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A SYMPOSIUM ISSUE ON THE ANALYSIS OF POVERTY AND ADJUSTMENT I

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A SYMPOSIUM ISSUE ON THE ANALYSIS OF POVERTY AND ADJUSTMENT

THIS SYMPOSIUM ISSUE draws primarily on background papers from the World Bank's *World Development Report 1990: Poverty*. The articles in this issue were refereed in the usual way. The Editorial Board invited Lyn Squire, leader of the team that prepared the report, to write the introduction to the symposium.

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Introduction: Poverty and Adjustment in the 1980s

Lyn Squire

One of the most important debates of the 1980s has centered on the impact of structural adjustment programs on the poor. Some argue that the poor suffered severely during the 1980s and that much of their suffering can be attributed to adjustment. Others hold that declining standards of living were experienced by some, but certainly not all or even most, of the poor and that without adjustment the extent and depth of suffering would have been greater.

The debate encompasses two distinct questions: what happened to the poor during the 1980s and have adjustment policies intensified poverty? The first question is factual, and the answer lies in a careful analysis of available information. But, to answer the second question, one must be able to develop a credible outline of what would have happened without adjustment; that is, an appropriate counterfactual situation has to be developed. The articles in this issue address both questions.

I. WHAT HAPPENED TO THE POOR DURING THE 1980S?

Although analysis of *how* the welfare of the poor has changed in the 1980s is simpler than determining *why* the changes occurred, it is complicated by problems of definition, data availability, the unit of analysis, and method of measurement. These problems of measurement are addressed comprehensively in the January 1991 issue of *The World Bank Economic Review*.

There are four major measurement issues that must be addressed. First, while a policymaker's objective may be to ensure some minimal level of welfare for all citizens, highly contentious political and ethical issues are involved in selecting the particular aspects of well-being to be considered and their acceptable minimal level. (The wide differences in results of "apparent prosperity measures" derived from intensive field work and "current and permanent income" classifications are illustrated in Lanjouw and Stern 1991.)

Second, data problems are pervasive in analyzing living standards. Several elements of well-being are qualitative and resist measurement. Even when

Lyn Squire is in the Latin America and the Caribbean Regional Office of the World Bank and led the team that wrote the *World Development Report 1990: Poverty*.

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clearly quantitative indicators are considered, comparable and reliable time series data are seldom available in developing, and often even in industrial, countries.

Third, the unit of analysis may be based on residence, household, shared expenditures, family, or individual, and the resulting measurement of poverty will depend on the distribution of welfare among the members of the unit and the equivalence scale used to account for differences in the number of members across units (the difficulties and differences even in studies with relatively ample data are illustrated in Atkinson 1991).

Finally, issues of aggregation and weighting will impinge on measurement within and across sectors, regions, and periods. If the utility of income declines with increases in its level and if some minimum threshold of income or consumption is needed for survival, even a similar absolute reduction in income (for instance) may hurt the very poor more than the relatively poor. But how should the changes in the income of the very poor and the less poor be weighted? (The degree of poverty is reflected in measures of the poverty gap applied by Ravallion and Huppi [1991] in their decomposition of changes in poverty in Indonesia.)

The *World Development Report 1990* (World Bank 1990) argued that well-being is a product of a range of factors, including adequate consumption of goods and services, health, status, achievement, and security. Because most of those factors can be attained in the market, available income will generally determine access to them and thus is the most commonly used measure of well-being.

The *World Development Report 1990* demonstrated that sustained increases in the incomes of the poor require broadly based economic growth. Since the distribution of income changes only slowly, most observed reductions in poverty are primarily a consequence of increases in average income. The great majority of the poor are found in South and East Asia (520 and 280 million people, respectively, in 1985), regions that sustained annual growth in per capita gross domestic product (GDP) of 2.8 and 7.0 percent, respectively, from 1980 to 1988. Sub-Saharan Africa and Latin America, with 180 and 70 million poor, respectively, experienced *declines* of 2.4 and 0.7 percent during the same period (World Bank 1990, table 2.1 and indicator tables 2 and 26). These data suggest that the majority of the world's poor—those in Asia—may have benefited from broadly based economic growth during the 1980s. In Sub-Saharan Africa and Latin America, however, the 1980s can be aptly labeled “a lost decade,” and indeed much of the debate has focused on these regions. Analysis of those (few) countries with reliable data drawn from household surveys confirms this general picture.

Such data are available throughout the 1980s for Hungary, Poland, and Yugoslavia. Milanovic shows that with the distribution of income remaining more or less unchanged, poverty moved in line with average income—increasing in Poland and Yugoslavia and remaining roughly constant in Hungary. Two

developments stand out in the Polish and Yugoslavian experience. First, poverty became an increasingly urban phenomenon. And second, the increase in poverty was associated with a decline in real wages rather than an increase in unemployment.

In these countries an explicit choice was made to try to distribute the social costs of adverse economic developments more evenly by allowing decreases in real wages rather than increasing unemployment. The extent of public employment made such a policy feasible. But in most countries this is not an option, and the ultimate impact on poverty, especially in urban areas, will depend on the flexibility and responsiveness of the labor market.

This point emerges clearly from Pissarides' analysis of developed countries. Despite the presence of social insurance, poverty increased during economic recession mainly because of increased unemployment in Australia and the United Kingdom and mainly because of lower wages among unskilled and low-skilled workers in the United States. Pissarides' study also shows that, unlike the other industrial countries in his sample, the impact of recession on the poor in Sweden has been much less severe, apparently reflecting the combination of limited-duration unemployment insurance and a public sector job guarantee. This, it is claimed, provides protection but minimizes adverse effects on incentives because one cannot receive unemployment benefits indefinitely. Most countries in the developing world are not able to administer or finance such systems, but the basic principle underlies public employment schemes such as the Maharashtra State Employment Guarantee Scheme in India.

The general relation between growth (or decline) and poverty notwithstanding, it is still possible for the poor to suffer a decline in well-being even when average incomes are rising. According to Ahmad and Wang this seems to have happened in China. China undertook systemic policy reform in 1979–83, especially in rural areas. Because the system of reporting changed in 1984, data for the pre- and post-1984 periods are not strictly comparable. The evidence suggests, nonetheless, that between 1978 and 1988 real average per capita net income for rural residents approximately doubled, and real average per capita expenditure for urban residents may also have almost doubled. The dramatic improvement in average personal income was reflected in a significant decline in the incidence of poverty in rural areas through 1983, but this trend was partially reversed thereafter. From 1981 to 1984 the incidence of poverty declined significantly in urban areas. Although urban poverty was also lower in 1988 than in 1985, the trend rose after 1986. Ahmad and Wang attribute these setbacks to a combination of the dismantling of some aspects of the system of social security and services, on the one hand, and stagnation in agricultural production and accelerated inflation, on the other hand. The poor were rendered more susceptible to adverse economic events.

Without household surveys the analyst is forced to rely on approximate indicators of the income of the poor. In their analysis of five Sub-Saharan African countries, for example, Sahn and Sarris look at the effect of changes in relative

prices on the incomes and expenditures of the poor, assuming that production and consumption behavior remains unchanged. This has the obvious advantage of requiring information only on changes in prices (which is relatively easy to collect) and on the initial distribution of sources of income and pattern of expenditures (a more difficult undertaking). The empirical gains, however, come at a cost; when prices increase, for example, improvements in the well-being of net producers will not account for resulting increases in production and thus will be underestimated. Similarly, losses suffered by net consumers will be overestimated because substitution into competing goods will not be reflected. Nevertheless, given that most countries lack time series data on income distribution, the Sahn-Sarris approach provides a framework for examining the direct effect of changes in key prices as well as the indirect effect of adjustment policies more broadly through changes in wage rates.

While acknowledging these qualifications, Sahn and Sarris conclude that "there is little evidence of large welfare gains or losses" for the poor arising from the changes in relative prices witnessed in the 1980s in their five countries despite the overall decline in average incomes noted above. The article focuses, however, on rural smallholders. Although most of Africa's poor are in this group, it leaves open the question of what happened to the urban poor. One inference to be drawn from this article is that much of the burden of adjustment in Africa falls on those, including the poor, in urban areas.

A key conclusion of the *World Development Report 1990* is that economic growth does not translate automatically into comparable improvements in such nonincome measures of the poor's well-being as life expectancy, primary school enrollment, and so on. By the same argument it might be expected that temporary economic decline is not necessarily associated with a reversal in social progress. And yet much of the debate has focused on the issue of the poor's access to basic social services during the 1980s.

Behrman and Deolalikar focus on this issue in their analysis of the Jamaican structural adjustment program. They ask whether selected measures of well-being deteriorated significantly during 1984 and 1985, years of intense economic adjustment. They estimate the secular trend for each variable of interest and test for a statistically significant deviation from that trend in 1984 and 1985. By focusing on departures from trend, this method avoids the undue reliance on changes in levels that has often characterized previous studies.

Their general conclusion is that, when viewed as departures from trend, the changes observed in Jamaica in 1984 and 1985 are much less significant than has been suggested by other researchers, who focused on changes in level. For example, they find no evidence of significant deviations in a range of measures related to educational and health outcomes but do detect some nutritional deterioration among small children. Although there are clearly questions of the short- versus long-term sensitivity of well-being that cannot be addressed in this brief time frame, the value of their contribution lies in its emphasis on careful empirical investigation and interpretation.

The articles in this issue do not provide a definitive answer to the question of how poverty changed in the 1980s, but they do suggest that, as more careful empirical analysis becomes available, some of the more extreme views of the 1980s will have to be modified. They also point to some important insights and suggestions for future work. First and foremost, the quality and reliability of data related to poverty needs to be improved. The value of household surveys is revealed in Milanovic's study of Eastern Europe and Ahmad and Wang's analysis of China. This suggests the importance of improving the capacity of countries to undertake periodic surveys of living standards. Second, for many countries, and obviously for historical analysis, simpler approaches will be required. The articles by Sahn and Sarris and by Behrman and Deolalikar point to the variables that are most likely to be correlated with poverty and that could form the basis for analysis in data-scarce countries. Third, and consequently, empirical confirmation of the assumptions underlying these two articles would be an important contribution. In particular, can existing household surveys be used to test the Sahn-Sarris assumption that changes in producer and consumer behavior can be ignored in the short run so that the analyst can legitimately focus on changes in prices? Similarly, is the Behrman-Deolalikar reliance on such nationwide indicators as infant mortality appropriate for assessing changes in the well-being of the poor?

II. HAVE STRUCTURAL ADJUSTMENT POLICIES INTENSIFIED POVERTY?

Those who wish to tackle the second question must confront not only the absence of reliable data but also the need to specify what would have happened had the adjustment policies under consideration not been pursued. The need to compare results with an appropriate counterfactual applies to all analysis of economic policy, but it has often been forgotten in the debate on adjustment. In this respect Sahn and Sarris are careful to stress that their analysis of prices and poverty says nothing about adjustment policies precisely because they do not analyze what prices would have been without adjustment. Similarly, Behrman and Deolalikar's analysis of departures from trend says nothing about adjustment policies unless it is argued that the trend would have indeed continued had adjustment policies not been implemented, a slim possibility considering the untenable economic conditions of the period.

Among the policies commonly adopted in structural adjustment programs is devaluation of the domestic currency and reduction of disincentives to international trade. This is intended to increase foreign exchange earnings (improving the current account balance) and the perceived creditworthiness of the country (increasing capital inflows) and to induce a more efficient allocation of resources domestically to reflect the comparative advantage of the country. What is not known is whether these policies entail lower levels of welfare for the poor in the short run compared with a continuation of the existing policy regime or some other package of policies.

Reform of fiscal (and related monetary) policies raises the same issue. Clearly these programs can reduce welfare in the short run, but in most cases they were preceded by declines in terms of trade and external finance, increasing debt service costs, and unsustainable growth in external and fiscal deficits and inflation. Thus any analysis of the effects of structural adjustment on poverty must compare the outcome not with the preceding period, but with the outcomes that could be expected from alternative policies that would have been economically and politically feasible under the difficult conditions of the 1980s.

By stressing the importance of what would have happened without adjustment, the issue is correctly posed as one of choosing among alternatives. Bourguignon provides a simple framework for exploring options following a negative external shock. His analysis captures the key elements of the long-run strategy set out in the *World Development Report 1990* and places them in the context of a short-run economic crisis. The report demonstrated that poverty had been reduced most successfully in countries that both pursued growth that created productive opportunities for labor (thus increasing the most important asset owned by the poor) and invested in the human capital of the poor (thus increasing their capacity to benefit from the opportunities arising from economic growth). It argued that with this two-part strategy the poor not only benefited from growth but also contributed to it.

The report also recognized the need for a "safety net" to protect the poor during adverse circumstances arising from, for example, a major external shock. This is the starting point for Bourguignon's analysis. A permanent deterioration in the terms of trade that reduces income throughout the economy also raises the marginal value of income to the poor, thus increasing the social value of income transfers to them. But the marginal value of investment also increases because the structural adjustment that is now required realistically can only take place through new investment. The tradeoff between the use of limited resources for these two options is the fundamental dilemma confronting the policymaker.

Bourguignon explores this dilemma. He first asks, should resources be transferred to the poor immediately following the shock, through a system of taxes and transfers that entails both static and dynamic efficiency losses and realistically will result in some of the benefits going inadvertently to the nonpoor? And, if so, should the transfer be in the form of current income or productive assets, such as investment in human capital? Numerical optimization of Bourguignon's model produces results that suggest that in the first few years of adjustment the net social benefits of transfers to the poor will be less than the social benefits to investment. Then, when recovery is under way, investment in education and training of the poor will provide greater social benefits than will transfers of current income to them.

These illustrative results depend critically on the assumed values of a few key variables, especially the increased productivity of capital during restructuring and the efficiency cost of taxes and transfers. Moreover the analysis, by intention, makes no allowance for the possibility that the economy is operating well

within its production frontier before the shock or for the possibility that the market signals necessary to guide investment decisions take time to be put in place. If these assumptions were dropped, the resulting optimal policy would include increased resources being made available for consumption by the poor in the short run. Finally, as Bourguignon shows, the availability of external assistance changes the preferred outcome significantly—transfers are part of the optimal strategy, even in the short run, with investment in human capital taking an increasing proportion of the transfers over time.

The level of abstraction in the Bourguignon model is both its strength and its weakness. In an effort to provide more realism, Bourguignon, de Melo, and Suwa analyze models representing a low-income African economy and a middle-income Latin American one. Their approach allows a richer representation of the underlying economic structure; relative to the Latin American model, the African one is characterized by greater wage and price flexibility, a lower stage of institutional development, and less integration with international financial markets. The authors expose the two models to the same external shock and then explore several alternative responses. These can be divided into two cases. The first is a no-adjustment case, in which the authorities rely on import rationing to support a constant real exchange rate. The second is a set of adjustment packages, including real devaluation, tax and tariff reform, and compensatory income transfers.

The value of these models lies in their ability to trace the consequences of alternative adjustment paths on income distribution. This simultaneously reveals the impact on the poor and the sources of likely political resistance to adjustment (such as those benefiting from prior policies). The analysis of options reveals two key points. First, the no-adjustment option increases poverty: during the seven-year simulation period the head count index of poverty increases from 30 to 40 percent in Africa and from 12 to 36 percent in Latin America. This result flows directly from the assumed reliance on import controls, a policy that creates rents that mainly benefit the rich. Second, initial conditions have an important effect on the outcome (including the distributional consequences) of adjustment policies. Thus the option including a real devaluation helps most of the poor (those living in rural areas) in the African case through higher export earnings but hurts those in the informal sector (see the conclusion of Sahn and Sarris). The same package, however, hurts the rural and urban poor in Latin America. Here the poor rely more on wage income, and, because market rigidities prevent the economy from responding to the new structure of incentives, employment and real wages fall.

Experience in countries as diverse as Costa Rica, Ghana, and Indonesia reinforces the conclusions drawn from these models. By far the most important point, and the main message of the Bourguignon model, is that the primary objective of adjustment should be to move the economy as quickly as possible to a growth path that allows effective implementation of the two-part strategy outlined in the *World Development Report 1990*. Three measures seem espe-

cially important: swift action to restore a sound fiscal position and to realign relative prices; some consumption-smoothing, either through a temporary cut in investment or increased capital inflows; and efforts to ensure that cuts in public expenditure are not at the expense of items, especially basic social services, that are crucial to the well-being of the poor. In some cases (such as Indonesia) this combination of measures may reduce poverty even in the transition. In other cases (such as Costa Rica) poverty will intensify in the short run. Nevertheless this package holds the best prospect for a least-cost return to a growth path consistent with sustained increases in the well-being of the poor.

Although it is important to keep this central point in mind, many countries, and rightly so, have experimented with compensatory programs designed to act as a safety net during the transition. In designing such schemes, attention must be paid to their success in reaching the intended beneficiaries, their fiscal cost, and their impact on incentives. Public employment schemes are often proposed as cost-effective ways to transfer resources to the poor, provided the offered wage is sufficient to meet basic needs but not high enough to attract the relatively rich. Newman, Jorgensen, and Pradhan explore these issues in the case of Bolivia's Emergency Social Fund (ESF).

The ESF was established as a temporary program during Bolivia's economic crisis to finance requests from local authorities for small, labor-intensive projects. Unlike most such schemes, projects were executed and the workers hired by private subcontractors. The program has been very successful in attracting and disbursing substantial external funds. However, Newman, Jorgensen, and Pradhan consider how the program has affected the earnings of the workers hired. Of particular interest is their attempt to define what the participants would have earned without the ESF. This effort to establish a counterfactual leads to important insights.

At first glance it appears that the ESF has not been particularly successful in reaching the poor because most of the participants fall in the middle rather than the lowest deciles of the earnings distribution. But the definition of earnings in this calculation includes the earnings from the program. Estimates of the earnings of these workers without the ESF indicate, however, that about 30 percent of the participants would have fallen in the two lowest deciles of the earnings distribution and more than 70 percent in the bottom four deciles. This conceptually more accurate assessment of the fund's success in reaching the poor emerges through specification of a counterfactual.

The key element that determines the distributional effect of the program is the wage. Because private subcontractors are used, who pay market rates, the wage fails to act as a screening device. Thus, although the average participant in the program earns 51 percent more, about two-thirds of the transfer is required to replace forgone income, and not all of the net transfer accrues to the lower income groups. Thus the scheme, although reaching many relatively poor people, is not an especially cost-effective way to transfer income to the poor. Other programs, such as the Employment Guarantee Scheme in Maharashtra State in

India, set wages low enough so that only the poorest choose to participate. In principle this increases the share of the transfer reaching the poor and reduces the fiscal cost of any given transfer to the intended beneficiaries.

The articles in this issue cannot conclusively answer how adjustment policies have affected the poor. But they do emphasize the correct way to approach the problem—through a careful comparison of the results of alternative policies. The articles by Bourguignon and by Bourguignon, de Melo, and Suwa demonstrate the required approach, but the lack of country-specific application may weaken their salience for the policymaker. Country-specific analysis, however, is limited by the number of countries with reliable household-level data for the 1980s. This suggests that for future work it may be necessary to increase the size of the sample by using an approach such as that of Sahn and Sarris. But to address the question of the effect of adjustment, their approach would need to be combined with an assessment of the impact of alternative adjustment policies on key relative prices. At the very least this approach would make best use of the available data while still emphasizing the importance of comparing alternatives.

But not all effects of adjustment work through prices. At least two other areas warrant additional work. First is the need to assess the distributional consequences of public expenditures, especially those on basic health and education. Although an analysis by income class may only rarely be feasible, examining the distribution of expenditures by region (most of the poor reside in rural areas) and by service (preventive versus curative care, for example) may be possible and can provide the basis for a more equitable (and efficient) allocation of spending within the constraint imposed by macroeconomic conditions. The second is the importance of examining the effectiveness of programs designed to compensate those most vulnerable to the adverse effects of adjustment. Many countries are now pursuing schemes similar to the ESF to cushion the impact of adjustment on the poor. The fundamental issue in assessing these schemes is their cost-effectiveness in achieving their objective relative to other options. Subjecting them to the kind of analysis undertaken by Newman, Jorgensen, and Pradhan could increase their effectiveness in transferring income to the poor.

REFERENCES

- Atkinson, Anthony B. 1991. "Comparing Poverty Rates Internationally: Lessons from Recent Studies in Developed Countries." *The World Bank Economic Review* 5 (1): 3–21.
- Lanjouw, Peter, and Nicholas Stern. 1991. "Poverty in Palanpur." *The World Bank Economic Review* 5 (1): 23–55.
- Ravallion, Martin, and Monika Huppi. 1991. "Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period." *The World Bank Economic Review* 5 (1): 57–82.
- World Bank. 1990. *World Development Report 1990: Poverty*. New York: Oxford University Press.

Poverty in Eastern Europe in the Years of Crisis, 1978 to 1987: Poland, Hungary, and Yugoslavia

Branko Milanovic

Eastern Europe experienced an economic crisis between 1978 and 1987. Declining income led to substantial increases in poverty rates in Poland and Yugoslavia, while poverty in Hungary remained at about the same level as before the crisis. In all three countries urban poverty increased, as the economic condition of state sector workers deteriorated to a much greater extent than that of agricultural and mixed households. The increased poverty was entirely explained by declining income, because the overall income distribution did not change or in some cases improved.

In the past decade countries in Eastern Europe have experienced declining growth rates, debt problems, worsening economic efficiency, and a widening technological gap compared with the West. These aspects of the economic crisis in Eastern Europe have been studied recently by, among others, Gomulka (1988), Gomulka and Rostowski (1988), Winiecki (1986), Zloch (1987), and Knirsch (1984). However, little is known about how the crisis has affected the standard of living and its impact on poverty. Most studies on these topics have been anecdotal or are concerned with income distribution rather than poverty (Flakierski 1986, Morrisson 1984, Okrasa 1988, and Bergson 1984).

This article charts the evolution of poverty in Poland, Hungary, and Yugoslavia during the 1980s. A headcount index of poverty is used to look at poverty rates by country, for various social groups, and in rural and urban areas. The slowdown of growth and the reversal in the resource transfer in the three East European countries were so great that they were reflected at the level of households in an almost uniform decline in real income and increase in poverty.

Section I looks at the effects of recession on poverty in socialist countries and how they differ from those in capitalist countries. Section II presents macro-

Branko Milanovic is in the Country Economics Department of the World Bank. The discussion in this article is based in part on background papers prepared for the *World Development Report 1990* by Milanovic (1989), Posarac (1989), and Szalai (1989) on Poland, Yugoslavia, and Hungary, respectively. The author thanks Bela Balassa, Aleksandra Posarac, Tine Stanovnik, Irena Topinska, and the anonymous referees for their comments.

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economic indicators of the crisis in Poland, Hungary, and Yugoslavia and looks at the impact of the crisis on per capita income. Poverty lines, poverty rates, and income distribution in the three countries are discussed in Section III. Section IV analyzes the determinants of the poverty rate, and the change in the poverty rate is decomposed into the income, distribution, and demographic effects. Conclusions are presented in Section V.

I. THE EFFECTS OF RECESSION ON POVERTY IN SOCIALIST COUNTRIES

There are two primary ways in which the effects of recession on poverty may differ between socialist and capitalist countries. First, in capitalist economies the total income of those with a relatively high share of capital income decreases faster than does the income of other groups. In socialist economies the share of capital income in total household income is much less. Profits are originally not received by individuals, but are retained by enterprises or transferred to the state. Therefore a recession may not change the functional income distribution at the household level very much.

Second, the recession in the socialist economies during the 1980s was not accompanied by increased unemployment. In Poland and Hungary unemployment was virtually nonexistent, and in Yugoslavia unemployment as a percentage of the labor force remained unchanged. The wage bill was reduced through uniform cuts in all wages. This probably resulted in part from the strong role of workers' councils and trade unions at the enterprise level and in part from government policies designed to prevent increases in unemployment (including the subsidization of loss makers). Uniform wage cuts probably resulted in less severe effects on poverty than would have been the case if the same reduction in the wage bill had been achieved through layoffs (Nolan 1988-89; Buse 1982; Sawhill 1985, p. 1092).

In capitalist economies unemployment benefits may sustain some of the unemployed above the poverty line. However, the low share of capital income and the absence of increased unemployment suggest that the increase in poverty resulting from recession would, in a typical socialist economy and all other things being equal, be less than in a capitalist economy.

II. ECONOMIC CRISIS IN POLAND, HUNGARY, AND YUGOSLAVIA

The late 1970s marked the onset of economic crisis in Poland, Hungary, and Yugoslavia. During the 1970s a substantial inflow of foreign capital had masked the effects of weakening economic performances. But the period of relatively easy and cheap borrowing drew to a close, and the 1979 oil shock and increased real interest rates in the early 1980s were final blows for East European economies. By 1981 Poland, Hungary, and Yugoslavia were in deep crisis.

In Hungary and Yugoslavia the 1980s was a period of stagnation and crisis. In Poland two subperiods can be distinguished. From 1978 to 1982 real gross

domestic product (GDP) contracted by one-fifth, while from 1982 to 1987, GDP grew at an average annual rate of 5 percent. However, the current account deficit decreased from almost 6 percent of GDP during 1979 to 1982 to only 1.6 percent of GDP during 1982 to 1987. The impact of recovery on domestic demand and personal income was therefore less than the relatively high GDP growth rate alone would suggest.

Macroeconomic Indicators of the Crisis

Selected macroeconomic indicators of the crisis are given in table 1. Output per capita, which in the three countries grew at an average annual rate of between 5 and 7 percent during the 1970s, decreased in Poland and increased by less than 2 percent annually in Hungary and Yugoslavia during the 1980s. The substantial current account deficits that the countries were able to run in the previous decade were no longer feasible during the 1980s, when voluntary lending dried up. The squeeze on domestic demand originated from two directions: real output practically ceased to grow and resource transfers from abroad either decreased or became negative. All three countries attempted to protect personal consumption by making severe cuts in fixed investment. The decline in current consumption was arrested at some indeterminate cost in future output and consumption. The lower level of investment probably helped to widen the technological gap between these countries and the West (Brada 1989).

In Poland the crisis began in 1978, when the economy started on a fast downward plunge. GDP decreased by 20 percent during the next four years, thus recording the sharpest decline in postwar Europe. The level of GDP attained in 1978 was not regained until 10 years later. Per capita consumption was practically stagnant throughout the 1980s. After an almost 6 percent average annual growth in the 1970s, during the 1980s real wages declined by 3.7 percent a year. In 1987 real wages were thus 30 percent below the 1978 level. The share of gross fixed investment in GDP decreased by 8 percentage points.

Table 1. *Selected Macroeconomic Indicators of the Crisis*
(percent)

Indicator	Poland		Hungary		Yugoslavia	
	1970-78	1979-87	1970-78	1979-87	1970-79	1980-87
<i>Per capita growth rate^a</i>						
GDP	+7.1	-0.6	+5.9	+1.9	+5.1	+0.9
Consumption	+6.5	-0.2	+3.7	+2.6	+4.5	+0.8
Real wages ^b	+5.6	-3.7	+2.9	+0.1	+2.1	-2.2
<i>Share of GDP^c</i>						
Current account	-5.0	-3.5	-4.8	-2.5	-1.7	+0.2
Gross fixed investment	33.6	25.3	31.6	25.6	32.1	24.1

a. Average annual growth rate.

b. Real wages in the socialized sector of the economy.

c. Average annual value.

Source: *Statistical Yearbooks* of the three countries, except for current account, from IMF *International Financial Statistics* (various years), *Bilten Narodne Banke Jugoslavije* (various years), and IMF (1987).

During the 1980s Poland was compelled to reduce its current account deficit as a percentage of GDP to about half of its previous amount. Moreover, the current account deficit measured as a percentage of GDP was underestimated in the 1970s. This was due to an overvalued exchange rate of the zloty, which made the dollar GDP appear higher than it was in reality. Reduction in the external inflow of resources in the 1980s was thus greater than suggested by the data in table 1.

In Hungary the first full crisis year was 1979. Since then the rate of growth has failed to recover to the levels it routinely reached during the 1970s. Per capita consumption grew by an average annual rate of 2.6 percent during the 1980s, which compared with 3.7 percent during the 1970s. Hungary alone of the three countries succeeded in maintaining a constant real wage level. It reduced its current account deficit as a percentage of GDP to about half of its previous amount. The share of gross fixed investment in GDP decreased by 6 points.

In Yugoslavia the crisis began in 1980. It had been postponed by a surge in short-term borrowing in 1979, which allowed the country to finance a current account deficit equal to 6 percent of GDP. Per capita consumption was practically stagnant throughout the 1980s. The entire increase in real wages achieved during the 1970s was lost in the next decade. Yugoslavia's current account moved into surplus, and the share of gross fixed investment in GDP decreased by 8 percentage points during the 1980s.

Impact of the Crisis on Per Capita Income

The effect of the crisis on the population's standard of living is best illustrated by changes in income. Table 2 presents indexes of domestic demand, consumption, real wages, and income by type of household. The data are presented in per

Table 2. *Real Per Capita Indicators, by Type of Household, 1987*
(1978 = 100)

<i>Indicator</i>	<i>Poland</i>	<i>Hungary</i>	<i>Yugoslavia</i>
<i>Macro indicators</i>			
Domestic demand ^a	87.9	103.6	85.9
Consumption	98.0	126.1	100.5
Wages ^b	71.1	101.0	72.0
Pensions	83.2	120.4	88.1
<i>Household surveys</i>			
Workers ^c	67.8	103.9	63.0
Farmers	81.5	101.0	102.5
Mixed households	84.5	n.a.	81.8
Pensioners	82.6	118.2	n.a.

n.a. Not available.

a. For Yugoslavia, excludes changes in stocks.

b. Real wages in the socialized sector.

c. For Yugoslavia, includes all nonagricultural households (workers and pensioners).

Source: Data on the real income of different types of households are from household surveys. Other information is from *Statistical Yearbooks* of the three countries.

capita terms for 1987. The benchmark year for comparison is 1978, which was the last year in which there was relative prosperity in all three countries. Household survey data have been used to obtain the relative and absolute per capita income positions of workers, farmers, mixed households, and pensioners.

As already mentioned, by 1987 real wages in Poland were reduced by about 30 percent compared with their 1978 level. Real pensions decreased by 17 percent. The average pension as a percentage of the average wage increased from 45 to 53 between 1978 and 1987. The number of pensioners increased significantly (by more than 1.3 million) during 1982 to 1984, after the mandatory retirement age was lowered by five years. The change in retirement age was motivated by the fear that widespread unemployment would follow the introduction of market-oriented reforms in 1982 and 1983. The per capita income of workers' households was a third less in 1987 than it was in 1978. Per capita income of farmers, mixed households, and pensioners decreased by less than 20 percent, with mixed households doing somewhat better than the other two groups.

In Hungary real pensions in 1987 were some 20 percent higher than they were in 1978. The average pension as a percentage of the average wage increased from 48 in 1978 to 57 in 1987. During this period the share of pensioners in the total population increased because of the aging of the population. Real per capita income for workers and farmers was practically stagnant during the 1980s.

Real wages were reduced by about 30 percent between 1978 and 1987 in Yugoslavia. Real pensions decreased by 13 percent. The average pension as a percentage of the average wage increased from 58 in 1978 to more than 70 in 1987. In 1987 the per capita income of nonagricultural (workers and pensioners) households was 37 percent less than it was in 1978. Since these households include pensioners, whose relative position has deteriorated less than that of workers, the real income of workers must have been reduced by even more. The real income of farmers increased slightly, mainly because of favorable terms of trade in the early 1980s.

III. POVERTY IN POLAND, HUNGARY, AND YUGOSLAVIA DURING 1978 TO 1987

Intercountry comparisons of income inequality and poverty are fraught with difficulties. However, it can be argued that comparisons among Poland, Hungary, and Yugoslavia would be more reasonable than comparison of each of these countries with, say, the United Kingdom or the former Federal Republic of Germany. It is helpful that the level of development, the type of social system, and the macroeconomic performance of the countries are similar. The relative homogeneity of the comparators enables us to make intercountry comparisons and to draw general lessons about the changes in poverty during conditions of economic crisis in Eastern Europe.

In this section we first consider the official poverty lines in Poland, Hungary,

and Yugoslavia. We then look at poverty rates by household type and in rural and urban areas in the three countries. Finally we briefly discuss income distribution in Poland and Yugoslavia.

Poverty Lines

Intercountry comparisons can be valid only if the poverty lines in each country are nearly equal. We would expect this to be true for Poland, Hungary, and Yugoslavia, which have similar levels of development,¹ population compositions (significant agricultural labor force), and social systems (the prevalence of state ownership outside agriculture, widespread redistribution and subsidies, and egalitarian wage structure in the socialized sector).

We have used the official subsistence minimum to calculate the incidence of poverty in each country (appendix A). The social minimums are official in that they were calculated by official institutions (generally attached to ministries) and have been used as poverty lines in broad social debates. In each of the three countries, however, the calculated subsistence minimum has not been used as an eligibility criterion for social aid.

The official poverty lines are given in table 3 in international dollars, in terms of purchasing power parity, and as a percentage of the average wage in the socialized sector. For each country the official poverty line given is the per capita social minimum based on an urban household of four persons in 1985. From table 3 it is evident that the official poverty lines in Poland, Hungary, and Yugoslavia are quite similar. In dollar terms the three poverty lines are almost identical. In terms of purchasing power the Hungarian subsistence minimum is the highest. This reflects the relatively low prices of consumer goods in Hungary.

Expressed as a percentage of the average wage, all three poverty lines seem high compared with those in Western Europe. Atkinson (1991) reports that the per capita poverty line for a married couple with two children ranges from 12.5 percent of the average production worker's wage in the former Federal Republic of Germany to 33.7 percent in Sweden. There seem to be two possible explanations for the relatively high (in terms of average wage) poverty lines in Eastern Europe. First, a less developed country would tend to have a higher poverty line in terms of average wage, because the poverty line would normally increase by proportionately less than the average income (or wage). Thus Kilpatrick (1973) uses survey data to obtain an elasticity of the poverty line with respect to income of about 0.6. Smith and Welch (1989, p. 524) assume an elasticity of 0.5. Hagenaaars and van Praag (1982, pp. 151–52) obtain an elasticity of 0.54 for unchanged income distribution (elasticity is greater with a more unequal distribution). Based on surveys in the Yugoslav republic of Slovenia, Stanovnik (1989) estimates the income elasticity of the poverty line for urban households to be 0.57.

¹ According to 1989 World Bank data, per capita income in 1988 was \$1,850 in Poland, \$2,460 in Hungary, and \$2,680 in Yugoslavia.

Table 3. *Comparison of Official Poverty Lines, 1985*

<i>Country</i>	<i>Dollars^a</i>	<i>Purchasing power parity (international dollars)^b</i>	<i>As a percentage of the average wage in the socialized sector</i>
Poland	52.5	85.4	38.6
Hungary	52.7	125.6	45.0
Yugoslavia	51.3	110.5	34.1

Note: Poverty lines were calculated on a per capita basis for an urban household of four persons.

a. Monthly amount, converted at the official exchange rate.

b. International dollar value of consumption purchasing power parity.

Source: Household surveys, except for international purchasing power parity values, from United Nations (1988, p. 24 and annex table 3).

In figure 1 the per capita poverty line is expressed as a percentage of the average wage and is plotted against an indicator of the level of development (real per capita consumption at international prices) for market and socialist economies. Among the socialist economies only Hungary stands out with a poverty line that seems too high for its level of income. Poland and Yugoslavia are almost exactly on the regression line. The elasticity of the poverty line with respect to income is 0.56.

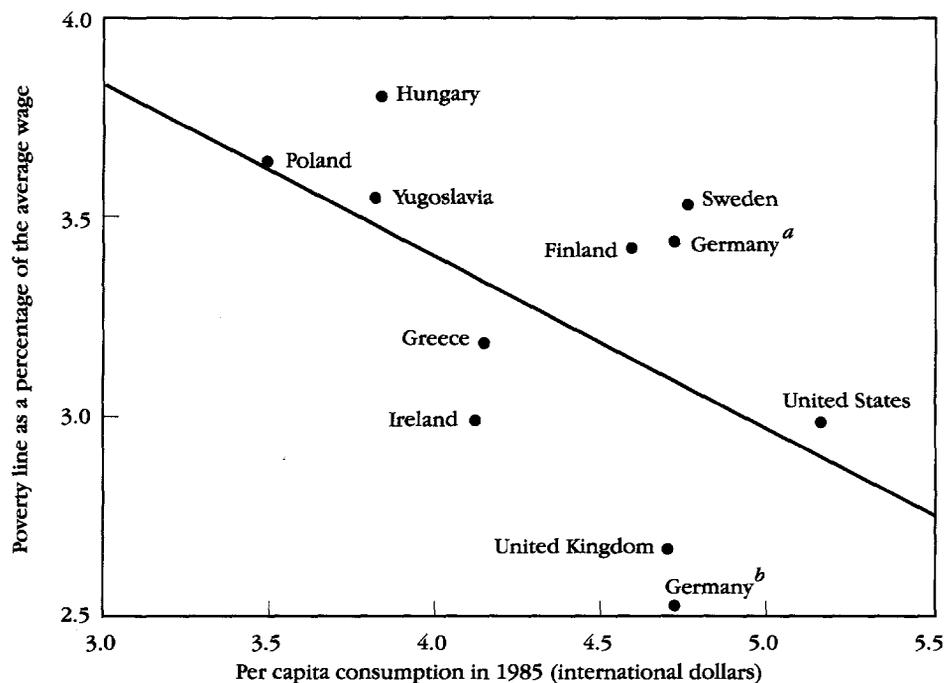
The second argument often used to explain the relatively high poverty lines in socialist economies is that poverty lines in socialist countries represent accounting devices that are devoid of any policy role. Households below the poverty line are not entitled to any benefits. Consequently, statistical poverty lines can be set at relatively generous levels. There may be some merit in this view, in that poverty lines that do carry policy implications (such as those of the former Federal Republic of Germany and the United Kingdom) are on the low side (see figure 1). The German example is particularly pertinent, since an estimated poverty line not related to policy is 2.5 times higher than the official line that triggers access to welfare benefits (see table 5). It is likely that, as Poland, Hungary, and Yugoslavia move closer to becoming market economies and develop welfare systems, official poverty lines will be lowered. It would be financially impossible to give income support to as much as one-fourth of the population.

Poverty Rates

During the 1980s the extent of poverty increased significantly in Poland and Yugoslavia and remained about the same in Hungary. Table 4 shows the estimated overall percentage of people living below the official poverty line in the three countries.² In Poland this percentage increased from less than 10 before

² A household whose income divided by the number of consumption units is less than the minimum (per consumption unit) is considered to be poor, and all members of the household are classified as poor. This approach was used for Poland and Yugoslavia. Hungarian data give subsistence minimums for different sizes and types of households, so that a direct comparison of household income with the minimum allows one to place the household above or below the poverty threshold. See appendixes A and B.

Figure 1. *The Poverty Line and the Level of Consumption*
(log scale)



Note: The poverty line is based on per capita income for an urban household of four persons. The estimated relation is $\log(P/W) = f(C)$, where P/W is the poverty line as a percentage of the average wage in the country and C is real per capita consumption at international prices in 1985. The estimated regression is $\log(P/W) = 5.1645 - 0.4416 \log C$
(0.001) (0.082)

with $\bar{R}^2 = 0.221$ and $SE = 0.364$. Assuming that both W and C measure the level of income and writing out the last relation, the elasticity of the poverty line with respect to income is equal to $1 - 0.4416 = 0.5584$.

a. Based on a calculated poverty line, which is not related to policy. This poverty line is 2.5 times higher than the official poverty line.

b. Based on the official German poverty line, which triggers access to welfare benefits.

Source: Per capita consumption at international prices is from United Nations Statistical Commission and Economic Commission for Europe (1988), table 5.11, p. 29, except for the United States, from OECD (1987), table 8. The poverty line is from country governments (see Appendix A), except for market economies, from Atkinson (1990).

the crisis to about 22 in 1987. In Yugoslavia the poverty rate was about 17 percent in 1978; by the mid-1980s it stabilized at 25 percent. In Hungary the poverty rate remained between 14 and 16 percent throughout the period. For comparative purposes the incidence of poverty based on official poverty lines for several OECD countries is shown in table 5.

Poverty Rates by Household Type. The poverty rates of major social groups in Poland, Hungary, and Yugoslavia are presented in table 6. Following the Polish classification, the poverty rates are given for four social groups: farmers, mixed households, workers, and pensioners. Mixed households are those where

Table 4. *Estimated Poverty Rates for Total Population, 1978–87*
(percent)

Year	Poland	Yugoslavia	Hungary
1978	9.2	17.5	15.4
1979	9.7	n.a.	n.a.
1980	11.1	n.a.	13.8
1981	13.9	n.a.	n.a.
1982	19.8	n.a.	14.8
1983	23.7	12.8	16.7
1984	21.9	21.5	n.a.
1985	19.1	25.7	15.7
1986	17.3	25.1	n.a.
1987	22.7	24.8	13.8

n.a. Not available.

Note: Data are for population living below the poverty line as a percentage of the total population.

Source: Author's calculations based on data from country governments (see appendixes A and B).

at least one member works full time in agriculture, while another is employed in industry or services. Workers' households include both blue- and white-collar workers. If a household includes both a worker and a pensioner, it is included in one or the other group depending on the dominant source of income.

In Poland the poverty rate among farmers increased from 15 to 21 percent between 1978 and 1987. The peak was achieved in 1983, following a 10 percentage point decline in the terms of trade between agriculture and industry. The poverty rate for mixed households increased the least of all four household types. The poverty rate among workers increased fourfold during the period. At the outset of the crisis, workers had the lowest poverty rate among the four groups. In 1987 one out of four persons living in workers' households was poor. The increase in the poverty rate for workers was reflected in a 30 percent decline in their real wages and per capita real income. Thus in 1987 farmers and mixed households had average per capita incomes, respectively, 9 and 3 percent *higher* than workers (table 7).

Throughout the period in Poland, the poverty rate was greatest among pen-

Table 5. *Poverty Rates in Selected OECD Countries*

Country and year	Percentage
Greece, 1982	22.7
Ireland, 1987	21.2
United States, 1985	14.0
Sweden, 1985	8.6
Germany, Fed. Rep. of, 1983	6.1
United Kingdom, 1985	4.5
Finland, 1985	2.9
Japan, 1984	1.0

Note: Data for Germany are based on the calculated poverty line, which is higher than the official poverty line (Germany^a in figure 1).

