of farm income are needed, although even here survey designers may want to collect data at the plot level in order to minimize measurement error. In contrast, in most cases the acquisition of inputs can be recorded at the household level by the person best informed about those purchases.

In contrast to crops, livestock are mobile. They can be kept either in a specific location on the farm, such as in the corral or compound, or on communally owned pastureland. Households may move livestock from one place to another, perhaps several times, over the course of a year. In addition, many of the inputs pertaining to animal husbandry are not necessarily linked to the plot or pasture where the animals reside. For example, veterinary services, labor inputs, and purchased feed are not necessarily provided on the land where livestock are usually kept. Thus there is little reason to collect animal husbandry data at a plot level; instead, questions about livestock husbandry should be asked at the household level.

Nevertheless, there are cases in which the quality of livestock data would probably be higher if more than one respondent were interviewed, particularly when some household members are responsible for herds that are separate from those of the head of household. This is often the case in agropastoral areas, where livestock husbandry is an integral part of the farming system. Indeed, livestock are a sign of wealth and status, and an important form of savings. All of this

implies that the ownership of livestock can be a sensitive issue. When livestock ownership is a sensitive issue, serious consideration should be given to using more than one respondent to answer questions about the livestock and herds of the household. Still, it may be difficult to elicit accurate answers if respondents cannot be interviewed privately, since the respondents may not want other household members to know the details of their livestock holdings.

RECALL PERIOD. Most previous LSMS surveys have used a recall period of the previous 12 months in the agriculture module because this coincided with recall periods used in other modules of the survey. Farm surveys typically use a one-year recall period, but in contrast to LSMS surveys, this period cannot be a random 12-month interval. Instead, it must correspond to either the most recent “harvest year” (the 12 months from one harvest until just before the next year’s harvest) or the most recent “production year” (the 12 months from planting until right before planting begins one year later). These two ways of defining an agricultural year can incorporate one or more “cropping seasons” (also known as “agricultural seasons”), which are the times from the beginning of planting until the end of the harvest. In some areas, such as the West African semiarid tropics, there is only one agricultural season, which reflects the fact that there is only one rainy season per year. In other areas, such as the East African highlands, there are two agricultural seasons, since there are two rainy seasons per year. Of course, even in areas with only a single rainy season per year, there can be two cropping seasons if irrigation is used in the dry season or if certain crops can be grown and harvested without irrigation in the dry season.

The recall periods used for agricultural activities in previous LSMS surveys had several disadvantages. First, respondents were asked to provide the total amount of outputs and inputs on their farms in the 12 months immediately preceding the date of interview. Such an approach can lead to aggregation bias in countries where there are two or more cropping seasons per year (a problem discussed later in this section). Second, there is evidence that the use of one long recall period, such as one year, can have a detrimental effect on the quality of the household survey data (see Kelly and others 1993). Third, and perhaps most important, the 12-month period immediately preceding the interview often starts and ends in the

middle of an agricultural season, which can produce data that are not very useful. For example, suppose there is only one cropping season per year and a household is interviewed a few weeks before the harvest of that season. The output reported will be for the previous cropping season, and nearly all of the inputs reported will be for the current cropping season.

The implication of this discussion is that the recall period for recording agricultural outputs and inputs should be the cropping season, not the preceding 12 months. More specifically, the agricultural module should be administered after the end of the cropping season; it makes little sense for the interviewer to visit a farm in the middle of the season and count the use of inputs in that season because they will not be able to link these inputs to the outputs, which are not yet known. Although this is simple enough in principle, it may complicate the field organization of an LSMS-type survey (or any multitopic survey that visits households only once)—particularly by affecting the timing of the interviewer’s visit to sampled households. As explained in Chapter 3, in many LSMS surveys the interviews are spread out over 12 months, which makes it almost inevitable that households are interviewed in the middle of a cropping season. The best way to resolve this problem is to have interviewers ask about the most recent 12-month period that includes one or more completed cropping seasons. The following paragraphs explain how this would work for both countries with one cropping season per year and countries with two cropping seasons per year.

Consider semiarid West Africa, an area with just one cropping season a year. In semiarid West Africa the cropping season runs from June to October. Interviewing after the end of a cropping season can be done relatively easily. Any interview that takes place between November and May and uses a one-year recall period will cover that one season. Interviews can be done after May as long as the respondent remembers what happened the previous May. Thus in semiarid West Africa the recall period runs from May of the preceding year until April of the current year. More generally the recall period is the most recent 12-month period that contains a complete cropping season.

Things become only slightly more complicated in places where there are two cropping seasons, such as the East African highlands or the Indian semiarid tropics. Suppose that one cropping season runs from April to August and the other cropping season is from

November to January. If the interviewer were to visit the household during, say, September or October, the recall period would refer to the current year's April–August season and the previous year's November–January season, and the module would contain separate questions for each season. If the interviewer's visit occurred sometime in February or March, the interviewer could administer the module for the just-completed November–January season and for the April–August season of the previous year. If an interview were to fall in the middle of either season, the reference period used would be the 12 months that contained the two most recently completed cropping seasons. For example, if the interview were to take place in June, the recall period would run from March of the previous year to March of the current year. If the survey interviews were done continuously over a 12-month period (as has been done in many past LSMS surveys, for reasons given in Chapter 1), the data on the April–August season would be in one calendar year for some households and in another calendar year for other households; the same would be true for the November–January season. While this is probably not a serious disadvantage, analysts need to keep it in mind when using the data.

In countries with two or more cropping seasons per year, data should be collected separately for each cropping season, as it is common for there to be substantial differences in the extent and nature (for example, the crop mix or the technology) of agricultural activities in different seasons within one year, even when irrigation is used in the dry season. Even for plants with long-growing cycles that are harvested little-by-little throughout the year (such as roots, tubers, bananas, and plantains), there are differences in the intensity of harvesting depending on the season and on the point in the growth cycle of the plant. Thus respondents must be asked to provide separate answers for each cropping season.

If agricultural issues are the top priority of the survey, survey designers should seriously consider deviating from the common LSMS practice of interviewing households only once and spreading those interviews out evenly over a 12-month period. One option is to perform all interviews in a short period of time between two cropping seasons. An even better, though more expensive, option is to visit each household twice—once soon after the first season and a second time soon after the second season. In this case the

first interview would collect data only on the first season and the second interview would collect data only on the second season. Of course, the advantages of these options must be weighed against the advantages of having the interviews spread out over a long period of time. (Recall from Chapter 3 that the three advantages were controlling for seasonality patterns, reducing equipment costs, and reducing the number—and hopefully increasing the quality—of the interviewers trained.) In surveys for which agriculture is a lower priority, the advantages of deviating from the common LSMS interviewing scheme may be outweighed by the disadvantages.

In summary, 12-month recall periods must be used that include cropping seasons in their entirety as opposed to recall periods that begin or end in the middle of a cropping season. For many households this means that the 12-month recall for agricultural activities will not be the 12 months immediately preceding the interview but will exclude the previous 2 or 3 months. One disadvantage of this is that if analysts try to calculate total household income they will be faced with data on different sources of income that do not cover the exact same time period. For example, agricultural income may refer to the 12-month period beginning 15 months before, and ending 3 months before, the date of the interview. In contrast, the data on income from wage labor may refer to the 12 months immediately preceding the interview. However, this disadvantage is probably not a major problem, and it is generally preferable to forcing the agricultural module to fit the previous 12 months even if the interview takes place in the middle of a cropping season (as was done in most previous LSMS surveys). Of course, if agriculture is the main focus of the survey, the common practice of interviewing households over a 12-month period could be dropped in favor of either interviewing all households in a one- or two-month period between cropping seasons or interviewing each household twice, once after the first season and again after the second season. More experimentation in future LSMS-type surveys should provide useful experience on how best to collect agricultural data within the context of a multitopic household survey.

SAMPLE SIZE. Because of the inevitable budget constraints involved in any household survey, there is a tradeoff between using a large sample to keep sampling

errors low and using a small sample to fully implement all of the procedures designed to reduce nonsampling (measurement) errors. For a given sample size, nonsampling errors will generally be smaller in easy-to-survey situations than in hard-to-survey situations. As explained in Chapter 1, LSMS surveys usually have relatively small samples (2,000–5,000 households) due to their emphasis on reducing nonsampling errors. The size of the whole sample for a given survey depends not only on the agriculture module but also on all of the other modules in the survey. Survey designers should bear in mind that the size of the sample for the agriculture module will be smaller than that of the overall sample because many households do not have any agricultural activities. Also, when there is more than one agroclimatic zone in the country or region being surveyed, the sample for each zone will be even smaller. Consider, for example, a survey with a total sample of 3,000 households. About half of that number can be expected to engage in agricultural activities.⁸ Thus in a country with 3 distinct agroclimatic zones there will be, on average, about 500 agricultural households in each zone. These relatively small samples have direct implications for the design of the questionnaire. For example, if sharecropping (or orchard farming or some other farming practice) were common only in one of the zones and if only 10 percent of households in that zone engaged in sharecropping, it would not be worth asking a large number of detailed questions on sharecropping because they would apply to just a few households. In other words, a detailed analysis of sharecropping would not be possible due to the very small sample (about 50 households).

PANEL DATA. Causal analysis of agricultural activities can benefit from the collection of panel data. For example, panel data can be used to estimate production functions that remove certain biases caused by unobserved “fixed effects” (see Chapter 23 for a detailed discussion). They can also be used to examine the impact of certain kinds of government programs on agricultural outcomes and on the welfare of agricultural households. A third use of panel data is to study the impact of household-specific shocks such as crop disease. This issue is particularly important given the inherent risk of agricultural activities. Overall, there are several potential benefits of collecting panel data. At the same time, survey designers should be aware that many of the estimation methods that make

use of panel data often invoke questionable assumptions, as explained in Chapter 23. Thus panel data will probably prove useful, but the magnitude of the benefit is difficult to gauge at first glance.

If panel data are collected, serious consideration should be given to matching individual plots of land across the different surveys. The last section of Chapter 23 presents detailed recommendations for linking household members across a series of surveys that cover the same households. In principle, these methods for matching household members can be adapted to plots of land, but there is little experience in doing so for surveys separated by several years. Thus serious thinking and field testing need to be done to successfully link plots of land in panel surveys, using the discussion in the last section of Chapter 23 as a starting point. In some cases data analysts may also want to link individual bullocks or other large animals, or individual pieces of capital equipment. The same general methods may be used, but again there is very little experience in doing this.

UNITS OF MEASUREMENT. It is inherently difficult for analysts to use data that are not standardized in meaningful terms. When surveys are fielded in developing countries, respondents frequently provide answers using nonstandard units and terms. For example, in the LSMS surveys done in Ghana, fewer than 5 percent of the responses used standardized units (in the metric system or the English system). There were also a large number of nonresponses to questions concerning the conversion of local units into kilograms and other metric units (Jolliffe 1995).

One possible solution is available for local units that are containers, such as a hollowed-out gourd of a certain size. The best way to determine the weight of say, rice, in such a container is to fill it full of rice and then weigh the rice (scales are common pieces of equipment for collecting price data, as explained in Chapter 13, and thus the survey team should have at least one). The weight of one “gourd” of rice can be recorded in the community questionnaire or the price questionnaire. This need not be done for every type of product that may be measured using such a container. Instead, at the national level a table can be prepared that shows the weights of various products in terms of a standard unit of volume, such as a liter. This table can be used to determine the weight of one “gourd” of other products without having to

weigh each product described in terms of the local unit of the community.

An alternative way to resolve this problem is as follows. For each transaction by a household, note the quantity (in local units) and total cost of the transaction (or, for bartered goods or consumption from own production, the estimated cost). In the community or price questionnaire, ask knowledgeable people about the price per kilogram of that product; use that price and the total cost of the transaction to calculate the weight, in kilograms, of all transactions by each household.⁹ If no one in the community can give a price per kilogram, weigh out one kilogram of the product using a scale and ask community members the value of that amount. Unlike the method described in the previous paragraph, this method can also be used for units of measure that are not containers, such as “heaps” and “bunches.”

PRICES OF AGRICULTURAL PRODUCTS. In most previous LSMS surveys, price questionnaires were administered in each community from which households were sampled. In many surveys data on the prices of actual transactions have also been collected in the agricultural module of the household questionnaire. When collecting prices for agricultural products using either method, two potential problems should be addressed. First, prices are needed not only for heavily marketed crops but also for subsistence crops (including crops used solely for livestock feed) because subsistence crops constitute—very roughly—two-thirds of crop output in most rural areas in Africa and one-third to one-half of crop output in rural areas in Asia and Latin America. Second, in some countries, many communities reported too few transactions in the household questionnaires to generate reliable community price estimates. This second problem is exacerbated in situations where differences in household prices reflect differences across households in the quality of the crop.

These two problems lead to the more general issue of whether agricultural prices should be collected in a community-level price questionnaire, in the household questionnaire, or both. The safest approach is to collect both types of agricultural price data, because each type has advantages and disadvantages. Community-level price data should be collected because it is often the case that data collected at the household level include few observations—

occasionally even no observations—for some items in some communities. Another disadvantage is the frequent unit conversion problems noted above.

On the other hand, there are also problems with prices collected in a community-level price questionnaire such as the one presented in Chapter 13. First, these prices are retail (consumer) prices at the time of the interview, and to calculate household income analysts need data on producer prices at the time the crops were harvested. Consumer prices at the time of interview can be misleading because prices vary over the year. In particular, prices may drop significantly at harvest time, in which case the prices farmers receive for crops sold immediately after the harvest may be lower than consumer prices prevailing at the time of the survey. A second problem with data from the price questionnaire is that some agricultural products may not be sold in local markets throughout the year. For example, cocoa, coffee, rubber, and other export crops may not be sold in the community other than at harvest times. In addition, subsistence crops, such as fodder for animal feed, may not be sold in the community. The best way to resolve these problems is to design the price questionnaire to collect data both on current consumer prices and on the wholesale prices that prevailed during the one or two most recent harvest seasons. The information on harvest prices should not be collected by visiting local markets, but instead may be done as part of the interview of community leaders (see Chapter 13).

In some countries there may also be a third alternative: district-level price information on producer prices available from government agencies or from a public “market information service.” This is most likely in countries with easy-to-survey agricultural conditions. However, such official information is best used as a backup for the other two sources of price data rather than as a substitute for one or both of them.

ESTIMATING THE SIZE OF PLOTS. It can often be difficult to obtain an accurate measurement of the size of plots. The most obvious option is to ask plot managers to estimate the dimensions of their plot or plots, but in many countries they often find it difficult to do so, particularly when plots are irregularly shaped. Such a problem was encountered in the ICRISAT Burkina Faso survey (Matlon 1988). In that survey the interviewers had to measure the plots themselves, using a compass and a measuring tape. This clearly yielded

more accurate data than asking the plot managers for estimates; when the interviewers' measurements were compared to farmers' estimates of the size of their plots, large differences were found.¹⁰ This problem was also evident in a survey carried out in southern Haiti; researchers checked the accuracy of four informants' estimates of the size of 21 plots and found that the margin of error in the respondents' estimates ranged from 0 to 400 percent.¹¹

Resolving this problem is not easy because measuring plots is very time-consuming for interviewers, especially when the number of plots to be measured is large. The standard method to measure plots is to use a tape measure and a compass. More recently, Geographical Positioning System technology has appeared that uses satellite signals to pinpoint the location of any object on earth to within 100 feet. Yet there is little experience with using this technology to measure plot size in developing country situations, and such a method might be very inaccurate for small plots. More experience in the use of Geographical Positioning System technology for this purpose would be extremely valuable. Another option would be for the interviewer to ask all of the other questions concerning the plot and then send out a separate team, possibly lent by the country's National Agricultural Research System (NARS), to measure the plots. This two-step procedure has been adopted successfully in a variety of hard-to-survey situations.¹² This would be justified only in places where a pilot test has shown (by comparing respondents' answers with actual plot measurements) that respondents do not know the size of their plots, so that relying on respondents' estimates would generate very large measurement errors. If the pilot test shows that respondents' estimates are reasonably accurate, questions about plot size can be asked in the household questionnaire, and these direct measurement methods will not be needed. In situations in which the pilot test shows that the respondents cannot accurately estimate the size of their plots, it will be necessary to conduct an independent measurement of each plot using one of the methods discussed above. This is most likely to be the case in situations where the plot shape is irregular or changes by season and where the operator does not measure in standard area units or even in commonly used local units. Of course, independent measurements will raise the cost of the survey, though the magnitude of this added cost will vary widely from one survey to another.

MEASURING SOIL QUALITY. Information on soil quality can be extremely useful, but data on land or soil quality have not been collected in most previous LSMS surveys (Jolliffe 1995). The 1992–93 and 1997–98 Vietnam LSMS surveys and the 1995 China LSMS survey included questions about the quality of land but only in the form of a simple ranking (for example, from 1 to 5). While this kind of question can be useful, there are ways to ascertain soil quality with greater precision. One option would be to have soil scientists from the country's NARS examine the plots to obtain these data. This could be very expensive. A less precise but more practical approach would be to devise a series of local or folk classifications for soil quality and land configuration and then pretest them in local languages. This has been done effectively in India by Dvorak (1988), in Nigeria by Dvorak (1993), and in Burkina Faso by Matlon (1988) and Prudencio (1983). This approach is offered as one of the code options (local or folk soil type) in the recommended module discussed in the next section of this chapter, because it is less costly than soil testing but probably more accurate and useful than simple ranking. One disadvantage of folk classifications is that they may not be very consistent across communities; however, this may also be true for "official" land quality classification schemes such as those found in China and Vietnam.

LABOR. In the agriculture modules of almost all previous LSMS surveys, each household member has been asked to give summary information on the work done on the family farm during the previous week and in the previous 12 months. In most cases this approach has yielded inadequate data, for several reasons. First, the "past week" data are not very useful because the week used has a 50–60 percent chance of falling outside a crop production season in areas with one rainy season and roughly a 20–30 percent chance of doing so in areas with more than one rainy season. Second, the type and amount of labor needed on the farm varies greatly throughout a given cropping season, because there are peaks and troughs associated with tasks such as preparing plots (for planting), weeding, and harvesting; the same holds true for livestock production. During slow periods household members may need to devote only part of the day to farming, while the rest of their time is devoted to leisure, housework (including collecting firewood and making repairs to the house), and off-farm employment. Third,

labor input per hectare generally varies among the plots on a farm depending on the crop grown, the technology used, the soil type, and the operator's access to labor. Fourth, analysts need to know the amount of labor used per crop to estimate a production function for that crop.

A much better approach to collecting data on labor in agriculture is for the interviewer to ask questions on a task-by-task and plot-by-plot basis. There are two ways for this to be done. One is to ask plot managers how much labor time (measured in person days) was spent on different tasks (plot preparation, planting, weeding and harvesting) for each plot. The other is for each household member to be asked how much time he or she spent doing each of these tasks for different plots of land. The first approach was used in the 1995 LSMS survey in Northeast China and is used in the standard version of the agricultural module in Volume 3. The second approach was used successfully in the ICRISAT Burkina Faso survey (see Matlon 1988) and is used in the expanded version of the draft agricultural module. While one might object that this approach is more time-consuming than the approach used in past LSMS surveys, this is not necessarily the case. The disaggregated method may be quicker and easier than more aggregated methods in which the household head struggles to estimate how much time is spent on given crops for the household as a whole. The two approaches can be compared using a pilot test.

On the other hand, it may be best to enumerate certain tasks (for example, the maintenance of irrigation infrastructure or marketing) at the level of the farm rather than the plot. It is generally best to distinguish three types of labor: family labor, hired labor (either tenants or permanent or casual laborers), and exchange labor. In addition, one may want to distinguish laborers by whether they are men, women, or children.

It is better to put questions about farm labor in the agricultural module than in the employment module (see Chapter 9), for two reasons. First, it is best to ask all questions about tasks and use of inputs (such as animal traction or the application of chemicals or manure) together, as this helps the plot manager remember details of both. Second, respondents usually find it easier to remember how farm labor was deployed on individual plots rather than across the whole farm, and only the agriculture module deals with farm plots.

RAINFALL. Data on rainfall have almost never been collected in previous LSMS surveys. Since rainfall often differs substantially from year to year, among seasons within a given year, and across communities, analysts would ideally like to have data for each community for each season. In practice, very few communities have such data. Yet on a more positive note, in some countries rainfall data for each season can often be obtained from rainfall charts kept by district branches of the country's NARS or International Agricultural Research System (IARS). This could be useful because respondents at both community and household levels are unlikely to be able to recall rainfall levels with any degree of precision. If the survey has a strong focus on agriculture, a generous budget, and relatively few rural communities (less than 100), survey designers may want to consider whether it is worth the cost to hire people to measure rain in each community covered by the survey. However, this would have to be planned well ahead of time—at least 12 months before the first interviews were to begin.

Recommended Questionnaires for the Agriculture Module

This section introduces a short version, a standard version, and an expanded version of the agriculture module. The three versions are provided in Volume 3 of this book.

Each version of the agriculture module was designed to address the policy questions raised in the first section and the data needs presented in the second section. All three versions are divided into 6 sub-modules labeled Part A through Part F. Part A collects information on agricultural land. Part B asks the household about its inventory of agricultural equipment, such as tractors, threshers, and pumps. Part C gathers information on the amounts of each crop harvested, and what was done with these crops. Part D collects data on inputs used in agricultural activities, such as fertilizer and pesticides. Part E is designed to gather information about livestock, and Part F asks about the use of agricultural extension services. The short and the standard versions of the draft modules are presented in full. To avoid needless repetition, only those parts of the expanded module that differ from the versions in the standard module are presented.

The purpose of the short version is to collect data on agricultural assets owned by the household (land,

Box 19.2 Cautionary Advice

- *How much of the draft module is new and unproven?* In its basic design, the agricultural module in Volume 3 follows the approach taken in many previous LSMS surveys, in that it contains submodules covering land, capital, output and marketing, input use, livestock, and services. However, it also contains several substantial innovations. First, the recommendation that the recall period be the previous agricultural season (if there is only one season per year) or the previous two agricultural seasons (if there are two seasons per year) differs from past practice in LSMS surveys, although it is standard in farm management surveys. This is not a risky innovation and indeed should make the survey more accurate and easier to implement. A second innovation is collecting data on outputs and inputs by plot. This has been done only in a few recent LSMS surveys, such as those in China, Nepal, and Vietnam. This approach is also standard in farm management surveys, which makes it a low-risk innovation. Third, collecting data on land quality is innovative for LSMS surveys, but the methods suggested here are well-tried in farm management surveys. A fourth innovation is that the respondents are the plot managers rather than the single household member best informed about agricultural activities. Fifth, the draft module collects data on labor use by task, by season, and by plot. The fourth and fifth innovations also involve little risk because they are common in farm management surveys.
- *How well has the module worked in the past?* The agricultural module used in past LSMS surveys generated data that have been underused. This is not surprising because key variables were frequently missing or perceived by potential users as likely to be very inaccurate. Thus it is fair to say that the agricultural module has not worked well in the past.
- *Which parts of the module most need to be customized?* The land and input use parts (Parts A and D) require by far the most pretesting and customization. Part C on crop output and disposition requires the second-most customization. The sections of the draft questionnaires pertaining to capital (Part B), livestock (Part E), and use of agricultural extension services (Part F) should require relatively little customization. However, these differences in customization are all on a relative scale. The average amount of customization required for the agricultural module is quite large compared to the customization required in most other modules of LSMS surveys, because farming systems and agricultural and land policy issues differ greatly from country to country. Therefore, extensive pretests should be done, and the team doing the pretesting should include specialists in conducting agricultural field research in developing countries.

farm equipment, and large livestock) and to record summary information on crops grown and inputs purchased. Data on assets are useful to obtain an approximate measure of each household's wealth and the form that wealth takes. Data on crops grown can be used to classify agricultural households into different types, such as producers of export crops and producers of subsistence crops. Such crop data are also useful for calculating a rough measure of the incidence of any taxes or price subsidies for specific crops. Similarly, data on purchased inputs can be used to estimate the incidence of taxes or price subsidies on agricultural inputs. The short module also collects summary information on use of agricultural extension services, to see which households benefit from these services. This module is considerably shorter than the agriculture module used in previous LSMS surveys, and is intended for use in surveys for which agriculture issues are only of minor interest. This module does not collect the information required to calculate household income from agricultural activities.

The standard version collects a large amount of information on agricultural activities, and can be used to calculate household income from these activities. In addition, this module can be used to estimate production functions using the plot as the unit of observation. It can also be used to estimate cost functions and profit functions. The module is somewhat longer than those used in past LSMS surveys, but the time required to administer it may be no longer than the time required in those surveys because the interviewer and the respondent probably had to discuss the additional detail in this version just to complete those past versions. Moreover, interview time can be reduced by collecting detailed plot data for only a subset of plots; an example of this approach is the LSMS survey conducted in northeast China in 1995. This version of the agricultural module should be used when one of the main objectives of the survey is the analysis of agriculture issues. It should also be used when the decision has been made to collect total household income (see Chapter 17 for a full discussion of this choice).

The expanded version collects all the information in the standard version and adds detailed information on land transactions in the past five years. In addition, it collects more detailed information on labor inputs, both of household members and of hired laborers. This version of the agricultural module should be used

when the main objective of the survey is to study agricultural issues.

All three versions of the agriculture module presented in this book are merely starting points for developing a module to fit any particular country; the great variety of agricultural systems and issues across developing countries implies that survey teams must adapt the agricultural module to their circumstances and to the issues that they want to explore in depth. In some countries substantial changes will be needed. For example, in transition economies where the land market is privatizing, the survey team may want to collect information on land transactions during the past few years in the standard version, and perhaps even in the short version. Another example is countries where urban households have small farms or gardens such as “dachas” in Russia; the survey team may want to develop a new submodule that focuses on these types of activities. Oliver (1997) provides an LSMS-type questionnaire for the countries of the former Soviet Union, including a detailed agricultural module. Yet her design of the agricultural module is based on previous LSMS surveys and thus does not take into account of some of the suggestions of this chapter, such as the collection of data on each plot of land.

A final point regarding the different versions of the agricultural module is that they should be thought of as three points along a continuum of possible levels of detail. One could create a hybrid version that lies halfway between the short and standard versions or halfway between the standard and expanded versions. The key to success is to develop very specific objectives for the module, and to design the module with those objectives in mind.

Annotations to the Recommended Questionnaires

This section provides detailed notes on the three versions (short, standard, and expanded) of the agriculture module presented in Volume 3. The notes serve three purposes: to explain the recommended module, to point out where the survey team might introduce modifications to suit specific circumstances, and to flag potential difficulties related to survey questions, suggesting how interviewers can minimize these problems when interviewing households. In some cases modifications are suggested, including changes in response codes for questions, ways of posing questions,

who should respond to certain questions, which sections to include, and which questions to include in a given section.

Before examining these three versions in detail, one should review the general rules about questionnaire formatting in Chapter 3. These rules are particularly important for the agricultural module because many codes, including unit codes, land area codes, and crop codes, are used to fill it out. Applying these simple rules will greatly reduce errors in filling out the questionnaires and should also reduce interview time.

Two formatting rules are especially important. First, the codes should be consistent across different parts of the agricultural module (and indeed across the entire household questionnaire). For example, if one developed crop codes with rice as 1, wheat as 2, and maize as 3, these codes would need to be the same on every page of the module that asks about rice, wheat, or maize. Second, the codes needed to fill out any particular page of the questionnaire should appear somewhere on that page of the questionnaire or, if there is not enough room, on a facing page or a laminated sheet that provides all the codes.

Short Version

As explained in the third section, this version of the agricultural module is used when agriculture is only of minor interest and agricultural data are collected primarily for analyzing nonagricultural issues. The data obtained are not as accurate as those collected in standard and expanded modules because the questions are directed to a single household member (the member best informed about agricultural activities). A final difference between the short version and the two more extended versions is that the recall period of the short version is the past 12 months instead of the past two cropping seasons, since there is no intention of matching outputs with inputs to estimate a production function or any other causal relationship.

The following notes provide specific information about the design of the short version of the agricultural module.

PART A.

A.2. The main purpose of this question is to get a name or short description of the plot for reference during the interview. Only the code numbers for the plots, immediately to the left of the answers provided, are needed for data analysis; the data entry operator

need not enter the names of the plots in the electronic files. The one exception to this rule is the case in which panel data on plots are collected; in this case the name of the plot would be useful in the electronic files for matching plots when reinterviewing the same households in a future survey.

A.3. The codes for land area often vary by country; the appropriate codes should be obtained by consulting the ministry of agriculture or the local National Agricultural Research System (NARS), if there is one.

A.4. The different types of land will also vary by country; again the appropriate codes should be obtained from the ministry of agriculture or the local NARS. Further comments on this question are provided below in the notes for the same question in the standard agricultural module.

A.5–A.6. If the land has been rented out for all of the past 12 months, there is probably little reason to ask what crops are grown on it. The respondent may not even know what crops are grown on the land.

A.6. In most countries there is a large number of different crops; each crop can receive a different code number (as is done in Part C). The code numbers used do not fit in the space available in Question 6. Yet it is very convenient for the interviewer (and thus reduces errors in filling out the questionnaire) to have crop code numbers easily accessible. One way to do this is to have the codes printed on the facing page of the questionnaire. Another possibility is to have a laminated sheet with crop codes (and other codes) that the interviewer can set next to himself (or herself) during each interview. The codes used should include a code for “FALLOW,” for cases where no crop is grown on a field in a given season.

A.7. In countries where there are several different kinds of irrigation systems, and differences between them have important implications for the productivity and value of the land, one could add a question that asks for the type of irrigation on the plot.

A.8–A.9. These codes regarding how the land was acquired and the type of ownership rights must be customized to the circumstances in each country. Customization is particularly important for the transi-

tion economies of Eastern Europe and the former Soviet Union, as well as for the socialist countries of East and Southeast Asia.

A.10. In regions of certain countries land transactions may be rare, in which case respondents would have a hard time answering this question. In such cases one possible response could be “DON’T KNOW.” However, if at all possible interviewers should try to obtain an estimate—however rough—of the value of the land.

PART B. The list of items for which these questions are asked must be customized for each country.

B.3–B5. If joint ownership of these items is rare (which can be determined during the field test) these questions may be dropped. In this case the instruction in uppercase letters in Question 2 should be dropped and the instruction in Question 6 should be modified.

PART C. The answers to these questions will be approximate because they are not being asked for each plot. The list of crops must be customized for each country; again the appropriate codes should be obtained from the ministry of agriculture or the local NARS.

C.2. The main purpose of this question is to obtain a rough idea of the quantity of each crop produced by the household. This information can also be used to classify agricultural households by the kinds of crops they grow—for example, distinguishing producers of export crops, such as coffee, cocoa, or rubber, from producers of domestically consumed food crops.

C.3. The main purpose of this question is to obtain an approximate estimate of who benefits from price subsidies. Technically speaking, farmers only benefit from price subsidies if they sell their crops. The information gathered by this question is also useful because it gives a rough idea of the impact of price changes on farming households. Households that sell few of their crops will be more insulated from price changes than households that sell most of their crops.

PART D.

D. 1. Fertilizers, kinds of manure, pesticides, herbicides, and fungicides should all be referred to by their

explicit names, either brand names or generic names. This will vary significantly by country. The appropriate names should be obtained from the ministry of agriculture or the local NARS.

D.3. The codes for the source of purchased inputs must be modified for each country.

PART E. The purpose of these questions is to obtain a rough estimate of the stock of animals. Only large livestock are included. The types of livestock will vary by country; the questionnaire must be modified accordingly.

PART F. In some countries there may be different kinds of agricultural extension organizations or agents. If so, the questions in Part F should be modified to distinguish between the different types.

F.1, F.2, F.7, F.8 F.13, AND F.14. The difference between what constitutes a visit by a household member to an agent and a visit by an agent to a household is usually clear. However, in some countries the distinction may be less clear, such as when an agent comes to a meeting held by farmers near their homes. This distinction will depend on the nature of agriculture extension services in the country; survey designers should seek the advice of the ministry of agriculture and the local NARS in designing these questions.

F.3 AND F.9. As with Question 6 of Part A, the crop and animal codes should be visible to the interviewer, either on the opposing page or on a laminated code sheet.

F.15. After this question, the interviewer may want to ask what kinds of crops or animals were discussed during the visits, as is done in Questions 3 and 9 for visits to extension agents.

Standard Version

The standard version of the agriculture module provides data that can be used to calculate net farm income and to estimate both production functions and reduced form relationships. The order of the submodules is designed to follow the contours of a typical conversation with a farmer—first establishing the stock of land and equipment (Parts A and B), then asking about crops produced and marketed (Part C) and

inputs used in the production process (Part D), and finishing with similar questions for livestock (Part E) and a general discussion of access to agricultural services (Part F). Activities involving the transformation of agricultural products into processed foods or other agricultural goods are recorded in detail only in the household enterprise module (although the fact that some of the household products were used for this purpose should be recorded in Part C of the agricultural module), since such activities generally do not depend on whether the raw materials were produced by the household or purchased from some other source.

Questions regarding assets (equipment), input transactions, livestock, and agricultural services (Parts B, C2, D3, E, and F) are asked of a single household member—the person who is best informed. Detailed questions regarding plots (characteristics, products, and inputs) are asked of each plot manager. As discussed in the second section, this should reduce recall error with only a small increase in interview time.

The following notes provide specific information about the design of the standard version of the agricultural module:

PART A. This part is divided into three different sets of questions. The first, A1, collects information on plots of land owned and farmed by the household. The second, A2, collects information on plots of land rented from other households, and the third, A3, gathers data on plots rented out by the household. The appropriate questions to ask on the ownership and renting of plots of land can vary greatly over countries, so a large amount of customization is needed.

PART A1.

A1.2. This question obtains a name or brief description of the plot, for reference during the interview. Asking for the name of each plot should work well in farming systems with relatively few plots per household, such as Vietnam (with an average of 5)—but it becomes increasingly difficult in systems with more plots, such as China and Peru (which average 9) or Burkina Faso (with an average of 10–15). Another method may be needed if farmers do not have names or simple brief descriptions for their plots. One possibility is to combine information on the plot manager, the location of the plot, and the primary crop grown into a plot numbering system.¹³ For example, the

interviewer tells the plot manager, “Let’s talk about household plot 4 now, your cotton plot 100 yards from the residence.” It may help to have a blank page in the questionnaire for the interviewer to draw a rough map that can be referred to during the interview. A second issue is that in some countries farmers may exclude fallow or pasture plots, or plots with a failed harvest. In such cases interviewers must be trained to prompt each respondent (using the code list in Question 5) about plots that he or she would tend to omit. A final point is that only the code number for the plot (immediately to the left of the answers to Question 2) is needed for data analysis; the data entry operator need not enter the name of the plot in the electronic files. However, if panel data on plots are to be collected (see Chapter 23), including the name of the plot in the electronic files would be useful for matching plots when reinterviewing the same households in a future survey.

A1.3. The general approach of Part A1 is to ask the best-informed household member to list the plots owned and farmed by the household and to indicate which household member manages each plot. All further questions about the characteristics of each plot are addressed to the plot managers. Because plot management arrangements vary widely over farming systems, this approach may have to be altered to fit the country studied. In a “centralized” system (usually found on smaller farms with fewer plots and centralized operations such as irrigation), the household head manages operations on all plots. In this case question 3 can be omitted because the household head or the household member “most knowledgeable about agriculture” can answer all the questions for each plot.

A1.4. The codes for land area often vary by country; the appropriate codes should be obtained by consulting the ministry of agriculture or the local National Agricultural Research System (NARS), if there is one. It is important to pretest this area question carefully. The survey team should note two points in pretesting, adapting, and posing the question. First, in many countries farmers can only recall plot sizes in local units. The pretest will easily reveal this, and local agricultural researchers usually have the conversion coefficients from local units to hectares. Second, in situations in which plots are numerous, small, and irregularly shaped, it may be quite difficult for farmers

to approximate the plot size, even in local units. This is often the case in farming systems where mainly subsistence crops are produced and there is little reason to have accurate measures of one’s plots. In some cases households know the area of their major plots and cash crop plots, but not of minor or subsistence crop plots. If the pretest shows that this is the case, the survey team should consider adding an explicit plot measurement component to the survey. This will increase survey cost, but may be the only way to get a reasonably accurate measure of plot size in a rural economy in which the majority of rural incomes are from subsistence farming. One option for measuring plot size would be to hire a separate team, possibly lent by the NARS, to take the measurements. In most cases the cost would be relatively low. Finally, note that accurate plot size data are usually not needed for fallow, pasture, or wood lot plots.

A1.5. The different types of land will also vary by country, and again the appropriate codes should be obtained from the ministry of agriculture or the local NARS.

A1.6. In most countries there will be a large number of different crops, each of which can receive a different code number (as is done in Part C). All of the code numbers cannot fit in the space available in Question 6. Yet it is convenient for the interviewer (and thus reduces errors in filling out the questionnaire) to have crop codes easily accessible. One way to do this is to have the codes printed on the facing page of the questionnaire. Another approach is to prepare a laminated sheet with crop codes (and other codes) that the interviewer can set next to himself (or herself) during each interview. One crop code should be “FALLOW,” indicating that no crop was grown on a field in a given season. In cases in which two or more crops are cultivated on the same plot in the same season, detailed farm management surveys often attempt to determine how much of the plot is assigned to each crop. This could be done here by asking an additional question about the percentage of the plot devoted to each crop. If the two crops are intercropped (planted together), a separate question asking about this could also be added. A final point about Question 6 is that the interviewer should be instructed to ask about what crops were planted, not what crops were harvested, and the interviewer should

probe the respondent about this; otherwise farmers may omit crops that failed.

A1.7. In countries where there are several different kinds of irrigation systems, and differences between them have important implications for the productivity and value of the land, one could add a question that asks for the type of irrigation on the plot. Questions could even be asked about how the irrigation is managed.

A1.8–A1.9. These codes regarding how the land was acquired and the type of ownership rights must be customized to the circumstances in each country. These questions will be inadequate for farming systems in a socialist or “transition” economy. For two examples in East Asian transition economies, see the LSMS survey questionnaires used in northeast China in 1995 and in Vietnam in 1992–93 and 1997–98. For countries of the former Soviet Union see Oliver (1997).

A1.10. In regions of certain countries land transactions may be rare, in which case respondents would have a hard time answering this question. In such cases one possible response could be “DON’T KNOW.” However, if at all possible interviewers should try to obtain an estimate—however rough—of the value of the land. One possibility in such difficult cases is to drop the question entirely and ask about land prices in the community questionnaire.

A1.11–A1.14. These questions collect general information about the characteristics and quality of each plot. Other characteristics could be added depending on the nature of agriculture in the country and the issues of greatest interest to policymakers. An alternative to these questions on quality is directly measuring soil quality or other plot characteristics, but this is much more costly. Additional questions to consider adding are the distance to the plot from the household’s dwelling, local or “folk” soil classification codes, and, for tree crops, the fraction of the plot area with trees that are still too young to bear fruit. Usually there is information available from agricultural researchers on local farmers’ “folk” soil classification systems and how these correspond to scientific classification of soils.¹⁴ Combined with information about simple categorization of slope,

crop mix (cover), agronomic techniques (plow or not, mulch or not, terrace/bund or not), and time since last fallow, one can compute an index of soil erosion and degradation that is very useful in production functions. (See Byiringiro and Reardon 1996 for an illustration.)

PART A2. Questions 2–5 are identical to Questions 2–5 in Part A1, so the comments above apply here. Similarly, Questions 7–8 are the same as Questions 6–7 in Part A1, and Questions 9–12 are the same as 11–14 in Part A1.

A2.11. A related question, useful for some types of research, is the length of time that the household has been farming this land.

A2.13. These codes need to be adapted to each country. In addition, more detail could be added, such as which relative and how far away the landlord lives.

A2.14. These codes also need to be modified for each country.

A2.17. In some countries it may be common for livestock to be used as in-kind payments for renting. In such cases the “CROP CODE” column must include code numbers for livestock as well. Codes for livestock products may also be needed. For example, a common arrangement in the Sahel has one pastoral family obtaining user rights to a pasture plot in the dry season in return for milk provided to the landholder.

PART A3. Questions 2–3 are identical to Questions 2–3 in Part A1, so the comments above apply here. Similarly, Questions 6–7 are the same as Questions 4–5 in Part A1, and Questions 8–15 are the same as 7–14 in Part A1.

A3.4–A3.5. If the answer to Question 4 shows that the land was rented out for only one season, presumably it was farmed by the household members in the other season and thus was listed in Part A1. In this case there is no need to ask Questions 6–15; instead, one should simply note the plot code from Part A1 and the interviewer can proceed to Question 16. However, if the answer in Question 4 is that the land was rented out in both seasons, it presumably was not listed in Part A1 and the interviewer should proceed to Question 6.

A3.16. These codes need to be adapted to each country. In addition, more detail could be added, such as which relative the plot is rented from and how far away the landlord lives.

A3.17. These codes need to be modified for each country.

A3.20. See the comment above on Part A2 Question 17.

PART B.

PART B1. The types of farm equipment must be modified to fit the specific country. Some items, such as rice winnowers, may pertain to specific crops. In these cases the type of crop should appear in the name of the item.

B1.3–B1.5. Joint ownership is most likely for tractors, mills, and irrigation equipment. If joint ownership is rare for any item, these questions can be “blacked out” in the lines with these items. If joint ownership is rare for all items, which can be determined during the field test, these questions can be dropped. In this case the instruction in uppercase letters in question 2 should be dropped and the instruction in question 6 should be modified.

B1.6. It may be difficult for the respondent to state the price of each item as there may be no market for the item, the item may be home-produced, or the item may have been bought long ago and the household is not familiar with current prices. In these cases, the survey team may need to add a question to the community questionnaire regarding prices, but this should be avoided if possible because these would only be average prices. A final possibility is that an item may be obsolete and thus not sellable for any price. In this case the price should be recorded as zero.

PART B2. The list of hand tools needs to be modified to fit the circumstances in each country.

PART C. The general approach is to ask each plot manager to recall, for each cropping season, the production of crops on each plot, then to ask a single household member (the one most knowledgeable about the household’s farming activities) about the disposition of crops. The reason for recall of production by the plot

manager for each plot is that in the relatively decentralized farming systems commonly found in “hard-to-survey” situations there is no single household member who knows the details of each plot. In some “easy-to-survey” situations a single person may be able to respond. Part C1 could easily be modified to target only one respondent (by dropping the column for the name of the plot manager in Question 1), but it is still useful to collect output data by plot and by season. In contrast, there is little reason to collect disposal information by plot or by season; indeed, if the harvest from many plots is stored in a single place and then divided up for different uses it may be difficult, if not impossible, to do so. On the other hand, in some countries each plot manager may tightly control disposal of the products of his or her plot, in which case the questions on disposal must be addressed to the plot manager for each plot, which would mean moving all of the questions in Part C2 into Part C1. This could significantly increase the interview time if the same crop were grown on many different plots.

As discussed in the second section, the questions in Part C must explicitly distinguish between the different cropping seasons (as opposed to asking about “the past 12 months”).

PART C1. There is not enough room on this page to provide all the crop codes for the interviewer. The best approach is to list the codes on the facing page. This is not only more convenient for the interviewer but should also reduce error. An alternative is a plastic laminated sheet that lists crop codes and other codes as well.

C1.1. This list of plots will be used not only for Part C1, but also for Parts D1 and D2. This being the case, it may be useful to have this question as a fold-out flap in the questionnaire, similar to the list of names of household members in the household roster. The simplest way to list the plots is to list the plots in Part A1 in order, then list the plots in Part A2. In countries where households commonly own large numbers of plots, two pages may be required (which would also imply two pages for D1 and D2).

C1.2. In most countries room for four crops per plot over two seasons should be sufficient, but in some countries room for five, six, or even more may be needed. One might also ask about whether any of

these crops were intercropped with each other, but in most cases it is more convenient to ask this in Part A. Another issue is that crops with long-growing cycles, such as roots, tubers, bananas, and some fruit trees, are harvested little by little throughout the year. It may be hard for respondents to recall these harvests, and pretests will suggest the best way to resolve this problem. One approach is to ask about the typical off-take per week or month during the season; for example: “How many cassava root pieces did you dig out of your plot per week in this season?” Finally, note that nonstandard units may be common in “hard-to-survey” situations. Methods for resolving this problem are discussed in the second section of this chapter.

PART C2.

C2.1. The list of crops must be adapted to each country. In some cases the list could be 60–70 items. It is good survey practice to explicitly ask for each crop, since farmers may forget “minor” crops if they are simply asked to provide a list of the crops they cultivate.

C2.2–C2.11. Nonstandard units may be common in “hard-to-survey” situations. As discussed in detail in the second section, there are several methods for resolving this problem.

C2.4. In theory there is no need to ask for “total sales,” as that can be deduced from the unit price and number of units sold. But it may be common for a respondent to recall easily the total cash; if this is the case, a column for “total sales” can be added. Another reason for a total sales column is that in some situations crops are bartered, in which case the value of total sales can be in the form of in-kind payments. Finally, in some situations the seller does not get full payment at once, even within the recall period. The total payment in such cases may be divided into how much has been received so far and how much is still owed.

C2.5. This question establishes to whom a sale was made. The codes need to be adapted to each country. Other possible codes are a government cereal marketing agency or an export firm. Additional questions can be added for detail on output marketing—for example, whether the sale was in response to, or part of, a public campaign to increase commercialization of certain crops. Questions can also be added to find out the

reasons for sales or to find out more about the location or periodicity of the sales.

C2.6–C2.11. Crops may be disposed of in other ways, such as presenting some as gifts to relatives or neighbors or saving some for seed. If these are common ways of disposing of crops, questions along those lines should be added here. Disposal in the form of gifts may be hard to recall because it often consists of many small transfers; losses are the hardest to recall because this requires remembering what was harvested, subtracting all other uses, and looking into the storage bins or sheds to see what is left. Only in the case of theft or loss of large amounts is it easy to recall losses. Pretests will reveal how difficult these questions are in a specific situation and whether the questions need to be modified.

C2.9. This includes only crops that were processed then sold to others. This is considered a household business, and these activities are covered in detail in the household business module (see Chapter 18). Crops that were processed then consumed by household members should be included in Question 10.

C2.11. In some farming systems the harvested crop is stored in nonthreshed form, and in others it is stored in threshed form. The latter should be the standard, and if the unit is cited in nonthreshed form, that form should be noted. Coefficients that convert from threshed to nonthreshed units should be provided by the survey team in the documentation for the survey, based on consultation with the ministry of agriculture and any NARS. The question can be simplified in farming systems in which the respondents normally recall in one or the other form.

PART D.

PART D1. This section collects plot-by-plot information on the labor time of household members on different tasks and in different seasons. An alternative, more detailed way to collect such data is provided in the expanded version of the agriculture module. In contrast to the expanded module, individual household members are not identified in the standard version; rough estimates of the time spent working in agriculture can be obtained from the employment module (see Chapter 9). Putting detailed agricultural labor questions in the employment module is very dif-

difficult because it would be hard to design the employment module in a way to get plot-by-plot data. Also, since much of the labor may be that of the plot manager, it is easier for him or her to recall all the agriculture information at the same time, as opposed to splitting it between the employment and agricultural modules (which may not be administered on the same day). Finally, as discussed in the second section, it is best to collect all agricultural data in terms of the 12-month period that contains one or two complete agricultural seasons. This would also be hard to do in the employment module, which in general collects data for the past 12 months and the past 7 days.

In some situations, which can be discerned in pretests, it may be best to enumerate certain tasks, such as marketing or the maintenance of irrigation infrastructure, at the farm level. Information on such activities could be asked of the household member most informed about agriculture, and could be put in a set of household-level questions at the end of D1. This could include time spent by household members caring for livestock.

D1.1. As mentioned above, this question need not be filled out if Question 1 of Part C1 is written on a fold-out flap, as is done with the names of the household members in the household roster.

D1.3 AND D1.8. In some farming systems (such those as in West Africa), animal traction rental is done as labor hire, with the laborer bringing his own plow and team. In India, one usually rents bullocks but uses one's own labor and one's own equipment. In some countries one can rent traction equipment and supply one's own bullocks or horses, or rent a tractor and supply the diesel fuel. In general, if the arrangement is one where household members rent equipment or draft animals but supply their own labor, the labor time should be noted in these questions. If the system is one in which labor is hired and the laborer brings his own equipment or uses the equipment of the household, that labor time should be noted in Part D2. In some countries one may want to ask who supplied the equipment. (The cost of renting such equipment is recorded in Part D3.)

D1.3–D1.6 AND D1.8–D1.11. These are the main tasks in most countries, but in certain situations other tasks could be listed, or these tasks could be aggregated.

Another issue is whether each of these questions should be asked separately for men, women, and children. That would increase the length of the questionnaire and presumably the interview time, but the increase in interview time may not be very large. This can be evaluated in the pilot test of the questionnaire.

PART D1.6 AND D1.11. Harvesting labor may be quite difficult to recall for crops, such as cassava, that are harvested little-by-little over the season or between seasons. Pretests should reveal ways of modifying the question to recall such labor, but it may be necessary to come up with a rate and apply that to the output. For example, if it takes 1 hour to dig up a basket of potatoes, and 100 baskets of potatoes were harvested from the garden, about 100 hours of labor were needed. Dividing this by 8 hours per day yields about 12 days of labor for potato harvesting.

PART D2. Certain labor tasks may be done collectively (with other households) as “exchange labor.” One common variant of this is the communal work party that goes from farm to farm and performs a single task. In Part D1 there could be a separate question on such donations of labor on other people's farms. Receipt of such labor should be treated as receipt of “hired” labor and noted in D2. (A question could be added to distinguish such labor from “ordinary” hired labor.)

D2.1. As mentioned above, this question need not be filled out if Question 1 of Part C1 is written on a fold-out flap, as is done with the names of the household members in the household roster.

D2.3–D2.4. An alternative for hired labor is to ask about the labor days spent in each of the different tasks listed in question 4. This would lengthen the questionnaire and thus this option has been left to the expanded version.

D2.13 AND D2.24. The types of fertilizer must be adapted to the country of the survey. This list of codes should be developed in consultation with the ministry of agriculture and any NARS in the country.

D2.16, D2.18, D2.27, AND D2.29. The types of manure used must be adapted to the country of the survey. This list of codes should be developed in consultation

with the ministry of agriculture and any NARS in the country.

D2.20 AND D2.31. Very specific codes for the different pesticides, herbicides, and fungicides must be provided. As with other agricultural inputs, the list of codes should be developed in consultation with the ministry of agriculture and any NARS in the country.

PART D3. Prices for the different farm inputs were not obtained in Part D2. The reason for this was to avoid needless repetition, since the same input could be applied to many crops, and it is only necessary to ask for the price once. The prices are obtained more concisely in Part D3. If prices vary from season to season, one may want to make this distinction in Part D3. This could be done by dividing Question 2 into two questions, one for each season.

D3.1, LINES 1–11. Lines 1–11 in this grid should be replaced with explicit names of fertilizers, types of manure, pesticides, herbicides, and fungicides that are commonly used in the country.

D3.1, LINES 12–15. Provision is made for recording different wages paid for different tasks. It is usual for there to be such variation, and such variation should be fairly easy to recall. However, there may also be differences in wage rates depending on whether men, women, or children are hired. In this case more lines can be added that distinguish between wage rates for men, women, and children. Finally, hired labor is usually paid an hourly, piece, or daily wage, perhaps with an in-kind payment such as a meal. Rather than entering into details on the latter payments, the respondent is asked simply to make a rough guess of daily wage including in-kind payments such as meals. More detailed information on hired labor is obtained in part D2 of the expanded module. If piece rate payments are common, this could be accommodated in the standard module by adding “PER HECTARE,” “PER BASKET,” or similar codes into the unit code box.

D3.2–D3.3. One or more questions could be asked about credit arrangements at this point, such as whether credit was obtained to purchase some or all of the input, and the terms on which credit was obtained. For further discussion on collection of credit information see Chapter 21.

D3.3 AND D3.6. These codes must be adapted to the circumstances of the country.

PART E. The information on animals is gathered over the 12-month period that contains the last two cropping seasons (as opposed to the 12 months immediately preceding the day of the interview), to be consistent with the crop data in the agricultural module. Part E is designed to focus on farm households that hold livestock, rather than pastoral households that engage in transhumance or other mobile systems. A survey of the latter type of household would require much more detail on livestock activities.

E.2. The types of animals listed will vary by country. In some countries it may be useful to distinguish between mature animals and young animals. This can be done either by having separate lines for adult and young animals, or by distinguishing between the two types in selected questions.

E.3. Livestock holdings questions can be very sensitive subjects, except in farming systems in which there are few livestock. In some farming systems, livestock are an important store of wealth and self-insurance, a status symbol, and a means of financial freedom for family members (in relation to other members of the family). In Senegal, for example, it is difficult to solicit information from wives concerning the animals they own because they do not want the household head to know their wealth, which would reduce their autonomy (Kelly and others 1993). Where there is livestock taxation, households may also be reluctant to provide accurate information. In an LSMS-type survey it is best not to spend too much effort trying to ascertain livestock holdings very accurately. In most farming systems the data will probably be reasonably accurate, and greater accuracy would probably require much longer contact with the households. In farming systems in which livestock holdings are more complex (mainly in hard-to-survey situations), it would be better to interview each household member, but this can absorb large amounts of time and create tension. The person best informed at the household level can provide a rough estimate, and where he or she does not have a good idea, it is unlikely that the interviewer can use another method to get a better estimate in a single visit to the household.

E.6, E.11, E.14–E.17, AND E.20. Barter is often more common in livestock transactions than in transactions in other agricultural products; provision can be made for this by asking about in-kind payments in a separate question in systems in which such payments prevail.

E.15. More detailed questions can be added concerning animal health expenditures and services in countries in which animal disease is an important policy issue, such as in the trypano zones of Africa.

E.18–E.20. This question should exclude any animal byproducts that are used as inputs for food processing that is part of a household business. Such activities are covered in the questionnaire module on household enterprises (see Chapter 18). If such food processing activities are important, the use of animal byproducts for that purpose could be noted here by adding questions similar to 18 and 19.

E.19. The types of fresh byproducts will vary by country. The codes should be developed in consultation with the ministry of agriculture and the local NARS.

PART E. In some countries there may be different kinds of agricultural extension organizations or agents. If so, the questions in Part F should be modified to distinguish between the different types.

F.1–F.2, F.7–F.8, AND F.13–F.14. The difference between a visit by a household member to an agent and a visit by an agent to a household is usually clear. However, in some countries the distinction may be less clear, such as when an agent comes to a meeting held by farmers near their homes. Here the distinction will depend on the nature of agriculture extension services in the country; survey designers should seek the advice of the ministry of agriculture and the local NARS in designing these questions.

F.3 AND F.9. As with Question 6 of Part A1, the crop codes and the animal codes should be visible to the interviewer, either on the opposing page or on a laminated code sheet.

F.15. After this question the interviewer may want to ask what kinds of crops or animals were discussed during these visits, as is done in Questions 3 and 9 for visits to extension agents.

Expanded Version

The expanded version of the agriculture module takes the standard module as its starting point, adding Parts A4 and A5, which obtain information on land transactions during the past 5 years, and replacing Part D of the standard module with a more detailed Part D. The comments below apply only to Parts A4 and A5 and the expanded version of Part D. For details on the parts of the expanded module that come from the standard module without any modification, see the comments above.

PARTS A4 AND A5. The questions in Parts A4 and A5 are merely a point of entry for survey teams that wish to add a series of questions on the impacts of land reforms, decollectivizations, or other land market policies. The general approach is to ask the best-informed household member to describe all land transactions. However, in some farming systems plot managers have a large degree of autonomy in buying and selling their plots, so they may not need to obtain the permission of the head of household or even to inform the head. Such situations should be ascertained in the pretest; in countries where this is the case, provision must be made to administer these questions to all plot managers in the household. A final general comment is that asking questions about the past 5 years is rather arbitrary. The length of the recall period should depend on the specific conditions and policy issues in each country.

PART A4. In countries where farmers are expanding production by bringing new land under cultivation, one may want a separate section on such activities. The interviewer could ask the best-informed household member to describe land clearing activities to find out how much land the household cleared in the past five years, the use rights the household now has on that land, and the use to which the land is being put. The amount cleared may be hard to establish if the land is fragmented, partially cleared, or irregularly shaped. This is important to ascertain in a pretest. It may also be hard for households to value this land in areas where one cannot rent or buy land (because there is no land market), or if the household in question has little experience in the land market. Another issue is that the household might need permission from the village chief or other public authorities to clear land, and may consider that the equivalent of title. Finally, questions concerning land clearing and land title may

be quite sensitive because clearing may be officially banned, so the interviewer should be instructed to assure the respondent that all answers provided will be completely confidential.

A4.2. Past land transactions involving family members who now live outside the household may not be volunteered by the respondent unless the interviewer is instructed to be sensitive to this possibility and prompt for it. This comment also applies to Question 2 of Part A5.

A4.3–A4.4. Because most of the plots acquired within the past five years will still be in the household's possession, information on these plots will already be available from Part A1 or Part A3. When this is the case, it is noted in Question 3 and then the plot code from Part A1 or Part A3 is recorded in Question 4. This allows the interviewer to skip Questions 5, 6, and 7.

A4.5–A4.7. These questions are essentially the same as Questions 4, 5, and 8 in Part A1 of the standard module. See the comments above on those questions.

A4.7. It may be difficult to distinguish between long-term lease and sale or gift. Also, in some cultures there may be sensitivity or shame attached to selling land (just as anthropological research has shown that there is shame attached to selling grain within one's own village in some regions), so the interviewer should be instructed to be sensitive to the propensity of a respondent to describe a sale as a "gift." Finally, in areas with a mix of private and collective lands, allowing the reincorporation of land into the collective may be considered neither a sale nor a permanent divestiture; it might be seen as "long-term lending" land to the cooperative or collective. Questions specific to such land systems should be added. These potential problems should be explored in the pretest.

Some additional questions to consider adding are what kind of ownership rights the household has (similar to Question 9 in Part A1), whether the land was purchased on credit and, if it was, the terms of that credit. See Chapter 21 for further details on collecting credit information.

PART A5. These questions are mirror images of the questions in Part A4; thus the comments in Part A4 generally apply to the same questions in Part A5.

A5.7. In some places, selling land does not necessarily mean losing the right to produce on it. For example, in Burkina Faso, land can be transferred to another household but the original owner can still collect sheanuts from his trees on the land. Provision can be made in the module in countries where this is the case.

A5.11. In some regions of the world it may be interesting to track "urban-based buyers" as a separate category, in order to track absentee ownership.

PART D. The expanded version of Part D is intended to replace the Part D presented in the standard version of the agricultural module. It collects information on labor and nonlabor inputs in much more detail than does the standard version of Part D. The main purpose of collecting such detailed data is to estimate production functions and other causal relationships in much more detail. The data are also useful for detailed descriptive analysis of the agricultural activities of rural households.

PART D1. The expanded version of Part D1 is very different from the standard version. The main difference is that each household member is asked about work done on plots farmed by the household. The information collected is disaggregated by plot, season, and type of task. Each household member is expected to respond for himself or herself. This amount of detail will increase interview time, but such an increase should be expected since the expanded module assumes that agricultural policy issues are the top priority of the survey.

D1.1. Because the unit of observation for each line is household member, as opposed to plot of land, the fold-out list of plots in Part C1 cannot be used to replace question 1, unlike question 1 of the standard module for Part D1. Instead, the fold-out list of household members that is part of the household roster (see Chapter 6) should be used.

D1.2–D1.16 AND D1.18–D1.32. For each season, detailed data are gathered for the three plots on which the household member spent the most time. In addition, more cursory data are collected for three other plots in each season (Questions 34 and 36). In some countries there may be a need to increase the number

of plots for which detailed data are collected, and perhaps even the number of plots for which cursory data are collected. The pilot test of the questionnaire should reveal whether this is the case.

D1.2, D1.7, D1.12, D1.18, D1.23, D1.28, D1.34, AND D1.36. Plot ID codes are provided in Parts A1 and A2.

D1.3–D1.6, D1.8–D1.11, D1.13–D1.16, D1.19–D1.22, D1.24–D1.27, AND D1.29–D1.32. These four activities—preparing and sowing the field, applying inputs, weeding and pruning, and harvesting—should suffice for most crops in most countries. Some data analysts may want a more detailed list of activities; this can easily be provided but it will increase the interview time. Other activities may be needed for certain types of crops; for example, smudge pot operations may be needed for tree crops. Labor used to maintain or repair agricultural equipment is not explicitly mentioned. In most cases respondents will include this labor with the task for which the equipment is used—that is, maintenance of plowing equipment will be included in plot preparation and repair of irrigation equipment will be included in time spent irrigating the plot.

D1.6, D1.11, D1.16, D1.22, D1.27, AND D1.32. For cassava and other root crops that are harvested little-by-little over the year, respondents may have difficulty answering questions on days spent harvesting. For suggestions on how to handle this, see the note on Questions 6 and 11 of Part D1 of the standard version of the agricultural module.

D1.37–D1.39. These questions on hours per week spent on animal husbandry activities work best for households where raising animals is not the main activity. In agricultural systems that where raising livestock can be a full-time activity, much more data are needed on labor inputs.

PART D2. The main difference between the expanded and the standard versions of Part D2 is that the expanded version adds much more detail about hired labor.

D2.1. Unlike Question 1 of Part D1 of the expanded version, this question can be removed if Question 1 of Part C1 is placed on a flap that is visible when the questions in Part D2 are being asked.

D2.3–D2.10 AND D2.12–D2.19. The four main tasks listed in these sets of questions (preparing and sowing the field, applying inputs, weeding and pruning, and harvesting) could be expanded into a more detailed list of tasks, but this would increase the time required to complete the questionnaire. The level of detail of the tasks depends on the specific policy questions to be addressed and on the agriculture system prevailing in the country.

D2.3, D2.5, D2.7, D2.9, D2.12, D2.14, D2.16, AND D2.18. For some or all of these tasks, labor days could be disaggregated into adult male, adult female, and child labor days. This would lengthen the questionnaire but might be worthwhile under some circumstances. If this were done it would be useful to disaggregate payments for hired labor in the same way.

D2.4, D2.6, D2.8, D2.10, D2.13, D2.15, D2.17, AND D2.19. In countries where in-kind payments to hired farm laborers are common, survey designers could split each of these questions into two questions, one for cash payments and one for in-kind payments. However, before expanding the number of questions, the purpose of the survey and the results of the pretest should be reviewed to see whether this is worthwhile.

PART D3. The only difference between Part D3 of the expanded questionnaire and Part D3 of the standard questionnaire is that the expanded version has fewer items for questions 1–3. Because payments to hired labor are recorded in Part D2 of the expanded questionnaire, there is no need to ask about prices paid for different kinds of hired labor in Part D3.

Notes

The authors are very grateful to Bonnie Banks and Andrea Ramirez for helping to create the questionnaire. They are also thankful for comments from Harold Alderman, Christopher Barrett, Jeanine Braithwaite, Michael Carter, Carlo del Ninno, Margaret Grosh, Courtney Harold, Juan Muñoz, Scott Rozelle, Kinnon Scott, and the participants at two LSMS seminars. Finally, Reardon thanks Peter Matlon for years of training on farm surveys.

1. While it is analytically convenient to think of the household as a single entity that has one utility function, it is more realistic to assume that each household member has an individual utility function. As explained in Chapter 25, this distinction can have important policy implications. Yet the discussion in this subsection is quite general and thus applies in either case.

2. The main exception to this general statement is that in some socialist countries the government may stipulate that certain crops should be grown. For example, in some parts of China households are required to grow rice in order to meet quotas for rice production. However, this practice is becoming rare even in socialist economies. There may also be cases where the government directly rations scarce agricultural inputs, but this practice, too, is becoming rare.

3. Another use of causal analysis is to estimate parameters that researchers can use for applying optimization models. These models can be used to derive what farmers should do to maximize profits, or to optimize some other objective.

4. Whether farm size and capital holdings are really exogenous is a matter of debate. The answer often depends on the specific details of the data and of the agricultural system in the country where the data were collected.

5. The ability of the three different versions of the agricultural module to answer these questions will depend on whether the agricultural sector of the country in question is hard to survey or easy to survey. These two kinds of situations are discussed below. In general, the ratings in Table 19.1 are an average of the two situations.

6. Many regions of Nepal are hard-to-survey situations, but some (such as the Terai region) have characteristics that make them easy to survey. In such cases the household questionnaire needs to be designed to handle hard-to-survey situations.

7. Two other examples in which detailed data were not gathered for "minor" plots are the 1988–90 multiround farm survey in Senegal by the International Food Policy Research Institute and the Senegal Agricultural Research Institute (Kelly and others 1993) and the 1981–85 ICRISAT survey in Burkina Faso (Matlon 1988).

8. Since countries with hard-to-survey areas tend to be more rural, this proportion will be higher in those countries.

9. Survey designers should resist the temptation to have interviewers make these conversions in the field and then write down quantities in standard units in the questionnaire. Data analysts can do the conversions much more quickly and with far fewer errors.

10. In the Burkina Faso survey, Matlon asked the plot managers whether the plot was the same size as it had been the year before. Most said yes. For each plot said to be the same, he measured the plot and compared the data with measurements taken the year before, often finding a 100 to 200 percent difference.

11. The authors thank Kinnon Scott for this information.

12. This method has been used in Burkina Faso (see Matlon 1988), Niger (see Hopkins and Reardon 1989), Senegal (see Fall and others 1989), and Rwanda.

13. In the Burkina Faso ICRISAT survey (1981–85), the household head named the common field or fields that he or she managed at the household level, then named the individual plots managed by household members, referring to them by approximate

location ("by the paved road on the south bank of the river"), by manager ("my first wife"), and often by principal crop ("a cotton field").

14. A practical approach would be to devise a soil classification and land configuration scheme and to pretest it in local languages, asking the plot operator for the soil type and land configuration. This has been done effectively by Dvorak (1988) in India, Dvorak (1993) in Nigeria, and Matlon (1988) and Prudencio (1983) in Burkina Faso.

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20 Savings

Anjini Kochar

The savings module is an essential part of a multitopic household survey like the LSMS surveys. This module gathers data on the value of the household's stock of financial assets. Such data are necessary to accurately estimate household wealth, a variable that is required for research on almost all aspects of household behavior. And the savings module can collect information on both the types of financial assets held by households and recent transactions in such assets during the period of the survey—information that is directly relevant for analyzing household savings, particularly financial savings.

Although policymakers in most countries are interested in a wide range of issues relating to household saving, the savings modules in most multipurpose household surveys (including many LSMS surveys) typically collect information only on financial assets and liabilities. However, this need not limit the research on savings that can be done using the data, for two reasons. First, the data set generally includes information on the household's nonfinancial assets in other modules of the survey. This is appropriate as questions about, for example, the capital used in farm and nonfarm enterprises should be asked in the same part of the questionnaire that gathers information on how these assets are used. Second, while analysts need data on assets to address some policy issues, other issues can be addressed using data on income and consumption.

Given that research on savings requires data from other modules of the survey, it is important to keep such data needs in mind when designing these modules. Many of the data problems inherent in undertaking research on savings arise from difficulties in collecting data on income, consumption, and transactions in nonfinancial assets, difficulties which are discussed

in detail in other chapters of this volume. Therefore, in order to design a survey that can aid research on savings, survey designers should read this chapter in conjunction with the other relevant chapters of this volume, particularly Chapters 5, 17, and 21 on consumption, income, and credit.

The first section of this chapter lists the major policy issues associated with household savings. The second outlines the methodologies that can be used to analyze these issues and the specific data needed for such research—focusing particularly on how best to measure savings. The third section discusses the design of the savings module and the elements required in other modules to gather data for savings research, and presents two prototype savings modules: a standard version and a short version. The fourth section provides explanatory notes on the two versions of the module presented in the third section.

Policy Issues in Household Savings

Governments are interested in the rate of savings (in other words, the fraction of a household's income that

the household saves) and the types of assets held by households for several reasons. Perhaps the most important reason is the relationship between the level and form of household savings and the rate of growth of a nation's per capita output. And because savings choices also affect individual incomes, concern about the level and distribution of household income provides another motive for policy interest in saving. Moreover, in recent years policy interest in savings has been heightened by the recognition that people's welfare depends not only on their level of consumption in any given period but also on the stability of their consumption over time. Since saving provides a means to transfer income across periods and hence smooth consumption over time, policy concern about the welfare of households requires knowledge of whether households have access to the assets that allow such intertemporal income transfers, the costs of these assets, and differences in such costs across households.

The interest of policymakers in predicting the level of household savings and in influencing the level and distribution of household (and hence national) income implies that savings studies must examine not only the level and form of savings but also the determinants of savings. For example, if policymakers want to predict how anticipated changes in national demographic structure will affect national savings, they need data that enable a study of which demographic variables influence savings and how. Similarly, if policymakers want to use interest rates to bring about desired changes in the level and form of household savings, they need data that enable an analysis of the sensitivity of savings and portfolio choices to interest rates.

The rest of this section outlines the reasons policymakers are interested in the rate, form and determinants of savings. While a number of factors determine savings, policymakers often find it easiest to influence savings by intervening in the financial sector. Thus this section ends with a discussion of policy issues concerning the financial sector.

The Level and Form of Household Savings

Policy interest in the level and form of household savings exists because of the effects of savings on national income as well as their effects on both current and future household incomes and consumption.

EFFECTS OF SAVINGS ON NATIONAL OUTPUT GROWTH. Growth of output in an economy is determined by the

rate of growth of inputs and the productivity of inputs. The rate of growth of inputs reflects both the economy's savings rate and the productivity of inputs. Thus the savings rate and the productivity of capital determine the rate at which output grows. It is this relationship between output growth and savings that is the main reason policymakers are interested in household savings.

Historically, economists have emphasized the relationship between the rate of savings and income growth rather than the relationship between output growth and the productivity of savings. Lewis (1954) maintained that the "central problem in the theory of economic development is to understand the process by which a community which was previously saving ... 4 or 5 percent of its national income or less converts itself into an economy where voluntary saving is running at about 12 to 15 percent of national income or more." The central importance of savings in the growth process was also emphasized in the works of Harrod (1939) and Domar (1946), as well as in Solow's (1956) neoclassical growth model.

However, recent empirical evidence on the determinants of economic growth in a number of economies has emphasized the importance of factor productivity growth (World Bank 1991). Growth in factor productivities is believed to explain as much as 50 percent of the output growth in the United States between 1960 and 1985. While the contribution of factor productivity growth to output growth has been much smaller in Asian, African, and Latin American economies (particularly relative to the contribution of capital growth), as much as 50 percent of the difference in growth rates across economies is attributable to *differences* in productivity growth. Moreover, a slowdown in the productivity of inputs is responsible for much of the fall in growth rates experienced by most of the world's economies after 1973.

While much of this evidence relates to the productivity of all inputs, not just capital, data from a number of developing economies similarly suggest that there is more reason for concern about the productivity of capital than about the rate of savings. Official estimates show that in recent years the populations of poor countries (including many economies of Sub-Saharan Africa) have routinely managed to save at a rate equal to approximately 20 percent of their country's GDP. However, the rate of return on these savings appears to be very low—about 8 percent a

year—meaning that the high savings rate has contributed little to economic growth (World Bank 1989).

It is widely believed that the low return on assets in developing economies partly reflects the fragmented nature of capital markets and, hence, the inability of households to hold the assets that yield the highest rates of return. This explains policy interest in financial intermediation—in the spread of financial institutions and the willingness of households to entrust these institutions with their savings. Policy issues relevant to the spread of financial intermediation will be discussed in greater detail later in this section.

EFFECTS ON INDIVIDUAL INCOMES. While the aggregate savings level and the productivity of savings affect the growth rate of national output, the level and especially the forms in which households save also affect household incomes, particularly in countries where agricultural or nonfarm enterprises constitute a major source of household income. (This is the case in most developing economies; see Chapter 18 on the household enterprise module and Chapter 19 on the agriculture module.) Income from agricultural or nonfarm enterprises reflects, in part, the household's ownership of physical capital or "productive" assets such as the machinery and tools used in such enterprises. Investment in such assets represents an act of saving, thereby linking savings and portfolio choices to household income.

Because of this link between a household's income and its stocks of productive assets, developing country governments have for a long time encouraged households, particularly poor households, to invest in such assets. Indeed, projects aimed at encouraging households to invest in productive assets have been at the heart of many poverty reduction programs, such as the Integrated Rural Development Programs implemented in the 1970s and 1980s in a number of Asian economies.

THE IMPORTANCE OF SAVINGS AND PORTFOLIO CHOICES FOR SMOOTHING CONSUMPTION. Recent research has shown that the welfare of households depends not only on the level of their consumption in any given period but also on their ability to protect this consumption from income fluctuations—in other words, to "smooth" their consumption across periods within a year or over several years. Saving provides one means by which they can protect their consumption

from future income fluctuations. However, like the effect of saving on household income, the usefulness of saving for smoothing consumption depends on which assets the household has chosen to invest in. This is because assets may differ in terms of their liquidity. Thus, to assess whether households have the means to smooth their consumption over time, policymakers need to know not just the level of a household's savings but also what kinds of assets it owns.

The Determinants of Savings and of Portfolio Choices

Several theories explain the determinants of household savings and portfolio choices. Because these theories are predicated on different motives for households to save, they sometimes yield contrary predictions for how any given set of variables, including policy instruments, will affect household and national savings. This fact underscores the importance of research on the determinants of savings and portfolio choices.

DETERMINANTS OF SAVINGS. Much of the current research on savings stems from the "life-cycle model" (Modigliani and Brumberg 1954). This model assumes that people's tastes or preferences are relatively stable throughout their life cycles, while their income is stable only during their working years, falling to zero at retirement. Correspondingly, an individual's savings will peak in his or her prime earning years and fall as the savings are drawn down to finance consumption during retirement years. Since this model assumes that the young save while the old consume in excess of their income, it predicts that any changes in the incomes or numbers of young people relative to old people will affect national savings. Thus it predicts that economies in which there are more prime-age earners than elderly people will show positive aggregate savings, and that any increase in the relative size of the elderly population will reduce national savings. It also predicts that higher productivity growth—which increases the incomes of the young—will increase savings.

An alternative model of savings, the "precautionary savings model," theorizes that even though life cycle motives may exist, the primary motive for saving is not to guard against reductions in income in later life, but rather to protect consumption from annual or seasonal uncertainty in incomes (Deaton 1989). This model implies that assets must constantly be run down to protect consumption from income fluctuations.

Thus, according to this model, household savings will as often be negative as positive and will average zero over the years. If precautionary savings are important, national savings are likely to be low in economies where a significant proportion of the population is employed in occupations with fluctuating short-run incomes, such as agriculture. Growth in occupations with more stable incomes may cause precautionary motives for savings to be replaced by life cycle concerns—increasing national savings. The precautionary savings model also implies that policy interventions affecting the volatility or uncertainty of incomes and expenditures (for example, programs aimed at stabilizing prices or output or programs that provide unemployment or disability insurance) will significantly increase aggregate savings.

DETERMINANTS OF PORTFOLIO CHOICE. In order to encourage investments in specific assets, policymakers need information on what determines the choices that households make about their savings portfolios. For example, governments need to know what factors underlie the demand for financial assets before they can implement policy intended to increase deposits in financial institutions. It could be that a low demand for financial assets primarily reflects difficulties in withdrawing money from accounts in financial institutions. If so, policies that reduce such difficulties—say, by introducing passbook savings schemes—may have a far greater impact on the number and amount of deposit accounts than policies that increase interest rates offered by the accounts.

Understanding the determinants of total savings also helps policymakers understand households' portfolio choices. One implication of the precautionary savings model is that households (particularly ones that lack access to sources of credit for consumption as opposed to production) underinvest in illiquid assets—such as productive capital—because they need to maintain their stocks of currency, food grains, and other liquid assets in order to meet consumption needs (Morduch 1994). In this case lack of investment in productive assets primarily reflects a household's uncertainty about its income; thus any policy intervention that reduces this uncertainty would increase the household's willingness to invest in productive assets. This in turn requires policymakers to understand the sources of income variability. If such variability partly results from the ill health of household

members, particularly members who work, interventions that improve health and sanitary conditions may increase household investment in productive assets. Assessing the link between health inputs and savings choices requires data from the health module of the multitopic household survey (see Chapter 8).

Financial Intermediation

In this chapter, the term “financial sector” refers to “formal” financial institutions—institutions either regulated or owned by the government. Such institutions include banks, life insurance companies, and housing finance institutions, as well as any businesses, post offices, or other government agencies that accept household savings (either in the form of shares or deposits) but do not offer loans. “Informal” institutions, institutions not regulated by the government, include moneylenders as well as relatives and friends of household members who provide loans to households. Informal institutions also include group savings and credit associations, such as the *susu* men in Ghana and Gambia, the *tontines* in Senegal, and the *hui* in China. Some of these associations only maintain deposits for their members, while others also provide their members with loans.

The formal financial sector in many developing economies is small, both in absolute terms and relative to the informal sector. (Chapter 21 on credit provides statistics on the relative sizes of the formal and informal sectors in a number of countries.) One common measure of the financial depth of an economy is the percentage of the country's gross domestic product held either in currency or in bank deposits (including currency, demand, time, and savings deposits). In 1993 this percentage was less than 15 percent in some African economies, including Sierra Leone, Uganda, Guinea Bissau, and Ghana. In South Asian economies it ranged from 33 percent in Bangladesh to 44 percent in India (World Bank 1995).

There are several good reasons why the governments of developing economies are keen to develop the formal financial sector. The primary reason is to make the savings of households available to investors so as to enable households to realize the welfare gains from “trading” funds with other households over time (see Besley 1995 and Chapter 21 of this book). While the informal sector can serve this purpose, its geographic scope is relatively limited because informal sector transactions primarily occur between borrowers

and lenders who are well acquainted with each other. Economies with relatively large informal credit sectors thus tend to have fragmented capital markets, in which investors only have access to the funds of savers they are linked to through informal institutions. In practice this has meant that costs of credit and, equivalently, returns to savings, may vary tremendously across households. Indeed, equity concerns about the access of all households, particularly poor ones, to low-cost sources of credit underlie much of government interest in developing the formal financial sector, even though available evidence on formal financial institutions in a number of developing countries suggests that formal institutions do not always perform better than informal ones in this regard.

Policymakers in most developing countries are interested in knowing the level and spread of the formal financial sector across regions and among households within a given region, both in absolute terms and in relation to the informal sector. Concerns about the level of financial intermediation are closely linked to concerns about the profitability of formal financial institutions, which depends on both the volume of these institutions' business and the costs of doing business relative to the returns. Net costs are determined by such factors as the interest rate on deposits, the interest rate at which loans are made, the ability of institutions to collect on their loans, and other costs of servicing deposit accounts and loans, including administrative and transactions costs. Many of these factors are influenced by bank procedures and policies, which affect both borrowers' repayment incentives and incentives to maintain deposits. The factors affecting net costs are also influenced by the government's monetary and fiscal policies, which directly or indirectly determine inflation and interest rates, and by education and infrastructural development policies, which affect transaction costs and the costs of training bank personnel (Gurgand, Pederson, and Yaron 1994). Other critical inputs into the profitability of financial institutions include the willingness of households to maintain bank deposits and repay loans. While household surveys may not provide all the information needed to comprehensively analyze the effects of government and bank policies on financial institution profitability, they do provide the means to analyze the importance of several factors that may explain households' willingness to use formal financial institutions.

In addition to being concerned about the development and profitability of the financial sector, policymakers are interested in assessing whether formal financial institutions directly benefit households either by providing opportunities to invest in financial assets or by providing credit. Later sections of this chapter address the data requirements and research methodologies for evaluating the impact of formal financial institutions on savings. Chapter 21 discusses how the availability of formal credit can benefit households.

Data Requirements and Research Methodologies

This section discusses the data required to study the level, forms, and determinants of savings and other issues relating to financial intermediation. This section also discusses some of the methodologies commonly used in empirical savings research.

The primary requirement for any research on savings, whether it be motivated by interest in the level and forms of savings or in the determinants of savings, is some measure of savings. This section starts by discussing two alternative ways to measure savings: by subtracting consumption from household income and by observing changes in stocks of individual assets.

Since savings can be measured using income and consumption data alone, is it necessary to include a savings module in a multitopic household survey? In most cases, yes. Policymakers are interested not only in the amount of savings but also in household portfolio composition and issues related to the financial sector—both of which require data on assets. Data on financial assets are best collected in the savings module.

In this section the discussion on different ways to measure savings is followed by a discussion on types of assets for which data should be collected. Next are discussions of the data needed to inform financial sector research and of the benefits for such research of using panel data relative to using a single cross-section of data. The section concludes by considering whether it is necessary to disaggregate the household data in the savings module to the individual level.

Measuring Household Savings

Empirical studies have measured savings by subtracting consumption from household income and also by observing changes in household assets. Several studies

have presented results from using both measures (Paxson 1992; Wolpin 1982).

This subsection first discusses each method of measuring savings. Then the two methods are compared using data from the LSMS surveys in Pakistan and Ghana, to assess their relative merits and thus determine what data are needed to measure savings.

SAVINGS AS INCOME MINUS CONSUMPTION. Most empirical studies on household savings measure savings as the difference between a household's income and consumption (Deaton 1992a, 1992b). This measure is subject to all the problems that arise when measuring income and consumption, including the difficulty of obtaining accurate measures of the income of the self-employed, measures of the consumption of home-produced goods, and measures of the value of inputs that are only imperfectly marketable. Chapters 17 and 5 of this book detail the problems in obtaining accurate measures of income and consumption in household surveys. Survey designers should read these chapters carefully to understand the biases inherent in measuring savings as the difference between income and consumption and how, to some extent, these biases can be overcome by improving available measures.

When using income and consumption data to measure savings, it is also necessary to be aware of some issues that are not as important when the intent is simply to measure income or consumption. For example, when calculating income for the purpose of measuring savings it is necessary to allow for the depreciation of capital inputs and the appreciation of various stocks. In addition, the consumption measure used should include only the value of the services provided by the household's current stock of consumer durables, while the actual investment in those durables should be included in the savings measure. This necessitates dividing consumption goods into durables and nondurables. While such a division is clear-cut for goods like vehicles and heavy appliances (both durables), it is less obvious for clothing, kitchen utensils, and even jewelry. After it has been (arbitrarily) decided which goods are durables and which are nondurables, a value must be imputed to the services provided by each durable good.

A further problem arises if different reference periods are used for collection of income and consumption data, as is commonly the case. The reference period for income data may be a year or a season,

whereas the reference period for consumption data is generally a month or a week. The necessary extrapolation of annual consumption from monthly data may yield misleading estimates. This is because even if households smooth their consumption against fluctuations in income, consumption may vary from month to month as a result of, for example, price fluctuations. Savings may be overestimated for households that are interviewed during months in which their consumption was relatively low on account of such price fluctuations. Thus it is crucial to follow the recommendation of Chapter 5 that data on consumption expenditures should be collected by asking about a "usual month."

A final problem relates to the separation of labor income and asset income. Models of savings are usually used to test the relationship between consumption (or savings) and exogenous changes in income. Such tests require that labor income be separated from asset income, since the model is testing a theory about asset income. For households with a family farm or with a nonfarm household enterprise, it is generally not possible to separate labor income from asset income, since the profits realized from the business represent a return both to the family's labor and to any fixed assets used to produce this income. Thus, even when households do report payments to members engaged in family enterprises, it is not possible to ascertain whether this is a return to labor or to capital. Researchers have commonly dealt with this problem by assuming that farm profits primarily reflect a return to the family's labor. Measurement error in income and potential biases caused by endogeneity of labor choices are then addressed using instrumental variable techniques (see the statistical appendix in Chapter 26). Nevertheless, inaccuracies remain. The assumption that farm profits primarily represent a return to family labor is more likely to be true in countries such as Côte d'Ivoire, where labor is scarce relative to land (Deaton 1992b), than in land-scarce countries such as the South Asian economies.

SAVINGS FROM DATA ON ASSET TRANSACTIONS. If data are available on a household's asset transactions or on the stock of assets at the beginning and end of a reference period, savings can be measured as the net value of transactions in all assets or as the change in a household's stock of assets over the reference period. However, it is notoriously difficult to collect informa-

tion on all the various assets in which households invest their savings. Researchers tend to be skeptical about measuring savings based either on households' asset transactions or on stocks of assets at different points in time, because data on certain asset transactions may be missing or inaccurate.

Particularly difficult to collect are data on transactions in assets such as foodgrains, fodder, building materials, seeds, and other inputs. Possibly because of the difficulties involved in estimating quantities and value of such stocks, a number of highly reputable data sets, including that collected by the International Crop Research Institute of the Semi-Arid Tropics (ICRISAT) in India, contain no measures of such stocks. If survey designers do wish to collect these data, it is probably best to collect them at the point in the agriculture module when the interviewer is asking questions about the household's agricultural output and its disposal. To ensure the reliability of these data it is probably best to collect them by crop.

It is also difficult to obtain accurate information on a household's credit transactions and stock of currency.¹ The direction of the bias in credit transactions may also be hard to predict. Deaton (1992a) reported that there were many more creditor than debtor households in Côte d'Ivoire and suggested that this may be because respondents were more willing to report their assets than their liabilities. The opposite situation appears to prevail in Pakistan, where 1,667 households reported receiving loans from informal sources, primarily relatives and friends, and only 252 households reported making loans. An apparent reluctance to report loans made to others has also been noted in other South Asian economies, such as India (Kochhar 1997).