Source: Japan, Larin (1989); all other countries, Atkinson (1990).

sioners (see table 6). However, there were two distinct periods. In the first period the extent of poverty among pensioners increased rapidly. By 1983 one out of two persons in pensioners' households was poor. After 1983 the poverty rate for pensioners gradually declined to slightly over 25 percent in 1986 and 1987. This coincided with an increase in the number of pensioners from 11 percent of the total population in 1978 to almost 18 percent in 1987. The large number of new pensioners, whose pensions were higher than those of previous retirees, resulted in an increase in the average real pension and a drop in the poverty rate.

In Yugoslavia the poverty rate for the nonagricultural population (workers and pensioners) doubled; however, it remained lower than the poverty rate for mixed households and farmers. Unlike in Poland, the average per capita income for nonagricultural households remained higher than that of the other two groups (see table 7). The poverty rate for farmers declined sharply from 42 percent in 1978 to 27 percent in 1983 (when agricultural terms of trade improved), but increased to 45 percent in 1986 and 1987.

The real income of households in Hungary deteriorated much less than in

Table 6. *Poverty Rate, by Social Group, 1978-87*

Country and year	Percentage of population in each category with income below poverty line			
	Farmers	Mixed	Workers	Pensioners
<i>Poland</i>				
1978	15	10	6	21
1979	17	13	6	17
1980	17	11	8	24
1981	16	11	11	29
1982	21	16	17	36
1983	30	13	19	49
1984	25	13	19	39
1985	20	11	17	32
1986	19	9	17	25
1987	21	13	25	28
<i>Yugoslavia</i>				
1978	42	17	9	n.a.
1983	27	13	10	n.a.
1984	27	28	17	n.a.
1985	39	31	20	n.a.
1986	45	30	18	n.a.
1987	45	27	20	n.a.
<i>Hungary</i>				
1978	n.a.	n.a.	n.a.	21
1980	n.a.	n.a.	n.a.	17
1982	n.a.	n.a.	n.a.	13
1983	n.a.	n.a.	n.a.	18
1985	14	n.a.	18	14
1987	11	n.a.	17	11

n.a. Not available.

Note: For Hungary, farmers category includes mixed households. For Yugoslavia, workers category includes pensioners.

Source: Country governments (see appendixes A and B).

Table 7. *Per Capita Income, by Social Group, 1978, 1983, and 1987*
(percentage of per capita income of workers)

<i>Country and type of household</i>	1978	1983	1987
<i>Poland</i>			
Mixed	82	100	103
Farmers	91	107	109
Pensioners	77	78	93
<i>Yugoslavia</i>			
Mixed	70	87	91
Farmers	50	82	82
<i>Hungary</i>			
Pensioners	84	93	96

Note: Workers' income refers to the per capita income of workers' households in Poland, non-agricultural households in Yugoslavia, and active workers' and farmers' households in Hungary.

Source: Author's calculations based on data from country governments (see appendixes A and B).

Poland or Yugoslavia (see table 2). The poverty rate for workers was between 17 and 18 percent during 1985 to 1987. Poverty rates for pensioners and farmers decreased from 14 percent in 1985 to 11 percent in 1987.

Rural and Urban Poverty Rates. At the end of the 1970s poverty was predominantly a rural phenomenon in Poland, Hungary, and Yugoslavia. By the end of the 1980s it had become an urban phenomenon. However, the increased urban poverty did not occur as a result of rapid migration to the cities; it was caused by the gradual impoverishment of the already existing urban labor. The descent into poverty for the already established urban population was, among other things, associated with the inability to procure replacements for worn out consumer durables. Televisions, washing machines, and other consumer durables suddenly became too expensive for an ordinary household. Increased rents and electricity bills sharply compressed the affordable standard of living below the accustomed level. This reversed the standard of living to a level that households might have had some 20 years earlier.

Increased urban poverty can be politically accommodated if it is the result of people migrating from villages, looking for better jobs, and accepting a temporary decline in their standard of living. People in these circumstances assume that their situation will improve. A descent into poverty of the people who are already living in cities is socially more destabilizing. There are two reasons for this. First, there would be no basis for expecting that the situation would improve. This lack of hope has pervaded most of Eastern Europe in the 1980s. Such a feeling cannot exist in a rapidly industrializing developing society. Second, this was not a voluntarily accepted temporary decline in the standard of living, such as that existing among migrants.

The number and percentage of people living below the poverty line in rural and urban areas are presented in table 8. Before the crisis the rural poor accounted for 52 percent of total poor in Poland and three-quarters in Yugoslavia.

Table 8. *Population Below the Poverty Line in Rural and Urban Areas, by Country, 1978 and 1987*

	<i>Rural</i>	<i>Urban</i>	<i>Total</i>
	<i>Thousands</i>		
<i>Poland</i>			
1978	1,760	1,627	3,386
1987	2,441	5,879	8,321
<i>Yugoslavia</i>			
1978	2,592	837	3,429
1987	2,707	2,411	5,118
	<i>Percentage of total number of poor</i>		
<i>Poland</i>			
1978	52	48	100
1987	29	71	100
<i>Yugoslavia</i>			
1978	76	24	100
1987	53	47	100

Note: Rural poor are farmers and mixed households. Urban poor are workers and pensioners for Poland and nonagricultural households for Yugoslavia.

Source: Author's calculations based on data from country governments (see appendixes A and B).

About 10 years later the urban poor represented 70 percent of all the poor in Poland and almost one-half in Yugoslavia. The marked shift toward urban poverty is not to any significant extent the product of the changing structure of population. Between 1978 and 1987 the urban population increased by 15 percent in Poland and 24 percent in Yugoslavia; for the same period the number of urban poor increased 3.6 times in Poland and 2.9 times in Yugoslavia.

Income Distribution

The poverty rate for workers increased under circumstances of unchanged income distribution. The Gini coefficients for workers in Poland and non-agricultural households in Yugoslavia remained stable during the 1980s.³ In 1981 and 1982, when real wages and real per capita income for workers in Poland plunged, the narrow dispersion of income was reflected in an extremely low Gini coefficient of 0.18. For the remainder of the 1980s the Gini coefficient was between 0.21 and 0.22 in Poland. In Yugoslavia the Gini coefficient varied between 0.30 and 0.32. Thus the increased poverty rate for workers in Poland and Yugoslavia occurred almost solely because of a uniform cut in real income. It appears that everyone was in effect pushed below the earlier wage (income) level by the same proportion, which left the shape of the income distribution curve unchanged. This is not an unexpected reaction in societies with a strong egalitarian tradition and in which enterprises are run by workers' councils or trade unions. It is beyond the scope of this article to try to ascertain whether such a uniform decline had some deleterious impact on productivity by, for

³ This is the Gini coefficient of persons living in workers' households when households are ranked by their per capita income.

example, reducing absolute income differences and further discouraging (already scarce) innovation, risk-taking, and outstanding work effort. If this did occur, it might have unwittingly deepened the crisis (Socha 1989).

IV. POVERTY, INCOME, AND REDISTRIBUTION

The study of poverty should enable us to relate changes in the incidence of poverty to macroeconomic variables and to disentangle the influence of income changes from the influence of income redistribution. If these relations can be established and found to be statistically robust, they would allow us to make conclusions about the impact of various macroeconomic measures on poverty. This section considers only Poland and Yugoslavia, since there are insufficient data for Hungary. In order to expand the time series and make our conclusions stronger, data for different social groups (workers, farmers, and pensioners) are pooled.

Determinants of Poverty Rates

Results of the estimated equation for the determinants of the poverty rates in Poland and Yugoslavia are presented in table 9. The first explanatory variable is average real per capita income of the social group, which we would expect to be negatively related to the poverty rate. The second explanatory variable is the Gini coefficient for each group, which we would expect to be positively related to the poverty rate.

The elasticity of the poverty rate with respect to income is 0.52 for Poland and 0.43 for Yugoslavia. Thus, in order to reduce the poverty rate by 1 percentage point, real per capita income needs to increase, on average and without any change in income distribution, by about 2 percent in Poland and 2.5 percent in Yugoslavia. The implication is that more people in Poland than in Yugoslavia are bunched slightly below the poverty line.

Table 9. *Determinants of Poverty Rates in Poland and Yugoslavia, 1978-87*

Country	Constant term	Income term	Distribution term	\bar{R}^2 (F)	Standard error
Poland	391.53** (0.00)	-52.23** (0.00)	9.105* (0.04)	0.777 (51.5)	4.44
Yugoslavia	293.39* (0.016)	-42.98** (0.0)	46.405* (0.014)	0.890 (45.6)	4.05

* Coefficient is significant at 5 percent level.

**Coefficient is significant at 1 percent level.

Note: For each country equation, data are pooled for different social groups. The equations are of the semilog form: $POOR = constant + B1 \log(\text{income}) + B2 \log(\text{distribution})$, where, for each social group and year, POOR is the percentage of the poor, income is the average per capita income, and distribution is the Gini coefficient. For Poland the social groups are workers, farmers, and pensioners. For Yugoslavia the social groups are agricultural and nonagricultural households. Data in parentheses show the level of significance at which the null hypothesis is rejected. The number of observations is 30 for Poland and 12 for Yugoslavia.

Source: Author's calculations.

Not unexpectedly, in light of the fairly egalitarian distribution of income in Poland, a given change in income inequality has less of an effect on poverty in Poland than in Yugoslavia. To reduce the poverty rate by 1 percent, inequality in the income distribution (measured by the Gini coefficient) must decrease by 2 percent in Yugoslavia and by more than 10 percent in Poland.

Decomposition of the Change in Poverty Rates

Even if the level and distribution of income remain the same, poverty rates could go up or down because of demographic changes in the population. Such demographic changes could be different population growth rates in rural and urban areas, migration of the population from one area to another, or changes in the distribution of the population among the major social groups. The change in poverty rates between 1978 and 1987 can be decomposed into three components: change in the overall level of income, change in the pattern of income distribution, and change in the demographic composition of the population.

In table 10 these three components are broken down into the income effect, the distribution effect, and the demographic effect. The data show that the income effect has been the most significant determinant of changes in the poverty rate in Poland and Yugoslavia. However, the implied increase in poverty resulting from the decline in income has been greater than the actual increase in poverty because redistribution in Poland and redistribution plus favorable demographic changes in Yugoslavia have combined to mitigate the impact of falling income. If the overall income in 1987 had been equal to that before the

Table 10. *Decomposition of Change in Poverty between 1978 and 1987*
(percentage points)

	<i>Income effect</i>	<i>Distribution effect</i>	<i>Demographic effect</i>	<i>Total effect^a</i>
<i>Poland</i>				
Workers	+18.7	-2.4	+2.5	+18.8
Mixed	+9.8	-5.9	-0.2	+3.1
Farmers	+15.6	-7.7	-0.2	+6.5
Pensioners	+19.0	-11.3	+1.2	+6.8
Total	+16.7	-4.2	+1.5	+13.5
<i>Yugoslavia</i>				
Agricultural	+18.3	-15.4	0.0	+1.0
Mixed	+14.4	-3.1	-1.3	+9.4
Nonagricultural	+9.1	+0.2	+1.9	+11.4
Total	+11.8	-3.3	-0.7	+7.3

Note: The income effect is calculated by assuming the 1978 level of countrywide real income and everything else as it was in 1987. Average incomes of different social groups (or regions for Yugoslavia) are adjusted linearly, which implies that relative incomes of these groups are the same as in 1987 and thus may be different from what they were in 1978. The demographic effect is calculated by assuming the 1978 composition of the population (between social groups and sizes of households) and everything else as it was in 1987. The distribution effect is calculated as a residual.

a. The difference between the total effect and the sum of the three individual effects is due to an interaction term.

Source: Author's calculations based on country government data (see appendixes A and B).

crisis, then only 6 percent of the population in Poland and 13 percent in Yugoslavia would have been living below the poverty line in 1987. The actual poverty rates in Poland and Yugoslavia in 1987 were 23 and 25 percent, respectively. Poverty was raised by all three effects only in the case of nonagricultural households in Yugoslavia. The negative demographic effect was due to the higher population growth rate of the urban population in the less-developed regions.

V. CONCLUSIONS

The deep economic crisis that characterized Eastern Europe during the 1980s had a strong impact on average income and the percentage of people living below the poverty line. The situation deteriorated most sharply in Poland, where the number of people living below the poverty line increased from less than 10 percent of the population before the crisis to more than 20 percent by the late 1980s. In Yugoslavia the increase was somewhat less, from 17 to 25 percent. In Hungary the overall poverty rate remained constant. Perhaps as important was the change in the composition of poverty: whereas before the crisis most of the poor lived in rural areas, now most of the poor (as many as 70 percent in Poland) lived in cities. The urban, socialized sector (including white-collar workers) was the social group most affected by the economic decline. Their real wages, or the real per capita income of their households, declined by more than 30 percent in Poland and Yugoslavia. The reduction in income was accompanied by an unchanged pattern of income distribution; generally, socialized sector wages were cut uniformly across the board.

APPENDIX A. POVERTY LINES AND SOCIAL AND SUBSISTENCE MINIMUMS

For Hungary and Yugoslavia the social minimums are in effect subsistence minimums, which render it "possible merely to satisfy very modest necessities conventionally considered to be essential to ensure continuous living" (*Hungarian Statistical Yearbook* 1987, p. 328). Both Hungary and Yugoslavia also publish data on the social minimum, which is some 20 percent higher than the subsistence minimum. In the analysis for Poland, we use the social minimum, in which some 10 percent of resources are supposed to have been left at the discretion of the household to be used to satisfy nonessential needs. The Polish social minimum, however, is less, in real terms, than the subsistence minimum in Yugoslavia and Hungary (see table 3).

Consumption baskets are based on actual consumption patterns (for example, in Yugoslavia, the structure of consumption of the lowest income decile), which are corrected to reflect "healthy" normal consumption. All three minimums assume that the household rents a state-owned or cooperative apartment (with rents substantially below market levels). However, since most people either live in their own housing (necessitating only low direct maintenance expenditures and being charged mortgages at vastly negative interest rate) or in state or

cooperative apartments, the underestimate of the poverty line resulting from housing costs is probably small.

In Poland the social minimum has been calculated quarterly since 1980 by the Institute of Labor and Social Affairs. The basket of goods has been kept constant since 1983. In order to preserve an absolute standard of measurement, we have extended back to 1978 the real value of the social minimum for 1983.

In Hungary social and subsistence minimums have been calculated since 1982 by the Central Statistical Office. For the period before 1982, it was assumed that the ratio of the minimum to the average monthly per capita income was the same as in 1982. Since real per capita income in 1978 and 1980 was about the same as in 1982, this is tantamount to using a constant absolute level.

For Yugoslavia the social minimum has been calculated by the Federal Secretariat of Labor, Health, and Social Policy since the early 1980s. We had access only to 1987 and 1986 data; the values for other years were obtained by deflating 1987 data by the retail price index. In order to obtain the subsistence minimum, two categories (clothing and consumer durables) were excluded from seven categories of commodities that make up the social minimum.

The total percentage of people in poverty is obtained by applying different poverty lines to people belonging to different social (or regional) groups. In Poland there are four such minimums for workers', mixed, farmers', and pensioners' households. In Hungary there are separate minimums for each type of household (active and nonactive) and for each household size. In Yugoslavia there is a minimum for each of the eight republics or provinces. Consequently, the use of the national minimum in the combined set of data for all households will not in general yield the same result as the one presented here.

APPENDIX B. SOURCES OF DATA ON HOUSEHOLD INCOME

Polish results are based on annual household surveys conducted by the Central Statistical Office and covering 8,500 in the early years and more than 20,000 households later. Households are divided into four social groups (workers, mixed, farmers, and pensioners) and 7 to 8 income groups, ranked by per capita household income. The surveys are representative of about 90 percent of the population (the army, police, and private nonagricultural sector are not included).

Yugoslav data for 1978 and 1983 come from five-year surveys of 19,000 households. Data for other years are calculated from annual surveys of 6,000 households. All households are divided into three social groups (non-agricultural, mixed, and farmers) and between 10 and 11 income groups (ranked by per capita household income). Surveys are conducted by the Federal Statistical Office.

Hungarian data come from biannual household surveys conducted by the Central Statistical Office. For 1985 and 1987 it is possible to break overall data into three social groups (workers, farmers, and pensioners); for earlier years

only results for total population and pensioners' households could be calculated. The number of income groups varies between 8 and 12 (ranked by per capita household income).

There are no indications that the surveys have in general become less reliable or display a systematic bias throughout the period under study. The surveys, however, do have several flaws. For example, Polish samples have a response rate of only about 70 percent. The director of the Department of Household Budgets in the Polish Central Statistical Office points out that rejections are the highest among the poor and the well-off households (personal communication to the author). The incidence of poverty (even in relative terms) may therefore be somewhat understated. In Yugoslavia surveys include some inappropriate income items (such as revenues from the sale of assets). Since this item is shown together with income from the lease of assets, it is impossible to deduct it from income. Income is thus overestimated, and poverty incidence is biased downward. Income data in the surveys in all three countries fail to adequately reflect interest income from financial assets. When real return on these assets (including foreign exchange) was slightly negative or nil, the bias was not very significant. In the 1980s, however, the real rate of return on foreign exchange was almost continuously positive, and in some years it was very high. However, the real return on domestic deposits, particularly in Poland and Yugoslavia, which experienced high inflation, swung violently: in some years it was strongly negative, while in others it was around zero. Because of the lack of data on the distribution of financial assets by income groups, it is impossible to adjust income for this element. Consequent underreporting of income creates an upward bias in poverty statistics (even if the bias may not be high, since poor households typically have few financial assets).

REFERENCES

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Atkinson, A. B. 1990. "Comparing Poverty Rates Internationally: Lessons from Recent Studies in Developed Countries." Background paper for *World Development Report 1990*. World Bank, Washington, D.C. Processed.
- Bergson, Abram. 1984. "Income Inequality under Soviet Socialism." *Journal of Economic Literature* 22 (September): 1052-99.
- Brada, Josef. 1989. "Technological Progress and Factor Utilization in Eastern Europe." *Economica* 56 (November): 433-48.
- Buse, Adolf. 1982. "The Cyclical Behavior of the Size Distribution of Income in Canada: 1947-78." *Canadian Journal of Economics* 15 (May): 191-204.
- Flakierski, Henryk. 1986. *Economic Reform and Income Distribution: A Case Study of Hungary and Poland*. New York: M. E. Sharpe.
- Gomulka, Stanislaw. 1988. "Soviet Equilibrium Technological Gap and the Post-1975 Productivity Slowdown." *Economics of Planning* 22 (1-2): 1-17.

- Gomulka, Stanislaw, and Jacek Rostowski. 1988. "International Comparison of Material Intensity." *Journal of Comparative Economics* 12 (December): 475-501.
- Hagenaars, Aldi, and Bernard van Praag. 1982. "A Synthesis of Poverty Line Definitions." *Review of Income and Wealth* (September): 345-59.
- Hungary, government of, Central Statistical Office. Various years. *Hungarian Statistical Yearbook*. Budapest.
- International Monetary Fund. 1987. *Poland: Recent Economic Developments*. Washington, D.C.
- International Monetary Fund. various years. *International Financial Statistics*. Washington, D.C.
- Kilpatrick, R. W. 1973. "The Income Elasticity of the Poverty Line." *Review of Economics and Statistics*: 327-32.
- Knirsch, Peter. 1984. "The Limits to Growth in Socialism." *Survey* 28 (Spring): 70-82.
- Larin, Kathryn. 1989. "Country Comparative Study: Industrialized Countries." Background paper for *World Development Report 1990*. World Bank, Washington, D.C. Processed.
- Morrisson, Christian. 1984. "Income Distribution in East European and Western Countries." *Journal of Comparative Economics* 8 (June): 121-38.
- Milanovic, Branko. 1989. "Poverty in Poland in the Years of Crisis, 1978-87." Background paper for *World Development Report 1990*. World Bank, Washington, D.C. Processed.
- National Bank of Yugoslavia. various years. *Bilten Narodne Banke Jugoslavije*. Belgrade.
- Nolan, Brian. 1988-90. "Macroeconomic Conditions and the Size Distribution of Income: Evidence from the United Kingdom." *Journal of Post Keynesian Economics* 11 (Winter): 196-221.
- OECD (Organisation for Economic Co-operation and Development). 1987. *Purchasing Power Parities and Real Expenditures*. Paris.
- Okrasa, Wladek. 1988. "Redistribution and the Two Dimensions of Inequality: An East-West Comparison." *European Economic Review* 32 (March): 633-43.
- Poland, government of, Central Statistical Office. Various years. Official, unpublished statistics. Warsaw. Processed.
- Poland, government of, Institute of Labor and Social Affairs. Various years. Official, unpublished statistics. Warsaw. Processed.
- Posarac, Aleksandra. 1989. "Poverty in Yugoslavia 1978-87." Background paper for *World Development Report 1990*. World Bank, Washington, D.C. Processed.
- Sawhill, Isabel. 1988. "Poverty in the United States: Why Is It So Persistent?" *Journal of Economic Literature* 26 (September): 1073-119.
- Smith, James, and Finis R. Welch. 1989. "Black Economic Progress after Myrdal." *Journal of Economic Literature* 27 (June): 519-64.
- Socha, Mieczyslaw W. 1989. "Wages and Incentives Problems." In Roger A. Clarke, ed., *Poland: The Economy in the 1980s*. London: Longman.
- Stanovnik, Tine. 1989. "The Direct Measurement of Welfare Levels in Slovene Households." *Economic Analysis and Workers' Management* 23 (1): 43-54.
- Szalai, Julia. 1989. "Poverty in Hungary during the Period of Economic Crisis." Back-

- ground paper for *World Development Report 1990*. World Bank, Washington, D.C. Processed.
- United Nations Statistical Commission and Economic Commission for Europe. 1988. *International Comparison of Gross Domestic Product in Europe 1985*. New York: United Nations.
- Winiecki, Jan. 1986. "Are Soviet-Type Economies Entering an Era of Long-term Decline?" *Soviet Studies* (July): 325-48.
- World Bank. 1989. *World Bank Atlas 1989*. Washington D.C.
- Yugoslavia, government of, Federal Secretariat of Labor, Health, and Social Policy. Various years. Official, unpublished statistics. Belgrade. Processed.
- Yugoslavia, government of, Federal Statistical Office. Various years. Official, unpublished statistics. Belgrade. Processed.
- Zlock, Iliana. 1987. *Debt Problems of Eastern Europe*. New York: Cambridge University Press.

Macroeconomic Adjustment and Poverty in Selected Industrial Countries

Christopher A. Pissarides

The business cycle affects the incidence of poverty, as shown by evidence from Australia, Sweden, the United Kingdom, and the United States. Many of the poor in these countries are outside the labor market, and transfers are a major source of income for many others, but the unemployment and wage reductions that occur in recession increase the incidence of poverty. Major causes of poverty are unemployment in Australia and the United Kingdom and low wages in the United States. Similar cyclical effects are observed in Sweden, but a vast transfer program virtually eliminates poverty. There are several policy options for combating poverty caused by recession. A combination of unemployment insurance for a limited period followed by a job guarantee is the most effective policy toward unemployment, whereas poverty caused by low earnings can be remedied by redistribution through the tax system.

This article analyzes the relation between macroeconomic adjustment, in particular cyclical booms and recessions, and poverty in four industrial countries: Australia, Sweden, the United Kingdom, and the United States. The countries were selected for their diverse characteristics. The United States has the richest, most decentralized, and most diverse economy in the world, yet officially measured poverty is high and has remained largely unchanged since the late 1960s. The United Kingdom was the first country to introduce a comprehensive welfare state, but more recently it has been noted for its inflexible economy and high unemployment. Sweden is the most egalitarian Western society, with high taxation, a vast transfer program, and low unemployment. Australia combines features of the United Kingdom and Sweden: more corporatist than the United Kingdom but still suffering from many of its labor market problems.

Section I examines the characteristics and labor market status of the poor in each of the four countries. Although transfer payments are the main component of the income of the poor, the key to their changing fortunes during macro-

Christopher A. Pissarides is in the School of Business Administration at the University of California, Berkeley and in the London School of Economics. He benefited from the comments and suggestions of Anthony Atkinson, Bjorn Gustafsson, David Piachaud, Michael Walton, and anonymous referees, and from the excellent assistance of Andrea Brandolini.

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economic adjustment is their labor market status. Individuals close to the poverty line move in and out of poverty during the business cycle in response to both changes in their employment status and fluctuations in their wage earnings.

Section II examines the differing incidence of unemployment, the income distribution, and the behavior of low wages during the business cycle. Recent theories of wage determination under different institutional arrangements suggest that, in the United States in particular, low wages are likely to be much more responsive to cyclical macroeconomic fluctuations than average wages are. Although this pattern is found to some extent in other countries, unemployment is likely to be a more serious cause of poverty during a recession in the United Kingdom and Australia than falling wage earnings.

Finally, section III considers the policy options available to combat the effects of the business cycle on poverty. Sweden's experience has shown that the combination of an unemployment insurance system with a job guarantee for the unemployed after some months of unemployment, or a training scheme for young unemployed persons, can be very effective in dealing with the poverty caused by unemployment. When poverty results from low wages, a negative income tax is the most natural way to provide income support. Institutional change can increase the flexibility of the labor market.

Although the emphasis here is on short-run changes in poverty resulting from temporary fluctuations in economic activity, labor market changes that are unrelated to the business cycle also affect the poor. Recent examples of such changes are the rise in European unemployment since 1974 and especially since 1979, which many think cannot be reversed by macroeconomic expansion, and the increased divergence between skilled and unskilled (and between white and black) earnings in the United States. I shall largely ignore specific references to such "structural" or "secular" changes in unemployment and wages, except to note two things. First, although in theory it is clear what is cyclical, secular, or structural, in practice these are less easy to identify. The recent fall in unemployment in the United Kingdom is a pertinent example: what many considered to be a secular rise in unemployment was largely reversed when the economy expanded after 1986. Second, changes in labor market incomes have the same effect on the poor, regardless of the source of the change. Thus, any discussion about the effects of cyclical fluctuations in labor market incomes applies equally well to changes in incomes caused by secular or structural factors. But the policy responses to structural or secular changes are likely to be different from the ones discussed here. Groups in the population that are chronically poor and are largely unaffected by business fluctuations may well see no benefit from the policies discussed.

I. THE POOR AND THEIR SOURCES OF INCOME

In advanced countries where objective measures of poverty, such as malnutrition, are not relevant, poverty is a difficult notion to define. The approach

usually followed is to adopt a fairly simple definition that incorporates measured "equivalent" income, which is household income adjusted for household composition, and some broadly defined measure of household needs (for more discussion on the measurement of poverty see, for example, Sen 1976, Atkinson 1987, and Hagenaars 1986). Most countries adopt one of three conventions when measuring poverty. The first convention is to draw a "poverty line" such that all persons with equivalent income below this line are counted as poor. The poverty line is defined in real terms, so it is adjusted for inflation but not for changes in average income or in any other characteristics of the distribution of income. The United States was the first country to adopt such a definition of poverty. The real level of income that is used to define poverty in that country has not changed since its introduction in the 1960s.

The second commonly used definition of poverty is an administrative one and depends on existing social welfare policies. Many countries effectively guarantee a minimum level of income through income support programs, incorporating both cash and in-kind benefits. The income guaranteed is not in the form of a clear-cut "line" but depends partly on the subjective judgment of the social welfare officer in charge of each case. Nevertheless, the case officers follow guidelines established by a central welfare department, so it is possible to calculate the number of families receiving this kind of assistance and others with similar incomes not receiving it. These families are counted as the poor. This definition of poverty was in general use in the United Kingdom until 1985, when it was discontinued in favor of the third definition discussed below, and it is in use in public discussion in Sweden. The effective poverty line according to this definition varies with average income, because policymakers usually define the level of income support on the basis of average earnings. But adjustment of the guaranteed income level is not automatic and depends on the generosity of the government.

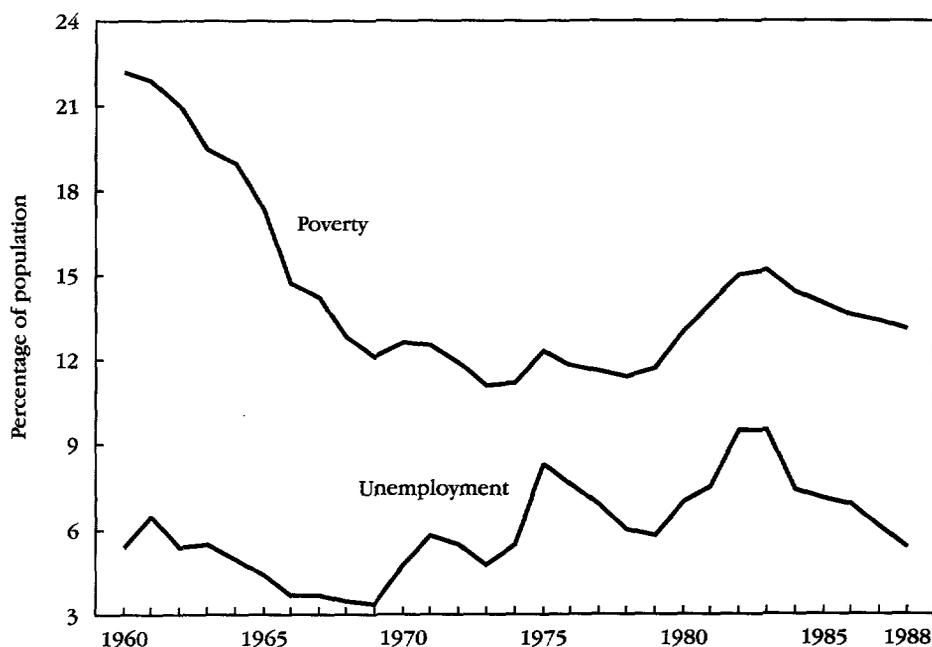
The third convention defines poverty in terms of the distribution of income; in the United Kingdom those with incomes not exceeding one-half of mean income are regarded as poor. When this definition is adopted, economic growth or business fluctuations do not influence officially measured poverty, unless they also influence the distribution of income. This definition of poverty is easier to compute than the others, and it is comparable across national frontiers and over time. For this reason it is often used in reports prepared for or by international organizations, such as the European Community (Commission of the European Communities 1981), the Organisation for Economic Co-operation and Development (OECD 1976), and the International Labour Office (Beckerman and others 1979).

Important as the difficulties in measuring poverty are, their significance for social research can easily be exaggerated. For many purposes, the precise definition of poverty is not very important. Indeed, for this study, an examination of the implications of booms and recessions for the incomes of households at the bottom end of the income distribution is sufficient. Exactly where the line that

divides the poor from the nonpoor is drawn is not very important in this analysis. What is more important are the sources of income of the poor and in particular how different types of income are affected by booms and recessions.

For the purposes of calculating poverty in the United States, household income is defined to include transfer income but not benefits in kind. (It is likely that in the future benefits in kind will also be included in official poverty statistics, but no comprehensive series is currently available.) The United States poverty rate was about 22 percent of the population in 1959 and 13 percent in 1988 (see figure 1). The poverty rate declined up to 1969, when fast economic growth and the introduction of a number of transfer programs reduced the poverty rate to 12 percent. Since 1970 the poverty rate has fluctuated around a flat trend line, with the fluctuations reflecting the temporary changes in incomes associated with the business cycle. This is shown in figure 1 by the close association between the poverty rate and the unemployment rate, which in the United States is a good cyclical indicator. The position of the poverty line in the income distribution has also been stable since about 1970, at about one-third the level of mean income (see the contributions in Danziger and Weinberg 1986, for example, Danziger, Haveman, and Plotnick 1986, p. 54).

Figure 1. *Poverty and Unemployment in the United States, 1960 - 88*



Note: The poverty level reflects different consumption requirements for families based on size and composition and on the age of the householder (before 1981 the sex of householder and farm-nonfarm residence were also considered). The unemployment rate refers to the total labor force.
Source: United States (1990), tables C-30 and C-39.

Table 1. *Composition of the Poor in the United States, 1967 and 1983*
(percentage of households)

<i>Household head</i>	1967		1983	
	<i>Pre-transfer</i>	<i>Post-transfer</i>	<i>Pre-transfer</i>	<i>Post-transfer</i>
Over age 65	50.6	40.4	42.8	21.3
Female with children under age 6	5.5	6.7	7.6	12.5
Student	4.0	5.5	4.2	6.9
Disabled	9.4	10.0	10.1	10.7
Full-time worker	14.7	19.1	9.1	14.4
All others	15.8	18.0	26.2	34.2

Note: The "all others" category includes single persons, male household heads, and female household heads with no children under age 6, who did not have a full-time job for the full year.

Source: Danziger, Haveman, and Plotnick (1986, table 1.3.4).

When discussing the composition of households below the poverty line, it is useful to distinguish between those who, because of personal circumstances, are not expected by society to work and those who are expected to work. The first group includes the elderly (over age 65), the disabled, and students; I also include women with children under school age, although whether this group should be included or not is more controversial. Women with children at or below pre-nursery-school age (about three years) are usually not expected to work if they do not want to, but the welfare services of the United States (supported by the Family Support Act of 1988) do expect women with older children to work. Norms are also beginning to change in the other countries because of the increasing availability of child care groups in society, which are often government-supported.

If transfers are ignored, the group not expected to work made up 65 percent of the poor in the United States in 1983, with the bulk (43 percent) composed of the elderly (see table 1). When transfers are taken into account, this group accounted for just 51 percent of the poor. If benefits in kind are also taken into account (for example, medicare, food stamps, and so forth), the group with labor market potential make up an even larger proportion of the poor. But even ignoring benefits in kind, as many as 62 percent of the poor under age 65 have no visible characteristic that should restrict their entry into the labor market. Since 1967, the relative importance of the group that is expected to work has increased. Table 1 shows that between 1967 and 1983 the proportion of the elderly decreased (largely because of an increase in transfers), whereas the proportion of workers without a full-time job throughout the year increased significantly.

The proportion of the income of the poor earned in the labor market and the proportion received as transfers are not available in official statistics. But using the panel study of income dynamics (PSID) of the University of Michigan, Blank (1989) estimates that labor earnings make up only 33 percent of the income of households in poverty, the rest being made up of transfers. Her figures include the elderly and the disabled, however, who earn less than 10 percent of their

income in the labor market. If this group is excluded, the percentage of income accounted for by earnings for the remainder of the households rises to about 55 percent.

More important, in contrast to labor income, the real value of the transfers received by the poor are largely unaffected by the business cycle, so that the financial circumstances of the poor change during booms and recessions because the labor component of their income changes. This is borne out by the analysis of Bane and Ellwood (1986), who find that for the poor less than 65 years old, about half of all poverty spells begin with a loss of earned income (38 percent because of the loss of the household head's income and 11 percent because of the loss of some other household member's income). Another 40 percent of poverty spells begin with a change of family circumstances, such as divorce or the birth of a child. Moreover, 73 percent of the poor move out of poverty when the household's earned income increases (50 percent because of an increase in the household head's income and 23 percent because of an increase in someone else's income) and only 15 percent of poverty spells end with an increase in transfer payments. Thus the study of the labor market status of individuals near or below the poverty line is critically important for understanding changes in poverty status during macroeconomic adjustment.

An analysis of the composition of households at the low end of the income distribution in the United Kingdom brings out even more strikingly the importance of the labor market for the poor during macroeconomic adjustment. The analysis of the composition of households with low incomes began in 1988 and is available only for three years, 1981, 1983, and 1985 (DHSS 1988). Because the statistics are not widely available, table 2 presents in full the composition of households with incomes below one-half the average income, by the economic status of the household head. The figures are very similar to those relating to the bottom percentile of the income distribution.

If the poor are defined as the members of households with less than half the average income, the most important factor associated with poverty is unemployment, with full-time work at low income coming second. The unemployed and

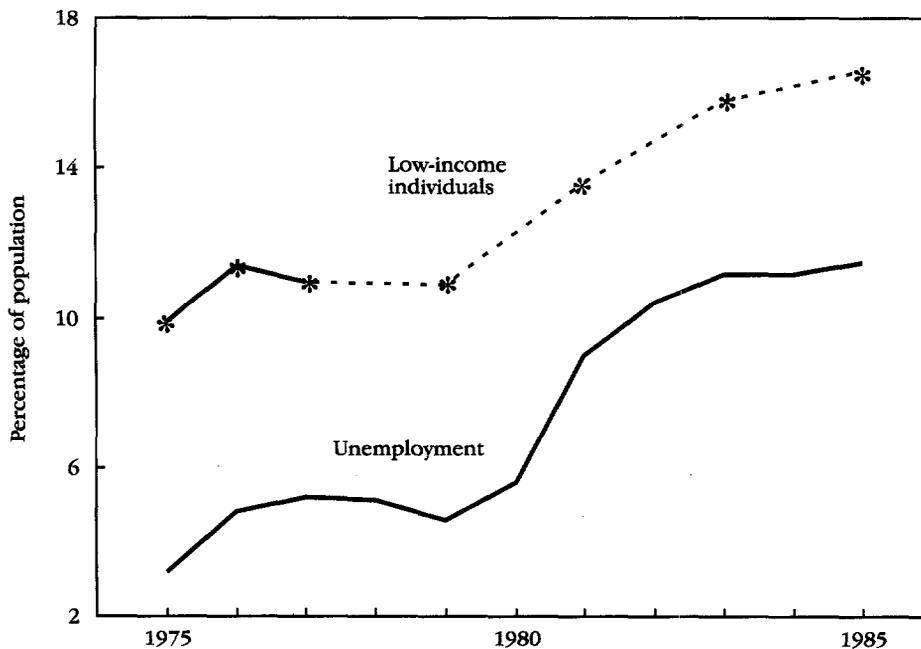
Table 2. *Composition of the Poor in the United Kingdom, 1981-85*
(percentage of households)

<i>Household head</i>	1981	1983	1985
Pensioner	13	10	12
Full-time worker	27	22	20
Sick or disabled	3	5	5
Single parent	8	6	6
Unemployed	44	43	48
Others	4	14	8
All poor as percentage of population	8.3	8.0	9.2

Note: Income is defined as total disposable income of the household, including transfers, and adjusted for household needs.

Source: DHSS (1988).

Figure 2. *Low-Income Individuals and Unemployment in the United Kingdom, 1975 - 85*



Source: For 1975-77, Atkinson (1983), table 10.2. For 1979-85, CSO, *Social Security Statistics*, table 47.07; CSO, *Annual Abstract of Statistics* (1988), table 2.1; and OECD, *Historical Statistics*, table 2.15.

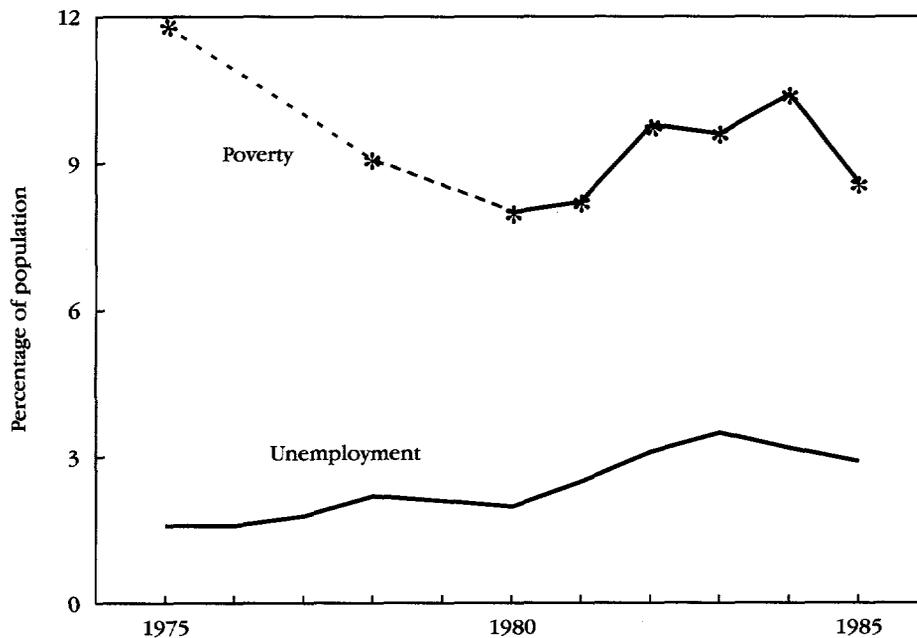
full-time workers combined make up almost 70 percent of the poor in 1985. Thus changes in unemployment and low wages during macroeconomic adjustment are likely to have a big effect on poverty. The increase in poverty between 1983 and 1985 is explained largely by the increase in unemployment between these two years. Figure 2 demonstrates with a different set of data the importance of unemployment in British poverty. This figure uses the administrative definition of poverty commonly used until recently, which counts as poor all those receiving the supplementary benefit and those with similar incomes who do not receive it. Unemployment and poverty in the United Kingdom from 1975 to 1985 clearly moved together.

The income of the bottom percentile of the income distribution in the three years covered by table 2 consisted mainly of transfer payments. Transfers accounted for 71 percent of all income in 1981, 73 percent in 1983, and 75 percent in 1985 (DHSS 1988; no other breakdowns of income sources are possible with the available data). This, however, does not negate the importance of the labor market in determining the extent of poverty. All groups listed in the table, except for full-time workers, are automatically entitled to some form of income support because they have insufficient labor-market income. Sometimes full-time workers are also entitled to support if their income is too low. If the

labor-market income of a household increases, transfers drop, but the household still has a better chance of moving out of poverty.

Sweden has the most generous social welfare system in the Western world. Expenditure on social services by the government amounts to about 30 percent of gross national product (GNP), whereas in the United Kingdom it is less than 20 percent and in the United States less than 15 percent of their respective GNPs (Luxembourg Income Study 1979–80, reported in Gustafsson and Uusitalo 1989). A definition of poverty based on the level of income assistance is therefore likely to show high poverty rates in Sweden. Indeed, this is borne out in recent estimates of the administrative poverty rate in Sweden by Gustafsson (forthcoming) and Gustafsson and Uusitalo (1989) (see figure 3). The estimates are based on the guidelines for social assistance for a single year (1985) so the implied poverty line is fixed in real terms. The fall in poverty since 1975 has largely been the result of transfers. Pre-transfer poverty (for families) increased between 1975 and 1985, from 35 to 42 percent, whereas post-transfer poverty fell from 15 to 11 percent. Figure 3 also shows movements in Swedish unemployment. Although there is some connection between short-run fluctuations in

Figure 3. *The Administrative Poverty Rate and Unemployment in Sweden, 1975 - 85*



Note: Persons below the absolute poverty line estimated by Gustafsson-Uusitalo (1989). The unemployment rate refers to the total labor force.

Source: Poverty data from Gustafsson-Uusitalo (1989); unemployment rate data from OECD, *Historical Statistics*, table 2.15.

Table 3. Percentage of Families in Lowest Sextile of Income Distribution in Sweden, the United Kingdom, and the United States

<i>Family type</i>	<i>Sweden</i>	<i>United Kingdom</i>	<i>United States</i>
Single men	15.3	5.9	21.4
Single women			
with no children	21.4	20.0	19.5
with children	30.8	68.6	57.7
Married couples			
with no children	9.8	6.7	5.4
with children	18.4	17.7	16.1

Note: The classification is according to equivalent disposable family income.

Source: Rainwater, Rein, and Schwartz (1986, table 1.3.6).

the poverty rate and fluctuations in unemployment, the link between them is not as close as in the United States and the United Kingdom. Unemployment does not appear to be as important a cause of poverty in Sweden as in the other countries, almost certainly because of the many measures of support available to unemployed workers in Sweden.

Another way to look at the Swedish data, which puts into better perspective the small extent of poverty in that country, is to make use of the comparative study by Rainwater, Rein, and Schwartz (1986). Although the study uses data for 1970, or a year near it, it is unique in its coverage of comparable income distribution data in Sweden, the United Kingdom, and the United States. The study defined poverty as the head count of those 25 to 55 years old with income below half of median income. Using this definition, poverty in Sweden amounted to 2.1 percent, in the United Kingdom 3.4 percent, and in the United States 10.9 percent. Interestingly, the poor in Sweden had closer (or the potential for closer) ties with the labor market than the poor in the other two countries. Table 3 gives the proportion of five family types that are found in the lowest sextile of the income distribution, on the basis of equivalent disposable income. Although in all three countries the group with the biggest concentration at the bottom end of the income distribution is single women with children, in Sweden the percentage is much lower than in the other two countries. Altogether, low-income rates in Sweden are more uniform across different groups of the population. Thus, when compared with the other two countries, Sweden has more of its poor in groups that have closer attachment to the labor force, such as single men and married couples with or without children. The role of Sweden's welfare state in lifting the groups with less labor force attachment out of poverty is the key to this comparison. Moreover, because Swedish unemployment is much lower than in either the United States or the United Kingdom, more poor families in Sweden have an employed head. In all three countries, but even more so in Sweden, most married couples with working wives escape poverty.

Poverty in Australia was first studied systematically by a Commission of Inquiry, which reported in 1975 (Australian Commission of Inquiry in Poverty 1975; the recommendations of the commission were not officially accepted but

became a standard reference on poverty in Australia). It recommended the adoption of what became known as the Henderson poverty line, first applied by R. F. Henderson in a study of the poor in Melbourne in 1966. The Henderson line was first defined along the lines of the U.S. poverty line, but after 1980 it was fixed in terms of the distribution of income, at about half of the mean income for the standard family.

The commission made a detailed study of the poor in Australia on the basis of a survey conducted in 1972–73. Beckerman and others (1979) did a similar study for the International Labour Office using a 1973–74 survey, and the Australian Social Welfare Policy Secretariat (1981) further calculated the extent of poverty, comparable with Beckerman's, for 1978–79 (despite the existence of an updated poverty line, it has not been possible to find a time series of poverty rates for Australia comparable with the ones that appear in figures 1–3 for the other countries). These studies concluded that poverty in Australia followed a pattern similar to that in the United States and the United Kingdom. The role of unemployment as a cause of poverty was once again brought out, although, as in the other countries, the main feature of poverty in Australia is the overrepresentation among the poor of single mothers and those over 65 years old. Table 4 gives some of the results of the comparison between the 1973–74 and 1978–79 surveys, in a form comparable with that used in table 3 for the other countries.

The groups that had the highest incidence of poverty in Australia in 1973–74 were the elderly and single parents. The poverty rate of the elderly, however, declined dramatically between the two surveys because an increase in pensions lifted them just above the poverty line. The poverty rate of single parents remained constant, whereas that of married couples and single people without children increased. The reason behind the increase in poverty is the higher unemployment in 1978–79. Unemployment in 1973–74 was 2.5 percent, and in 1978–79 it increased to 6.5 percent. In addition, the final column of table 4 shows that most of the poor belong to demographic groups that have close links

Table 4. *Composition of the Poor in Australia, 1973–74 and 1978–79*

<i>Family type</i>	<i>Percentage of family type counted as poor</i>		<i>Percentage of all poor, 1978–79</i>
	1973–74	1978–79	
Over age 65	26.1	8.9	17.7
Single persons			
with no children	8.9	11.2	33.7
with children	36.8	36.3	16.5
Married couples			
with no children	3.4	4.0	8.1
with children	6.8	7.4	24.1
Total	11.1	9.3	100.1

Note: The computations are on the basis of equivalent disposable income.

Source: Calculated from the information in Australian Social Welfare Policy Secretariat (1981, table 5.6).

with the labor market. The group labeled single persons with no children are mostly youths who are either unemployed or employed in low-income jobs. The other principal group, married couples with children, consists mainly of one-income families with one to three children, although there are also some unemployed heads. Families with two incomes are rarely, if ever, found below the poverty line, confirming the importance of working wives for a family's financial well-being.

Thus, although in the four countries under study the elderly and single parents have on average lower incomes than the rest of the population, most of the poor are persons with close links to the labor market. Part of the reason is that welfare policies are targeted mainly at groups that are not expected to have those links. But another reason is simple demography: in advanced countries healthy people under age 65 who are not single parents of preschool-age children are in the vast majority of the population. Among these, some are employed in low-wage jobs, some are unemployed, and some have irregular work patterns. These groups make up the majority of those who move in and out of poverty during recessions and booms. Even if a large part of their income consists of transfers, it is fluctuations in their labor income that determine whether they become poorer or richer during the cycle. Given this fact, the response of real wages and unemployment to macroeconomic change is a central issue in the study of poverty during macroeconomic adjustment.

II. CYCLICAL FLUCTUATIONS IN LOW INCOMES

It is natural for the economist interested in employment and wage determination during the business cycle to turn to supply and demand analysis. Can equality between the supply and demand for labor services explain employment and wage determination during the cycle? The answer most frequently given is that it cannot. Two related empirical features of cycles are inconsistent with the "competitive" equilibrium framework. First, employment fluctuates by more than this framework would lead us to expect, and, second, wages fluctuate by less. Thus during recession there is high unemployment and little change in average wages. The cost of recession is borne mainly by those who lose their jobs, whereas those retaining employment apparently suffer little in comparison.

These observations relate to total employment and average wages, and they have stimulated many interesting new ideas in modern macroeconomics. Their relevance to poverty during macroeconomic adjustment is twofold. First, the preceding section argued that there is a close link between unemployment and poverty. So, if cyclical fluctuations cause fluctuations in unemployment rates, they should also be expected to cause similar fluctuations in poverty rates. Second, the modern theory of wage determination provides insights into the factors that are likely to influence wages during macroeconomic adjustment. It is argued by proponents of this body of theory that such factors are not likely to

cause large fluctuations in average wages. By applying the same principles to the determination of low wages, we may well be able to make some inferences about the behavior of low wages during the business cycle.

Three implications of recent theories of employment and wage determination are of particular relevance to the poor. First, in most industrial countries low-income workers are likely to be unskilled and employed mainly in manufacturing and other production industries, which are the sectors of the economy most exposed to cyclical shocks. (The United States provides an exception that will be discussed below.) It follows that if cyclical shocks lead to fluctuations in unemployment, low-income workers will be more at risk than the average worker. Moreover, because they are the unskilled workers in their sectors, low-income workers are also likely to bear most of the unemployment in their sector. Workers in unskilled occupations frequently fall into poverty because of unemployment; when the economy picks up and they move back to employment, they cannot move far from the poverty line because of low wages.

This description is certainly true of the poor in the United Kingdom and Australia, and to a lesser extent in Sweden, which does not suffer much unemployment in recession (on the United Kingdom see Pissarides and Wadsworth 1990). In the United States, manufacturing wages are higher than in unskilled jobs in the service sector, where many of its poor work. Although the service sectors are also exposed to cyclical risks, they are not as exposed to the risk of unemployment as the manufacturing sectors are. Thus moving in and out of unemployment may well not turn out to be as serious a problem for the poor in the United States as it is likely to be in the United Kingdom and elsewhere.

The second implication about low wages that can be drawn from recent theories of wage determination relates to the responsiveness of wages to cyclical change. Recent theory argues that although wages are not very flexible during the cycle, they do respond to a rise in unemployment because of the threat that unemployment imposes on those still employed. Because low-income workers are more exposed to the risk of unemployment, their wages are also likely to be more responsive to cyclical shocks than the wages of the average worker. The average worker is hardly exposed to the threat of unemployment in most countries because of long job tenures and, in some countries, job security legislation and union influence. Average wages respond to unemployment over the cycle almost certainly because low wages respond to it.

The third argument of relevance here is that many of the unskilled, low-paid workers who make up the bulk of the poor are likely to be found in secondary sectors of the labor market that lack the organized institutions of the primary sectors. This is certainly true of low-income women without regular work patterns, but it may also be true of some men, especially youths and minorities. The low-skill service jobs that employ many of the poor in the United States are typical examples of the jobs found in the secondary sector of the labor market. Enterprises in secondary sectors operate in a market environment that is closer to the competitive paradigm than is the market environment of the primary

sectors, so that the business cycle is likely to lead to more wage fluctuations in the secondary sectors than it does on average in the primary sectors. Because incomes in the secondary sectors are typically lower than in the primary sectors, this is another reason for expecting the business cycle to lead to more wage fluctuations at the lower end of the wage distribution than on average.

A related factor is that much of the production in the secondary sectors takes place at the margins of profitability. Many companies in these sectors are not well-established, profitable concerns, and even small recessions may lead to bankruptcies and closures. In events such as these, the workers in these sectors are once again likely to lose income because of unemployment.

Thus comparing the fortunes of the poor with the fortunes of the average worker during recession may well show that the poor experience more unemployment *and* more wage reductions. Both unemployment and wage reductions contribute to poverty. In the final analysis, what cushions poverty in recession is not any particular response of market variables to the recession, but the response of transfer payments that are designed to provide income support for the unemployed and those with low incomes.

Evidence on the behavior of low wages and the unemployment of those who receive them during the business cycle is scant. Blank (1989) examined the behavior of the income of various groups of the population during 1969–81 using the Michigan PSID. Although she did not distinguish between the changes in annual hours of work resulting from unemployment and the changes resulting from overtime, short time, and other variations in the length of the work week, her results shed interesting light on the behavior of the income of poor households in the United States. As might be expected from the preceding discussion, heads of poor households experience more cyclical variations than other workers in both annual hours of work and in hourly earnings. Hours of work and hourly earnings are both strongly procyclical, so total labor income increases during a boom for both reasons. A 1 percent increase in GNP is associated with a 2.57 percent increase in the average hourly earnings of the heads of poor households and with a 1.25 percent increase in their annual hours of work. Total labor income increases 3.05 percent. The other components of household income (spouse's labor income, transfer income, and other income) do not show much cyclicity, so, despite the small fraction of total income accounted for by the head's labor earnings, the total income of poor households shows procyclicity. On average, the total income of poor households increases by 1.61 percent when GNP increases by 1 percent.

The responsiveness of hours of work and hourly earnings to the cyclical changes in GNP declines at higher incomes, so persons higher up in the income distribution experience less cyclicity in their earnings than persons below them. For example, the total income of the third quartile increases only by 0.82 percent when GNP increases by 1 percent, with total hours increasing by 0.52 percent and hourly earnings by 0.64 percent. This is very much in line with the argument that higher incomes are found in the primary sectors of the economy,

in which workers are less exposed to the risk of unemployment and wages are more protected from cyclical shocks than are wages in other sectors. Thus the income distribution shrinks in booms and expands in recessions. In a recession, poverty increases not only because incomes are generally lower, but also because the expansion of the income distribution shifts more households into poverty at given mean income.

The labor income of wives in poor households does not show strong cyclicity on average. This apparently paradoxical conclusion is explained by offsetting changes in the hourly earnings and hours of work of wives. The hourly earnings of wives show even more procyclicality than the average earnings of heads of households, perhaps because wives are even more likely to be in the secondary labor market than their husbands are. But wives in poor households also exhibit strong anticyclical behavior in their participation decision (what is often called the "added worker" effect). Although continuously employed women reduce slightly their hours of work during a recession, women previously outside the labor force seek employment to cushion the loss of household income resulting from the loss of the head of household's income. Usually the jobs that these women get pay well below the average paid by jobs held by similar continuously employed women. When the economy recovers and their husbands regain their lost incomes, these women leave the labor market. Thus the added worker effect provides an important cushion against the loss of income of poor households in recession, although the labor market performance of women as a whole offsets only the loss suffered by the drop in the earnings of those women already in the labor force.

Detailed information on the behavior of low earnings (and more generally on the income of the poor) during recession in Australia, Sweden, and the United Kingdom is not available. Comparing the structure of the labor market in the United States and in the other countries may allow some inferences about the behavior of low earnings in the other countries. The main question is whether the market at the low end of the wage distribution in the other countries is organized like it is in the United States. The answer is that it is not likely to be. There are important organizational differences at the mean, and this alone should warn that there may be organizational differences at the low end. More direct evidence relates to union coverage in the four countries and to the influence of central institutions in wage bargaining.

The United States has the least union coverage, and central institutions have no influence on wage negotiations. The market at the low end of the wage distribution is not well organized, and, as argued in this section, the behavior of wages and employment at this end is far closer to the competitive paradigm than the behavior of the same variables at the mean. In Sweden the wages of blue collar workers in manufacturing are negotiated at the central level, so union influence and centralization are as prevalent as for the average worker. Complete centralization, however, may produce as much flexibility as complete decentralization (Calmfors and Driffill 1988). The reasons behind the flexibility

are different but the outcome need not be. In a completely decentralized economy, wage flexibility results from the forces of competition operating at the level of the firm. In a centralized economy, wage flexibility is the outcome of the realization by the central negotiators that their own wage choices influence aggregate employment. If they want to have more employment, they cannot rely on someone else to bring it about (be it the central government or other unions moderating their wage demands). It can be brought about only by moderating their own wage demands. Thus the economic forces in Sweden may well produce as much wage flexibility at the low end of the wage distribution as in the United States.

One must also consider Sweden's policy of egalitarianism. Aggregate employment and wages are not the only objectives of central wage negotiators; the narrowing of differences in income is another. Although egalitarianism is achieved mainly through large transfers, it has also affected wages and employment policy. Big discrepancies in the wages negotiated for different job classes are avoided, and the workers displaced during recession have the choice of a job created by the government for the unemployed. About half of the workers who lose their jobs in Sweden gain employment through this scheme. These government job offers are in addition to the large transfers to low-income workers, which all but offset the effects of the fluctuations in market wages and unemployment on poverty.

In the United Kingdom wage negotiations take place in a different institutional environment. Unions or the wage councils affect the wages negotiated in virtually all of manufacturing and in about three-quarters of the rest of the labor force. Negotiations take place at the enterprise level, with central policy or central institutions having little influence. This has been especially true since 1979, when free market discipline has been used as the main weapon against union wage demands. The United Kingdom's institutional wage structure is the least flexible of the countries under consideration. When wages are negotiated by unions that are strong in their own enterprise but weak in influencing wages elsewhere, the link between a single union's wage demand and national unemployment is broken. Each union attempts to protect the wages of its members and feels unable to do much about the unemployed: even if it moderated its own demands to encourage more job creation, the number of jobs created would be insignificant compared with aggregate unemployment. If all unions behave in the same way, wages become highly unresponsive to macroeconomic shocks, and unemployment bears the burden of adjustment. This is as true on average as at the bottom end of the wage distribution, except that at the bottom end unemployment is more of a threat. A prolonged recession may eventually lead to wage reductions. This seems to have occurred in the United Kingdom during the severe recession of 1979–81. After two decades of remarkable stability in the earnings distribution, the ratio of wages in the lowest decile to median wages fell from 66 percent in 1979 to 61.6 percent in 1981 (Atkinson 1989, chap. 6). But overall, the structure of the labor market in the United Kingdom is such that

wages, even at the lower end of the wage distribution, are expected to be much less flexible than they are in the United States. The main factor influencing low-income households during recession in the United Kingdom is unemployment.

The Australian labor market is somewhere between the British and Swedish examples, with features of both in the behavior of wages and unemployment. Although wages are negotiated largely within each enterprise, as in the United Kingdom, direct government interference with the wage negotiation process and central institutions (in particular the Arbitration Commission) have had some influence on wage negotiations. Australia's institutional arrangements are a mechanism that influences wage negotiations by improving the general understanding between national union organizations and national employer organizations. Their direct effect on particular episodes of wage negotiations appears to have been exaggerated by some Australian economists: the Australian labor market certainly resembles the British market more than the Swedish market (Pissarides 1991, Calmfors and Driffill 1988). Thus the main implications of recession for the poor can be discerned by looking at the behavior of unemployment and overall wages in manufacturing. Manufacturing wages declined slightly after 1975 (elsewhere in the economy there has been moderate growth), and this has probably had some effect on poverty. But as in the United Kingdom, the main effect of recession on the poor in Australia is through unemployment.

Other evidence of relevance to the poor may be obtained by looking at changes in the distribution of total disposable income during the cycle, without attempting the difficult task of decomposing these changes into individual components. The poor are inevitably concentrated at the lower end of the income distribution, and their welfare depends, in the final analysis, on their total disposable income. Thus, looking at changes at the low end of the income distribution offers an all-encompassing approach to the investigation of the effects of the cycle on poverty.

Looking again at the evidence for the United States, it appears that the conclusion reached by Blank (1989) with data from the PSID is confirmed with aggregate data. Blinder and Esaki (1978) and Blank and Blinder (1986) examined the response of the income distribution during the cycle. They used both unemployment and inflation as cyclical indicators and regressed the income share of each quintile in the working population on the two cyclical indicators, on time trends, and on lagged dependent variables. They concluded that although inflation has no discernible effect on the distribution of income, unemployment has a strong expanding effect: when unemployment increases, incomes at the lower end of the distribution fall by more (in relative terms) than incomes at the higher end of the distribution, so income shares shift rightward. This confirms earlier results about the effect of unemployment on income shares (see, for example, Metcalf 1969).

Similar work with aggregate time series data was carried out by Nolan (1987) with data from the United Kingdom. The results with the U.K. data were similar to those with the U.S. data, but they were less well determined. Results for the

lowest quintile were statistically better than for higher quintiles and showed that a 1 percentage point increase in unemployment reduced the income share of the lowest quintile by 0.21 percentage points. This compares with Blinder and Esaki's (1978) estimate for the United States of a 0.13 percent reduction and Blank and Blinder's more recent (1986) estimate of a 0.185 percent reduction.

Thus unemployment is found to influence the distribution of income. The magnitude of the effect of unemployment on the overall income of those who suffer it will also depend on the duration of unemployment. Here again there are some differences among the four countries. In the United Kingdom and Australia, increases in unemployment tend to be accompanied by increases in duration. Thus in these two countries the direct effect of unemployment on the distribution of income, through the income of those that experience it, is likely to be larger than it is in Sweden and the United States. In Sweden unemployment is low and of short duration because of the job guarantee available to unemployed persons, whereas in the United States the average duration of unemployment is shorter at a given rate of unemployment than it is in the United Kingdom and Australia. Allowance should also be made for the available state support to the unemployed. In this regard, the United States offers the least support, followed by the United Kingdom and Australia and then Sweden, where unemployed workers have as much as 88 percent of the disposable income of full-time workers (Vogel and others 1988, p. 145). Although no similar statistic is available for the other countries, their unemployment compensation averages about 50 percent of lost wage earnings. Coverage in the United States is only 25–30 percent of the unemployed, whereas in the United Kingdom and Australia coverage is virtually universal. The direct effect of unemployment on the distribution of income also depends on whether we consider the distribution of annual income or the distribution of income in a shorter time period, such as a reference week. For annual incomes, the effect of unemployment is reduced (see Nolan 1987, chap. 5–6).

III. POLICY OPTIONS

Economic policy affects poverty at three levels. First, policies that are not specifically designed for the poor, such as macroeconomic management, have an influence on poverty through their effect on variables that enter the poverty equation, such as unemployment and wages. Second, transfer payments, most frequently designed to provide income support for low-income groups, influence the well-being of those who receive them and those who pay the taxes that finance them. Third, some of the policies designed to provide income support, especially transfer payments, influence the behavior of recipients. Such "disincentives" may offset to some extent the original policy goals.

The debate over the effects of policy on poverty has centered mainly on the question of the disincentives of transfers. An optimal government policy to fight poverty through redistribution should redistribute a given income to the poor

with minimum efficiency loss. The efficiency loss in transfers to the poor results from reduced labor supply by the recipients and possible changes in family structure induced by the policy. The corresponding financial cost consists of the loss of output because of the reduced labor supply, and the extra cost of the transfers to those who need to be supported for longer because of the choices they make. From society's point of view, the limits to redistribution are the efficiency losses of the policy.

Of course, policies designed for some specific purposes have implications for policy goals outside their immediate environments. This is as true for macroeconomic policy as for other policies. Macroeconomic policy is usually directed at things like price stability, full employment, exchange rate stability, credibility in foreign debt obligations, and so on. The policies designed to achieve these objectives have implications for poverty, but normally their influence on poverty is incidental, and it does not receive high priority in the design of macroeconomic policy.

If the reduction of poverty were a goal of macroeconomic policy, it is clear what the recommendation would be: lower unemployment. But this recommendation may conflict with other objectives, such as price and exchange rate stability, that do not directly influence poverty. A better policy advice would be to identify the poor as a group and target redistributive policy toward them in a way that offsets any harmful effects of macroeconomic policy on poverty. The reduction of poverty as a policy objective should come into the macroeconomic policy debate only if redistribution cannot undo what macroeconomic policy does to poverty. This is where the disincentives of transfers become the key to policy design. Without disincentives, transfers can obviously achieve any poverty rate that is desired, regardless of macroeconomic policy. But if the disincentives of transfers are serious enough, this will not be possible. In this case, the choices made at the macroeconomic level become crucially important for the cyclical fluctuations in poverty.

Consider unemployment and policy toward it. All governments now provide some support for the unemployed. Support takes the form of a direct income transfer (unemployment insurance), some payments in kind, and help with finding alternative employment. If unemployment insurance can replace all the income lost by the unemployed without costly implications elsewhere, macroeconomic policy need not be concerned with the poverty implications of unemployment. However, although small changes in the rate of insurance (say from 45 to 50 percent of income loss) do not appear to cause serious disincentives, as the rate approaches 100 percent (full income replacement), massive withdrawal from work is to be expected. (See, for example, the reviews by Danziger and others 1981, and Hamermesh 1982. On the United Kingdom see the studies by Nickell 1979 and Atkinson and others 1984.) Thus this is one case in which either some other policy for compensating the poor needs to be found or poverty reduction needs to be considered as one of the goals of macroeconomic policy.

Sweden's policy of offering jobs to the unemployed should be viewed in this light. Currently, some 2–3 percent of the work force are in state-financed labor market programs. The United Kingdom also started its own more limited scheme, targeted mainly at youths, when unemployment rates increased in the early 1980s. Although such programs have some adverse effects—such as increasing the cost of labor to private employers by removing some of the unemployed from the market—their disincentive effects are not as prohibitive as full income replacement would be (for an evaluation of Sweden's programs see Calmfors and Forslund 1990). As antipoverty programs, however, state-financed labor market programs for those who are able to work are as effective as transfer programs.

For groups of the population not expected to work, transfer programs are a more effective way of dealing with their poverty than labor market programs. The most important groups in this category are the elderly, the disabled, and mothers of very young children. Transfers do have a disincentive effect for these groups; if pensions were eliminated, for example, labor participation rates among the elderly would certainly be much higher than at present. But the cost of such disincentives is politically acceptable, because society has adopted the view that transfer-financed retirement is a right for all individuals. The main feature of the recent history of the transfer programs of the four countries under study is a large increase in the transfers to these groups that has either lifted them (just) out of officially measured poverty or has left them just below the line.

It has been argued by several commentators that most remaining poverty in the United States and elsewhere is concentrated in groups that do not have easy access to the labor market. The implication drawn from this claim, for example by Danziger and Gottschalk (1986), is that economic growth is not likely to contribute as much to eliminating poverty in the future as it did up to the early 1970s. Notwithstanding this claim, in the long run economic growth is the best weapon against poverty. The taxes needed for redistribution are more easily raised when average incomes are rising than when they are static. The claim by Danziger and Gottschalk and others should be taken to imply that although in the future economic growth alone cannot reduce poverty as much as it did in the past, economic growth with redistribution remains the best weapon against it.

Although the changing composition of poverty has some implications for the optimal design of antipoverty policy, the evidence and arguments examined in this article have shown that cyclical fluctuations in economic activity still influence the incidence and extent of poverty. For these “cyclical” poor, better economic performance is indeed a solution. In the absence of cyclical stability, the best approach is first to identify which demographic groups are likely to suffer most in recession and then to devise compensating policies for them with minimum disincentives. The elderly, the disabled, and single mothers of young children are clearly not the target groups for antipoverty policy in recession. The target groups are those who suffer most in recession: the unemployed and the workers in jobs with unprotected wages (for example, those in the secondary

labor market). The corresponding demographic groups are youths, unskilled workers, and women without regular work patterns (see Gramlich and Laren 1984, and Ellwood and Summers 1986).

If recession cannot be avoided, there cannot be complete protection from unemployment and wage reductions. Thus choices made at the macroeconomic level, such as the United Kingdom's high unemployment policy or Australia's recent (1986–87) policy of wage restraint, have implications for poverty. In such cases, what are the main factors for the design of policy specifically aimed at reducing the poverty of those affected by recession? A minimum level of support, say up to the current level of about 50 percent of income loss, may be provided by unemployment insurance. Small changes in the rate of benefits at these levels do not appear to produce substantial disincentives. What is more important for the disincentives of unemployment insurance at these levels is not the precise rate but the duration of benefits and the ease with which they can be obtained. Thus unemployment durations are shorter in countries where benefits run out after a certain period, such as in the United States, than in countries where some kind of benefit is available indefinitely, such as the United Kingdom (where unemployment benefits run for one year, after which a means-tested income support is available). Long unemployment durations are undesirable, not only because of their effect on family income and assets, but also because they may erode the work ethic and the worker's human capital. Thus indefinite unemployment benefits, even at low levels, may not be a desirable policy.

If unemployment benefits should not last forever, is there a replacement policy for long durations? One possibility, of course, is to let the long-term unemployed sink into poverty: the threat of poverty may ensure that they do find work before the benefit runs out. In the United States many do find jobs before reaching long unemployment durations, but there are also many, especially minority youths, who do not. Sweden's example has shown that there are viable alternatives to unemployment insurance for long durations: job creation by the government for the unemployed. The disincentive from this scheme is not reduced overall labor supply, as with unemployment insurance, but more scarcity of labor for private enterprise. Calmfors and Forslund (1990) show that labor programs increase the cost of labor to private employers for given unemployment. But because the government scheme offers employment to workers already unemployed, the cost takes the form of a smaller reduction in the real wage associated with a given fall in private employment. This cost does not appear to be too high in Sweden. If a job guarantee is available to the long-term unemployed, ending unemployment insurance when the guarantee comes into effect becomes a more acceptable policy. Similar arguments hold for youth employment programs. Indefinite subsidization of unemployed youths is an undesirable policy. They are at an age in their work horizon when they need to learn skills and start regular career patterns. Many governments, most recently the United Kingdom, subsidize training programs for youths. Such policies are attractive substitutes to unemployment insurance, both for the youths undergoing them and for the firms employing

them. They need not be more costly to governments than the unemployment insurance programs that they replace.

Thus effective antipoverty measures for the unemployed exist. The combination of unemployment insurance for a while, to help while the unemployed place themselves in jobs, combined with a job guarantee for those who do not succeed and job training for youths, appears both feasible and desirable. What of low wages? This is in many ways easier to deal with than unemployment. For a start, low wages are not as serious a cause of poverty as total loss of income. Also, countries have elaborate systems of taxation with details of earnings during long periods for each individual. Redistributive taxation is an obvious solution to the problem of poverty caused by low wage earnings. A negative income tax, for example, long advocated by Milton Friedman and others, is an effective tool, and one that is easy to administer, for maintaining incomes above certain policy-determined levels. Means-tested benefits, as currently practiced in the United Kingdom, are more difficult to administer and less effective in reaching those eligible than a negative income tax would be.

The policies outlined so far are policies that take the country's institutional environment as given. The discussion of wage determination, however, has shown that institutions do matter in determining the economy's adjustment path. Cyclical unemployment is less of a problem in a centralized economy such as Sweden's or a decentralized one such as the United States' than in a unionized decentralized economy such as the United Kingdom's and Australia's. Some attempts at more corporatism in the latter two countries have succeeded, with good results for the labor market. Australia in particular often achieves more corporatist policies, with more flexibility, as in 1986–87, when unions agreed to wage reductions on the understanding that there would be more investment for job creation. The United Kingdom too has an example of a briefly successful "social contract" in 1976–77. More recently the United Kingdom has tried to move in the opposite direction, toward less centralization. Again this policy has had some success in increasing the flexibility of real wages, but it appears that this success was bought at the cost of increased poverty: unemployment has been very slow to recover after a big initial rise, and the real wages that have fallen are those at the bottom end of the wage distribution. On the whole, institutional reform in the United Kingdom has not been successful in changing the fundamental structure of the labor market.

In Australia reform has a better chance of success because of the existence of the Arbitration Commission, whose authority is respected by unions and employers. Sweden's example shows that if the Arbitration Commission is given more power in wage determination, the results can be good for employment. The general principle for institutional reform to emerge from the study of the four countries is that if a social contract of the form practiced in Sweden and the other Nordic countries is not feasible, a decentralized labor market with fewer institutional constraints is more likely to facilitate the recovery of employment from recession than one with more constraints. But for such reforms to operate

successfully for the low end of the income distribution, antipoverty policies of the kind described earlier are also necessary.

REFERENCES

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Atkinson, A. B. 1983. *The Economics of Inequality*. 2nd ed. Oxford University Press.
- . 1987. "On the Measurement of Poverty." *Econometrica* 55: 749–64.
- . 1989. "The Take-Up of Social Security Benefits." In *Poverty and Social Security*. London: Havester Wheatsheaf.
- Atkinson, A. B., J. Gomulka, J. Micklewright, and N. Rau. 1984. "Unemployment Benefit, Duration and Incentives in Britain: How Robust Is the Evidence?" *Journal of Public Economics* 23 (February/March): 3–26.
- Australian Commission of Inquiry in Poverty. 1975. *Poverty in Australia*, First Main Report. Canberra: Australia Government Publishing Service.
- Australian Social Welfare Policy Secretariat. 1981. *Report on Policy Measurement*. Canberra: Australian Government Publishing Service.
- Bane, M. J., and D. T. Ellwood. 1986. "Slipping into and out of Poverty: The Dynamics of Spells." *Journal of Human Resources* 21 (March): 217–45.
- Beckerman, W., and others. 1979. *Poverty and the Impact of Income Maintenance Programmes*. Geneva: International Labour Office.
- Blank, R. M. 1989. "Disaggregating the Effect of the Business Cycle on the Distribution of Income." *Economica* 56 (May): 141–63.
- Blank, R. M., and A. S. Blinder. 1986. "Macroeconomics, Income Distribution, and Poverty." In S. H. Danziger and D. Weinberg, eds., *Fighting Poverty: What Works and What Doesn't*. Cambridge, Mass.: Harvard University Press.
- Blinder, A. S., and H. Y. Esaki. 1978. "Macroeconomic Activity and Income Distribution in the Postwar United States." *Review of Economics and Statistics* 60: 604–09.
- Calmfors, Lars, and John Driffill. 1988. "Bargaining Structure, Corporatism and Macroeconomic Performance." *Economic Policy* 6 (April): 13–47.
- Calmfors, Lars, and A. Forslund. 1990. "Wage Setting in Sweden." In Lars Calmfors, ed., *Wage Formation and Macroeconomic Policy in the Nordic Countries*. Stockholm: SNS Forlag.
- Commission of the European Communities. 1981. "Final Report from the Commission to the Council on the First Programme of Pilot Schemes and Studies to Combat Poverty." COM81769. Brussels.
- CSO (Central Statistical Office of Great Britain). Various years. *Annual Abstracts*. London: Her Majesty's Stationery Office.
- . Various years. *Social Security Statistics*. London: Her Majesty's Stationery Office.
- Danziger, S. H., and P. Gottschalk. 1986. "Do Rising Tides Lift All Boats? The Impact of Cyclical and Secular Changes on Poverty." *American Economic Review Papers and Proceedings* 76 (May): 405–10.
- Danziger, S. H., R. H. Haveman, and R. D. Plotnick. 1981. "How Income Transfer Programs Affect Work, Savings, and the Income Distribution: A Critical Review." *Journal of Economic Literature* 19: 975–1028.

- . 1986. "Anti-Poverty Policy: Effects on the Poor and the Nonpoor." In S. H. Danziger and D. Weinberg, eds., *Fighting Poverty: What Works and What Doesn't*. Cambridge, Mass.: Harvard University Press.
- Danziger, S. H., and D. Weinberg, eds. 1986. *Fighting Poverty: What Works and What Doesn't*. Cambridge, Mass.: Harvard University Press.
- DHSS (Department of Health and Social Security). 1988. *Households below Average Income: A Statistical Analysis 1981–85*. May, London: Her Majesty's Stationery Office.
- Ellwood, D. T., and L. H. Summers. 1986. "Poverty in America: Is Welfare the Answer or the Problem?" In S. H. Danziger and D. Weinberg, eds., *Fighting Poverty: What Works and What Doesn't*. Cambridge, Mass.: Harvard University Press.
- Gramlich, E. M., and D. S. Laren. 1984. "How Widespread Are Income Losses in a Recession?" In D. L. Bawden, ed., *The Social Contract Revisited*. Washington, D.C.: Urban Institute.
- Gustafsson, Bjorn. Forthcoming. "Poverty in Sweden 1975–1985." In E. S. Hansen, S. Ringen, H. Uusitalo, and R. Erikson, eds., *Welfare Trends in the Scandinavian Countries*.
- Gustafsson, Bjorn, and H. Uusitalo. 1989. "The Welfare State and Poverty in Finland and Sweden from the Mid-1960s to the Mid-1980s." University of Gothenburg, Sweden. Processed.
- Hagenaars, Aldi. 1986. *The Perception of Poverty*. Contributions to Economic Analysis 156, Amsterdam: North-Holland.
- Hamermesh, D. S. 1982. "The Interaction Between Research and Policy: The Case of Unemployment Insurance." *American Economic Review Papers and Proceedings* 72 (May): 237–41.
- Metcalf, C. E. 1969. "The Size Distribution of Income during the Business Cycle." *American Economic Review* 59 (September): 657–67.
- Nickell, S. J. 1979. "The Effect of Unemployment and Related Benefits on the Duration of Unemployment." *Economic Journal* 89: 34–49.
- Nolan, Brian. 1987. *Income Distribution and the Macroeconomy*. New York: Cambridge University Press.
- OECD (Organisation for Economic Co-operation and Development). 1976. *Public Expenditure on Income Maintenance Programmes*, Part II, Paris.
- . Various years. *Historical Statistics*. Paris.
- Pissarides, Christopher A. 1991. "Real Wages and Unemployment in Australia." *Economica* 58 (229/February): 35–36.
- Pissarides, Christopher A., and W. J. Wadsworth. 1990. "Who Are the Unemployed?" Centre for Economic Performance Discussion Paper, London School of Economics. Processed.
- Rainwater, L., M. Rein, and J. E. Schwartz. 1986. *Income Packaging in the Welfare State: A Comparative Study of Family Income*. Oxford: Clarendon Press.
- Sen, Amartya. 1976. "Poverty: An Ordinal Approach to Measurement." *Econometrica* 44: 219–31.
- United States, government of. 1990. *Economic Report of the President*. Washington, D.C.: Government Printing Office.
- Vogel, J., L-G. Andersson, U. Davidsson, and L. Hall. 1988. *Inequality in Sweden: Trends and Current Situation*. Stockholm: Statistics Sweden.

Inequality and Poverty in China: Institutional Change and Public Policy, 1978 to 1988

Ehtisham Ahmad and Yan Wang

There is considerable uncertainty and debate about changes in poverty and living standards that are likely to occur in an economy in transition from centrally planned allocations to a more market-oriented basis, but a dearth of evidence and rigorous analysis remains. There is a tradeoff between policies that provide a guaranteed living standard with low inequality, albeit at a low income level, and systems that provide much higher monetary incomes, but create greater income variability and vulnerability, particularly during periods of high inflation. The Chinese experience following the economic reforms of 1978 highlights this dilemma, and our analysis strongly suggests the need for appropriate social safety nets if rapid growth is to be achieved without the poor and vulnerable bearing the costs of such growth.

Successive Chinese constitutions have guaranteed the fulfillment of basic needs to Chinese citizens. Despite changes in policy and leadership, an important continuing element in this guarantee has been the prevention of destitution and the protection of vulnerable groups—the “social security” that we will examine here.

In urban areas the permanent residence registration (*hukou*) provided guaranteed employment, access to rationed essential consumer items, and eligibility for an enterprise-based labor insurance system (*danwei*) that included health care, retirement, and disability provisions. Until recently, the system was maintained by strict controls on urban registration and migration.

In rural areas land reform provided households with access to productive assets, and assets were distributed fairly equally within regions. Although the rural guarantee has been subject to local interpretation, severe deprivation was generally avoided (except during the famine of 1959–61) through a system of transfers to the poorest regions. Minimum nutritional intake, shelter, basic

At the time of writing, Ehtisham Ahmad was with the Development Economics Research Program of the London School of Economics on leave of absence at the World Bank. Yan Wang was a McNamara Fellow at the World Bank. This article builds on a discussion of the historical pattern of poverty in China by Ahmad and Zou (1989). The authors are indebted to Athar Hussain, Stephen Ludlow, Alan Piazza, Christine Wallich, and Gang Zou for helpful discussions and support and to Shahid Yusuf, the staff of the World Bank China Department, and the three referees for helpful comments on an earlier draft.

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health care, and education were generally achieved, although cash incomes were low (see Ahmad and Hussain 1991). Individual or household poverty was not a major concern of policymakers; rather resources were directed to areas deemed "poor." Thus, since the People's Republic was established in 1949, China has achieved remarkable improvements in welfare relative to other low-income countries by providing social services to the vast majority of its citizens. Although they were successful in many ways, the institutional arrangements, particularly during the 1970s, were not conducive to initiative, innovation, and growth.

As part of a dramatic policy reform package intended to improve economic incentives, in 1978 collective agriculture was dismantled, and China reverted to family farming under the "contract responsibility system." To stimulate agricultural production, government procurement support prices were raised substantially in three consecutive years starting in 1979 and were maintained at relatively high rates through 1987. Average real per capita net income for rural residents doubled during 1978–88, and agricultural output grew at an annual rate of 6.2 percent between 1979 and 1988, in contrast to the 2.7 percent rate of 1953–78. The reforms also were followed by a striking growth in township and village enterprises (TVEs), which by 1987 employed 87 million workers, compared with around 100 million employed by the state-owned enterprises (SOEs). Although workers in SOEs are covered by an extensive formal social insurance system, this is not true of TVEs or much of the non-SOE urban sectors. Such workers need to rely on employment opportunities for immediate sustenance and on extended family support, based on joint residence, in case of need. TVE production grew from about 3 percent of agricultural output in 1978 to 10 percent by 1987 (State Statistical Bureau annual-1988, pp. 34, 257–58). Despite reforms of the social insurance system, which relieved enterprises of the responsibility for retirees by extending pooling within localities or regions, institutional change has been fairly limited for SOEs.

The contract responsibility system also was extended to the nonagricultural sector, which allowed private and foreign-owned enterprises to operate alongside the SOEs and collectives. The urban employment guarantee was ended when the labor contract system was enforced on a nationwide basis in 1986, and legal provisions for bankruptcy (even of the SOEs) were created. Because of the food rationing system in the urban areas, the food price increases did not hurt residents with *hukou* rights, and the real average per capita expenditure of urban residents increased by 87.6 percent from 1978 to 1988 (State Statistical Bureau 1989a, p. 11) albeit at the expense of increasing budgetary subsidies on consumer goods.

Despite the increases in the average output and income of Chinese citizens since the reforms, the gains have not been evenly distributed, and urban residents without rations and rural net consumers were hurt by the price changes. In addition, disparities in rural areas, which have always existed (Ahmad and Zou 1989), have been exacerbated as a result of the reform, with the irrigated coastal

areas benefiting relatively more than others. This factor and the general relaxation of controls on residence and travel have led to the reappearance of rural-urban migration. Popular estimates of the urban "floating population" (as such migrants are called) range to 50 million. These migrants are not eligible for rationed goods and generally have no access to *danwei* (work unit) housing. Moreover inflation, which had averaged less than 3 percent in the 1970s and around 6 percent from 1980 to 1987, increased to around 20 percent a year in 1988, adversely affecting the poor and fixed-income groups. The State Statistical Bureau reported a decline in real income for 8.6 percent of urban households in 1986, 20.8 percent in 1987 (annual-1989a, p. 57), and 35 percent in 1988 (1989b).

From the policy point of view, China is caught in something of a dilemma. Although income was low under the pre-1978 system, inequality was also very low (especially at the local level, although regional differences existed), basic consumption needs were generally met through considerable public provision, and social indicators were at levels commonly achieved by high- and middle-income countries. Since the reforms, mean incomes have increased dramatically (see appendix tables A-1 and A-3), but there has been a reduction in publicly provided goods, and since 1985 rural poverty appears to have increased. In urban areas the sharp increase in inflation after 1987 also reversed the prior decline in poverty, although systemic changes since 1983 make comparisons with the earlier period somewhat problematic. In many areas the social safety mechanisms that had been built on a collective basis are no longer operative. This increases the likelihood of destitution and poverty, not only in the poorer regions, but also within relatively prosperous areas. Poverty reduction programs, however, provide transfers to poorer regions, not to poor households through individual entitlement (see, for instance, State Council 1987). Thus to measure the extent of poverty and inequality, we cannot assume that all individuals in a poor region are poor and must look at household-level income in both poor and relatively well-off areas.

Section I reviews changes in poverty and other indicators of living standards, and Section II reviews changes in inequality. Section III outlines those aspects of public policy that have relevance for our analysis of inequality and analyzes household-level data and the regional aspects of these data. Section IV presents final remarks summarizing our findings.

I. POVERTY AND LIVING STANDARDS IN A DECADE OF REFORM, 1978-88

In this section we juxtapose official estimates of rural poverty with alternative figures derived from other sources. To examine overall changes in living standards and poverty we use information from the *Statistical Yearbook* (State Statistical Bureau annual) and other government reports. Household-level observations from a 1985-86 survey (from the Chinese Academy of Social Sciences) are used to examine regional patterns.