If savings are to be measured using data on asset transactions, a survey designer has to make judgment calls about how to treat certain expenditures, primarily expenditures on education and health-related items. Typically, consumption and savings research has treated such expenditures as items of current consumption. However, research on the economics of education has emphasized that such expenditures represent investments in future income. As Gersovitz (1988) argues, even if education is desired only as a consumption good, the benefits of education are spread out over a lifetime, so these expenditures should be regarded as a consumer durable. There is less agreement on how health expenses should be treated. A case can be made

that health expenses reflect consumption more than investment, particularly in poor agrarian economies where out-of-pocket expenses for preventive treatment are often insignificant. Nevertheless, health expenditures do have effects that extend beyond the current period, and this certainly merits including health expenses in measures of savings.

A final cautionary note relates to the means by which households acquire or dispose of a particular asset. The value of asset transactions should not include the (imputed) value of gifts received by the household or given by the household. If the gift of a consumer durable is recorded as the purchase of an asset, the measure of savings derived from the asset data will not equal that calculated as the difference between income and consumption. One way to ensure that the value of such gifts is not included in data on asset transactions is to ask explicit questions about whether any assets were acquired as gifts (in the savings module or in other modules recording data on asset transactions). This procedure was used in the Pakistan LSMS.

COMPARING SAVINGS MEASURES TO ASSESS THE RELIABILITY OF THE DATA. Data from the LSMS surveys in Pakistan and Ghana illustrate the difficulties inherent in each of the two ways of measuring savings. A lack of data on important assets is a problem when measuring savings using data on asset transactions. And the difference between income and consumption does not always provide a reasonable estimate of savings, often because of weaknesses in the design of the income and consumption modules.

For the purpose of this exercise, data on income and consumption are taken from the aggregate files of the Pakistan LSMS data set. In addition to the usual problems of measurement error, these data are subject to all the assumptions that were made in arriving at these aggregates; no additional cleaning of the data has been done. Data on asset transactions were obtained from several different modules of the survey, primarily the income modules² and the savings module.³ To the extent possible, the value of gifts that households received was excluded from measures of income and consumption (because, as noted above, such gifts do not represent an act of saving by the household); the Pakistan LSMS specifically asked respondents whether any reported acquisition or sale of assets was in the form of gifts.

One difficulty in estimating savings in the Pakistan data arises from insufficient data on transactions in jew-

elry. While data on jewelry purchases were recorded in the inventory of durables module, this module did not provide information on the sale of jewelry. As a result, in this exercise jewelry purchases were considered consumption expenditures rather than savings.⁴

Table 20.1 shows substantial differences in the Pakistan LSMS between the estimates of savings derived from asset data and the estimates derived from the difference between income and consumption data. Using asset transactions to measure savings yielded a lower value than the value obtained by computing savings as the difference between income and consumption. However, all of the assets held by households may not have been enumerated in the data. In order to assess this possibility and to identify which asset transactions are most likely to have been misreported, Table 20.2 provides details on the number of households reporting savings and the mean level of savings by type of asset. These data show a low level of savings derived from loan transactions—possibly reflecting difficulties collecting data on loan transactions. On average, households in the Pakistan survey sample reported net borrowings of Rs. 19,805 (Table 20.2), a number that is particularly suspect given the relatively small size of the formal sector in Pakistan. The low level of savings measured using data on transactions may also reflect the lack of data on stocks of foodgrains and fodder.

Although stocks of foodgrains are more likely to contribute significantly to savings in rural areas than in urban areas, the absolute value of the difference between income and consumption is greater, on average, in urban areas than in rural areas. This raises the

possibility that measuring savings as the difference between income and consumption is just as error-ridden as measuring savings using asset data. Survey experts generally believe that existing ways of measuring income tend to underestimate the income of the self-employed. Thus, if self-employment is more widespread in rural areas, rural incomes (and hence savings) may be underreported relative to urban incomes.

Table 20.1 also provides data across income classes, which are created by dividing households by their median level of income. It can be seen that in the Pakistan survey the difference between the measure of savings derived from asset data and the measure of savings derived as the difference between income and consumption was particularly evident among the richest households. Taking high-income rural and urban households together, there is a difference of Rs. 41,130 between income and consumption. This is probably due both to the underenumeration of assets (causing error in asset-derived savings data) and to consumption by the wealthy (causing error in measures of savings as income minus consumption).

Official statistics from the Government of Pakistan report a domestic savings rate of 11.8 percent in both 1990–91 and 1991–92 (National Bank of Pakistan 1992).⁵ While use of the transactions data reveals a negative household savings rate, measuring savings as the difference between income and consumption yields a household savings rate of 16.5 percent. Another source of data on household savings in Pakistan, the Household Income and Expenditure Survey, showed a household savings rate of 4.6 percent for the year 1987–88.

Table 20.1 Alternative Measures of Mean Savings, Pakistan LSMS Survey
(rupees)

	Savings from asset data ^a (1)	Income minus consumption (2)	Mean income (3)	Mean consumption ^b (4)
All households	-3,901	8,652	52,246	43,783
poorest 50%	-4,621	-21,266	13,915	36,724
richest 50%	-3,088	38,463	90,577	51,743
Urban households	-4,162	19,266	65,014	45,959
poorest 50%	-3,244	-15,304	20,365	37,972
richest 50%	-5,200	53,962	109,783	55,036
Rural households	-3,642	-1,913	39,534	41,615
poorest 50%	-5,099	-24,687	9,738	35,243
richest 50%	-1,998	20,778	69,463	48,791

Note: Income and consumption are from aggregate World Bank files. Households are divided into rich and poor by their median level of income.

a. Savings in this column are calculated from asset data from different modules, as detailed in Table 20.2.

b. Consumption is total consumption minus the following items: education (VEXP5240), durables (VEXP5300), jewelry (VEXP3312), other household effects (VEXP4240), kitchen equipment (VEXP4320), furniture and fittings (VEXP4330), and other durable housing expenses (VEXP4390). Jewelry purchases (PV3312) are included in consumption and excluded from savings.

Source: Author's calculations based on Pakistan LSMS survey.

Table 20.2 Household Savings by Asset Type, Pakistan LSMS Survey

Asset	File number	All households		Urban		Rural	
		Number reporting	Mean savings in rupees (standard deviation)	Number reporting	Mean savings in rupees (standard deviation)	Number reporting	Mean savings in rupees (standard deviation)
Agricultural land	f09a4	39	-9,626 (77,169)	4	16,400 (42,940)	35	-12,600 (80,027)
Agricultural equipment	f09dm	36	50,897 (69,900)	4	130,250 (93,682)	32	40,978 (61,262)
Livestock	f09f2	1,063	-322 (8,885)	200	1,683 (10,552)	863	-787 (8,390)
Nonfarm assets	f10c1	362	8,130 (63,442)	216	6,817 (42,174)	146	10,072 (85,889)
Business improvement	f10c2	75	9,436 (36,585)	51	11,717 (44,019)	24	4,587 (7,615)
Cash	f15d1	4,559	-810 (38,334)	2,212	-1,349 (54,787)	2,347	-302 (5,065)
Residential land	f15dm	4,030	998 (37,220)	1,938	2,012 (51,862)	2,092	58 (13,260)
Investment land	f15dm	565	0.0236 (0.5219)	228	0.0008 (0.6091)	337	0.039 (0.4539)
Shares	f15d3	261	1,787 (35,101)	217	598 (30,054)	44	7,651 (53,578)
Deposits	f15d4	1,159	2,856 (41,257)	703	3,620 (46,591)	456	1,676 (31,316)
Bisi/savings committee	f15d5	867	-315 (12,490)	670	-704 (12,265)	197	1,004 (13,174)
Durable goods	Aggregate files	4,799	1,047 (8,233)	2,400	1,508 (10,870)	2,399	585 (4,122)
Education	Aggregate files	4,799	2909 (12,663)	2,400	4,527 (17,425)	2,399	1,290 (3,443)
Home improvement	Aggregate files	4,799	942 (10,355)	2,400	1,415 (13,754)	2,399	469 (4,984)
Credit	f15b3 f15c2	2,542	-19,805 (132,689)	1,262	-26,711 (184,185)	1,280	-12,997 (37,927)

Source: Author's calculations based on Pakistan LSMS survey.

In contrast to the data from Pakistan, the data from the Ghana LSMS yielded higher mean savings by using data on asset transactions than by subtracting consumption from income (Table 20.3). The data on asset transactions yielded positive average savings in both years of the survey (3,510 cedis in 1987–88 and 10,168 cedis in 1988–89), whereas the income and consumption data yielded average savings far less than zero (-100,490 cedis in 1987–88 and -114,851 cedis in 1988–89).⁶

The considerable discrepancy between these two measures of savings in Ghana partly reflects the fact that the mean net asset transactions of the sample households was skewed by exceptionally high purchases of assets by a small number of households. A mere 1 percent of the survey households accounted for 44 percent of the total recorded purchases of consumer durables by all of the sample households in

1987–88. Not surprisingly, calculating household savings at the median (Table 20.3) considerably reduced the discrepancy between the two measures. However, the difference was still large. Data on asset transactions yielded a median level of savings close to zero in both years of the survey, while the income minus consumption measure yielded median savings of -89,237 cedis in 1987–88 and -100,191 cedis in 1988–89.

Both measures of savings are suspect. Measuring savings as the change in the stock of households' assets was bound to provide misleading estimates in this case because the Ghana LSMS data set included no data on transactions in financial assets by the household although it did include data on the value of the household's stock of these assets. The bias introduced by this lack of data is probably substantial, given that financial assets comprised a significant percentage of household wealth. In 1987–88, 97 percent of sample

Table 20.3 Comparison of Savings Measures in the Ghana LSMS Survey

	1987–88		1988–89	
	Mean savings in cedis (standard deviation)	Median savings in cedis	Mean savings in cedis (standard deviation)	Median savings in cedis
Household income ^a	251,576.83 (293,219.69)	170,671.4	254,711.12 (256,143.66)	180,833.3
Household consumption	352,066.84 (260,702.49)	292,269.6	369,561.87 (270,024.36)	309,802.4
Savings as change in assets ^b	3,509.69 (99,627.49)	-600.00	10,167.72 (82,846.83)	600.0
Savings as income minus consumption ^a	-100,490.01 (260,108.76)	-89,237.1	-114,850.74 (251,159.24)	-100,191.0
Savings as income minus consumption ^c	-83,822.38 (284,676.95)	-74,622.8	-92,325.03 (243,969.92)	-92,103.8

a. Coulombe, McKay, and Round 1993.

b. Calculated as the value of available data on net transactions in land and buildings, livestock, farm equipment, business assets, consumer durables, and credit transactions. Details of these transactions are in Table 20.5.

c. Calculated by the World Bank.

Source: Author's calculations based on Ghana LSMS survey.

households reported owning financial assets, the mean value of such assets being 15,540.80 cedis. Much of this wealth was probably held as cash. Only a minority of households reported holding financial assets in such forms as bank deposits, deposits in other financial institutions, or stocks and bonds.⁷ In contrast, 84 percent of households reported owning “other” forms of financial savings, a category that includes stocks of cash.

If households finance their investments in other assets primarily through cash transactions, a lack of data on such transactions means that any measure of savings based on data on transactions is likely to be overestimated. Evidence on types of assets purchased and sold by sample households supports this conclusion. The disaggregated data on asset transactions in Table 20.4 reveal that the positive savings estimates derived from the data on asset transactions reflect a net purchase of consumer durables and, to a lesser extent, of business assets. The disaggregated data on the consumer durables purchased by households reveal that the high mean level of such purchases primarily reflects the purchase of high-cost indivisible items such as cars and television sets.⁸ It is unlikely that households finance such large purchases from their current income alone.

One possibility open to households is to finance the purchase of consumer durables through loans. Data from the Ghana LSMS survey on credit transactions (Table 20.4) reveal a fairly active credit market; 39 percent of households reported borrowing and 42 percent reported loaning to others in 1987–88. However,

these transactions appear to be primarily short-term, with as much as 94 percent of outstanding debt contracted within the reference year. While this may reflect a relatively low demand for long-term credit, it also undoubtedly reflects the limited availability of credit for financing long-term capital investment and investments in consumer durables. Households also have the option of selling some of their other assets to finance purchase of consumer durables. However, this is unlikely to be a viable option for many households as the data indicate that most of these other assets consist of farm and nonfarm capital, which are relatively illiquid. Table 20.4 reveals that, with the exception of livestock, households report relatively few sales of their other assets.

It is likely that households pay a significant share of the cost of purchasing consumer durables and business assets from their accumulated stocks of cash. If so, an absence of data on cash transactions in a given data set may result in an inflated estimate of the increase in net savings when instead it should show a shift in the composition of households' asset portfolios. It is not surprising that without data on cash transactions, measures of savings based on asset transactions show positive mean savings for the Ghanaian sample.

Other sources of error in the transactions data for Ghana are a lack of information on the household's stock of foodgrains and fodder and on the loans made by the household during the reference period. The data set does, however, provide information on the amount borrowed by each household during the ref-

Table 20.4 Asset Transactions, Ghana LSMS Survey, 1987–88 and 1988–89

	1987–88		1988–89	
	Purchases	Sales	Purchases	Sales
Land and buildings^a				
Mean (cedis)	138.01	196.29	177.33	444.67
Standard deviation	(2,040.64)	(2,508.14)	(3,879.92)	(11,268.90)
Frequency	(42)	(25)	(44)	(21)
Livestock^b				
Mean (cedis)	875.57	3,387.89	1,393.78	3,867.01
Standard deviation	(7,734.67)	(15,818.36)	(9,505.17)	(14,908.44)
Frequency	(398)	(627)	(496)	(774)
Farm equipment^c				
Mean (cedis)	452.60	288.25	330.94	43.27
Standard deviation	(12,261.11)	(10,947.61)	(6,126.50)	(1,303.27)
Frequency	(32)	(3)	(31)	(3)
Business assets^d				
Mean (cedis)	4,270.42	216.97	3,420.06	464.98
Standard deviation	(62,121.81)	(4,134.84)	(35,763.10)	(16,752.39)
Frequency	(571)	(15)	(657)	(12)
Durables^e				
Mean (cedis)	9,093.38	1,651.14	13,688.04	1,501.45
Standard deviation	(85,118.29)	(34,690.47)	(73,441.02)	(25,646.65)
Frequency	(365)	(48)	(589)	(68)
Credit transactions^f				
Mean (cedis)	6,173.16	9,073.60	7,852.23	8,631.21
Standard deviation	(24,099.16)	(80,052.52)	(31,352.02)	(50,297.17)
Frequency	(900)	(843)	(1100)	(996)

a. Data on land purchases are from file 9a of the Ghana data set. Data on land sales are from files 9a and 14b.

b. Data are from file 9f.

c. Data are from file 9k.

d. Data are from file 10d.

e. Data on purchases of durables are from file 11c and represent the value of durables reported as being bought during 1987–88. Data on sales of durables are from file 14b and include income from sales of vehicles as well as from rental of other durables.

f. Loans made by the household are recorded under purchases; a household's borrowing or the debt that the household contracted during the reference year are recorded under sales.

Source: Author's calculations based on Ghana LSMS survey.

reference period as well as on each household's total outstanding loans and debt. Because 94 percent of these loans were contracted during the reference year, the stock data on total outstanding loans payable to the household were used as an approximation for the loans made by the household during the reference year. Using the stock variable would, however, overestimate households' savings.

Thus in the Ghanaian data set much of the discrepancy between the two measures of savings may be explained by the absence of data on transactions in financial assets, on foodgrains and fodder, and on loans made during the reference year. However, the extent

to which consumption exceeds income and the correspondingly large negative savings estimated at both the mean and the median also call into question the accuracy of the consumption and income data.⁹ Chapter 17 on income suggests that the problem in the income minus consumption measure may result from an underenumeration of income. Chapter 17 also suggests several ways in which the collection of data on income can be improved—in turn increasing the accuracy of savings estimates. It will probably be easier to put these improvements into effect than to attempt to collect data on households' cash holdings, stocks of foodgrains, or credit transactions.

Collecting Data on Stocks of and Transactions in Specific Assets

Even if household savings are measured as the difference between income and consumption, data on stocks of and transactions in specific assets can significantly enhance the value of the survey for research on savings. Data on stocks of different types of household assets are of interest to policymakers because they provide information on the productivity of assets and, hence, on the contribution of savings to both household and national income. Data on transactions in specific assets are useful because they provide insights into issues of specific concern to policymakers, such as the determinants of savings. For example, Rosenzweig and Wolpin (1993) used regressions of sales and purchases of bullocks on measures of income variability to explore whether households use productive assets to smooth consumption. Udry (1995) used data on transactions in livestock and stocks of grains and other goods to assess the responsiveness of household savings to income shocks.

Data on stocks of assets are also necessary to estimate household wealth. Experience has shown that the accuracy of estimates of household wealth can be improved if households are asked about the value of different types of assets rather than being asked to provide an estimate of their total wealth. Since estimates of household wealth are required for almost all aspects of socioeconomic research on households, this reinforces the importance of collecting data on assets, even if income and consumption data are available in the survey.

Much of the research on savings that has utilized data on assets has been conducted at a fairly high degree of aggregation, analyzing, for example, the determinants of transactions in livestock, liquid assets (such as financial assets, stocks of grains and other goods, and currency), or “productive assets,” which are defined as all fixed assets used in the production of either farm or nonfarm income (Udry 1995; Kochar 1998; Alderman 1996). However, as discussed in Chapters 18 and 19 on the household enterprise and the agriculture modules, collecting accurate information on any broad category of assets generally requires collecting data on narrowly defined groups of assets within the broad category. Having data at this level of detail may also facilitate savings research. For example, Rosenzweig and Binswanger (1993) used details of stocks of different types of pro-

ductive assets to estimate the profitability and riskiness of household portfolios.

Research on Financial Intermediation

Because of the great importance of financial sector development for overall economic development, policymakers are perhaps most interested in financial assets. This subsection outlines methodologies and data requirements for researching the policy issues concerning financial institutions that were identified in the first section of this chapter. The relevant policy issues include the level and distribution of financial intermediation, the effects of government and bank policies on financial intermediation, and the impact of the development of the financial sector on households.

Financial institutions have two distinct, though related, objectives: to maintain deposits and make profitable loans. Their success in achieving these objectives determines the financial sector’s profitability and hence its growth. Thus researchers need to evaluate a country’s government and bank policies in terms of how these policies affect both of the functions of financial institutions. Similarly, research on the impact of financial institutions on households should consider not only how socioeconomic outcomes are affected by access to credit but also their effect on household savings.

This chapter focuses on general issues that arise in the context of financial sector research, issues that apply as well to research on factors determining the willingness of households to hold financial assets as to the credit functions of financial institutions. However, evaluating the credit functions of financial institutions also raises a number of specific data and methodological issues including how best to collect interest rate information and what determines households’ access to bank funds. Since these issues require data from the credit module, they are addressed in Chapter 21 on credit. Therefore, this chapter’s discussion of the data requirements and methodologies for research on financial institutions should be read in conjunction with the discussion of these issues in Chapter 21.

THE DISTRIBUTION OF FINANCIAL INSTITUTIONS. Researchers examining the spread and distribution of financial institutions generally use the disaggregated data on stocks of financial assets collected in the savings module of household surveys. This is a major jus-

tification for including a savings module in household surveys. On the basis of disaggregated data on stocks of financial assets, it is possible to discover which households are most likely to have accounts in financial institutions and, hence, whether households differ by, for example, socioeconomic status in their access to such institutions (Kochar 1997).

The extent to which researchers can conduct such an analysis using data from a multitopic household survey will vary from country to country depending on the level of development of the formal financial sector. Analysis of data from the Ghana LSMS survey in Deaton (1992a) revealed that only 7 percent of loans to the sample households were made by formal sector institutions (such as private banks, government banks, and cooperatives). Only 79 of 2,397 rural households in the Pakistan LSMS—3 percent of the rural sample—reported receiving loans from formal financial institutions. This small sample limits what can be learned about the formal sector from such multitopic household surveys. Thus research on the financial sector in such economies may require “stratified” surveys that identify borrowers from financial institutions and ensure that sufficient numbers of such households are included in the sample.

GOVERNMENT AND BANK POLICIES. Household data can be used to analyze the effectiveness of any particular government or bank policy if the data meet two criteria. First, the sample needs to include a sufficient number of households that are affected by the policy in question. Second, identifying the role of any particular policy instrument—such as the interest rate or the rate of return on deposits—in achieving a stated policy objective requires this instrument to display significant variation across the sample of households.

Data from one random cross-sectional survey will generally not be enough to evaluate government and bank policies relating to the financial sector, both because of the limited size of this sector in many developing economies and because government policies in this area generally involve changes in variables, such as interest rates, that do not vary significantly across the sample. This is particularly true if the data set provides information on only a single cross-section of households, but it is also true in short panels of data that survey households over a period of two to three years. This point is also made in Chapter 23 on panel data. Not surprisingly, most studies on the effects of

interest rates on household savings have used time-series data, either for individual countries or for a number of countries pooled together (Van Wijnbergen 1982; Giovannini 1983; and Fry 1988).

This lack of variability in key variables also limits the usefulness of a single cross-section of data for analyzing the effects of various bank policies—such as specific lending procedures and organizational innovations including group lending—on various aspects of financial intermediation.¹⁰ Most of the research in this area (Yaron 1992; Gurgand, Pederson, and Yaron 1994; Hossain 1988) has been based on case studies of specific financial institutions. For example, Yaron (1992) examined four rural financial institutions in Asia¹¹ and reviewed the factors underlying their success or failure in a number of areas including financial self-sustainability and outreach.

As a corollary, cross-sectional data can be used to analyze the effectiveness of any policy instrument that varies across a sample of households. For example, such data can be used to assess whether access to formal financial institutions, as measured by a household’s distance from the nearest such institution, affects the willingness of the household to hold deposits, as well as the attractiveness of the formal financial sector as a source of loans relative to the informal sector. Such information was used by Behrman, Foster, and Rosenzweig (1997) to assess whether the availability of a bank within 5 kilometers affected the savings of rural households in Pakistan. Household survey data can also be used to analyze the extent to which interest rates affect the demand for deposits or credit in economies where there is sufficient regional variation in such rates.

THE EFFECTS OF FINANCIAL INSTITUTIONS ON HOUSEHOLDS. Financial institutions can have an impact on household fiduciary outcomes such as savings and consumption and also on other aspects of well-being such as the health and education of children. However, it is very difficult to ascertain the extent to which a household’s behavior reflects its transactions with the financial institution in question. In particular, a researcher must address two issues. First, households that do report transactions with financial institutions may differ in their socioeconomic characteristics from households that do not report these transactions; if households with higher income are also more likely to borrow from such institutions,

a positive correlation between consumption levels and loans from financial institutions may merely reflect an underlying correlation between consumption and income. Second, the developers of a given financial institution or credit program may have purposely chosen to locate in a particular location because of the socioeconomic characteristics of local residents or of the agro-economic characteristics of the region (Rosenzweig and Wolpin 1986; Pitt, Rosenzweig, and Gibbons 1993). Therefore, any observed differences in savings between households with access to financial institutions and households without such access may merely reflect the unobserved socioeconomic or agro-economic characteristics that motivated the placement of the institution in its current location.

Addressing these selection problems requires, at a minimum, data on sufficient numbers of borrowers and nonborrowers or, more generally, participants and nonparticipants in any particular program. Also, in order to deal with the endogeneity of program placement, the nonborrowers need to be drawn from samples of households both in areas with financial institutions and in areas without such institutions. For these reasons, studies that have analyzed the effects of financial institutions on households have generally been based on data sets that were specifically designed for such an analysis. For example, Pitt and Khandker (1997) analyzed the impact of a number of credit programs in Bangladesh, including the Grameen Bank, on household outcomes such as consumption, labor supply, and the health and education of children. To do so, they used a stratified random sample of households both from villages with credit programs (“program” villages) and from villages without credit programs. The households within program and nonprogram villages were further distinguished according to whether they met the eligibility criterion for participation in the credit programs. Finally, within the program villages, households that met the eligibility criterion were divided into participant and nonparticipant households, with 12 participants being randomly selected for every five nonparticipants. Using this technique ensured that there were enough data on a sufficient number of participants as well as on a “control” group against whom the outcomes for the participants could be evaluated. In contrast, the “random” survey techniques usually used in the collection of multitopic household survey data rarely provide a sufficient sample of borrowers, particularly

in economies where the formal financial sector is poorly developed.

While inferring causality may not always be possible, it is possible to use household surveys to assess the correlation between the level of development of the financial sector and various outcomes of interest to policymakers. Thus the study by Behrman, Foster, and Rosenzweig (1997) was able to show how households with relatively easy access to financial institutions had a higher level of savings than households without such access, even though this study could not explain the factors that caused that difference in savings.

Assessing the Determinants of Households' Savings and Portfolio Choices

Most theories of savings are based on standard models of intertemporal choice. In these models, households are assumed to choose their level of consumption in any given period to maximize the present discounted value of utility over the life cycle, subject to a budget constraint that equates the present value of the sum of the household's consumption in each period with the present value of its lifetime income—and also subject to any other constraints, such as credit constraints, that may affect its decisionmaking over time. Given this common framework, theories of savings differ primarily in the importance they ascribe to the various determinants of savings, such as the variability of short-term versus long-term income, variability in households' preferences, uncertainty about households' incomes and expenditures, and liquidity constraints. Thus, in order to distinguish among these various theories, researchers need—in addition to measures of savings—data on income, on the demographic variables that determine preferences and discount rates, and on measures of the uncertainty in income and of the liquidity constraints to which a household is subject. With these data, researchers can use both regression analyses and simulation techniques (simulating savings on the basis of consumption and income data and hypothesized values of other factors that determine savings, such as interest rates) to understand savings. Alternatively, they can use simple techniques, such as plots of income and consumption by age, to assess whether savings display the “hump” shape predicted by life cycle models (Mincer 1979; Danziger and others 1983; Deaton 1992c).

Empirical research on household savings therefore requires income and consumption data, as well as

measures of demographic variables and other factors that affect savings. Data on household consumption are required not only because such data allow researchers to estimate savings as the difference between income and consumption but also because many theories of savings can be tested using data on consumption. For example, the hypothesis that households use savings to protect their consumption from income shocks can be tested through regressions that reveal the relationship between changes in income and either consumption or savings. In the past, researchers have preferred to use consumption data to test theories of savings; this is primarily because error in consumption measurements is likely to be less than error in savings measurements, which include the measurement error in both consumption and income.

While LSMS surveys provide data on household consumption and all the necessary demographic variables, they do not always collect the data needed to estimate total income (see Chapter 17 on total income). Therefore, survey designers should be aware that if savings research is an important justification for the survey, total income data need to be collected. Researchers investigating the effects of liquidity constraints or income uncertainty on savings need either some measure of these variables or data allowing them to estimate these variables—in addition to data on income, consumption, and demographic variables. And researching the determinants of portfolio composition requires data on stocks of or transactions in disaggregated groups of assets.

THE VALUE OF PANEL DATA. To infer savings motives accurately, it is generally necessary to have a panel of data, primarily because models of intertemporal choice imply that a household's savings reflect its expectations of future income and consumption. To test these models, researchers need data that span a number of years. Studies of how households change their savings in response to anticipated changes in either annual or seasonal income have generally been based on tests of the relationship between either savings or consumption and the change in income across periods (Hall 1978; Deaton 1992b; Flavin 1981, 1993; Alderman 1996; Kochar 1998). Deaton (1992b) regressed the change in income between two periods on the previous year's values of income and savings in order to test the hypothesis that households save in anticipation of changes in their income. Since savings

is defined as the difference between current income and consumption and hence must be positively correlated with current income, such tests of how savings change in response to anticipated changes in income cannot be based on regressions of current savings on current income. If a household's current income is used in a savings regression, it needs to be instrumented by values of the household's income in previous years to test the responsiveness of its savings to the component of current income that was anticipated on the basis of last year's value.

It is even more desirable to use panel data when analyzing how households' savings change in response to long-term changes in their income. The most convincing studies of the importance of retirement savings, such as the Longitudinal Retirement History Surveys in the United States, have used long panels of data. The Longitudinal Retirement History Surveys followed over 11,000 people of retirement age for 10 years (Hurd 1987; Bernheim 1987).

While several studies have tested the life cycle model using a single cross-section of data (Darby 1979; Deaton and Paxson 1992), it is difficult to infer life cycle motives from one round or even from a panel of data that provides information on households over only two or three years. In order to use such data, the researcher has to assume that the preferences, prices, and constraints that influence a household's life cycle experiences and, hence, its behavior will remain identical from one cohort to another. In other words, it has to be assumed that the behavior of a currently 60-year-old man is a reliable measure of how a currently 40-year-old man will behave 20 years from now. Using only one cross-section of data can also cause sample selection problems. Good health and the probability of living a long life are generally positively correlated with wealth, so that the rich are over-represented among the (surviving) elderly. Unless the researcher controls for this bias, he or she may conclude that there is little decumulation of wealth with age, even though such decumulation may in fact occur.

Panel data are also necessary for estimating the variability in individual incomes and, hence, the importance of precautionary savings to hedge against this variability. The scarcity of research on the importance of the precautionary motive in developing economies is probably due to a lack of the long panels of data required for such estimates. In contrast, consid-

erable research on precautionary savings has been done in developed countries such as the United States—in part because long panels of data have enabled researchers to estimate the variability in individual incomes (MaCurdy 1982; Hall and Mishkin 1982).

ENHANCING THE VALUE OF CROSS-SECTIONAL DATA FOR RESEARCHING THE DETERMINANTS OF SAVINGS. While panel data can be quite valuable, collecting long panels of data is costly and thus not always feasible. For this reason it is likely that for the foreseeable future, research on savings, particularly in developing economies, will have to be based on single cross-sections or short panels of data. And in spite of the deficiencies of cross-sectional data, these data can reveal important information about households' motives for saving.

Since one of the merits of panel data is that they enable researchers to estimate anticipated changes in household income, the usefulness of cross-sectional data can be increased if they provide measures of expected household income. In a single cross-section of data, Flavin (1993) used information on what households expected their income to be in the current year to estimate savings responses to anticipated changes in income. Guiso, Jappelli, and Terlizzese (1996) used data from a single cross-sectional survey on households' subjective perceptions of income risk and on whether they had been denied credit in the past to analyze how households' choices of assets changed in response to income risk and credit constraints.

Data on whether a household has experienced unexpected changes in consumption expenditures or income can also be useful in assessing whether households use savings to protect their consumption from such shocks and which of their assets they use for this purpose. Researchers interested in this issue have occasionally designed and administered a cross-sectional survey to collect such information. Udry (1995) designed a cross-sectional survey for rural Nigerian households that provided information on whether the households experienced unexpected changes in income over the reference period of the survey; he used this information to assess the responsiveness of savings, by assets, to such shocks. The availability of disaggregated data on the types of assets held by households contributed significantly to the value of this research—highlighting the benefits of collecting such data.

Other researchers have used data on the number of days of illness reported by working household members as a measure of income shocks (Cochrane 1991). Reported days of illness, however, may not represent a shock to the individual, not only because illness is often predictable but also because there is often systematic measurement error in self-reported measures of health. For example, there is considerable evidence that the number of self-reported days of illness is correlated with household characteristics such as income and education (see Chapter 8 on the health module). Nevertheless, the availability of such data does give researchers some insights into the factors that determine households' savings and portfolio choices.

The availability of data on the earnings of individual household members and the sources of these incomes can also facilitate research on particular savings motives. Having data on the earnings of individual household members enables researchers to ascertain whether parents and their coresident adult children combine their incomes so that the consumption of each individual depends not on his or her own income but on the combined incomes of all household members (Hayashi 1995). Such evidence informs research on life cycle savings; there may be little need to save for old age if the income of the young provides for the consumption requirements of the elderly. This research methodology is feasible in economies where individual sources of income are significant. However, it is difficult to implement in economies where individual earnings are rare, and where households instead earn their incomes from family enterprises through the joint labor of their members. In such cases, estimating the individual claims on jointly produced family income in order to test the hypothesis of pooled family income is fraught with difficulties (see Chapter 17 on total income).

Having income data by source also helps researchers understand savings. Researchers can use data on pensions or insurance payments to explore whether the households receiving such income are less likely to save and, hence, whether savings are a response to the need for annuity income or insurance. These data also enable researchers to investigate policy issues without having to delve into households' motives for saving. For example, the question of whether publicly funded programs such as social security “crowd out” private savings can be approached

either by examining whether savings reflect individuals' perception of their old age and insurance needs or by examining whether the receipt of social security payments causes a reduction in private transfers. Such an analysis has been conducted by Cox and Jimenez (1992) using a cross-section of data from the Peruvian LSMS. The researchers found that elderly people's receipt of social security benefits significantly reduced the amount of transfers they received from other households.

The usefulness of cross-sectional data for assessing the impact of government policies depends on how many households report being affected by the policies in question. For example, it would not be possible to use the Pakistan LSMS to study the effect of pensions on savings because of the very small number of households in the sample who reported receiving pensions (64 out of 4,799). Nor would it be possible to use these data to analyze the relationship between transfers from

children to parents and the need (or lack of need) for life cycle savings, because the entire sample yielded only 99 instances of transfers from children to parents.

The usefulness of cross-sectional data for savings research can also be enhanced if they are supplemented by aggregate time-series data on variables affecting household income. Paxson (1992) and Wolpin (1982) have used available data on rainfall statistics over a number of years to predict changes in agricultural incomes and, hence, to separate the transitory components of income from its permanent components—without the use of panel data.

Box 20.1 classifies savings issues according to what kinds of data are needed to analyze them.

The Relevant Unit for Analysis

The previous subsection suggests that individual-level data on incomes and on interhousehold and intra-household transfers may help researchers understand

Box 20.1 Policy Issues and multitopic Household Survey Data

Issues that can be analyzed with cross-sectional household survey data

- The ratio of household savings to household income.
- The forms in which households save and how households' physical assets are divided for use among self-employment enterprises, real assets, and financial assets.
- Variation in the rate and form of savings among households with differences in socioeconomic characteristics such as wealth, demographic characteristics, occupation, and region of residence.
- The importance of financial assets in household portfolios.
- The importance of formal financial institutions relative to informal ones.
- The difference in the importance of financial assets across households of different socioeconomic status.
- How total savings and savings in particular assets change in response to income shocks and expectations of income, if a measure of income shocks or expected income is available in the data.
- Insights into households' motives for saving if data on individual incomes and income by source are available.
- The effect of the availability of financial institutions on financial savings.

Issues that can be analyzed with two or three years of panel data

- Whether savings are used to smooth short-run fluctuations in income and which assets are used for this purpose.
- The importance of precautionary savings (even without direct measures of income shocks).

Issues that can be analyzed with 10 years of panel data

- The demand for life cycle savings and how this demand affects the composition of households' savings portfolios.
- Better estimates of both precautionary savings and savings for short-run consumption smoothing (due to data on income and consumption profiles over the life cycle).
- The effects of aggregate income shocks on savings during the survey period.
- Analysis of the effects on household savings of policy variables that vary over the duration of the survey, including macroeconomic factors such as inflation, interest rate changes, and fiscal and monetary policy.
- A similar analysis of the impact of government policies on the viability of financial institutions and, hence, on the extent and spread of financial intermediation.

Issues for which household survey data are not sufficient and for which additional data or special sample designs are needed

- Studying a special policy such as group lending would require a special survey collecting data from a sufficient number of households affected by the policy and from a control group of households not affected by the policy.
- Studying group lending would additionally require collecting sufficient data on borrowers and nonborrowers, including both the nonborrowers who have access to the program in question and the ones who do not.

Issues for which household survey data are of little use

- Analyses of the profitability of financial institutions by type of institution and policy. These usually require bank-level data.

household savings. Several recent studies have argued that data on incomes and consumptions of “private” goods, or goods for which individual consumption levels can easily be identified and measured, should be collected at the level of individuals within the household rather than at the level of the household. (This is discussed in detail in Chapter 24 on intrahousehold issues.) The authors of these studies argue that the theory of the unified household, which underlies much of neoclassical economics, is invalid, and that individuals within a household are likely to have distinct and unique preferences. Empirical research generally supports this hypothesis. For example, available evidence suggests that income earned by women is spent differently from income earned by men, with more of women’s additional income spent on food and education (Thomas 1990 and 1993; Schultz 1990; Quisumbing 1994).

Such gender differences are likely to affect household saving decisions, as they imply that the propensity to save may vary among individuals within a household. If governments want to increase the savings rate they should target individuals within a household who are most likely to be responsive to savings initiatives. While a significant number of microfinance institutions, such as the Grameen Bank in Bangladesh, do target individuals within the household—notably women—this policy has usually been adopted for reasons other than its potential effect on savings. Evidence on the effects of such programs on household savings is slowly accumulating (Pitt and Khandker 1997); however, much more research is needed in this area before firm conclusions can be drawn.

Even if programs that target individuals within a household are found to increase household savings, it will be difficult to infer whether this is because individuals differ in their savings propensities. Why? One reason is that testing differences in the savings propensities of individuals is much harder than testing the validity of the neoclassical model. General tests of the validity of the neoclassical model simply require identifying the income earned by some individuals within the household—an easy task to accomplish if there are wage earners in the household. In contrast, testing differences in the savings propensities of individuals requires assigning the *totality* of household savings (or consumption) to individual members, either by fully identifying the individual income and consumption of all of the household’s members or by assigning individual ownership to all assets. Chapter 17 on income and Chapter 5 on consumption both discuss the difficulties involved in col-

lecting individual-level data on these measures, particularly in the cases of joint (or household public) goods shared among household members and income from joint family activities. Similarly, assigning individual ownership to household assets—particularly consumer durables and productive assets used in the production of income from joint activities—may be an impossible task.

Therefore, it is not necessary to attempt to assign individual ownership to all household assets. However, it is worthwhile to record the ownership of assets, such as jewelry, that can easily be assigned to any given individual in a household, and to collect data on the wealth inherited by particular individuals in the household. These data are useful inputs into tests of the validity of the neoclassical “unified” household model relative to the “individualistic” models, since they provide a set of variables that may be correlated with individual incomes. The variables can then serve as instruments to correct for problems caused by measurement error and endogeneity in incomes. Chapter 24 discusses these and other variables that can facilitate research on intrahousehold issues.

Two Versions of the Savings Module

This section introduces two prototype savings modules—one standard length version and one short version—and discusses their design. (The modules are presented in Volume 3.) The primary purpose of the savings module is to provide information on a household’s financial assets, including currency, and on its other assets such as land and buildings held for investment purposes. Details of this information are not generally available in other modules. While it is possible to provide data on stocks and flows of all household assets in the savings module, available evidence suggests that data on most assets are best collected in modules other than the savings module. Thus the standard savings module is relatively short.

In some cases, lack of time and resources may necessitate fielding an even shorter survey—one that collects just the basic information necessary to assess household welfare. This survey need not collect information on household asset transactions but must include questions on the value of stocks of assets—including financial assets—since these data are needed to obtain a measure of total household wealth. While much of the discussion in this section pertains to the standard-length savings module, Table 20.5 summa-

rizes the relative merits of the short and the standard savings modules for addressing policy issues.

Collecting Data on Household Assets in the Savings Module

A recurring theme in this section is the difficulty of collecting data on households' stocks of and transac-

tions in assets, given the general hesitancy of households to disclose details regarding their wealth. It is necessary to keep this in mind in designing the questionnaire in general and the savings module in particular. For example, as discussed in Chapter 3, it is generally desirable to place the savings module near the end of the questionnaire. This serves two purposes.

Table 20.5 Summary of Policy Issues and How Multitopic Household Surveys Can Be Used to Address Them

Issue	Usefulness of questionnaire for analysis	Other modules from which data are needed	Would need to add
Short Questionnaire			
Rate and form of savings and differences across households	Good	Income and income-related modules; ^a Consumption from core; Socioeconomic indicators from core	Nothing
Level and spread of financial institutions	Good	Socioeconomic indicators from core	Nothing
Determinants of savings	Poor	Income and income-related modules ^a — for details such as measures of income expectations and shocks	Generally requires panel data
Determinants of portfolio choice	Poor	Income and income-related modules ^a — for details such as measures of income expectations and shocks; Asset-related modules ^b	Details of financial transactions from the standard questionnaire; Generally requires panel data
Effects of government and bank policies on financial institutions	Poor	Community survey—for data on distance to banks	Details of transactions in financial assets from standard questionnaire; Generally requires special survey
Impact of financial institutions on households	Poor		Details of transactions in financial assets from standard questionnaire; Generally requires special survey
Standard Questionnaire			
Rate and form of savings and differences across households	Good	Income and income-related modules; ^a Consumption from core; Socioeconomic indicators from core	Nothing
Level and spread of financial institutions	Good	Socioeconomic indicators from core	Nothing
Determinants of savings	Poor	Income and income-related modules ^a — for details such as measures of income expectations and shocks	Generally requires panel data
Determinants of portfolio choice	Fair	Income and income-related modules ^a — for details such as measures of income expectations and shocks; Asset-related modules ^b	Generally requires panel data
Effects of government and bank policies on financial institutions	Fair	Community survey—for data on distance to banks	Generally requires special survey
Impact of financial institutions on households	Fair ^c		Generally requires special survey to ensure data on sufficient numbers of borrowers

a. Estimates of annual income additionally require information on agricultural income (farming and livestock module), labor or wage income (labor module), nonagricultural or enterprise income (nonfarm enterprise module), livestock income (farming and livestock module), and other income including pensions, remittances, rental, and interest income (other income module).

b. Studying issues relating to portfolio composition requires disaggregated data on the stocks of and transactions in all assets. As above, this information needs to be collected in the modules that gather information on the different assets held by the household. In general these modules will be the housing module (for data on residential wealth), the farming and livestock modules (for data on agricultural assets, livestock, and inventories of foodgrains and fodder), the nonfarm enterprise module (nonfarm assets and inventories), and the consumption module (for data on consumer durables).

c. Using the standard questionnaire one can assess the impact of features of financial institutions that vary across a sample.

Source: Author's summary.

First, it enables the interviewer to develop a rapport with the respondent, hence, increasing the likelihood that the respondent will be willing to answer questions about the household's financial wealth. Second, it ensures that important data will already have been collected from the other modules if, upon being asked about the household's financial wealth, the respondent should decide to terminate the interview. Similarly, within the savings module, it is best to place questions about particularly sensitive assets, such as currency, toward the end of the module.

The difficulty in collecting data on financial assets suggests that it may be desirable to allow the respondent to put the value of an asset that he or she owns within a broad range of values rather than citing a specific figure. This approach may make the respondent more likely to part with this information. Depending on the willingness of the respondent to continue with the questions, the initial value range can be successively narrowed until the value of the asset in question can be placed within a fairly narrow range (Juster and Smith 1997). However, the feasibility of this approach should be tested in a pilot survey before it is incorporated into the questionnaire—as should the appropriate range of values to offer the respondent as options for the value of the household's financial assets. Therefore, the prototype modules presented in this chapter do not include such questions.

DATA ON HOUSEHOLDS' STOCKS AND FLOWS OF FINANCIAL ASSETS. The standard savings module should gather information on the household's stock of and transactions in such financial assets as stocks, shares, bonds, other securities, and deposits in financial institutions. These data not only facilitate research on savings but are also essential inputs into the estimation of household wealth. As noted earlier in this chapter, an accurate measure of a household's total financial assets is more likely to be obtained if respondents are asked to provide disaggregated information on the value of their financial assets such as bank deposits, currency, and savings in informal savings institutions than if they are asked to give the sum value of all their financial assets.

However, households are frequently hesitant to provide the interviewer with details of their financial wealth. As a result, these data are not available in many survey data sets, including many LSMS surveys. For example, the South African LSMS survey asked no

questions of any kind about the financial assets of the sample households because the survey designers assumed white households would not want to provide accurate details of their financial assets for fear that these assets would be confiscated after the imminent change to black majority rule. The Vietnam and Ghana LSMS surveys yielded only estimates of the total current value of all of the household's financial assets, without providing any details about financial transactions the household may have engaged in within the previous 12 months. Conversely, the Peruvian LSMS survey yielded data on the household's transactions but not on the current value of its financial assets.

The difficulties LSMS surveys have encountered in trying to collect accurate data on financial assets is an indication that it may be better to measure savings as the difference between income and consumption rather than to measure it on the basis of data on asset transactions. However, the evidence so far is only suggestive, and the question needs to be studied further before any conclusive recommendation can be made. Until solid evidence on the reliability of one measure over another becomes available, it may be desirable to collect data on asset transactions in addition to data on income and consumption, so as to enable the researcher to use both measures of savings. This underscores the need to improve techniques for collecting income and consumption data, as well as to ensure that reliable data on all asset transactions are recorded.

DATA ON OTHER ASSETS IN THE SAVINGS MODULE. Policymakers also need information on other household assets, including: stock and flow of physical assets used in the production of farm or nonfarm income; real assets such as land and housing wealth other than that used in the farm or nonfarm enterprise; land or buildings held purely for investment purposes; and stores of foodgrains, fodder, building materials, and other inventories. As with financial assets, not all past LSMS surveys gathered information on both the stocks and flows of such assets. Those in which this was done differ in terms of where in the questionnaire this information was collected. In the Vietnam LSMS survey, information on the stock of real assets (buildings and houses) was collected in the savings module, while information on the sale of these assets was collected in the miscellaneous income module. In the Pakistan LSMS survey, data on the stocks of and transactions in real assets were gathered in the savings module, where—

as in the South African survey these data were collected in a separate module.

One question that survey designers must address is the module in which to locate questions on nonfinancial assets so as to maximize the accuracy of responses. The answer to this question varies from survey to survey depending on which modules are included in each questionnaire. If the survey contains a farm and a non-farm enterprise module, as do about two-thirds of LSMS surveys, data on the stocks and flows of land, buildings, and other assets used in these enterprises are best collected as part of these modules, along with questions on the operations of the enterprise in question. In the absence of these modules, however, data on the relevant assets should be included in the savings module.

Data on other real assets, such as residential land and housing, are frequently collected in both the savings module and the housing module. This was the case in the Pakistan survey, where the housing module gathered data only on residential property, and the savings module collected data on the sum of residential and investment property.¹² This difference in method led to a difference in the value of land and buildings reported in these two modules. In the housing module 3,900 households reported owning residential land, with a mean value of Rs.155,000, whereas in the savings module 3,988 households reported owning residential land or land rented out for residential purposes, with a mean value of Rs.179,000. The number of households that reported owning residential land other than land they occupied was just 88. This small number suggests that some households did not report their ownership of residential land, though there is no means of verifying this with the data at hand.

Discrepancies of this kind suggest that respondents may be averse to providing accurate information on their assets when it is clear that the intention of the interviewer is to collect data on the household's wealth. It appears that respondents give far more accurate information if the relevant questions are asked in other modules in a less sensitive context, such as when the interviewer is asking about housing characteristics. Whatever the reason for these discrepancies, it seems that there may be little advantage to collecting data on individual assets in the savings module if they can be collected in other modules of the survey.

One drawback to gathering information on asset transactions in modules other than the savings module

is that there is a greater probability that some assets will inadvertently be ignored, adding to any measurement error in estimates of household savings based on asset transactions data. One asset that is frequently missed is buildings and land held for investment purposes.¹³ While the miscellaneous module frequently yields data on rental income from such property, it gathers no information on the property's value or on transactions in such buildings and land. The savings module may be the best place to gather this data. Separating questions on investment property from questions on residential property may also reduce measurement errors in the resulting data in both categories.

DATA ON STOCKS AND TRANSACTIONS OF CONSUMER DURABLES IN THE SAVINGS MODULE. The savings modules in several existing LSMS data sets contain information on households' stocks of and transactions in consumer durables. As with the value of property owned by the household, this information is also collected elsewhere in the survey, most commonly in a separate module that collects data on expenditures for nonfood items and consumer durables and additionally provides an inventory of durable goods. Again, as in the case of the value of residential and nonresidential property, comparing the data in this module with the data in the savings module suggests that the data in the savings module are unreliable. For example, the Vietnam survey asked households about the current value of their durable assets (such as motorbikes or washing machines) in the savings module. Only 22 households reported owning such assets, with a mean value per household of 8.3 million dong. This figure can be compared to the total value of all household durables from the "inventory of durable goods" module (Section 12, Part C of the Vietnam questionnaire), in which 4,663 households reported owning consumer durables, with a mean value per household of 2.9 million dong. Indeed, disaggregated information on the ownership and value of different types of assets reveals that the numbers of households owning just washing machines and motorbikes exceed the numbers reported in the savings module. While only 15 households possessed a washing machine, as many as 512 owned a motorbike, with a mean value of 8.8 million dong. Thus the data in the savings module appear to bear little relation to ownership either of total assets or of the individual assets explicitly mentioned in this module.

Because it appears that collecting data on the value of or transactions in consumer durables in the savings module results in considerable measurement error, these data should, to the extent possible, be collected in a separate module along with details on other items of expenditure.

Modifying Other Modules to Facilitate Research on Savings

Given that collecting data on real and physical assets in modules other than the savings module generally yields more accurate data, it is important to ensure that these modules are designed to yield the data needed for doing research on savings.

At a minimum, data are needed on the stock of and transactions in all assets. Most past LSMS surveys have collected such data for households' agricultural and business assets in the farm and nonfarm modules. However, a number of surveys have not gathered this information—compromising their value for savings-related research. For example, the Vietnam LSMS survey gathered no data on the purchase of buildings and lands by households for nonfarm enterprises, while the South Africa survey did not gather information either on the current value of household livestock or on the value of livestock purchased by farm households during the year in question.

Survey designers need to think carefully about how best to gather data on consumer durables. In most previous LSMS surveys the inventory of durables module gathered data on the current value and purchases of durables. Data on sales have generally been gathered in the miscellaneous income module, as in the Vietnam, China, and Ghana surveys. In all of these instances, however, respondents were asked how much income their households received from the sale of *all* durable goods, and this degree of aggregation may have increased the measurement error in this figure. Research on savings also requires distinguishing between income from the sale of durables and income earned from their rental. (This distinction is recommended in Chapter 11 on transfers and other nonlabor income.) Similarly, as discussed in Chapter 5 on consumption, it is important to separate purchases from gifts and bequests received by the household. As noted earlier, the best way to do this may be to include an explicit question about whether an asset was received as a gift or was purchased, along with questions about transactions in such goods.

The value of the data set for savings research can also sometimes be augmented by including in other

modules a few additional questions on any variables that affect savings. For example, information on whether the household's total current income exceeded or fell short of the expected amount could be conveniently located in the income module, and would facilitate research on the responsiveness of savings to anticipated changes in income. In a similar vein, Chapter 21 on credit suggests including in the credit module questions concerning whether or not households applied for credit over the reference period and the results of this application. The response to such questions may provide information on the importance of liquidity constraints, information that can be used to assess the effect of such constraints on savings.

It is important, however, to keep the overall size of the relevant module in mind when including such questions. For relatively long modules such as the agriculture module, further increases in length may compromise the quality of the data. In such cases it may be best to limit the questions asked to ones that are essential for obtaining accurate measures of the stocks of and transactions in the relevant assets. Thus it may be desirable to omit questions relating to reasons for the sale or purchase of any particular asset, or the timing of such transactions, despite their usefulness for savings research.

The loss of data that results from collecting asset information in modules other than the savings module is counterbalanced by the fact that collecting savings-related information in these other modules yields more accurate data on the value of asset stocks and transactions.

DATA ON INVENTORIES OF FOODGRAINS, FODDER, AND OTHER MATERIAL. As noted earlier, experience has shown that it is notoriously difficult to gather data on households' stocks of foodgrains, fodder, and other materials. Yet it is widely believed that stocks of such liquid assets account for a significant share of household savings in any given period. Finding ways to study the usage of this portion of household savings is likely to yield insights into what influences household decisions about savings (Chaudhuri and Paxson 1994).

Some surveys, such as the Vietnam LSMS survey, have gathered data on stocks of foodgrains (in this case, paddy and rice) in the savings module. The fact that in the Vietnam survey a very low number of households (337) reported owning such assets raises doubts about the validity of the data. Other surveys provide no infor-

mation at all on such stocks. For example, in the data set from the Pakistan LSMS survey it is only possible to estimate the nonmarketed surplus from foodgrains production during the reference year. No data are available on any stocks carried over from previous years.

Practical experience suggests that such data can only be reliably collected at the point in the agriculture module when the interviewer is asking specific questions about the household's crop output and its disposal (see Chapter 19 on agriculture). The China LSMS survey, one of the few to follow this practice, was designed so that data on inventories (by crop) at the time of the harvest and at the time of the interview were collected in the agriculture module. To facilitate research on savings, a multitopic household survey should include, at minimum, an extensive agriculture module that gathers such crop-specific details. While many past LSMS surveys have included such an agriculture module, questions on household stocks of and transactions in foodgrains and fodder need to be incorporated in future surveys. Since the reference period for transactions in other assets is usually the previous 12 months, it would be desirable to use the same reference period to record the change in inventories and transactions in foodgrains and fodder.

SAVINGS-RELATED DATA IN THE COMMUNITY QUESTIONNAIRE. Inserting questions on the availability and costs of financial services in the community questionnaire can also enhance research on savings. Data on formal financial institutions may be best suited for this questionnaire, because the terms of both borrowing and lending from such institutions are relatively uniform across all households in the community. In economies where such terms vary across regions and hence across households, data on such variables can significantly contribute to research on households' demand for financial services.

Chapter 4 on community and price data details some of the information that can profitably be collected in the community questionnaire. This includes the kinds of financial institutions available to households (such as government banks, private banks, and cooperatives), the kinds of savings instruments generally used in the community, the distance of relevant institutions from the community center, and the average interest rates on both loans and deposits, if any.

Box 20.2 indicates which elements of the draft module presented here are new and unproven and

which have been used successfully in past LSMS surveys.

Explanatory Notes on the Standard and Short Versions of the Questionnaire

The Standard Questionnaire

For each asset the survey covers, the respondent should be the household member most knowledgeable about the asset. Who this person is will vary depending on which assets are being discussed. While the male head of household may be most knowledgeable about savings in investment properties and financial assets, a female household member may know more about savings held through informal savings committees.

Box 20.2 Cautionary Advice

- *How much of the draft module is new and unproven?* The savings module presented in this chapter is similar to those used in many recent LSMS surveys.
- *How well has the module worked in the past?* While the savings modules used in past LSMS surveys have generally produced reasonable data, households are typically wary about providing information on their wealth and financial savings. It is therefore necessary to follow the recommendations in the chapter regarding the placement of the savings module toward the end of the survey, when sufficient trust has been built between the interviewer and the respondent. Some surveys have collected data on specific items (such as consumer durables or the value of residential property) in two different modules of the survey, and the wealth estimates derived from the different modules have sometimes been significantly different from each other. Such differences appear to reflect confusion regarding whether the data collected in the savings module are stocks of assets at a particular point in time or changes in stocks of assets during the reference period. These errors can be minimized with well-trained interviewers who understand the questions they must ask and who can communicate these questions well to respondents.
- *Which parts of the module most need to be customized?* In countries where the level of financial savings is low, questions in the standard questionnaire regarding details of different types of financial assets will not be necessary; in such cases only the short questionnaire may be feasible. In other economies, the disaggregated list of savings instruments (such as bonds, government certificates, savings accounts, and informal savings associations) in the standard version of the questionnaire must be tailored to reflect the availability of each instrument.

PART A. In the questions on land and property held for investment purposes should be included in the savings module only if such information is not included elsewhere in the survey. Thus data on income from rental of agricultural land is perhaps best collected in the agriculture module. No questions on the value of owner-occupied residential property or other land and property used in farm and nonfarm enterprises are included in this section, on the assumption that such questions are in other modules.

It is important to distinguish investments in residential land from investments in agricultural land in countries where the two kinds of land are conceptually distinct in terms of how they are taxed and the markets in which they can be transacted. If data on land is collected in the agriculture module, such a distinction is necessary to ensure that the information in the savings module does not overstate land ownership by double-counting the value of such land.

Questions 9 and 10 of Part A separate out receipt of gifts since not doing so will mean that the measures of savings yielded by income and consumption data will not tally with the measures of savings yielded by data on asset transactions. Also, if gifts are received as payment for previous services provided by the household, they are more akin to credit transactions than to outright gifts.

PARTS B AND C. In these two parts the lists of financial instruments are only suggestive. The actual items that should be included will depend on the nature of financial markets in the economy and the financial instruments available to households.

Question 3 of Part B collects data on interest income in the same section where data is collected on the household's financial assets. This will reduce measurement error more than will asking respondents about the sum of all of the household's interest, dividend, and profit income in some other module such as the miscellaneous income module.

Since some of the assets in Part B may be transacted several times in any given year, households may not be able to provide accurate answers if asked about each separate addition/withdrawal of the particular asset in question. In such cases it is easier to ask the respondent to give the value of that asset a year before the survey interview, as in question 4. The change in this value during the reference year (in other words, the difference in responses to questions 4 and 2) will

represent both new investments and any changes in the value of the asset over the course of the year.

PART D. The information in Part D is important in countries where local savings groups or rotating savings associations are an important means of increasing savings. Such associations include "bisi" accounts in Pakistan, "susu" accounts in Ghana, and "tontine" accounts in Côte d'Ivoire.

The Short Questionnaire

For each asset the survey covers, the respondent should be the household member most knowledgeable about this asset. Who this person is will vary depending on which assets are being discussed. While the male head of household may be most knowledgeable about savings in investment properties and financial assets, a female household member may know more about savings held through informal savings committees.

PART A. In this part the questions on land and property held for investment purposes should be included in the savings module only if such information is not included elsewhere in the survey. Thus data on income from rental of agricultural land is perhaps best collected in the agriculture module. No questions on the value of owner-occupied residential property or other land and property used in farm and nonfarm enterprises are included in this section, on the assumption that such questions are in other modules.

It is important to distinguish investments in residential land from investments in agricultural land in countries where the two kinds of land are conceptually distinct in terms of how they are taxed and the markets where they can be transacted.

PART C. Since the primary goal of including the value of financial assets in the short questionnaire is to obtain a measure of household wealth, there is no need to collect data on transactions in financial assets. Even with such a narrow objective in mind, the broad level of disaggregation in this questionnaire is useful for minimizing measurement error.

Notes

The author is grateful for comments by Margaret Grosh, Paul Glewwe, Julie Schaffner, and other participants in the LSMS authors' workshop.

1. One example of the difficulties in obtaining data on credit transactions is the host of problems that can arise in trying to obtain accurate details about the interest rates charged on informal loans. (See Chapter 21 on credit.)

2. The relevant files from which the data are drawn are listed in Table 20.1.

3. Expenditures on education and consumer durables were included in savings and excluded from consumption aggregates. Consumer durables included household effects, kitchen equipment, furniture and fittings, and other durable housing expenses.

4. No correction was made for the value of any jewelry received as gifts, because there were no data on this.

5. Data on household savings are not available.

6. The estimates of aggregate income and consumption used in this exercise were generated by Coulombe, McKay, and Round (1993) and used by McKay in Chapter 5 of this book. Since expenditures on health and education are included in the estimates of aggregate consumption, these expenses are excluded from the calculations of savings based on asset transactions. An alternative estimate of consumption aggregates calculated by the World Bank yielded approximately the same results. Problems encountered in estimating income and consumption are detailed in Chapters 5 and 17 along with suggestions for improving the collection of income data.

7. Of these financial assets, the most common was bank deposits, which were held by 36 percent of the sample households. Only a very small number of households reported owning financial assets in other institutions.

8. The purchase of cars, which was reported by just 1 percent of the sample population, accounted for 44 percent of the total expenditures on consumer durables by surveyed households in 1987–88.

9. The consumption aggregates used to calculate savings as the difference between income and consumption include a number of items that may more appropriately be treated as investments. Excluding education and health expenditures from the consumption aggregates calculated by the World Bank increases savings from –83,822.38 cedis to –68,732.57 cedis. Further excluding expenditures on home maintenance, kitchen equipment, and furniture increases savings to –61,760.77 cedis. However, since the savings estimate is still highly negative, questions remain about the reliability of the income and consumption data.

10. If the data set includes sufficient information on both borrower and nonborrower households, cross-sectional data can be effectively used to analyze such issues as the factors that determine households' access to bank credit and the effects of such access on various aspects of household behavior. See Chapter 22 on credit.

11. The Badan Kredit Kecamatan (BKK) and the Bank Rakyat Indonesia Unit Desa (BUD) in Indonesia, the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand, and the Grameen Bank in Bangladesh.

12. The Pakistan LSMS does provide separate details of the agricultural land owned by nonfarm households.

13. In a few previous LSMS surveys, such as the South African survey, information on nonfarming land and other immovable property has been collected in a separate module. This separate module provides information on only rental income from the land and current value of the land (or property)—and not on purchases or sales throughout the year.

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21

Credit

Kinnon Scott

The importance of credit for household welfare and the imperfect nature of credit markets have inspired governments to intervene in credit markets in a variety of ways. In particular, governments have adopted policies designed to increase access to and use of credit among specific groups and to promote the provision of credit for specific purposes.

In principle, the returns to credit use are high. Credit is a correlate of economic growth and, at the household level, credit can be a tool to improve and protect welfare. However, the fact that financial markets in many developing countries suffer from information imperfections, monopoly power, and segmentation limits the extent to which credit can promote economic growth and help households insure themselves against risk.

Designing successful policies to increase access to credit and to develop well-functioning credit markets requires an understanding of the effects of credit, household behavior regarding credit, and how credit markets function. Household-level data can provide policymakers with information on how households currently use credit as well as on the interrelations between credit, household characteristics, and household welfare.

The purpose of this chapter is to provide guidance on how best to collect policy-relevant data on credit from households and communities. The first section presents an overview of the key issues related to credit, issues that can be analyzed using data from household surveys like the LSMS surveys. The second section reviews the various methodologies that have been used to measure the impact of credit on households

and productivity and the role of credit in improving household welfare, and identifies the data needed to implement these methodologies. The second section also includes an assessment of how well previous LSMS surveys collected the data needed to analyze credit issues. The third section contains a summary of the key issues for data collection and recommendations on how to collect adequate data from household-level, community-level, and national sources. The fourth and final section provides detailed discussion of the draft module provided in this chapter.

Credit and Policy

There are two key reasons why governments intervene so often in the credit market. First, credit can provide significant benefits. Financial intermediation, as measured by the growth and development of the financial sector, in general is positively correlated with economic development. (The issue of financial intermediation is covered in Chapter 20 on savings.) More specifically, credit has the potential to improve the welfare of households. Second, credit markets often operate imperfectly in ways that prevent many households from using credit—thus limiting the extent to which credit can improve household welfare. The first

half of this section discusses ways in which credit can benefit households. The second half outlines the most common credit market failures.

What is Credit?

Credit is the trade of money, goods, or services at the present time for a payment in the future. Credit can be provided in many different forms and under a wide variety of arrangements. The standard loan, whereby the lender provides the borrower with money in exchange for a commitment from the borrower to repay the lender in cash, may not be the most common source of credit in developing countries. Nor is formal sector or bank lending necessarily a key source of financing for households in those countries. While lenders may be individuals or institutions whose main function is the provision of financial services, they may also be traders, employers, landlords, or relatives of the borrower who lend money only in particular circumstances.

Credit itself can be provided in the form of standard, formal loans or by a variety of informal means. Some common forms of informal credit are: trade credit, whereby credit is offered in-kind and no cash transaction occurs; tied credit, whereby the borrower is tied to the lender through other arrangements than credit (such as tenant-landowner or worker-employer relationships); rotating credit associations in which members pool their savings and at certain times have the right to borrow from the pool of funds; the pawning of goods; and simple agreements—often with no collateral or interest payments—between individuals who know each other.

Credit and Household Welfare

Using credit can have a significant positive impact on the welfare of households, particularly by increasing their productivity and decreasing the costs of smoothing their consumption. The main ways in which households stand to gain from credit use, as Besley (1995) argues, are similar to the ways in which the economy profits from intertemporal trade: specifically, the benefits arising from timing differences, technological opportunities, increasing returns to scale, and tastes.

TIMING DIFFERENCES. The gap between the time of investment and the time at which returns are realized is the primary way in which credit can benefit households. When households have access to credit, they can borrow money to make investments at the present

time against the expectation of future increases in their income. Without the opportunity to borrow, the household would not be able to take advantage of investment opportunities. The need for agricultural households to make seasonal investments is a good example of the cyclical nature of the need for credit.¹ Another example of this is when nonagricultural businesses invest to increase their output during peak selling periods. A final example can be seen in older persons lending to younger ones.

TECHNOLOGICAL OPPORTUNITIES. As technological opportunities are not equally distributed among individuals or households, those with fewer or poorer opportunities can benefit from investing in (or lending to) those with greater or more productive technological opportunities. Both parties can gain from such an arrangement.

Another important, albeit indirect, benefit is that having access to credit serves as an insurance mechanism for households, increasing their ability to bear risks (Eswaran and Kotwal 1990). Households that know they can borrow to maintain their consumption if an investment fails will be able to make riskier but potentially more profitable investments. This also leads households to adopt technology more quickly than they would have done in the absence of credit—potentially further increasing their productivity and, in turn, their income.

INCREASING RETURNS TO SCALE. For new technologies and activities, higher levels of investment may lead to increasing rates of return. An extreme example of this is when the rate of return to an activity is zero until some initial level of investment is made. If the initial investment is more than the household can afford from its income or savings, the household will benefit from being able to acquire credit to finance that investment.

TASTES. Individuals differ in terms of the relative weight that they put on present and future consumption. If an individual who prefers to defer his or her consumption to a later date lends to someone who needs to finance his or her immediate consumption, they both stand to gain. One key factor affecting tastes may be where people are in their life cycles.

CONSUMPTION SMOOTHING. Credit decreases the costs to households of maintaining certain consumption

levels.² When insurance markets and credit markets are absent, households self-insure. This can lead them to hold assets that are either nonproductive or have low productivity, but that are highly liquid. In periods of income shortfalls, they can sell these assets to produce the income that they need to maintain their consumption. Such self-insurance is costly for households in a number of ways. First, liquidating assets held for precautionary purposes may yield more money than a household really needs at that point. Second, if an asset has some productive value (as, for example, does livestock), liquidating it reduces household production. Finally, in areas with high levels of covariate risk (such as agricultural zones affected by the same weather or pest problems), the price of these assets may be depressed if many households with similar income shortfalls sell off their assets at the same time.

Access to credit provides households with insurance by decreasing their need to hold assets for precautionary reasons (Deaton 1991). This frees household resources for investments in more productive ways to generate income.

In the absence of credit of any sort, households' productivity is limited by their ability to self-finance consumption and investments. This can often lead households to underinvest or make inefficient investments. In addition, the absence of credit increases the costs to a household of maintaining its consumption levels. By taking advantage of credit, households and individuals can improve their welfare by increasing their productivity and lowering the costs of smoothing their consumption.

Market Imperfections: Imperfect Information

The design of most credit policy and government intervention in credit markets is driven by perceived imperfections in existing credit markets. Policymakers see imperfections (or barriers to trade) in credit markets as obstacles that prevent the full benefits of credit from being realized.

The asymmetry of information between lenders and borrowers leads to a phenomenon called equilibrium credit rationing. This situation prevails when lenders voluntarily set the price of credit (the interest rate) below the market-clearing price, leading to an unmet demand for credit. This underinvestment is a result of both adverse selection and adverse incentive effects (Jaffee and Russell 1976; Keeton 1979; Stiglitz and Weiss 1981; Stiglitz 1987).

ADVERSE SELECTION. Stiglitz and Weiss (1981) argue that lenders' returns are not monotonic in interest rates. This implies that there is an optimum interest rate that lenders will charge. If the rate is set above this level, lenders will receive decreased returns. This is because lenders know the mean risk associated with a pool of borrowers but do not know the risk associated with each individual borrower. As the less risky borrowers in the pool have a lower rate of return than the more risky borrowers, increasing the interest rate will push the less risky borrowers out of the market, leaving behind a pool of borrowers with a higher overall level of risk who tend to have high default rates. Thus the increased interest rate will leave lenders worse off than if they charged lower interest rates. The net result is that lenders maintain interest rates below the level of a market-clearing rate and lend less than they could if they had full and perfect information.

ADVERSE INCENTIVES. The interplay of imperfect information and moral hazard creates adverse incentives in the credit market. A borrower's actions affect both his or her returns and the returns for the lender. However, while a borrower has control over his or her actions, his or her lender has only limited control over these actions, and borrowers and lenders have different preferences. This is essentially the problem of moral hazard; the differences in preferences and degree of control lead to conflict between the two agents. Given this situation, lenders may choose not to increase interest rates—and thus avoid creating adverse incentives that they cannot control. For example, if lenders increase interest rates, borrowers may be more likely to substitute riskier projects, hoping that these projects will yield higher returns that will enable the borrowers to cover the higher interest rates. However, because many of these riskier projects are likely to fail, the expected return to lenders is reduced. Lenders voluntarily keep interest rates low to avoid or minimize this problem.

This assumes that deciding which project will be funded involves a moral hazard problem caused by the borrower's hidden actions and the asymmetry of information about the project. It may also be possible to have ex post asymmetry of information (S. Williamson 1986, 1987), in cases where the borrower knows how successful his or her project has been but the lender has less information and cannot find out more without incurring significant costs. This problem of moral

hazard with hidden information creates further incentives for lenders to keep interest rates at a level below the market-clearing rate. The lender only incurs the costs of verifying the returns to a project if the project fails (or the borrower states that it does). As raising interest rates can result in more projects failing (because lenders fund riskier projects), this increases the costs to the lending institution of verifying project outcomes. Thus the gain from increasing the interest rate is offset by the increased costs of verification.

TYPES OF RATIONING. As indicated in the above discussion, the most common result of equilibrium credit rationing is that the quantity of credit is rationed: not all people who want credit receive it and the price of credit is set below the market clearing rate. Another type of rationing exists when all potential borrowers receive loans smaller than the ones they need. In the past, explanations of this phenomenon were based on the assumption that there was a fixed return to investments (Hodgman 1960). This meant that there was a maximum loan size that could be covered by the return on the investment and that lenders would therefore deny requests for bigger loans. Subsequently, some analysts argued that lenders' unwillingness to bankrupt borrowers—due to decreased earnings in the future (Ryder 1962) and the high costs of bankruptcy (Miller 1962)—led to size rationing. In general, size rationing occurs when the investment of loan funds is subject to decreasing returns to scale (Jaffee 1972).

Market Imperfections: Contract Design and Enforcement

The problems associated with moral hazard can be affected by the ability of a lender to write and enforce contracts. If it were possible to write contracts that could completely cover all eventualities and that could be enforced without cost, there would be few problems of moral hazard. However, it is extremely difficult to create a contract that describes each possible state of the world in enough specificity for outside verification to take place. The incompleteness of contracts has been shown to have deleterious effects on the economic relationship between borrowers and lenders (Williamson 1985; Klein, Crawford, and Alchian 1978). Even where it is possible to revise and renegotiate an original contract, suboptimal levels of lending and investment can still result (Hart and Moore 1988).

Of course, if a contract is to have any value, it must be properly enforced. The legal system plays an

important role in how credit markets function. In places where legal systems are weak and it is difficult to get contracts enforced, many borrowers will only honor a loan contract when the costs of defaulting exceed the benefits of default. Over the long term, a lender can increase the costs to the borrower of defaulting by making repayment a condition of giving the borrower access to credit in the future. Eaton and Gersovitz (1981) studied how borrowers would be more likely to honor their contract if they thought that their reputation for being creditworthy would be damaged by defaulting.³ Diamond (1989) argued that there are other benefits to borrowers of not defaulting in addition to continued access to credit. Because lenders see borrowers who have not defaulted as having a lower probability of defaulting in the future, they are able to lower interest rates for this group. This has the effect of increasing investment in low-risk projects. It also means that, as the interest rate decreases over time, the cost of default to the borrower rises because the borrower stands to lose access to ever cheaper supplies of credit.

The threat of denying access to credit in the future also affects the behavior of borrowers, who will be inclined to embark on low-risk rather than high-risk projects (Stiglitz and Weiss 1983). This threat can only be effective if the borrower and the lender have an ongoing relationship. The lender stops lending to the borrower after the borrower defaults, signaling to other credit providers that this borrower is not a good risk.

Lenders are also affected by threats to their reputation. While renegotiating loan contracts can often prevent borrowers from defaulting, in certain cases lenders may force bankruptcy on a borrower instead of allowing him or her to renegotiate the terms of the contract. The ability of a borrower to renegotiate his or her contract has been observed to affect the borrower's future behavior, leading him or her to invest in high-risk projects (Eaton and Gersovitz 1981); the cost of default is lower to the borrower when negotiation can take place.

Government Intervention

The fact that credit has the potential to improve welfare has led to governments' interest in increasing access to credit and use of credit, both overall and among specific groups. Governments justify intervening in credit markets on the basis that markets have

failed or are inefficient. It is important to clarify what qualifies as credit market failure. A failure to achieve Pareto efficiency is the usual standard for defining market failure, but this may not be appropriate in the case of credit markets. Instead, as Besley (1994) argued, it may be more relevant to apply the standard of a constrained Pareto efficiency that takes into account the special circumstances of credit markets brought about by the repayment problem and by the asymmetrical nature of information.

Governments also justify intervening in credit markets on equity or redistributive grounds—for example, if some areas or groups are underserved by the market and only the government is willing to step in and provide these areas or groups with credit. It has been argued that people living in areas with poor agroclimatic conditions are underserved by the market (Binswanger and Rosenzweig 1986; Binswanger, Khandker, and Rosenzweig 1993), and some governments have used this idea of material risk to justify their intervention in the credit market. When assessing policy it is important to distinguish between market inefficiencies and the redistributive goals of credit policy; the market may be operating efficiently but not in a way that achieves the government's redistributive goals.

Although governments have an array of policy tools with which to influence credit markets, government intervention is not necessarily an appropriate solution. The evidence about whether the level of credit in an economy is too low is often contradictory. And past government interventions in the credit market have not always been successful; some have even created further problems.

CREDIT POLICIES. Government interventions in credit markets can be either direct or indirect. The most common direct interventions are policies that subsidize interest rates, lower interest rate ceilings, enforce lending quotas, and provide guarantees for borrowers without collateral. Examples of direct policies include the massive and widespread programs of subsidized credit for agricultural development (and recently also for microenterprise development) that exist in many developing countries.

Indirect policies can also correct for inefficiencies in the credit market arising from imperfect information and the subsequent costs of screening and enforcement. Some policies that affect the credit mar-

ket indirectly are ones concerning land ownership, the legal environment, and taxation. Land titling and land redistribution programs can lower the costs of both screening and enforcement by increasing the use of collateral for loans (Hoff and Stiglitz 1990; Besley 1994). Improving the regulatory framework and ensuring that existing laws are enforced can also improve the way credit markets operate. (See Besley 1995 for an overview of this issue.) Taxation policies such as taxing interest income (De Meza and Webb 1988) can have a significant impact on credit markets by affecting the levels of funds available.

ROBUSTNESS OF THE MODELS. Typically, when governments intervene in credit markets, they do so on the assumption that credit is underutilized. Due to information asymmetries between borrowers and lenders, lenders maintain interest rates below the market-clearing rate even when there is surplus demand for credit. This is the implication of the Stiglitz and Weiss (1981) model. However, the robustness of this model has been called into question. In the Stiglitz-Weiss model, projects are taken from distributions with a common mean but different variances. Riskier projects are those from distributions with larger variances. The expected return for all projects is the same. As de Meza and Webb (1987) demonstrate, if it is assumed instead that the returns to successful projects are the same but that the probability of their success differs (and hence the expected returns also differ), then too much credit is being supplied and interest rates are too low. In addition, even without changing assumptions, introducing other elements such as screening costs into the equation would contradict any conclusions obtained using the Stiglitz-Weiss model (de Meza and Webb 1988).

These theoretical contradictions make it difficult to design suitable policies. If overinvestment exists, introducing a policy of taxing investment income may be appropriate. On the other hand, if there is underinvestment, introducing this policy will have a negative impact in that it will discourage households from taking advantage of credit opportunities.

PREVIOUS EXPERIENCE. The need for policymakers to be cautious when designing and implementing credit schemes is suggested not only by theoretical contradictions about which policies are most appropriate but also by the practical experiences of governments.

When governments have adopted policies of financial repression (McKinnon 1973; Shaw 1973), this has led to disequilibrium credit rationing. As discussed above, governments sometimes impose interest rate ceilings lower than the market-clearing rate, to protect consumers against usury and to make credit affordable and accessible. However, these policies often result in a decrease in credit access. The interest rate ceiling forces financial institutions to pay lower rates on savings—limiting the stock of funds that the institution has available from which to lend (Wolken and Navratil 1981).

In addition, both theoretical work (Stiglitz and Weiss 1981; Hoff and Stiglitz 1993) and empirical work (Aryeetey and others 1997; Siamwalla 1990) have shown that the outcomes of direct policies aimed at increasing credit for specific borrowers or activities have often been the exact opposite of the desired outcomes. Target groups' access to credit has not increased, nor have interest rates fallen. And subsidized interest rates and directed lending have not only led to disequilibrium credit rationing (Vogel and Adams 1986; Adams 1984) and a decrease in loanable funds, they have also reduced access to credit for small or first-time borrowers who are supposed to be the beneficiaries of these government policies. Because interest rate ceilings lower the profits that lenders can be expected to make, the lenders aim to maximize their profits by lending to borrowers carrying the least risk—who tend to be the larger and wealthier borrowers. This bias holds true even in the absence of objectively measured higher default rates (Guttentag and Herring 1984).

Moreover, to the extent that lenders incur fixed administrative costs for processing loan transactions, a larger loan will generate greater profit (Anderson and Khambata 1985). And the artificially low interest rate ceiling makes it less feasible for lenders to pay to gather information about borrowers—causing lenders to ration the provision of credit to first-time borrowers (Thakor and Calloway 1983).

Another area in which government intervention has negatively affected how credit markets function is enforcement. Government programs that subsidize and direct credit have often had high default rates, to which governments have responded by not enforcing the repayment of loans, by forgiving debts, or both. The reasons why governments do this can be political or due to redistributive goals (that can conflict with

pure efficiency). Either way the net effect is to undermine the credit market (see Besley 1994).

Finally, the large number of credit providers in the market can complicate the design of credit policy as well as its implementation. As Aryeetey and others (1997) have demonstrated, changes in financial policy may or may not have the effects that policymakers expect. Weak linkages between sectors of the market, niche markets where barriers to entry by other lenders exist, and other manifestations of the fragmentation of the credit market in many countries can all affect the outcome of financial policy.

Policy Analysis and Household Data

Analysis of household-level data on credit use can help policymakers determine which—if any—credit policies are appropriate by providing them with information on existing structures and behavior as well as on the impact of previous policies. Household-level data can be used to answer three types of questions:

- What is the structure of the current credit market? For example, what are the sources of credit, what are the costs of credit, and for what purposes do households use credit?
- What evidence is there that imperfections exist in the credit market?
- What is the impact of credit on productivity?

Limitations of Household Data

Before looking at these topics in detail, it is important to note some of the limitations of household data collected through surveys in general and through LSMS-type surveys in particular. These limitations relate to both the quantity and the accuracy of data that can be collected.

First, in the interview approach, especially the structured interview and the type of interview with closed-ended questions, only a limited amount of trust and rapport can be established between interviewer and respondent. To the extent that credit use (like any activity associated with money) is a sensitive subject, this relatively impersonal interview approach can sometimes limit the amount and quality of information provided by the respondent.

Second, legal and cultural factors can also influence how much accurate data respondents are willing to provide to a survey interviewer. If they are involved in loans whose interest rates are higher than the legal

maximum or if they are embarrassed at having had to borrow money, they will underreport their credit use.⁴

Third, because of the wide variety of loans in the market and of the ways these loans are priced, serious difficulties arise in trying to measure credit and its costs by means of a household survey. This is the case not only because it is inherently difficult to properly investigate all aspects of credit use but also because there is a limit to the number of questions it is possible to ask in an interview and to the length of that interview. In addition, analyzing the effects of credit use often requires longitudinal data, which many household surveys do not collect. Panel data certainly can be, and have been, collected quite successfully, but there are some costs associated with designing and implementing panel surveys, not the least of which is the need to have sufficient funds for more than one round of a survey. (The costs may not be as high as they first appear; see Chapter 23 for a thorough discussion of the costs and benefits of collecting panel data.)

Fourth and finally, because LSMS-type surveys typically have small national samples, the resulting data often do not allow analysts to study rare events. For example, if only a small percentage of the population borrows from a specific lender or is covered by a government program, the survey data set will contain too few of these cases to enable analysts to draw accurate conclusions.

Describing Credit Markets

Household-level data is crucial for providing a detailed picture of credit markets. No other source can provide information on the entire credit market and on the characteristics of credit recipients. In any given country, the national statistics on savings and credit and more disaggregated figures from financial institutions provide information on the overall magnitude of savings and credit in the formal sector of the economy. However, this is only one (and, in many countries, not even the largest) credit activity in the economy. Estimates for nine Asian countries show that the nonformal sector accounts for anywhere from one-third to three-quarters of all credit that is disbursed (Montiel 1993). It has been estimated that the amount of nonformal credit disbursed in Honduras is as much as the amount of formal credit that is disbursed (Larson 1990)—although this is probably an overestimate (Scott 1992). The aggregate data at the national

level not only omit potentially large amounts of credit use but also provide little insight into the distribution of credit, the benefits of credit use to borrowers, unmet demand, and, in many cases, the ways in which credit is used.

As a result, household-level data are the primary source of information for determining the effectiveness of credit policies. However, to ensure that the overview of the credit market provided by household data is accurate, a survey must cover every kind of credit use, whether by a given household or in a specific community or region. The two key aspects of the credit market that affect data collection methods are the range of providers and the variety of arrangements under which credit is offered. Both aspects are discussed below, using examples from actual data sets to illustrate key points. Unless otherwise indicated, the examples are from past LSMS surveys.

SOURCES OF CREDIT. In any given country there is often a wide range of lenders and credit sources. At one end of the spectrum are formal institutions, typically national or commercial banks. These institutions provide a broad range of financial services, have established and often complicated rules governing access to their services, and are subject to government regulation. At the other end of the spectrum are informal lenders—lenders not covered by the regulations of a country's central monetary authority (Adams and Fitchett 1992). These lenders are usually individuals who provide one financial service—credit—and who supply this service based on their personal knowledge of the borrower. Moneylenders, the best-known type of informal lenders, have been the subject of debate for years (see Ladman 1981; Rao 1980; Adams and Nehman 1979; Bottomley 1963; U Tun Wai 1957). However, moneylenders are only one source of informal credit. Relatives, shopkeepers, and rotating credit associations are all part of this informal credit sector. And in between the extremes of formal institutions and informal credit sources are semiformal institutions, which include credit unions and certain types of nongovernmental organizations (NGOs).

Only formal sector and some semiformal sector operations appear in national accounts and other national credit databases. Thus household survey data sets are the only source of information on informal sector lending in developing countries. This is true even in countries where the distinction between the

formal and the informal sector is not very clear. In Honduras, for example, even though moneylenders are allowed to register themselves as lenders and seek restitution from loan defaulters, only 10 to 33 percent actually do register (Scott 1992).

An illustration from the 1994 South Africa LSMS illustrates the importance of household surveys for capturing credit use in an economy. As can be seen in Table 21.1, only 9.3 percent of all loans reported by households in the 12 months prior to the survey were disbursed by formal sector institutions, with another 5.8 percent disbursed by institutions in the semiformal sector. If these data alone had been used to estimate the share of households receiving credit, only 6.9 percent of all households would appear to have received credit, when the actual figure, taking into account credit disbursed from all sources, is 45.8 percent. Informal sector lending even accounts for a significant share—37.9 percent—of the total money borrowed. If analysts had drawn conclusions about credit markets and policy outcomes in South Africa without using household data, these conclusions would have been very inaccurate.

TYPES OF CREDIT. Most credit markets offer many different types of credit, ranging from formal loans backed by collateral with a set repayment period and interest rate to loans from friends and family members who may or may not attempt to cover their costs or make a profit. In between these extremes are loan arrangements such as supplier credit and tied lending (see below). For analysts to get an accurate picture of the credit market, it is important for a survey to capture all of these types of credit.

Cash loans are probably the least common kind of loan in most developing countries. As the South Africa

data show, trade credit is by far the most important type of credit (in terms of numbers of loans). Credit provided by shopkeepers and hire purchase arrangements constitutes the majority of all lending in South Africa. This is also the pattern of lending in Pakistan. Supplier credit is quite widespread in Pakistan; for some types of items, more households receive credit from suppliers than receive standard loans. As can be seen in Table 21.2, while approximately 20 percent of all agricultural households received general loans for agriculture, 24 percent of agricultural households purchased fertilizer on credit. (This pattern has also been found elsewhere; see Loria and Cuevas 1984.) Nonagricultural household enterprises use loans—and supplier credit—somewhat less than do agricultural ones, but both types of credit still exist.

Not only will total credit use be underestimated if information on all types of credit is not collected, but conclusions about the kinds of households using credit will be biased. Households tend to specialize in the type of credit they obtain. For example, it is unlikely that a household will receive both supplier credit and a cash loan. This can be seen in Pakistan, where only one-fifth of all agricultural households that received some type of credit for agriculture obtained both a monetary loan and supplier credit (Table 21.3). For nonagricultural enterprises this was an even smaller fraction.

In addition, given imperfect information and the effects of reputation in credit markets, it is likely that borrowers will tend to specialize in a particular lender: once a borrower has established a credit relationship with a lender, he or she will continue to use that source rather than any others. While longitudinal data would be needed to demonstrate this, a single cross-

Table 21.1 Loans by Source: South Africa, 1993

Source of loan	Number of loans	Percentage of all loans	Percentage of money borrowed
Formal ^a	552	9.3	47.4
Semiformal ^b	343	5.8	7.4
Informal ^c	4,755	80.1	37.9
Moneylenders, friends, relatives	955	16.1	
Shopkeepers	2,002	33.7	
Hire purchase	1,798	30.3	
Nonclassified	284	4.8	7.2
Total	5,934	100.0	100.0
Percentage of all households receiving credit		45.8	

a. Includes banks, building societies, and government agencies.

b. Includes NGOs, employers, credit unions, and burial societies.

c. Includes moneylenders, landlords, family and friends, shopkeepers, and hire purchase arrangements (purchases that are paid for over time).

Source: Project for Statistics on Living Standards and Development, 1994.

Table 21.2 Division of Loans and Trade Credit among Credit-Receiving Agricultural and Business Households, Pakistan, 1991

Households with agricultural enterprises		Households with other businesses	
Type of credit	Percentage of all credit received	Type of credit	Percentage of all credit received
Agricultural loan, monetary ^a	19.5	Business loan, monetary ^a	17.1
Loan in past 12 months ^a	6.8	Loan past 12 months ^a	7.5
Seed on credit	9.7	Frequent purchases, supplier credit	9.8
Seed partially on credit	13.2	Frequent purchases, other credit	1.2
Fertilizer on credit	24.0	Infrequent purchases, supplier credit	5.3
Herbicides or pesticides on credit	13.8	Infrequent purchases, other credit	1.4
		Buy durable goods on credit	3.9
Any credit for agriculture	42.0	Any credit for business	32.6
Share of all households receiving some agricultural credit	15.6	Share of all households receiving some enterprise credit	13.0

Note: Categories are not exclusive since households can have more than one type of credit.

a. Two different subgroups of the household were asked about overall loan use; both are included here.

Source: Author's calculations from Pakistan Integrated Household Survey.

Table 21.3 Specialization in Types of Credit, Pakistan, 1991

	Agricultural households	Households with nonagricultural enterprises
Percentage receiving credit	42.0	21.3
Percentage of these receiving:		
Monetary loan only	36.5	49.4
Supplier credit only	43.7	34.6
Monetary loan and supplier credit	19.7	16.0

Source: Author's calculations from Pakistan Integrated Household Survey data.

Table 21.4 Number of Sources of Credit, Pakistan and South Africa

Number of sources	Percentage of households in Pakistan	Percentage of households in South Africa
None	46.6	54.2
One	36.5	32.6
One or more	53.4	45.8
Of households receiving credit, percentage that receive it from only one source	68.3	71.2

Source: Pakistan Integrated Household Survey 1991; South Africa Project for Statistics on Living Standards and Development 1994.

section of data can give some indications about whether this is in fact the case. Credit use patterns in both South Africa and Pakistan provide some initial support for this hypothesis (Table 21.4). Of all households receiving credit, 68.3 percent in Pakistan and 71.2 percent in South Africa received credit from only one source.

RECIPIENTS OF CREDIT. When examining credit markets it is crucial to identify who has benefited from government credit policies. This task is simplest when a policy is targeted to specific areas or groups, or when a policy is designed, either directly or indirectly, to affect a specific type of loan (for example, a loan for housing, agriculture, or education). If the goal of a policy has been to direct credit to specific individuals, finding out who has received the credit indicates whether or not the policy has been suc-

cessful and what the policy's redistributive effect has been. Depending on what policy is being evaluated, the most relevant information about who receives credit may be at the household level (what types of households receive credit), at the sector level (what percentage of agricultural activities are financed by credit), or at the individual level (which people borrow).

Any data needed to analyze credit use should be collected at the same level of disaggregation at which credit data are collected. If a policy affects whether or not certain households receive housing loans, to study this policy it is enough for analysts to have data on households' income and assets (to analyze their collateral). If, however, a policy aims to increase women's access to credit, analysts will also need data on individual women, on their incomes and assets, and on some of their other characteristics.

CAN LSMS-TYPE SURVEYS PROVIDE ACCURATE MEASURES OF TOTAL CREDIT USE? As was illustrated above in the cases of informal sector credit in South Africa and supplier credit in Pakistan, not covering all of the sources and types of credit in a multitopic household survey can lead to serious mismeasurement of credit use—and the subsequent design and implementation of costly, ineffective credit policies. Thus it is essential for surveys to ask questions about every conceivable source and variety of credit to ensure that the full extent of credit use is accurately measured.

How well have previous LSMS surveys succeeded in covering all credit sources? Not very well. While basic information on borrowing has been collected in many past LSMS surveys (Table 21.5), few surveys have included detailed questions about credit sources or even general questions about using supplier credit for productive purposes. Questions on the use of supplier credit have most frequently been found in inquiries about agricultural enterprises, but even in these cases very few questions were included. Only the Kyrgyz questionnaire included a general question about the use of supplier credit.

Another critical omission in most previous LSMS questionnaires was the purchase of food on credit, which is an important dimension of the analysis of not only credit but also consumption. Only the Pakistan questionnaire and, to some extent, the South Africa questionnaire included direct questions about this.

Given the analytical importance of being able to determine total credit use, it is clear that some improvements could be made to LSMS questionnaires

in the future that would make this easier. Analysis of the data from the few surveys that have addressed this issue in depth⁵ has shown that it is vital to include explicit questions about the sources and types of credit and about the purposes to which credit is put. Only when these questions are included will surveys yield enough data to give an accurate picture of total credit use. Once an accurate measure of credit use and debt is available, it becomes possible to explore other key issues regarding the credit market. It also becomes possible to determine whether there is a need for the government to change its existing credit policies, make additional interventions in the credit market, or both.

It is also very important to gather data on the characteristics of borrowers and of the credit markets in which they operate. Previous LSMS surveys have been fairly good at collecting data on which households receive credit, because they have collected credit data at the household level along with data on the characteristics of households. Knowing which households have access to credit programs, what determines access to credit use, and what prevents households from using credit are first steps toward determining the impact of government programs. In past LSMS surveys it has been more difficult to assess the distribution of credit in a particular sector. An example is household enterprises. Because data on household enterprises were not collected on all household enterprises in sample households, it was not possible to determine what percentage of family-owned enterprises use credit. This meant that it was not possible to calculate the probability of any given household enter-

Table 21.5 Types of Credit Information Obtained by Selected LSMS Surveys

Country	Loans					Trade credit				
	Mortgage	All loans	Specific loans	By source		Agriculture	Non-agricultural enterprises	Food	Other consumption	Service
				Implicit	Explicit					
Ecuador 1994	○		● ^a	●						
Ghana 1987/8	○	●	●	●		●				
Ivory Coast 1985	○	●	●	●		●				
Kyrgyz Rep. 1996	○	●	●	●		●	●			●
Peru 1985	○	●		●						
Pakistan 1991	○	●	●	●		●	●	●		
South Africa 1994	○	●		●	●			○	○	
Vietnam 1992/3	○	●	●	●		●				

● Indicates that the questionnaire contained thorough questions on this topic.

○ Indicates that the questionnaire partially covered this topic.

a. Only agricultural loan information was collected.

Note. This table only shows whether each questionnaire included questions asking if the household had obtained credit of a specific type. The table does not show whether the design of the questionnaire would yield the data necessary to calculate the size of the loan, the total cost of credit, or other loan terms.

Source: Relevant LSMS questionnaires.

prise using credit and, therefore, it was also impossible to extrapolate to the universe of household enterprises. It is recommended for future surveys to collect data on all household enterprises. Doing this will clearly increase the usefulness of the household-level data.

One drawback of past LSMS surveys is that they did not collect data on credit use at the individual level. This is a serious flaw in these data sets in terms of the analysis of credit issues, one that should be rectified in future surveys.⁶ The need for collecting information on credit at the individual level is twofold. First, banks, credit unions, and moneylenders lend to individuals rather than to households. It is the individual who receives the loan, and it is his or her command over collateral that affects the lender's decision about whether or not to grant the loan. Second, not collecting credit information at the individual level may lower data quality substantially as one household member will not know the details of all other members and their activities. This is the logic behind much of the design of LSMS surveys. For such a sensitive subject like credit use, asking individuals directly can only help the quality of the data collected. Thus individual-level data are clearly necessary for assessing the impact of credit-related policies.

In addition, to determine available collateral it will be necessary to collect information about individual ownership of key assets such as land, housing, and major durable goods. (Past LSMS surveys determined household ownership, not individual ownership.) Determining individual ownership should require the addition of only a few questions to find out the identification code of the owner of each good. These can be added to existing sections on household asset ownership.

Future surveys should also gather data on government credit programs and eligibility prior to designing the questionnaire. Questions should be added to the questionnaire at the individual level aimed at identifying both who is eligible for benefits from such programs and who receives these benefits.

Evidence of Market Imperfections

The key argument that governments use to justify intervening in the credit market is market failure. Before a government decides to intervene in the market, it should ensure that it has clear evidence of market failure.

Adverse selection, moral hazard, and enforcement problems all affect credit markets in a variety of ways.

This section examines several potential market inefficiencies that result from imperfect information and enforcement problems in credit markets, including credit rationing, market segmentation, and monopoly power.

EVIDENCE OF CREDIT-CONSTRAINED HOUSEHOLDS.

Due to the problems of adverse selection and moral hazard, interest rates function not just as price mechanisms but also as screening mechanisms. Much of the economic theory of credit markets indicates that this will result in the non-price rationing of credit and to less credit use than would be the case in the absence of information imperfections. But, as has been discussed previously, the opposite could occur. A variety of empirical efforts have attempted to determine the level of rationing in credit markets.

The first and simplest method is to ask households about their ability to obtain credit. This method was used by Barham, Boucher, and Carter (1996) in Guatemala and by Feder and others (1989) in China. Basically, households are asked whether they have applied for credit; if so, whether their application was rejected; and if it was approved, whether they obtained the full amount that they requested. Feder and others (1989) found that defining credit-constrained households this way was compatible with data on the overall liquidity of the households. However, using this method of determining whether households are credit-constrained also requires collecting information on households that did not apply for credit. This is because, as Baydas, Meyers, and Aguilera-Alfred (1992) pointed out, some of the households that do not apply for credit do not do so because they believe that they will be refused. (This point is very similar to the argument for including discouraged workers in unemployment statistics.)

A second way to determine whether there is credit rationing in the market is to estimate the shadow price of credit, as was done by Sial and Carter (1996) in Pakistan and by Carter and Wiebe (1990) in Kenya. These analysts examined differences in output and net income among farmers based on their observable and unobservable assets and skills and their use of credit. At the observed average loan size, the marginal returns to borrowers were many times higher than the interest rate charged on loans, and loan sizes were below the level that would allow the farm household to maximize income.

Third, many of the tests of liquidity constraints have been done in the context of analysis of consumption. The theory of the optimization of consumption over time says that household consumption is constrained only by its lifetime budget constraint. If true, this means that households' propensity to increase consumption is less if they receive a temporary increase in income than if they receive a permanent increase in income. However, empirical studies have shown that consumption is more sensitive to temporary income changes than this theory would suggest, perhaps because households suffer from liquidity constraints.

To test this hypothesis, several analysts have attempted to measure the impact of liquidity constraints on household consumption. These studies have yielded some evidence of such constraints, but this evidence is inconsistent. (See Chapter 5 on consumption and Chapter 20 on savings. See also Deaton 1992, chapters 5 and 6.) Hall and Mishkin (1982), using the permanent income hypothesis, did find some evidence of such constraints. Zeldes (1989) explicitly used Euler equations (as first done by Hall 1978) to test the hypothesis that households maximize their lifetime utility subject to liquidity constraints. Zeldes specified the model and split the sample households in advance into two groups, one of which (with low or negative wealth) he specified as being credit-constrained and the other not. However, others have argued that if households are liquidity-constrained, they may change their consumption without violating the Euler equations, thus weakening the usefulness of such tests (Deaton 1992).

Unlike the tests of liquidity constraints discussed above, Hayashi (1985a, 1985b) and Japelli and Pagano (1995) used cross-sectional data. This type of analysis relies on splitting the sample households, based on the level of their savings, into those that are credit-constrained and those that are not. The analysts then estimated the level of consumption desired by the liquidity-constrained households and measured the gap between desired and actual levels of consumption. Hayashi as well as Japelli and Pagano found evidence that younger households—those with heads under the age of 30—were credit-constrained.

ADEQUACY OF LSMS DATA FOR STUDYING CREDIT RATIONING. Most previous LSMS surveys have included questions on what credit has already been obtained by households and on what money they owe. Only a

few surveys have also included questions about whether households have ever applied for credit and, if so, on the results of such application and the reasons given for refusal—even though such questions are perfectly feasible (and could easily be added to future surveys).

It would be more difficult to collect the necessary data for estimating the shadow price of capital, since this requires being able to calculate rates of returns to different activities. While it is possible to envision doing this in a study of a particular region or in a sample of a particular group such as coffee farmers or dairy farmers, it is unlikely that sufficient information could be collected at a national level to carry out this type of analysis. This is especially true given the small samples associated with LSMS surveys. Although the sample used by Sial and Carter for their study in Pakistan (1996) was small (around 125 farmers), all sampled farmers were engaged in growing the same principal crop. It is not clear that such concentrations of activities will prevail in a small national sample. (See Chapters 18 and 19 in this volume, on household enterprises and agriculture, for a discussion of the feasibility of calculating rates of return.)

Whether tests of excess sensitivity using LSMS surveys are feasible is a matter of some debate. First, these tests rely on panel data. Most past LSMS surveys have not collected panel data, although panel data may be more common in the future. (See Chapter 23 for a discussion of the advantages and disadvantages of collecting panel data.) A second issue is that the variables needed for these analyses are often the variables most difficult to measure adequately or accurately. Measurements of wealth and income may be tainted by error. (See Chapters 17 and 20 for details of the difficulties involved in measuring income and measuring savings.) And these problems are compounded in economies where a large proportion of the population works in the informal sector—adding to the difficulties of measuring income. It is not surprising that the bulk of empirical studies in this field have been done on industrial economies.

EVIDENCE OF SEGMENTED CREDIT MARKETS. One common problem in developing countries is the fragmentation of the credit market. In a fragmented credit market, lenders provide loans only to certain subgroups of the population or to certain regions. The result is that there is often little overlap between the clients of the various formal, informal, and semiformal

financial service providers. This outcome can arise for one of two reasons. Lenders may specialize in certain market niches—which is efficient when prices in different markets (formal, informal, and semiformal) reflect differences in the costs of funds and levels of risk in these different markets. Or credit markets may be fragmented because of market segmentation, in which price differentials exist because funds do not flow between areas or groups. This is inefficient because it limits the total amount invested in the economy, leads to suboptimal use of investment resources, and, in rural economies with high levels of covariate risk, increases the economic vulnerability of both borrowers and lenders.

Determining the difference between specialization and segmentation requires data from both borrowers and the lenders. It is necessary to identify all potential lenders and to collect detailed information on both their costs and their risks. It is not usually difficult to identify formal lenders, but informal lenders may be significantly more difficult to identify. Data for a study of credit in Thailand were collected by having interviewers live for up to two months in villages in Thailand not only to be able to identify the key lenders but also to build up enough trust so that the lenders would be willing to provide them with information on their costs, procedures, and default and enforcement problems (Siamwalla and others 1990). A further way that informal lenders have been identified is through interviews with households or borrowers, as were done in a study of credit markets in Ghana, Malawi, Nigeria, and Tanzania (Aryeetey and others 1997).

Once lenders are identified, it is possible to determine whether the market is segmented by comparing risk-adjusted interest rates between or among sectors. As in Aryeetey and others (1997), this requires data on explicit interest rates, rates of delinquency and default, costs of administering loans, and costs of funds to each lender. As it was not possible in this study to gather panel data, two-year retrospective questions were added to the questionnaire to attempt to track any changes in these variables. Of course, this may have led to bias if any informal lenders dropped out of the market during those two years and were thus excluded from the sample.

ADEQUACY OF LSMS DATA FOR STUDYING MARKET SEGMENTATION. The basic description of the credit

market that could indicate segmentation is easily generated using variables readily available from LSMS surveys. If data are collected on the sources of credit used by individuals in the sample as well as the purposes for which these individuals borrowed, it becomes possible to deduce the degree to which borrowers are confined to one segment or another of the credit market. The fact that these data are needed proves again the immense value of collecting exhaustive data on all sources and types of credit.

The other information required for determining the segmentation in the market—information on default rates, loan administration costs, and the costs of funds to lenders—is more difficult to collect with an LSMS survey. While some informal lending may be captured in the household survey, such surveys probably cannot adequately cover issues such as lenders' cost of funds and delinquency rates, which require information specifically provided by lenders. (Asking questions about informal lending may also be risky. In the 1990 Thailand study by Siamwalla and others such questions were not asked as it was felt that informants would not wish to answer. Still, many other LSMS surveys—for example, the ones in Côte d'Ivoire, Vietnam, Ghana—have asked such questions with no reported difficulties.) In past LSMS surveys, questions on household lending were typically included more to identify a household's assets than to study its lending or borrowing activities. In addition, household-level data cannot provide a probability sample of lenders—limiting the usefulness of this information even if all of the details of household members' lending activities could be collected.

Therefore, what is required to carry out this analysis is a survey of credit facilities, like the surveys of health and education facilities in such countries as Ghana and Jamaica. A credit facilities survey has not yet been performed as part of an LSMS survey, but this type of data collection exercise has been done elsewhere (see Aryeetey and others 1997; Udry 1990; Siamwalla and others 1990). Attempting to revise the methodologies of these surveys to fit the LSMS may not be entirely straightforward. One key concern will be to establish what “the community” means in the context of credit. (See Chapter 13 for a discussion of this issue.) In many areas of the world, traders who live outside of the physical community are an important source of informal credit. However, in countries where credit markets are a focus of government atten-

tion, attempting to carry out such a facility survey may be warranted.

EVIDENCE OF MONOPOLY POWER. One facet of segmentation can be the existence of monopoly power within the market. Because lenders have only partial and imperfect information about potential borrowers, they are forced to invest in screening mechanisms such as establishing other economic links with borrowers and identifying collateral. This investment in screening creates a “relationship-specific capital” (Hoff and Stiglitz 1990) that essentially ties borrowers to specific lenders and allows lenders to set their interest rates higher than their marginal costs. The lack of barriers to entry of lenders in credit markets does, however, limit the extent to which any one lender can monopolize the market. And in the informal sector, existing monopoly power may not be inefficient. As argued by Basu (1989), if the monopoly provider is a perfectly discriminating monopolist, there is no market inefficiency. The argument for the government to intervene in such a case is based on the fear that the lender is exploiting the borrower, rather than on the criterion of market inefficiency. However, there is evidence of inefficient monopoly power in informal credit markets in some developing countries and, to the extent that such power reinforces the segmentation of credit markets, this creates additional inefficiency.

The substantial gap between formal and informal sector interest rates is often given as evidence of lenders’ monopoly power. However, the gap in interest rates alone is not sufficient to support such an argument. In the first place, it is not the nominal interest rate that should be the focus of attention but rather the total cost of credit to the borrower. Adams and Nehman (1979) showed that the gap between formal and informal sectors disappears if the total cost of credit (calculated as the sum of the nominal interest rate and all of the borrower’s transaction costs including loan charges, payments to third parties, and the costs of his or her time and travel⁷) is used to compare the formal and informal sectors. Data on formal sector loans in Bangladesh, Brazil, and Colombia have shown that, for small borrowers, the nominal interest rate represents only a minimal share of the total cost of credit—9 percent, for example, in Bangladesh.

Tied contracts have also been cited as examples of monopoly power. By rendering borrowers dependent on lenders for other aspects of their welfare (such as in

the case of tenant farmers), such contracts appear to provide the lender with an inordinate degree of market power. However, this is not necessarily the case. When lenders use such contracts as screening devices, they are a source of monopoly power as only the lender has the information on the borrower’s potential for default (Bardhan 1989; Hoff and Stiglitz 1993). But when lenders use tied contracts to counteract problems of moral hazard and imperfect information, they may be doing so in the context of either perfect competition or a monopoly (Braverman and Stiglitz 1982).

Determining whether any lenders have a monopoly in the credit market requires data on the costs to lenders of providing credit and on the fees that lenders charge. Aleem (1990) studied lender costs in order to demonstrate market power in a rural area of Pakistan. By collecting detailed information on the lenders’ screening and enforcement costs, Aleem calculated the marginal and average costs of lending in that area. He found that the interest rates charged by informal lenders were close to average costs and above marginal costs. The fact that lenders can only do an incomplete screening of potential borrowers and the fact that borrowers have little information about other loan sources results in lenders specializing in specific types of loans and in the existence of too many lenders in the market. This causes interest rates to increase as lenders have to spread the costs of screening and enforcement over a smaller than optimal pool of borrowers.

Aryeetey’s study of four African countries (1997) also focused on lenders’ costs, comparing these to the interest rates that they charged. He found evidence of significant market power among informal sector lenders. Even though the informal lenders had lower transaction costs, lower default rates, and lower costs of funds than their formal sector counterparts, the interest rates they charged were substantially higher than those of formal lenders.

ADEQUACY OF LSMS SURVEYS FOR MEASURING MARKET POWER. It is probably beyond the scope of LSMS and other multitopic surveys to gather the information necessary to calculate the total costs to borrowers of obtaining and repaying loans and the total costs to lenders of providing loans. First, doing both of these calculations requires having accurate information on interest rates. Second, estimating total cost to a borrower requires having detailed information on all of the activities that the borrower under-

takes to obtain and pay back the loan. Third, estimating cost to a lender requires extensive information on all of the activities associated with lending, including default and delinquency rates.

Determining the interest rates borrowers are paying may be quite difficult. While information may be readily available on formal sector interest rates, it is harder to obtain information on informal sector rates. One of the characteristics of informal lenders is that they do not advertise (Aleem 1990). In theory it should be possible to identify interest rates simply from household interview data concerning loans received. But in practice simple questions to households about the interest rate they pay on a loan do not provide analysts with accurate information, for three reasons. First, households may know that they pay an interest rate but may not know what it is. Second, households may not be aware that they pay an interest rate because of differences in terminology among lenders. Third, because of religious laws against the charging of interest (as in Islam) or because the lender is attempting to improve screening and enforcement mechanisms, there may be no explicit interest rate, as an interest rate negatively affects the expected return to the lender. (See the earlier discussion of adverse selection.)

Evidence from both LSMS and non-LSMS household surveys indicates that all of these factors confound analysis of the cost of credit and the existence of monopolies. A survey conducted by the author in rural areas of Honduras showed that 40 percent of all borrowers were unable to tell the interviewer what interest rate they paid on their loan (Scott 1992). Approximately 37 percent of people in Pakistan were unable to remember their interest rate.⁸ In surveys that asked people not whether they paid an interest rate but simply what rate they paid, a large proportion of the answers were “zero.” While these answers may have been true—as Udry (1990) found in highly segmented informal markets in Nigeria—the large number of zero answers may also have reflected respondents’ lack of knowledge about the fees that they were being charged. In Peru in 1994 almost two-thirds of all borrowers stated that the interest rate for their loans was zero percent. While a number of loans from family and friends might have had a zero explicit interest rate, it is unlikely that two-thirds of all loans were interest-free.⁹ A more likely explanation is that the terms in which many informal sector loans are couched never mention the word “interest.”

In addition, lenders do not always charge explicit interest rates. To compensate for imperfect information, they often use tied or interlinked contracts. This further complicates the calculation of interest rates. If an interlinked contract does not specify an interest rate, analysts need detailed information on the complete loan arrangement—including the in-kind component, its value under the loan agreement, and an alternative valuation—in order to be able to estimate an interest rate. If the survey is taking place prior to the repayment of the loan, it may not be possible to calculate the real interest rate if the loan repayment involves, for example, some percentage of the borrower’s harvest.

Finally, religious bans on explicit interest may lead lenders to use tied or interlinked contracts or other repayment mechanisms besides charging interest. Islam prohibits interest charges; the 1991 LSMS data set for Pakistan, an Islamic country, showed that 92.2 percent of all the loans recorded in this country had no set interest rate. In the 1988/89 survey data for Ghana, which also has a significant Muslim population, a similar pattern was found.¹⁰ Lenders in these countries presumably adopted alternative mechanisms to obtain a return on their investments. Survey questionnaires must be designed to ensure that data are collected on these alternative mechanisms.

Determining interest rates is a difficult task—a task that past LSMS questionnaires have not effectively accomplished. Most past LSMS questionnaires have asked about interest rates using questions such as: “What is the annual rate of interest?” These questions were often asked of the household respondent even if this person was not the borrower.

One simple improvement would be to ask borrowers directly instead of asking household respondents. However, this alone will not solve the problem; borrowers were asked directly in the Honduran study cited above in which 40 percent of borrowers were unable to tell the interviewer the interest rate they paid on their loan (Scott 1992).

It is more important to focus on the wording of the question. This requires prior knowledge of both the types of loans provided in a country or region and the terms used to describe these loans. Interest rates may vary among providers but be described in a uniform way. In such cases it becomes especially important to find out the monetary (as well as linguistic) “terms” of loans provided. Among moneylenders in

Honduras, for example, a common form of informal credit is that for every 100 units borrowed, the borrower must pay 110 when the (short-term) loan is due.¹¹ An interest rate is being charged here, but since the borrower does not classify or understand it in this way, asking about an interest rate will not yield accurate data. However, when borrowers are asked how much they pay per 100 units or per month, they prove as knowledgeable about the subject as would be expected.

Properly wording questions about interest requires a fair amount of investigation and experimentation. Semiformal lenders can provide useful information about informal credit arrangements, since they tend to view the informal sector as their competition and are often quite knowledgeable about its activities. Siamwalla and others (1990) found that village headmen in Thailand were a good source of at least partial information on informal lenders.

Just as past standard LSMS questionnaires have not collected accurate interest rate information, neither have they enabled calculation of the total costs of credit to borrowers. Little information has been collected on the transaction costs of credit. No data has been gathered on the distances that borrowers travel to get to lenders, and only a few of the additional fees are ever mentioned. While several questionnaires have addressed the issue of agricultural extension agents, they have ignored the fact that borrowers often pay fees to such agents for providing verification needed for obtaining a loan. The questions that would need to be included in a household survey to calculate total borrower costs are not complex. Such questions have been incorporated into the draft module in this chapter.

Estimating the total costs to the lender of screening and enforcement activities as well as of funds and related activities is beyond the scope of an LSMS survey. The data needed for such estimations can only be collected in detailed lender surveys, which may face sampling problems and the difficulty of getting access to the whole range of lenders (see Aleem 1990 for an idea of the scope of this undertaking). Lenders have little incentive to provide interviewers with complete information, particularly on the kind and extent of cost data that would be required for this analysis. Thus, in the context of an LSMS survey, it is probably unrealistic to attempt to collect data on the total costs of lending.

The Impact of Credit

The willingness of governments to intervene in credit markets is based on the perceived benefits of such intervention. As discussed in the previous section, governments often justify intervention by citing market failures and inefficiencies that need to be rectified so that households can benefit from credit. This section examines how household-level data can provide analysts with information on the effects of credit.

EVIDENCE OF THE IMPACT OF CREDIT ON PRODUCTIVITY. An important reason why governments introduce policies that aim to increase the availability and use of credit is to increase the efficiency and productivity of investment. Making investment more efficient and productive improves the economic welfare of households that depend on that investment activity—and of the economy in general. However, even where government policies have increased the amount of available credit, it is not always apparent that productivity has increased, or that it has increased to a level high enough to justify the intervention. This seeming lack of success may be due to the fact that it is difficult to measure the impact on productivity of increasing the amount of credit available. Or it may be due to the fact that, for a variety of reasons, there has been little or no impact on productivity.

Various studies have shown that credit increases crop output—thus, if land is constant, increasing productivity. Feder and others (1989) found that credit-constrained households had lower output than non-constrained households. In data from India, Khandker and Binswanger (1989) found that a 10 percent increase in the amount of credit used led to a 2 percent increase in output. Further work in India has shown the impact of credit on productivity to be of a similar magnitude (Binswanger, Khandker and Rosenzweig 1993; Binswanger and Khandker 1995). This increase was found to come primarily through increased fertilizer use.

There are a variety of difficulties involved in measuring the impact of credit on productivity. One key issue concerns the simultaneity of credit demand and supply. Actual credit use is the result of both demand and supply of credit. In order to measure the impact of credit on productivity, analysts need an exogenous determinant of the supply of credit. Khandker and Binswanger (1989) used the number of rural commercial bank branches in any given area to generate such a variable. A further

paper by Khandker and Binswanger (1989) employed a two-stage procedure wherein an equation that included the number of offices or branches of formal sector lenders was used to estimate the volume of supplied credit, and this estimated volume of credit was then used to calculate the impact of the credit on input and outputs for borrowers. These papers only addressed formal sector credit, as there is no source of equivalent information on all informal credit providers.

A single cross-section of data is of limited use in capturing the impact of credit on productivity. Instead, information is needed on the initial use of credit by a given borrower, the borrower's initial level of productivity, and the resulting productivity. In an effort to get around the need for multiyear or multiperiod data collection, Feder and others (1989, 1990, 1991) have used cross-sectional data that incorporated retrospective questions. However, survey designers should be cautious about including retrospective questions, as respondents' memory errors can cause significant bias in the resulting data set. (See Scott and Amenuvegbe 1990 for an overview of the types of problems arising from reliance on respondents' memory.)

In addition, measuring productivity requires having detailed information about the economic activity in question (whether it is a nonagricultural household enterprise or an agricultural activity) both before and after the use of credit. For nonagricultural activities this implies collecting data on such factors as business inputs, production processes, outputs, and general economic trends for regions. For agriculture, information is needed on factors such as agricultural inputs and outputs, climatic conditions, and crops. (See Chapters 18 and 19 in this volume for details of how to collect such information.)

A final point that needs to be considered when measuring the impact of credit on productivity is that because of the nature of credit markets, policies increasing credit access may have little or no effect on productivity in the activity for which funds were borrowed. First, for an increase in credit to have an impact on productivity, access to credit must have been limited to begin with. As shown in Feder and others (1991), many households do not borrow because they have no need for credit—not because they are credit constrained. Some support for this interpretation can be found in Wiens (1998) on Panama.

Second, in cases where credit is neither the only nor the most significant constraint for increased pro-

ductivity, a policy aiming to increase credit will not necessarily increase productivity as expected. The lack of complementary activities and the lack of input and output markets limit the extent to which credit can increase agricultural productivity (Feder and others 1990, 1991; Choe 1996). Third, the impact of improved access to credit in one sector may actually affect a second, different sector. This will be the case if the true credit constraint is in the second sector (Feder and others 1989). Also, to the extent that credit is fungible, the impact of credit may well be on an activity other than the one for which funds were nominally borrowed.

ADDITIONAL IMPACTS OF CREDIT. Increased credit use has been shown to raise the level of inputs used by farmers, boosting fixed investment in equipment such as tractors and irrigation pumps (Khandker and Binswanger 1989; Feder and others 1989; Binswanger and others 1993; Binswanger and Khandker 1995). In addition, credit use affects labor markets in rural areas (Khandker and Binswanger 1989; Binswanger and Khandker 1995). On the one hand, capital is substituted for labor and agricultural labor declines slightly. On the other hand, nonagricultural labor increases, often substantially. The net result is a slight increase in agricultural wages.

The use of credit also affects other household behavior and the intrahousehold allocation of resources and decisionmaking. In their study of the effect of credit on such household level outcomes in Bangladesh, Pitt and Khandker (1996) focused on the impact of credit provided through group lending schemes on schooling, labor, household expenditures, the distribution of assets in the household, malnutrition, and contraceptive use and fertility. The study explicitly controlled for the endogeneity of participation in credit programs by using a quasi-experimental design that included both households that had the choice of participating in the program and households living in other areas that did not. Additionally, the authors estimated the effects of credit separately for male and female borrowers. The study showed increased credit in a household to positively affect children's years of schooling, the labor supplied by the household, and household expenditures. For contraceptive use and fertility, the gender of the credit recipient affected the results. If the credit was received by a man, fertility increased and contraceptive use declined;

the opposite held true for women recipients. Women receiving credit also increased their asset holdings.

Comparisons of these findings with the results that would have been obtained if neither gender nor the endogeneity of credit program participation had been taken into account demonstrate the importance of these refinements. A final point that will need to be addressed, however, is to separate the effects of the credit itself from the technical assistance tied to the credit. The survey instrument used by Pitt and Khandker incorporated questions concerning technical assistance activities.

ADEQUACY OF LSMS-TYPE DATA FOR ASSESSING THE IMPACT OF CREDIT ON PRODUCTIVITY. To assess the impact of credit on productivity, analysts need two types of data. First, analysts would need to have data from two or more points in time—preferably panel data. To date, most LSMS surveys have not been designed or implemented to gather panel data, making it impossible to assess the impact of credit on productivity. As noted above (and discussed more thoroughly in Chapter 23), it is feasible to collect panel data as part of the survey design. If measuring the impact of credit is important, panel data should be collected. While it may be possible to substitute longer recall periods for panel data by adding retrospective questions, analysts will need to carefully assess the quality of such data because some respondents may incorrectly remember some details, thus introducing significant bias into the data.

Second, analysts need detailed information on the productivity of a wide variety of economic activities. Except in areas where only one crop is grown or in cases where analysts are examining only one specific type of enterprise, the effort and expense required to collect such data may be too burdensome for a multi-topic survey like the LSMS. It is not clear whether household enterprise and agriculture modules of past LSMS surveys have collected sufficient data for analyses of the impact of credit on productivity. In deciding whether to gather information for such analyses, survey designers need to take into account the costs (particularly in terms of interview length) of attempting to gather the information needed. See Chapters 18 and 19 for further discussion of this topic.

A final consideration concerns the way LSMS surveys obtain data on credit. As noted in a previous section, LSMS surveys have typically collected credit data at the household level by asking one person in the

household to list all of the loans that the household may have received. This has a serious drawback for measuring the impact of credit on productivity. As Pitt and Khandker (1996) showed in their Bangladesh study, this impact varies depending on whether men or women received the credit. Thus, as discussed previously, credit data needs to be collected at the individual level and not simply aggregated over all household members.

LSMS Surveys and Credit: Summary

A summary of the policy concerns discussed in this section can be found in Table 21.6. The table lists key credit issues for which household data can be used and the data required to carry out analyses of these issues. This chapter introduces two draft LSMS credit modules: a standard version and an abridged version. (The questionnaire pages are presented in Volume 3.) The last two columns of the table show the adequacy of each of the two draft modules in collecting the information needed for each type of analysis.

Data Collection

Two points become clear from the previous sections. First, it is not a simple matter to collect adequate data on credit use and on the impact of credit and government credit policies. Second, past LSMS surveys have not dealt with many of the complexities involved in gathering data on credit use. This section outlines the key practical issues involved in collecting data on credit use and presents two draft questionnaire modules—a standard version and a shortened version—designed to collect credit data. This section also provides recommendations on how other modules of the questionnaire will need to be adapted to ensure that sufficient data is collected. In areas where LSMS modules are insufficient, the section lists other sources of relevant data.

Key Issues

In any data collection exercise, the format of a questionnaire and its modules is shaped by the current policy priorities of the country studied. However, as has been illustrated in the previous sections, several considerations will affect almost all surveys that aim to gather information about credit. Such considerations are summarized in this subsection.

EXHAUSTIVE COVERAGE OF TYPES OF CREDIT. To ensure that all types of credit are covered in the survey, design-

Table 21.6 Summary of Policy Issues and the Adequacy of the Proposed Modules to Address Them

Policy issue	Specific issue(s) for analysis	Data requirements from credit module	Other modules from which data are required	Short module adequate?	Standard module adequate?	Questions in Standard Credit Module
Total credit use by households	Source, purpose, amount of debt	Listing of all household credit use by source	Agriculture; Household enterprise; Consumption (data on purchases of goods and food on credit)	Yes (if data are also collected in other modules)	Yes (if data are also collected in other modules)	Part A: 3–4, 7–8, 11–12, 15–16, 19–20, 22–23
Incidence of government programs	Credit programs	Credit use by program	Characteristics of households related to program, for example, housing module in the case of mortgage program, agricultural module in case of agricultural lending program, and so forth	Yes	Yes	Part B: 3, 31, 55
Credit rationed households	Ability of households to obtain credit	Refusals of loan applications, not requesting loan due to belief that will not receive	Characteristics of households such as welfare level (consumption), collateral (housing module, durable goods);	Yes	Yes	Part C: 1–6
	Shadow price of credit	Loan size and cost	Agriculture; Household enterprise (data on output, net incomes, other relevant characteristics of farmers and enterprise owners)	No	Possibly, depending on data collected in other modules	Part B
Cost of credit		Loan size, transaction and interest costs		No	Probably	Part B
Market segmentation		Sources and uses of credit	Lenders' costs (default rates, loan administration costs, cost of funds) from facility survey	Limited unless a facility survey of lenders is carried out	Limited unless a facility survey of lenders is carried out	Part B: 1–3, 29–31, 53–55
Impact of credit on productivity		Cost of credit	Agricultural; Household enterprise (for measures of productivity in investment activity)	No	Yes, if panel data are collected	Part B

Source: Author's summary.

ers should include a series of explicit and probing questions in the questionnaire. If questions are not included on all types of credit, this will lead to a serious underestimation of the use of credit in the economy as a whole, and yield a distorted picture of credit users. Two important types of credit that have often been omitted in past LSMS surveys are trade credit for productive activities and consumption credit for food and household goods.

EXHAUSTIVE COVERAGE OF ALL SOURCES OF CREDIT. Survey designers should make a serious effort to include explicit questions about all possible sources of loans. Many lenders in the informal sector have been missed by past LSMS surveys. Important sources of finance that

have rarely appeared in LSMS questionnaires include pawnshops and rotating savings and credit associations.

ACCESS TO CREDIT. Access is not simply a function of the number of lenders in a given area. Religious, ethnic, and economic factors can either facilitate or constrain access to different sources of credit. It may be necessary to obtain information on credit access by examining both formal and informal rules for obtaining credit. Borrowers may be an important source of information about informal rules.

COLLATERAL. Collateral requirements are an important determinant of access to credit, as well as of the cost of

credit. Collateral requirements may take the form of compensatory balances or real property. Care should be taken to determine both the ownership and value of collateral assets held by individuals.

COST OF CREDIT. Accurately measuring interest rates is critically important but surprisingly difficult. Given the wide disparity in views on interest rates and how they are defined and understood, survey designers need to investigate this matter thoroughly before attempting to design questions to obtain information on the cost of credit. Questions on the cost of credit should be put to direct informants—the household members actually responsible for loans—rather than to proxies.

The nominal interest rate is only one facet of the total cost of credit. Data on other transaction costs—additional fees, legal work, and costs incurred in time and transport to obtain the credit—are also needed.

PANEL DATA. Panel data are often needed to analyze the impact of credit on production and consumption and to identify liquidity-constrained households. The need for panel data may be an important consideration when designing a survey. See Chapter 23 for an overview of the costs and benefits of panel data.

INDIVIDUAL-LEVEL DATA. Households do not borrow money, individuals do. Data must be collected at the individual level both on the use of credit and on assets (collateral) and income. This is important for determining who actually obtains credit and what the barriers to credit use are. Collecting individual-level data enables analysts to study such issues as legal barriers to credit use and the intrahousehold distribution of resources and power.

GOVERNMENT POLICIES. If a survey aims to determine the impact of a specific policy or program, information will be needed from sources other than the survey instruments themselves. Government sources will need to be used to collect detailed information on the exact benefits of a program, the value of any subsidies it provides, its geographical coverage, and its eligibility criteria. Information will also be needed on programs and policies that affect credit use indirectly.

LEGAL FRAMEWORK. For credit markets to operate effectively, contracts need to be enforceable. Therefore,

it is necessary to go beyond the survey instruments to collect additional information on any aspects of the legal system that may assist or hinder the enforcement of contracts.

General Design Issues

No one questionnaire or module can be used in all countries—or even in the same country at different times. Which policy questions are high priorities will vary as policies are created or discarded. The resources available for carrying out a specific survey will also change. Thus the draft questions and modules in this section must be modified to fit policy interests and credit market characteristics in the country of the survey, as well as the resources available to conduct the survey.

Questionnaire design is complicated by the variety of ways in which credit is provided. For data collection purposes, a distinction is made between receiving monetary loans and purchasing goods on credit. Monetary loans can be defined as loans given and received in monetary terms regardless of whether the borrower receives cash or goods. For example, a loan for agricultural inputs made by an agricultural cooperative to a farmer is the same regardless of whether the borrower can use the money at his or her discretion or whether he or she must use it to buy inputs from the cooperative that gave the loan. In the draft questionnaire, information on monetary loans is collected in the credit module; data on purchasing goods on credit are collected by adding questions to other modules of the questionnaire. Although the distinction between these two types of credit is somewhat artificial, interviewers must be trained to recognize this distinction and to classify credit activities correctly.

A distinct credit module is needed for several reasons. First, data must be collected at the individual level to ensure that the data are highly accurate and comprehensive and to allow analysts to link a borrower's characteristics with his or her credit use. Second, not all credit is linked to a specific productive activity. If questions on credit were asked only at the level of the household, agricultural activity, or nonagricultural business, it would be extremely difficult to ensure that all data on credit were collected and that no double counting of credit occurred.

The credit module alone cannot capture all of the types of credit used by households; questions also need to be added to other modules of the questionnaire.

Placing certain credit questions in other modules is useful for several reasons. First, for some analyses it is important to associate credit with specific activities. Second, putting questions on agricultural credit (say, supplier's credit for fertilizers) in the agriculture module improves the flow of an interview, preventing it from skipping back and forth among topics. Finally, adding credit questions to other modules makes it possible to place questions concerning other aspects of credit, such as collateral, in their logical places in the questionnaire.

A final, practical benefit of putting questions on credit both in a credit module and in other modules is that this enables the survey team to cross-check credit data. Given that the use of credit can be a sensitive matter for some people, they may understate the extent to which they use it—resulting eventually in the underestimation of total credit use in a given country. It is essential that survey designers take steps to avoid such underestimation, especially since household survey data are necessary for any estimates of total credit use in a country (and not just of formal and semiformal credit).

Adding Questions to Other Modules

Questions about credit need to be added to the modules on housing (Chapter 12), savings (Chapter 20), consumption (Chapter 5), agriculture (Chapter 19), and nonagricultural household enterprises (Chapter 18).

HOUSING. Two types of questions need to be added to the housing module. First, researchers must ask which household member owns the housing unit. This is necessary because one of the keys to being able to borrow is owning marketable assets that can serve as collateral, and the most important of these assets is housing.

Second, researchers must ask questions to collect data on mortgages and the terms and balances of mortgage loans. These questions are important because obtaining housing is a common reason for borrowing and incompletely paid mortgage loans are often the largest of people's debts.

The housing module that has been used in most LSMS surveys already contains much of the information needed on credit (see Chapter 12). To capture information on the legal status of the housing, the ownership of the asset, and the existence of outstand-

ing loans, about five or six questions need to be added to the housing module. These are shown in the Questionnaire Example 1. The first question, a standard one usually found in LSMS housing modules, is contained in the draft module in Chapter 12. The Chapter 12 module additionally includes Questions 7 and 8, which have also become more common in recent surveys.

DURABLE GOODS. The only question that needs to be added to the durable goods part of the consumption module concerns who owns specific items. (Durable goods are discussed in Chapter 5 on consumption.) Because, like housing, many durable goods can be used as collateral for other loans, it is important to determine who in a household actually owns the goods in question. There is no reason to apply the ownership question to all durable goods as many durable goods are not appropriate for collateral. Which goods can be used as collateral and which are most frequently used will vary from country to country; some preliminary investigation on this topic will be needed in each country. For those goods that can be used as collateral, a question should be added to this part asking for the identification code of the person who owns the item (Questionnaire Example 2). Where feasible, the durable goods for which ownership questions will be asked should be listed together on the questionnaire. This will help ensure that these questions are not accidentally omitted during the interview.

If analysts wish to know whether the durable goods were obtained through credit, one question should be added asking how each good was obtained. However, this question can lead to double counting if the item was purchased with loan funds. Thus in the resulting data set it must be possible for analysts to be able to distinguish the type of credit used to purchase the good. And analysts will have to be careful to ensure that this distinction is respected.

SAVINGS. Savings can take a variety of forms, some of which can be used as collateral. Chapter 20 provides a detailed discussion of the various forms of savings, including liquid assets and nonliquid assets, both of which can be used as collateral for borrowing. Items of value can be pledged or pawned, and money deposits (compensatory balances) are a standard requirement in many credit unions and banks.

Thus it is important to collect savings data in general but also specifically at the individual level. However, it can be difficult to get respondents to answer questions about their savings, especially ques-

tions about deposits. Chapter 20 discusses the difficulties associated with asking for such information. The standard version of the savings module presented by that chapter provides examples of how to collect sav-

Questionnaire Example 1: Credit Questions to Be Added to the Housing Module

1	How did your household obtain this dwelling?	PRIVATIZED 1 PURCHASED FROM A PRIVATE PERSON..... 2 NEWLY BUILT 3 COOPERATIVE ARRANGEMENT 4 SWAPPED 5 (> 10) INHERITED 6 (> 10) OTHER 7 (> 10)	<input style="width: 80px; height: 20px;" type="text"/>
2	Did anyone in this household borrow money to purchase this housing unit?	YES.....1 NO.....2 >>> 7	<input style="width: 80px; height: 20px;" type="text"/>
3	From what person or institution was money borrowed to purchase this housing unit?	GOVERNMENT HOUSING BANK..... 1 OTHER PUBLIC HOUSING PROGRAM 2 PRIVATE BANK BUILDING SOCIETY .. 4 CREDIT UNION OR OTHER COOPERATIVE EMPLOYER OR LANDLORD 6 RELATIVE OR FRIEND 7 OTHER INSTITUTION [SPECIFY _____]..... 8 OTHER INDIVIDUAL [SPECIFY _____]..... 9	<input style="width: 80px; height: 20px;" type="text"/>
4	In what year was this money borrowed?	Year	<input style="width: 80px; height: 20px;" type="text"/>
5	What was the total amount borrowed?	Currency	<input style="width: 80px; height: 20px;" type="text"/>

6	How much is still owed? <div style="text-align: right;">Currency <input style="width: 80px; height: 25px;" type="text"/></div>
7	Does any member of the household have a title or any document that shows ownership of this dwelling? YES ..1 NO.....2 (>10) <input style="width: 100px; height: 25px;" type="text"/>
8	What type of title? FULL LEGAL TITLE, REGISTERED 1 <input style="width: 100px; height: 25px;" type="text"/> LEGAL TILE, NOT REGISTERED 2 PURCHASE RECEIPT 3 OTHER, SPECIFY _____ .. 4
9	Which person holds the title or document to this dwelling? [INTERVIEWER: WRITE ID CODE OF THIS PERSON IN THE BOX, FROM HOUSEHOLD ROSTER] <input style="width: 100px; height: 25px;" type="text"/>

Note: Question numbers are to show sequencing and skip patterns.

Questions 1-2: The first question serves to determine which households might have borrowed for their present housing. Those who inherited their housing or swapped for it have clearly not borrowed and thus are sent on to the ownership questions. Question 2 is a further filter question; if no borrowing for housing occurred, the respondent is sent directly to questions on ownership. If borrowing for housing did occur, the respondent is sent to Question 3, the first in a series of questions about the characteristics of the loan.

Questions 3-6: These questions are designed to collect basic information on the mortgage loans. If there are specific credit programs for housing, these need to be included as options in Question 3; the other categories listed must be adapted to the local housing loan market. Depending on the importance of housing finance and policies, it may be worthwhile to add more questions here to obtain details about the terms of credit. While some of this information may be collected in the credit module, the relative rarity of mortgage borrowing means that very few households will have borrowed for a mortgage in the past 12 months and, hence, little information on this type of credit will be collected.

Questions 7-9: These questions allow ownership of housing to be connected to the individual providing data that will be added to determine the assets (collateral) an individual owns. The categories in Question 8 will need to be very carefully adapted to the local legal situation, taking into account types of formal, legal ownership as well as the variety of informal claims that confer different values on the housing studied.

ings information. Although the questions are designed to be administered only at the household level, they can easily be adapted for use at the individual level. The short version of the savings module is inadequate for determining ownership of assets and savings.

CONSUMPTION. Many purchases of food and common household products are made on credit. Questions must be added to the consumption module to ensure that all such consumption credit is captured. While analysts would ideally like to know the exact quantities of food and other items purchased on credit and the sources of credit for each item, there are practical difficulties involved in gathering such information. Even without such credit questions the consumption

module is extremely long and takes up a significant amount of the total interview time—and may become tedious for the respondent. Thus it is not feasible to add new questions for each food item on the list.

Two recommendations are made here that should allow for a rough estimate of such credit without excessively lengthening the questionnaire. First, a series of questions should be added inquiring about purchases on credit at an aggregate level rather than for individual products. The dilemma is whether it makes more sense to group products by category (for example, fresh fruits and vegetables, meats, breads, cleaning products, and so on) or by point of purchase (for example, supermarket, open air market, and so on). These different aggregations can have the same

Questionnaire Example 2: Credit Questions to Be Added to the Durable Goods Part of the Consumption Module

1. Does any member of the household own a:	2. Who owns this item? [INTERVIEWER: WRITE IN THE ID CODE OF THE OWNER]	3. How many years ago did you acquire this [ITEM]?	4. How was this [ITEM] obtained? OWN CASH 1 CASH FROM LOAN.....2 ON INSTALLMENT...3 OTHER CREDIT..... 4 GIFT..... .5 (>6) PAYMENT FOR SERVICES..... .6 (>6)	5. How much was paid for this [ITEM]? (>7)	6. How much was this [ITEM] worth when you received it?	7. If you wanted to sell this [ITEM] today, how much would you receive?
YES.....1 NO. 2>(NEXT ITEM)						
Refrigerator						
Television						
Stereo						
Tape recorder						
Sewing machine						
Motorcycle						
Car						
Truck						

Note: Questions 1, 3, 5, 6, 7: These questions will vary depending on considerations other than credit. See Chapter 5 on consumption.

Question 2: This is the additional question for determining ownership.

Question 4: This is designed to determine if the item was purchased using some credit mechanism. The terminology will have to be adapted, but the categories need to be maintained.

results for specialty stores such as bakeries and pharmacies. However, in the real world, many stores do not specialize in only one product, and survey designers must make some choices. The proposed questions below collect data by category of good rather than by point of purchase. The advantage of this method is that since food purchase data is collected product by product, analysts can estimate the value of credit for categories of goods without asking detailed additional questions. If credit information is collected in some aggregate of these products, the value of the purchases is already known and only the share of such purchases made on credit is needed to determine the value of the credit. If the questions were phrased in terms of points of purchase, it would be necessary to gather further information on how much money was spent at each of these points. (If data on consumption were collected by point of purchase, this argument would be reversed. See Chapter 5 on consumption.)

The most important criterion for deciding whether to collect data by category of good or by point of purchase is the ease with which respondents can supply the necessary information; this determines

whether the information they give is likely to be accurate and detailed. Thus, it will be necessary to do extensive pre-testing of this module. It may be worthwhile to test the two alternatives in a pilot exercise to ensure that the most effective design is chosen.

The second suggestion for collecting data on consumption credit without unduly lengthening the questionnaire is to collect data only for the 12-month reference period rather than for both the 12-month and 30-day reference periods. This suggestion assumes that access to consumption credit does not vary much throughout the year, although in areas with severe weather fluctuations or high covariate risk or in areas where poverty is severe, this may not be the case. If survey designers expect seasonality to affect access to this kind of credit, it is more appropriate to apply the shorter reference period to these questions (assuming a 12-month interview schedule). Again, prior knowledge of the area where the questionnaire is to be administered is needed, as is pre-testing.

Questionnaire Example 3 shows how to collect these data for food purchases. Similar series of questions should be created for other non-food purchases—from

common expenditures on items such as detergents to expenditures on larger items such as clothing and small appliances. (Similar questions should be added for durable goods; see preceding discussion on durable goods.)

A final consideration is the cost of acquiring credit for consumption. Are there price differentials between cash purchases and credit purchases? If so, this has serious ramifications for valuing total consumption (see Chapter 5). While it will not be feasible to collect detailed information on such price differentials, some rough calculation may be possible with the answers to some very basic questions. Determining the exact phrasing and format of these questions will, however, require some preliminary

knowledge of the issue in the location where the questionnaire is to be administered. Two different ways of obtaining this information are included here; the pilot test should help determine which is preferable or if both are needed.

HOUSEHOLD ENTERPRISES AND AGRICULTURAL ACTIVITIES. Four key issues concerning credit need to be addressed in both the module on agriculture and the module on nonagricultural household enterprises. Survey designers will have to be careful to ensure that these two modules are compatible with the credit module. This is especially true if they decide to use the short versions of either module as this will limit the possibilities for credit analysis.

Questionnaire Example 3: Credit Questions to Be Added to the Food Purchases Part of the Consumption Module

1.	Do you or any members of your household purchase food on credit in other words, buy food and pay for it at a later date? YES.....1 NO.....2 (>22)		<input type="text"/>
2.	On average, during the past 12 months, what percentage of all fresh fruits and vegetables purchased did you obtain on credit? [IF ZERO, >> 7]	Percent	<input type="text"/>
3.	When you purchase fresh fruits and vegetables on credit, do you pay a higher price? YES.....1 NO.....2 (>6)		<input type="text"/>
4.	On average, in percentage terms, what is this price difference?	Percent	<input type="text"/>
5.	What was the difference in price between the cash price for [ITEM] and what you paid for [ITEM] on credit the last time you purchased [ITEM]?	<input type="text"/>	<input type="text"/>
		Cash	Credit
6.	Where do you obtain the majority of the fresh fruit and vegetables that you purchase on credit? PRIVATE INDIVIDUAL.....1 SMALL STORE (PRIVATE).....2 SUPERMARKET (PRIVATE).....3 GOVERNMENT STORE.....4		<input type="text"/>
7.	On average, during the past 12 months, what percentage of all fish, meat and dairy products purchased did you obtain on credit? [IF ZERO, > 12]	Percent	<input type="text"/>
8.	When you purchase fish, meat and dairy on credit, do you pay a higher price? YES.....1 NO.....2 (>11)		<input type="text"/>

Questionnaire Example 3 (continued)

9.	On average, in percentage terms, what is this price difference?	Percent <input type="text"/>
10.	What was the difference in price between the cash price for [ITEM] and what you paid for [ITEM] on credit the last time you purchased [ITEM]?	<input type="text"/> <input type="text"/> Cash Credit
11.	Where do you obtain the majority of the meat and dairy products that you purchase on credit? PRIVATE INDIVIDUAL.....1 SMALL STORE (PRIVATE).....2 SUPERMARKET (PRIVATE).....3 GOVERNMENT STORE.....4	<input type="text"/>
12.	On average, during the past 12 months, what percentage of all grains and cereal (unprocessed) purchased did you obtain on credit? [IF ZERO, >17]	Percent <input type="text"/>
13.	When you purchase grains and cereals on credit, do you pay a higher price? YES.....1 NO.....2 (>16)	<input type="text"/>
14.	On average, in percentage terms, what is this price difference?	Percent <input type="text"/>
15.	What was the difference in price between the cash price for [ITEM] and what you paid for [ITEM] on credit the last time you purchased [ITEM]?	<input type="text"/> <input type="text"/> Cash Credit
16.	Where do you obtain the majority of the grains and cereals you purchase on credit? PRIVATE INDIVIDUAL.....1 SMALL STORE (PRIVATE).....2 SUPERMARKET (PRIVATE)..... 3 GOVERNMENT STORE.....4	<input type="text"/>
17.	On average, during the past 12 months what percentage of all canned and processed food purchased did you obtain on credit? [IF ZERO, > 22]	<input type="text"/>

Questionnaire Example 3 (continued)

18.	When you purchase canned and processed food on credit, do you pay a higher price? YES.....1 NO.....2 (>21)		<input type="text"/>
19.	On average, in percentage terms, what is this price difference?	Percent	<input type="text"/>
20	What was the difference in price between the cash price for [ITEM] and what you paid for [ITEM] on credit the last time you purchased [ITEM]?	<input type="text"/>	<input type="text"/>
		Cash	Credit
21.	Where do you obtain the majority of the canned or processed goods you purchase on credit? PRIVATE INDIVIDUAL.....1 SMALL STORE (PRIVATE).....2 SUPERMARKET (PRIVATE).....3 GOVERNMENT STORE..... 4		<input type="text"/>

Note: Question 1: This is the filter question for food purchases on credit. While this question is needed to ensure that households not using credit to buy food are not annoyed by the following questions (which would be irrelevant), the question must be carefully worded so that all informants understand what is being asked, and no households that actually do purchase on credit are excluded from this section.

Questions 2, 7, 12, 17: These questions determine the share of purchases made on credit. Each of these questions actually contains two separate questions: Do you purchase any [food item type] on credit? and If so, what percentage of [food item type] is purchased on credit? While it is efficient to merge these two questions, it is imperative that interviewers be well trained to ensure that zeros are written in when the household makes no such purchases. Here the difference between zero and blank is quite important; interviewer errors will be common if this is not made clear in their training and checked during data entry.

Questions 3, 4, 5, 8, 9, 10, 13, 14, 15, 18, 19, 20: These trios of questions aim to determine what price differences exist between goods purchased with cash and goods purchased on credit. These questions have not been used in LSMS surveys, and there is limited experience on how important these questions are and how they should be phrased. Work done in Pakistan (Mansuri 1993) showed a five percent differential between cash and credit prices. Clearly pre-testing and other knowledge of the area where the survey is being carried out are needed. If it is determined that the price differential is negligible and/or that the difference is standard for certain products or by area, it may not be necessary to include these questions.

Questions 4, 5, 9, 10, 14, 15, 19, 20: If it is determined that questions are needed on price differentials between cash and credit purchases, the difficulty will be in obtaining accurate information. The questions here try to find out the percentage markup for a category of purchases. The markup may not be standard across types of items, or the respondent may only be able to quote the price difference and not give a percentage figure. These possibilities are accounted for by the second of the two questions in each category, which ask for the explicit price difference between cash and credit costs of one item per category. The item used should be a commonly purchased item, or represent an important share of total purchases in the category. Given the complexities involved, it will be useful for interviewers to write any calculations they make (converting price differences to percentage terms, for example) in the side margin of the questionnaire page. Supervisors should check these calculations before passing the questionnaires to the data entry phase.

Questions 6, 11, 16, 21: The list of purchase points will have to be adapted for each country. The key considerations are to be exhaustive and to focus on any types of sales points that might be of policy relevance. Government stores versus private stores may be an important distinction; specialty stores versus supermarkets might be another. If there is a policy interest in where credit is provided (as opposed to just its availability) it may be useful to add this list of purchase points to the community questionnaire to determine access.

The small store in the answer lists for these questions could include more informal shops such as *kioskos* in the former Soviet Union or *pulperias* in Central America.

The first use for credit data gathered in the agricultural and the household enterprise modules is to link and cross-check loan data gathered in the credit module. In the process of identifying the appropriate respondent for the agricultural or enterprise activities,

the interviewer should check the answers in the credit module given by that individual and determine if he or she received a loan for agriculture or a household enterprise. Questionnaire Example 4 provides an example of the type of questions to add to the agri-

Questionnaire Example 4: Credit Questions to Be Added to the Agriculture Module

1. [INTERVIEWER: WRITE IDENTIFICATION CODE OF HOUSEHOLD MEMBER INVOLVED IN AGRICULTURE:]	2. [INTERVIEWER: CHECK QUESTION NUMBER ** IN CREDIT MODULE: DID THIS PERSON STATE THAT RECEIVED LOAN FOR AGRICULTURE IN PAST 12 MONTHS? YES.....1 NO.....2

Note: Question numbers are included only to show sequencing and skip patterns.

Questions 1, 2: The first two questions of the agricultural (or nonagricultural business) module will be filled in by the interviewer before the second-round interview. Question 1 identifies which household members to administer the agricultural (or nonagricultural business) questions to. Question 2 requires the interviewer to review the credit module and determine if the respondent reported borrowing for agricultural (or nonagricultural business) purposes.

culture module; the same type of questions should be added to the household enterprise module.

These added questions can be compared with answers to questions on loans within the agriculture and nonagricultural enterprise modules to ensure that no loans are missed. (This assumes that the agricultural and household enterprise modules contain a general question that associates a loan with a specific plot¹² or household enterprise.) If a respondent claims to have received credit but there is no sign of this credit in his or her answers to the questions in the credit module, the interviewer should try to reconcile this discrepancy. If necessary the interviewer should re-administer the credit module to this person to ensure that his or her credit data are accurate.

The second issue to be addressed in the agricultural and household enterprise modules is the issue of supplier credit. Survey designers may decide to include questions on this subject in these modules for the purposes of analyzing agricultural and household enterprise issues rather than credit issues. A discussion of these types of questions can be found in Chapter 18 although not in Chapter 19. Detailed examples of such questions are not provided here. (See Chapter 18 for ways to formulate these questions.) However, there are two points that survey designers should bear in mind when assessing whether the questions about supplier credit in these two modules are adequate for analyzing credit issues. First, while it would be possible to include an overall filter question for supplier credit for farm (or household enterprise) inputs in each of these modules, it would be better to include a series of detailed questions (by type

of product) to ensure that all supplier credit is captured. The prevalence and size of this source of credit justifies the additional questions. Second, additional questions about the source, magnitude, and repayment terms of supplier credit are needed. This series of questions should be repeated for all key inputs or groups of inputs, and an additional question at the end of the series should ask if any other items were obtained on credit and, if so, which items, and for how much.

The third credit issue that needs to be addressed in the agricultural and household enterprise modules is the ownership of collateral such as real estate (land and buildings) and other assets. As with housing, it is necessary to gather data on the ownership of land and nonresidential buildings as well as other assets at the individual level rather than at the household level.

The final credit-related issue that needs to be addressed in the agricultural and household enterprise modules is the issue of sales of outputs on credit. Like the questions on supplier credit, questions concerning sales on credit by the farmer or firm are already likely to be included in these modules for other analytical reasons. Detailed information on how to formulate these questions is provided in Chapters 18 and 19. Again, survey designers need to ensure that the wording of the questions in these two modules meets the needs of credit analysis.

The Credit Module

The separate credit module is designed to capture information on all borrowing in monetary form—in other words, all credit excluding supplier credit and

the goods purchased on credit that are covered in other modules—in the previous 12 months. The module is broken down into four parts: use of credit, costs and terms of credit obtained, credit history, and lending. The module should be administered to all individuals of working age (without an upper age limit), regardless of whether they are actually working.

The placement of the credit module in the questionnaire will come from a compromise between two considerations. On the one hand, because credit questions are sensitive, it is better to place the module as late in the interview as possible. The longer the interviewer and the respondent have interacted before the credit questions are administered, the more likely it is that trust will have been established between them—minimizing the likelihood that respondents will refuse to respond or will give interviewers incorrect information. For this reason, in past LSMS surveys credit modules have usually been administered last.

On the other hand, since credit data are collected at the individual level, they need to be collected during the individual-level phase of the interview. During the first round of the survey the interviewer collects information directly from all household members; due to the different schedules of each household member this often requires the interviewer to make a series of visits to the household. Given the importance of getting credit information directly from those who are responsible for that credit, and given the cost involved in interviewing each household member, it is important that whenever possible, all individual level modules are administered in one sitting. This means that the credit module must be administered in the first round. However, within this first round, it is recommended that the credit module be placed directly after the employment module, to take advantage of skip patterns (since the credit module is administered to all people of working age). This is a reasonable compromise as it means that the module will come late in the individual-level interviews while still ensuring that the information is collected from the direct informant.

PART A: USE OF CREDIT. The questions in this part explicitly ask about loans from a wide variety of sources, starting with the most informal (and most likely to be missed) and moving to the most formal. The questions are designed to elicit information on all loan activity in the previous twelve-month period.

The questions will provide the analyst with both the total number of loans obtained in the period and the total amount of borrowing by the individual. All of this information will be broken down by source of funds.

The part also determines the last date a loan from a particular source was obtained. This helps demonstrate which persons borrow (even if not in the past 12 months) and what credit sources are available to them. Finally, the part contains information on total debt of the individual, again broken down by source.

PART B: COSTS AND TERMS OF CREDIT. While one would, ideally, like detailed information on all loans held by individuals, obtaining such information requires more questions and time than are feasible in an LSMS or other multitopic survey. The other extreme, collecting no detailed loan information at all, would limit the types of analyses that could be done and in many cases would be unacceptably restrictive. The part presented here represents a compromise between these two extremes: data are collected only on the loans that a person has most recently obtained. The data are collected by loan purpose: agriculture, nonagricultural businesses, or consumption. This matches the data collected on purchases on credit in the three parts, enabling some assessment of total borrowing for each of these activities.

While Part B appears quite lengthy, in fact it comprises the same twenty-eight questions repeated for each of three possible loans. Since very few individuals will have more than one type of loan from more than one source, it is expected that much of this part will not be used by most respondents. Adding to this the fact that only a small minority of households has loans, the average time devoted to this part will be quite small.

The range of questions that can be asked about a specific loan is quite broad. It is clear that the draft module proposed here is more limited than that of surveys devoted entirely or primarily to credit. This is a function of the tradeoffs required in doing a multitopic survey as opposed to a single-topic one. As noted earlier, the data that can be collected in an LSMS or other multitopic survey may not be adequate for all types of credit analyses. Examples of topics not addressed here are the long-term relation a borrower has with a lender and the details on all short-term credit obtained in a year.

PART C: PAST USE OF CREDIT. Part C of the credit module, on credit history, should be asked of all individuals regardless of whether they have received credit in the previous 12 months. Part C also examines the issue of credit access. Questions are asked about loan applications that were refused, whether a person wanted credit even though he or she did not apply for it, and what a person thinks about his or her chances of obtaining a loan from the lenders in the market. These questions enable analysts to examine the characteristics of people whose access to the credit market is limited—as well as of people who perceive that their access is limited.

PART D: LENDING ACTIVITIES [OPTIONAL]. This part is designed to identify individuals who lend money to others. Because such information is not available from any other source, this part is very important. However, there are several drawbacks to including this part (which explain why it is considered optional here). The most compelling argument for not including this module is that given the sample size of LSMS-type surveys, so few people may be identified that it may not be worthwhile to try to collect this information.

Another argument against including Part D is that it touches on what may be a very sensitive area. Even though every attempt has been made to make the part as unthreatening as possible to the lender, including such a part may not be possible in certain countries. If there is a great deal of negative press or bad feeling about informal lenders, lenders may not wish to tell interviewers about their lending operations. In such cases it is best to leave out this part to avoid the risk of obtaining poor-quality data and the risk of interviewees refusing to collaborate with the remainder of the survey.

If Part D is included, it is important to minimize the extent to which respondents feel uncomfortable with this part. This is done in the Part D of the draft credit module. The respondent is never referred to as a lender, nor is the respondent asked about his or her lending activities. Instead the questions refer to who “owes you money” or “who borrowed from you.” No questions are asked on interest rates charged and other sensitive terms of lending. And the part has deliberately been kept quite short.

If Part D is omitted analysts have to rely on the detailed loan data from Part B for information on how the informal market works. If survey designers decide to omit Part D, they may wish to gather additional information about informal lenders in Part B, such as

names and occupations. After Question 2 in Part B, a new Question 3 should ask: “What is the main occupation of this person [the lender]?” The question can be coded with the occupational categories used in the employment module.

The Short Version of the Credit Module

To shorten the credit module, survey designers must first determine which policy issues are a high priority in the country. With these issues in mind, they can decide which of the credit parts and questions can be dropped and which must remain. For most general analysis, basic information is needed on use of credit, access to credit, and ownership of collateral. If the survey is intended to evaluate a specific policy, appropriate questions may be added.

USE OF CREDIT. The use of credit could be covered in a substantially reduced credit module that includes Part A and some of Part B of the standard version of the credit module. Even in the shortened version this module must be administered at the individual level, not the household level. As in the draft short version of the module in Volume 3, a series of 24 questions may be used to determine the number of loans that the respondent has received in the past 12 months as well as some key details about his or her most recent loan. This will allow the analyst to determine the individual’s total debt, but it will not provide data on the cost of obtaining or repaying a loan, nor will it provide data on the total inflow or outflow associated with credit use in any given time period. To be sure to capture all credit use, additional questions about the use of credit should be included in the consumption, agriculture, and household enterprise modules. The series of questions about supplier credit and purchases “on credit” can be reduced to a simple “Yes/No” question in each module, phrased as follows: “Did you, or anyone in your household, purchase any food (agricultural supplies/businesses inputs) on credit during the past 12 months?”

However, it is important to keep in mind that these questions are included in these modules for specific analytical purposes not related to the analysis of credit. Thus survey designers should consult the analytical objectives of the other modules before deciding to delete these questions.

ACCESS TO CREDIT. The questions that determine individuals’ use of credit also yield a great deal of infor-

mation about their access to credit. Additional questions that reveal credit access are in Part C of the standard credit module, on credit history; most of Part C is incorporated into the short version of the module. These questions are not controversial and can be answered quickly.

COLLATERAL. As discussed above, the questions on collateral are placed in the housing, agriculture, and household enterprise modules. To shorten the questionnaire these questions can be simplified to “Who owns the asset?” and “What form of title does this person hold?” The type of title is just as important as who owns the asset, so the latter question should not be dropped. Identifying individual ownership of goods may also be a priority for analysts of the primary topic of these other modules. The planning of these modules and the credit module will have to be closely coordinated.

Community-Level Data

The community questionnaire can be used to gather information on the pool of lenders in the community. These community-level data are needed to determine the extent to which the location of lenders, as opposed to the characteristics of borrowers, may be affecting access to credit. A simple series of questions in the community questionnaire can address this issue (see Chapter 13 for details).

However, there are three limitations to the usefulness of the community questionnaire for identifying lenders. (These limitations do not apply to identifying schools and other facilities.) The first difficulty is in identifying informal lenders. It is likely to be relatively easy to identify formal lenders in the community, as this information is usually available at the national level at the agency that registers banks.¹³ Even many semiformal institutions can be identified this way.¹⁴ For identifying informal lenders no such lists exist. Other lenders in the community can often supply information on informal lenders, but this usually only includes people who lend systematically. There is unlikely to be any source of information on truly informal loans between relatives and/or friends. It is not clear that the community questionnaire will be able to collect such information either; thus the community questionnaire will probably underestimate the availability of credit in the community.

The second limitation is that all of the lenders utilized by individuals may not be located in the individ-

uals’ communities. Community leaders are unlikely to be able to identify lenders outside the community—again contributing to underestimation of the availability of credit to community members.

A third limitation is that borrowers’ physical access to lenders is not equivalent to actual access. Unlike education, for which the presence of a public school indicates that all children have access to schooling if they so desire, the presence of a lender has little to do with whether a community member is able to borrow. The number of lenders from which any one person can borrow is limited by factors including his or her economic status, investment activity, and ethnic or religious status. To analyze people’s access to credit, it may be more relevant to collect information on the borrowers’ perceptions of their access than on any physical list of lenders in a given area (along the lines of the final question in Part C of the credit module).

Facility-Level Data

If analysts want detailed information on lenders, a facility survey may need to be incorporated into the overall survey, since information on lenders is usually better obtained from service providers than from community leaders. However, a facility survey focusing on credit providers may yield less useful information than those that have typically been used in LSMS surveys focusing on schools or health facilities. Such a credit-focused survey may also require significantly different fieldwork techniques.

On the positive side, formal lenders and even most semiformal lenders are willing to provide information on their lending policies and requirements (as this information is already in the public domain). They are often willing to release annual reports indicating the total assets of their institutions. And semiformal institutions often provide valuable information on private lenders because they see private lenders as their competitors. Such information may include what interest rates are charged, what collateral is required, and what other fees are charged in the credit market. The information can be used to cross-check the household data and, if need be, to fill gaps in individual-level data.

On the negative side, lenders of any type rarely provide disaggregated information on the number of borrowers that they serve, the share of loans by purpose/sector, the average loan size, or other similar

information. This is partly because of how lenders maintain their accounting and financial records (especially lenders that are not computerized). But it is also due to their frequent unwillingness to share such information, which can often be an insurmountable problem.

To boost the quality and quantity of data collected on the informal sector, efforts must be made to establish trust between the interviewer and the community—and especially between the interviewer and moneylenders. In a Thailand study interviewers lived in communities for long periods of time to establish this trust (Siamwalla and others 1990). While potentially effective, this technique is probably not feasible in the context of a multitopic survey.

Other Sources of Data

Several other sources of data can be used to complement the data gathered from households, communities, and facilities.

REGISTRIES OF LENDERS. At the national level, data can often be found at the superintendency of banks, associations or federations of credit unions (or cooperatives), and similar institutions. These data sources can yield information about the location of all of the main offices of such lenders and their branches throughout the country. Information on total assets, the amount of money loaned, and bad debts is also sometimes available from these sources.

LEGAL SYSTEM. Analysts of credit issues are often interested in three types of laws. First, basic laws governing the formation of financial institutions can provide an explanation for the observed form and distribution of formal sector lenders in a given country. (Additional laws may exist that regulate semiformal lenders.) Second, information about contract law and the extent to which it is enforceable helps analysts understand the availability and use of credit. Third, information will be needed on any laws that may affect credit use either directly (say, by creating specific lending programs or by banning discrimination) or indirectly (tax laws).

OTHER STUDIES. Small sociological or anthropological studies may exist that explore the attitudes of the population toward lending and borrowing and the various forms such activities take in a given country. These studies will be important sources of information for survey designers; they will ensure that the question-

naire accurately captures all of the lending activities in which individuals and households are engaged.

Detailed Discussion of Questionnaire Modules

This section contains detailed notes on the two credit modules in Volume 3. In addition to these specific suggestions, the questionnaire design team needs to keep in mind that all questions will need to be adapted to local circumstances.

Standard Credit Module

PART A: USE OF CREDIT. As discussed previously, people may be sensitive about providing information on their borrowing activities. One way to make Part A less threatening to respondents is to replace the word “borrow” with the word “lend”—asking how many times someone lent to the respondent rather than asking how many times the respondent borrowed.

This module should be administered to people of the same ages as the respondents for the labor module—with no upper cutoff limit.

A1–A2. These questions enable analysts to distinguish credit data provided by the individual borrower from indirect credit data (which are likely to be of much lower quality).

A3–A6, A7–A10, A11–A14, A15–A18, A19–A21, A22–A25. These groups of questions contain essentially the same questions repeated for six different types of lender: family or friends, employer or landlord, credit union, cooperative or NGO, bank or government agency, rotating savings and credit association, and other.

A3, A7, A11, A15, A19, A22. For added clarity, these questions not only refer explicitly to loans but also explain exactly what is meant by adding the phrase “funds that you have to repay.” (People tend to under-report loans, especially loans from family members.)

A4, A8, A12, A16, A20, A23. These questions, used in conjunction with the first questions in each group, allow an estimation of average loan size by lender and average loan size provided to each type of borrower.

A5, A9, A13, A17, A21, A24. For respondents who have borrowed in the past 12 months, each of these ques-

tions provides the date of the most recent loan from one source. For respondents who have not borrowed in the past 12 months, these questions allow analysts to determine if the person has ever borrowed money, and if so, how recently. It is not feasible to attempt to collect credit data beyond a limited time period (here, 12 months).

A6, A10, A14, A18, A25. The information collected in these questions includes borrowing outside the 12-month reference period, and may differ from the total amount borrowed during this period. The series on rotating savings and credit associations does not include a question on the total debt of the borrower as this is inappropriate for this type of lending arrangement.

A26–A27. Cash loans may be obtained by pawning personal and household goods, especially in urban areas.

A28. This is a filter question to determine if Part B of the module should be administered to the respondent. This is an awkward question, since reviewing the answers to A5, A9, A13, A17, A21, A24, and A26 can stop the flow of the interview. In training sessions, interviewers should be taught how to do this review of Part A quickly and accurately without losing the thread of the interview.

PART B: DETAILS OF CREDIT. The respondents for this part are all people of working age (with no upper age limit) who borrowed in the 12 months prior to the interview. This part is essentially three series of identical questions: the first on borrowing for agriculture, the second on borrowing for nonagricultural enterprises, and the third on borrowing for consumption. The following notes are based on the first series of questions, for agriculture, but are relevant to all three series.

B1. If the respondent has not borrowed any money for agricultural purposes in the past 12 months, the interviewer skips to B29, which asks if the respondent has borrowed for nonagricultural enterprise activity. If the answer to B29 is no, the interviewer skips to B53, which asks if the respondent has borrowed for consumption. If the answer to B53 is no, the interviewer moves on to Part C.

B2. From this question on, data are collected only for the most recent loan for agriculture. This question asks for the specific purpose of the loan. Only the main purpose is collected here; it may be worthwhile adding an option for respondents to give two or three purposes. Still, because money is fungible, adding more purposes may not significantly improve knowledge of how the loan is used.

B3. As the source of the loan is very important, one wants the list of options here to reflect all types of lenders that exist. The list will need to be customized for the country where the survey is being administered. A useful list will allow the analyst to determine if the source is formal, informal, or semiformal as well as whether it is a government program (direct or sponsored) or not.

B4–B8. These questions are designed to determine the transaction costs of obtaining a loan. The variety of costs charged to the borrower for the loan (Question B8) will need to be customized for the specific setting, in terms of both content and the names by which certain items are known.

B9–B10. Many NGOs—and some banks and credit unions—provide their clients and borrowers with technical assistance. This assistance may take the form of help in drawing up loan applications and designing projects, or the teaching of loan fund management and how to work with group borrowing schemes. Because these services may have a major impact on the success rates of borrowers, determining exactly what services have been received is critical.

In the pilot test it will be important to determine how common this technical assistance is and whether it is focused on one topic or covers a variety of aspects of the loan process. If the assistance is very rare or focuses mostly in one area, Question B10 is adequate as it stands. If, however, there is wide use of such assistance, or the assistance includes a variety of aspects (such as project design and managing loan funds), it might be worthwhile to allow multiple responses to B10. In any case, B10 will need to be customized.

B11–B19. These questions all refer to collateral and how collateral is valued. Questions B11–B13 discuss labor that might be provided for a loan. B14–B17 refer

to the use of the harvest as collateral, and B18–B19 refer to other types of collateral.

B11–B13. Question B11 determines the number of days of labor, if any, the borrower had to provide for the loan. If labor was not part of the credit arrangement, the interviewer skips to B14 on the use of harvests as collateral. If labor was a part of the arrangement, B12 and B13 allow analysts (in order to estimate the real cost of credit) to distinguish among days of labor provided free, days paid at the market rate, and days paid below the market rate. Question B13 attempts to determine the value of the individual's labor in the normal market if no credit arrangement were involved.

B14–B17. Pledging part of one's harvest is a common form of collateral for agriculture. Question B14 asks what quantity of the respondent's harvest is pledged under the loan arrangements. If none of the respondent's harvest is pledged, the interviewer proceeds to questions on other types of collateral. If part of the respondent's harvest is pledged, B15–B17 are needed to determine how this harvest has been valued for payment. Question B15 asks for the price that the lender will pay for the harvest. If the agreement does not include a currency price but is instead a percentage of some other price, B16 is needed to determine whether the price is a percentage of a future price, and what percentage. Question B17 asks what the value of the respondent's harvest would be if the borrower were free to sell it outside of the credit agreement. Again, this information is needed to determine the cost of credit.

B18–B19. The values of personal guarantees, group lending, and cosigners cannot be directly estimated.

B20. The total amount borrowed in the loan is needed to determine the cost of the loan and to determine how loan size relates to collateral, payback terms, and other aspects of the loan.

B21–B22. This is an attempt to determine the interest rate a person is paying, if they are paying an interest rate. Question B22 may need to be revised to reflect the standard language or terms in use in a given country. Or it may be necessary to add a question to probe for interest rates. As discussed previously, many people will be unable to answer B22 as it now stands.

B23–B27. By determining the frequency, number, and value of loan payments, these questions provide further information on the cost of credit. Interest rate data that a respondent cannot provide may be calculated from this series of questions.

B28. The module does not provide a complete look at the borrower's loan history with lenders and the extent to which loans have been paid off on time. This question provides the only information on whether a borrower is in arrears.

B29–B52, B53–B76. Questions B29–B52 are the same as Questions B1–B28 but focus on nonagricultural businesses rather than on agriculture. Questions B53–B76 follow the same pattern focusing on consumption. These two series are slightly shorter than the series on agricultural loans because the three questions concerning the use of harvest as collateral have been dropped.

PART C. CREDIT HISTORY. The respondents for this part are all people of working age (with no upper age limit) regardless of whether they borrowed in the 12 months prior to the interview.

C1. This question has a reference period of 12 months, matching the information collected in Part A. While it might be interesting to expand this reference period, the analyst has limited information about the borrower's characteristics more than 12 months prior to the survey, which reduces the usefulness of any information that could be obtained by expanding the reference period.

C2. The reasons for refusal are important and can be linked with data in other parts of the questionnaire on total debt and on asset (collateral) ownership.

C3. This question is designed to determine which type of lender the borrower was not successful in borrowing from.

C4. This question contains an awkward skip pattern that will need to be practiced by interviewers.

C5. This question is for all people who either did not request a loan in the previous 12 months or requested a loan and were turned down.

Box 21.1 Cautionary Advice

- *How much of the draft module is new and unproven?* Parts B, C and D of the standard module draw heavily on other credit surveys and some LSMS surveys. Part A, which attempts to collect data by source, has not been tried, and needs to be tested to determine both the respondent's willingness to answer and the time involved in administering this section.
- *How well has the module worked in the past?* Most of the data obtained in past versions of the module seems reasonable, with the exception of interest rates. But because credit is a sensitive issue, some checking with other sources may be useful to ensure that underestimation does not occur.
- *Which parts of the module most need to be customized?* Specific questions on interest rates need to be addressed most carefully, as do questions concerning the overall terms of loans. The language used to describe these will be quite country-specific. In areas with minimal formal-sector or semiformal lenders, questions on total debt can be cut and further questions can be added to ensure a more accurate measurement of informal credit and its costs.

C6. The purpose of this question is to determine borrowers' perceptions of their access to credit. The question differs substantially from other ones, as it is based on opinion rather than fact. Although mixing together opinion-based and fact-based questions can be problematic, this question is needed given the importance of borrowers' perceptions of their access to credit.

PART D. LENDING ACTIVITIES. The respondents for this part are all people of working age (with no upper age limit) regardless of whether they borrowed in the 12 months prior to the interview.

D1. The key issue in this question is to find the least threatening wording. The interviewer asks not "Have you lent money to someone?" but instead "Does someone owe you money?" The idea is to avoid putting people in the position where they have to say that they are a moneylender.

D2. Pilot testing may reveal that this question needs to be dropped, since it will identify the respondent as a moneylender rather than just a person who once lent a friend or relative some money. As one would like to

make this distinction, the question is useful—but not if it jeopardizes the rest of the information.

D3–D10. These questions could be rewritten to ask about a typical borrower rather than about the most recent borrower—for example, "Are most of the people who borrow from you..." or "How much does the average person owe you?" While this approach could be useful, it has been avoided here because it emphasizes the respondent's status as a commercial lender.

Credit Module: Short Version

The questions in this module are taken from Parts A, B and C of the standard version. See the relevant discussions for each of the questions in the notes above.

Notes

The author has greatly benefited from the helpful comments and suggestions of Paul Glewwe, Margaret Grosh, Shahidur Khandker, Anjini Kochar, Ghazala Mansuri and Chris Udry.

1. Of course not all agricultural credit needs are for short term investments. Longer term investments, such as investments in infrastructure and equipment, exhibit different patterns.

2. The impact of credit on the costs of consumption smoothing is related to the degree to which savings are precautionary. This is, in turn, a function of levels of risk and of the existence of alternative insurance mechanisms in the economy. It should also be noted that, to the extent that households save for precautionary motives, the supply of credit will affect overall savings levels as credit serves as a substitute. Precautionary savings are covered in Chapter 20.

3. Creditors may also use positive incentives to encourage loan repayment. Borrowers who do not default are often provided with increased credit opportunities by their lenders (for example, by credit unions and credit card companies).

4. A meeting of credit union managers in Tegucigalpa in 1991, attended by the author, discussed the fact that being a saver is considered a 'good' and being a borrower 'bad'—and that underestimation of credit was common.

5. Data from the Kyrgyz study were not available for analysis at the time of writing.

6. The most that past household-level data sets revealed about individual credit use was who receives the benefit of credit for productive purposes. This was deduced by combining the information on the purposes of the credit the household held (see Table 21.5 for the division of activities financed by household credit) with the household identification codes of the farmer or the owner of the household enterprise that are recorded.

7. Loan charges include application fees, compensatory balances, closing costs, and forced purchase of services from the lender. Third parties receiving payments include such persons as agricultural extension agents who must fill out the loan form for the farmer or evaluate the land and collateral.