Official Estimates of Poverty

There are two official estimates of poverty in China. The first, by the State Council (1989), defined rural inhabitants with per capita nominal net income below 200 yuan (Y200) as poor, and those with income below Y150 as extremely poor (defined in Chinese as *jihan jiaopuo*, or “those who cannot dress warmly and eat their fill”). The Y200 figure was roughly 50 percent of mean rural income; the countries belonging to the Organisation for Economic Co-operation and Development similarly use 50 percent of average income as a poverty line. The use of a nominal figure to estimate poverty changes across sectors and over time is problematic, especially since relative price changes have been accelerating in recent years. In addition various groups in the urban population have had differing access to subsidized and rationed goods, a pattern that has also been changing over time. Thus, although cash incomes are perhaps easier to identify in China than in some other developing countries, they clearly do not reflect actual changes in living standards. If such nominal poverty lines are used, even if adjusted for some national rate of inflation, comparisons over time and across groups and regions are biased because they do not account for differences across regions and groups within regions. A common error is to apply the Y200 poverty line to the period before reform, when cash incomes clearly did not fulfill basic needs (see Ahmad and Zou 1989).

A State Council report suggests that by the end of 1985, there were 102 million rural residents with per capita incomes below Y200, equal to about 12.2 percent of the rural population (State Council 1989, pp. 1–2). Among them, the 38.4 million poorest, or about 4.4 percent of the rural population, lived in 664 out of the 1,936 counties. According to this report, these poor are concentrated in 18 regions in middle and western China. It is not clear whether the method used was to examine the distribution of all households across all regions and then to apply the poverty cut-off point, or whether “poor areas” were identified first and then the entire population of these districts was assumed to be poor. Using the regional classification, however, the central government, together with the provinces and autonomous regions, targeted 678 counties for public works projects amounting to Y4 billion. Of these, 328 counties were on the list of the central government, with 43 percent in minority (non-Han peoples) areas.

A second official source of estimates is the *Statistical Yearbook of Rural Areas of China* (State Statistical Bureau 1985a, 1987), which provides information on the number of recipients of government relief funds and the recipients as a percentage of the total number of the poor. It does not detail, however, the criteria used to define the “poor.” The numbers of poor in rural areas calculated from this information were 65.8 million in 1978, 65.3 million in 1983, 96.5 million in 1985, and 102.3 million in 1986. The number for 1985 is close to the State Council estimates, which suggests that the Y200 cut-off point has been used. Recipients of relief funds increased from 30 million in 1978 to 40 million in 1986, but formed a decreasing proportion of the poor after the 1983 reforms

(from 54 percent in 1983 to 40 percent in 1986), which reflects the contraction in social security coverage.

There is no official Chinese estimate for urban poverty, which suggests that authorities have seen poverty very much as a rural and regional phenomenon.

Poverty Lines

Counting the number of poor below a given poverty line fails to measure the intensity of poverty and thus changes in the positions of those below the line. Further the choice of a line may be based on criteria, such as minimum levels of nutrition, income, or expenditures, the setting of which requires some degree of conjecture and normative decisions. Income itself may not reflect real living standards when some goods and services are provided without cost or at different subsidized prices. Further, where intertemporal comparisons are concerned, the choice of the appropriate deflator may make a considerable difference in the poverty line found. Thus the use of a single "absolute" poverty line may be problematic.

With these caveats in mind, we examine the bases for several alternative poverty lines as a first step in our analysis. For both rural and urban areas we take two given poverty lines. To be consistent with the State Council estimates for rural areas for 1985, we first use annual per capita income of Y200 to represent rural poverty and Y150 to capture extreme deprivation. The general index of retail prices does not adequately reflect an average rural consumption basket since it includes prices of items, such as fertilizers, that are not consumed directly. However, we use it in the absence of a more satisfactory deflator. To set a poverty line for urban areas, we took Y375, or slightly above half of the urban mean per capita income of Y682, in 1985. For sensitivity, a lower line of Y300 was also assumed. The general cost of living index for staff and workers was used as the urban deflator. The retail price and cost of living indexes used are averages of the plan prices of state-owned commercial units, negotiated prices, and open-market prices, weighted by the actual value of sales or purchases at different prices (table 1). This first set of poverty lines, adjusted for changing prices, could be taken to measure changes in "absolute poverty."

A second set of lines is constructed relative to mean income in each year: for urban areas we calculate annual poverty lines at 50 percent of mean income and for rural areas at 35 and 50 percent. Using these poverty lines, if a small proportion of households experienced very rapid rises in income while the income of the great majority of households changed little, this would increase average income, the poverty lines, and the proportion of households that fell below those lines. Such lines could be taken as representative of "relative poverty."

An alternative, a poverty line based on level of nutrition, requires information on consumption patterns and the price at which purchases are made. For example, in urban areas different price indexes would be needed for households with and without access to rationed goods. Similarly, many households in poor rural

Table 1. *Alternative Poverty Lines in China, 1978–88*
(yuan per capita per year)

Poverty line	1978	1980 ^a	1982	1983	1984	1985	1986	1987	1988
<i>Rural</i>									
1985 State Council lines adjusted for inflation ^b									
Y200: poverty	156	169	176	179	183	200	212	228	270
Y150: extreme deprivation	117	127	132	134	138	150	159	171	203
Share of yearly mean income (percent)									
50	67	96	133	155	178	199	212	231	273
35	47	67	95	108	124	139	148	162	191
<i>Urban</i>									
1985 absolute poverty lines adjusted for inflation ^c									
Y375	279	314	320	327	335	375	401	436	526
Y300	224	251	256	261	268	300	321	349	421
50 percent of yearly mean income ^d	158	229	247	263	304	343	414	458	560

a. 1980 figures refer to 1980 for rural and 1981 for urban areas.

b. Deflated using the retail price index.

c. Deflated by the general cost of living index of staff and workers.

d. Based on income available for consumption.

Source: Authors' calculations based on State Council (1987 and 1989) for rural poverty lines and State Statistical Bureau (1989a and annual) for urban lines.

areas obtain grain free or at low “resale prices” while others face relatively high “market” prices. Because such information is not available, we use several different expenditure-based poverty lines, including the official poverty line, without attempting to assign nutritional equivalence.

While the inflation-adjusted absolute rural poverty lines increase gradually from 1978 to 1988, the relative income-adjusted lines start at a much lower level and show a sharp rise after the reforms and a slower increase after 1985. This reflects the lower average income at the onset of the reform period and its dramatic increase during the decade. The choice of the “higher” urban poverty line for 1985 was intentionally taken as above the relative poverty line. However, with inflation and the increase in average nominal incomes, by 1987 the higher absolute poverty line had fallen below 50 percent of mean incomes. By the same token, the higher absolute line was above the “relative” poverty line for the entire period before 1984.

Public transfer payments in China have included rations, subsidies, and payments in kind. In rural areas the government stipulates a “basic consumption of grain” (*jiben kouliang*) and redistributes grain from surplus areas to poor and disaster-prone areas. Peasants in these areas obtain the “resale grain” free or at low prices. In urban areas the government provides low-priced rations of staple food and other consumer goods covering, at times as many as 77 items, including wheat flour, rice, other grains, edible oil, sugar, meat, eggs, cloth, cotton, matches, and soap. Ration coupons are distributed according to size of the household and the gender and age of the household members. Subsidies cover a wider range of commodities and services, including rental housing, public transportation, *danwei*-based child care and health services, and labor insurance

benefits for permanent employees of state enterprises. In Beijing subsidies accounted for around 60 percent of the municipal budget, which amounted to Y530 for each registered resident or around 50 percent of mean cash income (*China Daily* 1989b). These have made the standard of living considerably higher than that measured by cash income alone.

The transfer payments are unevenly distributed, especially between urban residents with *hukou* and others. Clearly, a higher cash income would be needed for individuals without *hukou* rights to achieve the same living standard as someone with *hukou* rights on the poverty line. Rough calculations suggest that the value of rationed grain alone may be around 25 to 35 percent of poverty-level income. Added to that is the value of subsidized housing and other commodities. It would not be surprising, therefore, if the poverty line for non-*hukou* holders were to exceed Y500 per capita in 1985 prices. The relative value of the subsidies would vary by location, especially in proportion to the scarcity of accommodation, so that in the major cities higher poverty lines are likely to be needed. Unfortunately the data do not permit us to differentiate between urban *hukou* recipients and the floating population.

It is estimated that Beijing's floating population numbered around 1.12 million in 1988–89, with 60 percent being migrant workers. Their numbers have increased about 23 percent a year, and they may now constitute one-sixth of Beijing's metropolitan population (*Zhonguo Xinwen She* 1989). Further, casual evidence suggests that the floating population in Chinese cities has grown to more than 50 million (*China Daily* 1989a). Although not all of these floating workers are poor, evidence suggests that most are and reinforces our unease with the use of poverty lines that do not account for this very large Chinese subclass.

Incidence of Poverty

We estimate the incidence of poverty by applying the poverty lines from table 1 to the household distribution from the *Statistical Yearbook* (State Statistical Bureau annual-1988, 1989) for peasants and the urban population (table 2; see tables A-1 to A-3 and A-5 for its derivation). There is some controversy about the size of the rural population (see table A-4), and we also use an alternative rural-urban breakdown from the United Nations to derive alternative poverty estimates (table 3). Additional sensitivity is provided by using household level survey data for 1985–86 (table 4).

The State Statistical Bureau did not break down rural income below Y100 or over Y500, so the distributions for peasants are truncated at the lower end for earlier years and at the upper tail for more recent years. Thus, for 1978, 65 percent of the households are in the two lower groups, and, for 1988, the top two groups account for 53 percent of the households. Consequently, the assumptions concerning distributions within groups are likely to be important in estimating poverty as well as inequality. Group means also are not known, although the overall sample mean is given. This makes the estimation of inequality literally subject to assumption (as discussed below). The urban distributions

Table 2. *Estimates of the Incidence of Poverty in China, 1978–88*

Poverty line	1978	1981	1982	1983	1984	1985	1986	1987	1988
<i>Rural</i>									
1985 State Council line (Y200) adjusted for inflation									
Households (percent)	65.1	44.3	19.1	14.9	16.0	12.3	13.9	13.1	14.8
Population (percent)	—	—	—	—	—	13.6	—	14.4	16.12
Persons (millions)	—	—	—	—	—	90.8	—	83.9	89.5
1985 State Council line (Y150) adjusted for inflation									
Households (percent)	44.1	22.6	7.9	5.6	7.5	4.4	5.6	5.3	5.7
Population (percent)	—	—	—	—	—	5.0	—	6.0	6.34
Persons (millions)	—	—	—	—	—	33.4	—	35.0	35.2
50 percent of mean incomes									
Households (percent)	22	—	8.3	7.6	14.3	12.1	13.4	13.7	15.2
Population (percent)	—	—	—	—	—	13.4	—	14.9	16.6
Persons (millions)	—	—	—	—	—	89.6	—	87.0	92.0
35 percent of mean incomes									
Households (percent)	15.7	—	2.7	2.5	5.2	3.7	4.3	4.4	4.7
Population (percent)	—	—	—	—	—	4.1	—	5.0	5.3
Persons (millions)	—	—	—	—	—	27.5	—	28.9	29.4
<i>Urban</i>									
50 percent of mean incomes									
Households (percent)	—	1.96	1.35	1.75	2.02	9.02 ^a	5.60 ^a	6.71 ^a	7.77 ^a
Population (percent)	—	—	—	—	—	11.92	—	7.92	9.12
Persons (millions)	—	—	—	—	—	45.6	—	39.4	49.3
Y375 adjusted for inflation									
Households (percent)	—	11.2	8.9	8.1	4.7	9.87 ^a	5.42 ^a	5.30 ^a	7.29 ^a
Population (percent)	—	—	—	—	—	13.03	—	6.24	8.57
Persons (millions)	—	—	—	—	—	49.8	—	31.1	46.3
Y300 adjusted for inflation									
Households (percent)	—	3.05	1.91	1.66	1.50	7.89 ^a	4.33 ^a	3.52 ^a	5.84 ^a
Population (percent)	—	—	—	—	—	10.43	—	4.17	6.86
Persons (millions)	—	—	—	—	—	39.9	—	20.8	37.1

—Not available.

a. These figures are not comparable with those of previous years because of the regrouping of the data from the State Statistical Bureau (1989a); see table A-3 for details.

Source: Authors' calculations based on data given in State Statistical Bureau (annual-1988), p. 716, and (1989a), pp. 350, 352, 462, and 465; see tables A-1 to A-3 and A-5.

Table 3. Incidence of Poverty in China Using U.N. Population Estimates, 1985, 1987, and 1988 (millions)

Poverty line	1985		1987		1988	
	Adjusted for household size	Unadjusted for household size	Adjusted for household size	Unadjusted for household size	Adjusted for household size	Unadjusted for household size
<i>Rural</i>						
Y200 adjusted for inflation	$\frac{Y200}{113.4}$	102.6	$\frac{Y228}{123.1}$	112.0	$\frac{Y270}{139.5}$	128.0
Y150 adjusted for inflation	$\frac{Y150}{41.7}$	36.7	$\frac{Y171}{51.3}$	45.3	$\frac{Y203}{54.9}$	49.3
50 percent of mean income	$\frac{Y199}{111.8}$	100.9	$\frac{Y231}{127.3}$	117.1	$\frac{Y273}{143.6}$	131.5
35 percent of mean income	$\frac{Y139}{34.2}$	30.9	$\frac{Y162}{42.7}$	37.6	$\frac{Y191}{45.9}$	40.7
<i>Urban</i>						
50 percent of mean income	$\frac{Y343}{25.8}$	19.5	$\frac{Y458}{17.9}$	15.2	$\frac{Y560}{21.1}$	18.0
Y375 adjusted for inflation	$\frac{Y375}{28.2}$	22.3	$\frac{Y436}{14.1}$	12.0	$\frac{Y526}{19.8}$	16.8
Y300 adjusted for inflation	$\frac{Y300}{22.6}$	17.1	$\frac{Y349}{9.4}$	8.0	$\frac{Y421}{15.9}$	13.5

Note: In the Chinese official estimates of the incidence of poverty, the household distributions are not adjusted for household size. Here the unadjusted 1985 rural poverty estimate coincides with the official figure of 102 million.

Source: Authors' calculations based on United Nations (1986), table A-1.

Table 4. *Estimates of Households and Individuals in Poverty from Cross-Sectional Data, 1985–86*
(percent)

	Poverty line		
	< Y300	< Y350	< Y400
<i>Urban</i>			
Individuals	13	15.2	17.8
Households	5	7	9.6
<i>Rural</i>			
	< Y200	< Y250	< Y300
Individuals	8.1	16.1	28.6
Households	7.6	15.2	27.8

Source: Authors' calculations based on the 1985–86 unpublished household survey data tapes.

were not truncated (see table A-3), but in 1984 urban households were re-grouped, and a great number of rural townships were reclassified as urban so that rural and urban data for before and after 1984 are not strictly comparable. Although the estimates based on UN population data for 1985–88 are more comparable, it is not clear whether nonmonetary transfers are adequately reflected therein, so that only comparisons for recent years are likely to be valid.

Headcounts corresponding to the poverty lines of table 1 are presented in table 2. All poverty lines show a decline in poverty during 1978–83, with the inflation-adjusted equivalent of Y200 per capita showing the most precipitous drop from 65 percent of the rural households in 1978 to less than 15 percent by 1983. The figure of 65 percent in poverty reflects cash income, but before 1983 there were considerable transfers in kind, so that this does not reflect living standards, which were already as high as those in middle-income countries by the mid-1970s (Ahmad and Hussain 1991, and table 5). The poverty index based on 50 percent of mean income, however, suggests a drop in income poverty from only 22 percent of households to 7.6 percent in 1983.

Chinese official estimates (State Council 1989, State Statistical Bureau 1985a) do not correct for varying household size and use a higher figure for total rural population (870 million for 1985), rather than the 665 million given by the State Statistical Bureau. Using the UN population projections does not greatly affect directions of change in poverty or the overall incidence of poverty, but the number of poor in rural areas is higher, with fewer urban poor (see table 3). All the headcount measures suggest an increase in poverty and destitution after 1983–84, following national adoption of the Responsibility System, when some disruption would be expected. During 1985–88 the share of rural households and the rural population in poverty increased substantially according to both State Council lines, possibly because of the stagnation of agricultural production and the acceleration of inflation after 1985.

Given the changed definition of urban areas since 1985, the headcount measures for 1981–84 are not strictly comparable with those for 1985–88, but the poverty line based on 50 percent of mean income suggests an increasing trend in

each period. However, adjusting the fixed (1985) poverty lines for price changes leads to a decline in the first period, but an increasing trend since 1985. The increase in urban poverty is particularly marked in 1988 relative to 1987. This is strongly correlated with the inflationary trends that have adversely affected urban fixed-income groups, such as pensioners.

Rural and urban incomes and poverty for 1985 are compared in figure 1. A larger share of the rural population appears at the lower income levels. For the poverty lines chosen (Y200 in rural areas and Y375 in urban areas), the incidence of urban poverty is somewhat higher. If the urban poverty line (Y300) is chosen, the incidence would be less than for Y200 in rural areas, but greater than for Y150. The data from the State Statistical Bureau exclude the floating population, and in the analysis above it has been assumed that such households have the same income distribution as those with *bukou* rights. Most evidence suggests that the floating population is more concentrated at the lower end of the income scale, however, so that true urban poverty would be higher than the estimates here.

Additional cross-section evidence on poverty has been obtained for both rural

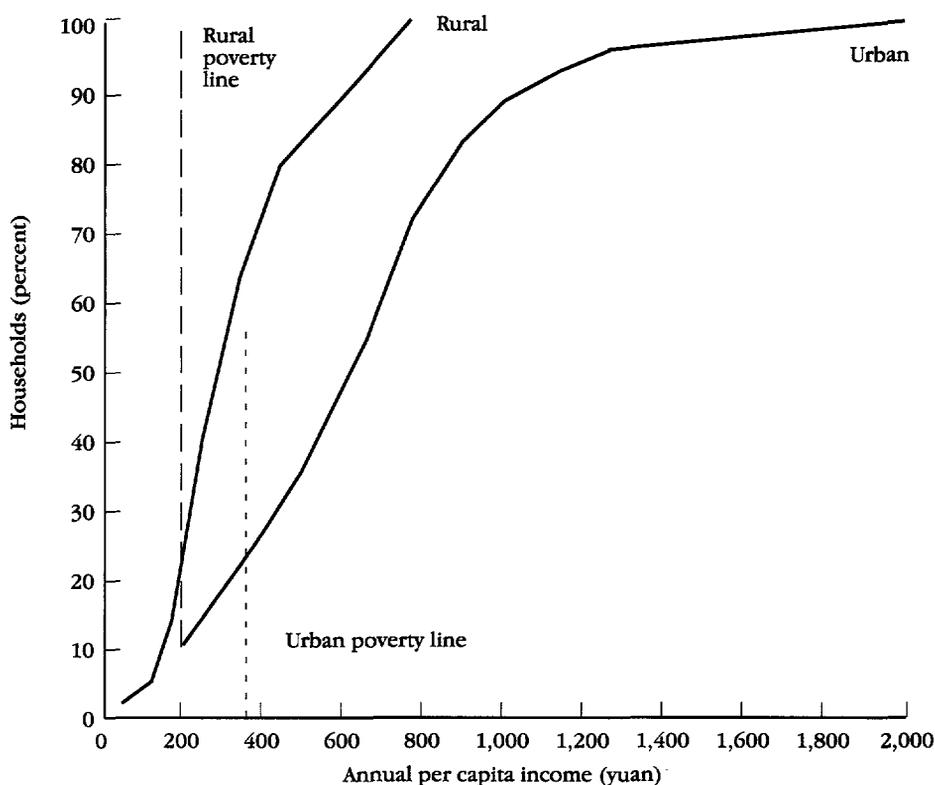
Table 5. *Infant Mortality and Life Expectancy at Birth in China, 1950–86*

Year	Infant mortality rate (per thousand live births)		Life expectancy at birth (years)	
	Official	Estimated	Official	Estimated
1950		265	35	30.5
1954	138.5	236		34.1
1956	81.1			
1957	70.9	229	57	34.8
1958	80.8			
Cities	50.8			
Counties	89.1			
1959	88.3	208		37.7
1963	83.6	137		49.0
1973–75	47.0	96		57.3
Male	50.1			
Female	43.7			
1975	27.1			
1978	22.3	65		64.2
1981	34.7	44	67.9	
Male	35.6	45	66.4	65.8
Female	33.7	43	69.4	68.7
1986	34.0	51	69.05	
Cities	15.4	20	Male	67.3
Counties	38.5	59	Female	70.7

Note: Bannister (1989) quotes some Chinese authors' work, which reported under-sampling of the areas with high infant mortality rates in the 1987 survey on children.

Source: Official infant mortality rates: for 1954–81, Wang (1988) p. 37; for 1986, State Statistical Bureau (1989c), p. 417–19. Estimated rates: through 1978, Jamison and others (1984), p. 5; and, for 1981 and 1986, Hao, Arriaga, and Banister (1988) and Banister (1989). Official figures for life expectancy at birth: for 1950, State Statistical Bureau (1989a), p. 109–10; for 1957, a survey conducted in 11 provinces; for 1981, the third population census conducted in 1982; and, for 1986, the 1 percent survey conducted in 1987. Estimated rates: through 1978, Jamison and others (1984), p. 5; and, for 1981 and 1986, Hao, Arriaga, and Banister (1988) and Banister (1989).

Figure 1. *Cumulative Distribution of Income in Rural and Urban Households, 1985*



Note: Since the group mean incomes are not given, we take the mid-point of the interval as the mean income for each household group.

Source: State Statistical Bureau (annual - 1989), pp. 726 and 742.

and urban areas for 1985–86 from household-level data. Table 4 presents six alternative poverty lines for rural and urban areas and the proportions of households and individuals below these levels. No attempt has been made to adjust the provincial samples relative to the national population. Adjusting the Y200 rural poverty line for inflation results in a line of Y212 for 1986, so that the actual 1985–86 incidence in rural areas should be closer to that shown for Y200 than for Y250. For urban areas the inflation-adjusted Y375 base is Y401 for 1986, so that the comparison of figures from table 2 should be made with the results of the <Y400 line. The cross-section estimates thus are roughly the same orders of magnitude as are our estimates using data from the State Statistical Bureau in table 2.

Other Indicators of Living Standards

Although evidence on living standards indicates that life expectancy at birth has steadily improved (State Statistical Bureau 1989a, pp. 109–10), this is a

relatively stable measure reflecting long-term trends. The infant mortality rate, however, is much more sensitive to short-term fluctuations. It is often taken as a comprehensive indicator of living standards since it reflects the nutritional status of women, health care facilities, access to clean water, sanitary conditions, and so on. In China the infant mortality rate increased substantially during 1958–62 and since the reforms (see Hussain and Stern 1988), while life expectancy was relatively unchanged (see table 5). Both life expectancy and infant mortality levels had reached middle-income standards by the early 1970s.

The reforms have led to a decline in the local collective resources that had been used to provide preventive health care and the public hygiene network in rural areas. Alternative financing mechanisms have been slow to develop. The infant mortality rate appears to have increased recently, as seen in estimates for 1986 (Jamison and others 1984), and official figures (State Statistical Bureau 1989a). Evidence of the rise in the rate alarmed the government sufficiently to induce it to introduce a nationwide inoculation program, in conjunction with UNICEF, to cover at least 90 percent of infants by 1991 (Ahmad and Hussain 1991).

The original delivery mechanisms of medical and educational services have been under severe stress since the 1980s. The problems with preventive care are apparent in the case of snail fever. Although this had reportedly been eradicated, it is now estimated that there are 1 million patients affected (World Bank 1989, p. 9–12). Altogether there are now 60 million sufferers from various endemic diseases, with 500 million potentially threatened (*China Daily* 1989c). Policies and new mechanisms to provide social services and safety nets for the vulnerable groups in a period of economic transition are needed, often with support from international agencies.

II. INEQUALITY IN CHINA

Measuring changes in living standards through the use of poverty lines is not very enlightening because of both the existence of subsidies and rations and the inability of such measures to reflect changes in the extent and distribution of poverty among those below the line. For the latter purpose, inequality measures that are sensitive to transfers at the lower range of the income distribution are preferred to the headcount index. Poverty measures such as the Foster-Greer-Thorbecke class are sensitive to the intensity of poverty, but they also are subject to the problems inherent in the choice of a poverty line. We use here two variants of the Atkinson index of inequality, which reflect the degree of inequality aversion through the value assigned to a parameter, e . This parameter could be varied from 0 to infinity. With $e = 0$, a unit of income to the poorest would be equivalent to a unit to the richest, regardless of income levels. We set e equal to 2 and 5 to reflect relatively high degrees of inequality aversion. With $e = 2$, the Atkinson index weights the welfare of poor individuals 32 times more heavily than that of another with twice the income. A value of $e = 5$ is often used to express maxi-min or Rawlsian preferences. If the gap between the wealthiest and

Table 6. *Estimates of Rural Income Inequality in China under Differing Distribution Assumptions, 1981 and 1987*

<i>Distribution assumption</i>	<i>Coefficient of variation</i>		<i>Gini coefficient</i>		<i>Atkinson index^a</i>			
					<i>e = 2</i>		<i>e = 5</i>	
	1981	1987	1981	1987	1981	1987	1981	1987
<i>Group mean income unknown</i>								
Households are concentrated at lower bounds of income groups	0.365	0.324	0.172	0.180	0.102	0.144	0.227	0.426
Households are concentrated at upper bounds of income groups	1.219	2.089	0.342	0.386	0.557	0.478	0.904	0.929
<i>Midpoint as group mean</i>								
Households are concentrated at the mean of the income groups	0.470	0.440	0.247	0.243	0.231	0.240	0.566	0.659
Households are concentrated at the bounds of the income groups	0.483	1.455	0.266	0.306	0.405	0.297	0.889	0.637
Households are distributed evenly within income groups	0.475	1.010	0.260	0.285	0.290	0.284	0.809	0.849

Note: Indexes are based on data on the number of households in each income range, with the mean income and distribution in each range unknown. Only the population means are known.

a. *e* is the inequality aversion parameter.

Source: Authors' calculations based on State Statistical Bureau (1989a).

Table 7. *Estimates of Urban Household Income Inequality in China under Differing Distribution Assumptions, 1981 and 1987*

<i>Distribution assumption</i>	<i>Coefficient of variation</i>		<i>Gini coefficient</i>		<i>Atkinson index^a</i>			
					<i>e = 2</i>		<i>e = 5</i>	
	1981	1987	1981	1987	1981	1987	1981	1987
<i>Group mean income unknown</i>								
Households are concentrated at lower bounds of income groups	0.216	0.335	0.099	0.179	0.042	0.097	0.108	0.217
Households are concentrated at upper bounds of income groups	1.080	0.780	0.262	0.283	0.202	0.313	0.395	0.713
<i>Midpoint as group mean</i>								
Households are concentrated at the mean of the income groups	0.517	0.578	0.221	0.255	0.167	0.201	0.435	0.444
Households are concentrated at the bounds of the income groups	0.850	0.657	0.248	0.259	0.196	0.247	0.444	0.679
Households are distributed evenly within income groups	0.679	0.614	0.239	0.258	0.177	0.216	0.438	0.565

Note: Indexes are based on data on the number of households in each income range, with the mean income and distribution in each range unknown. Only the population means are known.

a. *e* is the inequality aversion parameter.

Source: Authors' calculations based on State Statistical Bureau (1989a).

poorest 5 percent of the population was 15 times the income of the poorest, the Atkinson index would give a weight of 50,000 to the bottom 5 percent relative to the top 5 percent and in effect would focus almost exclusively on the bottom 5 percent. We also present measurements based on other commonly used indexes: the Gini coefficient, which is relatively sensitive to transfers among the middle ranges of the distribution, and the coefficient of variation, which is most sensitive to income changes among the rich (see Champernowne 1974 for a discussion of these indexes).

Given that the reported income ranges for each year have been fairly large and that the mean incomes are unknown, the calculation of inequality indexes requires some assumptions about the distributions. In table 6 we experiment with the effect on measures of inequality of five such assumptions about rural income distribution for 1981 and 1987. For instance when we assume that observations are clustered at the upper income bound, this generates a Gini coefficient of 0.34 for 1981 (a decidedly more unequal distribution than the estimate of 0.23 reported in table A-1). Assuming instead a grouping around the lower bound reduces the Gini coefficient to 0.17. When we assume that the midpoint of each group represents the group mean, this reduces the spread of the Gini estimates for 1981 for lower and upper clustering to 0.247 to 0.266. However, the rural income data ranges were overly aggregated at the lower (Y0–Y100 per capita) and upper (+Y500 per capita) ranges, and thus the underlying density-functions were truncated. Therefore one would not expect the distributions to remain constant or the midpoints to represent the group means.

The Atkinson indexes, which weight heavily changes in the income of the poor, show either improvement or deterioration in the position of the poorest from 1981 to 1987, depending on the grouping assumptions. For $e = 2$ under three of the five assumptions the index declines: the position of the rural poor improved relative to the mean. With $e = 5$, however, the index rises under four of the five assumptions, which suggests a relative deterioration in the position of the poorest.

Examination of the upper ranges of the size distribution, using the coefficient of variation, suggests sharp increases in inequality resulting from the presence of the relatively rich. For instance there is a sharp increase in the coefficient of variation (when the midpoint is assumed with linear interpolation). As expected, this increase is even higher when the crude upper bound assumption is adopted. It would be unrealistic to expect that all the rich would have been clustered at the lower bound.

The middle ranges of the size distribution show less change. The Gini coefficient is relatively unchanged for the lower bound assumptions, but increases marginally for the linear interpolation. This suggests that the bulk of the change in inequality results from changes among the relatively well off as well as the relatively poor in rural China.

There is less disagreement among the indexes for the urban sector, except for the coefficient of variation, which is most sensitive to changes in the top range of

Table 8. *Inequality in Rural Areas in China by Province, 1985-86*

Province	Households					Population				
	Number	Coefficient of variation	Gini coefficient	Atkinson index ^a		Number	Coefficient of variation	Gini coefficient	Atkinson index ^a	
				<i>e</i> = 2	<i>e</i> = 5				<i>e</i> = 2	<i>e</i> = 5
Beijing	189	0.69	0.25	0.24	0.80	711	0.37	0.20	0.12	0.27
Shanxi	290	0.55	0.27	0.20	0.47	1042	0.43	0.22	0.15	0.41
Heilongjiang	339	0.75	0.27	0.21	0.44	1351	0.62	0.25	0.18	0.40
Gansu	246	0.46	0.25	0.23	0.73	1125	0.48	0.25	0.24	0.76
Jiangsu	442	0.50	0.24	0.29	0.94	1705	0.44	0.24	0.34	0.95
Anhui	434	6.10	0.47	0.43	0.77	1947	6.46	0.51	0.45	0.53
Henan	551	0.65	0.28	0.25	0.68	2367	0.66	0.27	0.23	0.55
Hubei	425	0.52	0.24	0.19	0.71	1802	0.55	0.24	0.18	0.46
Guangdong	286	6.39	0.57	0.55	0.83	1305	6.27	0.56	0.52	0.63
Sichuan	625	5.93	0.42	0.39	0.85	2187	0.73	0.24	0.19	0.79

a. *e* is the inequality aversion parameter.

Source: Authors' calculations based on the 1985-86 unpublished household survey.

the distribution (table 7). The urban data suggest a smoother distribution, with less scope for varying assumptions concerning the underlying group distributions, although group means and distributions are still unknown. The two Atkinson indexes display sharp increases in 1987 relative to 1981, which suggests that increasing urban income concentration is due largely to the increased number of the very poor relative to the urban mean. There is no increased concentration at the upper end of the income scale, which is consistent with the relatively limited institutional changes in the urban enterprise sectors up to 1987. Subsequent increases would be linked to the spurt of inflation experienced.

The aggregate evidence presented above reflects increasing inequality, but it does not indicate why this has happened or who the poor are. Through the use of household level survey data for 1985–86, we examine below some evidence on why inequality has increased: the regional variations and sources of individual vulnerability.

III. CROSS-SECTION DATA ON INEQUALITY: REGIONS AND INDIVIDUALS

In this section we describe the regional and individual dimensions of poverty and vulnerability and attempt to describe who the poor were on the basis of household-level observations from the 1985–86 government survey. Identifying the poor puts in context the different policies that have been used by the state and those that might be necessary in the future.

The 1985–86 survey provides an important starting point in describing the poor, but it is subject to some limitations. Although the urban and rural samples are fairly large, 4,203 and 3,827 households, respectively, not all rural or urban areas have been sampled in proportion to their populations. The resulting estimates thus may be more representative of particular provinces rather than regions or of China as a whole. We also cannot estimate comparable regional poverty lines, because we lack province- and sector-specific price deflators. Further work in this area is necessary to generate reliable nationwide estimates. The inequality estimates are more solidly based, however, unless it can be shown that the group-specific rankings change with the use of alternative price indexes.

Regional Variation

Considerable variation in the incidence of inequality is evident among the ten rural areas sampled (table 8). Guangdong, with the second highest mean income in rural areas, has the greatest concentration of income in the upper and middle ranges of the size distribution. However, the Atkinson $e = 5$ index, which weights heavily extremely low incomes relative to the mean, is *lower* in Guangdong than in Jiangsu (a relatively rich province) and Sichuan (and than in Gansu—one of the poorest provinces) in per capita rather than household terms. Although income distributions in Gansu and Jiangsu are relatively alike in the middle ranges of the distribution, the poor in Jiangsu are relatively worse off in relation to the mean, as measured by the Atkinson indexes.

Table 9. *Inequality in Urban Areas in China by Province, 1985–86*

Province	Households					Population				
	Number	Coeffi- cient of variation	Gini coeffi- cient	Atkinson index ^a		Number	Coeffi- cient of variation	Gini coeffi- cient	Atkinson index ^a	
				<i>e</i> = 2	<i>e</i> = 5				<i>e</i> = 2	<i>e</i> = 5
Beijing	136	0.47	0.24	0.27	0.79	552	0.57	0.31	0.58	0.86
Shanghai	68	0.46	0.27	0.46	0.87	382	0.78	0.44	0.77	0.90
Tianjin	379	0.48	0.23	0.25	0.84	1511	0.55	0.28	0.61	0.91
Hebei	156	0.47	0.23	0.51	0.95	686	0.62	0.32	0.71	0.94
Shanxi	141	0.49	0.25	0.24	0.62	651	0.51	0.28	0.27	0.60
Inner Mongo	54	0.54	0.24	0.23	0.68	229	0.50	0.22	0.21	0.67
Liaoning	237	0.38	0.21	0.15	0.39	836	0.37	0.20	0.15	0.40
Jilin	170	0.47	0.23	0.44	0.94	716	0.52	0.28	0.76	0.95
Heilongjiang	144	0.56	0.28	0.42	0.88	704	0.70	0.36	0.58	0.86
Shaanxi	191	0.48	0.25	0.54	0.98	828	0.61	0.33	0.91	0.99
Gansu	201	0.43	0.24	0.21	0.64	793	0.45	0.24	0.23	0.65
Ningxia	22	0.38	0.21	0.47	0.88	106	0.39	0.21	0.46	0.88
Qinghai	106	0.59	0.23	0.21	0.60	461	0.46	0.22	0.27	0.68
Xinjiang	81	0.57	0.30	0.49	0.91	427	0.80	0.43	0.77	0.93
Shandong	169	0.42	0.23	0.38	0.92	633	0.43	0.23	0.38	0.92
Jiangsu	119	0.36	0.19	0.25	0.88	412	0.35	0.19	0.27	0.88
Anhui	94	0.39	0.20	0.15	0.46	364	0.42	0.22	0.17	0.46
Zhejiang	84	0.45	0.24	0.19	0.50	309	0.46	0.24	0.19	0.52
Fujian	108	0.43	0.24	0.37	0.83	428	0.45	0.25	0.42	0.84
Jiangxi	170	0.42	0.21	0.18	0.62	691	0.41	0.21	0.18	0.62
Henan	112	0.46	0.24	0.35	0.88	526	0.64	0.34	0.65	0.91
Hubei	219	0.40	0.21	0.17	0.61	839	0.39	0.21	0.18	0.61
Hunan	114	0.46	0.24	0.24	0.76	514	0.56	0.30	0.49	0.83
Guangdong	152	0.43	0.23	0.21	0.66	601	0.43	0.23	0.20	0.61
Guangxi	120	0.45	0.23	0.27	0.75	520	0.60	0.32	0.57	0.83
Sichuan	343	0.51	0.25	0.30	0.88	1287	0.55	0.28	0.58	0.92
Guizhou	96	0.49	0.24	0.19	0.59	388	0.49	0.24	0.20	0.61
Yunnan	217	0.42	0.22	0.28	0.89	794	0.42	0.22	0.31	0.90

a. *e* is the inequality aversion parameter.

Source: Authors' calculations based on the 1985–86 unpublished household survey.

The survey indicates that the poor are more likely to be the elderly without extended-family support, the incapacitated or sick, and those who have suffered from an interruption of earnings, possibly because of weather or seasonal variations. Transfers in response to geographical concentrations of poverty thus are still appropriate in the period after reform, although migration provides a measure of protection that was not available earlier. The substantial number of poor in the richer provinces illustrates, however, that geographical targeting is unlikely to reduce poverty. The poor in rural areas such as Gansu face relatively low income-generating prospects from agricultural activities, and, given that many of these areas are somewhat inaccessible, prospects for migration are limited. This suggests the need for improvements in infrastructure (irrigation and roads) and in education and training, as well as employment generation and support for the poorest.

As in the rural areas, patterns of inequality differ across China's cities. Guangdong, for example, has the highest mean income levels in the sample from the 1985–86 household survey but appears to have relatively low inequality (table 9). But Shanghai and Beijing, which rank third and second, respectively, in average per capita income, displayed relatively high inequality.

Shanghai has the most mature demographic profile of any city in China, with a greater proportion of the elderly than others: 1.71 million aged 60 and over, out of a total population of 12.5 million. A survey of the aged in Shanghai in 1987 (Chen 1987) suggested that the extremely old, or those above 70, formed 38 percent of the aged. It also found that 30 percent of the aged had annual incomes below Y480, 42 percent below Y720, and almost 70 percent below Y1,080. Given that old age pensioners often live with a spouse or helper, a pension of Y1,080 a year may well imply a per capita income of Y540. Pensions are linked to standard wages at the time of retirement, with little adjustment for inflation. The 70 year old (and above) would have retired around 1978 (the Cultural Revolution discouraged retirement) at a relatively low income level. Thus it would appear that many of those at the lower end of Shanghai's income distribution are the elderly. Since unemployment insurance does not extend to the informal sector in China, the floating population or those looking for work could also form part of Shanghai's poor.

Identification of the poor may also result from comparisons between Gansu, one of the poorest provinces, and Jiangsu, a province that has benefited from the growth of the past decade. Although Gansu is a poor province, urban incomes are determined largely by formal sector wages, which vary little across provinces. Thus, as table 10 shows, in 1982 mean income in urban Gansu was higher than in Jiangsu, and Gansu had a greater concentration of income under all criteria. By 1985–86, however, per capita income in urban Jiangsu was greater than in urban Gansu. Income in Gansu remained more concentrated at the upper and middle ranges, as depicted by the coefficient of variation, the Gini, and the Atkinson index with $e = 1$. In urban Jiangsu, however, the poor appear to have lagged behind the mean: there has been a sharp increase in the Atkinson indexes.

Table 10. *Income Inequality in Jiangsu and Gansu Provinces, 1982 and 1985-86*

Sector and indicator	1982		1985-86	
	Jiangsu	Gansu	Jiangsu	Gansu
<i>Urban</i>				
Mean annual income per capita (yuan)	593	648	962	874
Coefficient of variation	0.320	0.582	0.363	0.435
Gini coefficient	0.157	0.252	0.189	0.236
Atkinson index ^a				
<i>e</i> =1	0.044	0.109	0.075	0.096
<i>e</i> =2	0.083	0.182	0.253	0.214
<i>e</i> =5	0.183	0.323	0.876	0.638
<i>Rural</i>				
Mean annual income per capita (yuan)	309	174	555	277
Coefficient of variation	0.287	0.423	0.497	0.463
Gini coefficient	0.149	0.203	0.242	0.246
Atkinson index ^a				
<i>e</i> =1	0.038	0.068	0.102	0.104
<i>e</i> =2	0.075	0.122	0.286	0.233
<i>e</i> =5	0.175	0.231	0.940	0.731

a. *e* is the inequality aversion parameter.

Source: 1982 distributions, Lim and others (1985), p. 89; 1985-86 figures, authors' calculations based on the 1985-86 unpublished household survey.

Groups at Risk: Characteristics of the Poor

The characteristics of a typical poor household are illustrated by an example in Jiangsu. This was a household of three unemployed adults, headed by a disabled worker, aged 64. They subsisted on a disability pension equivalent to Y984 a year paid by the head's prior employer, a SOE. Thus China's elaborate labor insurance system does not guarantee above-poverty income, as this example shows.

There are two further groups of individuals that are likely to be among the poor. First, it has been estimated that there are as many as 51.6 million disabled in China. Government policy has been directed largely toward occupational rehabilitation, and 34,000 enterprises have been set up to employ disabled people, generating work for 1.34 million disabled workers and an output of Y18 billion in 1988 (communication from the Ministry of Civil Affairs, Beijing, March 1989). Although labor insurance is used for workers in the urban formal sector, in other sectors there is an emphasis on income generation and capability enhancement through occupational welfare schemes. This set of policies is known in China as "enhancing the ability to produce blood, rather than blood transfusion."

A second group of individuals in poverty are the 100 million people each year that are victims of natural disasters. Disaster relief in excess of Y1 billion is provided by the central government annually, mainly in the form of grain to augment local resources. In addition to the rescue, shelter, medical care, and feeding operations that are necessary, the government also establishes

employment-generating activities and attempts to restore infrastructure within three to six months. Early warning and information systems are crucial in mitigating the effects of natural calamities, and such systems have been improved considerably since the period of the great famine (1959–61) (Ahmad and Zou 1989).

There is a system of support for vulnerable rural individuals (widows, orphans, and the elderly without family support) known as the “five guarantee-system” or *wu bao* (see Ahmad and Hussain 1991). In 1988 there were 3 million claimants, who received Y1.5 billion, of which the central government provided Y200 million–Y300 million. Although the level of support varies, the average *wu bao* expenditure was thus Y500 per person in 1988, which suggests that the poverty lines taken in this article may have been somewhat on the low side. As with Victorian poor relief, the emphasis is more on preventing the “undeserving” elderly from getting relief than on ensuring that all the “deserving” actually do derive benefits. There is a severe social stigma attached to the receipt of *wu bao* funds, and this restricts claim rates and the applicability of the measure. The preferred avenue for ensuring old age support is to rely on sons and if possible to reside with a son (see Jia 1988). As the very low number of claimants shows, the *wu bao* system has failed to provide an acceptable alternative to family support and thus to help curb the growth of the rural population.

IV. CONCLUDING REMARKS

The Chinese population in 1978 had low cash income, which was relatively equally distributed at the local level. Despite regional variations, destitution was rare, and social safety nets appeared to work, although the institutional arrangements restricted initiative. After the economic reforms, cash income grew rapidly, particularly in the major cities and coastal areas. Higher mean income, however, was associated with greater variance in standards of living both across and within regions. This appears to have put great stress on the social security system, broadly defined.

In some respects the rural areas of Gansu, Henan, and Shanxi are reminiscent of pre-1978 China, with low incomes and relatively low inequality. Sichuan, another low-income province (but with mean income greater than the above-mentioned provinces), has greater inequality and higher poverty levels than, say, Shanxi. However, the prospects of rapid agricultural growth in these areas must be somewhat limited. Without migration or alternative employment-generating possibilities, the government’s policy of targeting extremely low-income counties for transfers, investments, and training would appear to be relatively pragmatic given the information costs of household-specific programs in a country of China’s size and stage of development. In 1989 the central government supported 9 counties in Gansu, 34 in Shanxi, 16 in Sichuan, and 15 in Henan. Provincial governments supported 12 in Gansu, 21 in Shanxi, 30 in Sichuan,

and 9 in Henan. In addition, 20 counties in Gansu were supported by a special *Sanxi* (three western areas) grant.

The system of disaster relief in China is relatively well developed, and its information-gathering capabilities have improved since the famine of 1959–61. But the absence of a safety mechanism for vulnerable people in rural areas, other than *wu bao* for the elderly or incapacitated, is an issue of concern, and the poor and vulnerable in richer areas such as Jiangsu are similarly unprotected. There is clearly scope for examining public policies in such cases.

Shifting employment patterns, particularly with respect to township and village enterprises in rural areas and the floating (unregistered) population in urban areas, create both a set of opportunities and problems. The erosion of traditional household-based support, declining protection from unemployment, sharp increases in inflation, and the rise in variation in living standards in the post-reform period have raised new issues in China's social security system.

The economic reforms, which led to substantial increases in income after 1978, undoubtedly improved material living standards, especially in the early years. Subsequently, an unravelling of the established safety nets, an aging population, and the advent of high episodes of inflation reversed this trend for an increasing proportion of the population. In recent years increased poverty has coincided with falls in some of the related social indicators. Changing demographic patterns and employment prospects together make it essential to identify the vulnerable if the poor are to be protected. Although the Chinese method of identifying vulnerable areas is a useful first step in a poverty reduction strategy, it is not adequate to offset the problems and contingencies that China is likely to face in the coming decades.

Table A-1. *Percentage of Peasant Households in China by Nominal Net Income, 1978-88*

<i>Yuan per capita</i>	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
0-100	33.3	19.3	9.8	4.7	2.7	1.4	0.8	1.0	1.1	0.9	0.5
100-150	31.7	24.2	24.7	14.9	8.1	6.2	3.8	3.4	3.2	2.4	1.5
150-200	17.6	29.0	27.2	23.0	16.0	13.1	9.4	7.9	7.0	5.0	3.3
200-300	15.0	20.4	25.3	34.8	37.0	32.9	29.2	25.6	21.8	17.5	13.5
300-400		5.0	8.6	14.4	20.8	22.9	24.5	24.0	21.7	21.3	17.5
400-500	2.4 ^a	1.5	2.9	5.0	8.7	11.6	14.1	15.8	16.5	17.2	16.7
Over 500		0.6	1.6	3.2	6.7	11.9	18.2	22.3	28.7	35.7	47.0
Average annual net income	134	160	191	223	270	310	355	398	424	463	545
Gini coefficient	0.32	0.28	0.26	0.23	0.22	0.25	0.27	0.30	0.31		

a. For over 300.

Source: State Statistical Bureau (annual-1988), p. 732, (annual-1989), p. 742, and (1989a), p. 465. Gini coefficients are calculated by World Bank staff.

Table A-2. *Peasants' Income Distribution and Household Size in China, 1985, 1987, and 1988*

<i>Yuan per capita</i>	1985			1987			1988		
	Percentage of households	Number of household members	Percentage of population	Percentage of households	Number of household members	Percentage of population	Percentage of households	Number of household members	Percentage of population
Below 100	1.0	6.09	1.13	0.87	6.09	0.98	0.5	6.09	0.6
100-150	3.4	6.09	3.83	2.38	6.09	2.68	1.5	6.09	1.7
150-200	7.9	5.90	8.63	4.99	5.90	5.45	3.3	5.90	3.6
200-300	25.6	5.82	27.5	17.51	5.82	18.8	13.5	5.82	14.6
300-400	24.0	5.53	24.5	21.34	5.53	22.0	17.5	5.53	18.0
400-500	15.8	5.08	14.8	17.21	5.10	16.3	16.7	5.20	16.1
Over 500	22.3	4.91	20.2	35.7	5.10	33.7	47.0	5.20	45.3

Source: Authors' calculations based on State Statistical Bureau (1985b), p. 20. The columns on household size are based on data from Hubei province.

Table A-3. *Proportion of Urban Households in China by Nominal Monthly Income Per Capita, 1981-88*

<i>Yuan per month per capita</i>	1981	1982	1983	1984	1985	1986	1987	1988
0-20	2.05	0.92	0.61	1.67	11.05	5.67	4.24	8.32
20-25	5.46	3.68	2.97					
25-35	31.81	25.63	20.32	10.52				
35-50	42.29	45.40	46.56	38.89	24.78			
50-60	11.90	14.20	16.42	22.67	19.53	16.17	13.36	7.61
60-70	6.49	10.17	13.12	26.25	16.04	17.86	15.74	10.26
70-80					10.96	14.82	14.61	12.53
80-90					7.01	10.24	12.09	12.46
90-100					4.11	7.40	8.49	11.91
100-110					2.63	4.60	6.08	9.21
110-120					3.89	3.05	4.35	7.25
120-130								
130-140	1.24	2.04	3.82					
140-150	0.39	1.11	2.95					
Over 150		1.69	3.17	8.36				
Average	38.17	41.21	43.83	50.63	57.11	68.99	76.33	93.25

Note: Figures after brackets are the sums for the income groups bracketed.

Source: State Statistical Bureau (annual-1988), p. 716, (annual-1989), p. 726, and 1989a, p. 462.

Table A-4. *Total and Urban Population: Comparison between the State Statistical Bureau and United Nations Estimates, 1985-90*

Year	Total (millions)	Urban population as percentage of total population	
		State Statistical Bureau	United Nations
1985	1,050.4	36.4	20.6
1986	1,065.3	40.8	20.8
1987	1,080.7	46.1	20.9
1988	1,096.1	49.3	21.1
1989			21.2
1990			21.4

Source: State Statistical Bureau (1989a), pp. 350 and 352; and United Nations (1986), table A-1.

Table A-5. *Urban Income Distribution and Household Size in China, 1985, 1987, and 1988*

Yuan per year per capita	1985			1987			1988		
	Percentage of house- holds	Number of household members	Percentage of popula- tion	Percentage of house- holds	Number of household members	Percentage of popula- tion	Percentage of house- holds	Number of household members ^a	Percentage of popula- tion
0-240	} 11.05	5.03	14.6	4.24	4.43	5.02	} 8.32	4.39	9.77
240-300									
300-420									
420-600	24.78	4.08	26.47	11.7	4.39	13.73	7.61	4.18	8.51
600-720	19.53	3.75	19.17	13.36	4.18	14.93	84.1	3.70	81.7
720+	44.64	3.41	39.85	70.7	3.70	66.33	100	3.74	100
Total	100	3.82	100	100	3.74	100			

a. 1987 figures used because of lack of data for 1988.

Source: Author's calculations based on data from State Statistical Bureau (annual-1986, 1988, 1989) and (1989a).

REFERENCES

- The word "processed" describes informally reproduced works that may not be commonly available through library systems.
- Ahmad, Ehtisham, and Gang Zou. 1989. "Deprivation and Prosperity in Chinese History." Background paper for WDR 1990. World Bank, World Development Report Unit, Washington, D.C. Processed.
- Ahmad, Ehtisham, and Athur Hussain. 1991. "Social Security in China in a Historical Context." In E. Ahmad, J. Dreze, J. Hills, and A. K. Sen, eds., *Social Security in Developing Countries*. Oxford: Clarendon Press.
- Banister, Judith. 1989. "A New Survey of Infant Mortality in China: A Research Note." Working Paper, U.S. Bureau of the Census, Washington, D.C. Processed.
- Champernowne, D. G. 1974. "A Comparison of Measures of Income Distribution." *Economic Journal* 84: 787-818.
- Chen, Xianhuai. 1987. "A Comprehensive Survey on the Aged Population of Shanghai." In *Shanghai Laoling Wenti Zhanlue Duice Yianjiu* [Research on the Strategic Policies for the Aging Problems in Shanghai]. Shanghai: Fudan University and the Committee of Aging Problems in Shanghai.
- China Daily*. 1989a. (January 17).
- . 1989b. (July 17).
- . 1989c. (October 25).
- Hao, Hongsheng, Eduardo Arriaga, and Judith Banister. 1988. "China: Provincial Patterns of Mortality." Paper for the Seminar on Mortality and Morbidity in South and East Asia, Beijing. August.
- Hussain, Arthur, and N. H. Stern. 1988. "On the Recent Increase in Death Rates in China." Discussion Paper. London School of Economics, China Program.
- Jamison, Dean T., and others. 1984. *China: The Health Sector*, Washington, D.C.: World Bank.
- Jia, Aimei. 1988. "New Experiments with Elderly Care in Rural China." *Journal of Cross-Cultural Gerontology* 3: 139-48.
- Lim, Edwin R., and others. 1985. *China: Long-Term Development Issues and Options*. Baltimore, Md.: Johns Hopkins University Press.
- State Council. 1987. "State Council Document on Economic Development of the Poor Regions," no. 95, October 30, 1987. Processed.
- State Council, Office of the Leading Group of Economic Development in Poor Areas. 1989. *Outlines of Economic Development in China's Poor Areas*. Beijing: Agriculture Publishing House.
- State Statistical Bureau. 1985a and 1987. *Zhongguo Nongcun Tongji Nienjian* [Statistical Yearbook of the Rural Areas of China]. Beijing: China Statistical Publishing House.
- . 1985b. *Ge Sheng, ZizhiQu, Zhixiashi Nongmin Shouru, Xiaofei Diaocha Yianjiu Ziliao Huibia* [Compilation of Data from a Survey on Farmers' Income and Expenditures of All Provinces, Autonomous Regions, and Municipalities Directly under the Central Government]. Beijing: China Statistical Publishing House.
- . 1989a. *Fenjin de Sishinian 1949-1989* [Forty Years' Progress.] Beijing: China Statistical Publishing House.

- . 1989b. "Statistical Bulletin of the National Economic and Social Development, 1988." *Jingji Ribao [Economic Daily]* (March 1).
- . 1989c. *Statistics on 1987 Survey on the Situations of Children in China*. Beijing: China Statistical Publishing House.
- . Annual. *China: Statistical Yearbook*. Beijing: China Statistical Publishing House.
- United Nations. 1986. *The Prospects of World Urbanization*. New York.
- Wang, Weizhi. 1988. "Trends and Differences in China's Mortality Rate." In *New China's Population*. New York: Macmillan.
- World Bank. 1989. "China: Long-Term Issues in Options for the Health Sector." China Department, Washington, D.C. Processed.
- Zhonguo Xinwen She [China News Press]*. 1989. 0254GMT (August 8).

Structural Adjustment and the Welfare of Rural Smallholders: A Comparative Analysis from Sub-Saharan Africa

David E. Sahn and Alexander Sarris

The direction and level of changes in real incomes brought about by structural adjustment are determined by a variety of factors, including sources of income, patterns of expenditures, and movements in relative prices in the wake of adjustment. An economic model is used to derive an index of real income, which is employed for data from Côte d'Ivoire, Ghana, Malawi, Madagascar, and Tanzania. No systematic changes in relative prices, and especially in the ratio of tradable to nontradable prices, were noted after the beginning of adjustment, although the diversity of income sources implies that the implications of movements in relative prices on smallholder welfare are indeed complex. The results indicate that there is no unequivocal pattern of increase or decline in the real welfare of the rural poor but that there are marked differences among countries and regions.

Stabilization and structural adjustment programs are being implemented widely in Sub-Saharan Africa in response to the macroeconomic crisis that emerged during the 1970s. Although the timing and nature of adjustment has differed markedly from one country to the next, one of the common aspects is that the economic opportunities faced by various agents in the economy will be changed. In particular, of key importance are the expenditure switching policies of the adjustment programs, which alter relative prices for various products and factors, generally with the intent of expanding the tradable goods sector. Policies that bring about changes in the price signals in the economy will affect household welfare as mediated by changes in the structure and level of incomes and consumption. This article is concerned with how macroeconomic adjustment policies affect low-income rural smallholder households, since they comprise a

David E. Sahn is at the Cornell University Food and Nutrition Policy Program, Ithaca, New York. Alexander Sarris is at the University of Athens, Department of Economics, and Cornell University Food and Nutrition Policy Program. The authors thank Gerald Shively and Dimitris Psaltopoulos for their research assistance. This research was supported by the Africa Bureau of the U.S. Agency for International Development under a Cooperative Agreement with the Cornell University Food and Nutrition Policy Program.

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large percentage of households in most Sub-Saharan African countries, many of which are appropriately classified as poor.

Since it has been shown that the rural poor are often net consumers of staple grains, especially traded goods whose prices are assumed to increase commensurate with devaluation or removal of price controls, adjustment programs are asserted to have deleterious consequences for the rural poor. The expectation that adjustment programs will induce a fall in real wages further exacerbates the negative impact of adjustment (see Pinstруп-Andersen 1988; Cornia, Jolly, and Stewart 1987). A contrary argument is that adjustment programs stand to help the rural poor directly or indirectly by raising producer incentives and rural incomes. Relative price movements commensurate with adjustment are seen to favor products produced by smallholders, whose real incomes will consequently rise. A more balanced and agnostic viewpoint is that the impact of adjustment on the poor is not knowable a priori and will be determined by the propensities of the poor to produce and consume tradables versus nontradables, as well as by actual movements in relative prices (see Addison and Demery 1985 and Sahn 1990).

In order to address this debate and gain some further insight into how smallholders are affected by adjustment in the short term, two especially important issues require careful analysis. The first is the structure of poor rural smallholders' income and consumption, namely, the sources from which they derive income, appropriately grouped for analysis, and the products that satisfy their consumer needs. The second aspect is how structural adjustment affects the values of these magnitudes by means of changes in relative prices.

In this article the emphasis will be on examining the relevant economic signals before and after policy reforms were instituted. This procedure cannot attribute any changes in the relevant signals to specific adjustment programs. To analyze how policy reforms affect economic signals in an economy is a major undertaking, which would necessitate the use of complex empirical models (see Scobie 1989, Pinstруп-Andersen 1990, and Sarris 1990). However, our aim is to infer directions of welfare changes after reforms were instituted and not to examine whether the change in the fortunes of the poor is due only to adjustment or to other concurrent developments. We are interested in the welfare changes of a typical household within a given group, rather than how the total magnitude of poverty will change (Kanbur 1987).

The next section outlines the methodological framework and analytical model that is to be used to examine how low-income smallholder households are affected by macroeconomic adjustment. This is followed by a discussion of the data employed from the five countries included in the comparative analysis: Côte d'Ivoire, Ghana, Malawi, Madagascar, and Tanzania. This presentation and discussion of descriptive statistics will focus on characterizing the structure of consumption and sources of income and on price movements that have occurred during adjustment. We then present the results of the analytical model as well as policy implications of the findings.

I. METHODOLOGY

The precise definition of poverty or vulnerability is a matter of considerable research, and we shall not delve into the issue here. We begin with a rural smallholder household that is representative of a class that has been identified as poor or vulnerable. The household will derive its income from agricultural and nonagricultural activities. The agricultural activities will be distinguished among those that produce exportable and other nonfood tradable cash crops (such as coffee, cocoa, cotton, and tea), those that produce tradable staple food crops (mainly maize, rice, and wheat), and those that produce nontradable food products (such as coarse grains, roots and tubers, fruits and vegetables, and livestock products).

The share of income derived from own-account agricultural activities and other agricultural or nonagricultural activities are denoted by S_a and S_r , respectively, in some base year, and include transfers and remittances, where

$$(1) \quad S_a + S_r = 1.$$

The shares of own-operated farm agricultural income derived from activities that produce exportable, tradable staple food, and other nontradable agricultural products are denoted by S_{ae} , S_{af} , and S_{ao} , respectively. The base year shares of total household consumption expenditures (including subsistence consumption) are denoted by θ_f , θ_o , and θ_n for expenditures on tradable staple food products, nontradable food products, and nonagricultural products, respectively. Changes in the welfare of this type of household can then be monitored by examining the following index of changes in real income:

$$(2) \quad \tilde{Y} = \{(S_{ae}\tilde{P}_e^p + S_{af}\tilde{P}_f^p + S_{ao}\tilde{P}_o^p) + S_r\tilde{r}\} - (\theta_f\tilde{P}_f^c + \theta_o\tilde{P}_o^c + \theta_n\tilde{P}_n^c)$$

where Y is real income; P_e , P_f , and P_o are the price indexes of the three agricultural product groups outlined above, with the superscript p for producer prices and c for consumer prices; r is the unit reward of any nonagricultural production activities of the given class of households; and P_n^c is the consumer price of the nonagricultural product. The symbol \sim above a variable indicates a percentage change over a given period.

Equation 2 can be derived by taking the derivative of a standard household consumer utility function, which is a function only of quantities consumed, under the assumption that the household earns income by operating on a standard production possibility frontier of agricultural and other activities. As long as smallholder activities are labor intensive and total labor available for each household and technology do not change, the frontier will not shift outward over time. Thus only substitution among activities because of relative price changes will occur. This implies that quantity changes should not be part of equation 2. In Côte d'Ivoire, Ghana, Malawi, Madagascar, and Tanzania, per capita production of total agricultural output has not been increasing. If the technology is labor-using and there is full employment, not much aggregate supply response to price is expected (Binswanger 1989).

Although changes in the prices of the three agricultural products faced by producers and consumers and in the price of the nonagricultural product P_n^c , can be observed and monitored relatively easily, the price of nonagricultural production activity r cannot. Given, however, that in many countries a large share of the income of poor households is derived from such activities, it cannot be neglected. This has been acknowledged by several authors, who have emphasized the relation between the agricultural and nonagricultural wage and the price of other agricultural products (Ravallion 1989, Sah and Stiglitz 1987). In our approach, however, r symbolizes something wider than just wages. It stands for the reward to any other type of activity, apart from work on one's own farm. The appendix presents the outline of a model through which the change in r can be expressed as a function of the changes in the other four observable prices in equation 2, as well as several other parameters related to adjustment and smallholder income.

The derivation of the model described in the appendix yields the following expansion of equation 2 that captures changes in real income:

$$(3) \quad \begin{aligned} \bar{Y} = & \left\{ \left(S_{ae} + \frac{S_r \lambda_a b_e}{(1-\gamma)\Delta} \right) \bar{P}_e^p + \left(S_{af} + \frac{S_r \lambda_a b_f}{(1-\gamma)\Delta} \right) \bar{P}_f^p \right. \\ & + \left(S_{ao} + \frac{S_r \lambda_a b_o}{(1-\gamma)\Delta} \right) \bar{P}_o^p + \frac{S_r \lambda_n}{(1-\alpha-\beta)\Delta} \bar{P}_n^p \\ & \left. - \frac{S_r \lambda_n \beta \bar{P}_m}{(1-\alpha-\beta)\Delta} \right\} - \{ \theta_f \bar{P}_f^c + \theta_o \bar{P}_o^c + \theta_n \bar{P}_n^c \} \end{aligned}$$

where:

$$(4) \quad \Delta = \frac{\lambda_n(1-\beta)}{1-\alpha-\beta} + \frac{\lambda_a}{1-\gamma}.$$

The symbols in equations 3 and 4 are explained in detail in the appendix. They involve the labor parameters of the Cobb-Douglas production function (α, β, γ), aggregated labor shares in agriculture and nonagriculture (λ_a, λ_n), and shares of exportables, traded food, and other agricultural activities in total agricultural output (b_e, b_f, b_o). The price P_m denotes an index of noncompetitive imported goods. Equation 3, therefore, depends on structural variables and changes in price indexes that are relatively easy to estimate, as well as on a set of assumptions that are explored explicitly in the appendix.

The weights multiplying producer prices inside the first bracket in the right-hand side of equation 3 sum to one. Similarly, the weights in the second bracket sum to one. In other words, real income changes can be looked at as changes in the ratio of a Laspeyres index of nominal income (in combination with wages) and a Laspeyres index of consumer prices, with weights specific to the poor smallholders being examined in this study.

The use of a fixed weight index underestimates real income gains and over-

estimates real income losses. This is so because the output, and consequently the income shares in the numerator, would tend to increase for products whose prices increase, and hence a fixed weight numerator would tend to be smaller than a true index. In the denominator, substitution among consumed goods would tend to lessen consumption shares for products whose prices increase. Hence, the fixed weight denominator would tend to be larger than the true one.

We could make the analysis more accurate by starting with a base year t_0 and using equation 3 to estimate the first order welfare changes for a subsequent period t_1 , given observed price changes. Assumptions about production transformation parameters and own price and cross-price elasticities of demand could then be used to estimate new production and consumption shares in period t_1 , which could be used to estimate welfare changes for period t_2 and so on. Although such an analysis of piecewise linearization and updating will give a better estimate of welfare changes, it must be based on assumptions about the values of several parameters, which are normally not available for countries in Sub-Saharan Africa. Hence, the second order gain in prediction accuracy might be lost by the parameter uncertainty. It is also the case that a variable weight division index in both the numerator and the denominator would clearly be superior, but there are no data with which to implement it. Therefore we have adopted a simpler and more straightforward analysis, but recognize the direction of bias being introduced into the analysis.

II. DATA AND DESCRIPTIVE STATISTICS

To apply the framework described above, a data set on the sources from which households derive income and the products that satisfy their consumer needs has been organized for Côte d'Ivoire, Ghana, Malawi, Madagascar, and Tanzania. Household data on income and consumption from each country were analyzed. For Côte d'Ivoire, the Côte d'Ivoire Living Standards Survey data from 1985–86 were analyzed as the basis for understanding the income sources and the expenditure patterns. (See Grootaert 1986 and Ainsworth and Munoz 1986 for a description of the unpublished data set.) The Ghana Living Standards Survey from 1987–88 was analyzed to describe income and consumption patterns in Ghana. (The unpublished survey, conducted by the Ghana Statistical Service in cooperation with the World Bank, follows the structure of the Côte d'Ivoire survey.) For Côte d'Ivoire and Ghana, two prototype households are distinguished—one for the forest region and the other for the savannah—to reflect the main agroclimatic zones for smallholder agriculture. In both surveys, the profile of consumption and production characteristics was based on our analysis of the data tapes, which allowed us to select the bottom 20 percent of the per capita expenditure distribution.

The data for Madagascar were derived primarily from the social accounting matrix for 1984 (Dorosh and others 1990), which used various national accounts and regional surveys to define a group of smallholder farms cultivating

Table 1. *Sources of Total Income of Low-Income Rural Smallholders in Five Countries in Sub-Saharan Africa, Selected Years (percentage of total income)*

<i>Type of income</i>	<i>Per capita total income</i>								
	<i>Côte d'Ivoire</i>		<i>Ghana</i>		<i>Madagascar</i>			<i>Malawi, south</i>	<i>Tanzania, all</i>
	<i>Forest</i>	<i>Savannah</i>	<i>Forest</i>	<i>Savannah</i>	<i>Coast</i>	<i>Plateau</i>	<i>South</i>		
Agricultural income	76	81	57	68	42	39	48	51	73
From home consumption	31	40	37	54	25	31	37	37	50
From agricultural sales	45	41	20	14	17	8	11	14	23
Nonagricultural earned income ^a	21	17	40	31	55	58	49	13	25
Nonearned income ^b	3	2	3	1	3	3	3	36	2

a. Includes wages, salaries, and own-account earnings.

b. Includes income from transfers, remittances, and other nonearned sources.

Source: Based on data from: Côte d'Ivoire, 1985–86 Côte d'Ivoire Living Standards Survey (unpublished); Ghana, 1987–88 Ghana Living Standards Survey (unpublished); Madagascar, Dorosh and others (1990); Malawi, Harvard Institute for International Development (1989); and Tanzania, 1976–77 government household survey (unpublished).

between 0.25 and 1.5 hectares. The data allow us to distinguish between households in three agroclimatic regions (coast, plateau, and south) with markedly different production characteristics.

For Malawi, data tapes from a regional survey conducted in the Zomba district in the southern region were analyzed to arrive at the income and consumption patterns. (See Peters and Herrera 1989 for a complete discussion of the survey.) Because the communities surveyed were all in the densely populated region, the data have limited applicability to the more land-abundant regions in the north and center of the country. In keeping with the intent to profile the poor smallholder, the mean landholding of the smallholders represented in this sample was only 1.5 hectares. However, these households are not likely the poorest of the poor, given that the high population density in the region has contributed to a large number of households having less than 0.5 hectare to cultivate (Sahn and Arulpragasam, forthcoming).

The data for Tanzania were derived from the results of a nationwide household survey performed in 1976–77. The unpublished survey covered 2,744 households across a larger spectrum of landholding sizes and incomes than the surveys in the other four countries; nonetheless, it included predominantly poor smallholders who have an average holding size of 1.43 hectares.

Sources of Income

Initially we distinguish among three income categories: earnings from agricultural activities, earnings from nonagricultural activities, and nonearned income (table 1). Agricultural income includes the income derived from the sale of what is produced as well as the imputed value of the portion of the household's production that is consumed by the household. Nonagricultural income includes income from wages, salaries, and own-account other than farming. Nonearned income includes income in the form of remittances, the imputed value of rent (where it could be estimated), and other transfers. Despite the great diversity in income shares, a few interesting features of these data are worth highlighting. First, even for smallholder households, nonagricultural earned income is a significant share of the total. For example, nonagricultural income in Côte d'Ivoire was 21 and 17 percent of total income for the forest and savannah regions, respectively. Figures for the two regions in Ghana were 40 and 31 percent, respectively. In Malawi nonagricultural income represented 13 percent of total income, while the figure for Tanzania was 25 percent. Among the data examined, the highest income share from nonagricultural activities, including wages, salaries, and own-account, was observed in the plateau region of Madagascar, where it was 58 percent of total income.

Second, even though nonearned income is the least important category, it makes a significant contribution in Malawi, where it comprises 36 percent of total per capita income. This is attributable to the fact that remittances from men working in South Africa or on estates within Malawi is an extremely

Table 2. *Sources of Agricultural Income of Low-Income Rural Smallholders in Five Countries in Sub-Saharan Africa, Selected Years*
(percentage of total agricultural income)

<i>Source of agricultural income</i>	<i>Per capita agricultural income</i>								
	<i>Côte d'Ivoire</i>		<i>Ghana</i>		<i>Madagascar</i>			<i>Malawi, south</i>	<i>Tanzania, all</i>
	<i>Forest</i>	<i>Savannah</i>	<i>Forest</i>	<i>Savannah</i>	<i>Coast</i>	<i>Plateau</i>	<i>South</i>		
Traded food ^a	14	32	18	26	23	30	36	53	35
Consumed by the household	8	18	9	16	23	28	33	52	27
Sold	6	14	9	10	^d	2	3	1	9
Nontraded food ^b	41	46	70	73	46	69	58	24	61
Consumed by the household	32	31	57	63	35	51	44	20	42
Sold	9	14	13	10	11	18	15	4	18
Export crops ^c	45	22	12	1	31	1	6	23	4

a. Rice, maize, groundnuts, and other traded food.

b. Millet, cassava, sweet potato, yams, and other nontraded food.

c. Cocoa, tobacco, cotton, coffee, cola nuts, rubber, sugar, and other exportables.

d. A positive share less than 0.50 percent.

Source: Based on data from: Côte d'Ivoire, 1985–86 Côte d'Ivoire Living Standards Survey (unpublished); Ghana, 1987–88 Ghana Living Standards Survey (unpublished); Madagascar, Dorosh and others (1990); Malawi, Harvard Institute for International Development (1989); and Tanzania, 1976–77 government household survey (unpublished).

important source of income for smallholder households in the highly land-constrained southern region of the country.

Third, we are able to distinguish between the relative value shares of goods that are consumed by the household and those that are marketed. In all cases, except in Côte d'Ivoire, the value of household consumption dominates sales. This indicates a relatively noncommercialized agricultural sector.

Of greatest relevance, however, is the difference between tradable (such as rice, maize, and groundnuts) and nontradable (such as roots and tubers, vegetables, meat, and milk) food products and export crops (such as coffee, tea, tobacco, cocoa, and cloves) in the production of the average smallholder household for each country or region (table 2). As indicated earlier, we focus on the implications of price changes among these three components of agricultural earnings and on nonagricultural earnings r . By definition, virtually none of the export crops are consumed by the household. Although designating a commodity as a nontradable implies that it is not a direct substitute for an import good and is likewise not traded internationally, there is still considerable scope for selling such commodities in the local market place. Therefore, like tradable goods, these appear in both consumption and marketing of the households.

The relative importance of these classes of goods in overall agricultural incomes (including the imputed value of household consumption) and in revenue from sales varies considerably from one country or region to the next (table 2). In Côte d'Ivoire, tradable food products comprise only 14 percent of total agricultural income (including the imputed value of household consumption) in the forest region, whereas the comparable figure is 33 percent for the savannah. Export crops represent 45 and 22 percent of agricultural incomes and 75 and 43 percent of agricultural sales revenue, in the two regions, respectively. These patterns reflect the dominance of coffee and cocoa in the forest region. In the savannah only cotton is an important export crop, and tradable and nontradable food crops (such as maize, rice, and yams) represent nearly equally important sources of income. In other countries export crops as a share of total agricultural incomes and as a share of sales revenue are also much lower than those observed in the Côte d'Ivoire forest region. In Tanzania, the savannah region of Ghana, and the plateau region of Madagascar, only 4, 1, and 1 percent, respectively, of agricultural incomes are from production of export crops. In Malawi 23 percent of agricultural incomes (and 83 percent of sales revenue) is from the primary export crop, tobacco, and 12 percent of agricultural income (35 percent of the sales revenue) in the forest region of Ghana is from export crops (cocoa and cola nut).

Perhaps the most interesting finding concerning the three groups of agricultural goods is that nontradable goods represent a very high share of total agricultural income as well as a high share of sales revenue. In Ghana, 70 percent of agricultural income is from nontradables in the forest region, with the comparable figure being 73 percent in the savannah. Nearly 40 and 50 percent of the sales revenue are from these sources in the two regions, respectively. In the

Table 3. *Expenditures by Low-Income Rural Smallholders in Five Countries in Sub-Saharan Africa, Selected Years*
(percentage of total expenditures)

Type of expenditure	Per capita expenditure								
	Côte d'Ivoire		Ghana		Madagascar			Malawi, south	Tanzania, all
	Forest	Savannah	Forest	Savannah	Coast	Plateau	South		
Food	65	70	73	80	59	65	62	61	71
Traded	15	28	10	26	19	16	16	35	23
Rice	6	11	2	8	13	16	13	0	5
Maize	5	10	6	16	a	a	a	33	17
Groundnuts	1	5	1	1	a	a	a	2	1
Other	2	3	1	1	5	0	3	0	0
Nontraded	50	42	63	54	46 ^b	49 ^b	49 ^b	26	48
Millet	0	3	0	16	a	a	a	1	4
Cassava	4	3	12	5	—	—	—	1	2
Other	46	37	51	33	—	—	—	25	41
Nonfood	35	30	27	20	41	35	38	39	29

— Not available.

a. A positive share less than 0.50 percent.

b. The data for Madagascar did not permit the role of cassava to be distinguished from that of other goods in the nontraded goods share.

Source: Based on data from: Côte d'Ivoire, 1985–86 Côte d'Ivoire Living Standards Survey (unpublished); Ghana, 1987–88 Ghana Living Standards Survey (unpublished); Madagascar, Dorosh and others (1990); Malawi, Harvard Institute for International Development (1989); and Tanzania, 1976–77 government household survey (unpublished).

Tanzania sample, nontradables were observed to comprise as high as 61 percent of total agricultural incomes and nearly 60 percent of the sales revenue. Even in the more commercialized Côte d'Ivoire, nontradables contribute 46 and 41 percent to total agricultural incomes in the savannah and forest regions, respectively. The relatively low level of nontradables in agricultural incomes in Malawi—24 percent—reflects the domination of maize in the diet.

The value of tradable food crops consumed by the households is generally greater than the value of sales of the same goods. This can be seen, for example, with maize and rice in both regions of Côte d'Ivoire and in Tanzania and Malawi. However, the degree to which household consumption dominates the sales of these specific commodities differs dramatically from one case to the next. In Malawi, where commercialized agriculture is by and large limited to the leasehold estate sector, the value of home-consumed maize per household is 100 times the value of sales. In the more commercialized forest region of Côte d'Ivoire 30 percent of the maize and nearly half of the rice is sold. Similarly, around half of the maize in Ghana's forest region is sold.

A sizable proportion of nontradable goods is sold, albeit locally. For example, 30 percent of the total value of nontradable crops in Tanzania is marketed. This is very close to the 32 percent observed for low-income smallholders in the savannah region of Côte d'Ivoire, which in turn is considerably higher than that in the forest region. However, in Malawi only 15 percent of nontradable goods are sold, which is in keeping with the overall lower level of commercialization of agriculture in the region. A larger share of nontradable goods than tradable commodities is sold locally in Malawi. Thus, local trade in nontradables represents an important source of agricultural and nonfarm income for traders, as well as for low-income smallholders.

Expenditure Shares

As expected of poor smallholder households, the share of expenditures allocated to food is high. The actual numbers range between 59 percent on the coast of Madagascar to 71 percent in Tanzania, 71 percent in the savannah in Côte d'Ivoire, and 80 percent in the savannah in Ghana (table 3).

A more disaggregated look at expenditures indicates that the shares represented by tradable versus nontradable commodities are quite variable. In the savannah region of Côte d'Ivoire, and especially in the southern region of Malawi, a relatively small portion of total expenditures (42 and 26 percent, respectively) is in the form of nontradable goods. However, for Ghana, 63 percent out of the 73 percent of the budget allocated to food in the forest region is in the form of nontradable goods. This reflects the importance of roots and tubers, legumes, vegetables, and meat (including fish and poultry) in the consumption bundle of the population. For example, yams alone in the Ghana forest region account for as high a budget share as rice and maize combined in the forest region of Côte d'Ivoire. In contrast, expenditures on tradables are higher in Malawi owing to the importance of maize in the consumption bundle.

Prices

For each country and region six price indexes were constructed. Three producer price indexes approximate developments in the prices of exportables, tradable food crops and other nontradable food products, respectively. Three consumer price indexes similarly summarize developments in the consumer prices of tradable food products, nontradable food products, and nonfood products.

The indexes were constructed from time series data for the producer and consumer prices of a number of products, which were considered major or representative. The shares in income and consumption of the pertinent group were considered in aggregating the different price series into group specific indexes. For example, for Côte d'Ivoire, the export price index was constructed by considering the producer prices of cocoa and coffee, with different weights for the forest and savannah rural poor, which reflect their respective income shares from table 2, scaled up so as to sum to one. Similarly, maize and rice producer prices were considered representative for the tradable food price index, while producer prices for plantain, cassava, and yams were considered representative of the other agricultural products category. For the consumer price indexes in Côte d'Ivoire, consumer prices for maize and milled rice were considered representative of the tradable food price index; plantain, cassava, and yams were considered representative for the products consumed under the other nontradable foods category, and the nonfood consumer price index was taken to represent the consumer prices of nonfood products. Similar procedures were followed for the other countries and groups.

In equation 3 there is one other price that must be specified: the price of importable intermediate products P_m . As a proxy for this we used the nominal exchange rate, multiplied by the import unit value index for African countries (which is from IMF 1990b).

Table 4 exhibits the evolution of the ratios of producer price indexes of exportable agricultural products (P_e^p) to the price indexes of tradable foods (P_f^p) and nontradable agricultural products (P_n^p) for each country and region. Given that exchange rate depreciation is a pillar of policy reform efforts in Sub-Saharan Africa, one would generally expect the price of exportables to rise compared with the price of nontradable agricultural products. At the same time one would not expect the expenditure-switching policy to cause a significant trend in the price of exportables with respect to tradable food crops. Despite these expectations, some caveats apply that may result in outcomes differing in practice. First, parallel free markets may be operating so that prices observed before adjustment already reflected what could be viewed as an approximation of the equilibrium exchange rate toward which adjustment will move the official market. Second, exchange rate devaluation is often undertaken in combination with other domestic and international trade and marketing reforms, such as adjustment of quotas and tariffs that may offset some of the gains to farmers or

losses to consumers that would be a consequence of higher relative prices for tradables and export goods. Third, there is often a considerable lag between the beginning of adjustment programs and the implementation of real policy changes.

With these points in mind, it comes as no surprise that the results of the price ratios analysis are mixed. For Ghana it appears that the ratio of exportables to tradable foods is higher after 1984 in both regions, and likewise the ratio of exportables to nontradable agricultural products also appears to have reversed a decline before 1984. In Côte d'Ivoire the trends appear to be quite different. Although the ratio of P_e^p/P_f^p appears to have risen after adjustment, the ratio P_e^p/P_o^p exhibits a clear downward trend. This likely reflects in part the appreciation of the CFA franc during this period.

In Malawi and Tanzania no significant trend is apparent in either ratio. In Malawi this is explained by pricing policy for export crops, specifically the tobacco varieties that smallholders are permitted to produce. The government administers the price of tobacco, and parastatals assume all the responsibility for procuring and marketing the crop. Therefore, there is no opportunity for the potential benefits of expenditure switching policies to be transmitted to the farmer. In Madagascar the trend in P_e^p/P_o^p takes a big jump in 1987 and 1988, back to levels observed in the 1970s. After falling dramatically in 1982 and 1983, during the formative stages of Madagascar's adjustment program, P_e^p/P_f^p showed signs of increasing during 1984 to 1988. However, in 1986 rice prices soared owing to insufficient imports and the emergence of shortages.

A similar set of consumer prices and ratios, including tradables to nontradables, tradables to nonfood, and nontradables to nonfood, were constructed. As with producer prices, in consumer price ratios there is little indication of generalizable trends that correspond to what might be expected to occur during adjustment: expenditure-switching policies that favor exportables, or at least tradable goods, relative to nontradables. This is explained by the fact that movements in prices in each country must be related not only to the specific exchange rate regime, but also to the commercial policies being pursued, institutional reforms that allow prices to clear the market, and stochastic events such as rainfall.

But perhaps of equal note is the instability in the price ratios in some of the countries. In Madagascar, for example, the large decline in P_e^p/P_f^p in 1986 reflected the shortfall in imports when a lack of coordination between ministries caused the government distribution system to run out of stocks (Shuttleworth 1989). In Malawi, P_e^p/P_f^p decreased from 100.0 in 1981 to 64.5 in 1982 because of a dramatic increase in the price of tradable food crops. Maize prices increased from Mk6.6 to Mk11.0, and the price of groundnuts increased from Mk33.8 to Mk51.9, while tobacco, the predominant export crop, witnessed a very small price change. In 1983, however, the tobacco price increased from Mk45.1 to Mk75.9, while maize prices did not change; the P_e^p/P_f^p ratio increased to 107.5. Thus price policy in Malawi was affected by a variety of signals, such as the

Table 4. *Producer Price Ratios for Exportable, Tradable Food and Nontradable Agricultural Products in Five Countries in Sub-Saharan Africa, 1975–89*
(percent)

Year	Côte d'Ivoire		Ghana		Madagascar			Malawi, south	Tanzania, all
	Forest	Savannah	Forest	Savannah	Coast	Plateau	South		
	<i>Ratio of exportable agricultural product prices to tradable food prices (P_E/P_F)</i>								
1975	79.8	143.7	175.3	180.9	178.8	196.4	196.4	95.8	123.6
1976	76.3	135.6	98.0	105.2	195.5	212.4	212.4	87.6	146.3
1977	74.0	122.7	67.8	77.8	192.0	211.2	211.2	98.5	117.1
1978	86.3	103.5	140.2	157.9	199.0	214.5	214.5	128.8	107.8
1979	85.1	97.7	152.4	168.9	194.7	189.9	189.9	123.3	108.9
1980	112.6	110.7	74.6	84.4	167.4	164.4	164.4	100.0	120.0
1981	100.0	100.0	124.6	141.0	161.4	159.5	159.5	100.0	94.9
1982	98.0	91.4	115.3	118.3	100.0	100.0	100.0	64.5	93.9
1983	93.1	84.5	39.9	44.1	107.8	101.0	101.0	107.5	101.6
1984	126.5	78.5	100.0	100.0	126.9	125.9	125.9	95.0	78.6
1985	111.3	90.4	205.7	214.7	106.8	112.2	112.2	113.2	88.9
1986	127.5	125.4	196.5	205.9	71.6	82.8	82.8	107.1	100.0
1987	124.9	126.1	200.1	212.8	117.4	139.3	139.3	114.8	105.2
1988	106.0	106.9	179.0	191.5	172.7	199.5	199.5	97.9	116.8
1989	—	—	—	—	—	—	—	97.7	137.3

Table 4. (continued)

Year	Côte d'Ivoire		Ghana		Madagascar			Malawi, south	Tanzania, all
	Forest	Savannah	Forest	Savannah	Coast	Plateau	South		
	<i>Ratio of exportables to nontradable agricultural products (P_e / P_n)</i>								
1975	191.9	275.1	—	355.3	145.3	178.0	163.9	65.1	112.9
1976	159.3	229.7	—	207.8	176.5	213.5	194.2	69.6	113.4
1977	86.3	136.5	122.1	107.3	136.5	176.3	153.0	78.3	65.2
1978	101.0	119.1	224.8	188.8	131.1	168.5	143.2	96.8	58.8
1979	85.6	101.9	227.2	225.6	118.3	143.4	117.4	95.6	70.7
1980	99.9	101.2	131.8	119.1	106.8	118.3	105.7	100.0	87.0
1981	100.0	100.0	153.9	153.7	93.0	99.6	92.9	100.2	98.0
1982	96.0	96.3	115.8	116.5	100.0	100.0	100.0	107.4	97.8
1983	80.6	80.4	45.1	50.4	103.7	95.7	96.4	85.8	100.7
1984	85.7	77.9	100.0	100.0	106.4	105.8	105.5	66.2	85.8
1985	97.0	97.5	279.2	277.7	102.5	108.7	107.1	75.0	88.9
1986	90.1	98.1	242.6	298.7	88.9	116.9	103.2	66.9	100.0
1987	87.8	94.5	182.6	265.8	129.7	173.9	152.6	71.7	107.0
1988	85.1	90.7	242.0	229.9	171.6	209.3	197.6	74.1	120.7
1989	—	—	—	—	—	—	—	82.2	128.2

— Not available.