8. This figure, calculated from the 1991 Pakistan Integrated Household Survey, may overestimate lack of knowledge of interest rates because in the survey database no distinction is made between missing data (refusals, omissions by the interviewer) and respondents' stating that they did not know the answer to the question. The figure is based on the assumption that all of these answers were "Do Not Know."

This issue illustrates the importance of maintaining the distinction between "refusals" and "do not know" answers, something LSMS data sets usually fail to do. Probably the most effective solution is to add an explicit question asking if there is an interest rate, as was done in the Vietnam LSMS.

9. Unfortunately, the wording of the question on sources of credit makes it impossible to check whether all loans with zero interest rates were from family or friends.

10. The results are surprisingly high for Ghana, where the Muslim population is proportionally much smaller than the Muslim population in Pakistan.

11. This information was provided to the author during discussions with credit union managers in 1991.

12. A discussion of how to obtain plot-level data is contained in Chapter 19, along with an assessment of associated difficulties.

13. In most countries this agency not only maintains lists of all banks (public and private) and their locations but also provides information on total assets and liabilities.

14. There are usually national federations of credit unions and other cooperatives; NGOs are also usually registered centrally. Some such federations will only be able to provide information on the locations of such lenders, while others will be able to provide details such as information on loans outstanding.

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22

Time Use

Andrew S. Harvey and Maria Elena Taylor

The allocation of time is a crucial decision that influences many aspects of households' living standards. The way a household allocates its members' time among various economic activities is an important determinant of the level of its income. Low-income households often devote large amounts of time to activities to meet the basic needs of their members such as fetching water, gathering fuel for cooking, or processing food. Travel and waiting time are often an important part of the cost of using health, education, and other services, and leisure is a common human desire. All of these activities, and the way they are distributed among the different members of the household, are of interest to policymakers.

Most previous LSMS surveys have included only a limited number of questions on time use in the various modules of the questionnaire, generally to study specific issues. In some past surveys the housing module contained questions on the time that household members spent gathering fuel or water, so that the value of their consumption could be imputed. Questions about time spent by household members at work were sometimes included in the employment module to help analysts calculate earnings rates. The education and health modules often contained questions on travel time to facilities to help analysts to calculate the implicit costs of these services.

Few previous LSMS surveys have tried to build a comprehensive picture of time use in a household. While this would necessitate the inclusion of a separate, lengthy module on time use, such data would extend considerably the range of issues relating to time use that could be analyzed. Having such comprehensive information would enable analysts to understand how a change in the labor activities of one member

affects every member's time use. It would also make it possible to understand the contributions that some members, especially women, children, and the elderly, make to household welfare through their nonmarket activities such as collecting water and fuelwood and growing crops for the household's own consumption. Because the economics profession is moving increasingly toward models that do not take the household as a single unit but that take into account intrahousehold allocations of time and resources, the demand for time use data is growing.

A comprehensive time use module for all household members might well be longer than any other single module, and would therefore either displace others or add considerably to the length of the interview. However, these costs are partially offset because a time use module would reduce the need for some question sequences capturing time use information in other modules and would provide more accurate data. This chapter discusses the practical issues involved in including a separate, module on time use in an

LSMS-type household survey so that designers of future surveys can evaluate their options. The first section describes the issues that can be analyzed with time use data. The second section identifies the ancillary data that analysis of time use issues requires and discusses various ways to collect these data. The third section introduces three drafts of a time use module (which are presented in Volume 3), and the fourth section provides explanatory notes for these draft modules.

Policy Issues Regarding Time Allocation

Data on how much time individuals and households allocate to performing various tasks can provide useful information to policymakers by improving analysts' understanding of several areas:

- Living standards.
- Human capital investment decisions.
- The labor force.
- Nutrition.
- Gender and age inequalities within households.
- The use of public services.
- Social changes and households' quality of life.
- Leisure and social interactions as indicators of household welfare.

Regional variations in time use may reflect variations in prevailing socioeconomic, environmental, or geographical conditions; thus time use variations can provide policymakers with important insights into the causes of regional variations in household welfare.

Time Use As an Indicator of Living Standards

Time is both an important asset and an important component of the cost of various goods. Time is especially important in poor households, where capital is scarce. Empirical studies in developing countries have shown that poor households make use of the time of all of their members, regardless of gender or age, to provide for the basic needs of the household. Measures of the amount of time spent by various household members on basic household chores may be an important indicator of household and individual living standards. Also, the amount of time that individuals spend doing basic household chores may limit the time that they have available to work outside the home, to tend to agricultural and other household production activities, to obtain education, or to care for children and elderly household members.

The household time overhead is the minimum number of hours that a household must spend on the basic chores vital to the survival of the family. This concept was first defined by Vickery (1977) who posited that poverty is a function of time as well as money. The household time overhead consists of the number of hours spent preparing meals, washing clothes, and cleaning house. It also includes time spent fetching water and gathering fuel for cooking and heating in households that lack running water, electricity, or gas. In general, a household with low household time overhead will be better off than a household with a high time overhead. However, the impact of the household time overhead also depends on the number of adults and children available to assist in performing these tasks. The impact of these costs on individual household members is determined by the distribution of household maintenance tasks among household members.

Time Use As an Indicator of Human Capital Investment Decisions

One of the primary uses of LSMS survey data is to analyze households' decisions about their human capital investments such as health care and education. Time spent in school and on homework are important measures of the investment that an individual and a household are making in education. Children's non-school activities, such as paid work or chores, may prevent them from benefiting fully from the time that they spend in school.

Time costs can be an important component of the cost of using education and health services. Therefore, in order to analyze household decisions regarding schooling and health care, it is very important to have a measure of these costs. Having a measure of travel time is useful even if the analyst already knows the distance to the facility in question, because not all households use the same mode of transportation. In the case of health care facilities, it may also be important to collect data on waiting time. The use of time data in studying these sectors is explored in detail in Chapters 7 and 8 on education and health.

Time Use Data in Labor Force Analysis

In industrialized market economies, most individuals work a specified number of hours each week in a designated location, for a specific employer and a well-defined period of time. However, in developing coun-

tries and in poor households everywhere, individuals tend to provide for their own needs and the needs of their dependents through a combination of formal and informal activities rather than through formal contracts with employers. Consequently, in order to obtain reliable indicators of labor availability and productivity in surveys fielded in developing countries, the definition of work must reflect time spent in productive activities rather than just time spent at a job. This means that labor market analysts must take into account the time spent in supplementary employment, in self-employment, and in the production of goods and services used by the household or traded in the market, as well as time spent in employment in a primary workplace in the formal sector. The need to count all of these activities is reflected in the complexity of the employment module discussed in Chapter 9. However, extreme cases of irregular labor patterns may be more thoroughly captured in a separate time use module. Time use data can also be used to measure productivity in household enterprises and agricultural activities (INSTRAW 1996). Labor market policymakers need to know about the activities of individuals who are not employed in the formal sector, what obstacles there may be to bringing people and activities into the formal sector from the informal sector, and how to measure the relative importance of market and nonmarket production for a household's resources.

Because time spent commuting is likely to enter into the labor market decisions of household members, time use data can be useful in analyzing these decisions and may provide an indication of the potential benefits of introducing or extending public transportation.

Time Use Data in Nutritional Analysis

One measure of individuals' health and well-being is their nutritional status. A number of previous LSMS surveys have gathered information on height and weight as an indicator of nutritional outcomes. Fully understanding the determinants of these outcomes is quite complex. One piece of the puzzle is the individual's physical activities, since a person who works at a desk every day requires far fewer calories than a person of the same age and sex who works every day doing strenuous physical labor. Having information on an individual's time use makes it possible for analysts to calculate that individual's energy requirements (Berio 1980; James and Schofield 1990).

In general, the extent to which time use data from LSMS surveys can be used in nutritional analysis is limited. This is because, as discussed in Chapter 5 on consumption, LSMS surveys have never collected information on individual caloric intakes and have only yielded very rough estimates of the availability of calories for the household as a whole. In principle, having time use data would allow analysts to adjust their measurements of household food consumption, but this has not been done to date and future studies will have to be conducted to explore whether it is ever worthwhile to do so.

Time Use Data and Intrahousehold Allocation and Gender Inequality

Time use data have become one of the most important tools of gender analysis. How tasks and resources are allocated within a household can have an important impact on the well-being of the individuals in the household. This issue is discussed in detail in Chapter 24. Time use data can help analysts study the nature and extent of intrahousehold inequality and the impact of that inequality. Time can serve as a yardstick that is equally able to measure market and nonmarket activities, women's and men's work, and the work of the poor and the rich. The amount of time spent in paid activities outside of the home may also have an important impact on the influence that each individual in the household has on the decisions made by the household.

When policymakers have not had a complete picture of what productive activities (whether market, nonmarket, or domestic) are needed to provide the household with its basic needs, this has often resulted in the adoption of inappropriate public policies. In particular, the differences in the contributions made by men and women to household time overhead have often been overlooked by policymakers. Because public policies have long been based on market productivity alone, they have underestimated the valuable contribution that women make to the household, to society, and to the economy. One example can be found in Berio (1980), which describes how a public policy that aimed to increase agricultural yields by encouraging the use of fertilizer on cash crops also increased the growth of weeds and thus the amount of time that farmers had to spend weeding. Since the cultivation and weeding of the cash crop was done by women, households' balance of time allocation was

altered in ways detrimental to food production and the care of children.

Analyzing the Utilization of Public Services with Time Use Data

Information on time use can inform policymakers about the utilization and impact of public services such as public transportation, schools, and electricity. Policymakers can factor this information into their decisionmaking and evaluation processes. For example, when policymakers are estimating the impact of providing piped water, they should consider the amount of time that this will save for households as well as the likely health improvements that will result.

Having information about the way time is allocated among the various members of a household helps policymakers understand which household members will be most directly affected by a policy modification (for example, one that changes the amount of time required to fetch water or to travel to work). Furthermore, the price of using public services is often subsidized for low-income households to ensure that they have access to these services. However, the subsidized service may not actually benefit the intended households if it is located far away, as this presents a substantial cost to the household in terms of time. Thus having information on travel and waiting times may indicate to policymakers the extent to which a price subsidy may be eroded by such opportunity costs. Similarly, if policymakers understand how households organize their day, they can better determine what hours of the day public services should be open to ensure maximum access for the intended target households.

Time Use Data for Evaluating Social Change and Quality of Life

If an LSMS survey is designed to be repeated over time or to collect panel data (as discussed in Chapter 23), the time use data that the survey collects may be used to provide indicators of social change over time. In developing countries this can include how environmental degradation affects household time allocation and which economic activities increase the use of child labor (Kumar and Hotchkiss 1988; Skoufias 1994). Also, if adults are required to spend more time on market activities, children may have to cover the residual household time overhead by completing the adults' household tasks, which may reduce the amount

of time that the children can devote to their schooling and thus restrict their future job opportunities.

Measuring Leisure and Social Interaction to Indicate Welfare

The need to recuperate after a hard day's work and to cultivate family and social relations is a basic human need and is consequently an indicator of a person's standard of living. Yet researchers who have studied households living at subsistence level have tended to disregard the value of leisure. Poor people face great demands on their time to produce the income required for basic needs, and are thus unable to spend enough time for rest and relaxation. This can have serious consequences for the health of household members and for the potential of a household to expand its opportunities.

Measuring leisure is difficult, not least because it means different things to different people. Leisure may include social interaction, relaxation, cultural activities, solitude, physical exercise, or participation in games or sports. The concept can vary from person to person, culture to culture, and time to time. This idea has been discussed by Ferge (1972), Skorzynski (1972), Young and Willmott (1973), and Shaw (1985). Ideally leisure should only incorporate discretionary or voluntary time. It should not be overestimated by incorporating idle time or a lack of market activity. Typically in both developed and developing countries leisure is equated with a household's total time allocation to predefined discretionary activities. In a few surveys in industrial countries, leisure is identified by using a follow-up question for each activity recorded in a time use diary asking whether the activity was leisure. This method allows for the fact that definitions of leisure can vary at different times and among different people. To take a Western example, women are usually responsible for getting supper on the table and would call it a chore rather than leisure. If a woman's husband occasionally cooks as a hobby and he fixes supper on the reference day of the time use study, he may choose to define his cooking as leisure. This subjective approach is relatively time-consuming and thus cannot be done as part of a very basic time use module. While subjective measurement may be the ideal, objective measurement as typically used has also proven robust and useful.

Measuring social interaction helps analysts understand the differences between paid and unpaid work and how members of families interrelate with each

other in both traditional and modern cultures. Many of the changes that take place in the transition between subsistence and market economies restructure families' use of time in ways that reduce or alter social interaction among their members. For example, when women wash clothes in the river or plant crops in the company of their children and friends, they are interacting with each other and teaching their children necessary social skills. This is in marked contrast to people who work in factories, isolated from their children, family, and friends.

Data Requirements and Data Collection Methods

This section explores the methodologies for gathering the data needed to analyze the issues discussed in the previous section. First, various aspects of measuring time are discussed. This is followed by a discussion of four different ways to gather time use data in the context of an LSMS survey and the benefits and disadvantages of each. The last part of this section discusses further design considerations.

Measuring Time

Time use studies can be “exhaustive,” in which case they record all of a household's activities within a specified reference period (such as one hour, day, or week). This is equivalent to continuous sampling and captures all activity during a predefined period. Alternatively, time studies may be “selective” in that only the amount of time allocated to certain activities is recorded. A third option is time sampling, in which the respondent or observer records the behavior of household members at predefined points in time—for example, at 10 a.m., noon, 4 p.m., and 7 p.m. The implications of these three sampling options are discussed below. (For more details see Martin and Bateson 1986.)

WHAT TO MEASURE. In time use studies, the basic unit is an episode, a single entry on the diary with all its attendant dimensions. Time spent on an activity has two aspects: the *number of episodes* and the *duration* of the activity. For some activities, such as brushing one's teeth, the salient feature is the number of episodes or the frequency of their occurrence. For other activities, such as homework, the most important aspect is the duration of the activity. In some cases the duration of

each episode is important; for example, four hours of continuous strenuous labor places a greater burden on an individual than two two-hour episodes. In other cases the total duration of all episodes of the activity may capture the relevant information; for example, the total number of hours of television watched is more important than the number of hours watched in one sitting.

For some activities it may also be useful to gather other information. The *temporal location*—the time of day, week, month, or year when an activity is undertaken—may be important for understanding the rhythm of society and the time constraints within which time allocation decisions are made. For example, the time of day at which people depart for work, shop, eat, prepare meals, or get out of school may influence other household decisions. If so, this is useful information for decisionmakers to have as they decide what hours health clinics or community centers will be open or what the peak times of day will be for the bus system. The *activity sequence* relates the activity to activities that precede and follow it, helping analysts understand how individuals organize their day. This information can guide policymakers in locating services and in scheduling operating hours to ensure that services are accessible. The context within which activities take place can also be important; *contextual information* includes the location of an activity, the other people present, the person for whom the activity was done, and any remuneration that may have been received for the activity. Subjective information such as how much an individual enjoyed an activity or how much stress he or she felt may also be useful. Finally, it is important for analysts to know about any *concurrent activities* (for example, women caring for children while preparing meals); failing to control for these activities will cause analysts to greatly underestimate the occurrence of secondary activities.¹ Secondary activities include listening to the radio, having conversations, talking to children, gardening, and looking after pets (Harvey and Macdonald 1976).

A large percentage of these secondary activities tend to be underrecorded. For example, women tend to perceive domestic and personal care activities as of no importance. Thus, unless an instrument is specifically designed to capture activities that are not perceived to be important, a large percentage of domestic and personal care activities will remain unrecorded.

Information on participation in an activity and on the activity's duration, frequency, and temporal location is straightforward to collect using time diaries or individual questions. Data on context, activity sequence, and concurrent activities are difficult to collect using questions, and generally require a diary format. Subjective information such as how a respondent felt during an activity can in general only be collected using qualitative methods (see Chapter 25).

These basic pieces of information about episodes can be combined in different ways, using different units of analysis, depending on the issue to be studied (Harvey 1999). Analysis may focus on the whole population, the subset of people who participate in an activity, an individual, a household, an activity, or an episode. The whole population is the unit of analysis for such issues as what proportion of the population is engaged in a particular activity and how much time these people spend on it on the diary day. Analysts may also be interested in how often and for how long participants engage in a particular activity or how individuals or households allocate their total time. Alternatively, analysts may wish to focus on an activity. When an episode is taken as the unit of analysis, it becomes possible to determine the time of day at which episodes take place, the presence or absence of individuals (such as the respondent's children or spouse), and the presence or absence of secondary activities. Using the episode as the unit of analysis also shows how the respondent fits an episode of a given activity into a sequence of episodes during the day, making it possible to analyze how people organize their day. At the most fundamental research level it is necessary to know the amount of time allocated to specific activities such as paid work, housework, child-care, and education. This yields information regarding the presence or absence of the activity, the amount of time allocated to it, the frequency of its occurrence, and the types of individuals and groups that engage in it.

MEASURING TIME WITHOUT A CLOCK. In parts of the world where people live at subsistence level, they often relate their activities not to hours as they appear on a clock face but to fluctuations of nature. These people may be more concerned about taking advantage of daylight and the seasons than about coordinating their activities. This does not mean that there is a complete lack of organization in their lives. On the contrary,

their activities seem to be more predictable and routine than those of people living in developed societies. Acharya (1982) wrote that subsistence societies:

“...have their own time-scale that aids them for daily activities. On visiting the fields in Asia during cropping or harvesting season, one finds people doing almost the same thing at the same hour every day. For example, in the Nepal Terai or in North India, during the harvesting period, people wake up early before dawn, perform hygiene in the early hour and go to the fields. In the late morning, around 7 or 8, it is usual to see the same persons carrying the food to the fields. One finds them having a mid-day meal at noon and resting about one hour. Without a conception of daily time distribution, it is hard to perform these activities with such accuracy.”

In order to collect time use data in such societies or households, survey designers need to give special attention to translating the local perception of time into a standard 24-hour timetable. (The notion is similar to that of creating a local calendar to help date births, as discussed in the anthropometry chapter.) Table 22.1 illustrates one good example of a diary that was developed to do this. Wagenbuur (1972) used such a method in a time use study in southern Ghana. The method was also used by Kennedy, Rubin, and Alnwick (1991), who analyzed and compared three time use studies in Kenya, two of which used the recall method in which time sheets were adapted to incorporate the hours and time periods used in their area of study. In Islamic cultures, the five daily prayers can provide markers for time during the day.

Given that people's perception of time is based on geographical conditions, religion, productive activities, and tradition, it is not possible to design a standard LSMS time-use module that can be used in all countries. As with the other modules, its design must take into account and reflect the mores and traditions of the group to be surveyed. In this case it is necessary to understand how the community identifies the hours of the day and how they calculate the amount of time it takes them to perform an activity. This local understanding of time can be integrated into the time diary, and it must be used to develop individual questions and answer codes. For example, it will be necessary to determine how respondents might answer the question

Table 22.1 Examples of Time Terminology in Southern Ghana

Standard Time	Time indications as used by majority of farmers	English translation	Activity
Midnight	Esuoom	Deep darkness	
1:00 a.m.	Akok-kan	First cock crow	
2:00 a.m.			
3:00 a.m.			
4:00 a.m.			
4:30 a.m.	Otsia-ebaasa or Enyimaye-wona nyew-awo	Third cock crow or Inability to recognize other faces	
5:00 a.m.			
5:30 a.m.			
6:00 a.m.	Anapa	Morning	
6:30 a.m.	Akoffo-reko-haban-mu or Adze-Akye	Farm-going period or Day is on	
7:00 a.m.			
7:30 a.m.			
8:00 a.m.			
8:30 a.m.			
9:00 a.m.	Win-awo	Sky is dry	
9:30 a.m.			
10:00 a.m.			
10:30 a.m.	Oka kakra ma wi-egyina	Sun about to be still	
11:00 a.m.			
11:30 a.m.			
Noon	Wi-redan	Sun still	
12:30 p.m.			
1:00 p.m.	Wio-redan	Sun turning	
1:30 p.m.			
2:00 p.m.	Wi-adan	Sun has turned	
2:30 p.m.			
3:00 p.m.	Pon-aber-aso	Closing time	
3:30 p.m.			
4:00 p.m.	Abe-twa-ber	Palm-wine tapping period	
4:30 p.m.			
5:00 p.m.	Wireko or Osomfo-wia or Osomfo wi-asten	Sun about to set	
5:30 p.m.			
6:00 p.m.	Wi-ato	Sunset	
7:00 p.m.	De dafo	Sleeping agent	
8:00 p.m.			
9:00 p.m.	Adze-asa	Day is over	
10:00 p.m.			
11:00 p.m.	Kurom-ater-dzinn	Night is advanced, town is dead silent	
Midnight			

Source: Wagenbuur 1972.

of “How much time do you usually spend fetching water?” It will also be necessary to determine how to translate certain answers into time. For example, when women said that a given activity took them all morning, the authors translated this as four hours (Kennedy, Rubin, and Alnwick 1991). To minimize random interpretation this translation must be done according to instructions given by the survey designers.

The importance of reflecting local perceptions of time in the module can be overemphasized. This is an area in which qualitative studies may provide helpful inputs into module design (see Chapter 25). At an expert meeting in Osaka in 1994, representatives of seven Asian countries all agreed a diary was not particularly problematic with respect to time consciousness.

Instruments for Collecting Time Use Data

Traditionally, time use data in developing countries have been collected by the interviewer observing the people about whom the data are gathered. This has the advantage of providing extensive amounts of information on time use and on the cultural context within which decisions about time use are made. However, observation is very costly and difficult to do for large samples. Therefore, this method is more often used in qualitative studies of time use. In contrast, the discussion in this chapter will focus on quantitative data collection methods that can be analyzed in conjunction with the other household and individual data from an LSMS survey.

The activities that are of analytical interest and the type of information needed to analyze them will deter-

mine the instrument that is needed to gather time use data. A variety of quantitative instruments can be used to collect time use data; these instruments vary significantly in terms of the amount of time and expense that they require. So, as for all other modules of the survey, designers have to make difficult decisions about the tradeoff between additional or higher quality data and the extra expense and logistical burden of more detailed methods.

One way to collect limited time use data is to use random observation. The interviewer arrives at the household at a time determined by the random draws of time periods specified as part of the sampling plan. The interviewer can then observe a rich set of contextual information about the activity—who is present, the quality of interaction among the people present, any secondary activities, and how long the primary activity continues. This method has several drawbacks. Because this method is more expensive than other methods, fewer households or less of their total time can be observed using this method. The approach works best at times that are acceptable for visiting people's homes—say, 7 a.m. to 7 p.m.—and thus causes the interviewer to miss any activities carried out at dawn and in the evenings. It is difficult to capture any activities that take place very far from the home. And the timing of any observations made is difficult to reconcile with the data gathered on other activities in a multitopic survey such as the LSMS. Due to these drawbacks, the random observation method will not be examined further in this chapter.

The method used most often in previous LSMS surveys is to include questions about the household's allocation of time to different activities in the various modules of the household questionnaire. This approach is not specifically illustrated in this chapter; instead, examples are given in the other chapters in this book that deal with the most common time use questions. However, when evaluated against more vigorous collection approaches, evidence suggests that data generated by this approach are subject to significant reporting error.

Another option is to design a special-purpose module in the form of a diary to capture data on all time use during the reference period. The number of activities specified in a time diary can range from a few dozen to hundreds.² The most complete type of diary can measure not only primary and secondary activities but also social interaction and other contextual details. Three prototypes of time use diaries are described

below; explicit illustrations are given in the draft time use module (introduced in the third section of this chapter). These diaries should not be seen as “either/or” approaches; different kinds of diaries can be combined within a single survey. In fact, within a single household a more elaborate diary may be used for one respondent while a less elaborate diary is used for other household members. As long as underlying design principles are adhered to, integrating the two types of diary should pose no significant problems.

Questions Included in Various Modules

Very few previous LSMS surveys have included separate time use modules. Most have placed individual questions on time use throughout the questionnaire.

The housing module frequently contains questions about the amount of time spent gathering wood and fetching water. In analysis of intrahousehold allocation issues or barriers to children's enrollment in school, the (often considerable) time dedicated to these tasks can be counted as a contribution to the household by the women and children who most often do them. Some calculations of household consumption include imputations for the value of the time used in these tasks. Time spent gathering water can also be used as an indicator of a household's contact with community and public services.

The education module often includes questions about time spent in school and time spent traveling to school. Questions about time spent doing homework are sometimes included to allow analysts to examine the balance between children's schooling and any domestic or paid work activities. Questions about time spent by other household members helping children with homework, volunteering at their school, or helping them get to school are rarely included but can be useful for rounding out an indicator of the actual investment a household makes in educating its children.

LSMS health modules often include questions on the number of days lost due to illness in the previous four weeks and on the amount of time spent traveling to, and waiting for care at, health facilities. In order to measure the total loss of welfare to the household, it may also be important to have information on the amount of time that other household members devoted to caring for the individual during his or her illness.

The employment module gathers information on time use in various categories of employment. The questions in this module are designed to determine labor

force participation rates, and data on the number of hours worked are often used to calculate earnings rates. Questions may also be included to gather information on time spent commuting. A time diary can reveal details about the allocation of time for self-employment or work in household enterprises. Estimating labor force participation requires data only on the total number of hours worked, but, in reality, those hours may have been divided among several enterprises.

Specific Time Use Modules

When survey designers choose to include a separate time use module in their survey questionnaire rather than distributing the time use questions among the other relevant modules, they have several different instruments from which to choose.

STYLIZED ACTIVITY LIST. The stylized activity list (presented in Volume 3) collects information on the frequency and duration of time spent on activities during the previous 24 hours. This instrument is designed to gather data on the frequency and duration of time spent on a limited list of activities. For a list of 20–30 activities, respondents are asked whether or not they participated in each activity in the previous six months, in the previous week, on the previous day, or on the day before that. If the answer is yes for either the previous day or the day before that, the respondents are asked how many hours they have spent on that activity during that day. The activities listed must relate to a viable and internationally comparable set of activities and must capture all of the activities that the respondent does during a given day. The total duration of all activities must equal 24 hours. Practically, this forces the interviewer to interrupt the interview to do the sum and possibly go back and correct times or insert activities. (This awkward task is avoided in the other formats of the time use module.)

The reference periods used—some combination of one year, six months, one month, one week, or one day—should reflect existing definitions of labor force participation and the periodicity of activities relevant to the population in question. Analyzing several of the issues mentioned in the first section of this chapter requires having information on specific activities such as travel time to school or work; in such cases the activity list might be expanded to include these activities. In other cases, such as time spent waiting at a health clinic during the last visit, it is not feasible to gather the

necessary data in a diary with a short reference period, because this activity does not occur regularly.

STYLIZED ACTIVITY LOG. The second type of diary, the stylized activity log, captures not only the duration of the activity but also the number of times it is done (episodes). In the activity log, respondents note each activity that they did in each 15-minute period of the previous day. This approach requires the respondent to think through the day and remember transitions from activity to activity. With this information, analysts can understand how an individual's day is organized. This systematic recall process increases the accuracy and completeness of the information that respondents give about their time use. The same basic principles apply to the log as to the list except that the time reference period for the log is fixed as a specific day and no information beyond that time is collected. If, as is recommended, diaries are obtained from all or most members of the family, analysts should be able to study the tradeoffs made among members of the household.

The stylized activity log yields information on the frequency of and duration of time spent only on activities during the previous 24 or 48 hours. However, it yields complete information on the timing, duration, and number of episodes of those activities, as well as on the activity sequence. Limited information on the location of and any remuneration for each activity may also be collected by asking the respondents about those things in the stylized activity log. Secondary activities may be noted by marking the appropriate time periods using a different colored pen or pencil than the one used for primary activities. And with the log, it is easy for the interviewer to check visually that the whole day is accounted for, without having to interrupt the interview to do sums. Depending on log design and equipment available, it may be possible to enter data using scanning rather than typing.

OPEN INTERVAL TIME DIARY. In an open interval time diary, respondents either note or are asked what activity they were doing when they began the day, what activity came next and at what time, and so on successively through the day. For each principal activity and its start time, other data can be noted, including: location; secondary activity; who else was present; the person for whom the principal activity was performed; machines, equipment, or animals used; and remuneration received.

The open interval time diary is better than the stylized activity list or log in three ways. First, respondents are asked to recall their day in much more detail than in the log; being asked about where they went and with whom triggers their memories of the previous day's activities. Second, the answers are given in the respondents' own words with no input from the interviewer; after the respondent completes the diary, all responses are coded by trained data coders.³ Third, the open interval diary yields significantly more detailed information on each activity that it covers.

Time diaries kept for a 24-hour day or longer are the best way to obtain information on daily activities or activities that occur regularly. This is particularly the case in situations where individual activities are hard to distinguish from each other, as noted by Niemi (1983). Both primary and secondary activities should be captured to reflect and measure daily activity patterns fully. If information is not collected on secondary activities, certain crucial data will be lost. Without information on the location of the activity and on the people accompanying the respondent, the other data are considerably less useful, as analysts are frequently interested in finding out the extent to which people are away from home and how much time they spend with, though not necessarily caring for, their children (Rigbers 1996).

The Advantages and Disadvantages of the Different Ways to Collect Time Use Data

Among the range of options for collecting time use data presented in this subsection, there are significant differences in terms of cost and management complexity, quality of data, and degree of detail of the data collected. The general advantages and disadvantages of the various methods are set out in Table 22.2. An important criterion in selecting a data collection method is the range of policy issues that can be illuminated by the data that will be collected with each instrument. Table 22.3 rates each of the proposed instruments—individual questions, an activity list, an activity log, and an open interval diary—in terms of how much valid, reliable, and in-depth information each instrument can collect for addressing different analytical issues.

To date, most LSMS surveys have collected time use data by including individual questions in various modules.⁴ There have been several weaknesses in most of these surveys from the point of view of studying

time use per se. Some of these weaknesses can be avoided in future surveys with minimal effort. Others cannot be avoided except by including a separate time use module in the survey.

The most obvious limitation is that it is not possible to acquire a full accounting of individuals' time use during the previous 24 hours, which limits the amount and range of analysis that can be done. It means, for example, that it is not possible to study how a change in one person's labor activities affects the use of time by other household members. Nor is it possible to apply physical activity ratios to estimate energy requirements or to compare energy use with energy intake. (Recall that dietary intake is not measured well in LSMS surveys anyway.) Moreover, without a 24-hour accounting framework, time use specialists believe that the resulting time use reports are often of dubious accuracy. The lack of a 24-hour accounting time frame means that the analyst cannot tell whether respondents used those times for which they did not mention having performed any activity to perform other activities that the questionnaire did not ask about (such as personal care, sleeping, or leisure) or whether the respondents were doing something the analysts would have liked to have known about. If the question is worded vaguely enough that respondents do not recognize all the possible variations in each category of activity, this can easily happen.

For example, the 1993 Jamaica Survey of Living Conditions, which used a modified activity list, yielded an average of only 50 hours' worth of activities per week. The major activities missing from the list were personal care and sleeping, which could not be expected to account for more than 50 to 70 more hours, so this left between 30 and 50 hours of the week that went unrecorded. Because the activity list did not have a summation to 24 hours like the draft module introduced in this chapter does, the interviewers could not check to see that the respondents were interpreting the activities in the way meant by analysts.

Another major drawback to the stylized approach is that in certain occupations, such as agriculture and other primary sectors, it is difficult in aggregate to separate activities over the day into work and nonwork components. Thus stylized questions can lead to considerable reporting error. For example, in Canada, primary sector workers' paid work per week was estimated at 22.9 hours in diary reports and 37.8 hours in

Table 22.2 Comparing Methods of Time Use Data Collection

Direct Observation. The preferred method in developing countries has been direct observation—recording of episodes or events by an outside observer.

Advantages

- Gathers data in a systematic way (Kalfs 1993).
- Eliminates the problem of illiteracy and time measurement.
- Used in settings where self-reporting, either through recall or diary keeping, is likely to produce highly questionable results—for example, in situations where respondents do not have a clear sense of time.
- Can be useful where activities are unstructured and fractionated in very small segments or where several activities are performed simultaneously and respondents cannot allocate their time disposition.
- Helpful as a precursor to the development of tools and instruments for understanding the sequence in which activities are performed.
- An important tool to evaluate time inputs into an activity simultaneously engaged in by several individuals (Khan and others 1992).

Disadvantages

- High cost.
- Samples tend to be small, reducing the representativeness of the data.
- Since only one observer is assigned to a household, only one person can be readily observed.
- Knowing they are being observed, people tend to change their pattern of behavior, choosing activities that are considered more socially acceptable.
- Observers find it difficult to distinguish between time spent on market and nonmarket activities.

Random Observation. As the name indicates, this approach creates a sample of the time to be observed. Such a sample can take one of two forms: fixed-interval sampling or random-interval sampling. The most popular approach in time use studies is random time sampling, known as random spot check observation. Great care must be taken to insure that the sample is representative of the study population. It must capture a true cross-section of each respondent in each situation—location, time period, season.

Advantages

- Instantaneous sampling readily provides data appropriate to estimating percentage of time spent in various activities (Altman 1974).
- Gathers data in a systematic way (Kalfs 1993).
- Eliminates the problem of illiteracy and time measurement.
- Used in settings where self-reporting, either through recall or diary keeping, is likely to produce highly questionable results—for example, in situations where respondents do not have a clear sense of time.
- Can be useful where activities are unstructured and fractionated in very small segments or where several activities are performed simultaneously and respondents cannot allocate their time disposition (Khan and others 1992).
- Reduces the cost of the survey and the impressionistic tendency in participants, relative to the direct observation approach.

Disadvantages

- Time-consuming compared to the diary approach.
- Does not provide the detail provided by direct observation and time diaries.
- Limits the period when people may be observed to daylight or nonsleeping hours—a problem when measuring women's burden of work, especially that of young mothers whose work extends to night hours.
- Observers find it difficult to distinguish between time spent on market and nonmarket activities.

Questions Integrated Throughout Other Modules. This traditional paper-and-pencil approach asks separate questions about time use in modules that discuss other topics. This is the approach most commonly used in LSMS surveys to date.

Advantages

- Reference periods may differ according to activity; facilitates the capture of rare events; can average out observations for common but not daily activities.
- Raises each topic at point in interview where other aspects of the subject are covered.
- Integrates well with rest of survey system in interviewer training, data entry requirements, and so on.
- Inexpensive.

Disadvantages

- Not very accurate.
- Does not build comprehensive picture of individual or household time use.
- Difficult to adapt question wordings for non-clockwatching societies.

Stylized Questions or Activity List. This traditional paper-and-pencil approach asks either open- or closed-ended questions on activity participation and use of time.

Advantages

- Reliable as far as incidence and frequency of participation (Kalfs 1993).
- Less costly to process than diary data.
- If the list is designed to provide a place for any activity and is constrained to capture a 24-hour day, the accounting nature of time use studies is maintained.

Disadvantages

- Tends to produce inaccurate estimates of duration (Kinsley and O'Donnell 1983; Robinson 1984).
- Stylized questions are much more dependent on perception, or subjective calculation, of time use. It is much more difficult to note small changes in time allocation at an aggregate level.
- Time-constrained stylized questions force people into a 24-hour day, assuming that a person does one thing at a time. Consequently, a large number of concurrent activities go unrecorded.

(Table continues on next page.)

Table 22.2 Comparing Methods of Time Use Data Collection (continued)

	<ul style="list-style-type: none"> • Time-unconstrained stylized questions allow for the recording of concurrent activities. Ending with a day that has more than 24 hours, however, produces an irreconcilable problem at time of analysis: inability to determine if this is caused by an error of recording or recording of concurrent activities. • Wording questions in a stylized mode is extremely difficult and complicated, leading at times to misinterpretations as shown in the LSMS survey from Pakistan. • This method has limited facility for capturing dimensions other than the primary activity.
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Stylized Activity Log. This precoded diary form provides for recording all activities in the defined recording period, which is typically one day.

Advantages

- Precoding considerably reduces coding time and cost.
- The instrument can be designed for machine capture.
- Using this log maintains the episodic structure of time use data.
- Constrains time to a 24-hour day, maintaining the accounting nature of the data.
- With the use of pictures, can be designed for use by an illiterate population.
- Respondent or interviewer does not need to write in detail.

Disadvantages

- Considerably reduces the level of detail possible for the activity codes.
- Reduces the level of episode detail it is possible to capture.

Interviewer-Administered Time Diaries. These diary forms are for recording minimally primary activities but more generally for recording primary and secondary activity, location, other people present, and any additional episode (diary entry) data sought for a defined survey period (often 24 hours).

Advantages

- "A chronological report comes closest to a reconstruction of life as it is experienced" (Scheuch 1972).
- Provides consistency in time activity data by following activity through the day and forcing a full accounting of time.
- According to Kalfs (1993), minimizes recall bias, wording problems of stylized questions, exaggeration of socially acceptable activity, and underreporting of socially undesirable activities.
- Accurate and reliable data can be obtained.
- Depending on design, may allow for recording of primary and concurrent activities as well as sequential, spatial, and social dimensions of the activity.

Disadvantages

- Design may be too complicated to follow, especially in developing countries where interviewers and respondents may have low levels of education. (However, this problem of design can be overcome.)

Tomorrow or Left Behind Diaries. These are generally the same as the time diaries, except that the diaries are left for respondents to complete as the assigned diary day progresses. They are then collected and reviewed by the interviewer (preferable) or mailed back.

Advantages

- Since events can be recorded as performed, the period recorded can be extended to a longer period of time than in other methods.
- A less expensive method of data collection, unless staff have to spend a lot of time reviewing and correcting diaries.

Disadvantages

- Difficult to implement in an illiterate society unless diary is designed especially for this purpose by including pictures of activities; considerable time may be spent training the respondents.
- In practice respondents do not record events immediately after their occurrence, reducing the reliability of the data.
- There is a problem reporting the sequence of daily activity; sometimes interruptions, overlapping, or concurrent activities are not recorded.
- Quality of recording may decline with time. Respondents tend to be conscious of recording at the beginning of the project, but their enthusiasm drops as time passes.
- Tomorrow diaries are expensive due to the repeated visit to the household.
- Because respondents become aware of their activities, they may tend to change their habits. However, since most activities in subsistence societies involve the fulfillment of a basic need, this may be less evident than in developed countries.

Source: Author's summary of literature.

Table 22.3 Usefulness of Time Use Data Collection Tools in Addressing Policy Issues

	Policy issue	Questions	List	Log	Diary	Modules from which additional data are required (data required)
1	Redefining poverty in terms of income and time	Low	Medium	Medium	High	Income (general income data)
2	Measuring the ratio of market to nonmarket productive activity in the economy	Medium	Medium	Medium	High	
3	Measuring the potentially employable labor force	Low	Low	Low	High	Education (education levels)
4	Measuring the contributions of women, children, and the elderly to market and nonmarket productive activities	Medium	Medium	Medium	High	Employment, Household Enterprises, Agriculture
5	Measuring the labor force participation of children and the implications for their education	Medium	Low	Medium	High	
6	Assessing whether households can transfer from nonmarket to market activities and meet all the household's basic needs	—	Medium	Low	High	Employment (wages), Community (prices), Education (education levels), Household Enterprises, Agriculture
7	Identifying nonmarket activities that would be unnecessary if infrastructure were available (for example, fetching water)	High	Low	Medium	High	Community (infrastructure)
8	Assessing how the time lost to ill health affects the time individuals spend on productive activities	High	Low	Medium	High	Health (health status)
9	Evaluating how the burden of work is distributed among members of a household	Low	Low	Medium	High	Time Use (diaries of multiple household members)
10	Recognizing the contribution women make to satisfy the needs of the household	Low	Medium	Medium	High	
11	Assessing household and family impact of women working outside the homeseats	Low	Low	Medium	High	Community (child care available in the community)
12	Assessing how access to public service affects household time allocation	Medium	Low	Medium	High	Income (income levels), Community (level of fees, community services, infrastructure)
13	Assessing how family cohesion is affected when family members increase the time dedicated to productive activities	—	—	Low	High	Time Use (data on others present during activities)
14	Assessing who looks after children and the elderly when families have to increase their productive activities	—	—	—	High	Time Use (data on others present during activities)
15	Evaluating social behavior and household habits	—	Low	Medium	High	Time Use (diaries of multiple household members)
16	Evaluating how the scheduling of public services affects the ability of groups, such as women, to benefit from them	—	—	Medium	High	
17	Identifying voluntary activity in order to incorporate it into public policy and national accounts	—	Low	Low	High	Time Use (data on others present during activities, recipients of activities)
18	Assessing differences in nutritional needs as a basis for nutritional monitoring and planning	—	Low	Medium	High	Anthropometry (anthropometric data), Health (health status)

Source: Author's summary.

stylized questions on the labor force survey. In contrast, for materials handling occupations these values were 32.8 and 32.9 hours.

Other drawbacks of using questions scattered throughout several modules rather than a full time-use module can be avoided in principle, even if they have not always been avoided in practice. In the Pakistan Integrated Household Survey (1991), for example, questions about nonmarket uses of time were addressed only to women, so it was not possible to determine the extent to which men participated in nonmarket activities, ruling out comparisons and some intrahousehold analysis. Moreover, for women the amount of time and number of episodes spent preparing meals were both lower than expected. An answer to the question, "How many hours a day do you normally spend preparing meals?" yields no information on the number of episodes of meal preparation in a day and may cause respondents to underreport the amount of time. When past surveys have included questions about time spent gathering wood or fetching water, these questions have yielded data on the amount of time spent but not on the number of episodes, nor on which household members are involved or on the time of day. It would, of course, be possible to add some questions to cover these points, but it would too cumbersome to do so exhaustively. If analysis of such points is an important goal of the LSMS survey, it may be necessary to include a separate time use module with a diary to be completed by all household members.

Because it has sometimes been difficult for respondents to distinguish between primary and secondary activities in specific questions on time use, there may have been substantial undercounting of some activities in past surveys. For example, a woman may not report any time that she spends caring for her child even if the child is with her all day as she minds a shop or works in the field. In surveys that are fielded in areas where the local people are not accustomed to thinking about time in hours and minutes, it is probably not workable to include questions on time use in the various modules of the survey, as diaries may elicit more and better information from these populations.

In LSMS surveys the questions included in various modules have been designed according to the needs of the particular modules. The reference periods have been chosen to suit the sector-specific analysis intended. For example, people who visited a health

clinic in the four weeks prior to the survey are asked how long they waited there. The reference period is long because visits to clinics are not very frequent and are important enough to those involved that they can be remembered many days afterward. Moreover, since the information on waiting time is used to build up a measure of the total implicit and explicit costs of seeking health care, it must have the same (four-week) reference period as the other data on health care costs.

In other cases respondents are asked about the amount of time spent on an activity, such as homework, in a normal day or week.⁵ In this case the analyst is trying to understand how much investment is being made in education. The implicit cost of a child's time doing homework, attending school, and commuting back and forth from school may be added to explicit fees.

Customizing reference periods on time use questions will support the varying sector-specific analytical purposes for which time use data have been gathered in most LSMS surveys. However, it also complicates the job of trying to build a comprehensive picture of the way an individual or household uses time; such a comprehensive picture may be required for accurate time use measurement or for analyses by time use researchers.

The problems with the limited approach to time use taken in LSMS surveys can be overcome by having a module that specifically covers time use. However, the cost of including a separate module can be significant. As Leones (1991) puts it: "Time allocation data win hands down as the most time-consuming and tedious household information to collect, organize, and analyze."

Using the diary approach represents a substantial increase in interview time, which can be a burden to respondents and increase the cost of the survey. There are no firm numbers, but anecdotal evidence from poor Latin American and African countries suggests that it takes an average of about 20–30 minutes per person to fill out the diary in an interview in a developing country.⁶ If all members of every household were to be interviewed, this would be one of the longest modules in the survey and, unlike some of the other long modules (such as agriculture or household enterprises), the time use module would have to be administered to all of the households in the sample.

Having a separate time use module may add costs in less obvious ways depending on the nature of the

module used. A stylized activity list should make little difference in data handling. However, if an activity log or diary is used, the format is so different from that of the other modules that more time will be needed to train interviewers and data entry operators. Data entry will take longer and data analysis will be more complicated. If an open interval diary is used, a large and complex coding exercise will be required. Moreover, the resulting data will have a complex structure that requires additional work to integrate them with the other information in the survey.

In summary, there are no “win-win” options for dealing with time use. The traditional partial LSMS approach severely limits the range of analysis possible and does not conform to the practices that time use surveyors agree are required to get good quality data. On the other hand, the most complete time use modules will add a significant burden to the questionnaire; they are likely to take longer to fill out per household than either the agriculture or household enterprise modules, and they must be filled out by all households. The cheapest alternative is the stylized activity list, which can more efficiently and accurately provide time use data frequently collected in LSMS surveys, along with additional time use data. The activity list could conceivably be implemented at a lower cost than previous time use question sequences.

The activity log, while somewhat more expensive, can provide for a limited number of activities and attendant dimensions of all of the measures provided by a time diary. This provides highly significant scope for analysis. The most data and analysis possibilities are provided by a diary, at significantly greater cost in time and money. However, the diary provides nearly limitless possibilities for analysis.

Further Design Considerations

A specialized time use module represents only one component of the overall LSMS survey, but it is useful to list some design issues that pertain to single-purpose surveys focusing on time use. Fortunately, most of these design issues can easily be accommodated within the format of an LSMS survey.

SAMPLING. The sample design recommended for LSMS surveys that include a nationally representative random sample of households is appropriate for the time use module. Most recent national time use surveys have chosen to have samples of between 3,500

and 5,000 households. This is on the high side but within the bounds of the usual LSMS sample size.

AGE. The time use module should be administered to all family members who have reached the age at which a child might start to participate in household or other unpaid work. This will differ from country to country. In general, the cutoff age should not be higher than it is for the employment module; the age may often be lower if children start to do a significant number of chores before going to work outside the household. The age of 7 has been used in the draft time use module in Volume 3.

GEOGRAPHY. The sample for the time use module should be a national sample and should be large and diverse enough to enable analysis of significantly different economic or ecological areas. At a minimum, it should be possible to identify urban and rural respondents.

RECALL PERIOD. As a rule of thumb, respondents should not be expected to recall events that occurred more than two days earlier. How the length of the recall period affects the quality of the data depends on which day of the week respondents are asked to recall their activities. Days with a pattern of activities dissimilar from the one on which the interview takes place are easier to remember. Thus, in Western cultures with a Monday through Friday workweek, respondents may be able to remember Saturday's activities fairly well on Tuesday and Sunday's activities fairly well on Wednesday. However, they may have trouble remembering Monday's activities on Thursday because there have been two other work days in between that had the same basic pattern of activities. Juster (1985) found that there was little if any deterioration in the quality of data reported for Friday's activities when they were reported on Saturday or Sunday and only a 10 percent deterioration when they were reported on Monday to Thursday. Some of the recall periods used in the surveys that were examined for this study were as long as four to seven days.

Klevmarken (reported in Keller and others 1982) studied 24 diaries, each of which covered 48 hours, and found that some activities were underreported for “the day before yesterday.” However, he found the major drawback of the two-day diary was the fact that it took so long to complete—an average of 63 minutes. On the other hand, work by the Swedish Central

Bureau of Statistics (also in Keller and others 1982), which took the average length of time reported on various activities as a test of data quality, found that there was little difference between “yesterday” and “day before yesterday” diaries.

NUMBER OF DAYS. Deciding how many days of time use data to gather per respondent poses a dilemma similar to the dilemma involved in gathering consumption data (see Chapter 5), but the dilemma is perhaps even more acute for time use. The fact that people’s memories of events start to fade after a day or two suggests that it would be wise to choose a short recall period. A recall period of a day or two is likely to capture activities that take place every day (such as cooking, fetching water, and feeding livestock) reasonably well, although some day-to-day variation is likely even in these routine tasks. However, using a recall period of a single day is less likely to capture activities that are frequent but not necessarily carried out daily, such as washing clothes, shopping, working on household enterprise activities, or (for children) doing homework. Also, a one-day recall period is highly unlikely to capture activities that are infrequent or highly seasonal, such as caring for the ill, working in many types of agricultural or household enterprise activities, and participating in festivals or ceremonies.

If the fieldwork is spread appropriately over the days of the week and year, gathering a single day’s information will give a reliable picture of society’s time use and even the time use of some groups within it. This will be sufficient for some analytical purposes, such as looking at patterns of time use over many years to examine social change or comparing the time use patterns of urban workers in the formal sector with those of rural farmers. However, having only one or even two days worth of data on households’ time use does not enable analysts to acquire a very firm grasp of individuals’ or households’ time budgets and the tradeoffs made within them, and such a grasp is required for analyzing many of the issues discussed in the first section of this chapter.

One of the basic decisions that needs to be made when designing the sample is about the tradeoff between number of respondents and number of recall days per respondent (Survey Research Center 1984). Increasing the number of recall days per respondent reduces important measurement errors, but it also reduces the usefulness of the data for analyzing sub-

groups of the sample (as there are fewer individuals in each group) and is likely to increase the number of diaries that are only partially completed because of increased respondent fatigue (Survey Research Center 1984). Thus, when collecting data by recall, it is virtually impossible for survey designers to stipulate more than a single day or at most two days unless the interviewer and the respondent meet several times.

Given this fact, the diaries should refer to the day previous to the interview or to the day following the interview. The following-day diary is more flexible in terms of the number and timing of days because the diary is left with the respondent for him or her to fill out on an agreed day. Thus the reporting day does not have to be so tightly linked with the interviewer’s schedule. The following-day diary, however, requires that the population be literate or that the interviewer have some carefully designed illustrations that give respondents a clear visual explanation of how to fill out the diary. If the diaries are to be left behind after the interview or dropped off before the interview, the logistics of this must be integrated into the fieldwork plan and the budget. It is highly recommended that respondents be asked to keep the time diary for at least two days. In an Australian study, 48-hour time diaries were used (Australian Bureau of Statistics 1988) because a pilot test found that the accuracy and detail of respondents’ reporting increased on the second day, as they became more experienced at filling in details. Also, the 48-hour diary provided twice the number of diary days as did a 24-hour diary, at only a very small increase in cost. Naturally, if the information were collected in an interview rather than by a self-administered diary, the increased cost of adding an extra day would be much greater.

The survey designer must thus make a difficult choice among three options: to gather data on a day or two of recall data and accept the risk of measurement error; to gather data over a longer period even though it is known that respondents’ recall can be inaccurate over such periods; or to administer the time use module to the household several times on a series of visits and thus assemble a long period of data from multiple short recall periods. The third option of repeated visits to the household is theoretically feasible but obviously more expensive.

DATA COLLECTION DAY. The data collection day is usually randomly assigned to the household, so that

about one-seventh of the sample is interviewed each day of the week (or two-sevenths are interviewed if there is a two-day recall period). This is called the “designated day” and is necessary because if the interviewers visited households simply according to their own convenience, the resulting data would probably be biased. For example, if the interviewer were to take a day off, the preceding day would be underrepresented in the data. Moreover, if it is systematically easier to find people at home on some days than on others (for example, on weekends in areas with a lot of formal sector employment), the groups for which data are collected on those days will be over-represented.

Experience suggests that while it is important to have a random distribution of reference days throughout the sample, it is not critically important to ensure that the plan be followed with absolute precision. In other words, in the inevitable instances when the interviewer cannot keep to the schedule or finds that the respondent is not at home on the day planned, it is better to change the reference day to the day preceding the new interview date than to ask the respondent to try to remember his or her activities a few days before or demand to make an extra visit on the same day the following week. A Swedish pilot study used a designated day but allowed the interview to be postponed to the same day in a later week (Lyberg 1989). The analysis suggested that there were no substantial differences in the duration of the activities reported in the “on time” and the “delayed” diaries. The prime criteria for selecting the reference day are how the data will be used, the administrative burden, and the cost. A study by Kinsley and O’Donnell (1983) found that the designated day approach was more demanding of the research team compared to the convenient day approach and, in the long run, yielded equally accurate data.

TIME OF YEAR. Ideally, a full year should be covered in the survey, with respondents and diary days randomly selected to ensure that an appropriate cross-section of respondents is interviewed in each time period (Staikov 1982). If that is not possible, data should be collected that are representative of significantly different seasons and crops.

TIMING OF THE REFERENCE DAY. To enable analysis of daily and weekly cycles of activities, the data collected must be representative of the full 24-hour cycle and of

all days of the week. However, it is not necessary for the diary to run from midnight to midnight. Recent Canadian studies used the period 4 a.m. to 4 a.m., as previous work had suggested that 4 a.m. was the point of minimum activity (and thus maximum sleep). A recent Dominican Republic study ran from 7 a.m. to 7 a.m.

INTERVIEW MODES. Each of the time diaries can be administered by an interviewer or filled out by respondents for their activities either the day before or the day after the interview. Researchers at the University of Michigan compared data collected by a variety of methods (Juster and others 1983). They found that the quality of the data may be better if the diary is left behind after the interview and filled in for the following day because the respondents do not need to rely on their memories. However, having the respondents fill in the diary generally requires that they are literate or are given some training with illustrated diaries and instructions. Also, Juster found that some respondents altered their normal activities if they wrote each activity down. For these reasons, in most LSMS surveys it is better to have the diary information collected in an interview rather than to leave the diary to be filled in by the respondents themselves.

OPEN OR FIXED INTERVAL DIARY. It is recommended that survey designers allow respondents to record their activities as these activities change (an open interval diary) rather than expecting respondents to record what they are doing every, say, 15 or 30 minutes (a maximum fixed interval diary). Fifteen-minute blocks have been used in the most recent surveys in the Netherlands, Norway, Switzerland, and the United Kingdom; a 10-minute block was used in Finland’s latest survey. In Canada and the United States, the open format has been used. Experts are divided about which method is preferable. However, recent work suggests that the open interval method may be more appropriate for previous-day diaries and the fixed interval method may be more appropriate for leave-behind diaries. It also appears that open interval diaries are more efficient if the diary information is collected from the respondent by the interviewer.

BUDGET. The budget required to collect valid and reliable time use data will depend on the desired level of accuracy and detail. Founded on a few basic principles

of time use data collection, the activity list, the simplest form presented, is probably the cheapest of the module formats. The activity log will be more expensive but will yield high-quality data with wide analytical possibilities. If the designers of a future LSMS survey decide to include a full time-use module, they should be aware that this may substantially increase the interview time and complicate the survey's logistics. Administering full time-use diaries also significantly increases the amount of data entry required and the complexity of data analysis. While the data gathered in time use diaries can support a substantial amount of research, if all that analysts need to know is, say, the amount of time that people spend commuting to work and if the analysts can tolerate some inaccuracy, it may be easier to ask a direct question rather than use complex time use diaries to extract that piece of information from respondents.

Draft Modules

As discussed in the previous section, there are two main options for gathering time use data: specific questions scattered throughout the household questionnaire and a separate time use module. Two variations of the stylized activity list are presented in the draft questionnaires in Volume 3. The first variation is a generic example with some questions on periods of longer than a day. The second variation pares away those questions and reformats the remaining questions into a layout similar to that used in other individual-specific modules in LSMS surveys. The first format puts all activities for one individual on a single page. Checking that the total amount of time reported adds up to 24 hours simply requires adding up one column of figures. The number of these sheets that should be included in the questionnaire is as many as is expected to be the maximum household size—in LSMS surveys, often 12 people.

Another alternative would be to use an activity list like the one used in the 1998 Nicaragua LSMS; such an activity list is also presented in Volume 3. When the first version of the Nicaragua activity list was pretested, the interviewers found it awkward to switch from the grids in the rest of the questionnaire (in which the information for each individual is listed horizontally) to the vertically oriented activity list. So the survey planners flipped the matrix around: the activities become columns rather than rows, and information

from all individuals was put on a single grid rather than on separate pages for each person. The advantage of this approach was that the interviewers found it more natural in the context of the rest of the questionnaire. The disadvantage was that it made it more awkward to calculate a sum across five pages of activities for each person to see that the time totaled 24 hours. The horizontal approach uses slightly fewer pages, with information for up to 12 household members contained on 5 pages rather than 12. In any case, the convenience to the interviewer and the probable reduction of errors in the data collection process are more important criteria by which to judge the design than the number of sheets of paper used. It should be noted that at the time of the pretest, the interviewers naturally had little training or familiarity with the questionnaire. Survey designers interested in using an activity list may wish to pretest both versions presented here to see which works best in their context.

Also presented in Volume 3 are examples of a stylized activity log and an open-interval time diary. Only the top part of a diary is shown because covering the full range of potential activities will usually require two pages. For both the activity log and the open interval time diary a set of pages must be included in the questionnaire for each day for the maximum number of household members expected. For example, if the log is to be filled out for one day and the rest of the questionnaire allows for up to 12 members in a household, 12 of the log pages should be included. If this log is to be kept for two days, 24 log pages should be included. The log and diary shown here are generic instruments that should be modified to reflect the specific circumstances in the country or region of the survey.

Explanatory Notes

This section explains how to code the information gathered in the draft modules presented in Part 3. Information on primary activities, secondary activities, other people present during the activities, people for whom the respondent carried out the activities, and location of activities can be precoded in the diary at the survey design stage with some loss of detail. Such precoding can greatly speed up the collection, coding, and entry of the data while preserving the integrity of the diary approach.

Regardless of which coding system is used, there is a consensus among time use experts that primary

Box 22.1 Cautionary Advice

- *How much of the draft module is new and unproven?* The time use modules suggested have been used in several developing countries in single-purpose surveys. Such modules have not, however, been used in the context of LSMS surveys, with the exception of version 2 of the activity list (which has been used only in a couple of cases that have not yet been thoroughly evaluated). Many of the requirements for a good time use survey are usually already present in an LSMS survey—appropriate sample size, well-trained interviewers, and so on. The main potential problem is that the module is quite long and will either displace others or increase total interview time significantly. Moreover, if the open interval time diary is used, a very large coding job will be required after the interviewing, which is not usual in LSMS surveys and will affect the logistics and speed of data entry.
- *How well has the module worked in the past?* The proposed modules appear to have worked well in the single-purpose surveys from which they are drawn.
- *What parts of the module most need to be customized?* The coding scheme will have to be carefully customized. If standard clock time is not a very salient cultural concept in the population being surveyed, a special conversion from local time terminology to the 24-hour clock will need to be developed.

activities must add up to 1,440 minutes per day. This significantly increases the accuracy and completeness of reporting because it provides a check as to whether the estimates of the duration of each activity were accurate and whether some activities were omitted.

Activity Coding

To provide the most extensive data, respondents should report on their participation in their primary activities (in other words, what they consider to be the main things that they are doing at each time of day) in their own words. The usual practice is to use a free-form diary that allows respondents to describe what they were doing. This approach allows far greater flexibility in recording and analyzing data than does precoding. The flexibility does impose some burden on analysts, since they must devise some kind of coding for themselves. Lingsom (1979) concluded that precoding primary activities is not desirable from an analytical viewpoint.

The alternative to a free-form diary is a precoded one. The major weakness of such precoding is that

precoding the primary activity greatly reduces the level of detail about the activity performed. For example, if an activity is coded as “child care,” it could mean bathing and dressing a child or it could mean reading to a child. For some analytical purposes it may be important to distinguish reading from bathing and dressing. This distinction tends to get lost in the precoded term “child care.” It is important that sufficient codes be available to distinguish activities of particular interest. It is also important that activities not precisely defined can be clearly assigned to an appropriate “other” category. Precoding has the same tradeoffs here as elsewhere in surveying; it reduces costs but also analytical possibilities.

What is needed is a hierarchical coding scheme that is sufficiently detailed to provide an unambiguous record of activities. First, at least four categories of activity must be distinguishable: paid work; unpaid work; personal care; and free time. No “other” category should encompass activities that would fall into more than one of the four. Second, the integrity of the coding hierarchy must be maintained in any precoded activity list. Regardless of the collection instrument used, the data should be codable into the four categories above and ideally into a more extended set of at least 20–30 activities. Appendix 22.1 of this chapter includes two activity-coding schemes that can be used to guide the collection of LSMS data. The schemes reflect both the data needs specified in the Pakistan and Jamaica LSMS surveys and the general framework used in most national studies. They were developed separately, with extensive international collaboration, by the Statistical Office of the European Communities (Eurostat) and by the United Nations Statistical Division for developing countries.

There is a wide variation in coding detail cross-nationally. The Japanese time use survey conducted by the Japanese Broadcasting Corporation (NHK) has the least-detailed coding system of all country surveys, with only 32 activity codes. In contrast, the time use surveys in Finland and Norway code 90 activities; the 1981 Canadian time use pilot survey coded 271 activities. If a diary is used, the level of detail in the coding scheme makes relatively little difference to coding or data capture yet provides considerable scope for analysis. If precoded alternatives—an activity log or activity list—are used, the level of detail is constrained by the instrument design and the interview situation. As noted above, the major cost choice is related to the choice of instrument rather than the instrument content.

“With Whom” Coding

The open interval diary gathers information on who was with the respondent while they were performing the activity. The log can also be modified to gather such information or at least to indicate whether children were present. Otherwise, data can be collected on whether the respondent carried out the activity: alone; with his or her spouse; with the children of the household; with other household members; with coworkers or schoolmates; with friends or relatives from outside the household; or with others outside the household. This information can be gathered to any degree of detail.

For clarity, a distinction must be made during the collection or coding of the data between “being in the presence of” and “acting with.” However, time use experts are still divided about whether it is preferable to make this distinction during the collection or the coding of the data, and about how best to ensure that the answers respondents give correspond with analysts’ definitions of the terms. In the Finnish pilot time use survey it was found that only one-third of the respondents filled in the “with whom” information correctly in terms of being in the presence of others. One-third reported only the active involvement of others, and other entries were ambiguous (Niemi 1983). Therefore, it is important to give respondents explicit instructions about how to report this category.

“For Whom” Coding

The “for whom” category of information has emerged as a legitimate and useful item of information for analyzing voluntary activity and instrumental-material services that assist people, such as help with basic needs like eating, washing, and going to see the doctor. In Germany, Blanke and Schafer (1992) used four simple categories to classify beneficiaries of respondents’ activities: their household; another household; their household and another household at the same time; and voluntary organizations. The pilot time use survey in the Dominican Republic used more complex beneficiary categories consisting of: the respondent; the respondent’s employers; self-employed work in the household; work on the respondent’s home; another household member; other social organizations or communities; work on other people’s homes; and work for the respondent’s own and other households. This categorization appeared to work well.

Location Coding

At a minimum, two categories of location should be used: home and away from home. However, it is recommended that survey designers include at least the following locations: inside the respondent’s home; outside the respondent’s home; at the workplace (away from home); at another person’s home; elsewhere away from home; traveling on foot; traveling by bicycle; traveling by car; traveling by public transit; traveling in another (or unknown) way; and at another (or unknown) location. An alternative location coding in some cases may be: at home; in the community; and outside the community.

Few existing data sets contain specific geographical locations for activities, although in some surveys conducted in industrialized cities, the addresses where the activities took place were collected. Undoubtedly, capturing precise geographical location data will be a luxury in most cases and unsuitable in the context of multitopic surveys such as the LSMS. Nevertheless, doing so is both feasible and analytically useful (Elliott, Harvey, and Procos 1976). In LSMS surveys it may be possible to capture a measure of the distance from the home to the place where an activity took place in the “where” or “comment” column of the most detailed diary.

Appendix 22.1 United Nations International Classification for Time Use Activities

1. Employment for establishments
 - 11 First job or employment
 - 12 Second, third and other jobs
 - 13 Working in apprenticeship, internship and related positions
 - 14 Short breaks and interruptions from work
 - 15 Seeking employment and related activities
 - 18 Travel to/from work and seeking employment in establishments
 - 19 Employment in establishments not elsewhere classified
2. Primary production activities not for establishments
 - 21 Crop farming and market/kitchen gardening: planting, weeding, harvesting, picking, etc
 - 22 Tending animals and fish farming
 - 23 Hunting, fishing, forestry and gathering of wild products
 - 24 Digging, stone cutting, splitting and carving
 - 25 Collecting water

- 26 Purchase of goods used for and sale of outputs arising from these activities
- 28 Travel related to primary production activities (not for establishments)
- 29 Primary production activities (not for establishments) not elsewhere classified
- 3. Services for income and other production of goods not for establishments*
 - * In each activity buying of inputs and selling the products are included, and may be disaggregated at the third digit level
 - 31 Food processing and preservation activities: grain processing, butchering, preserving, curing
 - 32 Preparing and selling food and beverage preparation, baking, confectionery and related activities
 - 33 Making and selling textile, leather and related craft: weaving, knitting, sewing, shoemaking, tanning, products of wood
 - 34 Building and extensions of dwelling: laying bricks, plastering, thatch, bamboo, cutting glass, plumbing, painting, carpentering, electric wiring
 - 35 Petty trading, street/door-to-door vending, shoe-cleaning and other
 - 36 Fitting, installing, tool setting, maintaining and repairing tools and machinery
 - 37 Provision of services for income such as computer services, transport, hairdressing, cosmetic treatment, baby-sitting, massages, prostitution
 - 38 Travel related to services for income and other production of goods (not for establishments)
 - 39 Services for income and other production of goods (not for establishments) not elsewhere classified
- 4. Household maintenance, management and shopping for own household
 - 41 Cooking, making drinks, setting and serving tables
 - 42 Cleaning and upkeep of dwelling and surroundings
 - 43 Care of textiles: sorting, mending, washing, ironing and ordering clothes and linen
 - 44 Shopping for goods and non-personal services: capital goods, household appliances, equipment, food and various household supplies
 - 45 Household management: planning, supervising, paying bills, etc.
 - 46 Do-it-yourself home improvements and maintenance, installation, servicing and repair of personal and household goods
 - 47 Pet care
 - 48 Travel related to household maintenance, management and shopping
 - 49 Household maintenance, management and shopping not elsewhere classified
- 5. Care for children, the sick, elderly and disabled for own household
 - 51 Physical care of children: washing, dressing, feeding
 - 52 Teaching, training and instruction of own children
 - 53 Accompanying children to places: school, sports, lessons, etc
 - 54 Physical care of the sick, disabled, elderly household members: washing, dressing, feeding, helping
 - 55 Accompanying adults to receive personal care services: such as hairdresser's, therapy sessions, etc.
 - 56 Supervising children and adults needing care
 - 58 Travel related to care of children, the sick, elderly and disabled in the household
 - 59 Care of children, the sick, elderly and disabled in the household not elsewhere classified
- 6. Community services and help to other households
 - 61 Community organized construction and repairs: buildings, roads, dams, wells, etc.
 - 62 Community organized work: cooking for collective celebrations, etc.
 - 63 Volunteering with for an organization (which does not involve working directly for individuals)
 - 64 Volunteering with for an organization (which does not involve working directly for individuals)
 - 65 Participation in meetings of local and informal groups/cast, tribes, professional associations, union, fraternal and political organizations
 - 66 Involvement in civic and related responsibilities: voting, rallies, etc.
 - 67 Informal help to other households
 - 68 Travel related to community services
 - 69 Community services not elsewhere classified
- 7. Learning
 - 71 General education: school/university attendance
 - 72 Studies, homework and course review related to general education
 - 73 Additional study, non-formal education and courses during free time
 - 74 Work-related training
 - 78 Travel related to learning

- 79 Learning not elsewhere classified
- 8. Social, cultural and recreational activities
 - 81 Participating in cultural activities, weddings, funerals, births, and other celebrations
 - 82 Participating in religious activities: church services, religious ceremonies, practices, rehearsals, etc.
 - 83 Socializing at home and outside the home
 - 84 Arts, making music, hobbies and related courses
 - 85 Indoor and outdoor sports participation and related courses
 - 86 Games and other pass-time activities
 - 87 Spectator to sports, exhibitions/museums, cinema/theatre/concerts and other performances and events
 - 88 Travel related to social, cultural and recreational activities
 - 89 Social, cultural and recreational activities not elsewhere classified
- 9. Mass media use
 - 91 Reading
 - 92 Watching television and video
 - 93 Listening to music/radio
 - 94 Accessing information by computing
 - 95 Visiting library
 - 98 Travel related to mass media use and entertainment
 - 99 Mass media use and entertainment not elsewhere classified
- 0. Personal care and self-maintenance
 - 01 Sleep and related activities
 - 02 Eating and drinking
 - 03 Personal hygiene and health
 - 04 Receiving medical and personal care from professionals and household members
 - 05 Doing nothing, rest and relaxation
 - 06 Individual religious practices and meditation
 - 08 Travel related to personal care and self-maintenance
 - 09 Personal care and self-maintenance not elsewhere classified
- 1. Employment
 - 11 Main job
 - 12 Second job(s)
 - 13 Time connected with own employment
- 2. Study
 - 21 School/university
 - 22 Free time study
- 3. Household and Family Care concerning own Household
 - 31 Food preparation
 - 32 Household upkeep
 - 33 Making and care FOR Textiles
 - 34 Gardening and pet care
 - 35 Construction and repairs
 - 36 Shopping and services
 - 37 Household management
 - 38 Child-care
 - 39 Adult assistance and care
- 4. Volunteer Work and Meetings
 - 41 Organisational work
 - 42 Informal help to other households
 - 43 Participatory activities
- 5. Social life and Entertainment
 - 51 Socialising
 - 52 Entertainment and culture
 - 53 Resting—time out
- 6. Sports participation
 - 61 Physical exercise
 - 62 Productive exercise
 - 63 Sports related activities
- 7. Hobbies and Games
 - 71 Arts
 - 72 Technical hobbies
 - 73 Games
 - 74 Other hobbies
- 8. Mass Media
 - 81 Reading
 - 82 TV and VIDEO
 - 83 Radio/music
- 9. Travel and unspecified time use
 - 90 Travel by purpose

Appendix 22.2 EUROSTAT Survey on Time Use Activity Coding List

- 0. Personal Care
 - 01 Sleep
 - 02 Eating
 - 03 Other personal care

Notes

The authors would like to thank Lynn Brown, Margaret Grosh, and Raylynn Oliver for suggestions.

1. This was confirmed in the 1981 Canadian Time-use Pilot Study, which found that more than one activity was occurring in 74 percent of the episodes reported.

2. Appendix 22.1 contains a preliminary activity list relevant to LSMS surveys. Appendix 22.2 contains a coding scheme developed by the Statistical Office of the European Communities (Eurostat) for a number of planned cross-national comparable studies.

3. LSMS survey designers try to avoid such ex post data coding as much as possible because this can be a significant source of nonsampling error, it can add significantly to the costs of the survey, and it can enormously extend the period between the end of the fieldwork and the time when data become available for analysis. Another option is to have the interviewers code the answers, either during the interview or before turning the questionnaires in for data entry. This requires extensive training of the interviewers as well as a very clear coding scheme. In a survey in the Netherlands that used a written diary, the respondents themselves coded the activities. Choosing this option requires both a literate population and very clear instructions and coding lists.

4. The 1998 Nicaraguan LSMS had the most extensive time use module, but results are not yet available. The 1993 Jamaica Survey of Living Conditions contained a time use module that incorporated a more comprehensive range of activities and more questions relating to unpaid work than most LSMS surveys, without, however, covering all possible activities. The 1991 Pakistan Integrated Household survey had a series of questions on the nonmarket use of women's time. None of these surveys used the generic diaries referred to in this chapter; instead, all of them used a series of questions such as "How much time did you spend yesterday on ...[activity]...?" with the list of activities comprising a dozen or so items that included various market, nonmarket, domestic, and leisure activities.

5. It is unclear how valid a measure such a question will produce. Some respondents may respond with a normal amount throughout their school lives while others respond with an average for the past week even if the week was in some way abnormal.

6. In a Canadian survey conducted by telephone, the time use diary took about 12 minutes of interview time. It asked only about primary activity, location, and who was present, and did not include all the follow-up questions in the draft modules introduced by this chapter. Canada probably also has a larger share of the population in formal-sector jobs with continuous hours that, together with commuting, account for a good deal of a person's active day. Moreover, Canada is a "time-conscious" society. Both of these circumstances would lead to average response times lower than might be expected in many developing countries.

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Part 4

Special Topics

23

Recommendations for Collecting Panel Data

Paul Glewwe and Hanan Jacoby

When survey planners expect to implement a series of surveys, either every year (as in the core and rotating module design discussed in Chapter 3) or every three to five years, the question naturally arises whether to interview the same households in each survey and thus collect “panel” data. The answer to this question is not a simple choice between “yes” and “no” because there are many different ways to collect panel data. When planners are deciding whether to collect panel data, they must take into account the resources available and the main objectives of the survey. A typical LSMS survey has many objectives because it is a multitopic survey, so survey planners have to make compromises and rank research priorities. The details regarding which kinds of panel data are most useful for research on specific topics can be found in the individual chapters in this book. The aim of this chapter is to provide a broad overview of the advantages and disadvantages of collecting panel data in LSMS-type surveys, then to offer some practical advice on when and how to collect such data.

This chapter is organized into four sections. The first section assesses the advantages of panel data over data from a series of surveys in which different households are interviewed in each survey. The second section discusses the disadvantages of collecting and using panel data. The third section reviews the experience of collecting panel data in developing countries, focusing on the issue of sample attrition. The fourth section concludes with a set of general recommendations for collecting panel data.

Advantages of Collecting Panel Data

The most common alternative to collecting panel data is the implementation of two or more surveys in which different households are interviewed in each

survey. The data collected using this approach are often referred to as repeated cross-sectional data. For conducting research and analysis, panel data have several potential advantages over repeated cross-sectional data. Whether all of these advantages can be realized is a matter of contention among economists and other data analysts, as will be discussed further below. This section reviews all of the potential advantages of panel data, beginning with those that are the clearest and least controversial and concluding with those on which a consensus has not been reached.

Estimating Changes in Variable Means More Precisely

Policymakers often want to know whether certain characteristics of individuals or households have changed over time. For example, they may want to

know whether the incidence of poverty or the rate of unemployment have changed. Such policy questions also arise with respect to health and nutrition indicators, education outcomes, agricultural activities, income levels, and many other topics, as discussed in more detail in other chapters of this book. These issues can be investigated whenever comparable household surveys have been implemented at two or more points in time.

When household survey data are used to investigate these kinds of questions, it is necessary to verify that the measured changes are statistically significant and thus unlikely to be caused by chance alone. Two surveys at different points in time may show that the percentage of the population classified as poor has increased by one percentage point, but this increase may not be statistically significant. In many cases estimates of changes in mean values of individual or household characteristics that use panel data are more precise than estimates based on data from cross-sectional surveys, which increases the likelihood that a given measured change will be statistically significant. As long as the characteristic in question is positively correlated over time (for example, households that are poor during one time period have a greater-than-average probability of being poor during the next period), the standard error associated with the estimated change in the mean value of that characteristic is smaller for a given sample size when the change is calculated using panel data.¹ This is an important advantage that panel data have over repeated cross-sectional data.

Estimating Changes at the Individual Level

Policymakers are often interested in the persistence of certain characteristics of individuals or households over time. For example, they often want to know what proportion of the people found to be poor in one year are still poor several years later—that is, whether poverty is a chronic or temporary condition. Similarly, policymakers may wish to know whether farm households that have low productivity in a given year suffer the same fate every year or whether this phenomenon tends to affect different farm households in different years.

Repeated cross-sectional surveys can be used to make comparisons over time across broad groups (rural versus urban or skilled versus unskilled). These comparisons are often referred to as measurement of

net changes in the population. However, repeated cross-sectional data reveal nothing about the movements of individuals or households over time, often referred to as gross changes, because different households and individuals are interviewed in each survey. Gross changes can only be addressed using panel data.

Before turning to the next topic, it is important to point out that measurement of gross changes over time can be biased by random measurement error in the characteristic of interest. For example, random measurement error in household income or expenditures will exaggerate movements into and out of poverty over time. This problem is potentially very serious, and is not easily solved without reliable information on the extent of measurement error in the data.

Providing Accurate Data on Past Events

A third advantage of panel data is that they record past events more accurately than do retrospective questions used in a single cross-sectional survey. Research has shown that survey respondents often do not remember the timing of past events very precisely, and in some cases past events are completely forgotten. If current information is gathered from the same respondents at two or more points in time, the data from the earlier survey are likely to be more accurate than data collected in a single more recent survey that asks respondents to recall past events. Analysts are often interested in the relationship between a past and present phenomenon—for example, whether children who began their schooling at a relatively late age several years ago are more likely to drop out of primary school today. To investigate this using only a single cross-sectional survey, respondents must be asked to recall how old their children were when they started primary school. Unfortunately, the respondents' memories are very often inexact, which leads them to give erroneous answers to questions posed by interviewers. These errors in the data will lead to inaccurate correlations between past and present events. In contrast, if two surveys had been done that interviewed the same households, the first around the time the children entered primary school and the second after the children completed primary school, the data on the relationship between age of entry and current enrollment would be much more accurate.

For some kinds of data households may not be able to provide information about past events. For example, researchers may want to know how likely it

is that a child who was malnourished at, say, two years of age will be enrolled in school at the time of the survey. Nutritional status can often be measured in terms of weight or height (see Chapter 10), but it is virtually impossible for household members to remember precisely the heights or weights of their children in past years. In such cases panel data are essential to allow researchers to relate past socioeconomic phenomena to current household and individual characteristics.

Reducing Costs

A fourth advantage of collecting panel data is the reduced cost of such data relative to repeated cross-sectional surveys. When the same households are interviewed in each survey, it is not necessary after the first survey to ask about characteristics of the household that cannot change, such as dates of birth, characteristics of the parents of household members, or educational attainment of adults. In contrast, if a new sample of households is interviewed each time, these questions must be asked each time the survey is fielded. Reducing the number of questions asked reduces the amount of time it takes to conduct the interview, which in turn reduces the costs of interviewing a given number of households.

However, for LSMS-type surveys this advantage may be relatively small. The great majority of questions asked in LSMS and similar surveys concern household characteristics that usually change between surveys. For example, most answers to questions in the consumption module, which is a major part of any LSMS questionnaire, would change from year to year. Moreover, it is good practice to ask at least some redundant questions to double-check the responses that were given in the initial survey.

Estimating the Impact of Government Programs

The advantages of panel data discussed so far are clear and thus do not require detailed explanation. (For further discussion of these advantages see Duncan and Kalton 1987 and Kalton and Citro 1993.) The remaining two advantages are more complex and contentious since they involve the application of advanced econometric and statistical techniques to panel data. In the authors' opinion, the two most important ways in which panel data can be used to carry out policy-relevant econometric analysis are estimating the impact of government programs and services on socioeco-

nomie outcomes and estimating "structural" models of behavior (including dynamic models). Estimating the impact of government programs is discussed in this subsection and estimating structural models of behavior is discussed in the following subsection. In both subsections the uses of panel data are illustrated with specific examples using data that are typically collected in LSMS surveys.

One important use of household survey data is to estimate the impact of government programs and services on households' living standards. In some cases specialized surveys are designed to collect information that can be used to study the impact of a specific program or project. LSMS surveys are not usually implemented for such purposes; instead they typically have many objectives and are nationwide in scope. Even so, LSMS-type surveys can be used in certain circumstances to evaluate government programs. In particular, many government programs, including schools, health clinics, and agricultural extension services, operate at the community level. The community questionnaire in LSMS surveys (see Chapter 13) can be used to collect information on the existence and characteristics of these government services. Combining community data with household data makes it possible to analyze the likely impact of improving or expanding these programs.

When evaluating programs it is important to distinguish between experimental and nonexperimental data. Experimental data are collected when a program or service is provided to a randomly selected "treatment" group and withheld from a randomly selected "control" group. The impact of the program is measured by comparing the outcomes for both groups (see Newman, Rawlings, and Gertler 1994). In contrast, nonexperimental data are collected on "real world" variation in both program participation and the outcomes of interest; access to the program is not controlled in any way by the survey team that collects and analyzes the data. The impact of the program is inferred from econometric analyses of the relationship between access to the program and outcomes of interest. In this chapter, only nonexperimental data are considered since the typical LSMS survey requires nationwide samples; it is usually feasible to collect experimental data only on a much smaller scale because of the costs involved. (See Newman, Rawlings, and Gertler 1994 for a recent discussion of analysis based on experimental data).

The main analytical issue regarding nonexperimental data is how to estimate the impact of a given program accurately—in other words, how to obtain an unbiased (in the statistical sense) estimate of the true impact. To make the discussion less abstract, consider assessing the impact of a new child health program using cross-sectional data (for example, Thomas, Lavy, and Strauss 1996).² A single LSMS-type survey usually provides data on height-for-age (an indicator of cumulative health status; see Chapter 10) for a random sample of children, as well as data on local health programs from a community questionnaire. The simplest way to estimate the impact of a program on child health is by using ordinary least squares multiple regression analysis. This can be done by regressing child height-for-age on a variable indicating the existence of the program and on other variables that could affect child health.

Two problems arise with ordinary least squares estimation based on cross-sectional data: nonrandom program placement and selective migration. The problem of nonrandom program placement, which was first discussed in detail by Rosenzweig and Wolpin (1986), arises because governments do not assign health services to communities at random. Instead, the provision of health services to communities is determined by several factors, some of which are not observed by researchers and may be correlated with child height. For example, if the government first provides services to the communities with the sickliest children, ordinary least squares regression results may show that services are associated with worse health outcomes. This is not really the effect of the program but instead comes about from the rules that guide the placement of the program. In general, when such programs are targeted to worse-off areas, ordinary least squares regressions will underestimate the program effect. Similarly, if better-off areas are targeted (perhaps for political reasons), ordinary least squares results will overestimate program impact.

The second problem is selective migration (see Rosenzweig and Wolpin 1988). Internal migration is common in many developing countries, and individuals or households may base their decisions to migrate on the amenities offered in the communities they are considering as potential destinations (see Chapter 16 for a full discussion of migration). For example, households that move to communities with government health programs may do so because they care more

about their children's health than do other households. If this is the case, the communities that have the health program will contain households that, on average, care more about their children's health than households in communities that do not have the program. The extent to which households care about child health is difficult to measure in household surveys. Thus this household characteristic will be both unobserved and positively correlated with the presence of the health program, which implies that ordinary least squares estimates will overestimate the program's impact on child health.

How can panel data solve these two problems? Suppose two surveys of the same households (and children) are conducted in different years and that between these years a child health program was implemented only in some communities. Assume further that the unobserved factors that bias ordinary least squares estimation (such as unobserved community characteristics that affect child health) do not change over time. Most importantly, assume that by the time of the second survey the new health program has existed long enough to significantly affect child health. For communities that benefit from the new health program, the change in child health in response to the change in the availability of the program measures the impact that the program has on child health. If the unobserved factors that biased the ordinary least squares estimates do not change over time, they cannot affect (and thus cannot cause biases in) estimates based on changes. The mathematics behind this intuitive argument is presented in Appendix 23.1. The simplest version of this estimation method is called fixed effects estimation, since it is based on the assumption that the unobserved factors that can lead to bias in ordinary least squares estimates are fixed—in other words, do not change—over time.

Before concluding that fixed effects estimates based on panel data are superior to ordinary least squares (or any other) estimates based on cross-sectional data, three points need to be made. First, the assumptions that must be made for the fixed effects procedure to produce unbiased estimates of program effects are rather stringent, and thus may be false. In particular, the unobserved factors that can affect the placement of the program may not be fixed over time. Indeed, Heckman and Robb (1985) argue that panel data are not a panacea for estimating the impact of programs because the statistical assumptions required

to justify fixed effects estimation may be no more plausible than those required to justify other alternatives to ordinary least squares estimation that, unlike fixed effects estimation, require only cross-sectional data to deal with nonrandom program placement and selective migration. (See Appendix 23.1 for a more detailed technical discussion of this point.)

Second, fixed effects procedures do not necessarily require individual-level panel data. Nonrandom program placement involves unobserved community-level factors, so two surveys covering the same communities but different households can be used. Pitt, Rosenzweig, and Gibbons (1993) used community-level panel data from Indonesia to study the effects of a government program on school attendance, fertility, and child mortality.

Community-level data can also be used to deal with selective migration if recent migrants can be individually identified.³ As long as community-level averages of household variables remain constant over time for the nonmigrant population, the fixed effects procedure will yield unbiased estimates.⁴ Unfortunately, this procedure has a serious disadvantage, which is that to obtain accurate estimates of the impact of a program it is generally necessary to collect data on a very large number of households—probably tens of thousands. LSMS surveys usually have considerably smaller samples.

Another example of fixed effects estimation that does not require individual-level panel data is estimation based on retrospective data. LSMS and similar surveys often contain retrospective information on labor force participation, migration, and fertility. Even height-for-age data contain information on past child nutrition and health. Suppose a survey collected anthropometric data on all children in each household, along with community-level information on when a new health program was set up. It would be possible to estimate the program's impact by subtracting the average difference in the height-for-age of sibling pairs in households with one child born before the program was introduced and another born after the program began from the average difference in height-for-age of sibling pairs in households where the program was never introduced or already existed before the first child was born (see Appendix 23.1 for a formal presentation). However, a problem with this "within-household" estimator is that it does not correct for selective migration; parents with an unusually

sickly first child may choose to migrate to communities that benefit from the health program.

A final concern is panel attrition, which is discussed further in later sections of this chapter. If two surveys are fielded four or five years apart, in the second survey it is possible—even likely—that a sizable fraction of households interviewed in the first survey cannot be found. Random attrition does not lead to bias in the estimates of the impact of government programs, but panel attrition is rarely random. For example, individuals who are more willing to take risks are more likely to migrate to find better employment opportunities, and thus more likely not to be found in the second survey. Nonrandom panel attrition has the same effect as selective migration; households leave the community, and thus the sample, in part because of government programs. Attrition will lead to bias if the households or individuals that remain in the sample differ in unobserved ways from those that have left. If all the characteristics of individuals or households that determine attrition are time-invariant, the fixed estimator will be unbiased, for the same reason that it is unbiased under selective migration. While this may appear to be good news, such an assumption may be false.

Estimating Structural Models of Behavior

The other potential advantage of collecting panel data that involves advanced econometric and statistical techniques is the estimation of structural models of behavior—in other words, of relationships between variables that are not affected by changes in policy.⁵ Estimates from such models can be used to evaluate not just the impact of one specific program but also of a variety of policies, including ones that have not yet been implemented, by simulating households' behavioral responses to these policies. For example, a labor supply elasticity (the percentage change in labor supply given a percentage change in wage rate) can be used to simulate the impact of various tax policies and welfare programs. Similarly, the parameters of an agricultural production function (or input demands) can be used to assess how price subsidies or other policies that affect prices influence households' agricultural production decisions. Another example of a structural model of behavior is a "dynamic decision rule," which is the relationship between an individual's current decision (say, to enroll his or her child in school or to participate in the labor force) and the current value of

a set of “state” variables (such as the household’s current assets or the health status of individual household members).

A key advantage of panel data in this context is that they control for unobserved variation (“heterogeneity”) among individuals or households that could lead to biased estimates of structural parameters. This idea goes back to the literature on “management bias” in estimates of agricultural production functions. A farmer’s management ability cannot be observed by an analyst, but it can affect (and thus be correlated with) the farmer’s output and input choices. Hence, an ordinary least squares regression of farm output on agricultural inputs may produce biased estimates of the technological relationship between inputs and outputs. For example, farmers who are good managers may also be more likely than other farmers to use modern hybrid seeds (as opposed to traditional seed varieties), in which case part of the observed positive correlation between the use of hybrid seeds and output would be due to unobserved management ability. With farm-level panel data, Mundlak’s (1961) fixed effects estimator removes this management bias. Yet, as emphasized in the previous subsection, fixed effects estimation requires the strong assumption that the unobserved factors that affect household behavior (more specifically, that are correlated with the regressors in the equation of interest) are fixed over time. The remainder of this subsection explains why this assumption is unlikely to be true and suggests what to do about it.

To illustrate the general issues involved in structural estimation, consider the estimation of a (linear) agricultural production function, which is feasible using data from the standard or expanded version of the agricultural module presented in Chapter 19.⁶ Assume that a farmer’s management ability cannot be observed. There may also be other unobserved factors, such as land quality and community infrastructure variables. As explained above, ordinary least squares estimation of such an equation using data from a single cross-sectional survey of agricultural households may lead to biased estimates of the impact of the observed variables. One solution to this problem would be to use instrumental variables to predict observed variables.⁷ This would require only cross-sectional data. Wages and the rental price of capital in the community may be good instrumental variables (predictors) for labor and capital inputs, assuming that

labor and capital markets are active and that their prices vary enough to allow for precise estimation. Yet even this strategy may be flawed, because community-level prices may be correlated with unobserved community infrastructure, which in turn may affect productivity directly. For example, input prices may be higher in villages with no paved roads, and a lack of paved roads may directly lower agricultural output, holding constant labor and capital inputs.

An alternative to using instrumental variables would be to use household panel data over two or more agricultural cycles. Unobserved farmer management ability could be eliminated by regressing changes in output over time on changes in observed inputs. The intuition behind this is that because farmer management ability is assumed not to change over time, this variable does not appear in the regression based on changes in variables. However, other problems may arise. Bad weather (such as floods or drought) and other unforeseen shocks (such as crop-eating pests) could directly affect output and also affect inputs that are used after planting time, including labor and applications of fertilizer. It is hard to collect data on such unforeseen shocks, and most LSMS surveys do not do so. (See Chapter 19 on the agricultural module.) Harvest labor is particularly likely to be correlated with almost all current-year shocks, since there is less crop to harvest when output is low. Because these unobserved shocks affect both inputs and outputs, they will lead to biased estimates even in regressions based on changes, since the error term in those regressions will be correlated with some of the regressors.

The situation with capital is also problematic. Investment may be low in the year immediately following a poor harvest. This reduces the capital stock in the next year, inducing correlation between changes in capital stock and changes in unobserved shocks. Thus fixed effect estimates would, in general, be biased. One way to deal with this problem is to apply instrumental variable methods to panel data; see Appendix 23.1 for some examples.

An additional problem can arise when the data on observed farm inputs are inaccurate. This is known as measurement error. Measurement error can bias ordinary least squares estimates. If measurement error is random and uncorrelated over time, fixed effects estimation will exacerbate this bias (see Griliches and Hausman 1986). The standard way to remove measurement error bias is to apply instrumental variable

techniques.⁸ An alternative approach using panel data was suggested by Griliches and Hausman (1986), but this approach requires at least three rounds of data.

Are household-level panel data necessary to obtain unbiased estimates of the agricultural production function? A retrospective survey covering multiple agricultural cycles would almost certainly not be feasible because there are simply too many variables for households to remember. What about repeated cross-sectional surveys with different households in the same communities (that is, a community-level panel)? Unbiased estimates based on community means can be obtained if there are a large number of communities and if one assumes that all communities use the same agricultural technology. However, this estimator is unlikely to be very precise, since it uses only intercommunity variation in agricultural output and inputs.

In other applications, repeated cross-section data have proven to be quite useful for estimating structural relationships. One application is research on consumption and labor supply behavior over the life cycle. In this case, by averaging, say, hours worked and wages within an age-cohort, it is possible to follow a given cohort of individuals or households over time using data from repeated cross-sectional surveys (see Browning, Deaton, and Irish 1985). Such panel data sets constructed from a series of representative cross-sectional surveys have the important advantage of eliminating nonrandom attrition, which often plagues panel data. Measurement error bias may also be reduced by using average values of variables for each cohort, since random measurement errors tend to cancel each other out when averages of mismeasured variables are calculated.

The last topic on using panel data to estimate structural relationships concerns dynamics. Sometimes, current production depends on past output. For example, a child's current height or weight is likely to depend directly on the child's height or weight in a previous time period, and a student's level of literacy in a given year probably depends directly on his or her level of literacy in the previous year (see Hanushek 1986). More generally, policymakers are often interested in the dynamic relationships concerning income, earnings, consumption, labor force status, welfare participation, and other socioeconomic phenomena.⁹ In each case, current decisions made by people or households depend on the outcomes of their past decisions;

for example, a person's current employment depends on his or her past labor market experience. It is hard to see how anything other than panel data could be used to estimate such structural relationships. Consider the child height example; using repeated cross-sectional data on children at different ages to follow cohorts of children over time would not yield enough observations for a practical estimator, and aggregating at the community level to exploit cross-sectional variation in height would work only if there were significant differences in mean height across communities, which is often not the case. Moreover, collecting retrospective data for several different time periods on income, expenditures, and even labor force status is likely to yield very unreliable data.

On the other hand, estimation of dynamic structural relationships using panel data is not straightforward. First, there are difficulties in finding credible instrumental variables and in correctly specifying the unobserved heterogeneity. (For a more detailed discussion see Appendix 23.1.) Second, an important problem in the analysis of income dynamics is that it is generally impossible to distinguish between transitory income shocks and measurement error in the income data, even with panel data. The only way to distinguish between these two phenomena is by using ancillary information to calculate the variance of the measurement error.¹⁰ Even this information is insufficient if measurement error is serially correlated, in which case it is not possible to distinguish the serial correlation in the transitory component of income from the serial correlation in the measurement error (see Ashenfelter, Deaton, and Solon 1986). On a more optimistic note, the relative impact of measurement error declines as the length of time being examined increases, and measurement errors are sometimes less of a problem when examining transitions between discrete events, such as movements into and out of unemployment or welfare participation. A third problem is panel attrition. Individuals who leave the sample are unlikely to be random with respect to changes in their living standards over time, which means that the sample that remains will yield misleading estimates; for example, households that lose an important source of income may move to a less expensive dwelling. The third section of this chapter discusses the extent of sample attrition in panel data sets from developing countries, and the fourth section provides recommendations on how to reduce this attrition.

Overall, these problems are potentially serious, but recognizing them when the questionnaire is being designed can reduce many of them. For example, as explained in Appendix 23.1, collecting data on assets owned by the household prior to the first agricultural cycle (or perhaps retrospective data on inherited assets) and on prices and wages from community and price questionnaires provides useful instruments for estimating agricultural production functions. Also, if a survey can collect repeated contemporaneous measures of specific outcomes of interest, such as child height and weight or scores on academic achievement tests in different subjects, researchers can use this information to correct for measurement error. For further advice on how to collect panel data with an eye to minimizing these problems, see the individual chapters in this book on each module.

Finally, a more general set of difficulties impinges on the use of fixed effects procedures for estimating both structural models of behavior and the impacts of government programs. First, fixed effects estimates reduce statistical degrees of freedom. In a two-year panel roughly half of the degrees of freedom are lost by differencing (estimating relationships using data on changes in variables). Other things being equal, this means that standard errors on the estimated coefficients will increase by a factor of approximately $\sqrt{2}$. On the other hand, longer panels have lower proportionate losses in degrees of freedom, and hence lower increases in the standard errors in the estimated coefficients; estimation with three years of data loses only one-third of the degrees of freedom, and so on. Second, one typically loses the ability to estimate the coefficients on time-invariant variables (such as the Z_h variables in equation 3 in Appendix 23.1). A third limitation is that simple transformations of the data to remove fixed effects, such as differencing, are usually possible only in linear models. In contrast, it is difficult to account for fixed effects and discrete or censored dependent variables (which usually require nonlinear specifications), although fixed effects are sometimes tractable in exponential models (for example, logit models) and have recently become feasible for tobit-type models (Honoré 1992). At present, fixed effects are also incompatible with most semiparametric estimation techniques, which are increasingly being used in the development literature (for example, Subramanian and Deaton 1996). Lastly, differencing can greatly exacerbate the problem of measurement

error, although repeated contemporaneous observations can be used to minimize this difficulty. (See Appendix 23.1 for further details.)

Summary

Panel data have several advantages over series of cross-sectional surveys. They allow policymakers and researchers to estimate changes in variables' means more precisely by reducing the standard errors of those estimates. Only panel data can be used to examine changes at the household and individual levels over time, and thus reveal whether certain characteristics, such as being poor, are transient or permanent. Panel data can provide more accurate data on past events, and they may be able to reduce survey costs, although such cost savings are probably minimal for LSMS-type surveys.

Panel data also allow researchers to use more sophisticated econometric and statistical techniques to analyze the impacts of government programs and to estimate structural relationships. While these techniques are subject to serious criticism, and researchers disagree on the merits of panel data, access to such data gives analysts a wider variety of methods with which to estimate program effects and structural relationships. Two points are particularly important regarding estimation of program effects. First, panel data are most useful when the interval between surveys is long enough for the program or policy in question to have had an impact; indeed, the interval must be long enough for some policy variation to occur. In several past LSMS surveys that collected panel data (described in the third section of this chapter) the time between surveys was only one year, greatly diminishing their usefulness for evaluating programs.

Second, community data are usually needed to evaluate community-level programs. This typically requires administration of a community questionnaire, which must contain sufficiently detailed information to distinguish between programs that failed because they were never really implemented and programs that were implemented and still failed. Regarding estimation of structural models, panel data are most useful to correct for unobserved heterogeneity at the household or individual level. Simple fixed effects methods are the easiest way to use panel data to estimate structural models, but problems can arise with these methods. Designing the questionnaires to collect certain additional data can reduce some of these problems.

Disadvantages of Collecting Panel Data

While panel data have several advantages over data from a series of cross-sectional surveys, these advantages must be weighed against any disadvantages. This section discusses two potential disadvantages of collecting panel data: higher costs and sample attrition. These two problems are related; attempts to reduce sample attrition will usually increase costs. Moreover, the extent of both problems is directly related to the sample design used. To put these issues in perspective, this section begins with a discussion of sample designs, and then considers each of the problems in turn.

Sample Designs

Almost all household surveys collect information from a sample of households that represents a much larger population of households. In almost every LSMS survey the population of interest to analysts is the entire population of the country, so the households interviewed must be representative of the current national population. The method used to choose the sample of households is known as the sample design. An essential objective of any sample design is to ensure that the households selected are representative of the larger population of households.

Most household surveys—and almost all LSMS surveys—initially choose a sample of households based on a sample of dwellings. The sampling procedure adopted usually includes two stages, although some have three stages. In the first stage (or the second stage if a three-stage sample is used), many small, well-defined geographical areas, known as primary sampling units, are randomly chosen, after which a list is made all of the dwellings in each primary sampling unit and of all the households living in those dwellings.¹¹ In the last stage, a sample of dwellings (and by extension of households) is randomly chosen from this list. In the simplest case, one household lives in each dwelling so a random sample of dwellings is equivalent to a random sample of households. Since each individual is assumed to belong to one household, this also constitutes a random sample of individuals. (See Chapter 6 for discussion of cases in which the household to which an individual belongs is ambiguous.) If two or more households live in one dwelling, this can be easily handled after the listing operation is complete by drawing either a random sample of dwellings (taking both households if such a

dwelling is picked) or a random sample of households (in which case it is possible that only one of the two households would be selected).

Sample designs become more complicated when the aim is to follow households or individuals over time. A sample of dwellings is not the same as a sample of households or of individuals, since households and individuals may move but dwellings generally do not.¹² Thus the decision to collect panel data requires a more specific decision about whether the sample over time should be a sample of dwellings, of households, or of individuals.

In general, attempting to follow households over time leads to both practical and conceptual problems because households, unlike dwellings and individuals, split up and regroup in many different ways. Children grow up and move away, adult household members leave to look for work, and new brides move into their husbands' households. Consequently, there are always cases in which it is unclear which households are the successors of the original households. Simple rules can be applied, but they generally result in a sample gradually becoming unrepresentative over time. (See the discussion of the ARIS-REDS survey in India in the third section of this chapter.) More complicated rules can be applied (see, for example, McMillan and Herriet 1985), but sooner or later problematic cases are encountered that defy resolution. Indeed, some survey statisticians question whether a panel survey of households is a well-defined concept (see Duncan and Hill 1985). In view of these problems, LSMS-type surveys should not attempt to collect panel data based on a sample design that tries to follow households over time.

Thus there are really only two practical options for collecting panel data: following dwellings over time and following individuals over time. Following dwellings is the simplest option, because dwellings almost never move. If a dwelling has been torn down or has otherwise disappeared, it can be dropped from the sample, since no households in the population are currently associated with it. A more serious issue is that new dwellings are built over time, and the households that live in them are likely to be different from the households that live in older dwellings. Because LSMS-type surveys almost always require a sample representative of the current population at each point in time that the survey is done, new dwellings (and the households that live in them) must be added to the

sample. Specifically, when a survey team returns to an area where a survey was conducted in a previous year, the team should make an updated list of all the dwellings in the area. This list will include all new dwellings (and the households that live in them); a sample drawn from the new dwellings can then be added to the sample of dwellings drawn in the previous survey to ensure that the new survey is representative of the current population.¹³

Following a sample of people is a more difficult option, since some people may move great distances from their original dwelling places. Moreover, when following people over time, there are two distinct concepts of a representative sample; one refers to the current population at each point in time and the other refers to a particular population cohort that ages over time. A survey that aims to represent the current population at each point in time should not only attempt to follow the people who were interviewed in the previous survey or surveys but should also try to add new people to represent new members of the population (specifically, new births and immigrants). One example of such a survey is the U.S. Panel Study of Income Dynamics, which regularly adds new births to the sample and has more recently attempted to add immigrants. A survey that aims to represent a particular population cohort over time simply follows the original population of interest as its members grow older and is not concerned with new entrants into the population. An example of this is the U.S. National Longitudinal Survey of Youth, which follows a cohort of individuals who were ages 14–22 in 1979.

Sample designs that follow the original individuals over time and also add new individuals to the sample to represent new members in the population, such as the Panel Study of Income Dynamics, are representative samples in both senses (although, when using the data, analysts should include only the individuals belonging to the type of sample required for the analysis).

The main problem with implementing a panel survey that follows individuals over time is locating individuals who have moved. Not only is this potentially very expensive, but also it is not usually possible to find everyone who has moved. Since people who move or are otherwise difficult to find are likely to differ from the rest of the population, losing them would lead to an unrepresentative sample. In addition, if a representative sample must be maintained at each

point in time (a goal of virtually all LSMS surveys), new people must be added to the sample to represent those who are new members of the population—either newborns or immigrants. (Deceased individuals and emigrants must also be dropped from the sample, but this is automatic because people who die or emigrate cannot be interviewed).¹⁴ Devising rules for adding new members of the population is rather complex. For example, if a woman in the sample marries, her new husband is unlikely to have been included in the original sample. When such couples have children, should all of their children be added to the sample or perhaps only half of them? One common approach is to add both the spouse and the children to the sample; over time this can significantly increase the number of individuals (and households) interviewed—thereby also significantly increasing costs.

Higher Costs of Collecting Panel Data

Although collection of panel data may reduce costs because some questions need not be asked again in follow-up surveys, other aspects of collecting panel data may raise costs. This subsection focuses on the costs of conducting a panel survey relative to conducting a series of cross-sectional surveys.

The previous subsection argued that there are only two practical sample designs for collecting panel data: panels of dwellings and panels of individuals. Panels of dwellings are both less expensive and easier to implement than panels of individuals, but panels of dwellings have the disadvantage that people who move to another dwelling are lost from a sample even though they are still members of the population. (This is the problem of sample attrition, which is discussed in the next subsection.) In most cases the cost of implementing a panel survey that follows the same dwellings over time is not much more than the cost of implementing a series of cross-sectional surveys.

There are two additional costs of returning to the same dwellings in subsequent years. First, a slightly larger questionnaire is needed to ask a small number of questions that help match the people who currently live in the dwelling with the people who lived in the dwelling at the time of the previous survey. (Such additions to the questionnaire are discussed in detail in the fourth section.) Second, some additional administrative costs are incurred by storing the names and addresses of households interviewed in previous surveys and transferring these names to the new ques-

tionnaires. In money terms, such extra costs are likely to constitute a very small percentage of the total costs of implementing any given survey. In fact, as pointed out in the first section of this chapter, there may be other savings involved in implementing a panel survey, savings that offset part or even all of these additional costs (although in LSMS-type surveys these savings are likely to be small).

Perhaps the most serious issue is not money costs but the capacity of the organization implementing the survey to perform the additional administrative work correctly. A statistical organization in a poor developing country with weak administrative capacity may find it difficult to carry out even a modest number of additional administrative tasks. However, in many cases, hiring one or two external consultants should ensure that these tasks are performed correctly; such consultants can also provide some training to increase local capacity.

The above discussion did not include the cost of performing a listing operation to find new dwellings in subsequent survey years as an additional cost of collecting panel data. This is because listing operations should also be done each time a cross-sectional survey is implemented.¹⁵ Thus the number of listing operations is the same for a panel survey based on a sample of dwellings (that updates the sample to include new dwellings) as for a series of repeated cross-sectional surveys based on a sample of dwellings, so no extra listing costs are incurred in the panel survey.

The fact that few additional costs are associated with collecting panel data on a sample of dwellings changes the focus of the discussion. The relevant question becomes: what additional costs are incurred if panel data are collected on a sample of individuals as opposed to a sample of dwellings? The decision to follow all individuals interviewed in the initial survey who are still part of the population being sampled (in other words, to follow all individuals except those who have died, emigrated, or moved into an institutional living arrangement) can involve substantial costs, for two reasons. First, it can be very expensive to locate and interview people who have moved, because some of them may have moved hundreds or even thousands of miles away, and in general they will be scattered throughout the population as opposed to being located in a relatively small number of primary sampling units. Second, many of the people who have moved now belong to households that were not part of the

previous sample of households. This means that these households and their members must be added to the sample, increasing the total number of households to be interviewed.

Unfortunately, it is difficult to quantify the costs involved in following individuals who move because these costs depend on many specific details. Indeed, in the case of existing panel surveys that followed individuals, it is often difficult to say what the costs would have been if a set of repeated cross-sectional surveys had been performed instead. Yet it is possible to get an idea of the magnitude of the problem by examining past panel surveys to see how many people moved out of their original dwellings over time; such an examination is performed in the third section of this chapter. In addition, it is important to realize that no amount of money would make it possible to track down all of the individuals who participated in the original survey. Therefore, survey planners must weigh the benefits of each additional effort to find more of the original individuals against the costs involved in making that effort.

One low-cost option would be to follow only individuals who moved within the same village or local community, but the disadvantage of this would be the loss of those people who moved outside of the township or community—which leaves a sample that is no longer representative of the population originally sampled.¹⁶ A very high-cost option would be to search for everyone who has not died, emigrated or entered an institutional living arrangement, but even after making elaborate efforts and spending large sums of money, it is still not possible to avoid missing a sizable number of individuals. (See the specific experiences discussed in the third section of this chapter.) There are also intermediate options such as attempting to locate all individuals who moved less than, say, 50 miles from their previous location. In any case, planners of panel surveys of individuals cannot avoid the fact that subsequent surveys will have samples that are no longer representative of either the original population or the current population. This problem of attrition is explained in more detail in the following subsection.

Sample Attrition Problems

As mentioned above, panel surveys that attempt to follow the same individuals over time cannot avoid losing some individuals in the original sample because of

the difficulties in following people who move. Moreover, panel surveys based on a dwelling sample design lose all of the individuals who move out of the original dwellings; while this does not lead to samples that are unrepresentative of the current population (assuming that newly built dwellings are added to the sample, as explained above), it does lead to samples that, as time goes by, become less representative of the individuals originally sampled who are still members of the current population. The fundamental problem in both cases is that the people who drop out of the sample do not do so randomly; they tend to possess characteristics that are different from the characteristics of people who remain in the sample. This implies that the people who remain are an increasingly unrepresentative sample of the population that was originally surveyed.¹⁷

In fact there are two different sample attrition problems: attrition that results in the remaining sample not being representative of the current population and attrition that results in the remaining sample not being representative of the (surviving) members of the population originally sampled. Repeated cross-sectional surveys avoid the first type of nonrandom attrition, and the second type is irrelevant since by definition these surveys do not attempt to follow individuals over time (though they can be used to follow population cohorts over time, as explained in the first section of this chapter).

As with the problem of additional costs, it is useful to begin the discussion of sample attrition with the case of a sample design based on dwellings. Panel surveys that follow dwellings over time usually have no serious problems of the first type of sample attrition (a sample that over time is increasingly unrepresentative of the current population) as long as newly built dwellings are added to the sample. That is, if it is possible to locate the dwellings covered in the previous survey (or, in the case of dwellings that no longer exist, the places where they used to be) there should be no problem of attrition of dwellings. A recent innovation that can help locate dwellings is Global Positioning System technology, which can record the geographical position of dwellings within 100 feet. The fourth section of this chapter provides useful guidelines on how to track down dwellings visited in previous surveys. Of course, if the location of the dwelling was poorly recorded in the initial survey (or if the information was lost after the survey was completed), dwellings will

be lost from the sample. Such attrition can be thought of as one type of “mismanagement attrition,” a phenomenon that also affects cross-sectional surveys. Mismanagement attrition has plagued many past surveys, but it can usually be avoided through careful administrative work.

Once the (surviving) dwellings that were sampled in the previous survey have been located, adding a sample of newly constructed dwellings will ensure that the sample is a random sample of all dwellings that currently exist and thus a random sample of the current population. A final problem is that once a previously surveyed dwelling has been located, attrition can occur if the household members who still live in the dwelling refuse to participate in the new survey. Refusal rates vary by country, but they are quite low in most of the developing countries where panel surveys have been done; refusal rates after a first successful interview are usually only 1–2 percent (see the third section of this chapter). While refusal rates for the initial interview tend to be higher,¹⁸ these rates affect panel and nonpanel surveys equally.

Overall, panel surveys based on a sample of dwellings that incorporates newly built dwellings should be representative of the current population at each point in time. While people who move are often lost from the sample (the second type of sample attrition), this problem does not put panel surveys at a disadvantage compared to a series of repeated cross-sectional surveys, since such dwelling-based panel surveys do not follow anyone over time.

Now consider panel surveys based on samples of individuals. These surveys can suffer from both types of attrition because it is virtually impossible to locate all of the individuals who were interviewed in the initial survey. Turn first to the problem that over time the sample is increasingly unrepresentative of the current population. Ideally, a panel survey that follows a sample of individuals will locate every person interviewed in the previous survey who has not died, emigrated, or moved into an institutional living arrangement. In this case the sample would continue to be representative of the (surviving) members of the population originally sampled. In order to ensure that the sample also represents individuals added to the population during the time between the previous and current surveys, new-borns and immigrants must be added to the sample. However, even if these new population members are adequately represented (and adding them to the sam-

ple is not a trivial task), the inability to find all the (surviving) people interviewed in the previous survey means that those who can be found are not a representative sample of the “old” members of the current population.

The extent to which panel surveys based on samples of individuals suffer from these attrition problems depends on the mobility of the population and the amount of effort used to locate individuals who move. Mobility varies widely; mobility was relatively low in a well-known survey in rural India implemented by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), while mobility was quite high in the 1990 LSMS survey in urban Peru. (These surveys are discussed in the third section of this chapter.) A recent panel survey in Malaysia (the Malaysian Family Life Survey, also discussed in the third section) shows what can be done if substantial resources are available to follow migrants. Of a sample of women who were first interviewed in 1976, 72 percent were found and reinterviewed 12 years later. Yet even this rate of attrition is high, since the 72 percent who were found are unlikely to be a representative sample of the original women. Finally, a very recent survey in Indonesia (the Indonesian Family Life Survey, also discussed in the third section) also made great efforts to follow individuals and households that moved. About 91 percent of the individuals interviewed in 1993 were located and reinterviewed in 1997.

In general, while mobility varies across countries and some surveys have been more successful than others in following individuals over time, almost all panel surveys that are based on a sample of individuals will gradually become unrepresentative of the current population. This is a serious problem for LSMS surveys because governments almost always want these surveys to be representative of the current population each time they are implemented. One advantage that panel surveys based on samples of individuals have over panel surveys based on samples of dwellings is that they more effectively follow individuals over time.

A Suggested Approach to Dealing with Cost and Attrition Problems

While the fourth section provides detailed advice on when and how to collect panel data as part of a household survey, the discussion in the two previous subsections already suggests a general approach to collecting

panel data in developing countries. In particular, it appears that implementing a panel survey based on a sample of dwellings is relatively simple, entails few additional costs (relative to repeated cross-sectional surveys), and can ensure that the sample is representative at each point in time as long as newly built dwellings are added to the sample. When such a dwelling-based sample is used, panel surveys will also yield data on a large sample of individuals because most individuals in developing countries do not move over periods of five or even ten years. The existence of such panel data presents analysts with the opportunity to exploit the advantages of panel data discussed in the first section, although the advantages that are based on advanced econometric techniques are still a matter of debate.

The discussion of the previous paragraph suggests that whenever a series of LSMS-type surveys is implemented over time, panel data should be collected based on a sampling of dwellings that incorporates newly built dwellings. The reasoning behind this recommendation is very simple: there is little cost to doing so, and there may be substantial benefits. If this advice is followed, survey designers should be aware that there are two ways to incorporate new dwellings. Many, if not most, new dwellings are built in areas where a large number of older dwellings already existed. These can be added to the sample of dwellings from each area by conducting a new listing operation in that area, as explained above. Dwellings constructed in areas where no dwellings have existed before, such as on the outskirts of existing cities, may necessitate the addition of new primary sampling units from these areas to the sample. Whether and how to add such sampling units will depend on the details of the sample design of the original survey. A sampling expert should be consulted to provide specific advice on this matter.

Collecting panel data based on a dwelling sample design has several advantages over using a series of repeated cross-sectional surveys; however, many types of analysis would be better served if the panel survey followed some or all of the individuals who moved out of their original dwellings between surveys.¹⁹ This can be done by adding the dwellings in which these individuals now live to the original sample of dwellings. When this is done the survey will be representative in two different senses, which correspond to the two different (but overlapping) data sets contained in the

overall survey. First, by retaining the dwellings that were in the original sample and adding new ones to represent newly constructed dwellings, the survey will still be representative of the current population, as discussed above. (Of course, the data set to use for any analysis that is to be representative of the current population must omit dwellings added for the purpose of following people who moved out of their original dwellings.) Second, the effort to follow individuals who moved will produce data that can be used to study a cohort of individuals over time. Studies that follow such a cohort over time should exclude from the data all individuals not interviewed in the original survey.

The question then becomes: How much effort and resources should be devoted to locating and interviewing individuals who move? The answer to this question can vary from “none” to “as much as is necessary to find and interview all household members who have moved.” Ultimately, the choice made along this spectrum will depend on the objectives of the survey, the degree of mobility in the population, and the resources available, so it is not possible to give general recommendations on the extent to which movers should be followed. However, the experiences of developing countries in collecting panel data, which are presented in the next section, give an idea of what is feasible.

There are several ways to reduce costs when tracking individuals who have moved. One option is to follow only individuals who have moved within their original village or local community. While this will not eliminate attrition in a sample of individuals, it will reduce such attrition, and the costs of locating and interviewing nearby individuals are much lower than the costs of locating people who have moved hundreds or even thousands of kilometers away. A second option is to follow all individuals who moved but to do this only for a random subset of the sampling areas (primary sampling units) or a random subset of the households in each area. A third option is to combine these two approaches so that the survey team attempts to follow most or all of the people who have moved short distances but a smaller proportion of those who have moved longer distances. (When drawing random subsamples, survey designers must calculate sampling weights that reflect the relative probability of being retained in the sample.) A final way to economize on resources is to stop following all indi-

viduals after they have been in the sample for a certain number of years. This leads to the issue of sample rotation, which will be discussed further in the fourth section of this chapter.

Experiences Collecting Panel Data in Developing Countries

There have been many attempts to collect panel data in developing countries, especially during the past 20 years. This section reviews these attempts, with particular emphasis on experiences with sample attrition and tracking households that move. Some reference is also made to the experiences that developed countries, particularly the United States, have had in collecting panel data. Information on the surveys from developing countries discussed in this section is summarized in Table 23.1.

Surveys Based on Samples of Dwellings or Households

Most panel surveys in developing countries, including several LSMS surveys, have used a sample design that follows dwellings or households over time. In many of these surveys, sizable sample attrition has occurred; many individuals interviewed in the initial survey no longer lived in the dwelling at the time of the second survey. This subsection reviews the experience of both LSMS and other household surveys, beginning with LSMS surveys.

One of the earliest attempts to collect panel data in an LSMS survey was the 1990 LSMS survey in Lima, Peru, in which survey teams attempted to revisit households in 1,200 dwellings that were originally surveyed in 1985–86. (The 1985–86 sample was nationwide while the 1990 follow-up survey covered only Lima, the capital city.) The sample design was based on a panel of dwellings, so no attempt was made to follow individuals who had moved out of their original dwellings. Interviews were completed in about 82 percent of the original dwellings, with most of the missing dwellings due to refusals (8 percent) or to dwellings being vacant or no longer existent (6 percent).²⁰ This refusal rate is very high for a developing country and undoubtedly reflects the social turmoil (terrorist insurgency and an extremely sharp decline in GDP per capita) that prevailed in Peru during that time; it also may reflect that this was an urban population, since urban populations are typically both more mobile and more likely to refuse to participate. In

Table 23.1 Panel Data Collection in Developing Countries

Country	Survey	Years of survey	Sample size (households)	Time between surveys/ rounds	Sample design	Attrition	Comment
Peru	LSMS	1985, 1990	1,200	5 years	Dwelling	43 percent of households after 5 years	Urban areas only, time of social unrest
Côte d'Ivoire	LSMS	1985–88	800	1 year	Dwelling	13 percent of households after 1 year	
Ghana	LSMS	1987/88, 1988/89	1,600	1 year	Dwelling	About 50 percent of households after 1 year	Did not explicitly ask about previous household members in follow-up survey
Jamaica	LSMS	1988–present	2,000	1 year	Dwelling	About 50 percent of households after 1 year	Did not explicitly ask about previous household members in follow-up survey
Tanzania (Kagera Region)	LSMS	1991–94	800	6 months	Household, but also followed individuals	10 percent of households after 2 years	Mostly in rural areas, one region only
Vietnam	LSMS	1992–93, 1997–98	4,800	5 years	Dwelling, but followed households that moved short distances	About 9 percent of households and 24 percent of individuals after 5 years	Relatively low mobility due to national restrictions on migration
India	ARIS	1968/69–1970/71	5,115	1 year	Household	19 percent of households after 2 years	Rural areas only
India	REDS	1970/71, 1981/82	4,756	11 years	Household	34 percent of households after 11 years	Rural areas only
India	ICRISAT	1975–84	120	Multiple interviews per year	Household	13 percent of households after 10 years	Rural areas only, interviewers living in villages, incentives provided to households to remain in the survey
Russia	RLMS	1992–present	6,334	6 months	Household	14 percent of households after 15 months	
Poland	HBS	1993, 1996	8,000	3 years	Household	37 percent of households after 3 years	
Malaysia	MFLS	1976, 1988/89	1,262	12 years	Individual	28 percent of women after 12 years	
Philippines	CLHNS	1983–present	3,085	Varies (see text)	Individual	9 percent of children after 12 years	One region only
Indonesia	IFLS	1993, 1997, 1998	7,200	4 years (up to 1997), 5 years (up to 1998)	Household, but also followed individuals	6 percent of households and 9 percent of individuals after 4 years	13 provinces (out of 27)

Note: ARIS is Additional Rural Incomes Survey; REDS is Rural Economic and Demographic Survey; ICRISAT is International Crops Research Institute for the Semi-Arid Tropics; RLMS is Russian Longitudinal Monitoring Survey; HBS is Household Budget Survey; MFLS is Malaysian Family Life Survey; CLHNS is Cebu Longitudinal Health and Nutrition Survey; IFLS is Indonesian Family Life Survey.

Source: Authors' summary.

about 31 percent of the dwellings where follow-up interviews took place, none of the individuals who had lived in the dwellings in 1985–86 remained (for details see Glewwe and Hall 1998). Only about 57 percent of the households interviewed in 1985–86 were found in their previous dwellings and consented to be reinterviewed. The proportion of individuals

found and reinterviewed is almost certainly lower than 57 percent, since household members in many of the reinterviewed households had moved away. While this is a very high rate of sample attrition, the 1990 Peru LSMS survey may be an extreme case because the survey took place in an urban area during a time of extreme economic and social instability.

The Côte d'Ivoire LSMS survey also had a panel element. The data gathered in the four consecutive surveys done from 1985–88 can be linked to form three successive two-year panels. As in Peru, the sample design was based on dwellings rather than on individuals, and no attempt was made to follow individuals who had moved. About 87 percent of the dwellings sampled in the first year contained the same household in the second year, in the sense that at least one adult household member in the first year was still a household member in the second year. While this attrition rate may seem relatively low, it is important to note that it refers to a time period of only one year. After several years, the attrition rate would certainly be much higher. Moreover, the attrition rate of individuals is almost certainly higher than the household attrition rate; in many households, several individual members left but the household was considered to be the same because some members from the first year still remained.

Two other LSMS surveys, those in Ghana and Jamaica, also had a panel structure. Half of the dwellings surveyed in the 1987–88 Ghana LSMS survey were surveyed again in 1988–89. The Jamaican LSMS survey has been implemented annually since 1988, and in some years dwellings surveyed in one year were surveyed again in the following year. In Ghana, and in the first few years of the Jamaica survey, no attempt was made to follow individuals or even to determine whether the people currently living in the resurveyed dwelling were the same as those interviewed in the previous survey. Thus researchers who were interested in panel data had to match households and individuals in the data sets for the different years on the basis of the names, ages, and sexes of the household members in the computer files,²¹ which was a time-consuming, messy, and inexact process. Because of this, in Ghana and in the first years of the Jamaica survey only about one-half of the individuals surveyed in two consecutive years could be matched with a reasonable degree of certainty (although in later years of the Jamaican survey this matching process was more successful due to improved office procedures and better questionnaire design). The lesson here is that explicit questions must be included in all follow-up surveys to allow data analysts to match the individuals in one survey with those in another. The fourth section of this chapter contains detailed recommendations on how to design such questions.

The most recent LSMS survey that collected panel data was the Vietnam Living Standards Survey, which was implemented in 1992–93 and 1997–98. The first survey covered 4,800 households, while the second covered 6,000 households. The second survey attempted to reinterview 4,704 of the 4,800 households sampled in the first survey by returning to the original dwellings of those 4,704 households. Households that moved within the village or commune were followed and reinterviewed, but those that left the commune were replaced. The 1997–98 survey successfully reinterviewed 4,301 of the 4,704 households, which implies an attrition rate of only 8.6 percent. The definition of a household being the same was that at least one member in the original household remained in 1997–98. A more stringent definition—that 50 percent or more of individuals who were members in either the first or the second survey were members in both years—implies a much higher attrition rate of 18.2 percent.

Finally, the percentage of individuals who were successfully reinterviewed is much less than the percentage of households using either definition. Attrition for individuals was 24.0 percent; 7.6 percent was due to the entire household leaving the sample, 2.2 percent was due to deaths, and 14.2 percent resulted from individuals who left their households. Overall, the Vietnam LSMS was much more successful at retaining households than earlier LSMS panel surveys. Much of its success reflects the high quality of work done by the General Statistical Office of Vietnam, but another factor is the relatively low mobility of the population due to government restrictions on migration.

In none of the LSMS surveys discussed so far were steps taken in the initial survey to collect information that would make it possible to match households in the initial survey with the households surveyed in later surveys. Nor, with the exception of the Vietnam survey, did any of these surveys attempt to follow households or individuals who had moved. However, one LSMS survey, the Kagera Health and Development Survey, did both. This survey collected four rounds of data over a period of two years (1991–93) from about 800 households in the Kagera region of northwest Tanzania. The survey was designed to study the impact of adult mortality (specifically AIDS mortality) on household welfare. It was representative of the Kagera region but not of the nation. Special efforts were made to track households during the course of the survey. In

the end, the sample attrition of households after two years (four rounds of interviews) was 9.6 percent, mostly due to migration out of the region (see Ainsworth, Ghosh, and Semali 1995). As with Côte d'Ivoire, the rate of attrition for individuals was almost certainly considerably higher, because some of the individuals in the households that stayed in the sample left their households and were not followed. Only 1.5 percent of the households interviewed in the first round refused to be interviewed in a later round, despite the high level of adult mortality in the sample. This low attrition after two years suggests that some of the panel attrition in earlier LSMS surveys might have been substantially reduced by better planning, although it must also be recognized that the mobility of the population varies considerably from country to country and that the Kagera survey primarily covered rural areas, where mobility is typically lower.

Turn now to the experience of non-LSMS surveys. To the authors' knowledge, the first household survey that attempted to collect a nationally representative panel data set (though only in rural areas) in a developing country is the Additional Rural Incomes Survey (ARIS) administered by the National Council of Applied Economic Research in India from 1968/69 to 1981/82 (National Council of Applied Economic Research 1986). This survey attempted to use a household-based sample design to collect panel data over time. If households split, the part that contained the head of the original household was defined to be the "successor" of the original household. The initial survey covered 250 villages from 1968/69 to 1970/71. It began with 5,115 households in 1968/69, of which 4,118 were interviewed in all three years—an attrition rate of 19 percent over two years. The attrition rate for individuals was almost certainly higher, because individuals who left the sampled households were dropped from the survey.

The panel data from 1970/71 to 1981/82 are more interesting. The 1970/71 survey covered 4,756 households. In 1981/82 an attempt was made to find and reinterview all of these households. The 1981/82 survey, known as the Rural Economic and Demographic Survey (REDS), successfully found and reinterviewed 3,139 of the original households—implying an attrition rate of 34 percent over 11 years. Again, the attrition rate for individuals was almost certainly higher. One reason why so many households were lost stems from the follow-up rules used. In particular, if

the household head died and the remaining household members split into different households, the household was considered no longer to exist and none of the "split" households were followed. This demonstrates the practical problems of using a sample design that tries to follow households, as opposed to people or dwellings, over time.

A final set of panel surveys from developing countries based on household or dwelling sampling frames is a number of small-scale, geographically focused initiatives. Probably the best known of these among economists is the ICRISAT survey conducted in India.²² This survey was designed primarily to study agricultural production, employment, and income dynamics in several drought-prone villages of Central and Southern India. In the three villages that were followed continuously for 10 years, 87 percent of the households (104 out of an original 120) were interviewed every year. As in the ARIS-REDS surveys, the follow-up rules focused on the household head, so that the attrition rate for individuals was presumably much higher. Attrition was primarily due to migration out of the village and to the death of the household head (Walker and Ryan 1990, p.16). This remarkably low attrition rate is partly due to the fact that the population being studied was rural and thus relatively immobile. In addition, the interviewers lived in the villages continuously during the ten-year period, thus developing a rapport with the villagers, and incentives to remain in the survey were periodically provided to the households.

Finally, since LSMS surveys have recently been implemented in some countries in Eastern Europe and the former Soviet Union, it is useful to examine attempts to collect panel data in these countries even though they are not usually considered to be developing countries. Many of these countries have a long tradition of collecting panel data, but the sampling methods used have had numerous deficiencies and panel attrition has been high. For example, in the Ukraine the sampling was not at all random, and each year between 10 and 20 percent of the households dropped out of the sample. Similar problems exist in panel data that have been collected for decades in Russia.

A more recent attempt to collect panel data in these countries is the Russian Longitudinal Monitoring Survey. The first round of this survey (July–October 1992) covered 6,334 households; 7,200 households were selected, but about 11 percent

refused to participate in the first interview (Russian Longitudinal Monitoring Survey 1999). In the second round (December 1992–March 1993), 6,068 of these households were still in the sample, which implies an attrition rate of 4.2 percent over about five months. (Households or individuals who had moved were not followed.) By the fourth round (October 1993–January 1994) only 5,473 households were still in the survey, so the attrition rate between the first and fourth rounds was 13.6 percent over a period of about 15 months.

Another recent example is the modified Household Budget Survey in Poland (Okrasa 1999). A new sample of about 16,000 households was drawn at the end of 1992. Of these, about 8,000 were followed from 1993 to 1996. After three years, about 5,000 households were still in the sample, an attrition rate near 37 percent. In both this survey and the Russian Longitudinal Monitoring Survey, the attrition rate of individuals was presumably much larger than the household attrition rate, and a substantial proportion of the attrition is thought to have occurred because of poor management.

Surveys Based on Samples of Individuals

Almost none of the panel surveys reviewed in the previous subsection (the sole exception being the LSMS survey in Kagera, Tanzania) attempted to locate and reinterview individuals who moved away from their original dwelling (or, in surveys that attempted to follow a sample of households, individuals who moved away from their original household). Thus these surveys inevitably lost sizable fractions of their original samples of individuals. In general, this is what one would expect given a sample design based on dwellings (or on households). There appear to be only three large-scale surveys in developing countries that were based on sample designs of individuals and thus made major efforts to locate individuals who moved as long as they were still thought to be part of the population originally surveyed (in other words, they had not died, emigrated, or moved into an institutional living arrangement). This subsection discusses these surveys.

The Malaysian Family Life Survey was the first panel survey in a developing country that attempted to maintain an individual sample design on something approaching a nationwide scale. The first MFLS was conducted in 1976. It successfully interviewed 1,262 “ever-married” women in Peninsular Malaysia.

(Malaysia has two distinct geographical sections, Peninsular Malaysia, where the majority of the population lives, and the Sarawak and Sabah regions on the island of Borneo.) The second Malaysian Family Life Survey, carried out in 1988–89, attempted to reinterview all of the 1,262 women who were still living in Peninsular Malaysia. The survey also attempted to follow a random sample of each woman’s children, including those who no longer lived with their mothers.

The follow-up efforts in the 1988–89 MFLS were fairly successful (Haaga and others 1993). Of the original 1,262 women, 31 were known to have died and 2 were known to have left Peninsular Malaysia. Of the 1,229 who remained, 889 (72 percent) were located and reinterviewed. Another 13 (1 percent) refused, and 20 (2 percent) were located but were away from home during the days when the interviewers were working in their areas. The other 306 could not be located; presumably most of them moved within Peninsular Malaysia, but a few may have died or left the peninsula. In some cases the addresses that had been recorded in the original survey were inadequate, so the original dwelling could not be found. Overall, about half of the original respondents were known or believed to have moved since 1976, and 51 percent of those who had moved were found and successfully reinterviewed. Of the children selected to be in the new sample who no longer lived with their mothers, 63 percent were located and interviewed. Given that 12 years had elapsed since the initial survey, a 72 percent success rate was a marked improvement over the attrition rates of many of the surveys discussed in the previous subsection. Yet even this success rate could be improved upon, since the initial survey in 1976 was not designed for the purposes of following households in later years. Methods to improve the design of the initial survey for follow-up purposes are discussed in the fourth section of this chapter.

Another large-scale panel data set based on an individual sample design is the Cebu Longitudinal Health and Nutrition Survey conducted in Cebu, the second largest metropolitan area in the Philippines. The initial survey began with a sample of 3,085 children born in the Cebu metropolitan area between May 1983 and April 1984, along with the children’s mothers. Each mother was interviewed about herself and her child every two months for a period of two years. As with the Malaysian Family Life Survey, the children and their mothers were followed if they

moved as long as they still lived in the Cebu metropolitan area. After the first two years of life, 318 of the children (10 percent of the sample) had moved out of metropolitan Cebu, 156 (5 percent) had died, and the mothers of 50 (2 percent) refused to continue participating in the survey. Every child in the sample was accounted for. In 1991, when the children were about 8 years old, a follow-up survey was conducted of the 2,561 remaining children. Of these children, 155 (6 percent) had migrated out of metropolitan Cebu, 38 (1 percent) had died, and 137 (5 percent) could not be located. In 1995, the children who were located in 1991 were surveyed for a third time. In this case, after a gap of three to four years, 98 percent of the children were found.

These retention rates are remarkably high given that those individuals who died or emigrated from metropolitan Cebu were (correctly) dropped from the sample since they no longer resided in the metropolitan Cebu area. Ignoring such individuals yields an attrition rate over the first two years of only 2 percent and attrition rates of only 5 and 2 percent during the periods when the children were ages 2–8 and 8–11, respectively. These exceptionally high retention rates may have been due to the competence of the survey team and the small size of metropolitan Cebu relative to, for example, Peninsular Malaysia. (None of the mothers and children who remained in metropolitan Cebu had moved very far away from their original dwelling; conversely, those who did move far away no longer lived in metropolitan Cebu and thus, by definition, did not need to be found.)

The high retention rates may also have been due to questionnaire design and survey methods. The original questionnaire was designed to collect information that would be useful for conducting follow-up surveys. Interviews were repeated every two months in the first two years of the survey, helping interviewers remember the location of the dwellings and presumably building trust between interviewers and households. Interviewers were assigned to the same households that they had covered in previous surveys.

The Indonesian Family Life Survey, which drew on the experience of the Malaysian Family Life Survey (and like the Malaysia Survey was designed and implemented by the Rand Corporation), also followed individuals over time. The Indonesian Family Life Survey covered about 7,200 households in 1993. While the sample was not nationally representative, it was repre-

sentative of 13 provinces that contained 83 percent of the total population of Indonesia. Four years later, in 1997, the Indonesian Family Life Survey was fielded again. All of the original households were to be revisited, and individuals or households that had moved were to be followed as long as they still lived in one of the 13 provinces surveyed. In 1998 a 25 percent subsample of the original households was visited again to assess the short-term impact of the financial crisis that began in late 1997.

The Indonesian Family Life Survey was quite successful in following individuals and households that had moved. About 94 percent of the households interviewed in 1993 were successfully reinterviewed four years later in 1997, and 96 percent were reinterviewed five years later in 1998.²³ The retention rate for individuals was lower—about 91 percent in 1997—as one would expect since finding a household does not imply finding all of the members of that household. Most of the attrition was due to failure to locate households and individuals that moved; of the 6 percent attrition in households from 1993 to 1997 only one percentage point was due to households who refused to participate in the second survey (after agreeing to participate in the first survey) while five percentage points were from inability to find households that had participated in the first survey.

One particularly interesting piece of information from the Indonesian Family Life Survey is an estimate of the cost of tracking people who had moved. Thomas, Frankenberg, and Smith (1999) report that the cost of tracking people added only about 20 percent to the cost of the survey. However, this figure represents only the added cost of “long-distance” tracking; “local” tracking (following households and individuals that moved relatively short distances) was done at the same time as visits to the households that had not moved, so the additional costs of local tracking were not included in this figure—suggesting that the 20 percent additional cost ought to be treated as a lower bound. For more information on the Indonesian panel data see Frankenberg, Thomas, and Beegle (1999) and Thomas, Frankenberg, and Smith (1999).

Lessons from Experience

This review of past experience of panel data collection in developing countries provides several lessons. First, a panel survey that uses a dwelling sample design and

does not attempt to follow individuals who move should expect to lose a substantial proportion of the original sample of individuals over time. After one or two years, survey planners should expect to lose at least 10 percent of the individuals in the original sample and perhaps as many as 20 percent. Over five to ten years, as many as 30–50 percent of the individuals in the original sample can be expected to move, as was seen in Peru and Malaysia.²⁴ The degree of mobility will vary, but will generally be lower in rural areas. A final point regarding mobility is that individuals often do not move very far. Of the movers who were located in the 1988 Malaysian Family Life Survey, 76 percent had moved within the same district and another 11 percent had moved to a different district within the same state.

Second, attempts to follow individuals over time, even if the individuals move, can be reasonably successful if they are well executed. The Indonesia survey was able to reinterview 91 percent of the individuals who were surveyed four years earlier. The Malaysia survey successfully interviewed 72 percent of the individuals from the sample of 12 years earlier, although this figure drops to about one-half when only people who move are considered. The survey in the Philippines retained over 90 percent of surviving originally sampled children over a period of 11 years, although the fact that the area sampled was only one metropolitan area, as opposed to an entire country, may have been an important reason for this high rate.

Examples from the United States are also instructive. After 15 years, the National Longitudinal Survey of Youth retained 89 percent of the youths ages 14–22 who were originally interviewed in 1979. On the other hand, in 1992 the Panel Study of Income Dynamics retained only about 50 percent of the respondents who had entered the survey 24 years earlier; in the first year alone 14 percent of the households dropped out after completing the initial interview.²⁵ Taking the Malaysian Family Life Survey as a benchmark, nationwide surveys that devote substantial resources to following individuals who move ought to be able to find about half of them 10 years later and perhaps three-quarters of them 5 years later.

A third conclusion is that good questionnaire design can greatly reduce sample attrition. For example, substantial attrition can be avoided by including a page in the questionnaire of the follow-up survey that asks what happened to each household member inter-

viewed in the previous survey. The importance of this can be seen by comparing the results of the Ghana and Côte d'Ivoire LSMS surveys. In Ghana the need to match “by hand” resulted in a loss of about half of the potential panel, many of whom almost certainly still lived in the originally sampled dwelling but had been given an erroneous age, sex, or name in the initial survey. In contrast, in Côte d'Ivoire about 87 percent of the households could be matched.

A final conclusion is that refusals by people in the original sample to participate in subsequent surveys have been encouragingly low—around 1 percent in the Kagera, Cebu, Malaysia and Indonesia surveys. The refusal rate was much higher in the Peru survey, but much of this could be due to the exceptional circumstances in late-1980s Peru.

Recommendations for Collecting Panel Data in LSMS-Type Surveys

This section draws upon the previous sections to provide recommendations for collecting panel data in LSMS and similar surveys. It begins with general recommendations, moves to some more detailed aspects of sample design, and concludes with specific practical advice, including draft questionnaire pages.

General Recommendations

Whenever any household survey is implemented there is usually at least some possibility that subsequent surveys will be done in later years, providing a possible opportunity to collect panel data. In such situations there are three possible choices: fielding a series of cross-sectional surveys in which a different sample of households is interviewed each time, collecting panel data based on a sample of dwellings, and collecting panel data based on a sample of individuals. The discussion at the end of the second section of this chapter leads to a first recommendation: LSMS-type surveys should collect panel data based on a sample of dwellings. As explained in the second section of this chapter, the sample of dwellings must be updated each time the survey is implemented by adding a sample of newly built dwellings, which will ensure that the sample is representative of the current population.

There are two reasons for this recommendation. First, there are potentially significant advantages to reinterviewing the households currently living in the dwellings that were sampled in the initial survey, and

there appear to be no serious disadvantages to doing so as long as newly built dwellings are added to the sample. Second, for a sample design that attempts to follow individuals over time, substantial sample attrition is virtually unavoidable. For example, even though the Indonesian Family Life Survey was very successful at reinterviewing households and individuals after four years, about 9 percent of individuals could not be reinterviewed. As a result, a panel data set based on a sample of individuals becomes representative of neither the current population in subsequent surveys nor the cohort of individuals covered in the initial survey. This is a serious problem for LSMS surveys, since in almost all cases governments want these surveys to be representative of the current population each time they are fielded.

The recommendation to collect panel data in household surveys based on a sample of dwellings, as opposed to a sample of individuals, limits the potential usefulness of the data because many types of analysis that use panel data are better served by a survey that follows individuals when they move. However, it is possible, though more expensive, to accommodate these analytical needs by implementing a survey that uses a dwelling sample design and also follows individuals who move out of their dwellings. Such a sampling procedure would produce two distinct, although overlapping, data sets: a representative sample of the current population at each point in time and a sample that, apart from the inevitable attrition problems, represents a cohort of individuals who are followed over time.

The fundamental issue then is whether the analytical benefits of following individuals who move out of the original sample of dwellings are worth the cost. This is a matter of judgment, and there are a number of different options available to survey designers. In countries with weak survey implementation capacity, the safest course may be not to follow individuals at all. For other countries, some attempt to follow individuals may be worthwhile.

A relatively unambitious option is to follow only individuals who have moved a relatively short distance—say, within the same township or within 10–20 kilometers. In the space of one to two years, about 10–20 percent of the original household members are likely to move. The experience of the 1988 Malaysian Family Life Survey suggests that most of them will stay within 10–20 miles of their original

dwelling. Thus about 7–12 percent of the original household members will have moved to dwellings that are close to their original dwellings.

If these new households were added to the sample, the field costs of including these extra interviews in the sample (adding a few percentage points to account for additional travel expenses) would be about 10–15 percent higher than the field costs of a panel survey based on dwellings that does not try to follow any individuals who move. Over five years, about 30–50 percent of the individuals who were interviewed in the initial survey are likely to move to another dwelling. About 75 percent of these would have moved a relatively short distance from their original dwelling, so about 25–40 percent more households would have to be added to the survey, which would raise the field costs of the survey 30–50 percent (again, after adding a few percentage points for additional transportation expenses). In LSMS surveys field costs are typically 40–50 percent of total costs (see Grosh and Munoz 1996), so the total cost of an LSMS survey would increase by about 5–10 percent if the time between surveys were one or two years and 15–25 percent if the space between surveys were five years.

If survey planners choose to follow individuals who move even greater distances, field costs will be higher—especially for transportation and “search” costs. One can only speculate what field costs would be for a nationwide survey that seriously attempted to follow all individuals who had not died, emigrated, or moved into an institutional living arrangement; such costs might be 25–50 percent more than those of a simple dwelling-based panel survey if the time between surveys were one to two years and 50–100 percent more if the time interval were five years or longer.²⁶ These increased field costs imply increased total costs of 10–25 and 20–50 percent, respectively. Even with such expenditures, it will not be possible to find all of the individuals who moved after the first survey. Based on the experience of the 1988 Malaysian Family Life Survey, as many as 50 percent of individuals who move may be lost, although the success of the 1997 and 1998 Indonesian Family Life Surveys in locating movers suggests that most movers can be found. In general, looking for individuals who move outside the local community could significantly increase the costs of the survey and will be only partially successful.

The costs of following individuals who move may appear to outweigh the benefits, especially in the case of individuals who have moved long distances. However, as discussed at the end of the second section, these costs can be reduced by following only a subset of the individuals who move, especially for individuals who move long distances. For example, survey planners may decide to follow only individuals in a subset of the sampling areas or only a subset of households in each area. Another possibility would be to follow a randomly chosen subsample of people who have moved to a different state or region. A disadvantage of following only a subset of migrants is that there will be little data for in-depth analysis of long-distance migration and associated phenomena. Yet such a subset may provide information that will be useful for measuring the extent of attrition bias.

Another option for containing costs is to follow individuals only for a certain number of years. The longer one attempts to follow individuals who move, the more expensive the survey will be and the less representative the sample will be of the individuals covered in the initial survey. For LSMS-type surveys, which generally have multiple objectives, there may be little reason to follow individuals for more than 10 years; any analytical objective that requires observations on the same individuals for more than 10 years should probably be carried out using a specialized survey.²⁷ Some analytical objectives may even allow surveys to stop following movers after only five years. This gets into the issue of sample rotation, which is discussed in the next subsection.

Before turning to more specific suggestions, a final general point to consider is that collection of panel data will probably require more careful supervision of interviewers. Even in cross-sectional surveys, interviewers are often tempted to cut corners to make their work easier. In panel surveys there will be additional temptations, such as the temptation not to search very hard to find the dwelling that was surveyed in a previous year. Indeed, some analysts have informed the authors that they suspect that matching problems in some panel surveys were due to interviewers substituting a random dwelling or household for the panel dwelling or household that they were supposed to interview.

Additional supervision procedures must be taken to prevent interviewers from succumbing to this and other temptations, because quality control in field-

work can be decisive for determining whether a panel survey is a success or a failure. In particular, supervisors should check carefully when interviewers claim that they have not been able to find the dwelling previously surveyed, and supervisors should revisit at least some of the dwellings that interviewers claim are the ones that were covered in the previous survey. Monetary incentives could be offered to interviewers who find the correct panel dwellings; this approach was taken in the Indonesian Family Life Survey. For a more general discussion of supervision issues see Grosh and Muñoz (1996).

Recommendations for Sample Rotation in Panel Surveys

When a decision is made to collect panel data, survey planners must consider how long to keep the original sample before starting over with a new sample of dwellings or individuals. In principle, panel surveys based on a sample of dwellings can follow the same dwellings for decades by continuing to add newly built dwellings to the sample and dropping dwellings that cease to exist from the original sample. On the other hand, surveys could replace the initial sample with a completely new sample after five or ten years. The same issue arises when trying to follow individuals who have moved out of the dwellings since the initial survey: how long should the survey attempt to follow the original sample before starting over with a new set of individuals?

Consider the case of a panel survey based solely on a sample of dwellings. There are three practical reasons not to follow the same dwellings for many decades. First, each time a survey is fielded, a small percentage of the dwellings involved will be dropped from the sample because the dwellings' occupants refuse to continue participating in the survey. Over many years, the percentage of the original dwellings no longer in the sample due to refusals will increase, steadily eroding the representativeness of the sample. Second, there could be errors in the procedure that adds new dwellings to the sample. For example, the listing operation in a follow-up survey may select the wrong "newly built" dwellings to add to the sample if the data on age of dwellings contain errors.

Third, household members who have been interviewed many times over several years may behave in ways that compromise data accuracy. Some may grow weary of the long interviews typical of LSMS-type surveys and decide to give misleading answers that their

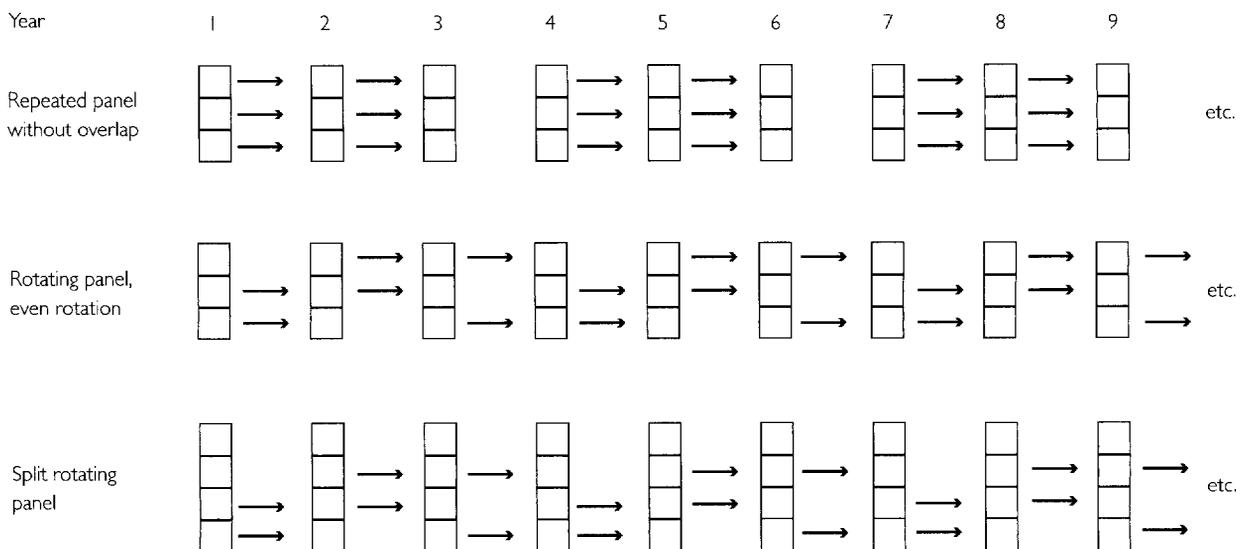
experience has shown them will shorten the interview (claiming, say, that they no longer operate a household business when in fact they do). A related problem is Hawthorne effects, in which people's behaviors are affected by being observed over time. For example, if interviewers ask women each year whether they know of, or have used, a particular contraceptive method, the women interviewed may decide to find out more about the method and possibly use it.

The discussion in the previous paragraph suggests that panel surveys based on samples of dwellings need a system to rotate the sample—that is, a system to replace dwellings that have been followed for several years with new dwellings. To provide background for recommendations on sample rotation, a brief review of several basic options is needed. (For more detailed information see Duncan and Kalton 1987 and the references they cite.) Figure 23.1 shows three different ways to follow dwellings over time. In the first two cases, after a dwelling has initially been surveyed it is resurveyed in the two subsequent time periods (hereafter referred to as years, although they could be intervals of several years), after which it is replaced by a "fresh" dwelling. The presence of an arrow between any two boxes in Figure 23.1 indicates that the same dwelling (or, more generally, the same group of dwellings) is retained in the following year; the absence of an arrow indicates that a dwelling has been dropped from the sample and replaced with a new one.

The first sample rotation option in Figure 23.1 is a repeated panel without overlap. Each dwelling surveyed in the first year is surveyed again in the second and third years. In the fourth year all of the dwellings that were interviewed in the first three years are dropped and an entirely new sample is selected for the fourth, fifth, and sixth years, and so on every three years. When newly built dwellings are added in the second year, these dwellings are surveyed in the third year but dropped in the fourth year; any newly built dwellings added in the third year are also dropped in the fourth year.

There are three disadvantages to using repeated panels without overlap. First, this could lead to misleading trends over time because the number of dwellings added to the sample varies widely from year to year. For example, consider a survey in which only newly constructed dwellings are added in the second and third years, while all dwellings are replaced in the fourth year. If wealthy households are more likely to refuse to participate in subsequent surveys (perhaps because monetary incentives used to win households' cooperation are less enticing to them), sample attrition due to refusals will reduce measured mean income in the second and third years and increase it in the fourth year.²⁸ Second, since it is never the case in any year that a random subsample of dwellings is retained while others are replaced, it is not possible—at least in the first three years—to check for attrition bias by com-

Figure 23.1 Repeated, Rotating, and Split Panels



paring the replacement dwellings with dwellings retained from the previous year. Third, it may be that changes at the household and individual levels (gross changes) that span the third and fourth years are of particular interest to analysts, but these changes cannot be examined if this rotation scheme is used because all dwellings are replaced after the third survey year.

The second design shown in Figure 23.1 is a rotating panel with even rotation, in which one-third of the sample dwellings are replaced each year by a new set of dwellings. This design overcomes the three disadvantages of the repeated panel without overlap. In this scheme, in any given year after the first two years of the survey, one-third of the sample will consist of new dwellings, one-third will be interviewed for the second time, and one-third will be interviewed for a third time. Thus the first disadvantage discussed in the previous paragraph (spurious time trends) is avoided. The second disadvantage is also circumvented because each year one-third of the sampled dwellings are a new random sample of existing dwellings, so each year one can check whether there is any attrition bias due to refusals (or any other causes). Finally, this scheme yields panel data for any two- to three-year period, resolving the third problem.

In both of the panel rotations discussed so far, all of the dwellings are part of the panel rotation scheme. This does not have to be the case. The third and last scheme shown in Figure 23.1 is a split rotating panel. One-fourth of the sampled dwellings (the top row of blocks) are not part of any panel, and three-fourths are part of a three-year panel. Thus half of all of the households in the sample are new each year. This leads to a higher proportion of new households than in the evenly rotating panel (which had one-third), reducing the problem of the sample becoming unrepresentative due to refusals by respondents to participate in follow-up interviews. On the other hand, such refusals are usually rare, so this advantage of split-panel rotation schemes (relative to a "full" rotating panel) may be outweighed by the disadvantage that panel data are collected for only part of the sample.

The above discussion suggests that survey designers should use a full (as opposed to a split) sample rotation scheme, with even rotation to replace dwellings in the original sample. One exception to this recommendation is that it may be better to use a split rotating panel in cases in which a significant percentage (5 percent or more) of households may refuse to be rein-

terviewed. However, this is not a major problem in most countries, and even if it is, the extent of possible bias can be investigated within a rotating design without a split, as explained above.

In Figure 23.1, dwellings are replaced after only three years, but this is just for the purposes of illustration. If a survey is fielded every four to five years, there should be no problem in following the same dwellings over three surveys (in other words, over eight to ten years) as long as the proportion of households that refuse to be reinterviewed is well under 5 percent in the second year. If 5 percent or more refuse to be reinterviewed, survey planners should seriously consider either replacing dwellings after they have participated in only two surveys or using a split panel rotating panel scheme. There is probably little benefit to retaining dwellings for longer than 10 years, which means that it is reasonable to rotate one-third of the dwellings out of the sample with each survey.

When a survey is performed annually, in most countries it is feasible to use the same dwellings for at least five years and, if there is a strong interest in analyzing panel data, for up to ten years. If the cumulative number of refusals of follow-up interviews reaches 5 percent or more of the original sample of dwellings after, say, five years, survey planners should consider rotating dwellings out of the sample after five years.

The recommendations of the previous paragraphs assume that the decision on whether to do the survey annually or less frequently (such as every 3–5 years) has already been made. For a general discussion of how to make this decision, see Chapter 2. Factors in this decision that are specific to the analysis of panel data were presented in the first section of this chapter. In particular, this decision should consider the analytical objectives of the survey. For example, attempts to estimate structural models using panel data are better served by a survey that collects panel data every year for at least five years (and preferable longer than that). In contrast, using panel data for program evaluation often requires only two surveys, but these surveys should be several years apart to allow new programs to have an effect on the outcomes of interest.

These recommendations for sample rotation also apply to surveys that attempt to follow individuals who move out of their original dwellings. In particular, there is no point in following people whose original dwellings have been rotated out of the sample.

Because the sample of individuals followed over time is a combination of movers and nonmovers, when nonmovers are dropped, the movers by themselves will not be representative of any initial population. If the costs of following movers are high, it may be best to drop the movers before dropping the dwellings from which they moved, especially in the case of those who have moved far away from their original dwelling and are therefore more expensive to follow. The suggestions made in the previous subsection about when it makes sense to follow movers still hold for the dwelling sample rotation scheme recommended in this section.

Specific Recommendations

This subsection provides specific recommendations for collecting panel data. Survey planners can use these recommendations to minimize sample attrition and ensure that the panel data they collect are as accurate as possible.

THE FIRST SURVEY. As long as there is a possibility, however remote, that an initial survey will be followed by another survey, planners should take a few simple steps in the first survey that will improve the ability to locate dwellings in the future and thus reduce unnecessary sample attrition if subsequent surveys are implemented. First, the addresses of dwellings should be recorded in the initial survey in as much detail as possible, so that they can be easily located if something changes (for example, if the dwelling is painted a different color, if the name of the street changes, or if the numbering system changes). Second, detailed maps of where the households are located should be drawn up in the initial survey and the maps should be stored in a safe place for use in future years.

Third, Global Positioning System equipment should be used at the time of the first survey to obtain the latitude, longitude and even altitude of each dwelling. Global positioning devices are relatively inexpensive (a few hundred dollars) and quite small (about the size of a cellular telephone). Fourth, and perhaps most importantly, all of the above information should be stored for future use, as paper copies, in electronic form, or preferably both; in some countries panel surveys could not be carried out because questionnaires and all other records with information from the previous survey had been thrown away. When detailed addresses, maps, and Global Positioning

System readings are recorded and securely stored for future use, survey teams in later years should be able to locate virtually all of the dwellings covered in an initial survey, as long as these dwellings still exist. For dwellings that no longer exist, the team should be able to determine with a high degree of certainty that those dwellings are in fact gone.

Collecting information on each individual household member in the initial survey also helps interviewers in subsequent surveys to match individuals from different survey rounds after their dwellings have been found. Interviewers should obtain not only the formal names of household members but also any informal names by which they are known in the community. If the names of the persons are written in a different alphabet or language than the one used for the survey questionnaire, interviewers should record these names on the household roster both in that alphabet or language as well as in the alphabet or language used to fill out the survey questionnaire. Finally, in countries where individuals have national identification codes (such as social security numbers), it may be possible to collect this information to match data on individuals from different survey rounds. However, national identification codes may be sensitive information, so interviewers should not insist that individuals provide them; doing so may reduce respondents' level of cooperation.

FOLLOW-UP SURVEYS. If an initial survey collects all of the information described above, it should not be difficult to reinterview people who have remained in the same dwelling during the intervening time period. The most important task is to record the information clearly so that it will be possible to create a computer file that matches dwelling and individual ID codes from the first survey with such codes from the second survey. In the case of dwelling codes, the simplest approach is to use the same code in both years.²⁹ If a dwelling no longer exists or is vacant, or if the occupants refuse to cooperate, this should be recorded as well. (A questionnaire page that collects this information—provided in Volume 3—is introduced in the following subsection.) To match individuals across surveys, certain basic information on the individuals interviewed in the first survey must be recorded and transcribed onto the questionnaire for the subsequent survey before the interview begins—specifically, the name (including any nicknames), age, and sex of the individual and the ID

code used in the initial survey. It may also be useful to record information on the person's relationship to the head of household, the person's occupation, and, if possible, any national identification code. The following subsection discusses in detail two different ways to record such information.

Two things can be done to minimize refusals in follow-up surveys. First, the survey team can use the same interviewers that were used in previous surveys, assigning them to the same households that they interviewed before. This can help because a familiar interviewer is more likely than a stranger to induce a reluctant household to cooperate. The survey team that implemented the Cebu Longitudinal Health and Nutrition survey in the Philippines, which was quite successful in minimizing attrition, attributes part of its success to that practice. However, there is one potential problem with this; analysts will not be able to distinguish (time invariant) measurement error specific to a given interviewer from (time invariant) measurement error specific to a given household. Second, planners should seriously consider offering small gifts or monetary incentives to households to participate in the follow-up survey. While some statistical agencies are quite comfortable with such payments, others are not; each country will have to decide based on past survey experience.

FOLLOWING INDIVIDUALS WHO MOVE. The discussion so far has focused on household members who do not move. If survey planners decide to follow some or all of the household members who move after the first survey, several additional steps can be taken during the first survey and in subsequent surveys that will make it easier to locate these members in later years. First, in the initial survey it is useful to ask the head of household the names and addresses of one or two people in the immediate vicinity who would be most likely to know at some later date where the household may have moved. Second, sometimes local officials can provide information on the current location of people who move. For example, in the 1988 Malaysia Family Life Survey, postal delivery workers were often able to provide the survey team with information about people who had moved.

Third, it is important to establish reliable lines of communication between the survey teams working in different areas. Thus, when one team discovers that an individual has moved to an area that is in the vicinity of another team, the first team can give the second

team the information necessary to find and interview that person. This procedure worked quite well in the 1988 Malaysia Family Life Survey and the 1997 Indonesia Family Life Survey. Finally, the importance of finding individuals and households that move must be stressed during the training of the interviewers, and planners should consider giving incentives, such as cash bonuses, to interviewers who locate individuals and households who have moved, with higher bonuses for more distant movers. Such incentives were used in the 1997 Indonesia survey, and may partially explain that survey's success in finding movers.

Implications for Questionnaire Design

This subsection introduces two questionnaire pages that allow interviewers to match data on households and individuals in a follow-up survey with data on the same households and individuals from a previous survey. (The questionnaire pages themselves are found in Volume 3.) This subsection also discusses changes that may be needed in other modules of the household questionnaire in surveys that collect panel data. The first page determines whether the dwelling was included in the sample for the previous survey and, if so, whether the dwelling was successfully located and its inhabitants reinterviewed in the subsequent survey. This page also contains some information on dwellings that are being added to the sample in an effort to follow individuals from the initial survey who have moved; for these dwellings, information is recorded on the household member being followed.

The second page matches the individuals currently in the dwelling with the individuals who occupied that dwelling during the previous survey. Using ID codes, this page enables the survey team to match data from the previous survey on all the original inhabitants that still live in a dwelling with data on these individuals in the current (follow-up) survey. This page is also used to collect information on what happened to any former occupants who are no longer in a dwelling. The following notes explain how to use these two questionnaire pages.

ADDITIONAL QUESTIONS FOR THE HOUSEHOLD IDENTIFICATION AND CONTROL PAGE. The Metadata module (introduced by Chapter 4) contains a questionnaire page entitled "Household Identification and Control Information." This page collects basic information about a dwelling and the household in it, including

the address of the household, the ID code for the primary sampling unit, and the ID code for the household. The version of this page presented in Volume 3 does not consider the possibility of collecting panel data.

The first page introduced here, “Additional Questions for the Household Identification and Information Control Page,” provides questions that should be added to the household identification page of the metadata module. These questions should be included only in follow-up surveys, and not in an initial survey.

For purposes of collecting panel data, there are three kinds of dwellings: dwellings that were covered in the previous survey, dwellings that have been constructed since the last survey or added as part of a dwelling sample rotation scheme, and dwellings that have been added because people who moved into them occupied a dwelling covered by the original survey. If the survey does not follow individuals who move, only the first two kinds of dwellings will be part of the survey, and Questions 2–4 of the “additional questions” page should be removed. The following notes provide detailed information on the design of the “additional questions” page.

Two general changes need to be made to the household identification page when adding these extra questions concerning panel data. First, a distinction must be made between the dwelling and the household, and ID codes must be assigned to both. Second, the questions about replacing households should be moved toward the end of the page, and should come after the questions presented in the “additional questions” page of this chapter. The following paragraphs provide more detailed information on the additional questions for the household identification page.

Q1–Q4. These four questions should be filled out by office staff or the field team supervisor before the interviewer visits the dwelling.

Q1–Q2. These two questions identify dwellings that are in the sample as part of an effort to follow people who move.

Q2. Interviewers can also distinguish (by having separate response codes for each case) between dwellings surveyed for the first time because they are new dwellings and dwellings added because they are replacing dwellings that were rotated out of the sample.

However, if household or cluster ID codes already convey this information, it is not necessary to make this distinction in question 2.

Q2–Q4. These three questions can be dropped if the survey does not attempt to follow individuals who move.

Q3–Q4. These two questions, for people who have moved to new dwellings, should be filled out before the interview by either the office staff or the field team supervisor. This information allows the data analyst to match the individuals in the current dwelling with the same individuals who, at the time of the first survey, lived in a dwelling that was part of the sample for the first survey. The personal ID codes for these people should be filled in here as well as on the “identification of persons interviewed in the previous survey” page (discussed below). This is necessary to show which individuals currently living in the dwelling are the movers being followed.

The basic scenario for filling out these questions is as follows. An interviewer goes to a dwelling that was part of the previous survey and finds out that someone who was interviewed in that survey has since moved out of the dwelling. By asking the current occupants of that dwelling (or neighbors or local officials), the interviewer discovers where that person is currently living. Someone must then interview the household members (including the person who has moved) living in the mover’s current dwelling. Before the interview in the new dwelling is conducted, a new questionnaire is prepared. The cluster and household ID codes of the dwelling of origin are entered in response to Question 3, and the personal ID code (at the dwelling of origin at the time of the previous survey) of the person who moved is entered in response to Question 4. Finally, some basic information on this person needs to be added on the “identification of persons interviewed in the previous survey” page (discussed below), in the line that corresponds to that person’s personal ID code in the previous survey. This procedure works equally well if several people move from a dwelling included in the first survey to another dwelling.

Q5–Q7. These are standard questions to ask about any dwelling in which a household is being interviewed, regardless of the status of the dwelling. The interview-

er should ask Question 7 for all cases in which an interview did not take place, because the appropriate action for the interviewer will depend on the answer to that question.

Q7. This question determines what should be done if it is not possible to conduct an interview in the dwelling. If the dwelling was covered in the previous survey, it may still be possible to get some information from friends and neighbors; in this case the interviewer should go on to the “identification of persons interviewed in the previous survey” page (discussed below). If the dwelling is included in the survey because it is inhabited by an individual who has moved and is being followed, there is little that can be done and the interview should end. If the dwelling is being added to the sample as part of a sample rotation scheme or because it is a newly built dwelling, it should be treated exactly as one would treat a dwelling that cannot be interviewed in a cross-sectional survey. Question 7 uses a skip code that assumes that when such a household cannot be interviewed another household will replace it. Another option in such cases is not to replace the household, in which case the skip code for the last response should be changed to “END OF INTERVIEW.”

PAGE FOR IDENTIFYING PEOPLE INTERVIEWED IN THE PREVIOUS SURVEY. This page should be included in follow-up surveys but not in the first survey. Its basic purpose is to match the individuals who lived in the dwelling in the previous survey with the same individuals still living in the dwelling at the time of the follow-up survey. For people who have left the dwelling, this page gathers information on where they are now and why they left the original dwelling.

There are two ways to collect this information. The first way is to start by collecting information about individuals currently living in the dwelling, and then ask whether these are the same people that were living in the dwelling in the previous survey. For reasons that will become clear below, this will be called the “new ID code” method. The second way is to ask about the household members who lived in the dwelling in the previous survey and record who is still in the household and who has left, then to ask about any individuals who have moved into the dwelling since the previous survey. This will be referred to as the “same ID code” method. Each method has advantages

and disadvantages, and the one to use will depend in part on the nature of the overall survey and the amount of time between the previous survey and the current survey. This chapter presents draft questionnaire pages for both methods.

The main advantage of the same ID code method is that individuals retain the same personal ID code as long as they remain in the dwelling where they were originally interviewed. This helps data analysts manipulate the data, and reduces any errors that may be caused by the interviewer or data entry operator in assigning new ID codes to the same person. Having the same ID code is particularly advantageous when households and individuals are interviewed many times, such as when they are interviewed annually over a period of five or ten years.

The main disadvantage of the same ID code method is that it becomes more cumbersome when there has been substantial mobility in and out of the dwelling, which is more likely to occur when a long time has passed since the previous survey. In particular, if most or all of the previous inhabitants have moved out of the dwelling, all pages of the questionnaire that collect individual-specific questions in rows lined up with the household roster (see the discussion in Chapter 3) will have a blank row for each person who has left. For example, suppose there were seven individuals in a dwelling in the previous survey and all of them left. Since this method reserves lines 1–7 of all the individual-specific modules for those people, all seven lines must be left blank in each of the modules of the questionnaire used in the follow-up survey. This disadvantage becomes particularly cumbersome if adding new people exceeds the number of lines allowed for household members; in this case two household questionnaires have to be used, one with some members of the household and another with the other members. For example, if seven other people currently live in the dwelling mentioned above, they must be allocated to lines 8–14, and if the questionnaire has only 12 lines (as is the case for the modules in this book) a second household questionnaire must be filled out for persons 13 and 14.

Another disadvantage of the same ID code method is that it becomes more cumbersome when the decision is made to follow individuals who move out of their previous household into new dwellings. At the new dwelling there is little reason to prepare a questionnaire that has the names of all the household

members of the mover's previous dwelling, and it may also be awkward to try to retain the same ID code for the mover in his or her new dwelling. In most cases it is probably more sensible to have new household rosters for new dwellings (those added to the sample to follow people who move) than to retain the rosters used for dwellings that are part of the original sample. This may imply having two types of household questionnaires, one for following individuals who move and one for dwellings of origin; this was the approach followed in the Kagera Health and Development Survey (see KDHS Research Team 1999).

The advantages and disadvantages of the new ID code method are the inverse of those for the same ID code method. The main disadvantage of the new ID code method is that individuals do not retain the same ID codes over time, even if they remain in the same dwelling. This is a disadvantage because it makes the work of data analysts a bit more complicated and perhaps more error-prone, and it also increases the possibility that the wrong ID code is entered at the data entry stage. The main advantage is that using the new ID code method it is easier to fill out the questionnaire for dwellings in which most or all former household members have moved out. The new ID code method is also more convenient to use when the survey attempts to follow individuals who have moved out of their households.

Both methods have been used in LSMS surveys. The same ID code method was used in the Kagera Health and Development Survey, and the new ID code method was used in Côte d'Ivoire, Peru, and Vietnam. In general, short time intervals between surveys favor the same ID code method while the new ID code method has more advantages when the time interval between surveys is longer. The new ID code method is more convenient when following individuals who move. However, survey designers must decide for themselves which method to use. The decision regarding which method to use should be made carefully, and it may be wise to try both methods in a field test before choosing between them.

A final general comment regarding both methods of matching individuals across surveys is that it may be useful to build removable household roster pages in the questionnaires. This eliminates the tedious (and potentially error-prone) process of copying information from the household roster of the previous survey into the questionnaire to be used in the current sur-

vey. The basic idea is that the household roster page in the first survey is detachable and can be inserted into a slot prepared for it in all subsequent surveys. For an example of how this worked using the same ID code method see Ainsworth and others (1992) and KDHS Research Team (1999). A similar approach could be used with the new ID code method; the roster from the initial survey would be inserted in such a way as to replace Questions 2–5 in the "Identification of Persons Interviewed in the Previous Survey" page.

The following paragraphs explain how to use the "new ID code" version of the questionnaire page that matches individuals across surveys. This page should be added to the end of the household roster module, which provides a list of all individuals who are currently members of the household. (For more detail on the household roster see Chapter 6.) Questions 2–5 of this page are filled out by office staff or the field team supervisor before the household is interviewed, based on information copied from the questionnaire used in the previous survey (or from electronically stored data files). An alternative to copying this information onto the new questionnaire is to have a detachable household roster in the previous survey, as explained above. Copying can also be avoided if the form is printed out from electronic files from the previous survey; the form can then be stapled into the appropriate place in the new questionnaire.

This questionnaire page is designed primarily for use when an interviewer is going to a dwelling that was part of the sample in the previous survey. However, it can also be used when the interviewer is following people who have moved out of a dwelling sampled in a previous survey. In the second case, only people who moved from the original dwelling to the current dwelling should have their names entered in column 2. (The same applies to the accompanying information in columns 3, 4, and 5). One row needs to be filled in on this form for each mover—the row corresponding to the mover's personal ID code in the previous survey. (In many cases this means only one row will be filled out for a dwelling.) For such movers the answer to Question 6 will always be "yes," the link with the ID code in the current household will be made in Question 7, and Questions 8–14 will never be filled out.

Q1. If the answer to this question is "NO ONE," the interviewer should proceed to the next section. A

response of “NO ONE” indicates that a completely new household now lives in the dwelling and neither the members of this household nor anyone else in the area have any information about the former occupants, all of whom have left.

Q2–Q5. These four questions contain information to assist in identifying people who are interviewed across two or more surveys. One could add more information for the same purpose. For example, information could be added on each person’s occupation or on some kind of national identification number (such as a social security number). Individuals who were not household members in the initial survey will not have any information filled in for these questions, and none of the questions on this page should be asked regarding those individuals.

Q5. In almost all cases the codes in Question 5 should be exactly the same as the codes used for the same question in the household roster of the previous survey. The only exceptions are if the head of household has changed or if the relationship is one that can change, such as spouse (in the event of a divorce).

Q7. The ID codes collected in this question, when paired with the previous survey ID codes (which are in the column at the far left of the questionnaire page), provide the crucial information that allows data users to match the data from the two different surveys for any individual who was included in both surveys. Supervisors must give extra attention to this data, both when checking the work of the interviewers and when checking the work of the data entry operators.

Q8. The second response code for this question refers to a situation in which a household “splits” into two or more households but no member actually moves out of the original dwelling; such a situation is common in some East Asian countries. One questionnaire should be filled out for each household, and when the interviewer is filling out a questionnaire for the original household, the people who live in a newly founded household in the dwelling should be given the code “2.” Completing a questionnaire for a newly founded household should follow the same procedure used for a household that was added to the survey for purpose of following individuals who moved. In countries where such household “splits” do not occur, the second response code can be dropped.

Q12. This question aims to determine whether the person is still in the population being sampled (assuming that people who move into institutional living arrangements are excluded from the sample population).

Q14. If mortality is of particular interest to analysts, questions to collect additional information on mortality, such as cause of death, can be added after this question.