Note: The indexes for each country and region equal 100.0 in the year in which the first World Bank structural adjustment loan was approved for that country.

Source: Computed from data from: Côte d'Ivoire, International Monetary Fund (1990a), Government of Côte d'Ivoire (various years), and World Bank data; Ghana, Alderman (forthcoming), Republic of Ghana (1989), and World Bank data; Madagascar, Republic of Madagascar (1988), Dorosh, Bernier, and Sarris (1990), and Dorosh and others (1990); Malawi, Government of Malawi (various years), Sahn and Arulpragasam (forthcoming), and World Bank data; Tanzania, Government of the United Republic of Tanzania (1988, 1989), Economic Research Bureau (various years), and World Bank data.

Table 5. Values of Other Structural Parameters in Five Countries in Sub-Saharan Africa

Parameter	Côte d'Ivoire	Ghana	Madagascar	Malawi	Tanzania
Share of labor in nonagricultural production (α)	0.58	0.48	0.56	0.49	0.65
Share of capital in nonagricultural production (β)	0.12	0.13	0.20	0.22	0.18
Share of labor in agricultural production (γ)	0.66	0.66	0.58	0.66	0.90
Share of labor employed in agriculture (λ_a)	0.64	0.53	0.74	0.81	0.61
Share of labor employed in nonagriculture (λ_n)	0.36	0.47	0.26	0.19	0.39
Share of export crops in total agricultural output (b_e)	0.44	0.15	0.07	0.28	0.16
Share of traded food crops in total agricultural output (b_f)	0.07	0.16	0.26	0.43	0.17
Share of other food products in total agricultural output (b_o)	0.49	0.69	0.67	0.29	0.67

Source: Computed from data from: Côte d'Ivoire, World Bank data; Ghana, World Bank (1983, 1990) and national accounts and production data from the government of Ghana; Madagascar, Dorosh and others (1990); Malawi, Government of Malawi (1985), Government of Malawi (various years b), Government of Malawi (various years c), World Bank data, and trade data from the National Statistics Office of Malawi; and Tanzania, World Bank (1990) and 1976 input-output table, and national accounts data from the government of Tanzania.

maize shortage in 1981 and pressure to increase foreign exchange commensurate with the signing of the second adjustment loan in 1983 (Sahn and Arulpragasam forthcoming).

Another example of a marked incongruity in the price ratio is found in Ghana in 1983, when both P_e^p/P_p^p and P_e^f/P_p^f plummeted. The explanation is to be found in the food shortages caused by the drought and bush fires that decimated food crops, driving the prices of rice, maize, and subsequently roots and tubers to dramatic highs (Alderman forthcoming).

Many interesting stories could be told about observed price fluctuations. The data indicate the lack of clear adjustment-induced trends in prices. Smallholders have been, and continue to be, buffeted by price shocks. The combination of the stochastic nature of the weather and the vagaries of government decisionmaking results in large and unpredictable year-to-year fluctuations.

Other Parameters

The remaining necessary parameters for the simulation of the model were estimated from a variety of sources for each country, and they are summarized in table 5. These parameters refer to the national level, and so they are not specific to any regional or income group. They were compiled generally by examining national accounts, input-output, and labor force statistics in the various countries, using some adjustments and approximations where the exact figures were not available.

III. RESULTS OF THE MODEL

From the analysis in section I and the appendix, we derived equation 3, which enables us to simulate changes in the income of a typical member of a rural poor smallholder household. This equation was derived by constructing two Laspeyres indexes of nominal income and nominal consumer prices for each class, corresponding to the two brackets in equation 3. The index of nominal income was computed by multiplying the weights by the various producer price indexes mentioned in the previous section, where the parameters in the weights and the price series were those described in tables 2 and 4. Similarly, as shown in the second bracket of equation 3, we multiplied the index of nominal consumer prices discussed in the previous section by the weights derived from table 3. The ratio of the weighted nominal income index to the nominal consumer price index gives an index of real income for a given class of rural smallholders.

Table 6 exhibits the evolution of this index of real income for poor rural households in each country and region from 1975 to 1989. For each country and region the index is set at 100 in the first year that a structural adjustment program was implemented in each country (the first year in which a structural adjustment loan from the World Bank was approved). The index describes changes in real income arising only from relative price changes and does not incorporate changes that would arise from random fluctuations in production.

Table 6. *Index of Real Income of Low-Income Rural Smallholders in Five Countries in Sub-Saharan Africa, 1975–89*

Year	Côte d'Ivoire		Ghana		Madagascar			Malawi,	Tanzania,
	Forest	Savannah	Forest	Savannah	Coast	Plateau	South	south	all
1975	102.0	105.2	n.a.	n.a.	108.2	100.2	101.8	95.3	148.6
1976	103.2	110.5	n.a.	n.a.	106.8	97.6	100.0	102.6	145.3
1977	91.1	102.3	146.9	123.0	107.3	98.3	100.1	101.9	154.4
1978	116.1	119.6	88.9	88.5	107.0	97.5	99.2	106.0	164.4
1979	100.0	105.7	83.5	78.4	106.9	96.8	98.4	106.4	166.7
1980	106.9	103.9	97.5	93.1	106.8	99.2	99.6	100.0	154.1
1981	100.0	100.0	109.5	100.2	104.9	99.5	98.3	88.8	125.0
1982	98.7	99.5	101.8	100.9	100.0	100.0	100.0	101.6	134.1
1983	84.8	91.5	108.5	123.4	98.2	98.2	97.4	125.6	147.4
1984	90.3	89.8	100.0	100.0	97.8	96.8	95.7	116.2	133.9
1985	90.3	91.6	97.6	90.0	99.7	99.1	99.3	124.2	118.5
1986	97.8	96.3	89.5	85.6	104.9	104.3	108.8	118.4	100.0
1987	87.0	86.6	99.9	88.5	102.8	97.9	102.4	105.0	111.1
1988	89.3	91.7	89.1	88.0	98.5	93.0	95.2	104.2	91.6
1989	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	118.1	n.a.

n.a. Not available.

Note: The indexes for each country and region equal 100.0 in the year in which the first World Bank structural adjustment loan was approved for that country.

Source: Authors' computations.

So, for instance, in a year of drought and high food prices, the index might indicate high real incomes for typical rural smallholders, under the assumption that their production was not affected by the drought. Although this is clearly not correct, it isolates the effects of prices from the effects of random shocks on the quantities produced. Even this, however, is a simplification, because random shocks in production will affect observable prices and might bias the results. In any case, the objective of the exercise is to see if there are noticeable trends.

In Tanzania the results indicate that after the 1976–77 coffee boom, there was a decline in rural smallholder incomes, which became more acute beginning in the major crisis years of 1984 and 1985 before structural adjustment. In 1987 real rural incomes began to rise, but this was not sustained into 1988. The decline in rural smallholder incomes during the last half of the 1980s was largely attributable to the liberalization of maize meal in 1984, which led to a threefold increase in its price. This had adverse consequences on the smallholders who are net consumers and making purchases at official prices. Nonetheless, the actual decline in incomes shown in table 6 is overstated, given that many consumers were already paying the open-market price before liberalization. Without a comprehensive data series on the price of open-market maize and on the share purchased on the open versus official market, it is not possible, however, to determine the extent of the decline.

In Côte d'Ivoire, since 1981, when adjustment programs were first implemented, there appears to be a small but significant trend toward declines in real rural smallholder incomes in the forest and the savannah regions. This is especially obvious in 1987 and 1988, when the CFA franc appreciated considerably concurrent with falling world prices for cocoa and coffee. But it also reflects the contraction of the economy as a whole, which has occurred since the beginning of adjustment.

In Malawi the results also correspond to expectations. In particular, the negative GDP growth rates reported in 1980 and 1981 correspond to the low values in the index. Similarly, the index fell temporarily in 1987 and 1988 because the real prices for the major traded agricultural good, maize, and the major export crop, tobacco, were lower during those two years than at any time during the period between 1975 and 1989 (Sahn, Arulpragasam, and Merid 1990). But in addition to the movement of the income index corresponding to our expectations, it is equally important that total output and yield for all major export, traded, and nontraded goods were at best stagnant during the period covered by the model (Sahn and Arulpragasam forthcoming). This implies that neglecting to incorporate the supply response is not a serious compromise in the Malawi case.

Madagascar also witnessed no significant trend in rural incomes in any of the three regions after 1982, when the adjustment operations were initiated. This is not surprising given that the initial years of Madagascar's reform program were dedicated primarily to stabilizing the account balances through reducing absorption. In addition, an examination of government policies regarding the taxation of agriculture reveals that at least through 1987, the last year for which data are

available, the extremely high level of taxation of coffee, vanilla, and cloves had not abated during adjustment (Dorosh, Bernier, and Sarris 1990). Similarly, other indicators on the performance of the food crop sector, such as total rural rice consumption and rice production per capita, actually declined between 1982–83 and 1986–87 (Dorosh, Bernier, and Sarris 1990). This adds further credence to the results of the model, which indicate that smallholders have not been early beneficiaries from adjustment.

The most questionable results of the model regard the case of Ghana. In particular, the index of real income for poor rural smallholders suggests that incomes were highest during 1981–83. This seems counterintuitive, given that after 1984 the macroeconomic performance of Ghana was quite impressive, partially because of incentives to produce exportable crops, particularly cocoa. The explanation for the surprising results of the model is to be found by referring back to earlier tables on the structure of incomes and expenditures and price trends, recognizing the limitations of the model itself in incorporating aggregate supply response, and reconsidering the importance of rewards to non-agricultural activities that are captured in the model.

The fact that export crops, particularly cocoa, make up such a small share of overall income in the savannah (0.7 percent of total income and 1.0 percent of agricultural income) and in the forest region (6.8 percent of total income and 12 percent of agricultural income) partially explains why increased incentives to export crop producers have not resulted in higher real income for the rural poor. A related factor is the prominence of nontraded crops in income shares. In keeping with expectations about the consequence of large-scale currency devaluation, the relative prices of nontraded commodities have not been increased during adjustment. Thus there has been little increased income to households that are heavily engaged in producing roots and tubers.

The limitation of this model, which was discussed earlier, is that it does not capture aggregate increases in output that result from adjustment programs or unrelated stochastic events. This represents a noteworthy shortcoming for Ghana, given the evidence that, unlike the other countries included in the study, there have been sustained increases in aggregate output since the beginning of adjustment. In 1984 agricultural labor was significantly increased by the massive repatriation of Ghanaians from Nigeria. Most of these settled in rural areas and joined their former households, thus increasing the labor available in each household as well as the ratio of workers per dependents. This would tend to shift the typical smallholder production possibility frontier outward and would tend to improve average smallholder per capita income. The model's limitations in considering a fixed production possibility frontier are most seriously manifested in the Ghana case.

Perhaps the most interesting point in explaining the counterintuitive results for Ghana lies in reconsidering one of the innovations of the methodology used here: the incorporation of nonfarm smallholder income in the index of total real income. It would be useful to investigate whether the trends indicated in table 6 are common for different components of income. To illustrate this, we separated

the total real income index into two components, the first representing real income from agriculture and the second representing real income or rewards from nonagricultural activities (table 7). In terms of equation 3, in the first index the numerator is nominal agricultural income, which is composed of the three agricultural producer price indexes, P_e^p , P_f^p , and P_o^p , weighted by the agricultural income shares S_{ae}/S_a , S_{af}/S_a , and S_{ao}/S_a (which sum to one). The denominator is the consumer price index. In the index of real income from nonagricultural sources the numerator incorporates all five producer price indexes (P_e^p , P_f^p , P_o^p , P_n^p , and P_m^p) and their remaining (without the agricultural income shares) weights (which are divided by S_r so that they sum to one) as indicated in equation 3. The denominator is the consumer price index.

Table 7 indicates that for Ghana the major factor leading to the mild decline in real income is not a fall in agricultural income, but the decline in nonagricultural income. To the extent that adjustment programs in fact bring about shifts in relative prices that lower returns to labor, this finding is not altogether surprising. Furthermore, there was a large devaluation of the cedi in 1984, which led to a sharp rise in the cost of capital, intermediate inputs, and consumables. It is plausible that there was a sharp rise in the cost of nonagricultural activities and a subsequent decline in nonfarm income-earning opportunities for the rural poor. However, possible increases in marketing services and other forward and backward links with agriculture are not fully captured, given that aggregate output is fixed. This latter point once again admonishes caution in interpreting the results.

Examining the trends of the index of real income from agriculture and the index of real income from nonagricultural sources for other countries indicates that for Tanzania, both components of real income exhibit similar trends. In Côte d'Ivoire, although in the forest region the indexes exhibit similar trends, in the savannah region real agricultural income shows a declining trend, while nonagricultural income does not exhibit any clear direction of change. In Malawi both components of real income generally show similar trends. However, the increase in income in 1989 shown in table 6 is largely attributable to the increase in the index of real income from agriculture, which reflects the large jump in producer prices for maize and tobacco, while consumer price increases for staple tradable foods (maize and groundnuts) were moderate. In Madagascar the overall indexes do not exhibit significant trends, and this appears to be the case for agricultural and nonagricultural incomes. Therefore, it appears that, except for Ghana, the trends in agricultural real income are similar to those in nonagricultural real income.

IV. SUMMARY AND CONCLUSIONS

This article presents a model that enables us to examine trends in the real incomes of rural smallholders in several countries and regions in Sub-Saharan Africa. The results indicate that there is no unequivocal pattern of increase or decline in the real welfare of the rural poor but that there are marked differences

Table 7. (continued)

Year	Madagascar									
	Coast		Plateau		South		Malawi, south		Tanzania, all	
	Agricultural component	Non-agricultural component								
1975	115.8	97.0	96.0	96.8	101.2	96.6	93.6	93.6	150.7	138.4
1976	113.6	94.9	88.6	96.1	96.3	96.4	102.0	99.9	147.8	134.4
1977	114.2	97.0	93.5	95.6	99.2	95.6	101.0	99.8	156.8	145.1
1978	113.0	98.8	92.4	96.7	97.9	96.7	105.0	104.9	170.4	147.3
1979	112.8	101.2	93.5	97.3	98.0	97.4	105.0	106.6	172.6	151.5
1980	112.7	103.0	100.1	99.2	101.0	98.7	100.0	100.0	156.5	149.5
1981	108.5	102.5	101.5	98.7	99.4	97.6	87.7	89.9	126.5	122.2
1982	100.0	100.0	100.0	100.0	100.0	100.0	103.1	99.9	135.6	131.3
1983	96.4	99.6	95.8	99.7	95.1	99.7	126.9	124.0	148.9	144.5
1984	96.4	97.6	93.5	97.7	92.7	97.3	116.1	115.4	137.8	124.1
1985	99.7	97.5	98.2	97.6	98.8	97.6	123.4	123.7	118.7	117.9
1986	110.5	100.0	111.5	98.9	117.1	100.5	116.5	119.3	100.0	100.0
1987	109.9	97.2	98.0	97.4	105.9	98.7	101.4	107.9	113.0	106.8
1988	102.1	94.8	83.8	97.8	90.8	98.2	99.4	108.2	91.9	90.5
1989	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	115.5	120.0	n.a.	n.a.

n.a. Not available.

Note: The indexes for each country and region equal 100.0 in the year in which the first World Bank structural adjustment loan was approved for that country.

Source: Authors' computations.

among countries and regions. This highlights the importance of the structure of rural smallholders' incomes and expenditures and the evolution of relative prices. However, changes in relative prices, and especially in the ratio of tradable to nontradable prices, are not sufficient indicators or predictors of developments in real welfare. Ghana seems to be a good case in point: although the agricultural exportable good prices seem to have been favored after adjustment, this has not led to major rises in the real incomes of rural smallholders in either the forest or the savannah regions.

This analysis suffers from several limitations. For example, as discussed above, the simulation model is unable to capture adjustments to price signals made by producers and consumers. Hence, indications that rural smallholder welfare does not change in fact might imply small improvements. Similarly, our price indexes do not include prices for all products that make up the tradable and nontradable groups. However, we do not believe that more detailed analysis of prices would reverse the general conclusions, since we captured a large proportion of income and expenditure shares for each country. We have stopped short of the type of modeling that is required to explain how policy has influenced the observed price trends and hence cannot attribute the evolution of smallholder real incomes to adjustment programs or any other specific factor. However, we believe that we have shown that the issue of structural adjustment and rural poverty is complex and that earlier efforts that arrived at simplified statements on the harmful or beneficial effects of adjustment based on stylized facts were not useful. They failed to account for sources of income, patterns of expenditures, and movements in relative prices in the wake of adjustment.

We have shown that the direction and level of changes in real income brought about by structural adjustment are determined by a variety of factors. Outcomes will be different and unpredictable without, at a minimum, a careful analysis of an extensive range of data, including the information on income, expenditures, and prices found in this article. This is because there is considerable variation in the shares of tradables, nontradables, and exportables in the consumption bundle as well as in the outputs of smallholders; because changes in nonagricultural incomes can offset or reinforce changes in agricultural earnings, and these shifts are in turn conditioned by a variety of parameters that characterize the economy as a whole; and because relative prices do not move in a predictable fashion in the wake of adjustment because of the range of domestic and international commercial and trade policies that impact upon these patterns. Further research to construct dynamic and general equilibrium models is needed to define, using counterfactual analysis, the changes brought about by adjustment. The loss in precision in some of the simplifying assumptions in the model presented here does not, however, detract from the fact that it indicates the direction and order of magnitude of changes in smallholder welfare in the years since adjustment programs began. Thus, although the search for generalizations will continue, at this juncture, it is safe to conclude that there is little evidence of large welfare

gains or losses accruing to smallholders in the wake of policy reforms that have been initiated in the countries studied.

APPENDIX. A MODEL FOR ANALYZING REAL INCOME CHANGES OF RURAL SMALLHOLDERS

Consider an economy composed of two sectors: agriculture and nonagriculture. The agricultural sector produces three products (exportables, traded foods, and other agricultural products, denoted by e , f , and o , respectively) and, apart from land, uses only labor. The nonagricultural sector produces one product using labor and an imported intermediate product. Technology is Cobb-Douglas. The nonagricultural sector can be thought of as composed of a formal and an informal sector, producing largely consumer products that are imperfect substitutes in consumer preferences. The formal sector, which includes all the public enterprises, is in many analyses modeled as a fix-price nonagricultural sector; it has excess capacity and fixed nominal wages. The informal sector, composed of many individual and small-scale unincorporated enterprises, is a flex-price sector characterized by ease of entry and exit and a lot of self-employment. The two sectors are lumped together here as one sector that operates so as to maximize short-run profit.

It might appear strange to lump together two sectors that apparently behave very differently. However, from our perspective, what is of interest is that the reward to nonagricultural activities varies and that labor can shift between the agricultural and nonagricultural sectors. The labor rewards to the flex-price nonagricultural sector vary in response to labor supply and demand. However, although it might appear that nominal wages are fixed in the so-called fix-price sector (that is, the public sector), it is well known that when real wages decline there, people reduce their labor input and engage in other agricultural and nonagricultural activities. Hence a decline in the output of the fix-price sector might mean an increase in the activity of the informal sector. In the aggregate, it is reasonable to expect that the output of both sectors together will respond to total expected rewards in both formal and informal activities, and this is what justifies our assumption that the total nonagricultural sector behaves as if it maximizes profits. The profit maximization assumption is a convenient way to describe our belief that output varies with prices and that labor and other input demands will also respond to prices.

Denote by X_n the output of the nonagricultural sector, by L_n the demand for labor in the same sector, by M the amount of the imported intermediate product that is demanded in the nonagricultural sector n , by w the effective unit labor reward, and by P_m the domestic price of M . The sector will maximize profit, π , where

$$(A-1) \quad \pi = P_n X_n - w L_n - P_m M.$$

The technology producing X_n is

$$(A-2) \quad X_n = K_n L_n^\alpha M^\beta$$

with α, β positive parameters ($\alpha + \beta < 1$) denoting the share of labor and imported intermediates, respectively, in the production of the nonagricultural products. Substituting equation A-2 into equation A-1 and maximizing, yields a function for the demand for labor L_n and the demand for M . Log-differentiating the demand for labor, we obtain

$$(A-3) \quad \tilde{L}_n = \frac{1}{1 - \alpha - \beta} \{ \tilde{P}_n - (1 - \beta) \tilde{w} - \beta \tilde{P}_m \}.$$

Equation A-3 expresses how the demand for nonagricultural labor changes, with changes in the price of the nonagricultural product, and its two main inputs.

The other major labor-using sector is agriculture. Agriculture supplies labor to the nonagricultural sector depending on the relative rewards of agricultural versus nonagricultural activities. At this point, we introduce two structural assumptions that seem to be quite relevant for countries in Sub-Saharan Africa. First, most agricultural production is organized along individually operated farm units. This implies that the reward of a unit of agricultural labor is on aggregate close to the *average* product of labor in agriculture. The second assumption has to do with the types of nonagricultural activities in which the rural poor engage. They usually involve either wage employment in rural or urban areas or some type of small-scale, owner-operated enterprise. Given capital requirements, risks, and so forth, we assume that the effective reward offered by the nonfarm enterprise to a unit of nonagricultural labor is close to the effective reward of farm operator labor. This type of assumption has been supported by some empirical evidence (Collier, Radwan, and Wangwe 1986), and we consider it to hold true for the countries in our sample.

Given the above reasoning, the behavioral relation that will govern the supply of labor from agriculture to nonagriculture is

$$(A-4) \quad r = w = \frac{P_a X_a}{L_a}$$

where X_a is the aggregate output of the agricultural sector, L_a is the labor employed in agriculture, and P_a is the aggregate price of agricultural output. If the production of X_a is governed by the following Cobb-Douglas relation:

$$(A-5) \quad X_a = K_a L_a^\gamma$$

then equation A-4 gives a relation between L_a and r . Log-differentiating that equation, we obtain a relation between the aggregate use of agricultural labor and the nonagricultural wage:

$$(A-6) \quad \tilde{L}_a = \frac{1}{1 - \gamma} (\tilde{P}_a - \tilde{r}).$$

Under the assumed Cobb-Douglas technology, equation A-6 is also valid if the unit reward is equal to the marginal product of labor in agriculture.

The final consideration has to do with the structure of the aggregate labor market. In Sub-Saharan Africa unemployment rates are very low; they are virtually zero in rural areas, based on data from household surveys (see, for example, Glewwe 1988). The reason is that people move in and out of various low-skilled activities quite easily. Although it is more difficult to find permanent wage work in the rural sector (for example, as a public employee), even that submarket is not separated from the rest of the labor market. In fact, it is quite prevalent that underpaid civil employees are involved in other activities by effectively diminishing their labor input into their official activity. The upshot of these arguments is that it is reasonable to suggest that the labor market in Sub-Saharan Africa is characterized by full employment, which determines returns to labor.

The implication of this consideration for our simple model is that we can use equations A-3 and A-6 in an aggregate labor market clearing equation to determine \bar{r} . The aggregate labor market equilibrium condition is

$$(A-7) \quad L_a + L_n = L$$

where L is exogenously given. Log-differentiating equation A-7 and using equations A-3 and A-6, we obtain

$$(A-8) \quad \bar{r} \left(\frac{\lambda_n(1-\beta)}{1-\alpha-\beta} + \frac{\lambda_a}{1-\gamma} \right) = \frac{\lambda_n \bar{P}_n}{1-\alpha-\beta} + \frac{\lambda_a \bar{P}_a}{1-\gamma} - \frac{\lambda_n \beta \bar{P}_m}{1-\alpha-\beta}.$$

In equation A-8 λ_a , λ_n are the base year shares of total labor employed in agriculture and nonagriculture, respectively.

We have abstracted from secular trends in wages caused by changes in the capacity of the two sectors (summarized by the all-inclusive indexes K_a and K_n in the model) as well as exogenous growth in the labor force. These influences could easily be included by adding to the right-hand side of equation A-6 another term \bar{r}^* , where

$$(A-9) \quad \bar{r}^* = \frac{\lambda_n \bar{K}_n}{1-\alpha-\beta} + \frac{\lambda_a \bar{K}_a}{1-\gamma} - \bar{L}$$

and \bar{L} is the exogenous natural growth rate of the labor force. Lacking much information on which to empirically estimate \bar{K}_a and \bar{K}_n , we simply neglect the term \bar{r}^* altogether.

Before substituting equation A-8 into our original equation 2 in the main text, we note that the log-change in the index of agricultural prices \bar{P}_a can be written as a function of the three agricultural product groups, as follows:

$$(A-10) \quad \bar{P}_a = \sum_i b_i \bar{P}_i^?$$

where b_i ($i = e, f, o$) are the base year shares of each group's output in the total

agricultural output of the country. With these conventions, equation A-8 can be substituted in equation 2 in the main text to yield the following equation that will be used to trace the real welfare of a typical poor household:

$$(A-11) \quad \tilde{Y} = \left\{ \left(S_{ae} + \frac{S_r \lambda_a b_e}{(1-\gamma)\Delta} \right) \tilde{P}_e^p + \left(S_{af} + \frac{S_r \lambda_a b_f}{(1-\gamma)\Delta} \right) \tilde{P}_f^p \right. \\ \left. + \left(S_{ao} + \frac{S_r \lambda_a b_o}{(1-\gamma)\Delta} \right) \tilde{P}_o^p + \frac{S_r \lambda_n}{(1-\alpha-\beta)\Delta} \tilde{P}_n^p \right. \\ \left. - \frac{S_r \lambda_n \beta \tilde{P}_m}{(1-\alpha-\beta)\Delta} \right\} - \{ \theta_f \tilde{P}_f^c + \theta_o \tilde{P}_o^c + \theta_n \tilde{P}_n^c \}$$

where

$$(A-12) \quad \Delta = \frac{\lambda_n(1-\beta)}{1-\alpha-\beta} + \frac{\lambda_a}{1-\gamma}.$$

Equation A-11 depends on structural variables that are relatively easy to estimate and on changes in price indexes that can be readily estimated. There are, nevertheless, several points of clarification and caveats about an expression such as equation A-11 that deserve mentioning. The behavioral relation equation A-4 is meant to imply that agricultural owner operators essentially equate the marginal reward to other activities with their average reward to their own agricultural activities. In other words, they regard agricultural activities as basic. In practice considerations such as risk and food security might make any specific test of equation A-4 difficult to implement. For instance, agricultural daily wages might appear higher than returns per day from own production, but we still do not observe small farmers abandoning their plots to work for large-scale operators or plantations. This implies that the effective wage, or the nominal wage adjusted for other factors, is lower than the apparent nominal wage. This is well known from the Harris-Todaro model.

Another salient feature of our assumption about sources of income of the poor rural household is that their reward to nonagricultural activities is basically assumed to be reward to the labor input. In other words, they do not share much in the aggregated profits of the nonagricultural sector. This basically means that because of ease of entry in the informal sector, whatever businesses the rural poor engage in will be mostly own labor intensive and owner operated, earning effective rewards, which, when adjusted for risk and other factors will be roughly equivalent to other labor activities.

Another assumption underlying our framework is that remittances and transfers, which in our model are included with non-own-account agricultural income, change proportionately with the unit rewards to nonagricultural activities. Private transfers and remittances are important parts of rural income in many African countries. They are usually generated by former household mem-

bers that have moved temporarily or permanently to work off-farm for wages or in their own business. If the income accruing to a rural smallholder household from remittances is regarded as reward to a portion of the household labor that is occupied with off-farm work, then it is reasonable to regard these transfers as part of non-own-account agricultural income and to include it with other non-agricultural income. If remittances come from abroad, then it is reasonable to consider them exogenous. However, the available statistics usually do not allow the breakdown of nonearned income into that originating within the country and that from abroad; in the empirical part of the article they are lumped with nonagricultural income.

REFERENCES

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Addison, Tony, and Lionel Demery. 1985. *Macro-Economic Stabilization, Income Distribution, and Poverty: A Preliminary Survey*. Working Paper 15. London: Overseas Development Institute.
- Ainsworth, Martha, and Juan Munoz. 1986. *The Côte d'Ivoire Living Standards Survey: Design and Implementation*. LSMS Working Paper 26. Washington, D.C.: World Bank.
- Alderman, Harold. 1991. *Downturn and Economic Recovery in Ghana: Impacts on the Poor*. CFNPP Monograph 10. Ithaca, N.Y.: Cornell University Food and Nutrition Policy Program.
- Binswanger, Hans P., and Joachim von Braun. 1991. "Technological Change and Commercialization in Agriculture: The Effect on the Poor." *The World Bank Research Observer* 6 (1, January): 57-80.
- Collier, P., S. Radwan, and S. Wangwe. 1986. *Labour and Poverty in Rural Tanzania*. Oxford: Clarendon Press.
- Cornia, A. P. R., R. Jolly, and F. Stewart. 1987. *Adjustment with a Human Face*. Oxford: Clarendon Press for UNICEF.
- Côte d'Ivoire, Government of. Various years. *Ministère de l'Economie et des Finances: Bulletin Mensuel*. Abidjan: Ministère du Plan, Direction de la Statistique.
- Dorosh, Paul A., Rene E. Bernier, and Alexander Sarris. 1990. *Macroeconomic Adjustment and the Poor: The Case of Madagascar*. CFNPP Monograph 9. Ithaca, N.Y.: Cornell University Food and Nutrition Policy Program.
- Dorosh, Paul A., and others. 1990. "A Social Accounting Matrix for Madagascar: Methodology and Results." CFNPP Working Paper 6. Cornell University Food and Nutrition Policy Program, Ithaca, N.Y. Processed.
- Ghana, Republic of, Ministry of Agriculture. Price Series for Selected Commodities, 1970-1990 (collected data). Processed.
- . 1989. *Quarterly Digest of Statistics*. Accra: Statistical Service.
- Glewwe, Paul. 1988. *The Distribution of Welfare in Côte d'Ivoire in 1985*. LSMS Working Paper 29. Washington, D.C.: World Bank.

- Grootaert, Christiaan. 1986. *Measuring and Analyzing Levels of Living in Developing Countries: An Annotated Questionnaire*. LSMS Working Paper 24. Washington, D.C.: World Bank.
- Harvard Institute for International Development. 1989. "Household Survey Data of Rural Smallholders in the Zomba District of Southern Malawi, 1986-87." Cambridge: HIID. Processed.
- International Monetary Fund. 1990a. *Côte d'Ivoire: First Review and Modification of a Stand-by Arrangement*. Washington, D.C.: IMF.
- . 1990b. *International Financial Statistics*. Washington, D.C.: IMF.
- Kanbur, S. M. R. 1987. "Structural Adjustment, Macroeconomic Adjustment, and Poverty: A Methodology for Analysis." *World Development* 15 (12, December).
- Malawi, Government of. 1985. *National Accounts Handbook*. Zomba: National Statistical Office.
- . Various years a. *Malawi Monthly Statistical Bulletin*. Zomba: National Statistical Office.
- . Various years b. *Economic Report*. Zomba: National Statistical Office.
- . Various years c. *Annual Economic Survey*. Zomba: National Statistical Office.
- Ministere de la Production Agricole et de la Reforme Agraire. 1988. *Caracteristiques Générales du Milieu Rural, Campagne Agricole, 1984/85*. Projet Recensement National de l'Agriculture et Système Permanent des Statistiques Agricoles, Tome II. Antananarivo: Repoblika Demokratika Malagasy.
- Pinstrup-Andersen, Per. 1988. "The Impact of Macro-Economic Adjustment: Food Security and Nutrition." In Simon Commander, ed., *Structural Adjustment and Agriculture: Theory and Practice in Africa and Latin America*. London: Overseas Development Institute.
- Pinstrup-Andersen, Per, ed. 1990. *Macroeconomic Policy Reforms, Poverty, and Nutrition: Analytical Methodologies*. CFNPP Monograph 3. Ithaca, N.Y.: Cornell Food and Nutrition Policy Program.
- Ravallion, Martin. 1989. "Do Price Increases for Staple Foods Help or Hurt the Rural Poor?" PRE Working Paper 167. World Bank, Washington, D.C. Processed.
- Sah, R. K., and J. E. Stiglitz. 1987. "Price Scissors and the Structure of the Economy." *Quarterly Journal of Economics* 107: 109-34.
- Sahn, David E. 1990. *Fiscal and Exchange Rate Reforms in Africa: Considering the Impact upon the Poor*. CFNPP Monograph 4. Ithaca, N.Y.: Cornell Food and Nutrition Policy Program.
- Sahn, David E., and Jehan Arulpragasam. Forthcoming. "The Stagnation of Smallholder Agriculture in Malawi: A Decade of Structural Adjustment." *Food Policy*.
- Sahn, David E., Jehan Arulpragasam, and Lemma Merid. 1990. *Policy Reform and Poverty in Malawi: A Survey of a Decade of Experience*. CFNPP Monograph 7. Ithaca, N.Y.: Cornell Food and Nutrition Policy Program.
- Sarris, Alexander H. 1990. *A Macro-Micro Framework for Analysis of the Impact of Structural Adjustment on the Poor in Sub-Saharan Africa*. CFNPP Monograph 5. Ithaca, N.Y.: Cornell Food and Nutrition Policy Program.
- Scobie, G. M. 1989. *Macroeconomic Adjustment and the Poor: Toward a Research Strategy*. CFNPP Monograph 1. Ithaca, N.Y.: Cornell Food and Nutrition Policy Program.

- Shuttleworth, Graham. 1989. "Policies in Transition: Lessons from Madagascar." *World Development*, 17 (3).
- Tanzania, Government of. 1988. *Annual Review of Maize, Rice, and Wheat*. Dar es Salaam: Ministry of Agriculture and Livestock Development.
- . 1989. *Basic Data, Agriculture, and Livestock Sector (1983/84–1987/88)*. Dar es Salaam: Planning and Marketing Division, Ministry of Agriculture and Livestock Development.
- . Various years. *Tanzania Economic Trends: A Quarterly Review of the Economy*. Dar es Salaam: Economic Research Bureau, University of Dar es Salaam and Bureau of Statistics, Ministry of Finance, Economic Affairs and Planning.
- World Bank. 1984. *Ghana: Policies and Program for Adjustment*. Washington, D.C.
- . 1990. *World Development Report 1990*. New York: Oxford University Press.

The Poor and the Social Sectors during a Period of Macroeconomic Adjustment: Empirical Evidence for Jamaica

Jere R. Behrman and Anil B. Deolalikar

Considerable uncertainty remains about the human impact of macroeconomic adjustment. Analysis of the impact of adjustment on the poor and on the social sectors is difficult because it involves evaluating a counterfactual situation in which households are affected by prices, incomes, and public services with the possibility of substantial substitutions—all within an economywide framework with complicated concurrent and lagged interactions. In this article, we utilize time-series data for Jamaica to examine whether macroeconomic adjustment, initiated in the early 1980s but intensified in 1984–85, was associated with significant deterioration in various indicators of health, nutritional, and welfare outcomes, particularly among the poor. Although we find evidence of substantial cuts in governmental expenditures on social services, there is little confirmation of significant short-run deterioration in human capital indicators during the adjustment period.

There has been much interest recently in analyzing the impact of macroeconomic adjustment and stabilization policies on poverty and on the social sectors. Some observers, such as Jolly (1985), Jolly and Cornia (1984), UNICEF (1984), and Cornia, Jolly, and Stewart (1987, 1988), have concluded that recent structural adjustment programs (SAPs) in developing economies have had substantial deleterious effects on human resources, especially those of the poor. These observers have been effective in persuading a number of influential international organizations, including the World Bank, to be more sensitive to these concerns, with the result that there has been more and more international attention paid to the human implications of macroeconomic adjustment policies.

Others, however, such as Glewwe and de Tray (1988), have argued that in many countries, particularly in Africa, most of the poor are not adversely affected by adjustment policies (and many may actually be helped) in part because

Jere R. Behrman is in the Department of Economics at the University of Pennsylvania, Philadelphia. Anil B. Deolalikar is in the Department of Economics at the University of Washington, Seattle. This study builds upon material in Behrman (1988) and Behrman and Deolalikar (1989). The authors thank the U.S. National Institutes of Health and the Operations Evaluation Department of the World Bank for support for some of the underlying studies.

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most poor households are rural. Poor, rural households are often insulated against shocks brought about by adjustment efforts because of self-provision of many necessities, and in fact may even benefit from the relative price changes that typically result from devaluation and trade liberalization (Krueger, Schiff, and Valdés 1988; Behrman 1990b, 1990c). In a case study for Indonesia, Ravallion and Huppi (1989) and Huppi and Ravallion (1990) have shown that macroeconomic adjustment actually coincided with a significantly reduced incidence of poverty. Poverty decreased partly because of increases in agricultural export prices induced by the adjustment program and partly because of the lagged effects of previous poverty eradication efforts.

Despite the greater awareness of issues related to the effects of adjustment, considerable uncertainty remains about the human impact of adjustment, because of the analytical and methodological difficulties of measuring the effects of adjustment on the poor and on the social sectors. A full treatment of the impact would involve the evaluation of a counterfactual situation in a complicated general equilibrium framework. The evidence presented to date on this issue is not the result of such a complicated analysis, and a complete treatment also will not be attempted here. In this article, we utilize time-series data for Jamaica to examine whether macroeconomic adjustment, initiated in the early 1980s but intensified in 1984–85, was associated with significant deterioration in various indicators of health, nutritional, and welfare outcomes, particularly among the poor. The purpose of this exercise is simply to determine what actually happened to the socioeconomic position of Jamaica's poor during structural adjustment.

I. ANALYZING THE IMPACT OF STRUCTURAL ADJUSTMENT PROGRAMS

The impact of policy changes undertaken in an adjustment program on the human capital—particularly health, nutrition, and schooling—of the poor depends on (i) the effect of adjustment policies on the incomes of and prices facing the poor, and (ii) the effect of income and price changes on the human capital behavior of the poor.

A number of researchers have attempted to map the first relationship, namely, the theoretical linkage between the incomes of and prices faced by the poor and specific adjustment policies, such as currency devaluation, contractionary monetary and fiscal policies, wage and price controls, and foreign trade liberalization (Addison and Demery 1985; Behrman 1988; Scobie 1989; Glewwe and de Tray 1988). The consensus of this literature is that, although economic theory provides a framework for analyzing these links, the number of such links and their complex interactions make it virtually impossible to predict a priori the impact of adjustment policy instruments on the resources controlled by the poor.

The second link—namely, between changes in income or price and the household outcomes of interest, such as health, nutrition, and schooling—has been the subject of much recent research (see surveys by Behrman and Deolalikar

1988, and Behrman 1990a). The economics of household decisionmaking suggest that, because of the possibility of substitution by households—among diverse sources of nutrient intakes, across the food intakes and labor supplies of different household members, and among various health and schooling inputs—it is difficult to predict the magnitude (and in some cases the direction) of the impact of changing incomes and prices on household human capital outcomes without careful empirical studies. For instance, if the price of foods which are important nutrient sources increases or incomes decrease as the result of an economic adjustment program, households could shift to cheaper nutrient sources or could reduce leakages between food they obtained and that which is consumed by household members. Recent studies indicate that even for very poor households nutrient intakes are adjusted only 1–3 percent for 10 percent changes in income (see, for example, Behrman and Deolalikar 1987, Bouis and Haddad 1990, Strauss and Thomas 1990, and Behrman 1990d). Similarly, the loss by one member of the household of a formal sector job as the result of an adjustment program may be offset in part with regard to short-run income effects by increased activities of other members of the household in the informal sector. To the extent that this occurs, it may be at the cost of long-run human capital investments (for example, keeping children out of school), which again are difficult to predict a priori. Thus, how reduced incomes and increased consumption prices affect the human capital decisions of the poor is largely an empirical issue—one on which there is little consensus.

Indeed, at a certain level, the question of how macroeconomic adjustment affects the poor is the wrong question to ask, because adjustment policies are not homogenous, and it is possible, within limits, for a government to choose policies that differ in their adverse effects on the poor. For instance, food subsidies and cheap food policies are often the first casualties of economic adjustment programs. There is sufficient evidence to show that removal of food subsidies can be detrimental to the poor (Pinstrup-Andersen 1985, 1986a, 1986b). However, many food subsidy programs have almost excessively broad coverage, and their cost can be reduced without severely affecting the real income of most of the poor. In Morocco, for example, Mateus and others (1986) estimate that the highest 30 percent of the income distribution received 47 percent of the subsidies, and the lowest 30 percent received only 16 percent of the subsidies. Ahmed (1979) reports that in Bangladesh two-thirds of the subsidized grain was distributed to urban areas even though most of the poor people reside in rural areas. For such cases, if targeting the poor and nutritionally vulnerable is administratively and politically feasible at a reasonable cost, it may be attractive from the point of view of structural adjustment programs. Targeted costs tend to rise as efforts to limit leakages to other groups increase, but Mateus and others (1986), Gavan and Chandrasekera (1979), and Alderman and von Braun (1985) argue that substantial reductions in the governmental budget and distribution costs of existing general cheap food policies can be achieved by effective targeting. Targeting measures such as subsidization of inferior foods (that is, those

that are consumed less as income increases) and direct distribution of food to those thought to be most vulnerable (for example, infants and pregnant women) could result in lower budgetary expenditures on cheap food programs without directly worsening the position of most of the poor (see also Pinstrip-Andersen and Alderman 1986, and Rodgers 1986).

A cheap food program is not the only policy related to the social sectors that may be cut as part of an economic adjustment program. Direct cuts in health services may have both an immediate and a long-run impact, and cuts in education may have a long-run impact given some evidence regarding the direct relations between better education and improved health and nutrition (see, for example, Isenman 1980; Behrman and Wolfe 1984, 1987, 1989; Rosenzweig and Schultz 1982; Wolfe and Behrman 1982, 1987). Jimenez (1987) provides a recent survey of pricing policy for health and education in developing countries. He concludes that the efficiency gains from user charges for selected types of health and education services (that is, those for which the benefits accrue primarily to the individuals concerned, such as hospital care and university education) could be substantial. He adds that the impact of increased user charges need not be inequitable, because "the present distribution of subsidies tends to be highly skewed toward higher income groups, who obtain greater access to more costly social services . . . even if they are uniformly free for all. Under these circumstances, the expansionary effect of fee increases for selected services (and if possible, for selected individuals) may actually improve equity in the distribution of public resources."