Turn now to the “same ID code” version of the questionnaire page that matches individuals across surveys. There are two pages for this version; the first consists of instructions for filling out the second. The instruction page is needed because this version of the “identification of persons previously interviewed” page completely replaces Part A of the household roster module, which also has a page of instructions. (For more detail on the household roster see Chapter 6.) Questions 1–3 are filled out by office staff or the field team supervisor before the household is interviewed, based on information copied from the questionnaire used in the previous survey (or from electronically stored data files). An alternative to copying this information onto the new questionnaire is to have a detachable household roster in the previous survey, as explained above. Copying can also be avoided if the form is printed out from electronic files from the previous survey; the form can then be stapled into the appropriate place in the new questionnaire.

In theory, one could use this questionnaire page to follow a person who has moved out of a dwelling sampled in a previous survey, but doing this is rather cumbersome. For example, when one individual is being followed, questions 1–3 could be prepared just for that person, assigning him or her the same individual ID code he or she had in the previous survey. All other lines could be used for other members of the new dwelling. On the other hand, it is probably clearer not to insist that this person receive the same individual ID code (that is, the same line number) that he or she had in the dwelling of origin. But if the ID code is changed, a new question needs to be asked to determine which person in this new dwelling is the one being followed. There are other difficulties as well, so it may be best to design a different questionnaire for following individuals who moved. Alternatively, one could use the “new ID code” method described above.

A final general comment is that one may want to ask a question similar to Question 1 of the “new ID code” page to indicate who is providing answers to

questions in cases in which none of the original household members remain in the dwelling. This could be done across the top of the page, as done on the “new ID code” page, or as the last question of the page.

Q1–Q3. These three questions gather information to assist in identifying people who are interviewed across two or more surveys. One could gather more information for the same purpose. For example, information could be collected on each person’s occupation or on some kind of national identification number (such as a social security number).

Q4. In almost all cases the codes in this question should be exactly the same as the codes used for this question in the household roster of the previous survey. The only exceptions are if the head of household has changed or if the relationship is one that can change, such as spouse (in the event of a divorce).

Q5–Q6. These two questions are crucial for determining who is currently a household member and who is not. Household members proceed to Questions 8–14, while nonmembers who were in the previous survey go to Questions 15–21. Individuals who are not members and were not in the first survey need not be asked any further questions. (The two different kinds of nonmembers are distinguished in Question 7.) In some cases survey designers may want to ask Questions 8–14 to the second kind of nonmember. In these cases Question 7 can be deleted.

Q8–Q14. These questions are identical to a set of questions in the household roster module. See Chapter 6 for notes on those questions.

Q15–Q21. These are essentially the same as Questions 8–14 in the “new ID code” page discussed above.

Q15. The second response code for this question refers to a situation in which households “split” into two or more households but no member actually moves out of the original dwelling; such a situation is common in some East Asian countries. One questionnaire should be filled out for each household, and when the interviewer is filling out a questionnaire for the original household, the people who live in a newly founded household in the dwelling should be given the code “2.” Completing a questionnaire for a newly founded

household should follow the same procedure used for a household that was added to the survey for purpose of following individuals who moved.

Q19. This question aims to determine whether the person is still in the population being sampled (assuming that people who move into institutional living arrangements are excluded from the sample population.)

Q21. If mortality is of particular interest to analysts, questions to collect additional information on mortality, such as cause of death, can be added after this question.

CHANGES TO OTHER QUESTIONNAIRE MODULES. A final task when collecting panel data is to review other modules of the survey to see whether changes need to be made. In general, this only occurs for follow-up surveys, not for the initial survey. There are two reasons why such changes may need to be made. The first is to avoid collecting redundant information. The fertility and migration modules, and to a lesser extent the employment, education, and housing modules, collect information about the past that should never change, and there is no reason to collect such information each time an individual or household is interviewed (except to check the consistency of responses).

The fertility module collects birth history information from all women of childbearing age and the migration module collects information on the place of birth and on migration that took place many years ago. The employment module asks about employment five years ago, and some of the information collected for adults (especially adults 30 or older) in the education module—such as grade repetition and grade attainment—will almost never change. For each of these modules it may be useful to change the design so as not to collect redundant information. However, it is very important to keep in mind that no information will be redundant for new household members; provision must be made for the full set of information to be collected from anyone who was not interviewed in a previous survey. For an example of how this was done for fertility and migration data see the descriptions of the Kagera Health and Development Survey in Tanzania in Ainsworth and others (1992) and KDHS Research Team (1999).

A second reason to modify other questionnaire modules is to collect information on changes in assets or the use of those assets. For example, if one would

like to estimate an agricultural production function using panel data from farming households, one might want to match the ID codes of specific plots of land across different surveys. Similarly, one might want to match the ID codes of specific household businesses, or perhaps even the assets owned by these businesses. A final example is studies of households' responses to income or other shocks; researchers may want to match households' durable goods with other assets over time, to see, for example, which items were sold by households that experienced a severe loss of income. Such data were collected for major assets in the Kagera Health and Development Survey in Tanzania; see Ainsworth and others (1992) and KDHS Research Team (1999) for further explanation.

Appendix 23.1 Technical Discussion of Econometric Analysis of Panel Data

This appendix provides a technical presentation of the material discussed in the fifth and sixth subsections of Part I of this chapter. The discussion is in the same order as those subsections: program evaluation comes first,³⁰ followed by estimation of structural models.

Program Evaluation

Consider the example in the text on how to assess the impact of a new health program on child health. A household survey conducted in year s provides information on height-for-age for a random sample of children. The community data indicate which communities have implemented the program. Let H_{ics} be the height-for-age of child i in community c in year s and let D_{cs} be a dummy variable indicating whether the community has the health program in year s . ($D_{cs} = 0$ if community c does not have the health program in year s and $D_{cs} = 1$ if it does.) Let α be the impact of the health program on height-for-age, which for simplicity we assume to be the same for every child.³¹

Ignoring the constant term and other regressors, we have the following simple regression equation:

$$(1) \quad H_{ics} = \alpha D_{cs} + u_{ics}$$

where u_{ics} represents unobserved factors determining child height. The ordinary least squares estimate of α , denoted by $\hat{\alpha}_{OLS}$, is equivalent to the difference between the mean height-for-age of children in communities with the program and the mean height-for-

age in communities without the program. That is, $\hat{\alpha}_{OLS} = \bar{H}_s^{(1)} - \bar{H}_s^{(0)}$ where $\bar{H}_s^{(1)} = E[H_{ics} | D_{cs} = 1]$ and $\bar{H}_s^{(0)} = E[H_{ics} | D_{cs} = 0]$, and $E[\cdot | \cdot]$ denotes the conditional mean.

If the placement of health programs is nonrandom, $\hat{\alpha}_{OLS}$ captures both the impact of the program and the rule by which the government places programs to communities. For example, if programs are implemented first in the villages with the sickliest children, $\hat{\alpha}_{OLS}$ will underestimate the program impact (unless in equation 1 the analyst can control for all health conditions that governments consider when placing the program). If selective migration exists, either because more "caring" families are more likely to migrate into a community with the program or are less likely to migrate out of such a community, $\hat{\alpha}_{OLS}$ will overestimate the program impact.

To solve these two problems, suppose that a second survey of the same households (and children) is conducted after year s , in year t , and that between these two years the health program is expanded to new communities. Suppose further that by year t the new health programs have existed long enough to significantly affect child height. Finally, assume that equation 1 also applies in period t and that the error term has three additive components:

$$(2) \quad u_{i\tau} = v_c + w_i + e_{i\tau}, \text{ for } \tau = s, t$$

where v_c represents unobserved community-level determinants of child height that are constant over time, w_i is a child- or household-specific time-invariant component reflecting parental "tastes" for child health and/or a child's "health endowment" (innate healthiness), and $e_{i\tau}$ represents all time-varying components of $u_{i\tau}$ (such as "shocks" or measurement error in $H_{i\tau}$). Nonrandom program placement leads to correlation between v_c and $D_{c\tau}$, while selective migration leads to correlation between w_i and $D_{c\tau}$ (for example, parents with high w_i , which could represent tastes for child health, migrate to communities with the program). These correlations imply that $\hat{\alpha}_{OLS}$ is a biased estimate of the true α .

Consider the fixed effects estimator, or "differences-in-differences" estimator, $\hat{\alpha}_{FE} = (\bar{H}_t^{(1)} - \bar{H}_s^{(1)}) - (\bar{H}_t^{(0)} - \bar{H}_s^{(0)})$, where the superscript now denotes values of $D_{c\tau} - D_{cs}$.³² Intuitively, $\hat{\alpha}_{FE}$ is the difference between the change in health status over time in communities where a new program was started,

$\bar{H}_t^{(1)} - \bar{H}_s^{(1)}$, and the change in the health status over time in communities where nothing changed, $\bar{H}_t^{(0)} - \bar{H}_s^{(0)}$. As long as the placement of the program is uncorrelated with the time-varying component of u_{it} (formally, $E[e_{it} - e_{is} | D_{it} - D_{is}] = 0$), $\hat{\alpha}_{FE}$ is a consistent estimator of α . By differencing out v_c , $\hat{\alpha}_{FE}$ reflects the true impact of the health program, not the program placement rule. Similarly, because $\hat{\alpha}_{FE}$ uses differences in height for the same children, variation across children in either endowments or parental preferences, which are embodied in w_i , are also eliminated.

The discussion in the text casts doubt on this use of panel data to “solve” both problems. Heckman and Robb (1985) argue that alternative cross-sectional estimation methods exist that, unlike ordinary least squares, deal with both problems. For example, one might argue that the placement of the new health program in communities is based in part on the proximity of the community to the capital city, and that the proximity of a household to the capital does not affect child height, given the presence or absence of the program. In this case one could use selectivity correction or instrumental variables procedures on cross-sectional data to eliminate the influence of the correlation between clinic placement and the unobservables. Of course, the choice of instrumental variables can be controversial; for example, selective migration may imply that proximity to the capital is correlated with w_i . The point is simply that it is not clear which is worse, a “bad” instrument or a “bad” assumption about the error term.

An example of a “bad” assumption about the error term is the case in which the fixed effect is not really fixed. Consider a simple example in which placement of the new health program is determined not only by the level of, but also by trends or shocks in, unobserved determinants of child health, as represented by e_{it} in equation 2. In this case new program placements are correlated with changes in e_{it} (that is, $E[e_{it} - e_{is} | D_{it} - D_{is}] \neq 0$), so that $\hat{\alpha}_{FE}$ is a biased estimate of α . One potential solution to this problem is to use initial program status, D_{is} , as an instrumental variable for the change in program status, $D_{it} - D_{is}$.³³ As with any instrumental variables procedure, the cost of this approach is a loss in statistical efficiency.

Turn next to Heckman and Robb’s (1985) argument that fixed effects estimates can be obtained from repeated cross-sectional data if one has information on the presence of the health program in each survey

year. Suppose there are two successive cross-sectional household surveys, the first conducted in year s covering a randomly selected set of communities indexed by c and the second conducted in year t covering a random set of communities indexed by c' . If these two sets of communities overlap, either partially or entirely, one can construct a community-level panel as discussed in the text. If there is no overlap, a community questionnaire is needed that was administered in year t and that collects information on the presence of the health program and the date it was established in communities c' , as well as the same information in year t from all the original communities c . Using this information from two successive cross-sectional surveys, the first term in the expression for $\hat{\alpha}_{FE}$ given above, $\bar{H}_t^{(1)} - \bar{H}_s^{(1)}$, is formed as the difference in average height-for-age of children living in communities where a health program was started between years s and t . The second term, $\bar{H}_t^{(0)} - \bar{H}_s^{(0)}$, is the difference in average height-for-age of children living in communities where the health program existed either in both years or in neither year. If equation 2 is valid, repeated cross-sectional data solve the nonrandom allocation problem since, with successive representative samples of communities, $E[v_c - v_{c'}] = 0$. Note, however, the efficiency advantage that panel data have over repeated cross-sectional data. Using a panel, v_c is purged with probability 1, while in repeated cross-sectional data it is purged only in expectation. Thus, with repeated cross-sectional data there is an additional source of sampling variance, the difference in the mean values of v_c and $v_{c'}$. This source of variance is negligible only in very large samples of communities, so that the panel data fixed effects estimator is more efficient.³⁴

Without information on the placement of the health program in the original communities, the fixed effects estimator using cross-sectional data is infeasible, since neither $\bar{H}_s^{(1)}$ nor $\bar{H}_s^{(0)}$ can be estimated.³⁵ Repeated cross-sectional data can still be used to estimate α , but this requires different assumptions about the unobservables than those embodied in equation 2, and generally requires more than two cross-sectional surveys. For example, assume that u_{it} in equation 2 exhibits first-order autocorrelation: $u_{it+1} = \rho u_{it} + e_{it+1}$, for $t > s$, $\rho \neq 1$. Heckman and Robb show that α can then be estimated using three successive cross-sectional surveys done after the health program started—that is, during and after year t . There is no reason to believe that this specification of the error term is less plausible

than equation 2. See Heckman and Robb (1985) for details.

Selective migration is hard to handle using repeated cross-sectional data, regardless of whether the sets of communities surveyed in successive years overlap (that is, whether a community-level panel can be formed). Because a random sample of residents of any community in year t is not a random sample of the year s population of that community, the fixed effects procedure outlined in the previous paragraph is not robust to selective migration.³⁶ Thus having two (or more) cross-sections is no better than having one when the problem is selective migration; in both cases one must resort to correcting ordinary least squares regressions for selectivity bias using one of the many available procedures (for example, Heckman 1979). The key advantage of panel data is that one knows an individual's status—that is, whether the individual has access to the health program and whether he or she migrates—in both survey rounds. Fixed effects estimation based on repeated cross-sectional data can overcome the problem of nonrandom clinic allocation—but not selective migration—if one knows the community's status in both survey rounds. If one views selective migration as a minor problem, this is reassuring. However, Rosenzweig and Wolpin (1988) argue that selective migration may be a serious problem.

Finally, consider the discussion in the text of fixed effects estimation based on retrospective data. For households with at least two children, one (child i) born before the program was started and another (child j) born after it was started, α can be estimated by subtracting the average difference in the height-for-age of such sibling pairs from the average difference in height-for-age of sibling pairs in communities with no change in program status across siblings. In terms of equation 2, this estimator differences out v_c but not necessarily w_p , since siblings may have different height endowments. The problem with this “within-household” estimator is that parents with an especially sickly first child (a low w_p) will be more likely to migrate to the community with the health program, so it does not correct for selective migration. Excluding recent migrants from the sample would not help unless one also corrected for the resulting selection bias. Alternatively, one could use program status prior to the birth of child i as an instrumental variable, as discussed above.³⁷

Structural Models of Behavior

Following the text, consider estimation of an agricultural production function. A common log-linear specification is

$$(3) \log Y_{ht} = \alpha \log L_{ht} + \beta \log K_{ht} + \gamma \log Z_h + \mu_h + \varepsilon_{ht}$$

where h denotes household, t denotes time, Y is output, L is labor, K is the capital stock, and Z is a time invariant input (such as education of the farmer).³⁸ The error term μ_h represents the farmer fixed effect, which, in addition to management ability, may reflect unobserved land quality and aspects of the community infrastructure, while ε_{ht} represents a transitory “shock” to output due to, say, weather or pests. As explained in the text, estimating equation 3 on a single cross-sectional data set using ordinary least squares would lead to biased estimates of α , β , and γ due to the correlation between μ_h and the three input variables.

One could try to correct this problem using instrumental variable methods, but the use of input prices for this purpose could be criticized. An alternative solution is to use household panel data to eliminate the fixed effect by taking first differences of equation 3 across years:

$$(4) \Delta \log Y_{ht} = \alpha \Delta \log L_{ht} + \beta \Delta \log K_{ht} + \Delta \varepsilon_{ht}$$

where $\Delta \log Y_{ht} = \log Y_{ht} - \log Y_{hs}$, and so forth, for years t and s ($t > s$). The time-invariant terms $\gamma \log Z_h$ and μ_h drop out of equation 4, so γ cannot be estimated (except under strong assumptions; see Hausman and Taylor 1981).

Estimating equation 4 by ordinary least squares yields unbiased estimates of α and β only if there is no correlation between the time-differences in the inputs ($\Delta \log L_{ht}$ and $\Delta \log K_{ht}$) and the time-differences in the transitory “shock” term ($\Delta \varepsilon_{ht}$). As discussed in the text, this is unlikely to be the case. To get around this endogeneity problem, one could use instrumental variables to predict $\Delta \log L_{ht}$ and $\Delta \log K_{ht}$. Valid instruments would include wages and prices (perhaps collected from community-level surveys),³⁹ as well as the period s capital stock and other permanent characteristics of the farm that were determined prior to the realization of ε_{hs} . If more than two rounds of data are available, values of L and K lagged two or more periods can also be used as instruments.

Finally, consider estimation of dynamic relationships. An example is child height (or weight), for which a production function might be specified as follows:

$$(5) \quad H_{it} = \rho H_{it-1} + \gamma X_{it-1} + v_i + w_{it}.$$

Height in period t depends on height in period $t-1$, nutrition inputs in period $t-1$ (X_{it-1}), and an error term that we have decomposed into permanent and transitory components (see, among others, Blau, Guilkey, and Popkin 1996). Almost any dynamic decision rule, such as the choice of X_{it} as a function of H_{it-1} , fits into this framework.

When using panel data to estimate dynamic relationships, the appropriate estimation procedure depends on whether one believes v_i is correlated with the other regressors in equation 5. If so, we can again take first-differences to eliminate v_i , so that the term $\Delta H_{it-1} = H_{it-1} - H_{it-2}$ appears on the right-hand side of the equation, along with ΔX_{it-1} and Δw_{it} . Three rounds of panel data are needed now, since the regression involves H_{it} , H_{it-1} , and H_{it-2} .⁴⁰ Also note that ΔH_{it-1} is correlated with Δw_{it} by virtue of the fact that H_{it-1} is correlated with w_{it-1} . Moreover, since the choice of X_{it-1} may depend on the realization of w_{it-1} , ΔX_{it-1} may also be correlated with the error term. The standard solution is to use H_{it-2} and X_{it-2} as instrumental variables, as these are correlated with ΔH_{it-1} and ΔX_{it-1} , respectively, but uncorrelated with Δw_{it} . One potential problem with this strategy is that these instrumental variables may have weak predictive power for ΔH_{it-1} and ΔX_{it-1} .

The presence of measurement error in H and X raises the data requirements for unbiased estimation of equation 5. If measurement error is serially uncorrelated, H_{it-3} and X_{it-3} are sensible instruments, but this requires at least four rounds of data. Alternatively, repeated measures of child anthropometric status taken at the same point in time can be used to deal with measurement error. For example, rather than using lagged height (H_{it-2}) as an instrument for ΔH_{it-1} , one can use lagged weight, since weight is measured differently than height but is strongly correlated with it. There is no analogous approach to measurement error in X , although prices lagged two periods back could be used as instruments (as in the agricultural production function example above).

Given that a multiround panel is required to estimate equation 5, nonrandom panel attrition becomes

a concern. In a low-income setting, child mortality can be high, so that many of the original children in a sample may die. Child death is a form of nonrandom attrition if it is correlated with the child health endowment v_i and unobserved health “shocks” w_{it} .⁴¹ Once again, differencing the data removes the former error component but not the latter, so that panel attrition may induce selection bias; on average, children who survive may have a different distribution of health shocks than children who die.⁴² Appropriate methods to deal with this bias are currently an active area of research.

A final dynamics issue does not concern structural models, but is of interest nevertheless: the persistence of poverty over time. Consider movements into or out of poverty, defined as a minimal level of annual household per capita expenditures. Let C_{ht} be the per capita expenditures of household h in year t , and let z be the poverty line. The probability that a household with a given per capita expenditure level today will fall below the poverty line next year, $p_{t+1,t}^h$, is $\Pr[C_{ht+1} \leq z | C_{ht}]$. A reduced form equation for the determinants of expenditures is:

$$(6) \quad C_{ht} = \delta' X_{ht} + u_{ht}$$

where the X variables are observable household characteristics. To estimate $p_{t+1,t}^h$ we need to know what fraction of the variance of u_{ht} is permanent (unobserved endowments of the household) and what fraction is transitory (luck in any given year). This sort of decomposition is impossible with cross-sectional data but can be done with panel data. For example, let $u_{ht} = w_h + e_{ht}$, with $e_{ht} + \rho e_{ht-1} + v_{ht}$, which allows for persistence in the transitory component (see, among others, Lillard and Willis 1978). For simplicity, suppose as well that the consumption shock, v_{ht} , is independent and identically distributed normal. Using panel data it is straightforward to estimate the household-specific permanent component (w_h), the shock variance (σ_v^2), and the persistence parameter (ρ). With these estimates one can calculate

$$(7) \quad \hat{p}_{t+1,t}^h = \Phi \left(\frac{z - (1 - \hat{\rho}) (\hat{\delta}' X_{ht} + \hat{w}_h) - \hat{\rho} C_{ht}}{\hat{\sigma}_v} \right)$$

where Φ is the standard normal cumulative density function and hats denote estimated parameters.

Unfortunately, while this type of analysis appears to be an important advantage of panel data, there is one serious problem. As mentioned in the text, measurement error in C_{it} (which is quite likely, as explained in Chapter 5), prevents unbiased estimation of $\hat{\sigma}_v$, so that $p_{t-1,t}^h$ cannot be estimated.

Notes

The authors would like to thank the following people for their very useful comments on previous drafts of this paper: Martha Ainsworth, Julie Davanzo, Angus Deaton, Elizabeth Frankenberg, Margaret Grosh, John Haaga, Graham Kalton, Fiona MacIntosh, Alberto Martini, Juan Munoz, Mark Rosenzweig, Kalanidhi Subbarao, and Duncan Thomas.

1. This follows directly from the formula for the variance of the difference of two means, \bar{y}_1 and \bar{y}_2 , which is $\text{Var}(\bar{y}_1) + \text{Var}(\bar{y}_2) - 2\rho(\text{Var}(\bar{y}_1)\text{Var}(\bar{y}_2))^{0.5}$, where ρ is the correlation between \bar{y}_1 and \bar{y}_2 (which equals the correlation between y_1 and y_2). In repeated cross-sectional surveys $\rho = 0$ because the two samples are independent of each other. Note that this argument assumes no measurement error. Although measurement error complicates the analysis, in general it does not alter the result that for a given sample size, panel data yield more precise estimates than repeated cross-sectional surveys (see Ashenfelter, Deaton, and Solon 1986).

2. The use of this specific example does not imply that one can analyze only new programs. Changes in the characteristics of existing programs, such as improvements in the quality of services, can also be studied in the same way.

3. All versions of the migration module presented in Chapter 16 identify recent migrants.

4. In some cases panel data are not even necessary at the community level to implement the fixed effects estimator. Heckman and Robb (1985) argue that fixed effects estimates can be obtained from repeated cross-sectional data if there is information on the presence of community programs in each survey. Yet selective migration is harder to handle with repeated cross-sectional data, even if a community-level panel can be formed. See Appendix 23.1 for further details.

5. A more precise definition in terms of economic theory is that the parameters of structural models are the fundamental components of either technological relationships (such as production functions) or household (or individual) preferences.

6. Most of this discussion also applies to the estimation of conditional profit functions and the analysis of nonagricultural enterprises.

7. See Chapter 26 for a brief explanation of instrumental variable methods in econometrics. For a more thorough exposition see a standard econometrics textbook such as Greene (2000).

8. All of the potential instruments mentioned in Appendix 23.1 would be valid in the case of (serially uncorrelated) measurement error in both inputs, with the exception of the first-period capital stock.

9. Some of these dynamic relationships are not structural ones, but the general point still holds that policymakers are quite often interested in a wide variety of dynamic relationships.

10. In the United States both the Panel Study of Income Dynamics and the Current Population Survey have conducted validation studies of earnings reports based on matched data from employer or tax records. Unfortunately, these validation methods would be of limited use in most developing countries, where wage income is less prevalent and recordkeeping by employers and tax authorities is less reliable.

11. For simplicity, the discussion here assumes that each household lives in a dwelling, which implies that there is no homeless or nomadic population. In most developing countries the vast majority of households live in some kind of fixed dwelling, however flimsy. However, in some countries substantial homeless or nomadic populations may exist. The difficulties associated with sampling such populations occur whether or not panel data are collected, so issues concerning homeless or nomadic populations are not considered further in this chapter. See United Nations (1993) for a useful discussion of how to draw samples and conduct surveys for such populations.

12. Examples of dwellings that may move are houseboats, tent-like dwellings used by nomads, and very simple shantytown dwellings constructed of boards, cardboard, sheet metal, and other scrap materials. In most countries such dwellings are either rare (for example, houseboats) or seldom move (for example, shantytown dwellings). Thus problems arising from dwellings that move will not be discussed further in this chapter.

13. This listing operation will also provide information about rates of population growth since the previous survey in each primary sampling unit. This information may be needed to adjust the sampling weights associated with each household. Such adjustments are straightforward and will not be discussed further in this chapter.

14. The other way an individual can leave the sample population is by entering an institutional living arrangement, such as a military barracks, a nursing home, a college dormitory, or a prison. Due to the difficulties of covering such populations, most household surveys deliberately exclude them. A problem that arises when survey planners want to follow the same individuals over time is how to find them again after they leave the institutional living arrangement and rejoin the general population.

15. In some cases, especially those in which cross-sectional surveys are done annually, listing operations are done only every 3–5 years. This practice is unwise because it can lead to unrepresentative samples (except in societies with very low mobility).

16. Actually such migrants are not completely lost. Household members, friends, and neighbors who remain in the area can provide some information about these individuals, including their current place of residence and their current economic activity; such information may keep more distant migrants in the sample for some purposes.

17. Calculating adjusted sampling weights can reduce bias due to attrition, but it cannot completely remove such bias because households and individuals who drop out of the sample will almost certainly differ from those who remain in the sample in terms of both observed and unobserved characteristics. Reweighting can adjust for differences in observed characteristics but not for differences in unobserved characteristics.

18. Examples of initial refusal rates from previous LSMS surveys are: 0.9 percent (Côte d'Ivoire), 0.6 percent (Pakistan), 1.3–3.3 percent (Peru), and 0.8 percent (Vietnam). Two important exceptions to these generally low refusal rates are in Jamaica, where refusal rates have ranged from 5.7 to 10.4 percent (primarily due to use of non-LSMS fieldwork methods) and in LSMS-type surveys recently done in countries of Eastern Europe and the former Soviet Union—such as the Kyrgyz Republic, which had a refusal rate of 3.8 percent in 1996.

19. Specific examples were discussed in the first section of this chapter. One general benefit of following individuals who move is that it reduces the magnitude of any bias caused by sample attrition.

20. To account for new dwellings in Lima, the original sample of dwellings was supplemented using a new sample of dwellings drawn from previously uninhabited areas that had been settled by migrants between 1985 and 1990.

21. While the Ghana computer files included all three variables (name, sex, and age), the Jamaica computer files included only age and sex.

22. Another ICRISAT panel survey was done in Burkina Faso but continued for only three years. (See Fafchamps 1993 for a description.) In addition, several small-scale panel data sets were collected in the 1980s and 1990s by researchers at the International Food Policy Research Institute. Most had small samples, but a few of these panels contained more than 500 households, including surveys begun in the mid 1980s in the Philippines and in Pakistan (Yohannes 1994).

23. Many of the households interviewed in 1993 that were not found in 1997 were found in 1998.

24. The 1990 Peru LSMS survey lost nearly 43 percent of sampled households; the percentage of individuals lost was probably more than 50 percent.

25. The figures for the NLSY were obtained from the website maintained for that survey, <http://stat.bls.gov/nlshome.htm>. The PSID information is taken from Brown, Duncan, and Stafford (1996).

26. Recent evidence from the 1997 Indonesian Family Life Survey suggests that following individuals who move great distances

may not be so costly; Thomas, Frankenberg, and Smith (1999) report that the cost of “completing a case” (finding and reinterviewing an individual or a household) of a long-distance mover is only about 50–60 percent higher than the cost of completing a case for a household that did not move or moved only a short distance.

27. Here large economies of scale may be possible. In particular, after an LSMS survey stops following individuals, it is possible to implement a separate, specialized survey that attempts to follow them for a further period of time. This would be much less expensive than implementing a new survey that does not build on any previous survey.

28. This problem could be avoided by looking only at those dwellings that are in the panel in all three survey years. However, this means that it would be necessary to wait three years before examining the data (since it is not possible to know in advance which dwellings will stay in the survey through the third year).

29. One potential problem with this system is that if a new household replaces an old household in the same dwelling, retaining the same dwelling number may cause data analysts to mistakenly assume that the new residents are the same household as the old residents. This problem is best avoided by making clear in the survey documentation that the only way to verify that the same people live in a given dwelling at two points in time is to check the data collected expressly for the purpose of making such matches.

30. This discussion of program evaluation is at an introductory level. Two recent and very thorough expositions are Manski and Garfinkel (1992) and Heckman, LaLonde, and Smith (1999).

31. The more general specification, where α varies across the population, raises issues in interpreting the program impact. See Heckman and Robb (1985) for a thorough discussion.

32. Assume that the program is never dismantled, so that $D_{it} - D_{is} \neq -1$.

33. This is the fixed effect-instrumental variables estimator, which can be written as

$$\hat{\alpha}_{FEIV} = \frac{1 - p_s}{p_t - p_s} \left\{ \left(\bar{H}_t^{(0)} - \bar{H}_s^{(0)} \right) - \left(\bar{H}_t^{(1)} - \bar{H}_s^{(1)} \right) \right\}$$

where superscripts denote values of D_{it} and p_τ is the proportion of children who had access to a program in year $\tau = t, s$. Intuitively, this estimator compares the growth of children who could potentially have had newfound access to the health program ($D_{it} = 0$) with those who could never have had newfound access since they already had the program in their community ($D_{it} = 1$), and then adjusts for the probability that the program was actually implemented. Foster and Rosenzweig (1996) use a similar procedure to estimate a school enrollment decision rule as a function of school availability in the village.

34. In principle, the fixed effect-instrumental variables estimator discussed in the previous note can also be implemented on repeated cross-sectional data.

35. In the unlikely event that the environment is stable (so that average child health will not change between years s and t for any reason other than the introduction of health program) repeated cross-sectional data can be used to estimate α given one additional piece of information. If we know (or can estimate) the proportion of children in the population, p_t , who had access to the health program in each survey year, α can be estimated as $(\bar{H}_t - \bar{H}_s)/(p_t - p_s)$, where the numerator is the average difference in child height-for-age across survey years.

36. One could drop communities that had no health program by year t under the assumption that out-migration to take advantage of the program in other villages (between years s and t) is important only in communities with no program to begin with. Yet this does not remove bias in the fixed effects estimator because it ignores the possibility that implementing the program may discourage households from (selectively) migrating out of a community when they otherwise would have.

37. Rosenzweig and Wolpin (1986) criticize the within-household estimator for a related reason. Suppose one exploits variation in the length of exposure of each child to a health clinic. Sibling differences in length of exposure depend on the age differences between siblings, which in turn depend on child spacing behavior of parents. Rosenzweig and Wolpin argue that because parents may adjust birth intervals in response to the realization of child-specific endowments, length of exposure to the clinic may be correlated with these endowments. Therefore, the within-household estimator would produce biased estimates of α .

38. This equation is derived by taking logarithms of both sides of the following Cobb-Douglas production function: $Y = L^\alpha K^\beta Z^\gamma e^{\mu+\epsilon}$.

39. Wages and prices are valid instruments here, unlike in equation 3, because unobserved community infrastructure, embodied in μ_{it} , does not appear in equation 4.

40. For more complicated dynamics, such as second-order autocorrelation in height, more rounds are needed.

41. A 1997 paper by Lee, Pitt, and Rosenzweig did not find evidence of bias due to attrition in the form of child mortality.

42. A similar problem arises with education production functions in that children who perform poorly in school tend to drop out. In this case, however, school dropouts can be followed and tested. See Chapter 8 on education.

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International Food Policy Research Institute, Food and
Consumption Division, Washington, DC.

24

Intrahousehold Analysis

Nobuhiko Fuwa, Shahidur R. Khandker, Andrew D. Mason, and Tara Vishwanath

Why perform intrahousehold analysis? The efforts of developing country governments to reduce poverty are often based on analyses of the determinants of poverty and of their effects on economic growth and development. Many of these studies use the household as the unit of analysis based on the assumption that the household is the appropriate level at which to target income transfers or other policies to enhance welfare, promote growth, or narrow income differentials. However, researchers and policy analysts are increasingly recognizing that, under certain circumstances, the outcomes of policies can have unforeseen consequences if patterns of intrahousehold resource allocation are not taken into account in the design of policies and projects.

Analyzing how a household's resources are allocated among its members requires individual-level data on each household member. Analysis of these data is fundamentally useful to policymakers in two ways. First, analysis of individual welfare outcomes (for example, in terms of consumption or health) can signal to policymakers whether there is a need for interventions targeted to specific groups or individuals within households. Second, such analysis can help policymakers assess whether existing policy interventions that are targeted to individuals or groups within households (such as children or the elderly) are succeeding or failing. These points are illustrated in turn below with a few examples.

Intrahousehold resource allocation analysis can be critical to the measurement of poverty and inequality. Haddad and Kanbur (1990) reported from Philippines that estimates of poverty can differ quite significantly—by as much as 30 percent—when methods using household-level and individual-level data are compared.¹ Their findings suggest that using house-

hold aggregate measures can result in a distorted picture of poverty if some households whose average per capita expenditures are above the poverty line contain members (for example, women or the elderly) whose standard of living actually falls below the poverty line. Moreover, data from many countries around the world indicate that there are significant (and sometimes persistent) gender disparities in human capital, access to productive resources such as credit and agricultural extension services, and participation in economic activities (World Bank 1995). Thus understanding the intrahousehold distribution of basic goods and services such as food, health inputs, education, and credit can help policymakers set strategic policy priorities.

Analysis of intrahousehold resource allocation is also important for understanding how policy interventions affect the welfare of different household members. Recent studies suggest that women and men differ in how they allocate resources among household members and that women may tend to allocate more resources to children than men do.² If

that is in fact the case, policies and programs that increase women's control of resources within the household may be more effective in improving children's welfare than policies and programs that target resources at the level of the household as a whole.

Moreover, policy initiatives can have unintended consequences if policymakers are unaware of "cross-person effects" in which the behavior of an individual within a household depends on behavior of other members. As households have their own ways of allocating resources, it is possible that household behavior may alter or offset the intended impact of a policy initiative (Schultz 1989). One classic example of this type of outcome is in school feeding programs. Sometimes when children receive meals at school, their food allocations at home are reduced and reallocated to other household members. This reduces the effectiveness of such programs, the aim of which is to increase children's food intake (Beaton and Ghassemi 1982).

Similarly, microcredit programs that are introduced to increase women's involvement in market-based production may have a variety of unanticipated effects on the family. For example, as women undertake more market-oriented activities, girls' housework responsibilities often increase, as they are often responsible for taking over the housework formerly done by their mothers. In analyzing microcredit programs in Bangladesh, Pitt and Khandker (1998) found that giving women access to credit tends to increase fertility and decrease contraceptive use, while giving credit to men tends to have exactly the opposite effect. While giving women access to credit increases the schooling of both boys and girls, the gender impact is not symmetrical, with the impact being much more pronounced for boys than for girls. Thus, since the allocation of time and the allocation of other resources within the household are interrelated, it is necessary for analysts to examine not only the direct impact of policies on the outcomes in which they are interested but also any indirect impacts of the same policies.

In some extreme cases, even interventions directly targeted to women may backfire because of the way households allocate their resources among their members. For example, a recent project on rice cultivation in Gambia was designed to increase the productivity of rice, which was cultivated by women, by giving these women incentives to produce for the market rather than for home consumption. Rice yields increased as a result of the project, but this caused men

to take control of rice cultivation from the women. As a result, women's share of household income actually declined, which was contrary to the project's intention (von Braun and Webb 1989). In this context, household members who have something to lose (in this case, the women) may focus their productive effort on preserving their personal control over their income rather than on maximizing farm profits at the household level (also see Jones 1986 for evidence from Cameroon).

These examples make clear that understanding how resources are allocated within the household and how changes in the policy environment affect these allocations is critical if policymakers are to design and implement policies that achieve their objectives and are effective in improving individuals' welfare. (See Alderman and others 1995 and Haddad, Hoddinott, and Alderman 1997 for more detailed discussions of the policy significance of intrahousehold resource allocation.)

The primary purpose of this chapter is to discuss how the draft LSMS questionnaire modules, which appear in earlier chapters of this book, can be designed to support intrahousehold analysis. The first section of the chapter discusses the modeling and empirical issues involved in intrahousehold analysis. The second section examines the definition of a household and of headship and looks at changes in household composition. The third section describes how intrahousehold analysis can be supported by the data that would be collected in the draft LSMS questionnaire modules presented in this book. The third section also highlights the limits of LSMS-type surveys in pursuing intrahousehold analysis and shows how designs that go beyond regular LSMS-type surveys can gather the data necessary to address more specific intrahousehold issues. The fourth and final section summarizes the chapter and advises those who will implement LSMS-type surveys in the future.

Modeling Intrahousehold Resource Allocation Behavior

This section reviews the conceptual and empirical issues involved in intrahousehold analysis.³ It begins by discussing how to model household resource allocation behavior and goes on to consider the issues involved in defining household membership and headship. The section concludes with a brief exami-

nation of issues involved in empirical econometric estimation.

How to Model Intrahousehold Resource Allocation Behavior

In developing countries, particularly in rural areas, the vast majority of economic activity takes place within the household. Decisions about education, labor force participation, savings and asset accumulation, investment, marriage, and fertility, which are made within households, critically affect growth and the distribution of income across households. Therefore, it is very important for analysts and policymakers to understand the structure of the household and how it varies across households and over time.⁴

In the vast majority of the theoretical literature, the household is treated as a collection of individuals who behave as if they are in complete agreement on how best to combine their time and the other resources at their disposal to produce goods at home and in the market for attaining the household's maximum possible welfare. Under this framework, household behavior is analyzed as if "the household" is a single decisionmaker (Becker 1991; Samuelson 1956). This unitary model has been used to analyze how certain types of intrahousehold outcomes in resource allocation, including gender disparities, arise (Berhman 1988a, 1988b; Rosenzweig and Schultz 1982; Pitt, Rosenzweig, and Hassan 1990). This theoretical framework has also been used to analyze some important cross-person effects such as the interdependence between a husband's and his wife's respective decisions on whether and how much to participate in the labor market.

However, analysts are increasingly recognizing significant limitations of the unitary model approach to household decisionmaking. First, the theoretical assumptions that underlie the unitary model—such as that all members share the same preferences or that a single member dictates all intrahousehold allocations—are quite restrictive and thus may not accord with reality (Bergstrom 1989; Folbre 1986). Second, certain phenomena such as domestic violence seem to contradict the unitary view of household decisionmaking. Third, an increasing amount of econometric testing of some underlying assumptions of the unitary model has rejected those assumptions (Bourguignon and others 1993; Browning and others 1994; Thomas 1990, 1993; Thomas and Chen 1994; Schultz 1990).⁵

Consequently, in the last decade, other models of household decisionmaking have increasingly been developed in the literature. These more general approaches, called "collective" models, incorporate the preferences and relative decisionmaking power (or bargaining power) of different household members in the models of household decisionmaking (McElroy and Horney 1981; Manser and Brown 1980; Chiappori 1988; Lundberg and Pollack 1993; Carter and Katz 1997).

As long as different models produce the same predictions about the relationship between policy instruments and intrahousehold outcomes, which model is used in any analysis will not be of great significance to policymakers in terms of how they design policy interventions (Hoddinott 1992). For example, Rosenzweig and Schultz (1982) observed that the probability of survival in rural India differs by gender and that the probability of survival is higher for females in areas with greater opportunities for female employment. Under the unitary model framework, this observation can be interpreted as a result of households responding to their perception of the different returns yielded by investments in boys as opposed to girls. Under the collective model framework, the same observation can be seen as the result of household bargaining between the husband and the wife. When women have higher earning potential, they are more able to influence how the household's resources are allocated (Folbre 1984; Rosenzweig and Schultz 1984). However, regardless of the theoretical framework, the policy implication is the same—that increasing women's employment opportunities reduces the gap between boys and girls in the probability of survival.

Collective models do have some additional policy implications that the unitary model does not suggest. For example, collective models predict, as the unitary model does not, that which household member receives the income affects how that income is subsequently allocated among alternative consumption goods (Browning and others 1994; Bourguignon and others 1993; Thomas 1990, 1993; Lundberg, Pollack, and Wales 1997).

Furthermore, collective models show that any institutions or social norms that affect the access of different household members to economic resources can significantly affect intrahousehold resource allocation. These include the rules, norms, and laws that

govern marriage (McElroy 1992), inheritance, access to common property resources in communities (Haddad and Kanbur 1992), and use rights for agricultural land (Platteau 1996; Vishwanath and others 1996).

Yet another major implication of some collective models is that the outcomes of the intrahousehold resource allocation process may not be efficient. If resource allocation within households is indeed inefficient, this could signal the need for policy interventions. While the assumption of efficiency in the allocation of consumption has not generally been challenged in the empirical literature, it has been challenged on the production side. It has been documented that there is a great deal of gender disparity in production, which varies widely across different areas. Men and women may grow different crops and different amounts of these crops. In Sub-Saharan Africa women grow almost 80 percent of all food.

One issue that has been widely discussed is whether or not inputs for production are allocated efficiently across different plots. Some recent studies have found that the intrahousehold allocation of productive resources between men and women leads to production inefficiencies. For example, Jones (1986) examined the work done by Massa women in North Cameroon. She found that because women controlled the income from their own plots but not from production on their husbands' plots, they spent more time on their plots and less time on their husbands' plots than would have been optimal if they were trying to maximize total household income. Thus, as suggested earlier, they were more interested in preserving their own personal income than in maximizing total household income.

Many studies have supported this finding in other countries. Although some of these studies have been qualitative, they strongly suggest that labor is not pooled within households and that labor allocations across plots are inefficient. Udry (1996) examined yield differentials for identical crops from men's and women's fields in Burkina Faso and found that women's fields had lower yields than men's yields and that the allocation of inputs among these fields was inefficient. This implies that the value of household production could be increased significantly simply by reallocating factors of production that are currently used on men's plots to women's plots.⁶ Vishwanath and others (1996) also suggest that the higher a household

member's status within the household, the higher the productivity of his or her plots (after controlling for other factors).⁷

However, for analysts to test the validity of these alternative models of household behavior, they need data on income and assets at the individual level rather than at the household level. They may also require information on the variables (including marriage and inheritance customs as well as rules about land access or common property access) that can affect the intrahousehold allocation of household resources.

Empirical Issues

There are three types of econometric models for analyzing intrahousehold behavior: structural models, reduced form models, and conditional demand models (see Chapter 26 of this book on econometrics; Strauss and Thomas 1995; Behrman 1992; Pitt, Rosenzweig, and Hassan 1990; and Pitt 1997).

STRUCTURAL MODELS. Estimating "structural" relationships makes it possible for analysts to infer whether household members favor the boys or the girls of the household. If there is a preference, analysts can assess whether this preference (as reflected in the intrahousehold allocation of schooling and nutrients) affects the children's earnings and health outcomes (Behrman 1992, 1988a, 1988b). Analysts can also discover to what extent preferences and income maximization motives (which are usually assumed to be based on a household consensus) explain any inequality in food intake among members of the same household (Pitt, Rosenzweig, and Hassan 1990). However, using this method involves a few difficulties. For example, it is necessary to control the endogeneity of right-side variables, and it is difficult to measure and costly to collect some of the crucial input variables (such as individual-level data on food intake and time use) usually required to make a structural estimate of intrahousehold outcomes.

REDUCED FORM MODELS. Reduced form relationships are mostly easier to estimate than structural form relationships and are appropriate for examining certain types of intrahousehold cross-person links, such as how a change in the wife's wage rate affects the participation of her husband and children in the labor force.

CONDITIONAL DEMAND MODELS. Conditional demand functions can be used to analyze the

reduced form demand relations that depend on (or ‘are conditional on,’ using an econometric jargon) behavioral variables such as the utilization of or participation in government programs (for example, schooling, health services, or credit schemes). In estimating conditional demand functions, price variables are commonly used as identifying instruments to control for the endogeneity of right-side behavioral variables (see Chapter 26 on econometrics). However, in the case of intrahousehold analysis, estimating conditional demand functions at the individual level, the analyst may find it difficult or even impossible to find a sufficient number of suitable identifying instruments. See Pitt (1997) for a detailed discussion of the econometric estimation of conditional demand functions in the context of intrahousehold analysis.

SUMMARY. As discussed in detail in Chapter 26 (on econometrics), evaluating the effects of policy interventions is a complex issue that not only involves the design of surveys and methods of analysis but must also take into account the design and the nature of the programs to be evaluated. In cases where the main aim of a particular household survey is to evaluate an intervention, the ideal scenario would be to incorporate the survey into the implementation schedule of the program itself. Likewise, the program might incorporate some randomized experimental components (see Newman, Rawlings, and Gertler 1994 for examples). In such circumstances it may not be vital to collect a set of potential instrumental variables in the household survey.

When neither panel data nor randomized experimental data are available, another approach may be to look for exogeneity in the eligibility criteria associated with the program. In such cases, even when a baseline survey is not available, it is often possible to evaluate the impact of a program if there is some random or predetermined criterion that restricts participation in the program or eligibility for program benefits.⁸ This approach is the so-called “quasi-experimental survey method” (see Pitt and Khandker 1998). However, in the case of general multitopic household surveys like the LSMS, it may be prudent to collect data on a set of possible “instruments”—variables that can be used in the analysis to identify the impact that a given program has on household and intrahousehold outcomes.

What Constitutes a Household?

No matter how the decisionmaking process is modeled for analyzing intrahousehold resource allocations, a more fundamental question is who makes up the household and why. Should the definition of a household be a group of individuals who live together under one roof and share a common kitchen or cooking pot, as assumed in most household surveys? The definition of a household can be very complex and is often culture- and location-specific. Households are formed partly by economic incentives but often also reflect social and cultural norms. The household is not a static institution, as its structure and composition varies in response to internal and external changes. The complexity is best stated in Guyer (1980): “A household is a particularly dense center in a network of exchange relationships.” As such, any fixed definition of a household may be an oversimplification and may, therefore, lead analysts to draw erroneous conclusions when evaluating the intrahousehold impact of policies and projects.

The definition of the household that is usually used in LSMS surveys can impose serious constraints on empirical analysis because of a lack of information about other individuals or families who influence decisions and outcomes within the household. For example, in many households in developing countries, extended families live within the same household, and several households live within the same compound. Guyer (1986) provides examples from West Africa in which households within a kinship group may farm separately but consume many goods jointly.

Changes in Household Composition

The composition of households can change over time as a result of marriage, divorce, migration, partition, or the combining or linking of previously separate households (see Foster 1993 who uses data from Bangladesh).⁹ Moreover, there are a number of factors that can influence people’s decisions to come together as a household or to alter household composition over time. For example, social norms and rules regarding inheritance—and thus access to resources—can affect individuals’ incentives to live together. The inability of people to borrow may cause them to share a household with their parents or siblings. The nature of land and labor contracts may affect people’s decisions to extend their households (Walther and Nugent

1988). And households may choose to send some of their members to live elsewhere to insure themselves against market or institutional failures or to mitigate the impact of economic shocks.

Selecting Marriage Partners

Taking household composition as given also implies that households have no control over the characteristics of the spouses of household members. On the contrary, household members often choose their spouses by the attributes that the spouses can bring to the household. Ignoring this fact in analysis may result in flawed interpretations of household behavior and, subsequently, wrongly targeted policies. (See Weiss 1997 for a general review of the economic literature on marriage.) For example, if a man values educated children, he may choose to marry an educated woman. Ignoring this endogenous selection in analysis would overestimate the influence of the wife's schooling on their children's educational attainment.

To correct for the endogenous choice of partners, analysts need data on the characteristics of the marriage market¹⁰ at the time and place of the couple's marriage.¹¹ To understand how spouses are selected in the marriage market, analysts also need data on the characteristics of individuals who enter the marriage market with particular endowments such as education or assets, as well as data on their parents. This information will help analysts understand what factors influence bargaining power within households, as well as postmarriage outcomes including patterns of intra-household resource allocation. Because the characteristics of the partners forming a household cannot be regarded as exogenous, analysts must explicitly take the selection of the marriage partner into account in their modeling. Such analysis requires more data than is usually collected when the conventional definition of the household is used in a survey.

Household Headship

An important related issue is the definition of the "household head." The original reason for identifying the household head in household surveys was to account for all of the household members and to avoid double-counting any members in the household roster by assigning one member to be a reference person (Rosenhouse 1989). Typically in LSMS surveys, the household head is identified by the survey respondent, who may or may not also be the household head.

While this definition fulfills its original accounting purpose, problems can arise when this definition of headship is used in analysis. Some of the ways in which the concept of household headship are used in analysis are in studying the incidence and depth of poverty in female-headed households and the different ways in which female- and male-headed households allocate resources among their members.

If female-headed households are over-represented among the poor, it may be appropriate for policymakers to specify female headship as a targeting criterion for poverty reduction programs.¹² It is often claimed that female-headed households bear a triple burden: a female breadwinner is likely to have fewer job opportunities, earn less per hour, and have less access to economic resources than a male head would; female heads tend to have a heavy time burden because they have both productive and "reproductive" responsibilities (such as child rearing and household chores); and being the sole economic supporter means that a female head has more people to support with her income than she would in a jointly headed household (Rosenhouse 1989).

Yet it is critical to recognize that self-reported female-headed households can actually vary widely in terms of the marital status of the head and of who economically supports the household. For the purpose of identifying poor or vulnerable households, analysts have attempted to disaggregate self-reported female-headed households by the presence or absence of male partners¹³ or to redefine female-headed households according to the degree to which the female head is the sole economic supporter of the household.¹⁴ The empirical evidence on the question of the poverty of female-headed households is mixed. A recent literature review by Buvinic and Gupta (1997) concluded that evidence generally points to a positive association between female headship and poverty. However, Quisumbing and others (1995) analyzed consumption expenditure data from 10 developing countries¹⁵ and found that, based on the self-reported headship definition, female-headed households were not obviously poorer than households headed jointly or by men, except in two cases (rural Ghana and Bangladesh).¹⁶

Another common analytical use of the household headship concept is in the analysis of how male and female heads differ in terms of how they allocate their household's resources (Bruce and Lloyd 1997;

Handa 1996b; Rogers 1995). For such analysis the household head needs to be defined as the person who has decisionmaking authority over the allocation of household resources (commonly proxied for by the person's economic contribution to the household). Researchers often infer that the differences between male and female heads in terms of their resource allocation behavior are due to systematic differences in preferences between men and women. However, perhaps a better approach for this kind of inquiry would be to analyze the allocation patterns of consumption expenditures, controlling for the different economic contributions made by women and men to the household and the extent to which they have control over the allocation of resources (Hoddinott and Haddad 1991; Thomas 1990, 1993, 1994).

Even when alternative definitions of headship rather than self-reported headship are used for analytical purposes, there can still be problems in using a given definition of headship and analyzing the effects of female headship on various household or intrahousehold outcomes using survey data (Bruce and Lloyd 1997; Strauss and Beegle 1996). When comparing female-headed households with households headed jointly or by men, analysts usually assume (albeit implicitly) that household headship and membership are exogenous with respect to the outcomes in which they are interested.¹⁷ However, while some women may become the household head because of an exogenous event (for example, the death of their husband), others often become head as a result of deliberate choices made by individuals such as a marriage, a common union, or a household split. Thus the systematic differences that are often observed between female-headed households and those headed jointly or by men may not be the direct result of female headship but instead arise from other factors that jointly determine both the woman's headship and these outcomes.

These potential problems with regard to endogenous female headship come back to the issues of the definition of the household, the formation and dissolution of the household, and changes in the household's composition.¹⁸ For this and other reasons, despite the wide attention that female-headed households have been given in policy discussions, the usefulness of some studies using the concept of household headship may be questionable.

Implications for Data Collection

The discussion so far has a number of implications for the collection of data that can support the analysis of intrahousehold issues. There are implications not only for the types of information collected but also for the quality of the information and, hence, how the information is to be collected. This section focuses on a set of issues concerning the collection of these data, including the definition of the household and the household roster, the scope and limitations of collecting data at the individual and plot level, the collection of data on suitable 'instruments' to be used in econometric analyses, and various methods of data collection.

It must be emphasized that analysts have only recently given much attention to intrahousehold resource allocation. As a result, some of the recommendations in this section concerning data collection have not necessarily been well tested in the field so far. Also, some of the information collected at the individual level rather than the household level is costly (for example, data on time use and food consumption). Therefore, it is extremely important for survey designers to be aware of the policy priorities so they can be selective in determining what kind of information they need to collect at the individual level.

Household Roster, Household History, and Interhousehold Links

How households are formed, their composition, and how they ought to be defined are very culture- and location-specific. Although many household surveys, including most LSMS surveys, have typically defined a household as "people living or eating together," this definition imposes serious constraints on empirical analysis because it fails to give any information about other individuals or families who influence decisions and outcomes within a household. The shortfalls of this definition have at least two important implications for collecting data for intrahousehold analysis. First, it is vital in the household roster and migration modules to collect information on factors that cause changes in a household's composition, on the migration history of the household's members, and on any interhousehold networks. Second, within certain parameters it is important for survey designers to take local conditions into account when designing the questions in the household roster.

Several types of information are particularly valuable for intrahousehold analysis.

HOUSEHOLD HEAD. As was discussed in the previous section, a major problem with traditional headship analysis is that since the “head” of the household is self-reported, it is often not clear what “household headship” means for each household. One way of addressing this problem is to collect information on how each household defines its household head. After asking the respondent to identify the household head, additional questions could be asked such as: “What is the main reason for this particular person to be identified as the head?” Based on pretesting of survey instruments, a possible set of answers could be precoded, including: he or she makes important input and output decisions; he or she is older than other household members; he or she controls most of the household resources; he or she contributes most of the household income; and so on.

CHARACTERISTICS OF THE HOUSEHOLD HEAD’S NONRESIDENT RELATIVES. As we have seen in the previous section, relatives who are not members of the household by the conventional household definition can still be vital players in the allocation of resources within the household. For this reason it is very useful to collect information on the age, education level, and occupation of the household head’s parents and children as well as his or her spouse’s parents, as is proposed in the household roster chapter (Chapter 6). In addition, if the parents of household head and spouse do not live in the same household as the head and his or her spouse, it may be useful to add a question asking the rough distance between their own and their parents’ residences. This can be seen as one measure of potential financial links between the households. If the parents are no longer living, similar data should be collected on the nearest extended family member who does not live in the same household, such as a sibling.

It can also be useful to analysts to have data on the assets held by these nonresident relatives, particularly if it appears that interhousehold transfers are important and potentially affect intrahousehold resource allocation. In this case the household roster can be expanded to include similar information on relatives within a certain range, which can be determined through pretesting or qualitative research preceding the household survey. It is also important (especially if house-

holds include more than two generations) to make sure that the questionnaire records which children belong to the different sons and daughters within the household, as is intended in the draft household roster introduced by Chapter 6.

RECENT MOVEMENTS OF HOUSEHOLD MEMBERS. All three versions of the draft migration modules introduced by Chapter 16 collect information on the migration history of household members, which can be useful for studying how households form and change. For example, the modules ask questions about any recent movements by the members of the household (and by the household as a whole if all the members have moved recently) including the timing of those moves (“how long has it been since you came to stay here?”) and the person’s original location. Once previous locations have been identified in the migration module, information on those localities (and the distance from those localities to the household’s current place of residence) can be gathered from sources other than household surveys.

All of the versions of the draft migration module also ask about the birthplace of each household member, and both the standard and the expanded versions obtain an almost complete migration history for each member since his or her birth. After identifying the locations of members’ past residences (particularly their places of birth and childhood residence), it is possible to gather information on the characteristics of such places, including rainfall variance and level, from sources other than household surveys. These data in turn can be used to control for household/individual heterogeneity in analyses of intrahousehold resource allocations.

CONTEXT-SPECIFIC INFORMATION. Certain context-specific information about the structure of the household can also be important to support analysis of intrahousehold outcomes. For example, beyond simply noting whether a household member is male or female, in some cases it may be important to collect information about each individual’s standing within the household. In certain contexts in Sub-Saharan Africa it may be important to disaggregate the gender category according to the person’s social status or seniority within the household or within the extended family or kinship network. This may be particularly important in polygamous societies or in societies with

clan and tribal structures.¹⁹ Gender differences in the allocation of resources and in other outcomes of interest may also vary significantly across ethnic groups, even within a given country. This makes it crucial to collect data on the ethnic and religious affiliation of household members, as is proposed in the draft household roster introduced by Chapter 6. The extent to which collecting these or similar context-specific data is important in a given country context can be determined by using qualitative methods of data collection prior to development of the survey itself (see below and also Chapter 25 on qualitative methods).

Potential Providers of Transfers

Given the potential importance of understanding interhousehold transfers in order to understand intrahousehold outcomes, one possibility is to add questions asking the household head and his or her spouse about potential (as opposed to actual) providers of transfers to the household. Although this is not proposed in Chapter 6 on the household roster nor in Chapter 11 on transfers and other nonlabor income, one possibility would be to ask both the head of the household and his or her spouse to list up to three individuals or households who might provide transfers to the household if it were to experience an economic shock. The head and spouse could also be asked to give information on the age, education, occupation, location (including whether rural or urban), and land holdings of each of these potential providers of transfers.

Gathering this additional information would have several advantages for analysts. First, they could use these data as potential instrumental variables for identifying household behavioral variables such as demand for credit or participation in the labor market. Second, by putting these questions to the household head and to his or her spouse separately, these data could also be used as individual-specific variables, which are relatively rare. For example, it is possible that the husband and the wife may expect to count on different people to provide transfers during a time of crisis. Such differences can be exploited econometrically to enhance the intrahousehold analysis.

Third, asking about potential providers of transfers would complement the questions about actual transfer incomes (see modules on migration and on transfers and other nonlabor income) in the analysis of interhousehold transfers. While the questions about actual transfers capture the transactions that happened to take

place during a specific reference period (the previous 12 months), the household may maintain interhousehold links with some potential donor or recipient households, whether or not such transfers actually take place during the survey period. Collecting separate information on potential providers of transfers can help analysts understand the patterns of interhousehold links. For example, Pitt and Khandker (1998) collected and used data on potential providers in a survey that focused on the impact of microcredit schemes on intrahousehold resource allocations in Bangladesh.

Individual-Level Resource Allocation Outcomes

In order to analyze individual outcomes, personal interdependencies, and cross-person effects within households, it is necessary to collect some key data at the level of the individual rather than the household. The kinds of data most commonly collected at the individual level are twofold: first, who brings in income to the household and controls these resources, and second, to whom these resources are allocated. In many respects, collecting more individual-level data on inputs and outcomes would make it easier for analysts to explore intrahousehold resource allocation in greater detail. This kind of information is important partly because most analytical work so far has focused on how resources are allocated between sons and daughters and, to some extent, between older and younger children, but there is work to be done on the allocation outcomes of the elderly and the disabled as well.

This does not imply that multitopic household surveys need to collect all data on an individual basis. Some individual-level variables are extremely difficult to measure and costly to collect. Survey designers should decide how much data to collect at the individual level in light of the relative benefits and costs of collecting such data.

Among the variables that capture intrahousehold resource allocation outcomes, many of them are inherently individual-level variables and are thus already collected at that level in most household surveys, including the LSMS. These variables include data on anthropometric, educational, labor market, and health outcomes. As recommended in Chapter 10, data on anthropometric outcomes should be collected for household members of all ages, not just for children. As discussed in Chapter 8, individual-level data on the utilization of health services and goods are also critical

for understanding intrahousehold allocations and can also be collected relatively easily in household surveys.

On the other hand, some outcome data are very difficult and costly to collect at the individual level and thus should not be gathered on a routine basis in nationally representative, multitopic household surveys like the LSMS. Collecting individual-level data on *all* consumption goods would be problematic. For one thing, not all consumption items can be assigned to individuals since some of them (such as housing, utilities, and furniture) are public goods, consumed jointly by all household members.

This means that data on these consumption items can only be collected at the household level. However, some key private goods are related to human capital development and are relatively easy to assign to individual beneficiaries, and data on these items have already been collected at the individual level in most previous LSMS surveys. This is reflected in the relevant draft modules presented in Volume 3 (for example, the modules on education and health). Furthermore, some previous LSMS surveys have differentiated between adult men and women and between boys and girls in collecting data on expenditures on some private goods such as clothing and footwear. Being able to identify the goods consumed only by adults enabled Deaton (1987) and others to make inferences about the possible gender biases in consumption expenditure allocations between boys and girls. This study was one that did not require a full set of individual-level consumption data in order to make some inferences about intrahousehold allocations of consumption. Other approaches have been taken in Chiappori (1988), Browning and others (1994), and Bourguignon, Browning, and Chiappori (1995). These studies used both individual-level data on control of income or assets (see below for a discussion of the difficulties involved in collecting such data) and aggregate household consumption data to make inferences about the “sharing rules” by which intrahousehold allocations take place.²⁰

There has been some debate about the usefulness of using indirect methods to infer patterns of intrahousehold consumption allocations when only household-level data are available. While Deaton’s method of using information on the consumption of adult goods has been used to analyze intrahousehold consumption allocations in several developing countries,²¹ little evidence has been found of gender discrimination in

consumption allocations between girls and boys—even in areas where a strong bias towards boys is believed to exist (see Ahmad and Morduch 1993 on Bangladesh, Subramanian 1994 on northern India). Some experts would argue that these results are an indication that such indirect approaches are not capturing the full and true picture of the way resources are allocated within households.²²

In low-income countries, a large proportion of household consumption expenditures go toward food. Thus, in principle, it might seem desirable—even essential—to collect individual-level data on food consumption. In practice, however, collecting accurate data on individual food consumption is very difficult. Among the most serious issues is the potential for measurement error (see Behrman 1992 for a more detailed discussion). Given the relatively short reference period typically used in collecting individual food intake data (for example, the previous 24 hours), a large variation in the food consumption of individual household members could lead to random measurement errors. At the same time, more intrusive methods of collecting food intake data, such as the direct weighing of food at mealtimes, may cause respondents to alter their eating behavior from their normal pattern towards what they consider to be the norm—thereby causing systematic measurement errors.²³

Collecting individual food consumption data is also costly in terms of time and money. The time costs are made clear by the International Food Policy Research Institute’s Bukidnon study in the Philippines, for which collecting individual food intake data (based on 24-hour recall interviews, typically with wives within the household) required about an hour of interview time (Bouis 1997). In monetary terms it was found that collecting food intake data at the individual level through 24-hour food weighing was about four times more expensive than collecting household-level data on food acquisition using a seven-day recall period (Garcia and Senauer 1992).

While one of the major purposes of collecting household consumption expenditure data is to measure and monitor the changes in welfare of household members, household-level consumption measures can be inadequate for monitoring poverty and inequality at the individual level. At the same time, given the difficulties and costs of collecting individual-level food consumption data, welfare monitoring at the individ-

ual level may be better achieved by collecting and analyzing data on anthropometrics, health and morbidity, and education, which are all inherently individual-level measures, and are collected in LSMS-type surveys on a regular basis. A distinct advantage of using these outcome measures for monitoring the welfare of individuals is that there is less likelihood of measurement error in the collection of these measures than in the collection of individual-level food intake data (Behrman 1992).

For these reasons, a multitopic household survey such as LSMS is probably not an appropriate instrument for collecting individual-level food consumption data on a regular basis. However, there may be a rationale for collecting such data under particular circumstances, in a more specialized survey, or in one of the rotating modules in a multiyear LSMS survey (possibly on a smaller scale than the typical LSMS or using a subset of the full survey sample). For example, when outcome measures, such as anthropometric or health measures, indicate biases related to gender, age, or birth order in the allocation of resources among household members, survey designers may want to consider conducting a small-scale, specialized survey to collect individual-level consumption data, including food intake data, on an experimental basis. In particular, designers may want to consider collecting individual-level food intake data in areas where there is severe and chronic malnutrition or in those countries or regions within a country (for example, northern India) where gender-specific mortality rates or population sex ratios are extremely out of balance.

Other individual-level outcome data that are relatively difficult to collect are data on the time allocations of individual household members; these data can be critical for shedding light on intrahousehold resource allocations. As discussed earlier, changes in wages, prices, or access to productive resources such as credit usually result in a reallocation of time and tasks among individuals within the households, which can have serious implications not only for the adults within the household but also for the children. For example, households in developing countries often consider children's labor to be a substitute for the labor of an adult (often their mother). This means that if women's wages go up, the adult women of the household are more likely to seek work outside the home, which may mean that their children will be expected to stay home from school and do the home chores and

market-related work that the mother would otherwise have done.

Another policy issue often raised is whether or to what extent the time women spend on household chores such as cooking, child care, and collecting water and firewood prevents them from spending more time on productive activities. The "double day" burden on women (in that they have both productive and household chores) raises the question of the relative lack of leisure time that women have compared to men. If leisure time is seen as a welfare measure, data on the leisure time of individual household members can be used as an indicator of one dimension of well-being.

To analyze these policy issues, it is important to develop a comprehensive time profile that accounts completely for the activities of the previous 24 hours and thus captures both the market and nonmarket activities of household members, including childcare and all types of household chores (see Chapter 22 on time use). The time allocated to leisure can be derived as a residual—in other words, considered equivalent to whatever time has not otherwise been accounted for. In order to examine cross-persons effects, it is also important to collect such information for all individuals in the household (above about age 6), due to the fact that the way children and adults dispose of their time is linked.

However, as discussed in more detail in Chapter 22 on time use, it should be recognized that collecting time use data is subject to several potential complications. For example, it is sometimes difficult to obtain accurate information on how individuals use their time when they carry out several activities concurrently. This is generally more of a problem with women who may be involved in multiple activities during a single, discrete time period (for example, looking after a child and preparing food both for human consumption and for livestock production). Moreover, collecting accurate data on time use is often confounded by ingrained cultural definitions and perceptions about work. Women, for example, may perceive that they are not working when involved in activities related to home production even though this may be considered work in other cultural contexts. Also it can be very difficult to obtain accurate measures of how individuals allocate their time among various tasks (including the intensity of that work effort—in other words, how much work is accomplished during a given time period) when they carry out several activities at the same time.

Apart from such measurement issues, another major problem with collecting comprehensive time use profiles for all household members is the fact it takes a long time to collect such information. The amount of time required for administering a time use module differs depending on various factors including how the module is designed, the degree of detail in the precoded activity categories (see Chapter 22 for more details on available options), and the different kinds of lifestyles of people in different circumstances. (Lifestyle differences may be clearly differentiated between adults and children, between urban residents and rural residents, and between people with full-time occupations and people with a combination of self-employment jobs.) The average time required for conducting a time use module with a recall period of the previous 24 hours can vary from 10 minutes per person in a developed country (generally by telephone interview; Harvey 1997) to 20–30 minutes per person in a rural areas in a developing country (Bouis 1997). Given that an interviewer would need to spend this amount of time with every household member above, say, age 6, this could add up to a significant amount of time in the administration of the household survey questionnaire.

Therefore, despite the potential usefulness to analysts of having comprehensive time use data, it may not be practical to include such a module in an LSMS-type survey on a routine basis except when the study of time use is a high analytical priority in the country. However, there are some alternatives to including a comprehensive time use module in an LSMS-type survey. For example, a partial time use profile could be developed, in which respondents are asked how much time they spent on specific set of activities without having to account for the entire 24-hour period. (See, however, Chapter 22 for a discussion of potential drawbacks of such options.) Alternatively, the time use module could be administered to only a subset of individuals (such as adult women and all children) rather than to all individuals.²⁴ Yet another possibility might be to collect time use data using qualitative methods such as random spot-checking, often conducted by anthropologists (Acharya and Bennett 1981).

In choosing among these options, survey designers should consider the priority policy issues in the country studied. What policy questions can be analyzed using time use data? Can the collection methods

used gather data that will be adequate for analyzing these questions? For example, in the Nicaragua LSMS in 1998, high-priority policy issues included the issue of child labor and the question of whether or not the time that women spend on household chores prevents them from participating in the labor force. Therefore, the designers of the LSMS decided to include a time use module in the survey. However, due to budget constraints they decided to administer it to a randomly selected subsample (roughly half) of the total sample of households, and they also reduced the number of questions in the other modules to some extent. Because of the need to capture all activities including household chores, the module was designed to yield a comprehensive time profile. Because of the need to analyze cross-person effects among household members (including children), the designers chose to collect time use data for all members of the households in the subsample. Other examples of surveys in which time use data were collected in developing countries are some of the surveys conducted by the International Food Policy Research Institute and the International Crops Research Institute for the Semi-Arid Tropics.

Individual Control of Resources

Analysts also need data on individuals' control over the household's resources to study how resources are allocated among household members. Knowing who controls how much of the resources available to the household is more crucial for understanding intrahousehold resource allocations than knowing the amount of resources available to the household as a whole. In the empirical literature, such information has been crucial in testing the "income pooling" hypothesis as well as the Pareto efficiency of household resource allocations (Schultz 1990; Thomas 1990, 1993; Thomas and Chen 1994) and in inferring "sharing rules" between husband and wife (Browning and others 1994). Testing the efficiency of input allocations in agricultural production requires data on individuals' access to land (Udry 1996; Vishwanath and others 1996).

Therefore, data on individually owned assets—in other words, individual-level data on asset ownership within the household—are critical for undertaking intrahousehold analysis. These include data on landholdings, which should be collected in the agricultural module (see the next section), and data on other

physical assets including those used for nonagricultural enterprises that the household may have. The expanded version of the draft household enterprise module introduced by Chapter 18 identifies which household member is in charge of each household enterprise and which member owns each asset used for the enterprise including land, buildings, equipment, and machinery and vehicles. As discussed in Chapter 18, from an intrahousehold analysis point of view it is important to identify the owner of major asset items used for household enterprises separately from the manager of the business, since the day-to-day manager of a household enterprise may not actually own the assets used for his or her business. Owning assets may be more important than the day-to-day use or management of such assets in determining the bargaining power of household members and thus the intrahousehold allocation of resources.

It can also be very useful for intrahousehold analysis to collect information on which household member owns any assets that were inherited or owned prior to the formation of the household.²⁵ This category of assets is less likely to have been affected by the decision that the individual made in the past about participating in the labor market or investing and thus may be particularly useful as instruments for conditioning variables. Therefore, it would be useful to identify any assets that were owned individually by adult members of the household before they were married. (Individual ownership generally means that the owner has a right to sell or dispose of the assets without the consent of her or his spouse.) Which assets should be listed in the questionnaire will depend on the country and culture of the study. It may be necessary to use pretesting or qualitative research to identify the assets most often brought into the household at the time of marriage—for example, land, a house, a housing lot, animals, or personal items such as jewelry. Once these items have been identified, a brief set of questions can be added to the durable goods section of the consumption module.²⁶

Despite the general desirability of collecting data on individuals' control over the economic resources of the household, collecting data on individual income from all sources can be problematic. First, as with individual-level consumption and time use data, there are potentially serious problems of measurement error. In the case of income data these can stem from a range of problems including difficulties associated with esti-

imating income from joint production activities, imputing the value of in-kind income (for example, meals received by agricultural laborers), and the fact that specific individuals (often women) may prefer to underreport their income if their earnings are not under their full control. There may be other gender-specific differences in reporting the value of income. For example, Lampietti (1999) found in non-LSMS household survey data from Ethiopia that female respondents systematically reported lower levels of agricultural income than male respondents for households with otherwise similar (observable) characteristics.²⁷ However, all this is not to say that no individual-level data on income and earnings should be collected. It is particularly useful to collect data on individual wage income (see Chapter 9 on employment). In fact, if accurate data on individual's time use can be collected (see above), a potentially "cleaner" measure of individuals' income can then be imputed.

A number of researchers have recently tried to analyze the links between how much control men and women have over household income and a variety of intrahousehold outcomes (Schultz 1990; Thomas 1990, 1993; Hodinott and Haddad 1995; Wang 1997). As McKay notes in Chapter 17 of this book, if this is an analytical priority, it may become necessary to collect data on either total earned income or "unearned" (nonlabor) income at the individual level. However, beyond problems of measurement, there are other problems associated with this approach. One specific problem with using income as an explanatory variable in regression analyses is that income is generally an endogenous variable dependent on both individual and joint (household) choices regarding the allocation of members' time to different tasks (see Chapter 26 on econometrics for a discussion of endogeneity problems). Various efforts have been made in the empirical literature to control for the endogeneity of income. Schultz (1990) and Thomas (1990, 1993) analyzed data on unearned or nonlabor income since this is taken to be (at least) largely unaffected by individual labor supply decisions.²⁸ However, even this measure has some problems since nonlabor income, as a function of asset or investment income, may partly reflect a person's past decisions about participating in the labor market. While it is possible to use instrumental variables to control for the endogeneity of income, finding appropriate instruments that affect income but do not affect the outcome of interest is often quite difficult (see below).

Plot-Level Agriculture Data

To facilitate intrahousehold analysis, in many countries it is most productive to collect agricultural data at the plot level rather than at the household or individual level. This is the methodology followed in the expanded version of the agricultural module introduced by Chapter 19. Particularly in Sub-Saharan Africa, where men and women farm autonomously on separate plots, having detailed data on agricultural inputs and outputs by plot will help analysts study the intrahousehold allocation of resources for agricultural production. It will help them not only to analyze the efficiency of production but also to assess the cost-effectiveness of different potential interventions. Given the importance of collecting information on individuals' control over economic resources, as discussed above, it would also be desirable to collect individual-level data on who owns the plot, who has use rights to it, and who manages the plot, for each plot separately, whenever it is appropriate and possible to do so.

Moreover, although it may not be necessary to collect such data on a routine basis in multitopic household surveys, questions on how individual plots were obtained and under what tenurial and contractual arrangements may be quite useful in some contexts. For example, in some Sub-Saharan African countries, the intrahousehold allocation of land rights and the effect of this allocation on agricultural productivity is a major policy concern. Some questions dealing with this issue are in the expanded version of the draft agricultural module (for example, "How was the plot obtained, from whom, and, if purchased, at what price?"). Nevertheless, if this policy issue is important, survey designers may also wish to include questions such as: When did you obtain the plot? If it is borrowed, what are your contractual arrangements? Were any payments related to the plot made this year? Do you expect to have to make any payments over the next year? If you lend land out, have you had any disputes with the borrower? Have there been any disputes over the control of the plot within your family? Have any disputes resulted in an intervention by the village head or by other parties? Have there been or are there any court cases regarding the plot? Is there any written documentation regarding the plot, its ownership, or its current tenurial status? Do you have any plans to transfer or bequest any of the land that you own or control to your children, relatives, or others?

In countries where policymakers are concerned about the effect of the intrahousehold distribution of land tenure security on agricultural productivity, it may be necessary to gather panel data to analyze land use patterns over time and the changing nature of local land institutions. However, this kind of information is better gathered by qualitative research methods or in a community questionnaire than in the household questionnaire of an LSMS-type survey.

Instruments

To properly measure the effects of endogenous conditioning variables on a dependent variable in an econometric analysis, it is essential to find appropriate variables (for example, "instruments" or "instrumental variables" in an econometric jargon) that influence the conditioning variable (whether this is income or participation in a program) but do not affect the outcome of primary interest (see Chapter 26 on econometrics for a discussion of how to use instrumental variables in econometric estimations). As noted above, data on individually owned assets can be important instruments for identifying the effects of conditioning variables (such as income) in estimations. Data on landholdings at the individual level and male and female shares of household business capital and of other types of physical (nonlabor) assets may also be useful in this regard. It can be difficult to assign the ownership of some assets to individuals if the assets are jointly owned by all of the household members. However, it is generally useful to collect data on assets whose ownership can be assigned to individuals. Moreover, data on inherited wealth, dowry-related assets, and premarital assets can also serve as important instruments that are unrelated to a person's decision about participating in the labor market or to other current choice variables.²⁹ However, even these variables are not perfect, in that they can contain recall errors (as the respondents may have acquired their inheritances or premarital assets many years earlier) and it can be difficult to calculate the current values of these assets.

The prices of conditioning variables can also be potential instruments for identifying the effects of such variables. For this reason, it is critical that the community and price questionnaire gather detailed information on the market prices of commodities at the community level. The issue of using prices as instruments is complicated in the context of intrahousehold analysis since observed market prices often

influence both the conditioning variable and the final outcome of interest. For this reason it is also critical to collect data on individual-specific prices such as individual wage levels. As discussed above, the occupation and education level of the respondent's parents and the characteristics of his or her spouse may provide other instruments if they are not observed to affect productivity of the person in question.

Depending upon the specific focus of the analysis, there may be a variety of variables that would serve as suitable instruments to control for the endogeneity of such other variables as participation in a program. For example, proxies for "social capital" might be used as identifying instruments³⁰ for evaluating a credit program. In the case of group-based lending, these proxies might include the characteristics of the group's members (for example, their age, education level, and production activities) or of the organizers of the credit program (for example, their age, education level, and family background). Data on numbers and characteristics of potential providers of transfers may also be appropriate instruments for identifying the effects of participation in a particular program in a number of contexts (see Pitt and Khandker 1998).

Methods of Data Collection

The factors affecting intrahousehold resource allocation and thus the types of data needed to carry out intrahousehold analysis can be very context specific. To determine which variables are likely to be most important for intrahousehold analysis, how best to word survey questions, and which household members to ask specific questions (for example, men or women), it will often be important to collect qualitative and other context-specific data before developing the questionnaire and assembling and training the enumeration team.

QUALITATIVE AND CONTEXT-SPECIFIC DATA. Much of the information useful for intrahousehold analysis is specific to a given culture and location. This includes such issues as how men and women perceive and define work (which affects the approach used to collect time use data) and how men and women differ in their approach to household budgeting and expenditure (which affects the way household behavior is modeled). For these reasons, it is important that the design of the survey questionnaire be preceded and informed by context-specific qualitative analysis that

focuses on these key issues (see Chapter 25 on collecting qualitative data).

COLLECTING INFORMATION ON AND FROM MALES AND FEMALES WITHIN THE HOUSEHOLD. In many country and cultural contexts, collecting information on women from a male household head will lead to serious problems of measurement error. In some contexts this may also be the case when asking women to respond to questions in the presence of men. Men may not have accurate information about their spouses but may nonetheless insist on responding to questions by male interviewers. Similarly, women may want to conceal certain information from their husbands (for example, by underreporting their income if their husbands control how at least some of that income is spent). Therefore, for the purposes of intrahousehold analysis, it is critical to collect data directly from the individual in question to the extent possible. In some cultural contexts it will also be necessary to collect data from women in the absence of men. This may also have important implications for the size and gender composition of the survey interview team.³¹ It may mean that enumeration teams need to be larger and include a higher proportion of women than has typically been the case in past LSMS surveys. Therefore, as with the design of the questionnaire, it will often be necessary to gather preliminary information using context-specific qualitative methods to investigate the most appropriate ways to compose and train enumeration teams and conduct the survey interviews within households.

Conclusions

In recent years both analysts and survey planners have increasingly come to recognize that understanding how resources are allocated within the household can be critical for designing, implementing, and assessing poverty reduction policies and projects. This chapter has cited some recent theoretical and empirical literature on intrahousehold resource allocation and distribution in support of this view. Rigorous empirical testing of theories about how intrahousehold decisions are made is still in an early stage, but work is currently being done in turning these theories into testable hypotheses, as well as in collecting innovative data to support intrahousehold policy analysis.

Combined with the guidelines presented in this chapter, the draft LSMS modules in this book reflect

many of the recent advances in understanding what data are needed to undertake intrahousehold analysis and in collecting these data. Nevertheless, the data requirements for analyzing intrahousehold resource allocation can be quite extensive, given the need for individual-level data, and particularly when information on individuals outside the household is needed to enable analysts to investigate interhousehold links. Furthermore, some of the data about individual household members (for example, on consumption and time use) can be costly to collect. Given the limited amount of time available for conducting a survey interview with each household, it is not practical to collect all household information at the individual level in multitopic surveys such as the LSMS. Therefore, it is important that the designers of multitopic household surveys set clear policy priorities for analysis with respect to intrahousehold resource allocation and that they are selective about which data to collect at the individual level to make their analysis both feasible and cost-effective. In closing, it is worth noting that given the extensive data needed for some types of intrahousehold analysis, a multitopic household survey such as the LSMS may not always be the most effective vehicle for collecting these data. In cases where conducting intrahousehold analysis is the outstanding priority, policy analysts may consider fielding special, focused surveys to ensure that all of the necessary variables can be collected in a practical, cost-effective way.

Notes

The authors would like to thank Jere Behrman, Mark Pitt, John Strauss, Shankar Subramanian, and the participants in the LSMS authors' workshop for their valuable comments on earlier drafts.

1. It can be argued that if poverty or inequality levels are underestimated by the same degree (for example, across countries, across regions, across any other categories of population, or over time), the ranking among these areas or groups will not be affected. However, this is an empirical argument for which there is relatively little evidence so far. Haddad and Kanbur (1990) found that despite potentially large differences in the estimated levels of inequality and poverty between individual- and household-level measures, inequality and poverty patterns (in other words, the ranking of distributions among different social categories of people) are mostly unaffected. However, they found a few cases where the poverty rankings of men and women were reversed when individual-level measures were used instead of household-level measures. It should be noted that Haddad and Kanbur's results were based on particular assumptions about individuals' needs for food consumption. The

estimated overall poverty level may have differed, possibly substantially, from Haddad and Kanbur's results if individual needs based on activity or body mass index had been taken into account.

2. Thomas (1990) found that children's health outcomes differ significantly depending on whether (unearned) income is controlled by mothers or fathers. A recent study of the Grameen Bank in Bangladesh (Pitt and Khandker 1998) also suggested that the impact of borrowing on a number of outcomes (including boys' and girls' schooling and nutritional status) differs significantly depending on the sex of the borrower. (See also Behrman and Deolalikar 1990; Deolalikar 1991, 1993; and Echevarria and Merlo 1996.) However, as will be discussed in later sections, drawing these conclusions is not always straightforward because of various data problems and econometric issues.

3. A recent paper by the International Food Policy Research Institute (1996) covered a similar set of intrahousehold policy and data collection issues. The paper focused on the collection and analysis of data from special purpose and small sample surveys aimed at answering specific policy questions, such as food security. In contrast, this chapter focuses on integrating data requirements for intrahousehold analysis within the context of nationally representative, multitopic surveys like the LSMS surveys that aim to answer multidimensional policy questions. However, it also discusses situations in which a prototype LSMS survey may not be appropriate but a special-purpose survey might be fielded instead to gather data specifically for analyzing intrahousehold issues.

4. It should be noted here that the empirical evidence cited in this section, as well as in the introductory section above, comes mainly from Africa and South Asia, where there is a rich literature on intrahousehold resource allocation. This should not be taken to imply that intrahousehold issues are unimportant in other areas such as Latin America or the transition economies of Eastern Europe and the former Soviet Union. It is only that there is relatively less empirical analysis in these regions and that a whole range of different issues may be relevant to intrahousehold analysis in these areas.

5. Bourguignon and others (1993), Browning and others (1994) and Thomas and Chen (1994) used data from France, Canada, and Taiwan respectively to test the efficiency of household consumption allocations and the unitary model assumption. They all rejected the unitary model assumption but accepted the efficiency assumption. In earlier tests that did not examine the efficiency assumption, the unitary model was also rejected by Thomas (1993, 1990) and Schultz (1990), using Brazilian and Thai data sets respectively.

6. Udry also notes, however, that the effects of intrahousehold inefficiency may not be very large compared to those of inter-household differences.

7. This issue of access to land among different household members can have major policy implications, for example, in the implementation of land titling programs. Based on his review of litera-

ture on land rights in Sub-Saharan Africa, Platteau (1996) noted that there could be serious negative consequences when land title is granted to the male heads of households and when the customary use rights of women (as well as other groups such as pastoralists, hunter-gatherers, caste people, former slaves, and serfs) to land are not taken into account. Since women are vital agricultural producers in these areas, he argued, there may be negative efficiency as well as equity consequences due to such land titling.

8. For example, the rule that only those with less than 0.5 acres of land are eligible to participate in the Grameen Bank microcredit program makes eligibility a discontinuous function of landholding. Since landholding is a variable that is not likely to change in the medium-term in rural Bangladesh, it is reasonably considered to be exogenous, in other words, out of the control of the household. Similarly, other types of “discontinuities” in program eligibility rules include caps on income or wealth in means-tested programs, minimum or maximum education levels of household members, and employment histories. Pitt and Khandker (1998) used as an identifying device the existence in the survey sample of households who were located in the program villages but who did not have the option of participating in the credit programs due to the landholding criterion. In other words, if it is assumed that the behavior of the households (other than the fact that some households are eligible to participate in the program) with more or less than 0.5 acres of land is the same, the differences in the household outcomes of interests (for example, household expenditure and time use) may be attributable to the effects of the program without any concerns about the endogeneity of participation (since their participation or nonparticipation is assumed to be exogenous) or any community-level heterogeneity bias.

9. Foster found that the distribution of resources between linked households living within the same compound or *bari* is important in the sense that the educational attainment of children in partitioned households is positively associated with land ownership and with the education of the head of the joint household.