Such a characterization suggests that as part of adjustment packages, social programs in health or education could be altered through selected user charges so that the poor would not be adversely affected. Politically, this may be very difficult, perhaps even more difficult than food targeting—and if it were done, there would seem to be no good reason to reverse the process at the end of the adjustment program.

Recent studies of Indonesia (Ravallion and Huppi 1989 and Huppi and Ravallion 1990) emphasize that structural adjustment and policy reforms, initiated in 1983 because of external macroeconomic shocks, contained elements specifically aimed at sustaining Indonesia's past progress on poverty reduction. These studies conclude that the incidence of poverty continued to decline substantially during the initial adjustment period (namely, between 1984 and 1987). There were three main factors responsible for Indonesia's success. The first was the ongoing growth of agricultural income that resulted from real exchange rate depreciations that offset lower agricultural export prices, maintenance of subsidies for agricultural inputs (for example, fertilizer and pesticides), and improvement in the rural terms of trade caused by diversification away from rice and toward more profitable crops. The second was the combination of trade and industrial deregulation with real exchange rate adjustments, which resulted in rapid expansion of output and employment in the non-oil manufacturing sector. And the third was the maintenance of routine governmental expenditures and federal transfers to the provinces, both of which have larger poverty-

alleviation elements than development expenditures, and the reallocation of development expenditures away from industry and mining and into poverty-related sectors, such as food and export agriculture and human resource development. The Indonesian experience suggests that generalizations about the impact of economic adjustment must be tempered to take account of differential impacts depending on how an adjustment program is structured and implemented.

II. ECONOMIC ADJUSTMENT, THE POOR, AND THE SOCIAL SECTORS IN JAMAICA

Following a long period of macroeconomic deterioration, Jamaica initiated its structural adjustment program in 1981, with assistance from the World Bank and the International Monetary Fund. The program included, among other things, several adjustments to the real exchange rate, import liberalization, fiscal and tax reforms, and reduced government expenditures (Behrman and Deolalikar 1989). Initial implementation of the structural adjustment program was slow, with many of the policy measures being adopted forcefully only in 1984 and 1985 (Cornia and Stewart 1987).

Although there has been considerable interest in the impact of the Jamaican adjustment program on the poor and on their human resources, previous studies (Cornia and Stewart 1987; Boyd 1988) do not formalize the links between economic adjustment and the poor and their human resources. They instead use secondary data to characterize some of these links relating to unemployment, the composition of governmental expenditures, and direct indicators of health, nutrition, and education.

There are a number of methodological difficulties in rigorously assessing the impact of adjustment. Such an assessment would require the evaluation of a counterfactual situation in which individuals and households are affected by prices, incomes, and governmental services with the possibility of substantial substitutions—all within an economywide framework with complicated concurrent and lagged interactions. Because of exogenous factors, lags, feedbacks, and substitutions, simple correlations between economic adjustment policies and changes in the well-being of the poor must be interpreted with extreme care. Ideally, one would evaluate policies using a well-specified economywide model with the behavior of poor households embedded within the system. Such models, however, are rarely available.

The problem of identifying a counterfactual is even more severe. Even with a properly formulated economywide model, it is difficult to predict what alternative policies a government might have pursued, and whether their impact on the poor would have been more or less severe than the effect of policies that were actually adopted. What would have happened if no adjustment had taken place? Would the poor have been better off in the short run but worse off when (and if) the eventual collapse had come? In evaluating the impact of an adjustment program, then, the relevant comparison is not obvious.

The methodology used here is simple and, like the previous studies, ignores

many of these complex issues (which leads to limitations, as discussed below). We attempt only to establish the “facts” of whether the socioeconomic indicators of interest for Jamaica deviated significantly during the narrowly defined adjustment period (1984–85) from their underlying secular trends. Each indicator’s secular trend is estimated in a simple regression, and we test for a statistically significant shift in this relation during 1984–85. Each regression is of the form, $\ln(\text{indicator})_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 D$. The linear and quadratic time terms give the secular path in the dependent variable. The quadratic time term allows for the possibility that the Jamaican economy was coming out of its long deteriorating experience in the mid- and late 1980s because of the adjustment program or for other reasons. The last term, D , is a dummy variable equal to 1 in 1984–85. If its estimated coefficient is significantly different from zero, we can conclude that the relevant indicator in 1984–85 differs from the secular trend. (We define statistical significance of α_3 via a t -test at the 10 percent level.) First-order autocorrelation coefficients also are included if they are significant, but their inclusion does not change the basic results discussed below. Although rudimentary, this “reduced-form” approach permits determination of whether the critical adjustment years differed from the preceding (and, to a lesser extent, succeeding) secular trend in terms of social indicators, as opposed to being “bad” years within a longer experience, a distinction that unfortunately is not made in much of the commentary on the impact of SAPs and stabilization programs.

This approach certainly has its limitations. Given the limited length of the available data series, we cannot examine the long-run effects of the adjustment program, some of which may still be in the making. (Our data series do not go beyond 1987.) The secular trends, moreover, do not necessarily represent the counterfactual paths that would have been followed if there had not been an adjustment program or if the adjustment program had been of a different nature. Also, the significant deviations, or lack thereof, cannot be attributed to the Jamaican adjustment and stabilization program alone, because there is no control for other contemporaneous events, such as changes in the world market for bauxite—Jamaica’s leading export commodity. What this procedure reveals is whether the indicators of poverty, health, nutrition, and schooling deteriorated significantly, for whatever reasons, from their underlying secular trends during the critical adjustment years. The results may be suggestive of what the impact of the SAP was without the very difficult and expensive development of a general equilibrium model. And although we do not describe an economywide model, we do attempt to explore systematically in a limited way some dimensions of the relevant structural relations.

Boyd’s summary of the Jamaican 1984–85 adjustment experience (1988, pp. 153–54) concludes:

There is considerable evidence that economic policies . . . have served to worsen the condition of the poor in Jamaica. . . . The economic adjustment policies of the 1980s . . . have had considerable stagflationary effect. The impact on the poor has also been considerable, with decline in quan-

tity and quality of public services on every front—health, education, housing, and water—and increasing costs for what exists. The government has sought to mitigate these effects by its welfare programme, primarily its Food Aid Programme. This . . . programme . . . has not been sufficient to offset the adverse development on nutrition arising from falling real incomes and rising relative food prices. There has been a marked increase in malnutrition among children. . . . The removal of subsidies, increasing redundancies and unemployment, and the reduction in social and economic services, inter alia, have all had direct adverse effects of significant magnitude . . .

Examination of deviations from the trends for macroeconomic indicators (table 1) provides only limited support for Boyd's characterization of the SAP impact.

Table 1. *Secular Trends and Deviations for 1984–85 in Jamaican Macroeconomic Indicators*

<i>Indicator</i>	<i>Time</i>	<i>Time²</i>	<i>1984–85</i>	<i>First-order auto- correlation coefficient^a</i>	<i>Adjusted R²</i>	<i>Sample size</i>
<i>Foreign sector</i>						
Current account deficit (millions of U.S. dollars)	3.360 (0.6)	-0.115 (0.8)	6.221 (4.2)	0.78 (2.4)	0.54	22
Exchange rate (Jamaican dollars per U.S. dollars)	-0.119 (1.5)	0.007 (2.8)	0.364 (3.3)	0.66 (2.8)	0.97	24
Total exports	0.406 (8.4)	-0.010 (7.1)	-0.195 (1.4)		0.78	19
Total imports	0.212 (2.7)	-0.005 (2.2)	0.001 (0.0)	0.43 (1.7)	0.83	19
<i>Other</i>						
GDP per capita (1974 Jamaican dollars)	-0.083 (1.8)	0.001 (1.3)	0.012 (0.5)	0.57 (4.2)	0.94	17
Gross capital formation (millions of Jamaican dollars)	0.091 (1.0)	0.001 (0.5)	0.193 (1.3)	0.68 (3.9)	0.96	24
Total government expenditure per capita (1974 Jamaican dollars)	0.239 (7.7)	-0.006 (7.1)	-0.122 (2.1)		0.84	16
Government finance deficit (millions of U.S. dollars)	1.061 (1.1)	-0.026 (1.3)	-0.037 (0.2)	0.84 (6.5)	0.96	24
Commercial bank prime lending rate	-0.017 (0.5)	0.002 (2.1)	0.152 (1.6)	0.40 (1.4)	0.93	21
Consumer price index	0.215 (5.4)	-0.002 (1.2)	0.075 (1.1)	0.41 (1.7)	0.99	17
Inflation rate	0.235 (1.6)	-0.012 (1.7)	0.902 (1.7)		0.11	17

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

a. Included if a Durbin-Watson test indicated such correlation in the residuals.

Source: Behrman and Deolalikar (1989), appendix A.

In 1984–85, devaluation was approximately 44 percent more rapid than the trend, real governmental expenditure per capita fell 11.5 percent below the trend, and the current account increased significantly. But a number of other indicators—including real gross domestic product (GDP) per capita, the consumer price index, investment, imports, and exports—did not deviate significantly from the trend in 1984–85. Thus the evidence available suggests that the overall macro impact of the adjustment program in these years was not as negative as Boyd (1988) and Cornia and Stewart (1987) suggest.

Changes in Employment and Income

The total unemployment rate peaked in 1982 and declined monotonically thereafter with no significant deviation from the trend in 1984–85 (see table 2). Unemployment in Jamaica is defined to include both those who are actively seeking jobs and those who are not actively seeking jobs, but the results reported here hold whether total unemployment or only unemployment among job seekers is considered. Cornia and Stewart (1987) and de Tray (1985) argue that unemployment rates for women and youth are particularly important indicators of labor market conditions because these groups are more marginal labor force participants than are adult males. Female employment may be particularly related to health, nutrition, and education in Jamaica, where almost half of the households with children are female-headed. But the unemployment rates for females and for youth in 1984–85 also indicate no significant deviations from the trends. Boyd (1988) emphasizes the increasing “informalization” of Jamaican employment as evidence of deteriorating labor market conditions. The best available measure of informalization is the share of self-employed and independent workers in total employment, which rose from 39.1 percent in 1983 to 41.0 percent in 1984 and 42.7 percent in 1985. But the support for Boyd’s informalization conjecture seems quite limited despite these increases, because 1983 appears to be an anomaly: in each of the four previous years the informal employment share was more than 40 percent, with the 1981 share at 42.7 percent and the 1982 share at 42.6 percent. In addition, neither the number nor the share of workers who were self-employed or in independent occupations in 1984–85 differed significantly from the trends.

Even for those in the paid labor force, of course, employment is only part of what determines income; movements in real wages are another important factor in income fluctuations. Wage data for Jamaica are quite limited, but the median wages reported in the labor force survey relative to the consumer price index are an indicator of real wages. There is no evidence of significant deviations in 1984–85 from the secular trends in the real median wages for men or for women. As discussed in detail in Behrman and Deolalikar (1989), the 1983 values seem anomalous, so that there appear to be drops from 1983 to 1984–85, but not a significant deviation below the secular trends defined over longer time periods (and, in fact, the median real wages in 1984–85 exceeded those for 1978–82). Of course, many of the poor do not receive most of their income

from wage labor. A major alternative source of income for the rural poor is agricultural production of nonexport crops. We examined all nine indicators that we could locate for nonexport agricultural quantities, prices, and domestic product, and the only significant deviation was in the GDP deflator for the agricultural sector as a whole. Finally, some of the poor receive income in the form of governmental welfare and social security transfers, but these also do not reflect any significant deviations from the trends for 1984–85. Thus the available evidence does not seem to support any significant deleterious effect coincident with the 1984–85 adjustment program in employment, real wages, agricultural income of the poor, or governmental transfers to the poor.

Changes in Education, Food and Nutrition, and Health

Cornia and Stewart (1987, p. 115) claim that “educational expenditure per head of the population aged 0–14 declined by 40 percent” (apparently from 1981–82 to 1985–86). However, we calculated the decline in real governmental expenditures on education per child age 5–14 between 1983–84 and 1985–86 to be only 0.1 percent. This sharp difference appears to reflect three factors. First, Cornia and Stewart apparently used the overall GDP deflator instead of the sector-specific deflator. Since real wages in education dropped sharply over this time period, they substantially overstate the real resource decline. Second, Cornia and Stewart refer to a longer period in which the secular trend in such real expenditure was negative, not just to 1984–85. Third, although the population grew by 2.7 percent between 1983 and 1985, the number of children age 5–14 actually declined by 1.7 percent, so that including young, non-school-aged children skews the per capita expenditure downward. In addition, regressions for available time series data on education inputs and outputs generally indicate no significant negative deviations for 1984–85, with the single exception of output of crafts, production process, and operating workers per 100,000 population (see table 3).

Private real food expenditures are available in the national accounts for ten food groups. For none of these groups is there a significantly negative deviation from the trends for 1984–85 (see table 4). Moreover, for total food, root crops, and sugar and sugar products (and for bread and cereals at the 15 percent level of significance) the deviations are significantly positive. Total food imports per capita in U.S. dollars did not deviate significantly from the trend, though there was a significant shift from meat and meat preparations to dairy products (and, at the 15 percent level, to cereals and cereal preparations). Thus average real food expenditure increased in 1984–85, and the compositional shifts tended to be toward staples, which suggests that the increased real food expenditure was not primarily the result of increases in expenditure by those at the upper end of the income distribution. Such results do not support the hypothesis of a major deterioration in food and nutrient intakes among the poor in 1984–85.

We also used the food data to estimate linear food expenditure relations and found that the elasticity of food consumption with respect to total consumption

Table 2. *Secular Trends and Deviations for 1984–85 in Jamaican Labor Market, Agricultural Sector and Government Transfers*

<i>Indicator</i>	<i>Time</i>	<i>Time²</i>	<i>1984–85</i>	<i>First-order auto- correlation coefficient^a</i>	<i>Adjusted R²</i>	<i>Sample size</i>
<i>Labor market</i>						
Total unemployment rate	0.306 (2.7)	-0.008 (2.8)	-0.002 (0.1)	0.54 (2.8)	0.80	15
Males	0.058 (2.2)	-0.001 (1.7)	0.048 (0.6)		0.41	18
Females	0.364 (2.2)	-0.009 (2.5)	-0.009 (0.3)	0.67 (4.1)	0.86	15
Males age 14–19	0.234 (4.4)	-0.006 (4.3)	-0.041 (0.8)	-0.56 (1.7)	0.66	12
Females age 14–19	0.207 (11.6)	-0.005 (11.3)	-0.005 (0.3)	-0.69 (2.6)	0.84	12
Males age 20–24	0.420 (5.6)	-0.010 (5.3)	0.011 (0.2)		0.77	13
Females age 20–24	0.313 (9.3)	-0.007 (8.8)	0.010 (0.3)		0.91	13
Unemployment rate among job seekers	0.164 (2.1)	-0.004 (2.1)	0.064 (0.6)		0.12	15
Males	0.015 (0.2)	-0.001 (0.3)	-0.004 (0.0)		-0.17	15
Females	0.202 (2.8)	-0.005 (2.6)	0.069 (0.7)		0.42	15
Total employed persons	-0.008 (0.8)	0.001 (2.5)	0.010 (0.7)		0.95	15
Employed persons in self- employment or in independent occupations	0.040 (2.0)	-0.000 (0.6)	0.013 (0.5)		0.93	15
Percentage of all employed persons in self-employment and independent occupations	0.048 (2.5)	-0.001 (1.9)	0.003 (0.1)		0.69	15
Real male median wage (1974 Jamaican dollars)	-0.026 (0.6)	0.001 (0.3)	-0.114 (0.6)		0.02	16
Real female median wage (1974 Jamaican dollars)	-0.200 (0.4)	0.001 (0.3)	-0.118 (0.6)		-0.12	16
Male–female wage ratio for high-wage incomes	0.202 (4.1)	-0.006 (4.3)	0.032 (0.4)		0.52	16
Male median–female median wage ratio	-0.006 (0.4)	0.000 (0.0)	0.004 (0.1)		0.03	16
<i>Agriculture</i>						
Production per capita (pounds)						
Sweet potatoes	0.094 (2.0)	-0.004 (1.6)	0.236 (1.1)		0.21	19
Yams	-0.080 (0.7)	0.003 (0.7)	0.053 (0.5)	0.59 (3.3)	0.43	18
Cassava	0.110 (0.9)	-0.006 (1.2)	0.058 (0.3)	0.55 (2.2)	0.49	18

Table 2. (continued)

<i>Indicator</i>	<i>Time</i>	<i>Time²</i>	<i>1984-85</i>	<i>First-order auto- correlation coefficient^a</i>	<i>Adjusted R²</i>	<i>Sample size</i>
Gross domestic product of domestic agriculture per capita (constant 1974 Jamaican dollars)	0.021 (0.5)	-0.001 (0.6)	0.086 (1.1)	0.32 (1.3)	0.13	17
Gross domestic product of root crops per capita (constant 1974 Jamaican dollars)	-0.018 (0.2)	0.000 (0.0)	0.104 (0.9)	0.50 (2.1)	0.24	17
GDP deflator for domestic agricultural sector (1974=1)	0.093 (5.2)	0.002 (1.6)	-0.149 (1.8)		0.98	18
GDP deflator for root crops	0.101 (4.6)	0.000 (0.3)	-0.112 (1.1)		0.96	18
Share of domestic agriculture in national GDP	0.057 (1.9)	-0.002 (1.1)	0.092 (1.0)	0.21 (0.7)	0.67	17
Share of root crops in national GDP	0.056 (1.0)	-0.002 (0.8)	0.124 (1.0)	0.34 (1.2)	0.41	17
<i>Government transfers</i>						
Total real government expenditure on social security and welfare per capita (1974 Jamaican dollars)	-0.362 (3.3)	0.009 (2.9)	-0.062 (0.3)		0.53	16
Total real government expenditure on housing per capita (1974 Jamaican dollars)	0.961 (9.0)	-0.028 (9.1)	-0.213 (1.1)		0.88	16

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

a. Included if a Durbin-Watson test indicated such correlation in the residuals.

Source: Behrman and Deolalikar (1989), appendix A.

expenditure is 0.74. This implies that real food expenditure would drop 1.9 percent with the 2.5 percent drop in real product per capita in 1984 and 4.3 percent with the 5.8 percent drop in real product per capita in 1985. The use of these estimated expenditure relations to predict real food expenditure suggests the possibility of some deterioration in nutrition intakes in 1984-85, even if the data from which the relations are estimated do not. But these more pessimistic estimates do not necessarily imply a serious deterioration in nutrient intakes. A number of studies of poorer populations suggest that people with more income tend to pay substantially more per unit of nutrients than do poorer people, presumably because they buy higher quality food and have greater food leakages. This result holds even though the poor sometimes pay more for food of identical quality because they cannot make bulk purchases, and even if the poor at the margin have higher propensities to purchase and to consume basic nutri-

Table 3. *Secular Trends and Deviations in 1984–85 in Indicators of Jamaican Education*

<i>Indicator</i>	<i>Time</i>	<i>Time</i> ²	<i>1984–85</i>	<i>First-order auto-correlation coefficient</i> ^a	<i>Adjusted R</i> ²	<i>Sample size</i>
Real total governmental expenditure on education and training (1974 Jamaican dollars)	0.257 (3.0)	-0.006 (2.8)	-0.071 (0.8)	0.33 (1.0)	0.72	15
Real GDP per capita spent on private education (including University of the West Indies)	0.099 (7.4)	-0.003 (6.6)	0.007 (0.4)	0.37 (1.2)	0.94	17
Pupil-teacher ratio in primary schools	-0.072 (2.2)	0.002 (2.2)	-0.026 (0.6)		0.13	13
Pupil-teacher ratio in secondary schools	-0.075 (1.1)	0.002 (1.1)	-0.031 (0.4)		0.10	13
Capacity in primary schools	0.039 (0.9)	-0.001 (0.6)	-0.003 (0.2)	0.31 (1.9)	0.94	11
Capacity in secondary schools	0.142 (1.0)	-0.003 (0.8)	0.001 (0.0)		0.13	12
Output per 100,000 population of:						
Professional, technical, and managerial workers	0.085 (0.2)	-0.003 (0.4)	-0.016 (0.2)	0.67 (2.0)	0.67	14
Skilled and semiskilled workers	-0.201 (1.7)	0.006 (2.0)	0.176 (1.0)		0.55	15
Crafts, production process, and operating workers	0.735 (2.2)	0.020 (2.5)	-0.293 (1.9)	0.43 (2.0)	0.79	14
Number in attendance at skills-upgrading programs	-0.279 (1.4)	0.007 (1.3)	0.116 (0.4)		-0.03	15

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

a. Included if a Durbin-Watson test indicated such correlation in the residuals.

Source: Behrman and Deolalikar (1989), appendix A.

ents out of additional income than do those who are better off (see, for example, Strauss and Thomas 1990). The 1984 Jamaican consumption expenditure survey permits estimates of nutrient elasticities with respect to total expenditure for different income ranges (table 5). For the lowest income range, these elasticities are generally between 0.3 and 0.4. These elasticities are likely to be overestimates if actual nutrient intakes as a proportion of household nutrient purchases decline with income as a result of greater food losses and more provision of food to others (for example, laborers, guests), as emphasized by Bouis and Haddad (1990), or if there is bulk purchase of staples and the reference period for the expenditure survey is relatively short, as demonstrated by Behrman (1988). In fact, if one can judge by the careful Strauss and Thomas (1990) estimates for

Brazil, the failure to control for such factors more than offsets any nonlinearities in the relationship between elasticities and income levels. Strauss and Thomas report sharp nonlinearities, but their preferred estimates indicate an elasticity of nutrient intakes with respect to income for the very poor below the estimates given here. Our elasticities imply that with a 5 percent drop in real food expenditures, nutrient intakes would drop no more than 2 percent. This does not seem to suggest substantial deterioration in nutrient intakes in 1984–85.

Of more interest than the nutrient intakes are the indicators of the impact of nutrients. The two most-cited indicators for which there are time series data are the percentage of admissions of children under five years old at Bustamante Children's Hospital because of malnutrition or malnutrition-gastroenteritis, and the percentage distribution of children age 0–3 years by the Gomez classification of normal and grades I, II, and III malnutrition according to anthropometric measures. Hospital admissions with malnutrition increased from 2.1 percent in 1983, to 2.4 percent in 1984, and to 3.7 percent in 1985, and those with malnutrition and gastroenteritis increased from 2.0, to 2.7, and to 4.7 percent in these three years, respectively.

At first sight this might seem to be strong evidence of increasing malnutrition (Boyd 1988; Cornia and Stewart 1987). However, there are five important qualifications in interpreting these data. First, the same data source indicates that from 1983 to 1984 the percentage of admissions for malnutrition and/or gastroenteritis (a third category in the original data that is not reported by Boyd) fell from 23.5 to 19.0 percent, so the slight increases noted above for 1984 may only reflect changes in categorization between malnutrition with gastroenteritis versus simply gastroenteritis. (The same is true to a much lesser extent in 1985.) Second, the patients admitted to one hospital are not likely to be representative of the affected population in different regions and classes, though it is hard to know which way this biases such an indicator. Third, the increased percentages for malnutrition and malnutrition-gastroenteritis in 1984 and 1985 reflect not only increases in the absolute numbers of children admitted for these diseases, but also a decline in the total admissions from 4,709 in 1983 to 4,512 in 1984 and 3,369 in 1985. It might be strange to conclude that this component of the changed percentages reflects that children were worse off in 1984 and 1985. Fourth, the demand for hospitalization is usually thought to be income-elastic, and thus it increases with income for a given health status, rather than vice versa. Fifth, there are not significant deviations in 1984–85 from the secular trend for such admissions (see table 4). For all of these reasons, substantial caution should be used in interpreting these hospital admissions numbers.

The percentages of children in each Gomez category of nourishment shifted in 1984 and 1985 to indicate greater malnutrition, with the percentage normal dropping from 74.2 percent in 1983 to 72.9 percent in 1984 and 1985. The decrease in the percentage share of normal children was distributed across all three grades of malnourishment. Again, some caution is needed in interpretation for several reasons. First, the quarterly variations in the data are considerable,

Table 4. *Secular Trends and Deviations for 1984–85 in Jamaican Food Consumption and Malnutrition Indicators*

<i>Variable</i>	<i>Time</i>	<i>Time²</i>	<i>1984–85</i>	<i>First-order auto-correlation coefficient^a</i>	<i>Adjusted R²</i>	<i>Sample size</i>
<i>Real private consumption expenditure per capita (1974 Jamaican dollars)</i>						
Food	-0.137 (2.4)	0.005 (2.0)	0.091 (2.1)	0.37 (1.1)	0.83	12
Bread and cereals	-0.103 (3.5)	0.003 (2.5)	0.090 (1.6)		0.76	13
Meat	-0.100 (4.5)	0.004 (3.6)	0.018 (0.5)		0.80	13
Fish	-0.087 (2.5)	0.003 (2.1)	0.084 (1.3)		0.41	13
Dairy products	0.045 (1.1)	-0.001 (0.6)	-0.074 (1.0)		0.36	13
Oils and fats	-0.152 (4.9)	0.004 (2.6)	-0.050 (0.9)		0.96	13
Fruits, vegetables, and legumes	-0.292 (1.4)	0.012 (1.4)	0.031 (0.3)	0.48 (1.7)	0.29	12
Root crops	-0.102 (2.5)	0.004 (1.9)	0.200 (2.7)		0.56	13
Sugar and sugar products	-0.016 (0.2)	-0.001 (0.2)	0.252 (1.7)		0.12	13
Coffee, tea, and cocoa	-0.318 (4.4)	0.011 (3.2)	-0.019 (0.1)		0.86	13
Other foods	-0.199 (2.7)	0.004 (1.1)	0.174 (1.3)		0.89	13
Water and sanitation	0.020 (0.3)	0.000 (0.1)	-0.096 (1.2)		0.39	13
Medical care	-0.146 (2.6)	0.006 (2.3)	0.052 (0.5)		0.34	13
<i>Price index</i>						
All items	0.215 (5.4)	-0.002 (1.2)	0.075 (1.1)	0.41 (1.7)	0.99	17
Food and drinks	0.224 (5.3)	-0.002 (1.1)	0.066 (0.8)	0.37 (1.5)	0.99	17
<i>Food imports per capita (U.S. dollars)</i>						
Total	0.028 (0.3)	-0.001 (0.3)	-0.042 (0.1)		-0.17	19
Meat and meat preparations	-0.082 (0.8)	0.003 (1.0)	-0.30 (2.0)		0.18	15
Dairy products	-0.123 (0.8)	0.006 (1.6)	0.405 (1.8)		0.85	15
Fish and fish products	-0.006 (0.0)	0.001 (0.3)	-0.018 (0.1)		0.16	15
Cereals and cereal preparations	-0.167 (0.6)	0.006 (0.8)	0.655 (1.6)		0.35	15
Fruits and vegetables	-0.581 (2.3)	0.014 (2.1)	-0.457 (1.3)		0.46	15
<i>Malnutrition indicators</i>						
Percentage of children age 0–3 with:						
Gomez grade normal	0.119 (2.3)	-0.002 (1.9)	-0.040 (0.9)		0.63	10
Gomez grade I	0.011 (0.1)	-0.001 (0.2)	0.039 (0.3)		-0.23	11

Table 4. (continued)

Variable	Time	Time ²	1984-85	First-order auto- correlation coefficient ^a	Adjusted R ²	Sample size
Gomez grade II	-0.731 (4.2)	0.016 (3.7)	0.223 (1.5)		0.78	11
Gomez grade III	-0.323 (1.5)	0.005 (1.0)	0.307 (1.6)		0.70	11
Malnutrition cases as percentage of all hospital admissions	-0.142 (0.4)	0.005 (0.5)	0.122 (0.7)		0.42	10
Malnutrition and gastroenteritis cases as percentage of all hospital admissions	-0.342 (0.5)	0.011 (0.7)	0.218 (1.0)		0.58	10

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

a. Included if a Durbin-Watson test indicated such correlation in the residuals.

Source: Behrman and Deolalikar (1989), appendix A.

and not indications of an obvious seasonal pattern. For example, the percentage normal increased from 71.3 in the fourth quarter of 1984 to 75.0 in the first quarter of 1985 and then fell back to 72.7 in the second quarter of 1985. Second, the selection procedure for measurement is not clearly random, because it apparently depends on visiting child health clinics. Third, the deviations in 1984 and 1985 from the secular trends for the Gomez percentages are not significantly non-zero (see table 4) (although Gomez grades II and III would be non-zero at a lower significance level). Thus, these two sets of indicators do not provide much confirmation of declining child nutrition.

Another aspect of these two indicators of nutritional status is how they are related to governmental expenditures and indicators of health care availability and income. We estimate these relationships (table 6), and find that none of the coefficients of the capital expenditures are significantly non-zero, as might seem plausible a priori because capital improvements are likely to have a lagged effect.

Table 5. Elasticities of Nutrient Availability with Respect to Total Expenditure, 1984 Jamaican Consumer Survey

Total family expenditure (Jamaican dollars)	Elasticity of nutrient availability							
	Energy	Protein	Fat	Carbo- hydrates	Iron	Vitamin A	Calcium	Vitamin C
2,000	0.37	0.43	0.54	0.32	0.37	0.34	0.33	0.40
5,000	0.14	0.24	0.27	0.08	0.09	0.21	0.19	0.00
13,000	0.04	0.15	0.11	-0.01	0.04	0.22	0.09	0.07

Note: Elasticities were calculated using the midpoints of the total expenditure ranges.

Source: Based on data in Behrman and Deolalikar (1989), table A3-8.

But three of the six coefficients of recurrent expenditures are significantly negative—those for the percentage of children with Gomez grade II and those for malnutrition and malnutrition-gastroenteritis cases as a percentage of hospital admissions.

We also estimate relations for the same dependent variables with right-side variables including real per capita GDP (with significantly negative coefficients for Gomez grade II and for malnutrition admissions), hospital beds per capita (with a significantly negative coefficient for malnutrition-gastroenteritis admissions), and population per physician (significantly negative for the Gomez normal category and positive for all of the others except Gomez III) (table 7). These significant coefficients provide some support for the interpretation of the Gomez indicators and hospital malnutrition admissions as reflecting more general health and nutrition conditions, and thus create greater confidence that to the extent that they deviated in 1984–85, they reflect some true nutritional deterioration, at least for children, during 1984–85.

There are a number of indicators of health inputs and health outcomes for which time series are long enough to allow investigation of whether the values for 1984–85 differed significantly from the underlying secular trends (see table 8). Although no significant change in 1984–85 is noted for most of the health

Table 6. *Selected Nutrition and Health Indicators as Functions of Recurrent and Capital Real Government Expenditures on Health*

Dependent variable	Intercept	Per capita real government expenditure on health		Adjusted R ²	Sample size
		Recur- rent	Capital		
Percentage of children age 0–3 with:					
Gomez grade normal	4.05 (14.8)	0.076 (0.9)	–0.012 (0.4)	–0.20	7
Gomez grade I	3.65 (4.2)	–0.169 (0.6)	0.031 (0.3)	–0.35	7
Gomez grade II	3.33 (4.1)	–0.619 (2.5)	0.075 (0.08)	0.52	7
Gomez grade III	0.03 (0.0)	–0.247 (0.6)	0.017 (0.1)	–0.31	7
Malnutrition cases as percentage of hospital admissions	5.21 (4.5)	–1.253 (3.6)	0.115 (0.8)	0.65	9
Malnutrition/gastroenteritis cases as percentage of hospital admissions	9.26 (4.8)	–2.406 (4.2)	0.041 (0.2)	0.76	9
Death rate (per 1,000)	1.53 (1.3)	–0.016 (0.9)	0.027 (0.7)	0.78	15
Infant mortality rate (per 1,000)	6.51 (4.1)	–0.981 (2.2)	–0.271 (1.0)	0.23	11

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

Source: Behrman and Deolalikar (1989), appendix A.

Table 7. Selected Nutrition and Health Indicators as Functions of Population Per Physician, Hospital Beds Per Capita, and Real GDP Per Capita

Dependent variable	Intercept	Popula- tion per physician	Hospital beds per capita	Real per capita GDP	Adjusted R ²	Sample size
Percentage of children age 0-3 with:						
Gomez grade normal	5.51 (3.8)	-0.072 (3.9)	0.052 (0.5)	-0.095 (0.4)	0.71	7
Gomez grade I	-3.25 (0.8)	0.222 (4.4)	-0.239 (0.8)	0.690 (1.1)	0.77	7
Gomez grade II	13.02 (1.6)	0.234 (2.2)	0.380 (0.6)	-2.105 (1.7)	0.59	7
Gomez grade III	9.03 (0.7)	0.200 (1.1)	1.181 (1.1)	-1.889 (0.9)	-0.15	7
Malnutrition cases as percentage of hospital admissions	17.73 (1.6)	0.543 (3.5)	0.212 (0.3)	-3.221 (1.9)	0.79	9
Malnutrition/gastroenteritis cases as percentage of hospital admissions	20.80 (1.2)	1.010 (4.40)	-3.425 (2.1)	-3.766 (1.4)	0.87	8
Death rate (per 1,000)	-0.16 (0.1)	0.018 (0.3)	0.627 (2.8)	0.181 (0.5)	0.82	14
Infant mortality rate (per 1,000)	8.79 (0.4)	-0.621 (0.9)	1.633 (1.5)	-0.374 (0.2)	0.70	9

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

Source: Behrman and Deolalikar (1989), appendix A.

input variables, there is a positive change in the number of beds in governmental hospitals, and negative changes in total real governmental expenditures per capita on health (indicating a downward shift of 14.6 percent) and for the capital component of health expenditure (a downward shift of 46.2 percent). These downward shifts in governmental real health expenditures are large and would seem to have negative short- and long-run implications, even though any such deduction must be qualified because of the absence of any other indicators of significant downward shifts in health inputs (and the one positive shift noted above). Indicators of health outcomes exhibit no significant deviation in 1984-85 from the secular trends. The lack of a significant impact on health outcomes may indicate that increased efficiencies in health care delivery have offset most of the short-run negative impact of governmental health expenditure cuts, but the long-term effects cannot be measured here.

III. CONCLUSIONS

In summarizing the empirical results, it should be remembered that our conclusions must be qualified because of limited data, lags in the adjustment process, and complexities, substitution, and feedback both on a micro and a macro

Table 8. *Secular Trends and Deviations in Jamaican Health Indicators, 1984–85*

<i>Indicator</i>	<i>Time</i>	<i>Time</i> ²	<i>1984–85</i>	<i>First-order auto-correlation coefficient</i> ^a	<i>Adjusted R</i> ²	<i>Sample size</i>
<i>Input</i>						
Per capita real government expenditure on health (1974 Jamaican dollars)	0.336 (8.8)	-0.009 (8.2)	- 0.156 (2.2)		0.88	16
Recurrent	0.371 (8.4)	-0.010 (7.8)	- 0.124 (1.5)		0.86	16
Capital	0.303 (1.5)	-0.008 (1.4)	- 0.620 (1.8)	-0.21 (0.8)	0.23	15
Per capita real government expenditure on water and sanitation (1974 Jamaican dollars)	0.551 (2.3)	-0.018 (2.5)	0.175 (0.4)		0.37	16
Per capita real government expenditure on social sectors (health, education, housing, water and sanitation, social security)	0.285 (9.8)	-0.008 (9.0)	- 0.127 (2.3)		0.90	16
Percentage of children age 0–1 immunized against						
DPT	-0.362 (0.2)	0.011 (0.3)	0.074 (0.3)		0.55	7
Polio	0.662 (1.0)	-0.012 (0.9)	- 0.155 (1.4)		0.81	7
Measles	-2.471 (1.2)	0.060 (1.4)	0.180 (0.5)		0.82	7
BCG	0.545 (0.3)	-0.007 (0.2)	- 0.013 (0.0)		0.80	7
Population per public sector physician	0.161 (1.5)	-0.003 (1.1)	- 0.019 (0.1)		0.48	16
Population per public sector nurse	-0.059 (0.8)	0.002 (1.1)	- 0.167 (1.0)		0.07	16
Number of beds in government hospitals	-0.120 (1.3)	0.002 (1.0)	0.061 (1.7)	0.50 (1.9)	0.90	14
Number of beds in government hospitals per capita	-0.128 (2.9)	0.002 (0.9)	0.055 (1.5)	0.49 (1.8)	0.95	14
Real per capita GDP spent on health and medical services	-0.204 (0.5)	0.004 (0.5)	- 0.030 (0.5)	0.78 (3.9)	0.57	17
Imports of medicines and pharmaceuticals	0.546 (2.1)	-0.008 (1.2)	0.444 (1.2)		0.88	15

Table 8. (continued)

<i>Indicator</i>	<i>Time</i>	<i>Time²</i>	<i>1984-85</i>	<i>First-order auto- correlation coefficient^a</i>	<i>Adjusted R²</i>	<i>Sample size</i>
<i>Outcome</i>						
Infant mortality rate (per 1,000)	0.014 (0.5)	-0.003 (0.4)	0.346 (1.0)		0.63	9
Death rate (per 1,000)	0.014 (2.4)	-0.001 (5.3)	0.007 (0.1)		0.88	23
<i>Incidence (per 100,000)</i>						
Measles	0.230 (0.5)	-0.011 (0.8)	- 0.196 (0.2)		0.11	19
Tetanus	-0.261 (1.8)	0.003 (0.6)	0.127 (0.3)		0.83	18
Tuberculosis	0.030 (0.4)	-0.003 (1.4)	- 0.030 (0.1)		0.75	19
Typhoid	0.151 (1.3)	-0.004 (1.3)	- 0.152 (0.5)		-0.03	19

Note: The regressions were run with the indicator in natural logarithmic form. *T*-ratios are in parentheses.

a. Included if a Durbin-Watson test indicated such correlation in the residuals.

Source: Behrman and Deolalikar (1989), appendix A.

level. First, there is some evidence of an initial negative macro impact in 1984-85 in terms of indicators such as per capita GDP and inflation, followed by medium-term improvements. But focusing on deviations from the secular trends to see if the situation worsened significantly in 1984-85 relative to the underlying movements (rather than just whether it was bad) leads to a much less negative assessment of the situation in these years than by some previous analysts, such as Boyd (1988), Cornia and Stewart (1987), and Davies and Anderson (1987). If, in fact, the macro effects were smaller than often claimed, of course, the impact on the poor and on their human resources would also have been smaller.

Second, the negative short-run effects on employment and distribution also seem limited, and again more limited than suggested by other observers. Most of the short-run impact on employment, in fact, seems to have been neutral or positive, without significant negative deviations from the secular trends even for the most vulnerable demographic groups, such as youth and women. Moreover, the efforts to keep food prices low for the benefit of consumers possibly had an ongoing negative impact on the incomes of some of the poorer Jamaicans in agriculture, though the evidence on this possibility is limited. Governmental transfers and services almost certainly fell in real terms, though not so much from the underlying trends, as is often suggested; and in Jamaica, as in other countries, these programs tend to affect middle-income groups much more than the poorest.

Third, governmental expenditures on social services undoubtedly declined in real terms, and in the aggregate in 1984 and 1985 they were significantly below the trend. Nevertheless, the evidence of short-term deterioration in these sectors is limited. Only one out of ten educational indicators shows a significantly negative deviation for 1984–85. Real per capita food expenditure seemed stable despite income declines and real food price increases, perhaps in part because of some success in food programs. The small nutrient elasticities with respect to total food expenditure suggest that part of the explanation for nutritional developments was the substitution of lower-cost nutrients for more expensive ones (a pattern also observed in food imports), which may result in some important welfare losses, but relatively small nutrient intake deterioration for most Jamaicans. Nevertheless, there is some evidence, despite considerable qualifications about the data, of some nutritional deterioration for small children, though probably with subsequent recovery after 1984–85. For nonnutrient health-related indicators of inputs and outputs, there were about as many positive as negative changes in 1984–85, and very few significant deviations from the trends, despite drops in real governmental health expenditures per capita.

Concerns about the impact of adjustment on the poor and on the social sectors have multiplied and are more and more at least part of the policy discussion, if not always a part of policy design and implementation. Adjustment programs may have deleterious effects on the poor and on the social sectors, but the empirical evidence presented to date is not very convincing as a result of confusion about levels, trends, and deviations from the trends as well as questionable data interpretations. More careful and thorough analysis that clarifies the impact of alternative adjustment policies on the poor and on the social sectors and identifies policy instruments with which to cushion the poor from the adverse effects of adjustment will be needed, because macroeconomic adjustment will continue to be a reality in much of the developing world.

REFERENCES

The word “processed” describes informally reproduced works that may not be commonly available through library systems.

- Addison, Tony, and Lionel Demery. 1985. *Macro-economic Stabilisation, Income Distribution and Poverty: A Preliminary Study*. Working Paper 15. London: Overseas Development Institute.
- Ahmed, Raisuddin. 1979. *Foodgrain Supply, Distribution, and Consumption Policies within a Dual Pricing Mechanism: A Case Study of Bangladesh*. International Food Policy Research Institute Research Report 8. Washington, D.C.
- Alderman, Harold, and Joachim von Braun. 1985. “Egypt: Implications of Alternative Food Subsidy Policies in the 1980s.” International Food Policy Research Institute, Washington, D.C. Processed.
- Behrman, Jere R. 1988. “The Impact of Economic Adjustment Programs on Health and Nutrition in Developing Countries.” In David E. Bell and Michael R. Riech, eds.,

- Health, Nutrition, and Economic Crises: Approaches to Policy in the Third World*, Dover, Mass.: Auburn House.
- . 1990a. *The Action of Human Resources and Poverty on One Another: What We Have Yet to Learn*. LSMS Working Paper 74. Washington, D.C.: World Bank.
- . 1990b. "The Debt Crisis, Structural Adjustment, and the Rural Poor." University of Pennsylvania, Economics Department, Philadelphia. Processed.
- . 1990c. "Macroeconomic Policies: Issues and Research Strategies." University of Pennsylvania, Economics Department, Philadelphia. Processed.
- . 1990d. "Nutrient Intake Demand Relations: Income, Prices, Schooling." University of Pennsylvania, Economics Department, Philadelphia. Processed.
- Behrman, Jere R., and Anil B. Deolalikar. 1987. "Will Developing Country Nutrition Improve with Income? A Case Study for Rural South India." *Journal of Political Economy* 95 (3, June): 108–38.
- . 1988. "Health and Nutrition." In Hollis B. Chenery and T. N. Srinivasan, eds., *Handbook on Economic Development*. Vol. 1. Amsterdam: North Holland.
- . 1989. "Impact of Macro-Economic Adjustment on the Poor and on Social Sectors in Jamaica." University of Pennsylvania, Economics Department, Philadelphia. Processed.
- Behrman, Jere R., and B. L. Wolfe. 1984. "More Evidence on Nutrition Demand: Income Seems Overrated and Women's Schooling Underemphasized." *Journal of Development Economics* 14 (1 and 2, January-February): 105–28.
- . 1987. "How Does Mother's Schooling Affect Family Health, Nutrition, Medical Care Usage, and Household Sanitation?" *Journal of Econometrics* 36 (1 and 2, September-October): 185–204.
- . 1989. "Does More Schooling Make Women Better Nourished and Healthier? Adult Sibling Random and Fixed Effects Estimates for Nicaragua." *Journal of Human Resources* 6 (3, Fall): 644–63.
- Bouis, Howarth E., and Lawrence J. Haddad. 1990. "Are Estimates of Calorie-Income Elasticities Too High? A Recalibration of the Plausible Range." International Food Policy Research Institute, Washington, D.C. Processed.
- Boyd, Derick. 1988. "The Impact of Adjustment Policies on Vulnerable Groups: The Case of Jamaica, 1973–1985." In G. A. Cornia, R. Jolly, and F. Stewart, eds., *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*. Oxford: Clarendon Press.
- Cornia, G. A., R. Jolly, and F. Stewart, eds. 1987. *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*. Vol. 1. Oxford: Clarendon Press for U.N. Children's Fund.
- . eds. 1988. *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*. Vol. 2. Oxford: Clarendon Press for U.N. Children's Fund.
- Cornia, G. A., and F. Stewart. 1987. "Country Experience with Adjustment." In G. A. Cornia, R. Jolly, and F. Stewart, eds., *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*. Vol. 1. Oxford: Clarendon Press for U.N. Children's Fund.
- Davies, Omar, and P. Anderson. 1987. "The Impact of the Recession and Adjustment Policies on Poor Urban Women in Jamaica." University of the West Indies, Jamaica. Processed.