10. The term “marriage market” is loosely used to mean the social space where men and women meet potential partners (by arrangement, self-selection, or otherwise) and eventually agree to be married. “The phrase ‘marriage market’ is used metaphorically and signifies that the mating of human populations is highly systematic and structured” (Becker 1991).

11. Foster (1996) examined the effect of selecting a partner in the marriage market on the formation of human capital in rural Bangladesh. He found that the selection of a partner has a significant influence on how parents’ characteristics affect children’s schooling outcomes.

12. The identification of poor female-headed households, however, cannot be used as a proxy for the identification of poor women. Obviously there are both men and women in both female-

and male-headed households that are poor. While the poverty of both women and men living in female-headed households can often be related to the disadvantages of the female heads, focusing on female-headed households will not necessarily shed light on poor women living in male-headed households.

13. The most common disaggregation of this type is between *de facto* female-headed households (where the reported female head has a spouse or partner who is physically absent from the household most of the time, possibly as a migrant worker, but still economically maintains the household and exercises some decisionmaking authority) and *de jure* female-headed households (where the reported female head does not have a steady male partner and has either never been married or is widowed, divorced, or separated).

14. Such “economic” definitions of household headship include the earner of the largest cash income (the cash head), the earner of the largest labor income (see Rogers 1995), and the person who contributes the most productive labor time to the household (the working head; see Rosenhouse 1989).

15. These countries were Botswana, Cote d’Ivoire, Ethiopia, Ghana, Madagascar, Rwanda, Bangladesh, Indonesia, Nepal, and Honduras.

16. In addition, many country studies suggest that the relationship between female headship and poverty may differ significantly depending on such factors as the level of disaggregation of the data on reported headship by marital status and other demographic characteristics, regional disaggregation (for example, into urban and rural), the use of an “economic definition” of headship rather than the self-reported definition, and the adjustment of per capita consumption expenditure measures by adult-equivalent scales and economies of scale. For examples see Bushan and Chao (1997) on Ghana; Dreze and Srinivasan (1997) on India; Fuwa (forthcoming) on Panama; Handa (1994) on Jamaica; Louat, Grosh, and van der Gaag (1992) on Jamaica; Rogers (1995) on the Dominican Republic; and Rosenhouse (1989) on Peru.

17. One exception is Handa (1996a) who controlled for the endogeneity of female headship.

18. A recent study (Handa 1996b) that used data from the Jamaican LSMS survey directly addressed the issue of endogenous female headship. Handa’s results suggest that some unobserved characteristics of women (related either to their preferences or to their innate abilities) appear to be a determinant both of headship and of some aspects of household behavior that are often studied in relation to headship (such as household income or the likelihood of favoring children’s consumption over adults’ consumption). While Handa (1996b) used a cross-section of data, another potential approach to analyzing endogenous household headship would be to use panel data; this would enable analysts to observe changes in the headship of the same set of households over time.

19. Using data from Burkina Faso, Vishwanath and others (1996) found that a person's "within-sex" status (for example, among females) in the household had important implications for agricultural productivity when other factors were controlled for. Warner et al. (1997), analyzing data from Ghana, found that within-sex differences in status in the household significantly affected an individual's control and ownership of assets.

20. In order to identify "sharing rules," Browning and others (1994) had to be sure that at least one consumption good was "assignable" (in other words, the consumption of the good by individual members could be observed). They used the consumption of clothing (which was separately observed for the husband and for the wife) as this assignable good. A more recent version of their model in Bourguignon, Browning, and Chiappori (1995), however, does not need to have an assignable consumption good. The empirical application of the "sharing rule" approach has so far been limited to developed countries (for example, Canada and France).

21. These countries include Thailand and Côte d'Ivoire (Deaton 1989), India (Subramanian and Deaton 1991; Subramanian 1994), Burkina Faso (Haddad and Readon 1993), Bangladesh (Ahmad and Morduch 1993), rural China (Burgess and Zhuang 1996), and Pakistan (Deaton 1997).

22. See, for example, Ahmad and Morduch (1993), Browning (1992), Strauss and Beegle (1996), and Subramanian (1994). However, another interpretation is that the method is not flawed but rather discrimination against girls takes a form not detectable in the data on allocation of consumption expenditures, such as the allocation of a mother's time (rather than money) or bias in certain critical interventions like taking a child to a doctor when the child is sick (Deaton 1997).

23. However, other potential sources of systematic measurement errors in typical household-level food expenditure data have been also pointed out, such as the omission of food served to non-household members, which tends to increase with the household income level. Furthermore, whether food *availability* data (typically derived from household-level consumption expenditure data) or food *intake* data (derived from individual- or household-level observations of food consumption either with a recall period of the previous 24 hours or by direct weighing at meal time) are more reliable sources of food consumption data has been much debated. (See, for example, Bouis and Haddad 1991, Subramanian and Deaton 1996, and Strauss and Thomas 1995.)

24. Such an approach, however, would inevitably limit the analysis of cross-persons effects within intrahousehold allocation.

25. A recent study (Thomas, Contreras, and Frankenberg 1997) focuses on a different measure of power—the value of assets brought into the marriage by the husband and the wife—and examines whether women who own considerable assets at the time of their marriage are more able than other women to influence the

allocation of resources within the household. The Institute for Rural Development Studies (IFLS) data have explicit measures of the number of resources brought into marriage by the partners as well as other information on the children's health status and other social and demographic characteristics of the children and their parents. The analysis addresses the different sources of measurement error in the values of assets and suggests some analytical approaches to correct for them.

26. A section on individually owned assets was included in the household survey focusing on the intrahousehold impact of micro-credit schemes in Bangladesh (Pitt and Khandker 1998). An alternative approach would be to add a question asking which household member owns each item in the durable goods submodule of the consumption module. This approach was taken in the 1998 Nicaragua LSMS.

27. Lampietti (1999) postulated that these differences are attributable to different gender roles in agricultural production and marketing, with men being predominantly responsible for produce sales and cash transactions in the market.

28. Chapter 11 on transfers and other nonlabor income makes at least partial provision for these income endogeneity problems in the standard module by recommending that survey designers collect data on public transfers at the individual level. If this were a primary analytical concern, however, it would be useful to collect data on all categories of unearned income, including various forms of rental income. For the reasons indicated above, such an approach is generally preferable to having a single respondent indicate whether a particular component of rental income accrued to a specific individual within the household, as recommended in the standard module on transfers and other nonlabor income.

29. Some analysts have even argued against using inheritance and dowry variables as instruments because of potential links between such bequests and characteristics of the individuals being analyzed that are not observed in the data (Hoddinott, Alderman, and Haddad 1997).

30. If group members are self-selected, data on these characteristics may not provide valid instruments.

31. Blanc and Croft (1997) examined the effects of the sex of the interviewer on responses, using data from the Demographic Health Survey in Ghana.

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25

Qualitative Data Collection Techniques

Kimberly Chung

Qualitative inquiry has been used extensively in many fields, including anthropology, political science, and history. Economists, however, have traditionally used quantitative methods for collecting and analyzing data. As a result, many economists believe that qualitative methods are of limited use in economics or policy research. However, this is untrue. Researchers in the fields of demography, health, and agriculture (among others) have demonstrated that combining qualitative and quantitative methods has improved the quality of their research and policy recommendations (Scrimshaw 1990; Gill 1997; Rossman and Wilson 1985; Pimbert 1991; Pelletier 1992; Caldwell, Hill, and Hull 1988). The “either/or” attitude toward research methods prevents many analysts from realizing the benefits of using qualitative and quantitative approaches to complement each other (Tashakkori and Teddlie 1998).

What are qualitative data? The literature reveals a diverse set of definitions for this term. In the language of survey researchers, qualitative data are numeric observations that denote the presence or absence of a characteristic or membership to a particular category. Quantitative observations, by contrast, involve measuring the degree to which a feature is present. To score a qualitative observation, researchers must decide whether the object of study has a given characteristic or belongs to a particular category. If this information is recorded numerically, these “qualitative data” can be used to calculate percentages, frequencies, chi-squares, or other statistics. Qualitative data may therefore be analyzed using quantitative techniques.

A second definition includes textual or visual data that have been derived from interviews, observations, documents, or records. When collected from respondents, qualitative data are generated by intensive, often repeated, encounters with a small number of people in

their natural environment. Although the collection of survey data can be similarly described, the intensity of interaction with each respondent is very different. A survey, for example, collects information only on key variables and thus requires respondents to give short, simple answers. As a result, survey interviews are comparatively brief and far more structured than qualitative interviews, thereby making it difficult to collect in-depth answers to any given question. By contrast, qualitative methods focus on understanding a topic holistically rather than through its separate parts. The resulting data are therefore detailed, descriptive, and highly contextual.

Patton (1990) states that qualitative data focus on the everyday life of individuals, groups, and organizations. Researchers ask respondents to describe “normal” (rather than contrived or experimental) situations or institutions. Qualitative records contain descriptions of “situations, events, people, interactions, and

observed behaviors; direct quotations from people about their experiences, attitudes, and beliefs; and excerpts of passages from documents, correspondence, records, and case histories” (Patton 1990). The resulting data may be coded for themes and interpreted qualitatively. Or they may be coded and translated into quantitative data that is analyzed statistically (Boyatzis 1998).

By contrast, quantitative data are invariably numerical. In the social sciences these data are often collected by means of highly structured surveys and are analyzed using statistical techniques. The principal advantage of these surveys is that they can be administered to large numbers of individuals, households, or communities using standardized methods. Standardization across observations allows analysts to make statistical comparisons among groups of interest and to draw inference from the sample to the population. Quantitative surveys focus on questions that ask “What?” and “How much?” so that researchers may use statistics to test whether and to what extent certain relationships exist.

This chapter aims to illustrate how qualitative methods can be used to improve the collection and analysis of data from LSMS-type surveys. Since most survey researchers are already familiar with the collection and use of dichotomous and categorical survey data this chapter focuses on the use of “qualitative data” that are collected outside of a survey. In most cases these “non-survey” qualitative data will fall under the second definition given above.

The first section of this chapter provides a working definition of qualitative data, describing how methods of collecting qualitative data differ from methods of collecting quantitative survey data. The second section explains why qualitative data can be useful for improving household surveys. The third section presents a typology of methods commonly used in qualitative research. The fourth section presents examples of how some of these methods have been used in conjunction with quantitative survey work. The fifth section discusses the timing of qualitative work relative to survey work. The sixth section discusses the role that qualitative methods can play in the design and analysis of LSMS survey data. The seventh section draws conclusions.

The Qualitative Approach to Data Collection

Survey research is typically associated with the positivist research paradigm. In its most extreme form, this

paradigm assumes that there is one single form of reality “out there.” External forces are solely responsible for producing this reality; therefore, it makes no difference who makes an observation or how it is made. Rarely does anyone in the social sciences defend such an extreme viewpoint, but a majority of survey researchers do follow the positivist tradition of inquiry that was established in the natural sciences. Researchers formulate an explicit conceptual framework and construct hypotheses at the outset of their research project. They then collect data on key variables, using standardized protocols. The data are used to test predetermined hypotheses using established statistical procedures.

By contrast, qualitative inquiry is typically associated with research paradigms that emerged as counter-movements to the positivist tradition. These paradigms differ from the positivist approach in many ways, but in particular they do not support the premise of a single, objective “reality.”¹ Instead, reality is constructed by the values and experiences of the individuals involved in the research. Given a world with multiple interpretations of reality, qualitative researchers are more likely to approach data collection with an open mind, refraining from a priori assumptions and allowing the important dimensions of a topic to emerge during the data collection or analysis.² In practice, Miles and Huberman (1994) state that it is practical for researchers to begin fieldwork with at least a rudimentary conceptual framework and some ideas about how to bound the data collection. From here data collection and analysis gradually reveals patterns of information that lead to working hypotheses about the research question. This inductive approach to research is in stark contrast to the more deductive approach used in survey research.

There are many different research traditions that employ qualitative data³ and as a result there is substantial heterogeneity in the way such data are collected and analyzed (Patton 1990; Bernard and Ryan 1998). Acknowledging that there is no single “right way” to do qualitative research, this chapter describes qualitative data collection by contrasting the processes by which qualitative and survey data are collected. The qualitative approach to data collection is characterized by four attributes that distinguish it from the survey approach: it is less structured, it relies more heavily on iterative interviews, it relies on multiple sources and methods, and it aims to make different types of generalizations.

Qualitative Data Collection is Less Structured

Because qualitative researchers try to minimize assumptions about the relationships they will find, their methods for collecting data are relatively unstructured when compared to traditional survey methods. Differences in the level of structure occur at many levels, for example, in the way questions are asked and responses are recorded, in the latitude given to investigators during the questioning, and in the overall plan for collecting data.

Qualitative questioning tends to be open-ended. Qualitative interviewers encourage respondents to give detailed answers by listening attentively and following up with unscripted questions that explore an answer in greater detail and with greater depth. In contrast, survey interviewers typically ask standardized, closed-ended questions that require numerical or codable answers. Occasionally, they ask follow-up questions to clarify ambiguous responses that cannot be easily coded or quantified. Usually the ambiguous response is noted in a “remarks” column so that a new code can be added to the list of expected responses.⁴ Occasionally the interviewer will write other pertinent information in the remarks column, but this information is rarely used in a systematic manner during the analysis.

Qualitative protocols are also less structured than quantitative survey protocols. In surveys, standardized field protocols are written and tested before data collection begins. The sampling frame is set and, with the exception of sample attrition, the sample does not change during the study. Also, individual data collectors are required to follow the data collection protocol rigidly. As a result, they are not allowed to cut interviews short if they feel that the session is not productive or the respondent is not giving candid information.

In the qualitative approach the entire plan for collecting data is much more flexible. Since new concepts may arise at any time, qualitative researchers are allowed to adjust the data collection protocol to pursue concepts that have been revealed as important. As such, the methods used and the sequence in which particular data are collected may be altered. Areas of inquiry that produce irrelevant information can be dropped from the study, and areas that appear likely to yield more useful information can be pursued in greater detail. As a result, qualitative researchers are free to change the data collection system by adding, refining, or dropping techniques or informants. This approach to

research means that even the conceptual framework can change significantly during data collection.

Qualitative Data Collection Relies on Iteration

Iteration is a second characteristic common to the qualitative data collection process. During a single study, respondents may be interviewed several times to clarify and follow up on information that they provided in earlier interviews. Therefore, within a single study, data collection and analysis can be cyclical, with the first wave of data analyzed before subsequent phases of data collection have begun. The alternating pattern of data collection and analysis means that the information acquired during earlier periods of data collection can be used to inform and improve data collected during subsequent periods. However, for this to occur the field team must be capable of interpreting the collected data and making plans to follow up on topics that require further exploration. This is a complex task and has serious implications for project staffing.

Iteration in qualitative work is used at several levels: within an interview to clarify new ideas or terms that come up during the interview; in a repeat interview with a respondent after information from an earlier interview has been reviewed and analyzed; and in two or more interviews with the same informant using different methods each time (Gittelsohn 1995). Because qualitative data collection protocols are very flexible, there are no hard and fast rules about how many times a single respondent should be interviewed. It may be appropriate to interview one respondent several times, and another respondent only once.

Quantitative surveys may also involve iteration. However, this practice is usually confined to collecting the same information from a given unit of observation over time. With qualitative work, iteration is used for different purposes. Iteration is used to clarify concepts that arise during the data collection process or to check the reliability of data by conducting interviews or observations at different periods of time or in different situations and contexts.

Qualitative Data Collection Exploits Multiple Perspectives

Qualitative research relies on multiple perspectives to increase the internal validity of its findings.⁵ In particular, it is important to understand a phenomenon from the respondent’s perspective (the “emic” view) rather than just the researcher’s perspective (the “etic” view).

The emic, or insider, view represents the meaning that local people give to the events, processes, and institutions in their lives. According to Miles and Huberman (1994) uncovering the emic perspective introduces the possibility of discovering “latent, underlying, or non-obvious issues associated with the phenomena under study.”

Qualitative researchers do not abandon their own perspective during the process of data collection and analysis. Rather, they move between the emic and etic perspectives, cross-checking their own analysis of a situation against those of the people being studied (emic perspectives). As new information is revealed, they use this process to guard against invalid interpretations of the respondents’ statements. The process of systematically requesting feedback about one’s data or conclusions is referred to as “member checking” (Maxwell 1996).

Aside from seeking the “insider’s perspective,” qualitative research relies on triangulation to increase the internal validity of its findings. Triangulation is the practice of using several data collection methods to assess whether a given finding is authentic. Webb and others (1965) first coined the term when they wrote about validating findings by subjecting them to an “onslaught of imperfect measures.” Denzin (1978), claiming that no single collection method ever provides a complete answer to a research question, conceptualized several different forms of triangulation, including triangulation by data source, method, researcher, and theories.

Jick (1983) has underscored the hidden assumption of triangulation: that the weaknesses and limitations of each method are counterbalanced by the strengths of other methods. Triangulation exploits the advantages of each method or source while neutralizing its inherent liabilities. Triangulation is not limited to combining several qualitative methods; it can also involve combining qualitative and quantitative methods.

Many qualitative researchers believe that greater internal validity is one of the hallmarks of the qualitative approach. They maintain that research methods that ignore the emic perspective, such as the survey, will have low internal validity. Critics of the survey method say that survey researchers devote too little time to understanding the meaning of the variables and models that they choose. They are also skeptical of the use of proxy variables and multivariate modes of analysis that are stripped of context but heavy on

assumptions. Are the assumptions that are necessary to make the model work reasonable in this context? Does a survey variable truly represent the phenomenon that we think it does? Is this variable important in determining the outcome in question, or is there another variable more valid in this context?

Kirk and Miller (1986) state that validity checks require some sense of what “the truth” really is. In the absence of triangulation, they say that little can be done to increase the internal validity of social science measurements. Maxwell (1996), however, disagrees and suggests various strategies for improving internal validity, including searching for discrepant data and negative cases, member checks, verbatim notes of interviews, and feedback from others. None, however, will guarantee validity. Given that validity is hard to ascertain, it is not surprising that quantitative researchers have focused more often on increasing the reliability of their findings than on internal validity (Litwin 1995).

Differing Generalizations Made by Quantitative and Qualitative Methods

Using statistical sampling and analysis, quantitative researchers make sample-to-population generalizations—drawing statistical conclusions that generalize the findings associated with a particular sample to the entire population from which the sample was drawn. By contrast, qualitative researchers are usually less concerned with sample-to-population generalizations. Instead they conduct intensive, “naturalistic” investigations of fewer cases. Cases are often chosen purposively, according to prevailing theories and empirical evidence regarding the subject being studied. In doing so, qualitative researchers aim to make conceptual and theoretical extrapolations or analytical generalizations (Haberhorn, in Caldwell, Hill, and Hull 1988). Analytical generalizations are a different kind of conclusion than those derived from sample to population generalizations; they are working hypotheses that can be further examined in other studies.

Citing Cronbach (1975), Patton (1990) warns of the limitations inherent in generalizing from “naturalistic” case studies:

An observer collecting data in a particular situation is in a position to appraise a practice or proposition in that setting, observing effects in context. In trying to describe and account for

what happened, he will give attention to whatever variables were controlled, but he will give equally careful attention to uncontrolled conditions and to personal characteristics... As he goes from situation to situation, his first task is to describe and interpret the effect anew in each locale, perhaps taking into account factors unique to that locale or series of events... When we give proper weight to local conditions, any generalization is a working hypothesis, not a conclusion.

Thus Patton (1990) states that naturalistic inquiry produces conclusions in the form of working hypotheses that can be tested in new settings. Each case study provides a single piece of evidence that can be used to seek general patterns among several studies of the same phenomenon. Generalizations drawn from qualitative studies are therefore conceptual in nature and cannot be assumed to be generalizable to any specific population; they are merely working hypotheses for future comparative work.

Summary

This discussion of the nature of qualitative and quantitative data collection begs the question of whether a researcher's paradigmatic views predetermine the set of methods he or she must use. Is it possible to identify with a post-positivist paradigm but still use qualitative techniques? Is it possible for those adhering to an emancipatory paradigm to make use of surveys? Some would claim that quantitative and qualitative methods represent distinct positions about what constitutes reality and how social research should be conducted. They would argue that since the two methods are based on incompatible assumptions, they cannot logically be used together (see Guba 1985, for example).

This chapter takes the position that all research paradigms are valid, but that none are inherently linked to the methods that have been labeled "qualitative" or "quantitative." This position is understandably controversial, but has been championed by those who believe issues of epistemology should be separated from those of method (Reichart and Cook 1979; Firestone 1987; Bryman 1984; Abbas and Teddlie 1998). This paradigm of "pragmatism" maintains that the choice of method should be based on technical rather than epistemological criteria; researchers should therefore choose the method that is appropriate for the given research question. This author adheres to this

philosophy and suggests that quantitative and qualitative methods can logically be combined.

Using Qualitative Methods to Improve Household Surveys

Most survey researchers use some form of qualitative research to understand the political, economic, or cultural context in which their surveys are conducted. Some of these qualitative efforts are ad hoc in nature (such as informally talking with villagers), while others are more comprehensive (such as running a well-funded qualitative study in tandem with the survey). However, in practice, due to cost and time constraints, a majority of these efforts tend to be ad hoc and aimed at getting the survey in motion.

There are three distinct ways in which qualitative data may improve a quantitative survey. First, qualitative methods can be used to produce hypotheses and to shape a survey's conceptual framework. Many qualitative methods can rapidly produce an overview of a situation or a sense of "how things work" from the respondent's perspective. This helps researchers learn how and why their theories break down and discover ways in which human behavior or project outcomes run counter to their intuition. While many researchers carry out informal qualitative inquiries before proceeding with a survey, few are aware of the range of techniques available to generate new ideas or the wealth of information that can be provided by investigating the views of local people. Thus qualitative techniques can be used prior to a survey to shape the conceptual framework and to generate questions that can later be explored using either quantitative or qualitative methods.

Second, qualitative methods can be used to clarify the questions and terms that are used in a survey. Such clarifications make it easier for researchers to communicate effectively with respondents and to obtain meaningful answers to their questions. Typically, survey questionnaires are based on prototypes that have been used in other locations. In addition, new questions are often written to meet the specific needs of a given study. However, without adequate pretesting in the study location, these new and old questions can be highly confusing to respondents. And often little attention is paid to identifying the appropriate languages—colloquial or otherwise—into which a survey should be translated.

Developing good survey questions is the area in which qualitative research can most tangibly improve a survey. Poor survey questions typically result from problems of semantic or conceptual incongruence. Semantic incongruence can occur when a word in the original question does not exist in the language or dialect of the translation. The problem can usually be corrected by asking a native speaker to devise a colloquial translation that conveys the same idea using words different from those used in the original question. To test this translation, a second native speaker can be asked to translate the questionnaire back into English. If the original meaning has been preserved, the colloquial translation is successful.⁶

Conceptual incongruity is a more serious problem. This problem occurs when the researcher's definition of a concept is not the same as the definition used by the populations being studied. In such a scenario, an apparently faithful translation may be made of the original question that nevertheless does not retain the meaning of the original question. While semantic incongruence often indicates the presence of conceptual incongruence, semantic congruence does not necessarily imply conceptual congruence.

Citing an example from West Bengal, Bhattacharyya (1993) illustrate how conceptual incongruence can cause problems when interpreting survey data. During their study of how households make decisions about treating children with acute respiratory infections, they learned that the Bengali term for measles—listed in Bengali dictionaries and used by local physicians in their communications with patients—is *haam*. However, qualitative inquiry showed that respondents also used the term *haam* to include illnesses other than measles, some of which do not require medical treatment. Since the researchers could not be sure of the appropriate biomedical response to cases of *haam*, it was not possible for them to use the survey data to understand how caregivers responded to cases of measles. This study indicates that failing to understand the complexities of language can lead survey researchers to interpret data from their own surveys incorrectly.

Another example of conceptual incongruity may occur when a researcher wants to assess the use of a new agricultural technology on different kinds of soil. He or she may be interested in studying responses from certain soil types that are recognized by the scientific community. However, these soil types may not

be recognized within the communities studied (Kerven, Hilde, and Ragnhild 1995). In such circumstances, qualitative methods can increase the clarity of the terms, codes, and questions used in a survey, helping researchers understand local classifications and helping them phrase questions that make sense within these classifications.

Third, qualitative methods can be used to explain counterintuitive or inconclusive survey findings. For example, a researcher might analyze some survey data but not be able to explain the results using the available data. The variables necessary to understand a result may not have been included in the survey, or the correct variables may exist but the data may not be sufficiently disaggregated to provide a reasonable explanation. In such cases the researcher may choose to carry out a follow-up survey or to perform some qualitative work. When funds are limited or when it is clear that the survey instrument cannot elicit the kind of information needed, it may be appropriate to take a qualitative approach. For example, some LSMS surveys have included simple precoded questions that ask respondents to identify the public services they would like to see improved (South Africa 1993) or to state their level of satisfaction with their current standard of living (Jamaica 1992). Open-ended qualitative methods could be used to find out why respondents give certain services a higher priority than others and how they would like certain services to be changed. Similarly, researchers may use qualitative methods to validate the findings from their quantitative studies by asking respondents more in-depth, unstructured questions. In either case, a second-stage qualitative investigation can be a relatively quick and inexpensive way to interpret puzzling findings.

Qualitative Data Collection Techniques

There are many different ways to collect qualitative data. In this section we briefly describe five different techniques: interviews with individual respondents; interviews with groups; direct observation; systematic data collection; and participatory methods. Readers interested in learning more about how to practice these methods should consult the references listed at the end of each subsection.

Qualitative Interviews with Individual Respondents

Interviews with individual respondents are one of the most important tools available to qualitative

researchers. Such interviews can be informal discussions or more structured interviews using a predetermined questionnaire. In either case the aim is not to fit responses into predetermined categories or codes but instead to encourage open-ended answers that allow respondents to express their ideas as fully as possible.

INFORMAL INTERVIEWS. Most quantitative researchers who use survey instruments also use some type of informal interview. The informal interview can take place in any phase of a research project, but researchers often use it in the early phases to gain a broad understanding of the issues under study. There are no prewritten questions or interview guides in an informal interview. Instead the researcher follows whatever course appears promising, handling topics in the order they arise. The interview covers a broad range of subjects related to the topic studied. When the interview goes well, much information can be gained in a short amount of time.

Casley and Kumar (1988) describe the informal interview as akin to a conversation. To retain the informal nature of the interview, they suggest that researchers take only brief notes during the interview. However, in practice, the amount of note taking that is acceptable depends on the level of trust and familiarity between respondent and researcher. If the respondent knows the researchers and understands their project, he or she may not be concerned if the interviewer takes copious notes. However, if the researcher is unknown to the respondent or the topic discussed is a sensitive one, copious note taking during the interview may inhibit candid responses. If the interview proves to be fruitful, any notes taken are expanded and clarified as soon afterwards as possible, so that the interviewer does not forget what he or she was told.

There are some drawbacks to this method. First, because these interviews are informal, the quality of information produced depends on the skill of the interviewer. Skilled interviewers know how to probe for clarifying information and how to steer respondents back on course when the conversation drifts. A skilled interviewer may also be able to conduct the interview while taking few notes, helping to put respondents at ease. Second, since there is no predetermined set of questions or topics, there is no guarantee that the same topics will be covered in all interviews. Therefore, data collected from one informant

may not be compatible with data collected from other informants. (However, it is not always necessary to make direct comparisons between cases; in the exploratory phase of a research project researchers may only be trying to determine how they should think about the phenomenon in question.) Finally, because the interviews are not focused on a set of questions or topics, the informal interview can be more time-consuming than other methods.

SEMISTRUCTURED INTERVIEWS. Semistructured interviews differ from informal interviews in that the investigator uses an interview guide that lists the topics to be covered or the open-ended questions to be asked. (See Casley and Kumar 1988, p. 12–13, for an example of such a guide.) Usually researchers choose these topics or questions after a preliminary round of informal interviews. The interviewer is obliged to bring up each topic or question, but is not bound to do so in any specific order.

Because the interview guide contains predetermined questions or discussion topics, the semistructured interview has some resemblance to a survey interview. There are important differences, however. Questions are open-ended and respondents are encouraged to explain as fully as possible their answers to each question. The answers are therefore recorded as text. In addition, the detailed nature of these answers sharply contrasts with the numeric or precoded answers obtained from a typical survey interview.

The semistructured interview has a number of advantages. First, because it is built around a number of predetermined topics or questions, a great deal of information on very specific issues can be gathered quickly. Second, because interviewers are obliged to cover all topics or questions in the interview guide, the information obtained from all respondents is comparable. Nevertheless, the quality of the information gathered still very much depends on the skill of each interviewer. An interview guide can only suggest topics for discussion; it cannot suggest ways to probe for supplementary or clarifying information.

The respondents in semistructured and informal interviews are chosen because of specialized knowledge they may have about themselves (if they are “regular informants”) or about others (if they are “key informants”). Some researchers rely on theory to establish their criteria for selecting respondents. Honigman (1970) states that respondents should be

selected for their status (age, sex, occupation) or previous experience or qualities that endow them with special knowledge that the researcher values. If, for example, a researcher is interested in the rural credit market, the village moneylender may be a good respondent. However, most researchers agree that it is not possible to make a complete list of respondents before beginning the interviews. In each setting, the relevant respondents will differ according to the question being examined. Therefore, some respondents may be identified only after fieldwork has begun.

To illustrate this, consider the choice of a key informant in a study of the equitable use of irrigation water in south India (Reddy and others 1994). Informal interviews revealed the key actors in the communal management of village irrigation water. However, one of these actors was particularly knowledgeable about the use of irrigation water and the conflicts associated with its joint use (Kerr 1996). This person, the water man, was hired by farmers to open and close the gate on the village water tank each day. The water man had no land and was thus impartial in the distribution of water. The water man knew with great certainty who obtained water for their fields, how often each field was irrigated, and what conflicts were associated with the fair use of the village tank. Although the water man was an excellent key informant in these communities, it is unlikely that researchers could have known about him before visiting the site. Furthermore, there is no reason to believe that a water man would be found in other locations, even within India.

Since the selection of respondents is often based on non-probability sampling, the issue of bias always arises. However, qualitative researchers have developed a number of methods to decrease the chance of bias in their selection of key respondents. Casley and Kumar (1988) suggest that researchers should make sure key respondents represent a range of viewpoints and concerns. They suggest that the researcher identify a number of sources from which key respondents can be obtained and select a few respondents from each source. (In the above example, such respondents might include the water man in the village, members of the water users' group, people outside the users' group, and local agricultural extension agents.) Miles and Huberman (1994) recommend sampling "representative cases" as well as "negative" and "exceptional" ones. This form of sampling, they claim, allows researchers

to qualify their findings and to specify contingencies in the main patterns observed. Pretty and others (1995) suggest additional useful ways to avoid bias in qualitative study. Kumar (1993) recommends that 10–25 respondents should be included in a key informant study.

For further information regarding interview techniques with individual informants, see Kumar (1993), Casley and Kumar (1988), Patton (1980), Spradley (1979), Rubin and Rubin (1995), Weiss (1994), and Miles and Huberman (1994).

Group Interview Techniques

Group interviews can take so many different forms that the term "group interview" explains little about how an interview is conducted. Frey and Fontana (1993) state that group interviews may vary on four dimensions. First, group interviews serve many different purposes; they can be used as an exploratory tool—to reveal the broad context surrounding a subject area—or as a confirmatory tool—to validate a researcher's interpretations of previous collected data. Second, the style of questions used may differ. Researchers may ask open-ended, unstructured questions or highly focused, more "factually-based" questions.

Third, the role of the interviewer may also differ in various forms of group interviews. For example, researchers may employ a relatively direct, "question and answer" style of interview or a more passive, nondirective style. The "question and answer" style is used when answers are sought to relatively factual questions. The nondirective style may be used to elicit discussion among the group members and to reveal their opinions about a particular topic. In this case, an interviewer mainly listens and observes, speaking only when it is necessary to probe for more specific information or to move on to another topic.

Fourth and finally, there may be differences in the circumstances under which the group is assembled. Group interviews may be convened under relatively informal circumstances (for example, when a group spontaneously forms in a natural setting). Or the interviews may be convened under more formal circumstances, in which a venue is formally established for the interview and respondents are invited to attend.

Three of the many variations on group interviews are given below. Each differs in the structure of the questions asked, the role of the interviewer, and the circumstances under which the group is convened.

Some can be adapted for multiple research purposes, while others are best applied to specific purposes.

FOCUS GROUPS. The focus group has long been used in private industry for market research. More recently, it has been adopted by the development community. In theory, a focus group should include six to ten participants (Morgan 1988). In practice there are no strict rules about the size of the group. To make the sessions more fluid, harmonious, and candid, respondents are chosen so that each group is as homogenous as possible in terms of background and experience.

Focus groups are particularly useful for eliciting information about local attitudes toward, terminology for, and knowledge of a specific topic. The goal of focus groups is to elicit the insights and experiences of the participants and to stimulate discussion on areas that would not come to light without the interaction of the group. Ideally, the respondents stimulate further discussion with each other, delving into areas that could not have been anticipated during the planning phase. The researcher not only observes and records the discussion, but also acts as a facilitator who guides it. As a facilitator, the researcher's role is to introduce the subject, use subtle probing techniques to keep the discussion going, and encourage all members to speak. In addition, the facilitator must subtly subdue participants who are especially talkative or domineering, so that others have a chance to speak. A good facilitator recognizes shy and domineering individuals and enables both to contribute. When a focus group discussion goes well, the facilitator appears to play a small role in the discussion.

Typically a study that employs focus groups will include sessions with several groups. Morgan (1988) states that one group is never enough, although three or four groups may be sufficient for exploratory work. He suggests that more groups are necessary for more detailed analysis.

The composition of the groups is carefully planned since data analysis data often revolves around comparing and contrasting the groups' different responses. Knodel, Sittitrai, and Brown (1990) suggest that characteristics defining the groups fall into two categories: characteristics that differentiate groups from each other ("break characteristics") and characteristics common to all groups ("control" characteristics). Break characteristics—such as gender, religion, and geographic location—represent the parameters on

which researchers want to compare and contrast responses. Control characteristics represent the parameters that researchers want to control across all groups. Break characteristics in one study might be used as control characteristics in another.

For further information on focus groups see Morgan and Krueger (1998), Morgan (1993), Morgan (1988), Kumar (1993), Casley and Kumar (1988), and Knodel, Sittitrai, and Brown (1990).

COMMUNITY INTERVIEWS. Community interviews have been widely used in agricultural research. They are often conducted as public meetings that are open to all community members (Casley and Kumar 1988). In contrast to focus groups (where the participants discuss matters mostly amongst themselves) this group interview takes on more of a "question and answer" format rather than one of "listen and observe." In addition, because the questions are often more fact-oriented than in a focus group—for example, identifying the prevailing wage rate in a community—the presence of many people suggests that the group will iterate toward answers that represent a consensus. As such, discussions among the group members are often limited to reconciling conflicting answers.

Casley and Kumar (1988) suggest that researchers plan less than 15 questions and remain flexible about the number of questions asked. The questions should be free of technical language or jargon, and should be aimed at the level of the least informed person expected at the meeting. Politically or culturally sensitive questions should also be avoided, since the composition of the group cannot be controlled. (See Casley and Kumar 1988, p. 32, for a sample interview guide.) Casley and Kumar also suggest that researchers reserve time for "post-meeting discussions" immediately after the formal meeting. These discussions are extremely valuable because they allow respondents who were not comfortable speaking during the meeting to contribute their opinions. To underscore the importance of these discussions, Casley and Kumar (1988) cite an example in which small-holder farmers felt unable to speak during the meeting because they believed that the village leaders were misusing funds for their own interests. Further interviews indicated that this was indeed the case.

Researchers from other disciplines use group interview techniques similar to the community interview described above. Knodel, Sittitrai, and Brown

(1990) describe a similar type of interview that does not involve the entire community. Like the community interview, this technique is appropriate when no single person would be able to provide accurate answers to all the questions posed. However, with this technique researchers control the composition of the groups by inviting individuals that have knowledge in different areas. Again, the information requested is fairly factual, including for example the location of various health facilities, the types of service they provide, the date that each school was established, or other similar facts.

For further information on structured group interviews such as the community interview, see Casley and Kumar (1988), Kumar (1993), Frey and Fontana (1993), and Knodel, Sittitrai, and Brown (1990).

SPONTANEOUS GROUP INTERVIEWS. Group interviews need not be convened by the researchers themselves. Frey and Fontana (1993) cite a study in which researchers visited bars and restaurants where they knew that their study population spontaneously gathered. There they observed and listened to the group, and when appropriate, began to interview the group in a fairly directive way. The interview style later evolved in a “passive, enabling way, with questions.” Frey and Fontana caution that some finesse is involved in this type of interview. Researchers must be able to assess when it is appropriate to approach the group with questions, and they must have skill in managing the social situations that arise.

Direct Observation

Direct observation allows researchers to record first-hand descriptions of physical objects, social processes or events. The principle behind direct observation is that it allows a researcher to describe an event as it occurs. Its main advantage is that it provides an account of what actually happened, rather than what people say happened or what researchers assume happened. Thus data from direct observations can usefully complement data collected by means of interviews. Observation data can be important in the design of projects aimed at changing people’s behavior—such as observing local soil conservation techniques to understand why the adoption of recommended techniques is low—or evaluating the quality of service provided by a program or institution—say, by observing care

practices and physical resources available in a primary health care clinic.

There are many advantages to using direct observation instead of in-depth interviews. First, direct observation relies on the skill of the researcher to identify meaningful events rather than on the ability of respondents to recall details of their own behavior. Experienced ethnographers have noted that many people do not think in sufficient detail to recall how they have behaved under mundane circumstances. Thus respondents may omit details of their actions that are important to researchers but that the respondents consider inconsequential. Second, direct observation makes it possible to observe how individuals or groups behave in their natural environment. Some researchers have suggested presenting hypothetical scenarios to respondents rather than using direct observation. However, experience shows that hypothetical questions tend to be contrived and to elicit “best behavior” responses rather than candid ones. Finally, the technique of direct observation can be used at many different levels (regional, community, household, or individual). At the aggregate level, researchers’ observations tend to be impressionistic (for example, observations of the topography of a region). At more disaggregated levels, researchers’ observations may be more focused and structured (for example, observations about how women allocate time among activities).

For further information on direct observation techniques, see LeCompte and Schensul (1999), Bernard (1995), Patton (1990), Kumar (1993), and Casley and Kumar (1988).

Systematic Data Collection: Elicitation, Grouping, and Ordering Exercises

Most of the interview methods described above are fairly open-ended. However, qualitative researchers also use data collection techniques that are less open-ended and more formal. These techniques present each respondent with the same set of questions and are therefore referred to as “systematic” forms of data collection.

Systematic data collection methods are similar to closed-ended survey interviews in that they are more structured than other qualitative interview techniques. But unlike most surveys, these methods do not always include questions that require quantitative answers. For populations in which literacy is limited, such

methods often involve exercises (as opposed to questions) that focus on grouping, ordering, or rating things. For literate populations the same kinds of exercises can be conducted using written survey forms. In both cases quantitative methods are often used to analyze the qualitative data collected. Therefore, systematic forms of qualitative data collection overlap substantially with the methods traditionally considered “quantitative.” The methodology associated with collecting systematic qualitative data tends to be more transparent than the methodology associated with other qualitative methods. And because this form of data collection is more systematic, it decreases the chance of researcher bias (Miles and Huberman 1994).

Systematic qualitative data collection can be used in an exploratory fashion to determine how respondents define a given subject area or how they group or rank items within that subject area. A researcher might be interested in how a rural population seeks health care. Almost certainly the group’s behavior in seeking care will relate to its definition of what causes sickness. Therefore, to study this subject it is necessary to understand how the local culture defines sickness, causes of different sicknesses, and ways to treat these sicknesses.

FREE LISTING. Free listing exercises are especially useful for determining how local people define a particular subject area (such as illnesses, coping strategies, or credit sources). Respondents are asked to list items within a given area of interest. The objective of this exercise is to get respondents to identify the boundaries that local people associate with a subject. For example, respondents may be asked to free list all the possible sources of credit available to people living in the area. These data are qualitative, but simple quantitative techniques are often used to analyze them. For example, tallying the frequency of responses for each item on the list (in this case, credit sources) gives a sense of which items are most commonly associated with the concept of interest. When items occur with high frequencies, this indicates respondents’ agreement about the definition (or boundaries) of a subject area.

After the boundaries of a subject area are identified, researchers can use various techniques to determine how the items listed relate to one another. Understanding how respondents think about the subject helps researchers design research questions and programs that address their clients’ needs. And once a

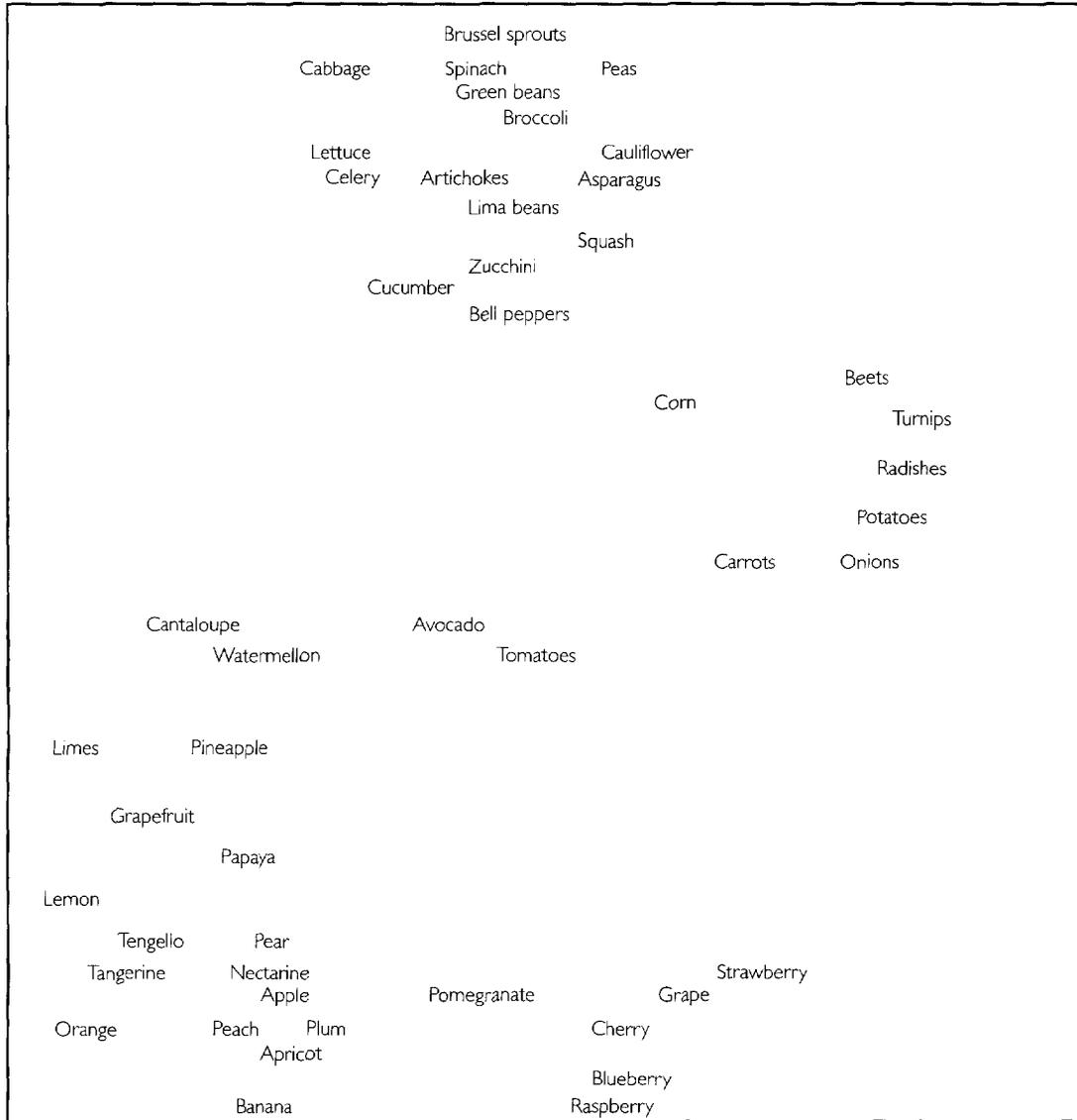
research project has begun, understanding the perspectives of respondents may help researchers learn why the project is succeeding or failing.

Three types of exercises can be used to acquire information about how items listed relate to one another and thus how clients think about a subject. These exercises are pile sorts, triadic comparisons, and ranking.

PILE SORTS. A pile sort is an exercise in which respondents group items (usually obtained from a free listing exercise) into categories that they define themselves. In a simple pile sort, respondents are given a set of cards, with each card representing a single item. (There are variations on the pile sort, many of which are more complicated than the one described here; see Weller and Romney 1988 or Borghatti 1999.) In areas where few people are literate, the cards may use pictures instead of words to indicate each item. In a free pile sort the researcher offers the respondent little instruction on how the piles are to be constructed, only indicating that he or she should make piles of things that belong together. When the respondent finishes the exercise, the resulting piles should contain items that are similar to each other but different from the items in other piles. To analyze the data for each respondent, the researcher considers all possible pairs of items, assigning a “1” if the respondent says they are different and a “0” if they are similar. The resulting “similarity-difference” data are numerical and can be analyzed using multidimensional scaling (Schiffman, Reynolds, and Young 1981). Multidimensional scaling is a technique that allows researchers to represent spatially (as in a map) the extent to which various items are similar or different. Figure 25.1 is an example of a multidimensional scaling analysis for two categories of foods, fruits and vegetables. Items that respondents consider similar to one another (fruits) lie close together at the bottom of the picture. Items that they consider dissimilar to fruits (in this case, vegetables) lie toward the top of the picture.

TRIADIC COMPARISONS. In this exercise, respondents are asked to consider three different items and identify which item is “most dissimilar” from the other two items. (An example of such a question is, “Of the terms ‘woman,’ ‘man,’ and ‘tree,’ which one is most different from the other two?”) Triadic comparisons can be done orally or with cards (as in the case of pile sorts). In contrast to pile sorts, triadic comparisons are

Figure 25.1 Results of a Pile Sort after Multidimensional Scaling Analysis: Fruits versus Vegetables, 1988



Weller and Romney asked subjects to sort the names of fruits and vegetables into piles. A multidimensional scaling analysis of the resulting data provides a spatial representation of the perceived similarities among the various items. Items that are close to one another are deemed similar. The vegetables are clustered in the upper right-hand corner, while the fruits are in the lower part of the picture. Avocado and tomato fall between. Such analyses can be useful for survey design, particularly when it is necessary to predetermine appropriate categorical responses.

Source: Weller and Romney 1988.

easiest to conduct when there are few items to consider. Triadic methods can be analyzed using the same methods as pile sorts.

RANKING EXERCISES. In these exercises respondents are asked to order a set of items by the extent to which they possess any given attribute. To assist respondents when there are many items, researchers can ask them to break down the list of items into a few groups (for

example, “high severity of illness, moderate severity of illness, or low severity of illness”) and then rank the items within each pile. Ranking exercises can also be done using comparisons by pair, in which each respondent is asked to compare all possible sets of pairs, identifying which member of each pair has more or less of a designated attribute. When comparisons by pair are used, ranking exercises can be done orally. Objects can also be ranked on the basis of several dif-

ferent attributes, and multidimensional scaling can be used to assess how similar or different items are.

For more information on systematic data collection methods see Weller and Romney (1988) or Borghatti (1999). For information on multidimensional scaling see Schiffman, Reynolds, and Young (1981).

Pictorial Methods Drawn from Participatory Research

Participatory research is used mostly for designing and evaluating projects. The methods associated with participatory research have evolved from several research traditions including applied anthropology, farming systems research, rapid rural appraisal, agroecosystem analysis, and activist participatory research (Pretty and others 1995). Participatory research goes by many different names, all of which carry slightly different assumption and emphases; Pretty and others (1995) list 32 different terms that have been used to describe participatory approaches to learning and action. However, one principle underlies all of these approaches: respondents should be active participants in the research process.

Participatory research is geared toward action and community-level change. Thus all actors who are likely to be affected by a proposed project—potential beneficiaries, project staff, funders—should share in making decisions about the project. Since decisionmaking is shared, the primary role of a participatory researcher is not to collect data for analysis and decisionmaking but to facilitate discussion and change on issues important to the respondents. As such, participatory research is meant to be interactive rather than extractive.

One of the primary goals of participatory research is to ensure that historically disenfranchised groups (such as women and the poor) have a voice in the design and implementation of projects. Including all the relevant actors in the research process increases these groups' sense of "ownership" of a project as well as the probability of the project's success. In a project with a large participatory component, community members participate in most (if not all) stages of project development and implementation.⁷ However, in practice, the level of shared decisionmaking in ostensibly "participatory projects" varies widely (Narayan 1996; Pretty 1995).

Many of the techniques used in participatory research (such as semistructured interviews, group interviews, and direct observation) have been described earlier in this chapter. However, participatory research became famous for its employment of a

different technique: using quick, crude pictures as a way to generate data. Typically, beneficiaries of a project draw pictures in response to questions posed by a facilitator or leader (not necessarily "the researcher"). These simple pictures may be drawn on the ground with a stick or powdered chalk or made with common materials like beans or seeds. The pictures are used to encourage discussion among groups of respondents. Usually the final answer or analysis of a problem evolves after a group of respondents has had a lengthy discussion about the picture. The pictures thus serve a dual purpose: they make interviews accessible to illiterate respondents and they facilitate group discussions. Even when respondents are literate, researchers may prefer to use this method because it promotes discussion and allows participants to follow visually the answers that other members are giving.

In recent years the methods used in participatory research have been widely publicized. As a result, their use has now spread to more traditional forms of research. Many research projects have discovered the usefulness of these methods for generating contextualized information quickly. As a result, these methods have increasingly been used to extract information from communities rather than to promote shared decisionmaking or community change. However, researchers who use participatory research methods to further their own research agenda should recognize that they are not truly conducting participatory research.

The preceding paragraph highlights that "participatory research" is really about the spirit in which the research involves the beneficiaries, and not so much about the actual methods used. In theory, a highly participatory project could use a very structured questionnaire to gain information if this information is requested by the community to solve a self-determined problem. It is important to acknowledge that the pictorial methods popularized by participatory researchers have now (confusingly) become synonymous with the term "participatory research."

For the most part, participation by local people is considered a low priority in LSMS surveys because such surveys are designed to collect information that is useful for researchers rather than for local communities. There is therefore little scope for shared decisionmaking or community-led action with an LSMS data collection approach. Nevertheless, the pictorial methods popularized by participatory research (like the other qualitative methods discussed in this section) can

be used to improve the quality of data collected by an LSMS survey; that is, they can also be used to develop hypotheses, to improve the wording or content of a questionnaire, or to validate survey findings.

The subsections that follow briefly describe three of the most commonly used pictorial methods that were popularized by the participatory research movement: seasonal mapping, matrix ranking, and group mapping.⁸

SEASONALITY MAPS. This exercise is used to explore the seasonal variation of a given phenomenon (for example, time allocation, food supply, pestilence, or sickness). In this exercise, a group of community members is assembled and asked to “make a month-by-month picture” of how the phenomenon varies over the course of the year. (Often local time units are used instead of months.) The months of the year (or local time units) are marked along a horizontal line and the group is asked about the incidence of the phenomenon (for example, sickness) during each time period. The picture is usually drawn on the ground or on a large piece of paper so that all participants can see. Local materials such as pebbles, sticks, seeds, or beans are used to mark monthly levels that are determined by group consensus. The result is a histogram type of picture that illustrates seasonal trends over time. An example is given in Figure 25.2.

MATRIX RANKING. This exercise is used to compare various items (for example, seed varieties) by a number of different attributes (for example, taste, yield, and storability). The matrix is either drawn on the ground or on a piece of paper. Group members choose a symbol to represent each item they wish to compare and the symbols are placed along the top of the grid. Along the side of the grid, the group makes symbols for the attributes that will be used to compare and score each item. The community members talk among themselves and determine how to score each item. The score is recorded by putting some number of pebbles, seeds, or other locally available materials into the appropriate cell. This pictorial method makes it easy for groups to make continual comparisons among the items. Figure 25.3 provides an example of a matrix ranking. Farmers in southern India were asked to evaluate different varieties of pigeonpea by a number of characteristics including leaf production, seed yield, and taste. Local seeds were used to mark the group’s preferences (one seed for very good, two for good, and three for less

good). The group in this example revealed that the ICPL 332 variety was not acceptable due to its taste, although it did have other favorable characteristics.

SOCIAL OR RESOURCE MAPPING. In this exercise, villagers are asked to draw a map of the important resources, structures, and institutions in their community. There are three main types of such maps: social maps, resource maps, and farm maps. Social maps typically depict communities or neighborhoods in sufficient detail to identify each household, structure, or resource that respondents deem important. Resource maps show the location of the natural resources of a certain area—for example, a watershed (by showing aquifers and wells) or the resources used by a village or community (such as water sources, wastelands, and forests). In the same way, farm maps cover a given farm. Since the participants draw the map, they mark items of importance using their own symbolic representations rather than the symbols found on conventional maps. Because the maps are large and use local symbols, respondents find it easy to follow discussions about spaces on the map. An example of a social map is provided by Figure 25.4. Figure 25.5 presents a resource map that shows how villagers perceive the conversion of forest land to a village over a 50-year period.

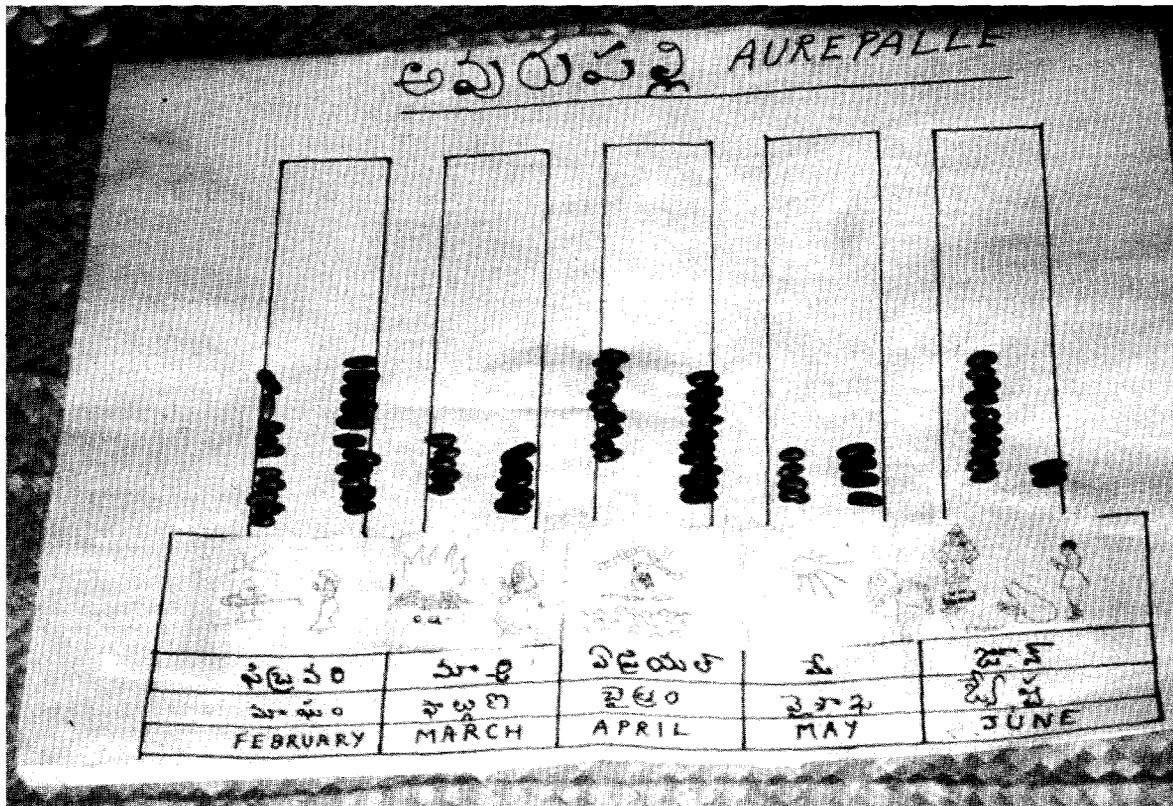
SUMMARY. There are many other pictorial methods used for participatory research and new ones are invented in the field each day. In most cases pictures or diagrams are used to make the discussion clear and accessible to the entire group. There are no hard and fast rules about the mechanics of collecting data using these simple pictorial methods. Rather, ingenuity and practicality are typically considered to be the most important factors in devising such methods of data collection.

To learn about more methods that have been used by participatory researchers, the reader is referred to the large number of instructive manuals on participatory procedures (among others: International Institute for Environment and Development (several years); Narayan 1993; Narayan 1996; Tamil Nadu Agricultural University 1992; Food and Agricultural Organization 1993).

Use of Qualitative Techniques in Survey-Based Policy Research

This section illustrates how qualitative methods can be used to improve the quality of survey-based policy

Figure 25.2 A Seasonality Map Constructed in Andhra Pradesh, India



Source: Chung and others 1997.

Figure 25.3 Matrix Rankings: Farmers' Pigeonpea Preferences, Medak District, Andhra Pradesh, India

	Local	Improved ICPL 84060	Improved ICPL 332
Leaf production	○○○	○	○○
Flower production	○○○	○	○○
Pod production	○○○	○○	○
Pod filling	○○○	○	○○
Pest resistance	○○○	○○	○
Seed yield	○○○	○○	○
Taste	○○	○	○○○
Wood production and quality	○○○	○	○○
Market price	○	○○	○○
Storability	○	○	○

If only one variety available	○	○	○○ ^a
○ Very good	○○ Good	○○○ Less good	

a. Rejected because of poor taste.

Source: Pimbert 1991.

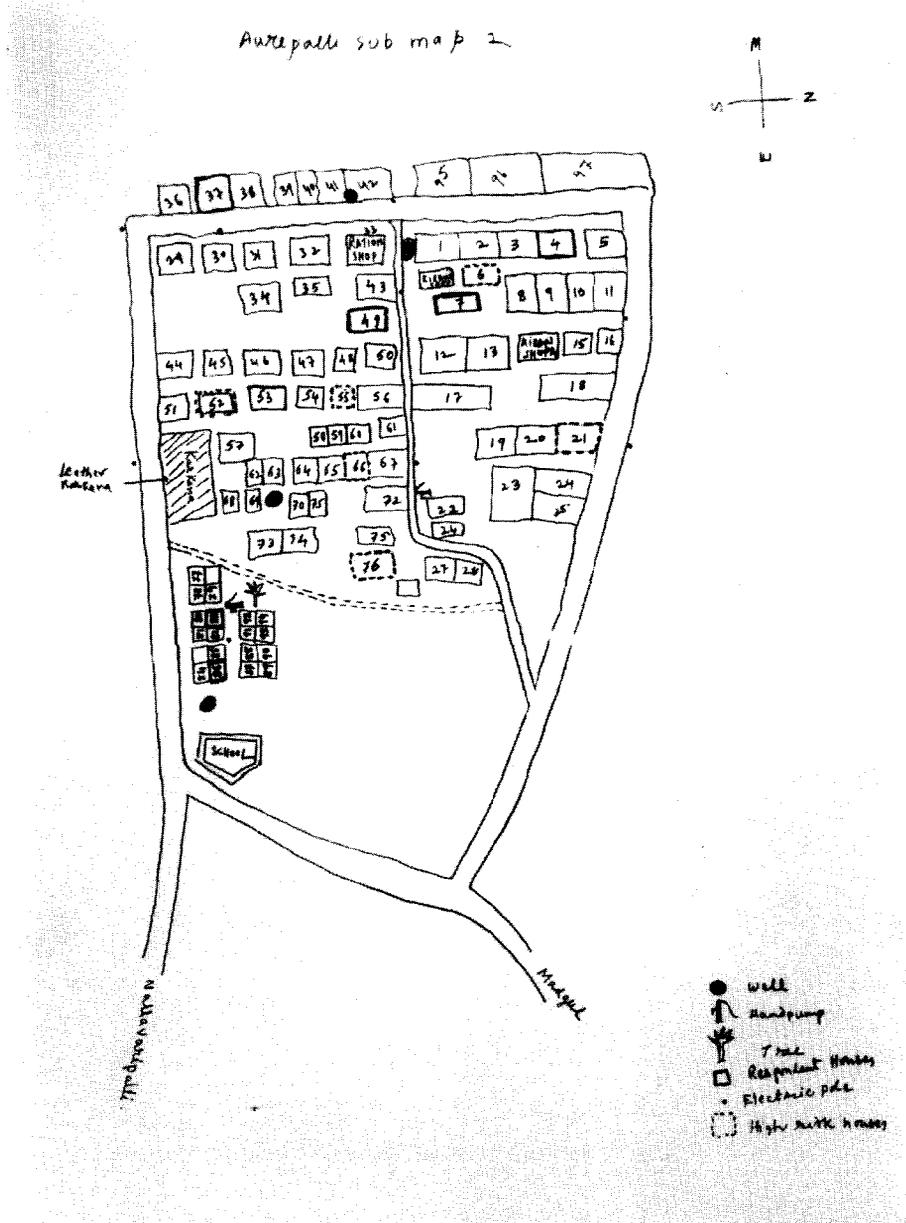
research. Specifically, qualitative data improve survey research in three main ways: by generating hypotheses, improving the design of survey questionnaires, and clarifying quantitative research findings. All three uses complement each other.

Using Qualitative Methods to Generate Hypotheses

Qualitative methods can be used to generate hypotheses for further testing. Two examples of this are discussed here. The first comes from the natural resource literature and illustrates how qualitative research can be used to derive hypotheses for further testing using new primary data. The second example is from the gender and agriculture literature and illustrates how secondary sources can be used to generate hypotheses even when no primary data collection effort is planned.

Kerr and Sanghi (1992) used a combination of qualitative and quantitative methods to identify the economic factors that determine whether Indian farmers invest in soil conservation techniques. Prior to this study, it had become clear that the results of the

Figure 25.4 Social Map Constructed in Andhra Pradesh, India



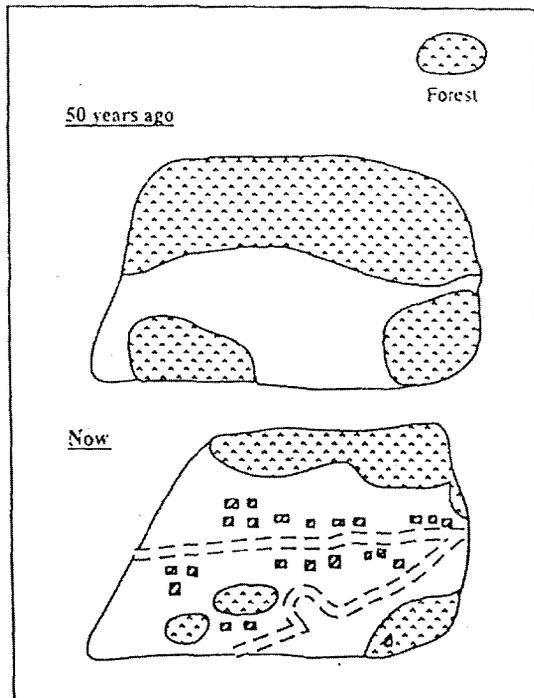
Source: Chung and others 1997.

Indian government's soil and water conservation programs were disappointing. Farmers had not adopted the recommended soil and water conservation measures nor had they maintained the structures built by the government. Some officials had therefore concluded that farmers did not understand soil erosion or did not care about it.

Kerr and Sanghi used a number of qualitative techniques to generate hypotheses about why the farmers had rejected the recommended soil and water

conservation practices. The authors formed a team of researchers that included an agricultural scientist, a social scientist, and a person skilled in communicating with farmers. The team began with direct observation of agricultural fields to understand the nature of soil erosion problems and the actions that farmers took to conserve topsoil. Having noted the characteristics of the fields that were badly eroded and identified the fields on which various forms of conservation had been tried, they interviewed the owners of the plots

Figure 25.5 Village Resource Map Constructed in Western Nepal

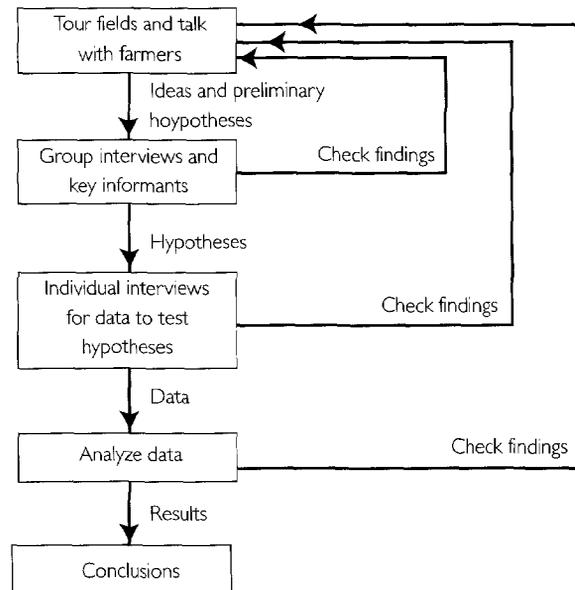


Source: Gill 1997.

(regular informants) to discuss their reasons for adopting or not adopting conservation measures. The farmers discussed their perceptions of the costs of soil erosion, the benefits of conserving soil, and their preferred methods (whether locally devised or recommended by the government) for conserving soil. These informal interviews with farmers were followed by larger, unstructured group interviews designed to yield a wider consensus on a variety of hypotheses regarding the use of soil conservation techniques.

The informal interviews were held with a small sample of farmers who were chosen in a purposive fashion; at this stage researchers were not interested in exploring the average farmer's behavior regarding soil conservation measures but rather in understanding the motivation behind a range of different kinds of behavior with respect to soil conservation. Interviews were conducted with farmers who adopted the government's recommended soil conservation practices, farmers who adopted other practices, and farmers who had not adopted any soil conservation practices. After each of these steps, researchers cross-checked the results from each method, using the principle of triangulation to arrive at a final set of hypotheses. This data collection process is outlined in Figure 25.6.

Figure 25.6 Process of Data Collection Used by Kerr and Sanghi



Source: Kerr and Sanghi 1992.

Kerr (1996) finds that this qualitative investigation led to a number of hypotheses that would not have been obvious from theory alone. The qualitative work suggested that farmers took into account a number of different factors in deciding whether to invest in recommended soil-conserving barriers; many of these factors were unrelated to the costs and benefits associated with building the barriers. Farmers explained that the barriers provided by the government were aligned with the contours of the hillside and thus did not fit the rectangular property boundaries. Also, farmers stated that the contour barriers would make it difficult to divide a plot equally among their sons after their death. Fights would ensue, disturbing the peace of the household.

Kerr and Sanghi (1992) also used theory to derive a set of more generic hypotheses for farmers' rejection of government conservation measures. Economic theory suggests that tenants are less willing to invest in conservation practices than are owner-operators. Theory also suggests that land and credit market failures can inhibit investment. By combining theory with qualitative fieldwork, the authors formulated a clearer set of hypotheses regarding investments in soil conservation. This set of hypotheses laid the groundwork for analyses using multivariate techniques (Pender and Kerr 1996) as well as follow-up work planned for other areas of India.

A second example illustrates the conditions under which secondary resources can be useful for developing hypotheses. Vishwanath and others (1996) planned to use existing household data from Burkina Faso to study issues related to gender, agricultural productivity, and land rights. To inform their hypotheses, they commissioned a review of the literature on land rights in Burkina Faso (Kevane and Gray 1996). Although standard research practice always includes a thorough literature review, Vishwanath and her coauthors took three unusual steps. First, they commissioned two authors who had spent extensive periods in Burkina Faso and were thus familiar with the context and the questions at hand. Second, they purposely broadened the literature review to include the anthropological literature. Third, and perhaps most importantly, the literature review was context-specific and focused on land tenure rights only in Burkina Faso (rather than in other countries or regions).

What is novel in this approach is not the use of secondary sources but rather the use of secondary sources that are context-specific. The authors felt that the effectiveness of gender-related projects is highly location-specific, and thus context should not be overlooked when hypotheses are developed for these projects. This literature review required substantial digging. Kevane (1997) states that he and Gray systematically scoured five area studies journals from 1910 to 1996 in both English and French searching for articles relevant to Burkinabe land tenure. The digging proved useful when the hypotheses were tested with the household data. Vishwanath and her coworkers suspected that male-female productivity gaps were greater in areas where women's plots were subject to greater land tenure insecurity within the household. The anthropological evidence indicated that marriage is the primary institution through which women obtain access to land and that women customarily lose access to land after they divorce. Citing published differentials in divorce among ethnic groups, Vishwanath and her coworkers used ethnicity as a proxy for security of land title within the household. Modeling male-female productivity differences as a function of land tenure security (and other plot-level characteristics), Vishwanath and others (1996) showed that inadequate access to productive resources within the Burkinabe household was significantly associated with the low productivity of women's plots.

Thus qualitative information can be invaluable for generating new hypotheses and testing them. Kerr and

Sanghi (1992) illustrate how preliminary qualitative work for a new field study can be used to develop research hypotheses. By contrast, Vishwanath's work indicates that a context-specific literature review can be valuable when no primary data collection is planned. Context-specific sources do not necessarily have to be in narrative form to be useful; Scherr (1996) suggests that maps are also useful for forming research questions associated with land rights, use, and management.

Using Qualitative Methods to Improve Questionnaire Design

Researchers planning surveys typically use a few qualitative interviews to familiarize themselves with the study site before writing their questionnaires. In practice this presurvey qualitative work is limited because the questionnaires are adapted from ones that have been used successfully in other locations, because researchers feel that they already know enough about a topic, or because researchers do not have enough time to conduct a lengthy qualitative study. Each of these situations decreases the chances of understanding the context in which research issues will be observed. Moreover, each can lead to practical problems with the phrasing of research questions. For example, respondents and researchers may not share the same assumptions and definitions about the concepts being studied. Respondents may have a hard time understanding questions that are not presented using their own terms and concepts.

Problems involving the use of language have been widely discussed in the demography, anthropology, and social psychology literatures (Ware 1977; Morris 1990; Vaessen and others 1987). Most researchers agree that the design of closed-ended questionnaires would be greatly improved if focused qualitative work could be carried out before the questionnaires are designed. Such qualitative work increases the researcher's understanding of how local people think about the research areas that will be covered by the survey questionnaires. This, in turn, can help researchers phrase questions using local terminology, ask questions relevant to the local context, and devise precoded categories that correspond to the ways local people think about these phenomena.

Jacobson (1993) carried out a three-week study using a variety of qualitative methods to improve the language, questions, and codes of a large Demographic and Health Survey on safe motherhood in the Philippines (Philippines 1994, Stewart et al. 1996). The

survey's ultimate objective was to find out more about the type and extent of women's obstetric illnesses (for example, what goes wrong with pregnancies and what is the incidence of each illness) and what the health service infrastructure can do to decrease the level of reproductive morbidity.

Jacobson's work illustrates how informal open-ended interviews can be combined with more systematic forms of qualitative data collection to lay the groundwork for an in-depth quantitative survey. Jacobson started with open-ended informal interviews. The informants were chosen purposively and opportunistically from women who had been hospitalized with one of four major obstetric morbidities. The interviewers used an interview guide to elicit the women's perceptions of their specific illnesses, their symptoms, and the causes of their illnesses. Because the questions were open-ended, the women were able to use their own terms to describe their illnesses.

Jacobson used triangulation to ensure that she had gained a consistent understanding of common reproductive illnesses. In addition to interviewing women who had experienced an obstetric morbidity, she interviewed the traditional birth attendants and relatives who had been present at the time of the birth, using them as key informants. To elicit a wider range of local reproductive terminology and define general problems related to pregnancy, she also interviewed women who had given birth but had not experienced any specific reproductive problem.

After conducting several interviews, Jacobson compiled lists of reproductive morbidities that were recognized by her informants, as well as lists of the signs, symptoms, and causes of each illness. She then undertook a systematic data collection exercise—a pile sort—to find out how local people defined the relationship between sicknesses and symptoms. To accomplish this, Jacobson made a list of obstetric illnesses. She then made a series of cards, each with a symptom that had been mentioned during the informal interview. Respondents were asked to sort through the cards and find the symptoms they associated with each illness. The frequency with which each symptom was associated with an illness was calculated and presented as a measure of the degree of “salience” of the illness within the community.⁹ Finally, respondents were also asked to identify the cause of each illness.

This qualitative exercise generated a list of reproductive illnesses that respondents could commonly

recognize by the onset of certain symptoms. The list of illnesses and symptoms provided the basis for revisions to the Philippine National Safe Motherhood Survey. These revisions included adding clarifying statements to questions, changing the phrasing of questions, and inserting many new answer codes. However, due to a lack of time and money, the qualitative work was conducted in only one of six linguistic areas covered by the survey: the Cagayan de Oro region, which accounted linguistically for 60 percent of the total survey area. As a result of the qualitative work conducted in this region, alterations were made in the Cagayan de Oro survey. This survey was then translated into the other five languages.

Jacobson's work illustrates how qualitative methods can be used to increase a researcher's understanding of the differences between emic and etic definitions of the subject being studied. Although compromises were made, Demographic and Health Survey researchers felt that their first attempt to use qualitative methods within a Demographic and Health Survey was successful, and they decided to increase the qualitative component in future surveys. However, it is important to note that Jacobson's work in the Cagayan de Oro relied heavily on the presence of a strong in-country collaborating institution, as a result of which her work in the region lasted only three weeks. This implies that under ideal conditions, a researcher with many data collection teams and sufficient supervision can conduct simultaneous qualitative studies and finish the work in a month. However, for this to occur survey planners must devote sufficient staff and resources to the venture, and trained investigators are needed who are fluent in each relevant language. Stewart (1996) suggests that these requirements are not trivial, and that it may be difficult to achieve the same efficiency in other settings. Given that good investigators are the key to the success of any qualitative study, Stewart (1996) warns that a poor qualitative study may improve a survey no more than a standard pretest would.

Using Qualitative Methods to Improve the Interpretation of Quantitative Results

An example from the demographic literature illustrates how qualitative work can be used to investigate the dynamics of a given quantitative finding. The work by Knodel, Havanon, and Pramualratana (1984) on the decline in fertility in Thailand is perhaps one of the

best examples of the micro approach to demographic investigation. The micro approach combines the reliability and generalizability of the survey approach with the emic perspective offered by the qualitative approach. In his now famous study, Knodel and his colleagues used focus group discussions to help to interpret the rapid and pervasive drop in birthrates observed between 1969 and 1979 in Thailand. When the study began there was considerable quantitative documentation of the fertility decline but little explanation of why it had occurred among the rural majority. Little to no qualitative work had been done on the subject, and particularly little attention had been paid to the perceptions of the people who had made these changes.

Knodel and his colleagues conducted 23 focus group sessions in five widely separated villages. Because of the abruptness of the fertility decline, Knodel expected that there might be a sharp contrast between the reproductive behavior of the older generation and that of the younger generation. Therefore, he chose to elicit the views of older and younger married couples on the dramatic differences in their fertility patterns. The focus group approach was appropriate for eliciting this kind of "sensitive" information as respondents largely speak among themselves during a session rather than to the interviewer. This confers a sense of security and anonymity to the process and lets people choose comfortable terminology to discuss the topic.

Using a quasi-systematic approach to conducting focus groups, Knodel and his colleagues faithfully transcribed each session, identifying the name (and any other pertinent information) of each speaker, distinguishing between spontaneous comments and ones made only after probing, and noting how much discussion different questions generated. The transcripts were then translated into English, and at least one person who had been present during the session cross-checked the translation. Once the records were translated, several investigators would read through each transcript and discuss the interpretation.

As a result of these focus groups, Knodel and his colleagues were able to suggest four reasons for the large changes in fertility: socioeconomic changes that had caused couples to view the prospect of having large numbers of children as a economic burden (in particular due to the cost of education); the lack of influence of parents and kin on a couple's reproductive

decisions; a latent demand for effective contraception techniques prior to the decline; and a government family planning program during the early 1970s that was effective in both urban and rural areas.

Knodel and his colleagues maintain that the thoughts and attitudes of the local population provided valuable insights into the nature and causes of this fertility change. However, like Stewart (1996) they warn that good qualitative work requires a significant investment of time. They suggest that it does not pay to take shortcuts with qualitative work if the information is needed to explain social behavior.

The Timing of the Qualitative Component

The sequential use of qualitative and quantitative methods allows researchers to use information gathered in early phases of a research project to improve data collection during later phases. This is a cost-effective way to proceed. However, in some cases researchers may choose to use qualitative and quantitative methods simultaneously to collect data (Rao 1997; Axinn, Fricke, and Thornton 1991; Wolff and others 1993; Chung and others 1997). The literature indicates that at least two different approaches have been taken to using qualitative and quantitative methods simultaneously on the same project. In the first approach, qualitative and quantitative data are collected concurrently so that they can be used to cross-check one another while the project is still in the field—thus improving the quality of data produced by each of the two components. In the second approach, qualitative and quantitative data are collected separately but used jointly in analysis.

The best of these projects contain qualitative components that are as important as the quantitative component and that are well conceptualized and well supported. They take an in-depth approach to a specific topic and are not "quick and dirty" operations. For example, Axinn, Fricke, and Thornton (1991) conducted a "fully integrated" study in which information from the qualitative component was taken into account in the quantitative component as soon as it was gathered, and vice versa. The principal investigators lived on-site and conducted the qualitative work themselves. In addition, they reviewed the survey forms each night. By doing so they were able to cross-check the accuracy of the respondents' answers as well as the performance of the interviewers. They were also

able to add extra data collection components when necessary. For example, after the project had begun, it became clear from the qualitative data that it would be necessary to obtain information on some extra variables that had not originally been included in the survey. Gathering ethnographic and survey data at the same time meant that researchers could quickly remedy this; a small survey was designed to collect the essential information. A key requirement of this fully integrated study was that the researchers were present on the site throughout the fieldwork stage. As such, the authors state that this model is only practical on a limited scale and is best conducted one community at a time. However, they also state that for some topics the integrated approach can be used to supplement national-level surveys.

In contrast to this fully integrated approach, Wolff and others (1993) describe a method in which the qualitative and quantitative components are designed jointly but carried out separately. Neither component informs the other, but the two forms of data can be analyzed together. As in the fully integrated approach, both components are of equal importance to the overall study and are fielded simultaneously. However, all of the research questions are developed in advance. Wolff and colleagues used this method to study the effect of family size on socioeconomic well-being in Thailand. They designed a set of 12 focus group interviews to complement a large survey. The focus group participants were purposively selected from the survey sample, and the survey questions and focus group guidelines were designed to produce data on comparable issues. The advantage of this approach over the sequential model is that each component is planned in advance. Thus researchers can be sure that neither component influences the answers obtained from the other. This in turn strengthens the conclusions that can be reached from analysis of the data.

Both of these examples illustrate that fielding a qualitative component at the same time as a quantitative survey can improve the quality of the data produced by a survey project. However, using the simultaneous method is not without cost. For the approach to be successful, researchers must be well acquainted with the setting and have a clear sense of what data they need. If this is established at the outset of the study, researchers can plan the qualitative and quantitative components so that they usefully complement each other.

The breadth of topics covered by LSMS surveys makes it impractical to include a simultaneous qualitative component in each LSMS survey project. However, it may be desirable to design a simultaneous qualitative component for subject areas that are high priorities for policy research or areas for which an emic perspective may be of particular value. To design the component successfully researchers must be familiar with the context in which the data are collected and understand the effect that context may have on the issues under study. Without this knowledge it would be difficult for a researcher to devise a qualitative component that yields sufficiently detailed information to be a useful complement to the survey. In addition, simultaneous studies are logistically more difficult to execute than sequential ones because they require more supervision. In choosing between the simultaneous approach and the sequential one, researchers must base their decision on the project's objectives, budget, staffing, and time frame as well as their own familiarity with the site and topics in question.

Qualitative Methods and LSMS-Type Surveys

The qualitative techniques described in the previous sections could be used in the design, collection, or analysis stages of any of the questionnaire modules in Volume 3. For example, qualitative methods can be used to improve the modules by tailoring the language, codes, and content of questions to the circumstances in the country of the survey. In addition, good qualitative research can make any research question more meaningful. Finally, once the survey data have been analyzed, qualitative techniques provide a way to clarify inconclusive or counterintuitive analysis that is faster and less expensive than conducting a new survey.

How Much Qualitative Work Should Be Done?

Practicality is the main consideration when deciding how much qualitative work to perform. Although any study or survey module can be improved by the addition of qualitative work, there is always a limit to the amount of time and energy that researchers can devote to these activities. This chapter suggests that qualitative policy research is not a quick "back-of-the-envelope" enterprise. Instead, like good quantitative research, qualitative work requires careful thought and organization, as well as time and money. Therefore, researchers must identify the subject areas that will

benefit the most from complementary qualitative work (Stewart 1996).

As described above, qualitative and quantitative work can be used either sequentially or simultaneously; for most “multi-purpose” LSMS surveys the sequential method is the most practical alternative. Of the various uses of qualitative work—generating hypotheses, improving the design of survey questionnaires, and clarifying quantitative research findings—generating new hypotheses requires the least investment of time and money. Since this work is exploratory, researchers only have to think, listen, probe, and construct loose hypotheses about the phenomenon under studied. This effort usually involves a small research team, often the researcher, his or her in-country collaborators, and an interpreter. Since it is not necessary to have a large data collection team, the exercise can be relatively cheap to carry out. Preliminary qualitative work of this nature can indicate the need for data that researchers had not originally planned to collect—suggesting vital questions that should be explored or making clear the need to carry out a special purpose survey.

By contrast, qualitative research that aims to improve the design of survey questionnaires or clarify quantitative survey findings is likely to require more time and money than the kind of preliminary qualitative work described above. Since the cost of doing this for all LSMS modules would be prohibitively expensive, researchers must decide which modules would benefit most from complementary qualitative work. Researchers might choose subject areas that are of highest priority for policymaking or subject areas that have not previously been studied using qualitative methods. Stewart (1996) argues that it is most cost-effective to use qualitative methods to explore subject areas that have not previously been studied using qualitative methods. For example, it may be more useful to use qualitative methods to study severe obstetric complications than to use these methods to study contraceptive use, since contraceptive use has already been the subject of many qualitative inquiries.

Staffing

The researchers associated with the field studies cited in the fourth section of this paper all note the importance of finding investigators with specific talents rather than specific credentials. To be effective, field investigators must be patient, attentive listeners with

the ability to recognize information that is important to a study. They must be able to probe for answers, to record their findings in prose, and to expand their written notes proficiently in the native language of the researchers. Finally, they must be capable of detecting subtle nuances in the local language. Thus they must be highly proficient, if not fluent, in both the local language and the researchers’ native language. Because people are the most important “instrument” for collecting qualitative data, the job requirements for a qualitative field researcher are very different from those for a survey researcher. It should not be assumed that people who can collect good survey data can also collect good qualitative data.

Finding good qualitative field investigators is not an easy task. Since most of the country institutions that collaborate with the World Bank in fielding and analyzing LSMS surveys are unlikely to have a qualitative research unit, most researchers will have to train their own investigators. The mechanics of training are beyond the scope of this chapter. At minimum, researchers should be prepared to: provide field investigators with some instruction on the main concepts associated with the study topic (say, food security or reproductive morbidity); conduct exercises in the field to give the investigators experience with the methods used; allow the investigators to discuss their training candidly so they can learn from each other’s experiences; and select investigators based on their performance during the training program. (To allow such selectivity, researchers should train several candidates for each position that must be filled.)

While the field investigator plays a critical role during the data collection process, it is also important to have a resident supervisor who can cross-check and support the efforts of field investigators. Even trained qualitative field investigators need support in the field. The best person to provide this support is the person who will analyze and write up the qualitative work—ideally the researcher. However, in several past qualitative projects, the researcher has shared the responsibility for the qualitative portion of the project with a full-time counterpart from the country in which the data are being collected. The ideal counterpart is a local researcher who understands the methods, goals, and subject matter of the project as thoroughly as the researcher. In general, the greater the involvement of the researcher and counterpart in data collection, the higher the quality of the data gathered. The best situ-

ation is when either the researcher or the counterpart assumes the role of field supervisor.

Quality Control

Quantitative surveys rely on standardization to ensure that the quality of the data is high. Flexibility, however, is one of the hallmarks of qualitative data collection, and standardization will not necessarily improve its quality. In large multi-site, multi-investigator projects, some standardization may be desirable to ensure that data are comparable across sites and that investigators are pursuing the same goals. The following steps can be taken to ensure that the same issues are addressed at each site while still retaining some flexibility in the method of data collection.

First, employing a full-time counterpart in the country (as discussed above) substantially improves the quality of the data collected. Ideally this person should be experienced in collecting both survey and nonsurvey data and should have the experience and knowledge to conduct research in the area of interest to the researcher.¹⁰

Second, the LSMS researcher and the in-country counterpart should together devise a strategy for collecting qualitative data, training qualitative field investigators, and launching and supporting the qualitative component. A research protocol should be drafted that lists the topics to be addressed and the methods that will be used to collect the data. It should be made clear that this protocol can be changed during the fieldwork stage if necessary. However, all such changes should be fully documented by the researchers and field investigators.

Third, both the researcher and his or her in-country counterpart must be willing to spend significant time in the field to support the field investigators and check the quality of the information being collected. Both must be willing to read the written accounts collected by the field investigators and help each of the workers improve their performance in weak areas. The researcher and his or her counterpart may ask themselves: Does a field investigator know when to probe for details in an interview? Is his or her writing clear enough? Is there enough detail in his or her written accounts? Has he or she included any comments on the process of collecting information or any observations based on nonverbal clues?

Fourth, for data to be of high quality in large multi-site and multi-investigator projects, all documentation must be transparent. If documentation is a standard

responsibility of field investigators, these investigators will be more conscious of the decisions they have made. Furthermore, making documentation a standard responsibility of investigators sends the message that field workers must justify any procedural changes. In some circumstances it may be useful for researchers to provide investigators with checklists of essential data that must be recorded—for example, the criteria for choosing subjects, the gender composition of group interviews, or any changes made to the interview guides.

Finally, researchers could form data collection teams that would travel together to each site. Working in teams enables investigators to increase the standardization of their work while learning from each other's field experiences. Specifically, investigators could work together to: fine-tune any procedures that can be standardized; document standard procedures and agree how to document nonstandard ones; discuss findings; interpret the information that they have collected; and share practical information about the study site and how to accomplish their goals.

Collecting high-quality data is difficult in any field situation. Good planning and documentation help improve the qualitative data that are collected as part of a multi-site, multi-investigator project. It is also essential that both the researcher and his or her in-country counterpart are involved in data collection; there is no substitute for on-site supervision, nor is there any way to judge qualitative work except by examining its outputs. The level of commitment needed from the researcher and his or her counterpart means that it is best to limit the qualitative work in any given LSMS survey to a few carefully chosen topics.

Conclusions

This chapter takes the view that many different research paradigms are valid, although they are distinct and philosophically irreconcilable. The chapter also maintains that epistemological positions need not predetermine the choice of research method. Thus qualitative and quantitative techniques can be mixed according to the technical requirements of a research project.

Many researchers take this pragmatic approach and separate issues of epistemology from those of method (Reichart and Cook 1979; Firestone 1987; Bryman 1984; Abbas and Teddlie 1998). Gittelsohn (1995) suggests that it is useful to envision a continuum of all methods based on the degree of structure

inherent in each method. At one end of the continuum are very unstructured methods, which tend to produce data that are descriptive and textual. At the other end are highly structured methods, which produce data that are compact and often quantifiable. Between these two extremes are a large number of methods that mix qualitative characteristics with quantitative ones.

This methodological continuum reveals a large overlap between tools used by quantitative researchers and tools used by qualitative researchers. Researchers subscribing to an emancipatory paradigm can use surveys, while researchers with positivist inclinations can use qualitative methods to learn about the perceptions of local communities. The methodological differences described in the first three sections of this chapter define the endpoints of a technical continuum rather than a paradigmatic one.

Therefore, the use of a qualitative method should not preclude the use of a quantitative one. In fact, qualitative methods can complement quantitative methods quite effectively, as shown in the examples in this paper. Direct observation, informal interviews, focus group interviews, key informant interviews, and the various methods derived from participatory research can all be helpful during various stages of the research process.

Adding a qualitative dimension to a research plan can only strengthen the research outcome. When qualitative and quantitative surveys are conducted together, they can provide checks on each other's findings, countering errors in quantitative data or false impressions developed from an interview with a particularly charismatic, but perhaps exceptional, respondent.

However, qualitative methods often require considerable time and effort. These methods require the presence of trained researchers at the research site, since they cannot be entrusted to investigators who have been trained to administer a questionnaire but not necessarily to understand the research question. Yet this is also one of the great strengths of qualitative methods—that they force researchers to devote more attention to the problem they are studying and to be clearer about the meaning of their survey data.

Notes

The author gratefully acknowledges John Kerr, Kate Stewart, Nora Jacobson, Joel Gittelsohn, Karabi Bhattacharyya, Nicholas Townsend, Ellen Messer, Jayashree Ramakrishna, David Miller, and

Sara Scherr for engaging discussions on the science and art of qualitative research. The author also thanks Margaret Grosh, Paul Glewwe, Anthony Bebbington, and an anonymous reviewer for comments on earlier drafts.

1. For example, the constructivist or emancipatory paradigms. See Guba and Lincoln (1994) for a comparison of the dominant research paradigms.

2. Note that qualitative research does not preclude testing of predetermined hypotheses, for example those given by theory. There is considerable heterogeneity in the use of qualitative methods for research and some may use qualitative data in a more deductive framework.

3. For example, ethnography, grounded theory, phenomenology, case study and many others.

4. In practice, if a survey instrument has been thoroughly pretested, "other" responses are rare.

5. Internal validity refers to the credibility of a finding. High internal validity indicates that a finding is credible. Low internal validity indicates that a finding is not credible. By contrast, external validity refers to the extent that findings are generalizable to other settings.

6. Since interviews are often conducted in a respondent's second or third language, Ware (1977) maintains that language competence can greatly affect a respondent's ability to understand and respond to survey questions. She, therefore, suggests involving both native speakers and non-native speakers who are skillful at reading and speaking in the translation process. This increases the likelihood that the translated expressions will be universally understood.

7. Admittedly, not all stages of a project necessarily need to involve direct input from community members, particularly technical stages (such as the design of a dam or the details associated with restructuring a tax system). However, proponents of the participatory method argue that each project will be more successful and will receive more support from stakeholders if clients are involved in the design of the aspects of the project that affect their lives (Pretty 1995). When project managers receive input from the clients, this helps them to identify the incentive structure under which clients operate and the reasons why clients undertake certain activities.

8. All three of these techniques originated in areas other than participatory research; these areas include farming systems studies and community development work.

9. Salience in this case refers to a consensus about the symptoms of a given illness. Higher frequencies illustrate greater consensus about the symptoms associated with the illness.

10. For their first efforts with the qualitative approach, researchers might choose to follow the model of Jacobson (1993) and arrange to collaborate with an institution in the country that already has some expertise in qualitative data collection.

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26 Basic Economic Models and Econometric Tools

Jere R. Behrman and Raylynn Oliver

The primary purpose of LSMS and similar multitopic household surveys is to increase the quality and quantity of data available for describing living conditions and studying household behavior in developing countries. In particular, these surveys can be used to study the relationship between government policies and household welfare. The impact of government policies on household welfare will depend on how households react to those policies. Household surveys can be used to estimate such reactions and, more generally, to study household behavior. But attaining these goals is not a simple task.

Ideally, analysts of household behavior would design experiments that would allow them to make associations between observed household behavior and observed determinants of that behavior (such as government policies). Experiments that are well designed and well executed would reveal any underlying causality (Deaton 1995). However, implementing controlled experiments in developing countries usually involves high costs, ethical issues, and practical difficulties.

Therefore, most analysis of household behavior in developing countries has been and will continue to be based on behavioral data collected in censuses and household surveys such as LSMS surveys. These data allow analysts to compile simple summary statistics that are useful for answering certain questions such as “What is the distribution of income?” and “How many households are poor?” In addition, cross-tabulations can be computed that reveal associations between household characteristics and behaviors and the determinants of such characteristics and behaviors (including government policies). These associations can be used to address questions such as “Which households are below the

poverty line?” and “How effectively are various social sector programs targeted toward low-income groups?” However, these associations generally do not reveal causation, because the outcomes observed in data from LSMS and other multitopic surveys reflect household decisions that are made in light of many different factors, some of which are not observed by analysts or policymakers.¹ Thus simply looking at associations among observed variables is not sufficient for analyzing the determinants of household behavior, including the role of government policies and the impact of household behavior on other variables. Such analysis requires a much more systematic approach.

Taking a more systematic approach implies that analysts must “model” household behavior. A model provides an analytical framework for exploring various dimensions of behavior in a systematic way. The model used by an analyst dictates the kinds of data that need to be collected, the estimation issues that should be addressed, and the assumptions that must be made when interpreting estimates. The model also provides guidance on which observable variables should be

included in the analysis to control for unobservable variables that are likely to affect both household and government behavior, and to measure the extent to which unobserved variables affect the estimates. However, far too often the models used in data analysis are not presented explicitly. To analyze household behavior accurately an approach is needed that carefully integrates data, modeling, and estimation. In other words, estimation and interpretation must be tied closely to an explicit model and to the data that are used, exploiting the data's strengths and acknowledging their limitations. A particularly serious limitation in most data sets is that they do not contain some of the variables that are included in the model.

The objective of this chapter is to provide an accessible review of the models used by economists to study household behavior and evaluate government policies as well as the implications these models have for estimating associations and causal relationships using data from LSMS-type surveys. Making this review accessible to readers with little or no background in economics or econometrics is challenging because modeling and estimation issues are often complicated, and because the issues involved tend to be specific to particular types of household behavior and government policies. To keep the chapter from becoming too lengthy, advanced topics such as recent innovations in behavioral models and econometric procedures are not covered, though some references are provided for interested readers.

Economists whose skills are up to date need not read this chapter. Instead, the audience for this chapter is economists whose skills have become rusty and noneconomists who are likely to design LSMS-type surveys or use their data. In order to reach as wide an audience as possible, the chapter uses general language and explains technical terms when necessary. It also avoids using mathematical expressions in the text, with the sole exception of a few linear relations in the second section. Finally, to make the chapter more accessible to noneconomists, a glossary of the most commonly used econometric terms appears at the end of the chapter, and a mathematical summary of some aspects of household modeling is presented in Appendix 26.1.

Some Basic Economic Models for Analyzing Household Behavior and Evaluating Policies

Simple economic models of household behavior help data analysts use LSMS-type surveys to examine

household behavior and how this behavior responds to various external changes such as changes in markets and in government policies. These models also help analysts explore such phenomena as the possible causes of inequalities in the distribution of income and of other socioeconomic outcomes across households and individuals.

Economic models typically assume that households maximize their welfare—that they try to attain as much satisfaction or welfare as possible given constraints such as their budget, their time, and their information. The budget constraint consists of the prices a household faces and the resources that it commands. Prices include the cost of goods in the market and the costs to the household, in time and money, of using social services. A household's resources may belong to individual household members (innate ability, education, health, time), to the whole household (land, housing, water supply, connections with other households), or to the community (availability and quality of schools and health facilities, markets for goods and services, general levels of health and education).

These models assume that households select the amount and types of goods and services that they purchase and produce, and allocate the time and assets of household members in a way that brings them as much satisfaction or welfare as possible given their existing constraints. A household's demand for goods and services and the way that it allocates its time can then be expressed in the model as a relationship (function) between the goods and services the household demands (or the time it allocates) and the prices that the household faces, its resources (including access to production technologies), and its preferences for the consumption of goods, services and leisure time. By estimating how these factors affect household demand, analysts can determine the potential impact of various government policies on household behavior.

The subsection to follow presents the simplest one-period model of household behavior. In the second subsection this model is extended in various respects. The third subsection discusses simple models that cover more than one period of time. The fourth subsection deals with the basic motives behind public policy and the determinants of this policy.

A Basic One-Period Household Demand Model

The simplest model of household behavior has the basic features necessary to make inferences that have

significant implications for policy. In this model, households have an objective function (an indicator of the level of welfare a household obtains when it consumes different bundles of goods and services) that they maximize subject to a budget constraint (the amount of resources the household has) and to market prices.

HOUSEHOLD OBJECTIVE FUNCTION. Economists almost always assume that households act to maximize their level of welfare. The household objective function shows the level of welfare that a household obtains for different combinations of goods and services that it could consume. One characteristic of the household objective function is that many different combinations of goods and services can provide the household with the same level of welfare. For example, suppose a household's welfare depends only on food and clothing. If a household's welfare decreases because the amount of food it consumes declines, one way to restore its initial level of welfare is for it to consume more clothing. Another characteristic of the household objective function is that more is better than less. Using the same example, for any level of food, more clothing increases welfare and less clothing decreases welfare, and the same is true for increases and decreases in food for any given level of clothing.

Government policies can affect a household's objective function both directly and indirectly. For example, the household objective function depends directly on food, the availability of which may be affected by government trade, food rationing, and agricultural policies. Households' consumption of food may also be indirectly affected by government policies. An example of this is government wage policies, which do not enter directly into a household's objective function but affect welfare by influencing the amount of resources that the household has to purchase food and other goods.

HOUSEHOLD RESOURCE CONSTRAINT. The amount of clothing and food households actually consume is limited by the resources that households have and the prices they face. Both of these factors are summarized in the household resource constraint, which states that the total value of the goods and services consumed by a given household cannot exceed the total value of the household's resources. In the simplest model a household's resource constraint is that its income must equal

or exceed the total amount it spends on goods and services at market prices. In practice, a household's resources consist of physical, financial, and human resources (including time), as well as resources received through public transfer and tax systems or through private transfers. The highest level of welfare that a household can obtain with a given level of resources depends critically on the prices that it must pay for goods and services. In more general models, these prices include not only monetary prices but also the cost of people's time; this is explained further in the next subsection.

A simple example of a household resource constraint illustrates this basic concept. If food costs \$1 per unit, clothing costs \$5 per item, and a household's income is \$20, the household can consume, for example: 20 units of food; 15 units of food and 1 unit of clothing; 10 units of food and 2 units of clothing; 5 units of food and 3 units of clothing; or 4 units of clothing. All of these combinations satisfy the household resource constraint. If the price of either food or clothing increases, this reduces the amounts of these goods that the household can consume. Alternatively, even if prices do not change, a decrease in the household's income reduces the quantities of one or both goods that the household can consume. To understand the impact of market changes and policy changes on household behavior, it is critical to know the extent to which a household modifies its behavior in response to price and income changes.

CONSTRAINED MAXIMIZATION OF THE HOUSEHOLD OBJECTIVE FUNCTION. Economists generally assume that households act as if they are trying to obtain as high a level of welfare as possible. Households prefer to have a high rather than a low level of welfare, but resource constraints limit the choices available to them. Under this assumption, a household can obtain the maximum level of welfare possible given its resource constraint if it chooses its consumption bundle so that the additional ("marginal") welfare generated by the last dollar spent on each good is equal across all goods. If this were not the case, a household could increase its welfare level by reducing consumption of a good that has a relatively low marginal welfare for the last dollar spent on it and increasing consumption of a good that has a higher marginal welfare for the last dollar spent.

Government taxes and subsidies can change the prices households face when making consumption

decisions. If different goods are subject to taxes or subsidies at different rates, households will generally favor goods with lower taxes or larger subsidies. Taxes reduce the level of welfare that households can obtain by effectively tightening the resource constraint, whereas subsidies increase households' welfare by relaxing the resource constraint.

DEMAND FUNCTIONS AND ELASTICITIES. A demand function is a relationship in which the quantity of a good demanded (purchased) by a household is a function of the price of that good, the price of all other goods, and the household's resources. Because the prices of all goods affect the demand for each good, the demand function for each good depends on the same variables (all prices plus the household's resources). Demand functions are probably the most common relations estimated by analysts to measure the causal effects of markets, household resources, and policies on household behavior. In general, an increase in the price of a good reduces the quantity demanded of that good, all other factors (prices and household resources) being equal.

So how much does the demand for a good change for a given change in its price? The standard summary measure of this kind of change in demand is the own-price elasticity of demand. The formal definition of own-price elasticity of demand is the percentage change in the quantity demanded of a good divided by the percentage change in its price. This measures how much the quantity demanded of the good changes because its price has changed. The sign of the elasticity indicates whether demand for the good has changed in the same (+) or opposite (-) direction as the change in the price. The absolute magnitude of the elasticity indicates how much the quantity demanded changes in response to the price change. If there is no response (in other words, the quantity demanded has not changed), the elasticity of demand is 0 and the demand for that good is described by analysts as "completely inelastic." If the quantity demanded declines but the percentage decline is smaller than the percentage decline in the price, the absolute value of the elasticity is between 0 and 1, which means that demand is "inelastic." If the percentage change in the quantity demanded is the same as the percentage change in price, then the absolute value of the elasticity is 1 and demand is said to have "unitary elasticity." Finally, if the percentage decline in the quantity demanded is more

than the percentage change in the price, the absolute value of the elasticity is greater than 1 and demand is said to be "elastic." Thus the elasticity shows how the quantity demanded responds in direction and degree to changes in price.

The degree to which a household's demand for goods and services changes in response to changes in the household's income is also of considerable interest to analysts and policymakers. The standard summary measure is the elasticity of demand with respect to income, usually referred to as the income elasticity. In this case there is an important distinction between inelastic (less than 1) and elastic (greater than 1) demand, with unitary elasticity (equal to 1) the borderline between these two. If the demand for a good has unitary income elasticity, a doubling of a household's income will result in a doubling of the quantity demanded. In the case of demand that is inelastic with respect to income, a doubling of the household's income will increase the quantity demanded by less than double. If demand is income elastic, then a doubling of the household's income will more than double the quantity demanded.

A percentage change in the quantity demanded for one good with respect to a percentage change in the price of another good is called the cross-price elasticity of demand. An example is the change in a household's demand for clothing in response to a change in the price of food (holding constant the price of clothing and the household's resources). In general, with more than two goods, cross-price elasticities can be either positive or negative. A positive cross-price elasticity of demand indicates that the two goods are substitutes, such as tea and coffee. In this case, an increase in the price of coffee would increase the consumption of tea, as households "substitute" tea for coffee. A negative cross-price elasticity of demand indicates that two goods are complements, such as tea and sugar (in countries where sugar is almost always added to tea). Such cross-effects can be important, and ignoring them can result in social programs having what Rosenzweig and Wolpin (1982) aptly call "unanticipated consequences," which can occur when a policy change directed at one aspect of household behavior has an impact on other aspects of household behavior. For example, using household survey data Rosenzweig and Wolpin (1982) found that improving water sources not only improves the health of household members but also reduces the number of children that households decide to have.

An important implication of this model of household behavior is that a household may change all of its behavior in response to a change in any one price or any one of its resources. The wide range of data collected in LSMS and similar multitopic surveys makes it possible for analysts to study a variety of cross-effects due to any given policy or market change. However, this can only be done in surveys that include a price questionnaire (which is described in detail in Chapter 13). For studying cross-effects, it is also important that surveys gather data on households' time costs, the quality of public services, private transfers, and households' financial, physical, and human assets.

Some Simple Extensions to the Basic One-Period Household Model

The basic model presented in the previous subsection is sufficient for illustrating the central features and implications of constrained maximization of household welfare. However, the model can be made more useful by extending it in several ways. Most analysts who are likely to use LSMS-type data need a model that explicitly includes the way in which household members use their time, including time spent working on household farms and businesses. For some analytical purposes it is also important to understand intra-household allocations; which household members obtain goods and services and which members control the household's resources can have important policy implications. Finally, it may be useful to model the factors that cause households to form and to dissolve.

INCORPORATING TIME. Data analysts may wish to incorporate the time use of household members into a household model for three reasons. First, how households allocate their time is often of interest to policymakers. The number of hours household members spend at work, caring for their children, or attending school can have an impact on both current and future household welfare, and such time allocation decisions are often affected by government policies. (See Chapter 22 for a thorough discussion of how to collect data on time use.)

Second, time may be a significant component in the total cost of a good. For example, the cost of the time spent by household members in traveling to health clinics and waiting for health care services is often an important price that households face, one that affects their demand for health care.

Third, time is an important resource available to households for producing income and welfare. Thus analysts should estimate the "full income" of each household, including the total value of their members' time. (See Chapter 17 for advice on how and when to collect income data.) The income variable used to estimate the demand function should include only elements of income that do not reflect time allocation choices in the model, because such time allocations are choices made by the household, not predetermined constraints on household behavior. In particular, income from wages, salaries, and family businesses should not be used to describe a household's available resources because such income reflects current choices about time allocation. Instead, the "full income" measure mentioned above or only the part of nonlabor income that does not reflect past time choices should be used.²

HOUSEHOLD PRODUCTION FUNCTIONS. The basic one-period household model assumes that households purchase in markets all of the goods that they consume. However, households in developing countries often produce agricultural goods or other items at home, some of which they may consume. Household production functions describe how households combine inputs to produce outputs. For example, agricultural production functions describe how households combine inputs such as land, fertilizers, pesticides, and seeds with their labor to produce crops and livestock. Nonagricultural household businesses have production functions in which the inputs are labor, raw materials, and capital equipment, and the outputs may be light manufacturing goods or commercial services.

Economists often use production functions to study the way individual, household, and community inputs are combined to produce health and education outcomes. Health production functions show how outcomes such as the health, morbidity, and mortality of household members depend on: individual inputs such as a person's consumption of nutrients, use of health care, and inherited traits (often referred to as genetic endowment); household inputs such as the quality of the household's water supply and the education levels of the adult household members; and community variables such as the availability of health services, the climate, and the environment. There are also education production functions, which show how the amount of time that a child spends in school, his

or her nutrition, the education level of other household members, and the quality of teachers and schools affect such educational outcomes as the child's acquisition of cognitive skills (such as literacy and mathematics skills).

Production functions are similar to household objective (welfare) functions in some important respects. A given level of output can be achieved with several different combinations of inputs. At any level of output, if the amount of one input is decreased then another input must be increased to maintain the same level of output. The household's maximization of production for a given resource constraint is parallel to the constrained maximization of the household objective function in the simple household model. The household's demand for inputs used in productive activities will depend on input prices and the household's resource constraint; this yields demand curves similar to those yielded by the simple household model. However, one characteristic of production functions, returns to scale, has no counterpart in household objective functions. If output increases by z percent when the amount of each input is increased by z percent, the production technology is said to have constant returns to scale. If output increases by more than z percent, there are increasing returns to scale, and if output increases by less than z percent, there are decreasing returns to scale.

In many cases, households produce goods that are bought and sold in the market at the same price. For example, a household that produces eggs at a particular point of time can either sell them in the market at the current price or consume them, paying the same price to purchase any additional eggs for consumption. However, this is not always the case. The selling price of a good may differ from the purchase price due to transaction costs experienced by farmers and traders or due to government subsidies or taxes. Furthermore, there is no market at all for many "home-produced" commodities such as health and education. When estimating household production functions analysts must take into account the existence of markets and the distinction between the purchase and sale prices of goods that households produce.

A final aspect of production functions that has implications for analysis is the possibility that households' production decisions can be modeled independently of their consumption decisions. If markets exist and there are fixed market prices for all relevant

products, households' consumption decisions should not affect their decisions about their production activities, and households' decisions about their production activities should affect their consumption decisions only to the extent that the production activities contribute to the total level of household resources (Singh, Squire, and Strauss 1986). If there is no market for some goods, or the selling and purchasing prices are not equal to each other, households cannot separate their consumption and production decisions when maximizing their welfare. This implies that the demand functions for the goods and services that households consume must include not only the prices of those goods and services but also the prices of all inputs that households use (and all outputs that households produce) in their production activities. It also implies that household resources appearing in the demand function must include productive resources such as all farmland and machinery owned.

INTRAHOUSEHOLD ALLOCATIONS OF RESOURCES. The simple model presented above can also be extended to explore whether consumption and resources are distributed equally among household members and whether there is discrimination within the household against girls, women, the elderly, young children, or others. These issues are discussed in detail in Chapter 24. The simple model presented above assumes that the preferences of an entire household can be represented in a single objective function. This would be the case if a household had only one member, if everyone in the household had the same preferences, or if a single individual made all of the decisions for everyone in the household. However, most households consist of several individuals who bargain with each other over the allocation of the household's resources. The bargaining power of each household member depends on the amount of resources he or she controls and the options available to him or her outside of the household. Analysts should take these factors into account when studying household behavior. For example, if mothers care more than other household members do about investing in their children's health or education, the portion of household resources controlled by mothers will influence these kinds of investments. This means that when estimating demand functions for children's health and education outcomes analysts should disaggregate total household income into the income of mothers and the income of fathers. On the

other hand, there is some controversy regarding whether these associations reflect causality or whether they reflect the fact that it is impossible to control for unobserved preferences and capabilities (as discussed further in the second section of this chapter).

Intrahousehold issues often lead to the question of how households are formed. The basic model not only assumes that the preferences of a household can be represented in a single objective function, but also takes the definition and existence of a household as given. Extending the basic model to explore the formation and dissolution of households and the importance of the bargaining power of various household members in decisionmaking is at the frontier of current research. Such extensions of the basic model can be done best with repeated data collection from the same individuals over time. (See Chapter 23 for advice on collecting such panel data.) However, some understanding may also be obtained from recall data on, for example, family background and assets that individuals had at the time of their marriage.

Incorporating Multiple Time Periods and Uncertainty

The basic model and the extensions discussed so far have considered household behavior at one point in time. However, many policy issues, such as uncertainty and saving, cannot be analyzed using a model with only one time period. This section considers models that have more than one period of time. For most analytical purposes two time periods are sufficient. While many aspects of the one time period model are retained in simple models that cover multiple periods, there are some important differences. For example, households no longer need to spend all of their income in each period, which implies that savings, borrowing, and other means of transferring resources over time must be modeled. (See the discussions of these issues in Chapters 20 and 21.)

CONSUMPTION DECISIONS OVER TIME. Consider a model that deals with consumption decisions over just two time periods. The household objective function depends on two goods, consumption in the first period, and consumption in the second period. A given level of income is received in each period. Households are able to borrow or save in the first period at a fixed interest rate (r), but they must pay all interest and principal on any loan in the second period. The intertemporal resource constraint implicit in these assumptions

is that, for households that consumed less than their total income in the first period, their consumption during the second period equals their income for the second period, plus $(1 + r)$ times the amount that they saved in the first period (because in the second period their income is supplemented by the amount that they saved in the first period plus the interest r on the amount saved).

If the household cannot borrow or save to transfer its resources across time periods, its level of welfare is fixed at the level obtained by consuming all of its first-period income during the first period and all its second-period income during the second period. If the household can borrow or save money, it is possible that adjusting its consumption in each time period will increase its overall welfare (that is, its welfare measured over both periods of time). Intuitively, the household can often reach a higher level of welfare with the same flow of income if it can transfer its resources over time because this enables it to smooth out any income fluctuations over time. For example, a household's overall welfare is higher over a two-day period if it consumes two bowls of rice per person each day than if it consumes one bowl on one day and three bowls the next day.

An important implication of the intertemporal model for data analysis is that demand functions must be modified to incorporate the household's income flow and the interest rate (rather than just the household's income at one point in time). Of course, most cross-sectional surveys, including most LSMS surveys, collect data on income for only the past year, but data on expenditures are always collected in LSMS surveys, and if households can smooth their income by transferring resources over time, their expenditures during one year are likely to better represent their long-run intertemporal income constraint than would their income during just one year (see Chapter 17 for further discussion).

If a household makes investments in the first period, it forgoes current consumption to increase future consumption. A particularly important investment that households make is in the human capital of their members, in the form of formal education, on-the-job training, and other investments that parents make in the health, schooling, and well-being of themselves and their children. The variables included in the demand functions for human capital investment are discussed in Chapter 7 on education and Chapter 8 on health.

UNCERTAINTY AND INSURANCE. The discussion up to this point has ignored the impact of uncertainty on households' decisions. Many households in developing countries are subject to substantial shocks from weather, price fluctuations and illness, and thus face considerable uncertainty about the future. One way households try to deal with these unexpected events is to smooth their consumption as much as possible, as discussed in the previous subsection. Another possibility is for households to insure themselves against such shocks.

Insurance permits households to set up several "contingent" consumption alternatives depending on the outcome of uncertain events (for example, "good" weather or "bad" weather). The simple intertemporal model of household behavior can incorporate this possibility. Consider a two-period model in which a household is faced with two mutually exclusive possibilities in the second period: a "good" state in which its income will be high and a "bad" state in which its income will be low. Without insurance or opportunities to save or borrow, its consumption will be equal to its income in each period. If the household can purchase K dollars of insurance in the first period with an insurance premium (price) of g , the price of the potential consumption in the good state that the household gives up to subsidize its consumption should the bad state occur is $g/(1-g)$ (as explained in the appendix). The household's objective function can be maximized subject to the resource constraints to find the optimal amount of insurance that the household should purchase. This is the amount of insurance for which the marginal benefit of the household's consumption in the bad state equals the marginal cost of the consumption that it forfeited in the good state. Thus the opportunity to buy insurance increases the household's welfare if the marginal benefits of its consumption in the two states are not equal.

Formal insurance markets are very limited in most developing countries. If income shocks cannot be anticipated and if households have no mechanisms for smoothing their income over time or insuring themselves against bad future outcomes, household behavior is likely to be affected. Therefore, data analysts and policymakers need to know what other mechanisms households use to cope with such shocks. Recent studies of these coping mechanisms have shown that households can pool risks through marriage, migration, transfers within extended families, altering

amounts of livestock, changing food intakes, and allocating time differently, as well as using formal savings institutions (Deaton 1997; Rosenzweig 1988).

Policy Objectives and Policy Choices

The discussion so far has provided a brief review of basic economic models of household and individual behavior. Before turning to the implications of these models for data analysis, it is useful to discuss briefly how policies should be chosen and how they are actually chosen. Economic theory provides two justifications for governments to intervene in the economy: reducing economic inefficiency and promoting a more equitable distribution of resources. However, all government policies impose costs on the economy, either directly by consuming resources or indirectly by creating distortions and inefficiencies in the economy. Therefore, for each proposed policy intervention governments should weigh the likely costs involved, both direct and indirect, against the likely benefits. Both economic theory and policy experience suggest that policies affecting only prices, such as taxes or subsidies, are less likely to introduce serious distortions and inefficiencies than more direct interventions in economic activities, such as rationing and import quotas.

ECONOMIC INEFFICIENCY. An economic situation is inefficient if some people could be made better off without making someone else worse off. Economic theory shows that market economies yield efficient outcomes if three conditions are met: prices reflect the complete marginal social costs of goods and services, markets exist for all goods and services, and all households (and firms) maximize their objective functions and thus behave efficiently given the prices and other constraints that they face. However, in the real world these conditions often do not hold, which means that there are economic inefficiencies. A common example is pollution. Clean air is a (public) good for which there is no market. Individuals may pollute the air in many ways. For example, burning garbage is often the cheapest way of disposing of it. Yet what is most convenient for the individual may be bad for society as a whole. Polluting the air imposes a social cost because dirty air can endanger the health of others.

A less obvious example is that some forms of knowledge are transferred outside of markets. For example, farmers learn to use new technologies, such as "Green Revolution" hybrid seeds, not only from

their own experiences but also from observing the experiences of others. Better educated farmers usually learn more rapidly from their own experience and thus tend to adopt new technologies more rapidly and effectively than less educated farmers. However, their experience benefits their less educated neighbors, which means that the benefits of an individual farmer's schooling go beyond the private gain to that farmer and include gains to neighboring farmers (Foster and Rosenzweig 1995, 1996).

Inefficiencies can stem from failures in the market or failures in government policies. Market failures include pollution and exposure to contagious diseases, both of which spread outside of markets. Market failures can also occur if firms charge consumers more than the marginal costs of production for their output, perhaps because they have a monopoly in the market. As discussed above, the lack of insurance or credit markets can also lead to inefficient outcomes—and thus represents another form of market failure. Policy failures can include import taxes that cause domestic prices to diverge from international prices, rationing that limits consumers' choices, price and wage ceilings and floors, and the provision of goods or services at prices lower than their social marginal costs.

Well-designed government policies can reduce the inefficiencies brought about by market failures, and can also help avoid policy failures. A thorough discussion of the design of government policies is beyond the scope of this chapter; for a good recent reference see Behrman and Knowles (1998) as well as the topic-specific chapters in this book. However, an important point for survey designers to keep in mind is that data analysts need detailed household-level survey data on markets and policies to measure the extent of market and policy failures and to design policies that will reduce these failures. For example, if the data show that households produce certain goods and services only for their own consumption and neither purchase nor sell anything on the market, this may suggest an absence of markets for those goods and services. Another example is that data on how households cope with the absence of insurance and credit markets provide analysts with further information that may be useful in assessing the negative consequences of such market failures.

DISTRIBUTION. The second key justification for government intervention in the economy is a desire to

change the distribution of resources among the population. For example, many societies believe that the government should ensure that all households have access to basic goods and services such as education and health care. Distribution is distinct from efficiency; a very efficient society may have a very unequal distribution of resources, while a very inefficient society may have equitable distribution of resources. Policies prompted by concerns about inequitable distribution of resources can have costs and distortions just like policies motivated by concerns about efficiency. Therefore, when policymakers consider an intervention to mitigate distributional inequalities, they should check for any efficiency costs or distortions that may be caused by the policy.

HOW POLICIES ARE CHOSEN. Government policies are generally made by individuals or groups of individuals within the government. These individuals and groups have various objectives in mind, often in response to pressures from groups and constituencies outside of the government. To evaluate the impact of government policies on household behavior, data analysts need to be aware that government policies themselves are behavioral decisions. Analyses that do not control for the determinants of government policies may either overestimate or underestimate the effectiveness of those policies.³

This point can be illustrated by a particular example, an evaluation of the impact of health clinics on child health using cross-sectional data from a number of communities. Analysts may overestimate the impact of health clinics on child health if a disproportionate share of the resources devoted to health clinics is concentrated in communities that have a relatively high amount of political power, and if political power can improve child health in other ways, such as through provision of greater wealth and better water. In contrast, analysts could also underestimate the effect of resources on child health if health resources are allocated disproportionately to communities that have unhealthy environments and high rates of poverty (and in most cases the greatest need for health services); unless they control for the resource allocation process, data analysts are likely to understate the effect that clinics have on improving child health. Thus it is important for analysts to try to understand how the government allocates resources and what underlies such allocations, as well as to measure the impact of

these allocations. For a more detailed discussion of this point see Chapter 23 on panel data.

Econometric Tools for Policy Evaluation Using Household Survey Data

As noted in the introduction to this chapter, analysts can use household survey data, such as those collected in LSMS and other multitopic household surveys, in two different ways to evaluate existing and proposed policies.

First, they can use the data simply to describe the existing situation. Policymakers often find this kind of analysis very useful because they need an accurate understanding of the current situation to judge the effectiveness of existing policies and to design better policies for the future. Examples of descriptive “facts” are the distribution of household incomes, the proportion of households below the poverty line, the characteristics of households below the poverty line, the income and other characteristics of households that benefit from specific social policies, the extent to which programs supposedly designed to help disadvantaged groups actually reach their intended beneficiaries, and the relative benefits of human capital investments for women and men.

Second, analysts can use LSMS-type data to estimate the causal effects of policies. Such estimates attempt to determine: what characteristics of schools lead to increased enrollment, attendance, and learning; what characteristics of health clinics lead to more use of health clinics and better health outcomes; whether private providers of health and education do a better job of providing these services than do public providers; whether income transfer programs lead to better nutrition and health and more investment in education; whether the benefits from programs targeted towards particular types of people (for example, infants, girls, or the elderly) are redistributed toward other household members; whether credit and insurance market imperfections limit human resource investments; and to what extent the provision of government benefits to households reduces (or “crowds out”) private transfers from other households.

Modeling is necessary for estimating causal relations. Modeling also influences which descriptions are relevant and which empirical measures best capture the essence of a concept. For example, if there is interest in describing on a general level the relationship

between income and school success, the question of how best to represent “income” and “school success” quickly arises. “Income” may refer: to wages and salaries, wages and salaries plus the imputed value of leisure time, the gross value of agricultural output or of products of other businesses, the value of agricultural output or the products of businesses after subtracting the costs of inputs, imputed rents on owner-occupied housing, transfers received from other households or from public institutions, returns on physical and financial properties owned, or some combination of several of these and perhaps of other types of income. The relevant concept of “income” may refer to an agricultural season, a calendar year, or much longer periods of time, depending on the opportunities for transferring resources over time. As discussed above, it may also depend on who receives the income and thus has the most control over its expenditure. Thus there are many different concepts of “income”; the same is true of “school success.” Explicit models of the phenomena of interest can provide substantial guidance concerning which of these empirical measures are most relevant, even for the purpose of merely describing the association between “income” and “school success” (as opposed to estimating the causal effect of income on school success).

This section focuses on the estimation of causal relationships, a complex and difficult task. The section begins by discussing the different types of relations that analysts use to estimate causal relationships. It then presents several estimation problems that frequently occur in attempts to estimate causal relations. The section concludes with a discussion of some possible ways to resolve these problems.

Types of Causal Relations

As discussed in the first section, economists generally assume that households maximize their objective function subject to their resource constraints and the production functions (how inputs can be combined to produce outputs) they can use. This constrained maximization of the objective function leads to demand functions that show how the demand for goods and services depends on households’ resources and the prices that they face. The precise shape of these demand functions will depend on the nature of the household’s objective function and the nature of all relevant production functions. Household resources include all income-generating physical, financial, and

human assets—some that may reflect past investments and others, like inherited traits, that may be independent of the behavior being studied. Prices include market prices as well as the financial and time costs incurred by the household in gaining access to public and private goods and services.

The most common ways of investigating the determinants of household behavior are to estimate: the direct underlying structural relations that determine behavior (for example, the production function for rice or wheat); and demand functions, which show the impact of prices, resources, and other factors on household behavior or on the demand for the inputs used in the production process. For both of these general types of relations, the level of production, or the amount of the good or service being demanded, is typically written on the left side of an equal sign and is referred to as the left-side variable or the dependent variable. On the right side of the equal sign are the determinants, which may be quite numerous. These include all the variables that come from the models discussed in the first section (for example, prices and income for demand relations), each of which has a coefficient to represent the causal impact of the right-side variable on the left-side outcome of interest. On the right side there is also a random (stochastic) disturbance term that represents chance events (such as fluctuations in the weather or in the disease environment) that are not observed by analysts and that, ideally, are not correlated with the observed right-side variables. To understand the magnitude of causal effects, it is desirable to obtain “good” estimates of the coefficients—estimates that represent only the true impact of the variables for which they are coefficients and not the effects of some other variables.

An important distinction to make regarding the right-side variables is the distinction between “endogenous” and “exogenous” variables. Endogenous variables are variables that the household can control, at least to some extent. Examples of endogenous variables are the amount of fertilizer and other inputs (including the labor of household members) used in the production of a crop such as rice or wheat. Exogenous variables are variables over which the household has no control, such as rainfall and, in most cases, prices. Structural relations almost always include some endogenous variables, while many demand functions include only exogenous variables. In gener-

al, endogenous variables make it more difficult to obtain good estimates than do exogenous variables.

STRUCTURAL RELATIONS. Structural relations are the relations that underlie the models of household behavior described in the first section of this chapter. The structural relations that are most often estimated are production functions. A production function is a technological relation that has on the left side the amount of the good, such as rice or wheat, that is produced by different combinations of right-side inputs, such as seeds, fertilizer, herbicides, rainfall, and agricultural labor of different types.⁴ A linear approximation of a general production function of the type discussed in the first section is presented in equation 1.⁵ The variable on the left side of the equation, Q , represents the output from a household’s production activities, while the right side of the equation represents three sets of variables corresponding to individual (X_I), household (X_H), and community (X_C) inputs, plus an explicit random disturbance term (U):

$$(1) \quad Q = a_I X_I + a_H X_H + a_C X_C + U.$$

Equation 1 shows the amount of Q produced by a household’s productive activities for different amounts of each input. The terms a_I , a_H , a_C are coefficients of the respective input variables, representing the causal effects of individual, household, and community inputs. The task of the analyst is to estimate these coefficients. The random disturbance term, U , captures random effects that are not otherwise represented by the right-side variables—for example, weather fluctuations or chance outbreaks of crop diseases.

A concrete example of equation 1 should make this relationship easier to understand. Consider the production of rice. The amount of rice produced is represented by Q , while X_I represents labor inputs for different types of family members, such as the amounts of male labor, female labor, and child labor. Inputs that are at the household level, X_H , include the amount of fertilizer used, the amount of seeds used, and so on, while rainfall is a community variable (because it is the same, or almost the same, for all households in a given community). Finally, U includes random crop diseases and weather conditions other than rain, both of which are difficult to predict and difficult to observe.

Generally, each of the three types of right-side variables in equation 1 may represent a whole set of

variables. It is useful for purposes of this chapter to distinguish four different subgroups of variables for each type. Superscripts *o* and *u* denote “observed in the data used” and “unobserved in the data used.” The superscript *n* refers to variables that are endogenous (influenced by the household’s choices) in the chosen model, and the superscript *x* refers to variables that are exogenous (beyond the household’s control) within the model used. With these distinctions, the variable list in the general production function relation can be expanded to $X_I^{on}, X_I^{un}, X_I^{ox}, X_I^{ux}, X_H^{on}, X_H^{un}, X_H^{ox}, X_H^{ux}, X_C^{on}, X_C^{un}, X_C^{ox}, X_C^{ux}$, and *U*. If these were substituted into equation 1, each would have its own coefficient *a* to indicate its impact on *Q*. The distinctions among these different variables are important because some of the most important and pervasive estimation problems arise from unobserved or endogenous right-side variables.

Table 26.1 considers a production function for rice and illustrates how variables from a typical LSMS-type household survey might fall into these different categories. At the individual level, time spent by different household members on tasks such as planting, weeding, and harvesting is part of people’s behavior and easily observed, while the age and sex of these individuals are observed but cannot be altered. The effort each household member expends on those tasks is also under their control but is less easily observed, and their innate ability in farming is unobserved and beyond their control. At the household level, the inputs used (fertilizer, seeds, and so on) can be observed and reflect the household’s choices, while certain characteristics of

the land (the slope or the soil type) cannot be influenced by the household although they can be observed. In contrast, certain characteristics of the agricultural equipment (such as the working condition of a tool or piece of machinery) are under the control of the household but difficult to observe, while some aspects of soil quality may be beyond the household’s control and difficult to observe. Finally, at the community level some conditions, such as the condition of communal irrigation ditches, can be observed and are under the community’s control, while rainfall is a community-level variable that can be observed but not altered. It is hard to imagine a difficult-to-observe community variable that is behavioral; the prevalence of certain crop diseases is a set of community variables that cannot be observed and is beyond the control of the community.

Exactly which variables fall into which categories in any particular case will depend both on the underlying model of behavior (which determines what is endogenous and what is exogenous within a model⁶) and on the variables available in the particular data set used (which imposes assumptions about what is observed and what is unobserved). As discussed in the next section on estimation problems, an important distinction is the difference between variables that the model treats as exogenous (and therefore less likely to be correlated with the disturbance term in the relation being estimated) and variables that are treated as endogenous (and thus likely to be correlated with the random disturbance term). If variables are correlated with (not independent of) the random disturbance

Table 26.1 Categorizing Input Variables for a Rice Production Function

Aggregation	Observed	Unobserved
<i>Individual</i>		
Endogenous	Time spent by individual household members doing specific tasks	Amount of effort applied by household members when doing specific tasks
Exogenous	Age and sex of household members who work on the farm	Household members’ innate abilities in performing specific tasks, including farm management ability
<i>Household</i>		
Endogenous	Inputs (fertilizer, seeds, and so on) applied to the household’s land	Quality and condition of agricultural tools and machinery
Exogenous	Slope of land and certain aspects of soil quality	Biological aspects of soil quality that are difficult to measure
<i>Community</i>		
Endogenous	Condition of communal drainage or irrigation system	Amount of effort applied by agricultural extension agents
Exogenous	Rainfall	Other weather conditions; prevalence of specific crop diseases

Note: How these variables are categorized depends both on which model is used (determining which variables are endogenous and which are exogenous) and on what data are available (determining which data are observed and which are unobserved). Therefore, the categorizations change for different models and data sets. However, the examples given in this table illustrate widespread practices.

Source: Authors’ determinations.

term, the estimates of their coefficients will, in general, be biased—leading to underestimation or overestimation of the true causal effects of those right-side variables on the outcome of interest.

If Q is an outcome determined by some kind of household behavior, the coefficients associated with the variables describing that behavior on the right side measure the direct effects of these variables on Q . Continuing with the example of the rice production function, the labor time household members spend working on their rice fields is such a variable, and the associated coefficients indicate the physical impact of an additional unit of each type of labor on the amount of rice produced. Note that a production function such as this indicates only the direct impact of a right-side variable on Q through the production process itself; it does not reflect the fact that that variable could have an indirect effect through its influence on other inputs used in the production process. For example, the level of education of household members who work on a household's rice fields may have a direct impact on rice production by making them more productive workers. Yet the schooling of household members can also have an indirect impact, since better-schooled household members may be more likely to find work off the farm and thus reduce the amount of time that they spend working on the household's rice fields. By definition, production functions include only variables that have direct effects. Whether the data analyst is interested in direct or indirect effects depends on the policy questions being addressed.

When analysts have good estimates of the appropriate production functions, they can be confident of identifying the direct impact of the right-side variables on the dependent (left-side) variable. However, good production function estimates can be difficult to obtain because many problems can arise during estimation, as discussed below.

REDUCED FORM DEMAND FUNCTIONS. Reduced form demand functions are estimated more often than any other type of function. These are the simple demand functions that were discussed, with some additional extensions, in the first section of this chapter. Data analysts use these functions very often to explore the determinants of household behavior. In some studies, household demand functions are derived explicitly from a model of a typical household's constrained maximization of its welfare. In this case, estimation of

the demand function reveals something about the underlying structural welfare parameters. However, in most studies demand functions are assumed to result from the households' constrained maximization of their welfare, and the underlying structural parameters cannot be uncovered ("identified") from the reduced form estimates. In these cases, analysts' estimates of the demand functions provide the total (direct plus indirect) effects of the explanatory variables on the "demand" for the behavioral variable in question, but they do not show the exact pathways by which the household's objective function and technical production functions influence behavioral outcomes.

For example, good estimates of reduced form demand relations can reveal the total impact of household members' schooling on rice production. However, they cannot reveal separately how much household members' schooling affects rice production directly by making them more productive workers, as expressed in equation 1, and how much household members' schooling affects rice production indirectly by changing the amounts of labor and other inputs that the household applies when it produces rice.

Reduced form demand functions depict a behavioral outcome (Z) that is determined by prices (P) and resources (R), both broadly defined, and by other factors (F) beyond the household's control, such as rainfall. The outcomes for which there is a demand function include all outcomes produced by the household through production functions, as shown in equation 1, plus all the inputs used in those production functions that are under the household's control, plus all other choices made by households. Thus the set of Z 's for which there are demand functions includes all of the Q 's in production functions such as equation 1, plus much more. A crucial requirement of all the right-side variables (P , R , and F) in reduced form demand functions is that they are exogenous—that is, completely beyond the household's control. The prices, resources, and other factors in these demand functions, like the inputs in the production function, can belong to the individual, the household, or the community (I , H , or C). So a linear approximation of the demand function can be written with a random disturbance term (V) as:

$$(2) \quad Z = b_{PI}P_I + b_{PH}P_H + b_{PC}P_C + b_{RI}R_I + b_{RH}R_H + b_{RC}R_C + b_{FI}F_I + b_{FH}F_H + b_{FC}F_C + V$$

where Z is behavioral outcome, P_I is individual prices, P_H is household prices, P_C is community prices, R_I is individual resources, R_H is household resources, R_C is community resources, F_I is individual other factors, F_H is household other factors, F_C is community other factors, and V is the random disturbance term.

The b 's indicate the impacts that the associated variables have on the demand for the behavioral outcome, Z . The random (stochastic) disturbance term (V) in each demand function includes all the effects of all the random disturbance terms in all of the production activities in which the household is engaged (in other words, all of the U 's for the household's different production functions) plus any other chance events. Prices, resources, and other factors can be either observed or unobserved in the data, so again it is useful to indicate this distinction using the superscripts o and u . There is one such demand function for each of the household's behavioral outcomes. Examples include the amount of each crop grown by the household, the health, nutrition, and schooling of each child, the consumption of basic staples by each household member, and the use of leisure time by each household member. In addition, there are all of the production function inputs that are controlled by the household, such as fertilizer used on each crop, the duration of breastfeeding for each child, medical care for each household member, and books and other school supplies for each child. Strictly speaking, all of these demand functions include the identical right-side predetermined variables, which means that there may be important cross-effects. For example, a change in the options that the household has for educating its youngest child may affect the oldest daughter's health, the mother's time working in labor markets, the father's consumption of rice, and all other decisions that the household makes. These effects occur because the change in the resource constraint faced by the household causes it to adjust all of its decisions, not just schooling for the youngest child. This shows that any predetermined variable affecting one behavioral outcome can also affect all other behavioral outcomes.

CONDITIONAL DEMAND FUNCTIONS. Reduced form demand functions such as equation 2 are unconditional in that none of the right-side variables are endogenous (controlled by the household). Conditional demand functions, on the other hand, include some right-side variables that are, or at least

could be, controlled by the household. This includes variables on the right side that are beyond the household's control today but were determined at least in part by the household's past behavior; conditional demand functions can be used to estimate relationships that include such "predetermined" variables.⁷ For example, a household's demand for health-related services during the current period might depend on each household member's health status at the beginning of the current period, which will depend on all of the household's past behavioral decisions related to health. In this case, the household's health status at the start of the current period is a right-side variable that is "predetermined" with respect to current prices, resources, and other factors in the demand function in equation 2. That demand function also includes all current prices. An accurate estimate of the coefficient of the household's health status would show how its health status at the start of the current period affected its demand for health-related services throughout the current period. The fact that the household's health status at the start of the current period was determined by the household's past behavior poses some estimation problems (which will be discussed in the next section), but the interpretation of its coefficient is clear.

Estimation Problems

A number of problems can occur in the estimation of the coefficients of production functions, reduced form demand functions, and conditional demand functions. These problems can lead to biased estimates of the coefficients (the a 's and b 's in equations 1 and 2) that show the impacts of the explanatory variables. Biased estimates can lead to ineffective, and even harmful, policies. These estimation problems all share a common characteristic: that the random disturbance term (U and V in equations 1 and 2, respectively) is correlated with one or more of the other right-side variables, instead of being uncorrelated with all the right-side variables. The most likely reason for this is that the disturbance term is really a compound disturbance term—that is, it includes unobserved variables as well as the standard random disturbance term. Another possible reason for such correlation is that the random disturbance term is defined in a particular way because the sample used in the estimates is not representative of the general population. This subsection discusses four kinds of estimation problems, all of which share

the characteristic that the disturbance term is correlated with one or more of the right-side variables: measurement error, omitted variable bias, simultaneity bias, and selectivity bias.

MEASUREMENT ERROR. Measurement error can contaminate any of the observed variables used for estimating the relations discussed in the previous section. Random measurement error occurs if the observed values of the variable (X^*) are not a fully accurate representation of the true variable (X), but instead the observed variable is the sum of the true variable plus a random error (w):⁸

$$(3) \quad X^* = X + w.$$

Whether random measurement error affects the estimates depends on whether the variable that was measured with error is the dependent variable or a right-side variable. Random measurement error in the dependent variable merely adds w to the random disturbance term (U or V), which does not lead to biased estimates of the coefficients (a 's and b 's) associated with the right-side variables.

In contrast, random measurement error in a right-side variable does lead to biased estimates of these coefficients. For example, consider a case in which fertilizer (X) is assumed to be the only right-side variable that affects rice production (Q). The true relation is:

$$(3a) \quad Q = bX + v$$

and the relation estimated is:

$$(3b) \quad Q = bX^* + v + bw.$$

Because observed use of fertilizer is a noisy measure of the actual use of fertilizer (perhaps because households cannot always recall exactly how much fertilizer they have used), the dependence of rice production on fertilizer is obscured, which results in the fertilizer effect being underestimated. The ordinary least squares (OLS) estimate of the impact of fertilizer on rice production is:

$$(3c) \quad b_{OLS} = b\sigma_X^2 / (\sigma_X^2 + \sigma_w^2).$$

Because $\sigma_X^2 / (\sigma_X^2 + \sigma_w^2)$ is less than 1, $b\sigma_X^2 / (\sigma_X^2 + \sigma_w^2)$ is less than b (the true impact of fertilizer on rice production), so the estimate of b in equation 3c is biased

toward 0, and thus underestimates the true impact of X on Q . The greater the variance in the measurement error (σ_w^2) relative to the variance in the true value of X (σ_X^2), the greater the bias.⁹

OMITTED VARIABLE BIAS. In both production function estimates and demand function estimates, there may be some variables that should be used as right-side variables but cannot be included because data on them were not collected in the survey. The inability to include these variables during estimation leads to bias in the estimated coefficients. This bias is known as omitted variable bias.

In the production function estimates these unobserved inputs might include soil quality (in a rice production function) or genetically inherited traits (in a health production function). (See Table 26.1 for a more comprehensive list of variables that cannot be observed in the case of a rice production function.) In terms of equation 1 (using the subcategories of variables), the basic estimation problem is that the observed right-side variables (X_I^{on} , X_I^{ox} , X_H^{on} , X_H^{ox} , X_C^{on} , and X_C^{ox}) may be correlated with the disturbance term, which now includes not only U but all of the unobserved variables (X_I^{un} , X_I^{ux} , X_H^{un} , X_H^{ux} , X_C^{un} , and X_C^{ux}). That is, all the unobserved variables must be added to the disturbance term, which becomes a new, compound disturbance term. For example, the disturbance term in a rice production function will include aspects of soil quality, the farmer's innate managerial ability, and the use of inputs that are not recorded in the data. Therefore, the estimates of the impact of the observed variables include not only their true effects but also the effects of any correlated unobserved variables. As a result, standard estimates of their effects, such as widely used ordinary least squares estimates, are likely to be biased one way or another—the direction depending on the details of the relationship being estimated.

Similarly, in demand functions the disturbance term will include not only V (the random disturbance term) but also all the unobserved variables (which can be denoted by P_I^U , P_H^U , P_C^U , R_I^U , R_H^U , R_C^U , F_I^U , F_H^U , and F_C^U). If any of the observed variables on the right side of equation 2 are correlated with any of the unobserved variables, their coefficient estimates are biased because they represent in part the effect of the correlated unobserved variable or variables. For example, as mentioned above the availability and nature of government health services may be associated with unob-

served community characteristics such as distribution of political power or with unobserved factors that lead to serious health problems. Further, in conditional demand functions in which some “predetermined” behavioral variable (such as a person’s health status at the start of the period in question) is included among the right-side variables, this variable may be correlated with almost any of the right-side unobserved variables because the right-side unobserved variables partly determined these behavioral variables in earlier time periods. For example, a mother’s unobserved knowledge regarding health and nutrition may have determined her child’s health status at the start of the period and may continue to influence the health care provided to the child during the current period. Unfortunately, analysts often ignore or assume away the biases that may result.

The sign and magnitude of omitted variable bias depends on the effect of the omitted variables and on their correlation with the included variables. Consider the case of a simple equation in which fertilizer (X_F) and soil quality (X_{SQ}), together with a random disturbance term (U), determine rice production (Q):

$$(4a) \quad Q = aX_F + bX_{SQ} + U.$$

If soil quality is unobserved, the new (compound) disturbance term is $bX_{SQ} + U$. One can show that the estimate for the coefficient of the fertilizer applied obtained from ordinary least squares is:

$$(4b) \quad a_{OLS} = a + b\sigma_{FSQ}$$

where σ_{FSQ} is the covariance between fertilizer applied and soil quality divided by the variance of the fertilizer applied. The sign and magnitude of the omitted variable bias is given by the last term. It depends on the sign and magnitude of the true impact of the omitted variable (b), the covariance between the omitted variable and the observed variable, and the variance of the observed variable. In this example, the bias could be downward; farmers may compensate for poor soil quality by adding more fertilizer, so that the correlation between fertilizer and soil quality is negative. On the other hand, the bias could be in the other direction; bad soil quality may make fertilizer less useful, so less fertilizer is used.

SIMULTANEITY BIAS. Simultaneity bias occurs when a dependent (left-side) variable in one equation is used

as an explanatory (right-side) variable in another relation. For example, simultaneity bias can arise when a right-side variable is endogenous (under the household’s control), in which case it is a left-side variable in some other relationship. In such situations it is very likely that this variable will be correlated with the random disturbance term when it appears as a right-side variable in any equation, which will lead to biased estimates of the associated coefficient.

Simultaneity bias can be a problem in two of the relations discussed earlier in this section: production functions and conditional demand functions. This problem does not arise in reduced form demand equations since by definition none of the right-side variables in those equations are endogenous. A simple example can demonstrate the basis for this estimation problem. Consider a production function for rice, as in equation 1. One of the right-side variables is the amount of fertilizer applied to the household’s field during the current period. For clarity, assume that there are no problems with measurement errors or unobserved inputs. Even in the absence of those problems, the amount of fertilizer used (and any other right-side variable chosen by the household during the same time period) is very likely to be correlated with the random disturbance term (U). Suppose that farmers with better managerial ability tend to use more fertilizer. The farmers’ managerial skills can also directly affect the production of rice, but because these effects are usually not observed in the data they are included in the random disturbance term (U) of the rice production function. This results in a correlation between fertilizer used and the random disturbance term (U) in the rice production function, which causes the estimated impact of fertilizer on rice production to be biased. Intuitively, the problem is that the estimated coefficient includes not only the effect of fertilizer but also the effect of the farmer’s managerial ability. The sign of the bias in this case is positive; because the farmer’s managerial ability raises fertilizer use and also makes the farmer more productive, the estimated impact of fertilizer on rice production is exaggerated by the better managerial skills associated with greater use of fertilizer.

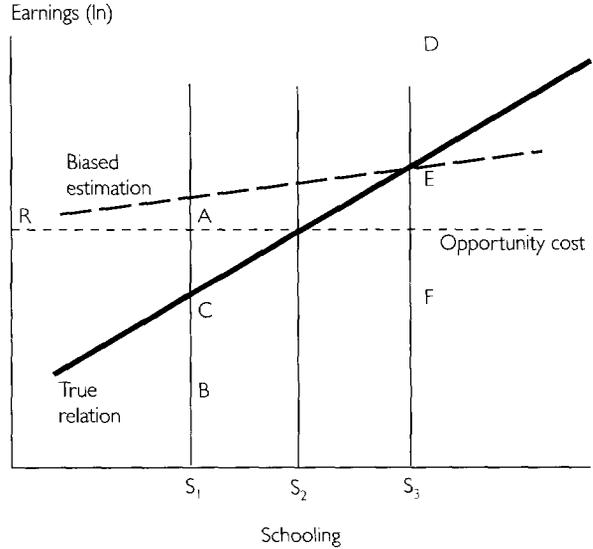
SAMPLE SELECTIVITY BIAS. Selectivity bias can result if observations are available only for a nonrandom subset of a general population. This can occur for any of the relations discussed earlier in this section. The best

known example is estimating the determinants of wages, which is a production function relation. This relation can be estimated only for individuals who want to work as wage earners and who actually obtain such employment. Figure 26.1 provides another simple illustration of selectivity bias. If there are observations on earnings and schooling for every individual in the sample, the true relation can be estimated. The solid line in this figure represents the true relation between earnings and schooling. Of course, the observations for most individuals do not fall exactly on this line. However, the true relation line best summarizes the cluster of earnings–schooling combinations for all of the individuals in the sample.

Sample selectivity bias arises when it is not possible to obtain data for every individual in the sample. In general it is possible to observe earnings only for individuals whose labor market earnings exceed what they could earn through an alternative use of their time such as working on the family farm. For simplicity, assume in Figure 26.1 that this opportunity cost is the horizontal dotted line at R on the vertical axis. Therefore, the earnings estimate is based only on the earnings–schooling subsample above this horizontal line. The problem is that this subsample is not randomly selected. For schooling levels below the level at which the true relation line crosses R (in other words, S_2 in the figure), only individuals who have sufficiently positive disturbances (the vertical distances between the line and the points around it) to get them to R or above are selected into the subsample. (For schooling level S_1 this would include the individual at point A , but not the ones at points C and B .)

For schooling levels above the level at which the true relation line crosses R , only individuals who have sufficiently negative disturbances to put them below R are not included in the subsample (for example, for schooling level S_3 , the individual at point F is selected out of the subsample, but those at points E and D are included in the subsample). Thus the procedure for selecting the subsample, with its systematic relation between schooling and the random disturbance term in the true relation, creates a correlation between the disturbance term and schooling for the subsample for which estimates of the earnings relation can be made. As a result, if only this subsample is used to estimate the earnings relation, something like the dashed slope line will be obtained, giving a biased estimate of the true relation between earnings and schooling.

Figure 26.1 Selectivity Bias in Estimated Relation of Earnings to Schooling



Source: Authors' representation.

Resolving These Estimation Problems

There are several possible ways to address the above estimation problems. The best solution will depend on the nature of the estimation problem and the costs of alternative ways of rectifying it.

MORE AND BETTER DATA. One solution is to acquire more and better data on household behavior. This has long been a goal of LSMS surveys. In particular, if it were possible to obtain at little or no cost data on variables such as soil quality that are not included in current household surveys, this would reduce omitted variable bias.¹⁰ Unfortunately, it is very difficult to obtain certain kinds of information. Many researchers have tried to obtain data that are usually regarded as very difficult to collect. For example, a 1993 household survey in Tanzania used contingent valuation methods to collect data on households' hypothetical responses to different prices, given the lack of variation in actual prices for publicly provided social services. That is, households were asked whether they would use public health facilities if the prices for such use were set at different levels (even though the actual prices were the same for all households). However, many experts are skeptical about how well these alternatives can fill gaps in observed data. (See Chapter 14 on environmental issues for a detailed discussion of contingent valuation methods.)

There are also a number of ways to design a household survey to minimize measurement error in

the data it collects. (These methods are discussed in Grosh and Munoz 1996 and in the chapters of this book.) For example, it is essential to ensure that the language used in the questionnaire is clear and concise. Proxy respondents should be avoided, and survey designers should weed out potential incentives for respondents to lie. Instead of simply asking respondents when a certain incident happened, it may be better to ask respondents to date that incident according to how close it was to the occurrence of a major national or personal event. This may help respondents remember the date of past events more accurately. It can sometimes be worthwhile to acquire alternative sources of data to check the accuracy of the information provided by survey respondents; an example of this is the use of clinic data on the health status of patients or school records on school attendance. This is quite useful provided that the same measurement errors are not repeated in the alternative data source.

However, collecting more and better data invariably implies greater costs in terms of money, time, and the risk that respondents will get tired of cooperating. So survey designers will always have to make decisions about tradeoffs, which will vary depending on how the data are likely to be analyzed.

FIXED EFFECTS ESTIMATION. Fixed effects are right-side variables that are not observed but are likely to be the same (“fixed”) across several observations. For example, many weather conditions will be the same for different households that live in the same community. These unobserved fixed effects can be represented by dummy variables (variables that take only one of two values, 0 or 1), in which case they are no longer a part of the random disturbance term. Taking these fixed effects out of the error term is advantageous in cases where the effects are correlated with other regressors (right-side variables) and the (remaining) disturbance term is not correlated with any of the right-side variables. In such cases, the original disturbance term was correlated with the right-side variables, which would lead to biased coefficients, but representing fixed effects with dummy variables will ensure unbiased estimates. To use the fixed effects method, each fixed effect must be associated with more than one observation. This will be the case if there are multiple observations on the same individual over time (individual fixed effects), more than one household in the same community at a single point in

time (community fixed effects), or more than one individual in the same household at the same point in time (household fixed effects).¹¹

The dummy variables control for all factors that are fixed and shared in common by groups of observations. For example, community fixed effects control for all observed and unobserved community characteristics that are the same for all households within a given community (though they may vary across communities). This eliminates omitted variable bias from community-level variables, and applies equally to production functions, reduced form demand functions, and conditional demand functions. Another example is household fixed effects; children from homes with books, writing paper, electric lights, and supportive parents can be expected to attend school longer and to learn more than children from homes without these features. If such household-level characteristics are unobservable, standard estimates may attribute to time spent in school not only the impact of the time spent in school but also the impact of unobserved household characteristics that affect learning and are correlated with time spent in school. The household fixed effects method could be applied to sibling data from each household to estimate the importance of time spent in school or any other variables that differ among siblings while controlling for unobserved household characteristics.

There are three key limitations of the fixed effects method. First, fixed effects can only control for fixed unobserved variables at a certain level of aggregation. Unobserved factors that vary at the most disaggregated level (such as individual’s inherited traits when there is only one observation per individual) cannot be controlled for using fixed effects. Second, the use of fixed effects at a certain level of aggregation prevents one from estimating the impact of all observed variables that vary only at that same (or any higher) level of aggregation. For example, using individual fixed effects on data that cover several time periods prevents an analyst from estimating the impact of all observed variables that are fixed over time. Third, fixed effects methods can exacerbate measurement error problems because such estimates are based on deviations from the mean (average) values for each group of observations with the same fixed effect, and measurement errors are magnified in estimates based solely on deviations from means.

INSTRUMENTAL VARIABLES. Instrumental variable methods are estimates in which observed right-side vari-

ables that are correlated with the random disturbance term are replaced by their predicted values. These predicted values are obtained from a “first-stage” regression of the right-side variable on a set of variables (the “instruments”) that are not correlated with the random disturbance term. This is a commonly used procedure for eliminating correlations between observed right-side variables and the disturbance term.

In production functions, the right-side variables that need to be instrumented generally include all endogenous variables (variables under the household’s control), such as the amount of fertilizer and other inputs applied by a farm household that produces rice. Endogenous variables must also be instrumented in conditional demand functions. More generally, any variable that is correlated with the random disturbance term should be instrumented. This could include even variables that are not endogenous, since omitted variable bias or measurement errors could affect such variables.

Good instruments for dealing with these estimation problems must have four characteristics. First, they must not already appear in the relation being estimated. Second, they must be uncorrelated with the disturbance term (which includes all of the unobserved right-side variables) of the relation being estimated. Third, the instruments must be sufficiently correlated with the observed right-side endogenous variables to provide reasonably accurate predicted values. Fourth, there must be at least one such observed instrument for every observed endogenous right-side variable in the relation being estimated. If instruments with these properties are used and there are no other estimation problems, the estimated coefficients that correspond to the instrumented variables will indicate the true impacts of all the right-side variables on the left-side variable.

In a production function, appropriate instruments for the right-side endogenous variables are the right-side variables in the demand functions determining endogenous variables that do not already appear in the relation being estimated. The most obvious candidates are prices, which do not belong in a production function (since it describes only physical relationships between inputs and outputs) but should have substantial predictive power for the amounts of inputs used. In a conditional demand function, any variables included in any demand function already appear in the relation being estimated, which means that they do not have the first characteristic of a good instrument.

In conditional demand functions with variables that are “predetermined” (determined in an earlier time period), such as an individual’s health status at the start of the current period, instruments might include variables that are past determinants but are not correlated with current determinants, such as past price or weather shocks.

In practice, it is often difficult to find good instruments. For example, in production functions, any unobserved endogenous variables (X_I^{un} , X_H^{un} , and X_C^{un}) in the compound disturbance term could depend on the potential instrumental variables for the observed variables that are under the household’s control. Such instrumental variables cannot be used because they do not have the second characteristic required of instrumental variables. Of course, estimates based on instrumental variables would be unbiased if there were no unobserved endogenous inputs, but in many cases this may be an unwarranted assumption, as suggested by Table 26.1. For conditional demand functions, the difficulties in using instrumental variables are even more severe. It is very hard to find a reason why a variable affects the variable being instrumented but does not directly affect the left-side variable in the equation of interest. Thus it is difficult to satisfy the first condition, since leaving the variable out of the equation of interest would lead to omitted variable bias. Perhaps the best use of instrumental variables is cases where the only estimation problem is measurement error. If the data contain alternative measurements of a variable that is measured with error (such as two separate measurements of a child’s height, or measurement of a household’s expenditures in both the last week and the preceding three months), one measurement of the variable can be used as an instrument for the other as long as a reasonable case can be made that the errors in the measurement of each are uncorrelated.

SELECTIVITY CONTROL. The basic approach in correcting for selectivity bias is to estimate the sample selection process that determines why only some observations are observed. For example, when estimating earnings or wage functions, the analyst estimates the process that determines whether or not an individual is a wage earner. There are several ways to bring the sample selection process into the estimation procedure. Perhaps the most widely used method is Heckman’s (1979) two-step method. In this method, the first step is the estimation of the selection process

for the entire sample. In the second step, the relation in question is estimated on the subsample that has the full set of data for the relation. In the second step a right-side variable is added that is calculated from the first-step estimates. This variable corrects for the effect that sample selectivity has on the original random disturbance term, so the term is no longer correlated with the observed right-side variables.¹² For example, in the first step one estimates whether or not a person is working as a wage earner, and in the second step the first-step estimates are used to create a variable that is added to the wage function regression to remove bias due to sample selection.

EXPERIMENTS. A major problem arises in evaluating policies and other determinants of household behavior when one or more of the right-side variables studied is not independent of the disturbance term (which inevitably includes many unobserved variables) in the relation being estimated. One possible way to resolve this problem, at least in some circumstances, is to conduct experiments with a treatment group and a comparison (control) group.

For example, to evaluate the impact of books on child learning, different random quantities of books (including none) could be given to a series of random samples of children, and comparisons could be made of the changes in the learning of the different groups of children. This experiment would yield an estimate of the (reduced form) impact of textbooks on learning and other educational outcomes. However, this approach cannot be used to estimate a production function relationship of the determinants of learning (or some other educational outcome), because the extra books supplement the household's in-kind resources, and the household may alter other factors (such as expenditures on textbooks) when it receives the extra books. It would be desirable to include household surveys as part of such experiments in order to see how other behavior changes in response to the "treatment" received under the experiment.

Well-conducted experiments can provide useful additional information for evaluating many policies. Linking such experiments to household survey data makes it possible to investigate possible "spillover" effects in which benefits targeted to one individual are redistributed to others by household decisions. Selective attrition, in which some households drop out of programs, can also be studied by linking the exper-

iment to a household survey. However, it is difficult in many contexts to avoid "experimental effects" and to prevent members of treatment and control groups from dropping out of the experiment. In many cases, questions of ethics or of fairness between treatment and control groups may preclude conducting experiments. Also, conducting experiments is usually very expensive. Finally, for many types of experiments there are economies of scale in implementation, which means that they are unlikely to be conducted on a nationwide sample—instead being implemented in a relatively small area in one part of the country.

Conclusions

LSMS and similar multitopic household surveys can be very valuable for understanding behavior and evaluating policies. However, when using such data great care must be exercised both to exploit their potential and to avoid drawing false inferences. The most satisfactory approach is to clarify what assumptions are made about household behavior by utilizing an explicit model of that behavior. Researchers must consider what the model implies about possible estimation problems, test the assumptions underlying their estimations, and try several different estimation methods to see whether the results are stable. Adopting this approach, the full richness of LSMS-type household surveys can be exploited, helping analysts and policymakers better understand many important dimensions of household behavior and better evaluate the impact of government policies on that behavior.

Appendix 26.I Mathematical Summary of Models

This appendix presents a mathematical summary of the basic models discussed in the first section of this chapter.

Basic One-Period Household Model

Consider a simple household objective function defined by two goods, food (F) and clothing (C):

$$(A-1) \quad W = W(C, F).$$

Both food and clothing are assumed to increase household welfare at diminishing rates ($W_C > 0$, $W_F > 0$, $W_{CC} < 0$, $W_{FF} < 0$).¹³ Along an equal welfare curve (a curve that connects all points showing the same level

of welfare in a two-dimensional diagram with consumption of food on one axis and consumption of clothing on the other), the following relationship holds:

$$(A-2) \quad dW = W_F dF + W_C dC = 0$$

which implies that:

$$(A-3) \quad dF/dC = -W_C/W_F.$$

In the simplest model, the household has a given income (Y) that it can spend on clothing and food at the market prices that it faces (P_C, P_F):

$$(A-4) \quad Y = P_C C + P_F F.$$

If resources are fully used, the equality in relation (A-4) holds, which implies:

$$(A-5) \quad F = Y/P_F - (P_C/P_F)C.$$

Therefore, a small change in C leads to the following change in F (for a constant level of welfare):

$$(A-6) \quad dF/dC = -P_C/P_F.$$

Combining (A-3) and (A-6) gives the condition for constrained maximization:

$$(A-7) \quad W_C/P_C = W_F/P_F.$$

The implied demand functions are:

$$(A-8) \quad C = C(P_C, P_F, Y) \text{ and} \\ D = D(P_C, P_F, Y).$$

The general definition of the elasticity of one variable Z with respect to another variable X is the ratio of the percentage change in Z over the percentage change in X :

$$(A-9) \quad E_{ZX} = (dZ/Z)/(dX/X).$$

Some Simple Extensions to the Basic One-Period Household Model

The general form of a household production function is that some outcome (Q), such as rice produced,

depends for a given technology on several individual (X_I), household (X_H), and community (X_C) inputs:

$$(A-10) \quad Q = Q(X_I, X_H, X_C) \text{ with} \\ Q_i > 0 \text{ and } Q_{ii} < 0 \text{ for } i = I, H, C$$

Production inputs by definition have positive marginal products, so $Q_i > 0$ with diminishing marginal productivities in the relevant range (making $Q_{ii} < 0$). Each of the three inputs in this production function can be a vector with a number of elements.

Consider the two-input case:

$$(A-11) \quad Q = Q(X_1, X_2).$$

Along the “equal-output curve” (the curve that connects all points showing the same level of production in a two-dimensional diagram with X_1 on one axis and X_2 on the other axis) the following relation holds:

$$(A-12) \quad dQ = Q_1 dX_1 + Q_2 dX_2 = 0,$$

so the slope is:

$$(A-13) \quad dX_2/dX_1 = -Q_1/Q_2.$$

The condition for maximizing the output of the production unit (in this case, the household) given the resources spent on inputs and given input prices implies that the marginal product for the last dollar spent on each input is the same:

$$(A-14) \quad Q_1/P_1 = Q_2/P_2.$$

Multiple Time Periods

Assume that there are two periods and make the additional assumptions that: the household objective function depends on two goods—consumption in the first period and consumption in the second period; the household receives some income in both periods; and the household can either borrow or lend in the first period at a fixed interest rate (r) while paying back interest and principal on the loan in the second period. The resource constraint implied by these assumptions is:

$$(A-15) \quad C_2 = Y_2 + r(Y_1 - C_1) + Y_1 - C_1 \\ = Y_2 + (1 + r)(Y_1 - C_1),$$

so the slope is:

$$(A-16) \quad dC_2/dC_1 = -(1 + r).$$

Suppose that the household can purchase K dollars of insurance with an insurance premium of g . If the household purchases K dollars of insurance, it gives up gK dollars of consumption in the good state in exchange for $K - gK$ dollars of consumption in the bad state, so the slope of the resource line through the noninsurance point is:

$$(A-17) \quad dC_g/dC_b = -gK/((1 - g)K) = -g/(1 - g).$$

Glossary of Basic Economic, Statistical, and Econometric Terms Used in This Chapter

BIAS. The extent to which (the expected value of) an estimate of a coefficient on a right-side variable is different from its true value and therefore misleading regarding the effect of the associated right-side variable on the left-side variable.

COEFFICIENT. A constant that is multiplied by the right-side variable to capture the effect of that variable in the determination of the outcome (or left-side variable, sometimes called the dependent variable) in that relation.

CONDITIONAL DEMAND FUNCTION. The household's demand for a good or service, as a function of both exogenous and endogenous variables. This is in contrast to a household's reduced form demand function, for which all the right-side variables are exogenous.

CONSTRAINED MAXIMIZATION OF THE HOUSEHOLD OBJECTIVE FUNCTION. The scenario assumed by economists in which households behave as if they maximize their household objective functions, subject to market prices and household resource constraints. Each household will obtain the maximum possible level of welfare given its constraints and prices faced if it chooses its pattern of consumption so that the marginal (or additional) welfare generated by the last dollar spent on each good is equal to the marginal welfare generated by the last dollar spent on all other goods.

CORRELATION. The covariance between two variables divided by the standard deviations of the two variables.

Correlation measures how two variables move together, taking on values between -1 (in which case they move in exactly opposite directions) and 1 (in which case they move exactly together).

COVARIANCE. An indicator of how two variables move together. Covariance is positive if the variables tend to move in the same direction, negative if they move in opposite directions, and 0 if their movements are completely unrelated.

CROSS-PRICE ELASTICITY OF DEMAND. The percentage change in the demand for a good or service brought about by the percentage change in the price of another good or service. This is calculated by dividing the percentage change in the first good or service by the percentage change in the price of the second good or service.

DUMMY VARIABLE. A variable that equals 1 for a certain type of individual, household, or community and 0 for all other types.

ENDOGENOUS VARIABLE. A variable (either right-side or left-side) that is chosen by, or influenced by the actions of, the household.

EXOGENOUS VARIABLE. A right-side variable that cannot be influenced by the actions of the household.

FIXED EFFECTS. Unobserved right-side variables in the (compound) disturbance term that take the same values for members that belong to the same group (or for the same member at different points in time). The presence of fixed effects may cause the disturbance term to be correlated with the observed right-side variables.

FIXED EFFECTS ESTIMATES. Estimates that use dummy variables for the level of aggregation at which there are fixed effects (for example, the individual, household, or community level) to eliminate the omitted variable bias caused by correlation between fixed effects and other right-side variables.

HOUSEHOLD OBJECTIVE OR WELFARE FUNCTION. An indicator of a household's level of welfare as determined by different combinations of goods and services consumed, including any goods and services pur-

chased in the market, produced by the household, or provided by the government.

HOUSEHOLD PRODUCTION FUNCTIONS. Relations that indicate how households can combine inputs to produce outputs.

HOUSEHOLD REDUCED FORM DEMAND FUNCTION. A household's demand for each good or service as a function of the price of the good or service, the prices of all other goods and services, the resources that the household has at its disposal, and a random disturbance term.

HOUSEHOLD RESOURCE CONSTRAINT. The fact that a household cannot spend more in purchasing goods and services for consumption than the total value of the household's resources.

INCOME ELASTICITY. The percentage change in a household's demand for a good or service in response to a percentage change in the household's income. This is expressed by dividing the percentage change in the demand for the good by the percentage change in the household's income. A value of 0 indicates no change. A value between 0 and 1 indicates that the percentage change in the quantity demanded is less than the percentage change in income. A value of 1 indicates that the percentage change in the quantity demanded equals the percentage change in income, and a value greater than 1 indicates that the percentage change in the quantity demanded is greater than the percentage change in income.

INSTRUMENTAL VARIABLES. A procedure for eliminating correlations between observed right-side variables and the disturbance term by replacing the right-side variables with their estimated values, where these estimates make use of variables—known as instruments—that are uncorrelated with the disturbance term in the relation of interest.

MEASUREMENT ERROR. A situation in which the observed values of a variable are not the actual values, but instead are the actual values plus an error term.

OMITTED VARIABLE BIAS. Bias in the estimated coefficients of right-side variables that occurs when some variables that should be included as right-side variables

are not included because they are not observed (or are mistakenly excluded). When this happens, the variables' effects are captured by the coefficient estimates of observed variables that are correlated with the unobserved variables.

OWN-PRICE ELASTICITY OF DEMAND. The percentage change in the demand for a good or service caused by a percentage change in its price. This is expressed by dividing the percentage change in the demand by the percentage change in the price. In almost all cases, own-price elasticity of demand will be negative because an increase in the price of a good will reduce households' demand for it. A value of 0 indicates no change. A value between 0 and -1 indicates that the percentage change in the quantity demanded is less than the percentage change in the price. A value of -1 indicates that the percentage change in the quantity demanded equals the percentage change in the price, and value less than -1 indicates that the percentage change in the quantity demanded is greater than the percentage change in price.

RANDOM DISTURBANCE TERM. An unobserved variable that represents chance events such as exposure to a virus or weather fluctuations. To obtain unbiased estimates of coefficients, the stochastic disturbance term must be uncorrelated with the right-side variables in the relation being estimated.

SIMULTANEITY BIAS. Bias in (the expected value of) the estimate of a coefficient associated with a right-side variable because that variable is endogenous and thus correlated with the disturbance term in the relation being estimated.

SAMPLE SELECTIVITY BIAS. Bias in estimates of coefficients that occurs when observations are available only for a selected subset of the population being sampled.

STANDARD DEVIATION. A commonly used measure of the variation in a variable. The standard deviation equals 0 if the variable always has the same value; otherwise it is positive. It is equal to the square root of the variance.

STRUCTURAL RELATIONS. The most fundamental relations in models of household behavior (see household objective functions and household production functions).

VARIABLE. A quantity that can differ in value both over time and among individuals, households, and communities.

VARIANCE. A measure of the variation in a variable. Variance equals 0 if the variable always has the same value; otherwise it is positive. Variance is the average (expected value) of the square of the difference between the mean (average value) of a variable and a random draw of that variable.

Notes

The authors thank Paul Glewwe, Margaret Grosh and Fiona Mackintosh for helpful comments on earlier drafts.

1. Throughout this chapter, the terms “not observed” and “unobserved” mean unobserved by data analysts and policymakers. What is unobserved in this sense, of course, depends on the data set, although some factors such as innate ability, innate health, family connections, preferences, and the extent to which future events are discounted when making comparisons with present events are always unobserved to some extent. Yet even though such factors are not observed by analysts and policymakers, they may be observed (perhaps imperfectly and with learning) by the individuals whose behavior is being studied, and these individuals may make decisions in part based on these factors. Behrman (1997, 1999), Strauss and Thomas (1995), and Udry (1997) emphasize such unobserved factors and their importance in analysis of behavioral data.

2. The income variable used should not be correlated with unobserved abilities and preferences; otherwise the estimated income coefficient will be biased. For this reason labor income or income generated from past labor (for example, pensions, unemployment benefits, and returns on assets accumulated from past labor) should not be used. There may be similar problems even with forms of income that are not generated by current or past labor. For example, if there are intergenerational correlations in abilities or preferences, and abilities and preferences are correlated with income generation and with bequests, even inheritances and other intergenerational transfers may be subject to this problem.

3. See Rosenzweig and Wolpin (1986) for a fuller discussion of these points. Pitt, Rosenzweig, and Gibbons (1993) provide estimates for Indonesia which indicate that accounting for the determinates of government policies can significantly alter estimates of the impact of these policies.

4. Another type of structural relation in the household modeling discussed above is the household objective function. This relation generally cannot be estimated directly, however, because the “output”—welfare—is not directly observed. Nevertheless, some aspects of the household welfare function can be inferred from

reduced form demand relations—which are discussed below—if these demand relations are derived explicitly from constrained maximization of a particular household objective function.

5. Linear approximations are functions for which the only right-side terms are causal variables (each multiplied by its associated coefficient) plus a random disturbance term. This excludes variables multiplied by each other (“interaction effects”) and variables raised to powers. Linear approximations are used in this section for ease of exposition; in actual studies, other functional forms with nonlinear terms such as products or powers of variables are often used to capture interaction effects and other nonlinearities.

6. For example, all community characteristics are usually assumed to be exogenous. However, in reality, households can change community characteristics by migrating or by lobbying the government for policy changes (for example, asking the government to finance community services from the central government budget), and these possibilities are incorporated into some models.

7. It is not possible, however, to use demand functions to estimate the effect of one endogenous variable determined in the current period on another determined in the current period. For example, it may be assumed that short-term nutritional status is determined simultaneously with a child’s performance in school. Consider the following two demand functions for school attainment (Z_p) and for child nutrition (Z_N) as dependent on two prices (P_1, P_2), predetermined resources (R), and stochastic disturbance terms (V_p, V_N):

$$(2a) \quad Z_p = b_{11}P_1 + b_{12}P_2 + b_{13}R + V_p \text{ and}$$

$$(2b) \quad Z_N = b_{21}P_1 + b_{22}P_2 + b_{23}R + V_N.$$

Equation 2b can be algebraically manipulated so that P_1 is determined by Z_N, P_2, R , and V_N . Replacing P_1 in equation 2a with this expression yields:

$$(2c) \quad Z_p = b_{31}Z_N + b_{32}P_2 + b_{33}R + V_p'.$$

This may appear to be a conditional demand function that could be used to explore the impact of child nutrition on school attainment. However, one can show that the coefficient of child nutrition is merely the ratio of the effect of the price that has been eliminated in equation 2a relative to the effect of that price in equation 2b—in other words, $b_{31} = b_{11}/b_{21}$. Thus the coefficient of child nutrition in equation 2c reveals nothing interesting about the effect of child nutrition on school attainment and only reveals data about the relative price effects (for P_1) in the two reduced form demand functions.

8. Random measurement error, the type discussed here, is the most common assumption. However, measurement error can also

be systematically related to the true variable, with implications that depend on the exact nature of the systematic relation.

9. The term σ_X^2 is the standard statistical notation for the variance of X , used to measure how much the individual observations of X differ from the mean (average) value of X . Similarly, σ_w^2 is the variance of w .

10. If there are multiple sources for a bias, eliminating any one cause does not necessarily lessen the bias because some other bias may have been offsetting the one that has been eliminated. However, in the absence of information suggesting that eliminating a particular bias exacerbates the problems due to another counteracting bias, the presumption is that eliminating any one bias probably lessens the total bias.

11. This means that panel data (see Chapter 23) must generally be used to control for individual fixed effects, although there are a few exceptions such as using data on identical twins to control for fixed individual genetic endowments.

12. The additional variable calculated from the first stage, which is known as the “inverse Mills ratio,” is a nonlinear function of several variables. Credible application of this method stipulates that at least one of these variables does not belong in the second stage, which is the equation of interest. An example of such a variable is the amount of land owned, which may affect whether an individual participates in the labor market but should not affect the wage he or she receives.

13. W_C is the derivative of W with respect to C —in other words, the change in W caused by a change in C . W_{CC} is the second derivative. W_F and W_{FF} are similarly defined.

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