- de Tray, Dennis. 1985. "The Jamaican Structural Adjustment Program: A Review of the Distributional Consequences." World Bank, Washington, D.C. Processed.
- Gavan, J. D., and I. S. Chandrasekera. 1979. *The Impact of Public Foodgrain Distribution on Food Consumption and Welfare in Sri Lanka*. International Food Policy Research Institute Report 13. Washington, D.C.
- Glewwe, Paul, and Dennis de Tray. 1988. *The Poor during Adjustment: A Case Study of Côte d'Ivoire*. LSMS Working Paper 47. Washington, D.C.: World Bank.
- Huppi, Monika, and Martin Ravallion. 1990. "The Sectoral Structure of Poverty during an Adjustment Period: Evidence for Indonesia in the Mid-1980s." PRE Working Paper 529. World Bank, Agriculture and Rural Development Department, Washington, D.C. Processed.
- Isenman, Paul. 1980. "Basic Needs: The Case of Sri Lanka." *World Development* 8: 237-58.
- Jimenez, Emmanuel. 1987. *Pricing Policy in the Social Sectors: Cost Recovery for Education and Health in Developing Countries*. Baltimore, Md.: Johns Hopkins University Press.
- Jolly, Richard. 1985. "Adjustment with a Human Face." U.N. Children's Fund, New York.
- Jolly, Richard, and G. A. Cornia. 1984. *The Impact of World Recession on Children: A Study Prepared for UNICEF*. Oxford: Pergamon Press.
- Krueger, Anne O., Maurice Schiff, and Alberto Valdés. 1988. "Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies." *World Bank Economic Review* 2 (3, September): 255-72.
- Mateus, Abel, and others. 1986. "Morocco: Compensatory Programs for Reducing Food Subsidies." World Bank, Washington, D.C. Processed.
- Pinstrup-Andersen, Per. 1985. "Food Prices and the Poor in Developing Countries." *European Review of Agricultural Economics* 12 (1/2): 69-81.
- . 1986a. "Assuring Food Security and Adequate Nutrition for the Poor during Periods of Economic Crisis and Macroeconomic Adjustments: Policy Options and Experience with Food Subsidies and Transfer Programs." International Food Policy Research Institute, Washington, D.C. Processed.
- . 1986b. "Macroeconomic Adjustment Policies and Human Nutrition: Available Evidence and Research Needs." International Food Policy Research Institute, Washington, D.C. Processed.
- Pinstrup-Andersen, Per, and Harold Alderman. 1986. "The Effectiveness of Consumer-Oriented Food Subsidies in Reaching Rationing and Incomes Transfer Goals." In Per Pinstrup-Andersen, ed., *Consumer-Oriented Food Subsidies: Benefits, Costs, and Policy Options*. Baltimore, Md.: Johns Hopkins University Press.
- Ravallion, Martin, and Monika Huppi. 1989. "Poverty and Undernutrition in Indonesia during the 1980s." PRE Working Paper 286. World Bank, Agriculture and Rural Development Department, Washington, D.C. Processed.
- Rodgers, Beatrice Lorge. 1986. "Design and Implementation Considerations for Consumer-Oriented Food Subsidies." In Per Pinstrup-Andersen, ed., *Consumer-Oriented Food Subsidies: Benefits, Costs, and Policy Options*. Baltimore, Md.: Johns Hopkins University Press.
- Rosenzweig, M. R., and T. P. Schultz. 1982. "Child Mortality and Fertility in Colombia:

- Individual and Community Effects.” *Health Policy and Education* 2, Amsterdam: Elsevier.
- Scobie, Grant M. 1989. *Macroeconomic Adjustment and the Poor: Toward a Research Strategy*. Ithaca, N.Y.: Cornell University Press.
- Strauss, John, and Duncan Thomas. 1990. “The Shape of the Calorie-Expenditure Curve.” Rand Corporation, Santa Monica, Calif. Processed.
- UNICEF (United Nations Children’s Fund). 1984. “The Impact of World Recession on Children: A UNICEF Special Study.” In *The State of The World’s Children 1984*. Oxford: Oxford University Press.
- Wolfe, Barbara L., and Jere R. Behrman. 1982. “Determinants of Child Mortality, Health, and Nutrition in a Developing Country.” *Journal of Development Economics* 11 (2, October): 163–94.
- . 1987. “Women’s Schooling and Children’s Health: Are the Effects Robust with Adult Sibling Control for the Women’s Childhood Background?” *Journal of Health Economics* 6 (3): 239–54.

Optimal Poverty Reduction, Adjustment, and Growth

François Bourguignon

This article analyzes poverty reduction policies in an applied optimal growth framework. Assuming that poverty reduction is effected through redistribution, it focuses on the static and dynamic tradeoffs between equity and efficiency and on the choice between current income and future income (that is, current productive asset) transfers to the poor. By numerically estimating a stylized economy, it is shown that, given reasonable assumptions about behavioral parameters, the efficiency cost of poverty reduction in an economy on a steady growth path is relatively low. In a period of adjustment following a severe exogenous shock, however, the scope for redistribution may be extremely limited if there is a constraint on foreign borrowing. Plausible examples are given of adjustment cases in which poverty reduction becomes optimal only after partial adjustment has been achieved.

Consider an economy that has undergone a severe and permanent adverse shock, such as a drop in its terms of trade or an increase in the interest rates on its foreign debt. As a result of the shock, mean income falls and poverty increases. Adjustment to the changed environment requires that output rise in the traded sectors in which relative prices are higher. Because resources cannot be rapidly and smoothly transferred between sectors, the rate of investment must rise. If the country does not have access to new foreign capital, higher investment necessitates an increase in the domestic savings rate, which further reduces consumption and increases poverty. Achieving efficient levels of output may therefore conflict with poverty alleviation during an adjustment period.

Concern for efficiency appears to have outweighed poverty consideration in most of the adjustment programs implemented by developing countries in the early 1980s. This neglect of poverty alleviation may have stemmed from a failure to recognize that adjustment can be a long-term process that benefits the poor only after several periods and that, furthermore, may be jeopardized if its

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interim social costs are considered too high. If alleviating poverty through overall growth requires an unacceptably long waiting period, explicit redistributive policies may have to be undertaken. There is now more and more recognition of the importance of the social, or redistributive, dimension of adjustment (for studies undertaken under the auspices of international agencies, see Heller and others 1988; Country Economics Department 1989, 1990; and Cornia and others 1987) and the lack of criteria by which to determine the weight that adjustment programs should attach to that dimension. Suppose policymakers' intertemporal social objectives involve both efficiency (a concern for the growth of per capita consumption) and equity (a concern for increasing the consumption of the poorest members of society). The problem for policy is to determine the amount of present and future resources to devote to alleviating poverty, knowing that the resulting resource allocation may slow the pace of structural adjustment and reduce attainable growth.

The present article explores this issue with the help of a numerical model based on a highly stylized analytical framework. Orders of magnitude for tradeoffs between efficiency and equity during an adjustment period are assessed, and some rough rules on when and how to undertake poverty reduction policies are provided. Many of the general conclusions of the model are derived from the theoretical literature on optimal growth and income distribution developed in the 1970s (see for instance Hamada 1967, Sheshinski 1976, Pestieau and Posson 1978, and Stanley 1978). Basically, these models conclude that income redistribution policies must strike a balance between equality and growth: because the marginal savings rate increases with income, a progressive income tax will lower average savings and the ratio of steady-state capital to labor, which would reduce growth. The standard models are mostly concerned, however, with the implications of income redistribution on steady-state growth. Their analytical results cannot, therefore, capture the growth effects of redistribution policies aimed at poverty alleviation during adjustment. The present model takes account of the poverty and adjustment features by integrating, although in a highly simplified fashion, three major aspects of antipoverty policy that have not previously been incorporated in a single analysis.

The first aspect is the tradeoff between efficiency and equity at a given point in time. This tradeoff arises from two related costs of transfer policies aimed at alleviating current poverty: the distortionary efficiency costs of non-lump-sum transfers and the leakage resulting from necessarily "imperfect targeting" of the poor. Real-world transfers are rarely lump-sum and therefore provide individuals with incentives to adopt inefficient behavior. Leakages result, first, because it is not administratively possible to distinguish perfectly between the poor and nonpoor, so that richer groups benefit from transfers intended for the poor, and, second, because the taxes financing those transfers are in part borne by the poor. Such leakages increase the resources required for poverty alleviation and hence raise its efficiency cost.

The second aspect is essentially an intertemporal tradeoff that has been the focus of the theoretical literature on growth and distribution. Redistributing current income from the rich, or the nonpoor, to the poor is likely to reduce domestic savings, however the redistribution is made. But, in the absence of external capital, adjustment and, more generally, growth require higher domestic savings for increased investment. Redistribution that achieves less poverty and lower savings in the present therefore implies less income, and thus more poverty, in the future. This argument does not take account of the possibility that poverty alleviation policies that improve nutrition, health, or education, for example, may improve labor productivity and hence themselves contribute to growth. This possibility is in part recognized by the third aspect.

The third issue confronting antipoverty policy is a strategy choice: whether poverty should be reduced through current income transfers or through investment in the poor (that is, expenditures that contribute to human capital formation). The latter “growth with redistribution” (as in the title of the 1974 book by Chenery and others) strategy can reduce the intertemporal conflict between equity and growth. But two caveats should be noted. First, this strategy may not alleviate current poverty, and, if financed from additional taxes that affect the poor, it may even temporarily increase poverty. Second, investment elsewhere in the economy may be more productive than assets transferred to the poor.

If we are to assess the overall tradeoff between growth and poverty-reducing redistribution during adjustment, these three aspects of policy must be considered in a common analytical framework. The required intertemporal framework is necessarily complicated, and the most simple, stylized specifications are therefore adopted. Even with these, however, analytical results describing the properties of the optimal redistribution policies are only obtainable if the analysis is restricted to steady-state growth situations—equilibria that are particularly irrelevant when studying adjustment episodes. Because realistic, generalizable results cannot be obtained, the framework is analyzed numerically to illustrate the tradeoffs it suggests in a highly stylized version of the real economy. The framework is part of a preliminary exploration of the possible growth costs of a poverty reduction program during adjustment, when contemporaneous and intertemporal tradeoffs and alternative (consumption- versus investment-type) redistributive policies are taken into account.

The article is organized as follows. Section I presents the analytical features of the model to be used and its functional specifications. The empirical implementation of the model is briefly discussed in section II. Section III is devoted to comparative dynamics experiments with the various policy instruments considered in the analysis and derives a measure of the tradeoffs under analysis. Section IV explores the optimal redistribution policies that follow from alternative assumptions about the intertemporal social objective of policymakers and the characteristics of the adjustment process. The policy implications and possible extensions of the analysis are discussed in section V.

I. THE ANALYTICAL FRAMEWORK

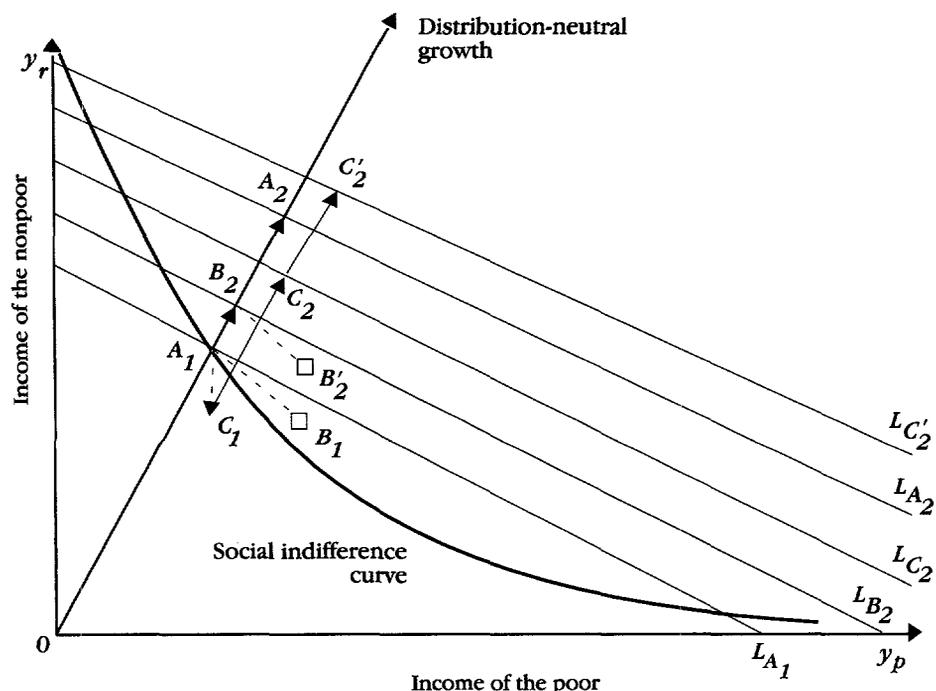
A simple geometric representation (figure 1) of the tradeoffs involved in poverty reduction policies will help in understanding the structure of the model used throughout this article.

The economy has two classes of agents, the poor with income y_p (represented on the horizontal axis) and the nonpoor with income y_r (represented on the vertical axis). The population shares, n_p and n_r , of each class are assumed constant, so that a change in poverty is represented by a change in y_p . Each line L with (constant) slope n_p/n_r thus corresponds to a given aggregate income. The economy is initially at point A_1 on the ray through the origin to the left of the 45 degree line (not illustrated). Because y_p is defined as the income of the poor, it is being implicitly assumed that y_p is less than (and y_r greater than) some minimum acceptable level of income (the poverty line defined in terms of income). With an equal initial distribution of income (so that the economy is on the 45 degree ray), poverty would be represented by an aggregate, and hence mean, level of income at or below some minimum L line. Without any poverty reduction policy, the saving and investment process would lead the economy to point A_2 at some period in the future. A_1A_2 is straight rather than curved because growth (or successful adjustment) is assumed here, for simplicity, to be "distribution neutral." In other words, relative individual income remains unchanged without policy intervention.

Figure 1 illustrates static and intertemporal tradeoffs under the two alternative redistribution strategies discussed above. Redistributive policies that aim to reduce contemporaneous poverty by transferring current income to the poor are considered first. The static tradeoff between poverty reduction and efficiency is represented by the move from A_1 to B_1 . In B_1 there is less poverty because the income of the poor is higher, but the mean income in the population is also lower: that is, B_1 is below the line L_{A_1} . The difference between the slope of the segment A_1B_1 and that of lines L represents the contemporaneous marginal efficiency cost of reducing poverty, that is, both the leakage that results from imperfect targeting and the distortionary effects of transfers. The relative slopes of A_1B_1 and L_{A_1} determine whether a poverty reduction policy should be undertaken; if B_1 lies on a higher social indifference curve than A_1 , as in figure 1, current transfers to the poor are preferred to nonintervention.

The intertemporal tradeoff is represented by comparing the no-intervention growth path A_1A_2 with the path A_1B_2 , where B_2 represents the gross income of both classes in period 2 that results from the redistribution A_1B_1 in period 1. The redistribution of current income is assumed to leave the primary distribution of incomes unchanged: B_2 lies on the ray OA_1A_2 . The dynamic cost of current income transfers is represented here by the position of B_2 below A_2 : at B_2 mean income per capita is smaller and the poor are worse off than at A_2 . Of course, it is still possible to redistribute income at B_2 . This is illustrated by the move from B_2 to B'_2 .

Figure 1. *Static and Intertemporal Tradeoffs between Equity and Growth Resulting from Alternative Poverty-Reducing Redistribution Strategies*



Note: Lines L represent various levels of aggregate income. A_1 is the initial position of the A_2 indicates the income state that would occur without policies to reduce poverty. Points B_t , $t = 1, 2$, represent period 1 and 2 states resulting from transfers of current income to the poor. Points C_t , $t = 1, 2$, represent states resulting from expenditure for human capital formation among the poor.

The economic states (levels and distribution of aggregate income) resulting from a capital transfer strategy are illustrated by the points C_1 and C_2 . The fall in aggregate income represented by the path $A_1 C_1$ corresponds to the distortionary cost of period 1 redistribution. Because it is assumed that the poor receive no current income with this strategy, both poor and nonpoor lose in the first period, in contrast to the distributive gains to the poor with an income transfer strategy. An asset transfer strategy may reduce poverty in period 2 through the income redistribution brought about by the initial asset transfer to the poor: the path $A_1 C_2$ lies below the path $A_1 A_2$, representing higher relative incomes among the poor. But it may be costly in terms of growth— C_2 may lie below L_{A_2} , as in figure 1, if investment in the poor is less productive than investment elsewhere in the economy. If this is not the case, the conflict between (dynamic) redistribution

and growth would disappear: investment in the poor would produce a Pareto-superior outcome in which both classes are better off relative to the nonintervention case. This possibility is illustrated by the point C'_2 .

The model we now present provides a more detailed description of the trade-offs represented in figure 1 by comparing the pairs of points A_1 and B_1 , A_2 and B_2 , and A_2 and C_2 and, for a given social welfare function, determines what combination of A_2 , B_2 , and C_2 is optimal.

The model has five basic components: a production function, an efficiency loss function that measures the output costs of taxation, a distribution submodel describing the allocation of total gross income among classes, a set of parameters describing tax and transfer policies, and a social welfare function.

The Production Function, the Tax Loss Function, and the Adjustment Process

The main state variable in the model is the total per capita capital stock, k . Gross income per capita, x , is a product of per capita production and a scale parameter, α , less proportionate losses from non-lump-sum redistribution, and is given by

$$(1) \quad x = \alpha \cdot f(k) \cdot [1 - L(T)]$$

where $f(k)$ is a standard production function, and α , the scale parameter, will be used to represent the structural adjustment process. T is the mean tax rate, and $L(T)$ is the loss function that indicates the share of total income lost because of the tax-financed redistribution policy. By assumption, taxation cannot be lump-sum. It thus entails economywide deadweight losses and distortionary costs that increase with the share of total income being redistributed. For this loss function to be meaningful, the income concept in equation 1 must be defined as some money-metric of the mean welfare level in the population rather than the mean monetary income actually accruing to the population.

The loss function is reasonably assumed to be convex, that is, the marginal welfare cost of taxation increases with the average tax rate. For simplicity, a quadratic specification for $L(T)$ is adopted:

$$(2) \quad L(T) = T[c + (1 - c)T]$$

where c , $0 < c < 1$ is a parameter that determines the size of the marginal welfare loss of taxation. This specification ensures that the loss is zero without taxation (c is then the marginal loss of output) and tends toward unity as the tax rate goes to 100 percent.

Structural adjustment will be represented by shifts in the scale parameter, α , of the production function. This use of α to describe the adjustment process is adapted from the growth literature's treatment of technical progress. Specifically, it is assumed that α converges toward its efficient long-run level, α^0 , at a rate that is a product of three factors: first, whether, and by how much, investment per unit of capital, i/k , is above some minimum level, e ; second, for given i/k , the exogenous speed of adjustment, v ; and third, the amount by which the

initial adverse shock has depressed α below α^0 , that is, $(\alpha^0 - \alpha)$. More precisely, denoting the change in α per unit of time by $\dot{\alpha} = d\alpha/dt$, we assume that

$$(3) \quad \dot{\alpha} = \nu(\alpha^0 - \alpha) \text{Inf} \{i/k - e, 0\}$$

where ν , α^0 and e are constant parameters, and i is gross investment per capita.

This specification is an ad hoc way of representing the following process. The need for structural adjustment implies that resource allocation in the economy is initially inefficient, possibly because of a recent permanent shock in the economy's foreign environment (in its terms of trade, for example); in other words, α has been shocked below α^0 . In the short run, capital (and labor if the scope for technical substitution is limited at the sectoral level) cannot be freely moved between sectors. Resource reallocation is therefore a dynamic process that occurs through new (gross) investment. The speed at which the economy adjusts to its new, efficient growth path, where $\alpha = \alpha^0$, thus depends either on the rate at which the capital stock is expanded or renewed (the term i/k) or, as assumed in equation 3, on the difference between that rate and some minimum value, the constant e , which represents the level of the investment rate below which natural rigidities constrain capital reallocation. The Inf function in equation 3 captures the implication that no adjustment takes place below e , that is, at any $i/k < e$, $\dot{\alpha} = 0$. The function $\alpha^0 f(\cdot)$ may thus be interpreted as the new aggregate production function when factor reallocation has been achieved. Changes in α represent the progressive adjustment toward this new efficient growth path of the economy.

Equation 3 models the structural adjustment process as a temporary increase in the marginal product of capital after a once-and-for-all drop in total output because of an adverse shock. Equation 3 suggests some nonconvexity of the production set (see Romer 1986 and Lucas 1985); however, here increasing marginal returns are only local or temporary. Output increases along the adjustment path because investment increases both the stock of capital, k , and its marginal product through its allocative efficiency, α . This specification, although ad hoc, captures the aggregate implications of situations in which early investment is unusually productive. It is especially appropriate if output is constrained by a lack of foreign exchange, which is common in adjustment episodes. Consider, for example, an economy that is temporarily off its production frontier because it has a foreign exchange shortage and no access to foreign capital. In these circumstances, any investment in the tradable sector not only raises output in that sector but, by relaxing the foreign exchange constraint, increases output in the nontradable sector. The specification illustrated by equation 3 is an aggregate representation of such a situation, but it also applies to less extreme cases.

Income Distribution and Capital Accumulation

The following formulation of the relation between growth and income distribution draws on Stiglitz (1976), Bourguignon (1981), and Ahluwalia and Chen-

ery (1974). Rather than considering just two classes, as in figure 1, the population is here divided into three classes of homogeneous individuals: the poor, the middle-income, and the rich. Having three classes will allow us to take account of some constraints associated with redistribution policies. The demographic growth rate is assumed to be the same in the three classes, so that their weight, n_i ($i = 1, 2, 3$), in the total population is constant over time. The three classes differ in their initial holdings of physical and human capital, k_i . The relative values of the k_i , and thus the income definition of the three classes, may change along the growth path. However, this is unlikely to happen to any significant extent over the limited time horizon analyzed here. In each class the gross income, x_i , of an individual is given by the sum of the returns to his labor, w , and to his capital, rk_i :

$$(4) \quad x_i = w + r \cdot k_i \quad i = 1, 2, 3.$$

Human capital is included in k_i so that w is the wage rate paid to undifferentiated labor and may reasonably be assumed to be constant across classes.

It is assumed here that wage and profit rates are proportional to the values that would correspond to the competitive equilibrium defined by the long-run production function $\alpha^0 f(\cdot)$. In other words, it is assumed that the adjustment process (as represented by changes in the shift parameter, α) and efficiency losses resulting from the transfer policy (the term $1 - L$ in equation 1) affect the remunerations of labor and capital in the same way. Thus neither the adjustment process nor efficiency losses affect the distribution of income. This assumption, although highly debatable a priori, allows the model to focus on redistribution for poverty reduction, abstracting from endogenous changes in the distribution of gross income.

The distribution of gross income is completely specified by equation 4, and the wage and profit rates are given by:

$$(5) \quad w = \alpha(1 - L) [f(k) - k \cdot f'(k)]$$

$$(6) \quad r = \alpha(1 - L) \cdot f'(k)$$

where $\alpha f'(k)$ is the (gross) marginal product of capital. The model is closed by the aggregation relationship for capital:

$$k = \sum_i n_i \cdot k_i$$

which, because the wage rate is assumed constant across classes, implies

$$x = \sum_i n_i x_i.$$

Net individual incomes deduct tax from, and add transfer payments to, gross incomes. Denoting by τ and σ indexes representing the extent of taxation and redistribution, respectively, let $\tau \cdot t(x_i/x)$ be the total taxes paid and $\sigma \cdot z(x_i/x)$ the

total benefits received by an individual whose income is x_i . The term $t(\cdot)$ represents the progressivity of the tax system, and $z(\cdot)$ the progressivity of the benefit system. The terms $t(\cdot)$ and $z(\cdot)$ are defined as functions, increasing and decreasing respectively, of relative income x_i/x , rather than of absolute income, so that the progressivity of the tax and benefit systems is not affected by growth. The following simple logistic specifications have been selected for the tax and benefit functions:

$$(7a) \quad \tau \cdot t(x_i/x) = \tau(x_i/x)^b / [1 + (x_i/x)^b]$$

$$(7b) \quad \sigma \cdot z(x_i/x) = \sigma / [1 + (x_i/x)^d]$$

where b and d are fixed coefficients representing the “targeting” capacity of existing tax and benefit instruments: zero values for b and d imply that $t(\cdot)$ and $z(\cdot)$ are constants and that it is therefore impossible to target taxes and transfers. The indexes τ and σ are related to the mean tax rate, T , and the mean benefit rate, Z , by the following equations, which average the taxes (8a) and benefits (8b) of the three classes:

$$(8a) \quad T = \left[\tau \sum_i n_i x_i t(x_i/x) \right] / x$$

$$(8b) \quad Z = \left[\sigma \sum_i n_i x_i z(x_i/x) \right] / x.$$

The terms T and Z , or τ and σ , are policy instruments, whereas the progressivity indexes b and d are assumed given. In other words, policymakers are free to choose how much to take from households and how much to redistribute to them, but they cannot choose how progressive their redistribution will be. A specification that makes the progressivity described by $t(\cdot)$ and $z(\cdot)$ itself a function of the mean tax and benefit rates T and Z is probably preferable but would complicate the analysis (see Kakwani 1976, Bourguignon and Morrisson 1979, and Morrisson 1980). In net terms, however, the overall progressivity of the tax-benefit system is variable. The net income in class i , y_i , is given by subtracting taxes from, and adding transfers to, gross income:

$$(9) \quad y_i = x_i - \tau \cdot t(x_i/x) + \sigma \cdot z(x_i/x).$$

Financing a given amount of public expenditures may thus be achieved with various combinations of τ and σ (or T and Z) that do affect net income distribution.

The progressivity of taxes and benefits have been treated separately, rather than defining a unique net transfer function, because it permits us to account for possible leakages from the redistribution system (arising from imperfect targeting and the distortionary costs of non-lump-sum redistribution) in a simple way. Suppose the government wants to transfer an additional dollar to the poor class ($i = 1$). Its budget constraint—see equation 11 below—requires that an

additional dollar be obtained through taxes. The function $t(\cdot)$, however, may be nonzero for x_1/x (that is, the poor may pay indirect taxes) so that the poor will actually receive less than a dollar in net terms. More than a dollar in taxes must be raised to permit them to receive one dollar net. This increases the efficiency loss L in equation 1, so that the amount that must be transferred to reach the initial redistribution objective will be still larger. Because the loss function $L(\cdot)$ is convex, there is a natural limit to the amount that may be redistributed.

The dynamic behavior of individual incomes is given by the accumulation of physical and human capital. Let $s(y_i/y, y_i)$ be the savings function of an individual with (net) income y_i . Capital accumulation in class i is specified as total saved income, $s(\cdot)y_i$, and accruals on asset transfers, $h_i H_i$, for that class—given that public investment increases the return on private investment by q —less net capital depreciation, nk_i :

$$(10) \quad \dot{k}_i = (1 + q) \cdot s(y_i/y, y_i/y_{0i}) \cdot y_i - n \cdot k_i + (1 + q) \cdot h_i \cdot H_i \quad i = 1, 2, 3.$$

In equation 10, y is mean net income, n is the demographic growth rate (plus the depreciation rate of capital), H_i is the assets transferred by the government to class i , h_i is the productivity of those assets, and q is the (constant) ratio of public to private investment. A detailed examination of the terms in this expression is helpful.

The function $s(\cdot)$ refers to the aggregate savings behavior of a class rather than to the behavior of the individuals belonging to that class. As such, it does not rely on the standard intertemporal or life-cycle microeconomic framework. Following most of the literature on the tradeoff between equity and growth and given that empirical (cross-sectional) studies support the assumption, the long-run marginal savings propensity is assumed to be an increasing function of the relative income of a class, y_i/y . The second argument in $s(\cdot)$ represents a short-run departure from the long-run value of the savings rate resulting from a fall in current income. It is intended to capture the idea that, with some inertia in behavior, savings rates may temporarily fall below their long-run levels because individual incomes are depressed from their initial value, y_i^0 , at the beginning of the adjustment period. With time and growth, savings rates are assumed to return progressively to the long-run values determined only by relative incomes, that is, when $y_i \geq y_i^0$, $s(\cdot) = s(y_i/y)$. The following specification of the savings function, which is used in our numerical experiments, reflects this idea:

$$(11) \quad s(y_i/y, y_i) = \{s_0/[1 + u(y_i/y)^{-m}]\} M(y_i/y_i^0, u).$$

In this specification u stands for time and $M(\cdot)$ is a function tending toward unity with both its arguments. The logistic term in equation 11 that gives the long-run value of the savings function, provides a means of representing approximately constant long-run savings propensities at both ends of the income distribution through the coefficients m and u , and ensures continuity in y_i/y . This facilitated the numerical calibration of the model.

The potential results of alleviating poverty through asset, rather than income,

transfers are represented by the H_i variables. For a given budget a choice must be made between increasing the income transfer, Z , part of which is going to the poor, and increasing the asset transfer, H_i . As it stands in equation 10, there is no explicit leakage effect in the latter transfer; that is, targeting is perfect. However, the parameters b_i allow the productivity of the transferred assets to be taken as lower (or higher) than that of other capital goods. The term b_i thus may reflect possible inefficiencies or costs in the asset transfer process.

The parameter q in equation 10 stands for the public component of investment. It is assumed here that public investment is strictly complementary to assets accumulated by, or transferred to, the private sector: a unit increase in private investment elicits q units of public investment. Its productivity is assumed to be the same as that of private capital, so that public investment basically increases the return on private capital by a factor $(1 + q)$. This seemed a simple way of accounting for the activity of the public sector and corresponding financing requirements, even though it excludes the possibility that the economy could expand through public investment.

The Government Budget Constraint and the Social Welfare Function

A similar desire for simplicity also explains the complementarity assumption made for current public expenditures. These are specified as a fixed proportion, g , of output. This does not really restrict the generality of the model. The government may still alleviate poverty through additional specific public expenditures—health programs, for instance—which are implicitly accounted for by the transfer variables Z and H_i . This means that the complementarity between current public expenditures and output refers only to those expenditures that are not directly concerned with redistribution.

Collecting the public expenditure terms (on the left-hand side) and the revenue terms (on the right), the current budget constraint of the public sector is (in per capita terms):

$$(12) \quad Z + \sum_i n_i \cdot H_i + g \cdot x + (q/1 + q) \cdot \sum_i (k_i + nk_i) = T + F$$

where F stands for exogenous receipts from the rest of the world. Their inclusion in equation 12 implies that the economy's access to foreign capital is assumed to be constrained to the exogenously available levels at any point in time. Foreign capital inflows, F , would otherwise vary with public financing needs and would be constrained only by some intertemporal indebtedness condition involving foreign interest rates.

The preceding budget constraint includes all the policy instruments considered in the present model: the transfer rate, Z ; the asset transfers, H_i ; and the tax rate, T . When dealing with optimal policies, the selected values of these instruments will be those which maximize the social welfare function obtained by adding the present value (discounting at rate θ) of welfare, in each period, U ,

to the discounted utility of the terminal capital stock, $V(k^A)$. This social welfare function, W , is given by

$$(13) \quad W = \sum_{u=1}^A U(1 + \theta)^{-u} + (1 + \theta)^{-A} \cdot V(k^A)$$

where u indexes time, A is the time horizon, and $V(\)$ is the utility of the terminal capital stock. U is the instantaneous welfare function and is defined on individual consumption expenditures, adopting the usual isoelastic specification:

$$(14) \quad U = \frac{1}{1 - \epsilon} \sum n_i \left\{ y_i \cdot [1 - s(y_i/y, y_i)] \right\}^{1-\epsilon}.$$

The coefficient ϵ is a measure of society's aversion to inequality. If that coefficient is equal to zero, policymakers do not care about the distribution of income and simply seek to maximize total discounted consumption per capita. If, on the contrary, ϵ is very large, only the level of consumption of the poorest in society matters for social welfare; this is the Rawlsian criterion (see Atkinson 1970).

The specifications of equations 13 and 14 are conventional in the optimal growth and the optimal tax literature. Optimization should ideally be performed on an infinite time horizon. Obviously, this is impossible numerically. The terminal utility function, $V(k^A)$, which prevents the optimal policy from depleting the entire capital stock at horizon A , is therefore required. In the numerical experiments, this function was obtained as the discounted social welfare, derived from equation 14, over an infinite steady growth path, starting from the income levels obtained at horizon A , where A is taken to be fifteen years from the initial period. The optimal policies at the beginning of the experimental period were checked and found to be largely insensitive to this terminal utility function or the time horizon.

The preceding social welfare function is defined in terms of inequality rather than in terms of poverty. It would have been possible to single out the poverty issue by explicitly introducing some poverty measure, together with mean consumption per capita, into the social objective function. Disregarding the fate of the middle class by aggregating it with the richest class, however, seems to ignore a possibly important constraint in poverty reduction policies in any country: namely, that the middle class may be the major political obstacle if a drastic redistribution policy is required to alleviate poverty.

The description of the model is now complete. In concluding the discussion of the analytical framework, it is important to stress the fundamental role played by the efficiency loss function, $L(T)$. Without such a function, or if it were not convex, the optimal policy would simply be to equalize all incomes, and the model would be equivalent to the well-known one-sector model of the optimal growth literature. If one wants to deal meaningfully with distribution issues, one must first understand why nonegoistic policymakers would never try to impose such perfect equality of incomes. There are two fundamental reasons; the first has to do with political economy, the second with efficiency costs. It is in the

spirit of the present exercise to favor the efficiency cost argument, and use of the function $L(T)$ allows us to model such costs in a tractable way.

II. NUMERICAL ESTIMATION OF THE MODEL

Although the preceding model describes the main elements of poverty reduction (through redistribution) policies in the simplest fashion, it is already far too complex for an analytical solution to be feasible. Its properties are therefore analyzed numerically. In this section, we report the solutions obtained from running the model under the assumption that no redistribution measures are in place. The resulting base-runs are used in section III to assess how redistribution policies affect output growth and other model variables. The values assigned to variables and parameters in the model are mainly based on Venezuelan data. Of course, given the greatly simplified nature of the model, the result is a highly stylized representation of Venezuela. Nevertheless, the outcome of this exercise accords reasonably well with the general ideas one has about the structure of an inegalitarian, primary export-oriented Latin American country in a process of severe adjustment. In what follows we discuss only the empirical assumptions or specifications that are likely to be critical for the comparative dynamics properties of the model (for details of the empirical implementation, see Bourguignon 1989).

Table 1 shows the evolution of the stylized economy under our calibration assumptions for the cases of a steady-growth path and an adjustment period following a major shock, assuming redistribution policies are not undertaken. Poor households have been defined as comprising the bottom 40 percent of the income distribution in Venezuela and are assumed to derive almost all their income from raw labor, that is, labor with the lowest skill level. Rich households correspond to the top 10 percent of the distribution and initially own 60 percent of both physical and human capital. The remaining population is "middle class."

As assumed in the theoretical model of section I, gross household income includes all the returns to capital, that is, all profits are distributed. This assumption results in a level of inequality that is higher than is generally observed. The production function is assumed to be Cobb-Douglas in order that the functional distribution of income remain stable over time. Likewise, the savings function, or class-specific savings rates, have been calibrated to yield an approximately constant distribution of income across classes in the steady-growth scenario. In that scenario gross domestic product (GDP) per capita grows at an annual rate of 1.2 percent—for a rate of population growth equal to 3 percent. The adjustment scenario simulation is based on a shock that has progressively reduced GDP and foreign exogenous receipts (F) per capita by 28 percent—the actual drop observed in Venezuela between 1979 and 1985. It also assumes that five years would be sufficient to recover the initial level of GDP per capita if the investment or savings rate were at the level of the steady growth scenario, that is, 26 percent. As shown for the adjustment scenario, however, the calibrated

Table 1. *The Steady-Growth and Adjustment Scenarios without Redistribution Policies*

Model variable by income class ^a	Steady-growth scenario			Adjustment scenario		
	Year 1	Year 5	Year 10	Year 1	Year 5	Year 10
Index of per capita gross income, x_i^b						
Poor	34.4	36.0	38.3	24.8	29.0	33.4
Middle-income	80.2	83.9	86.2	57.9	65.7	74.1
Rich	447.0	472.5	503.0	322.9	394.4	464.8
Mean per capita GDP ^c	98.6 (100.0)	103.1 (104.6)	108.7 (110.2)	71.2 (72.0)	83.9 (85.3)	96.9 (98.8)
Index of per capita net income, y_i^b						
Poor	33.3	34.9	37.1	24.2	28.0	32.1
Middle-income	75.8	78.6	81.9	55.3	62.0	69.6
Rich	379.6	402.3	430.0	281.5	328.9	380.8
Average	98.2	93.5	98.8	65.5	75.0	85.7
Tax rate (percent) ^d						
Poor	3.2	3.2	3.1	2.7	3.5	3.7
Middle-income	5.4	5.2	5.0	4.6	5.7	6.0
Rich	15.1	14.9	14.5	12.8	16.6	18.1
Average	9.5	9.4	9.1	8.1	10.5	11.5
Savings rate (percent) ^e						
Poor	1.7	2.1	2.7	0.4	0.8	1.5
Middle-income	17.3	17.4	17.6	10.1	14.8	15.9
Rich	32.7	32.8	32.9	28.4	32.8	32.8
Average	25.9	26.2	26.6	20.2	24.5	25.0

Note: Values are the numerical solutions to the article's model, assuming that no redistribution policies are in force. The steady-growth scenario assumes steady growth of 1.2 percent per year and per capita. The adjustment scenario assumes that the economy has suffered a shock that has reduced GDP and foreign inflows by 28 percent.

a. Classes are distinguished by their initial holdings of capital, which determine their gross income. Individuals within a class are homogeneous.

b. All income figures are normalized by mean gross income (before correcting for efficiency costs) in year 1 of the steady-growth scenario.

c. Figures in parentheses are mean gross income, before taking account of the efficiency loss of taxation.

d. The tax rate for class i , $i = 1, 2, 3$, is $\tau(x_i/x)$, where τ is the policy instrument determining the extent of taxation and x is the average per capita gross income for the population. The average tax rate for the population is

$$T = \tau \left[\sum_i n_i x_i (x_i/x) \right] / x.$$

e. The savings rate for class i , $i = 1, 2, 3$, is $(1 + q) s(y_i/y, y_i)$, where y is average per capita net income for the population and q is the ratio of public to private investment. Thus reported rates include private and complementary public savings. The average population savings rate is

$$(1 + q) \left[\sum_i n_i y_i s(y_i/y, y_i) \right] / x.$$

Source: Calculations are based on variables and parameters derived from Venezuelan data in Bourguignon (1989) and estimates from other countries.

recovery is in fact much slower because of an exogenous temporary drop in savings rates associated with the initial crisis.

As noted, the base runs reported in table 1 assume no redistribution is undertaken. Tax receipts, which are slightly more than 9 percent of mean GDP in the steady-growth scenario, finance part of the public investment and current expenditures, which represent 33 percent of private capital accumulation and 15 percent of GDP, respectively. The balance of public expenditure is financed by exogenous foreign receipts— F in equation 12—which, for Venezuela, are assumed to correspond to oil export revenues and to grow at the annual rate of 1.3 percent per capita.

The progressivity of the tax system is summarized by the elasticity parameter b in equation 7. There is little evidence on the value of this parameter in developing countries, as discussed by Morrisson (1980). The value selected for the simulations reported in table 1 leads to a rather progressive tax system in which the average tax rate faced by the rich is almost five times that faced by the poor and three times that of the middle class. (Diaz (1987) reports ratios of 3 and 2, respectively, for Mexico.) Because accurate estimates are not available, however, this is treated as a benchmark value for our later analysis. The case of a proportional tax system is considered in the next section.

Empirical estimates of the cost of taxation are very imprecise. Estimates of the marginal welfare cost of labor income taxation in the United States, derived by Ballard, Shoven, and Whalley (1985), Stuart (1984), and Shoven and Whalley (1984) from applied general equilibrium models, range from 10 to 50 percent of tax revenues. However, using a partial-equilibrium Harberger-type approach, Browning (1987) found that costs ranged from 10 to more than 300 percent of tax revenues. Using developing country data in a general equilibrium framework, Clarete and Whalley (1987) estimate that the marginal cost of a tariff on import substitutes increases from 28 to 600 percent as the tariff rate goes from 5 to 30 percent, whereas the marginal cost of a commodity tax on the same goods varies from -7 to 11 percent. Clarete and Whalley (1987) and Dahl and Mitra (1989) provide similar estimates.

The loss function specified in equation 2 depends on a unique parameter, c . It was arbitrarily chosen to yield a 25 percent marginal loss in the steady-growth simulation if the average tax rate is 10 percent. This average tax rate excludes Venezuela's oil revenue taxes and royalties, which are treated exogenously. The associated average efficiency loss is 16 percent of tax revenues. This seems a reasonable order of magnitude and stands at the lower end of the range of estimates currently found in the literature. The optimal redistribution policy depends on both the marginal cost of taxation and the pace at which it increases with taxation, that is, the convexity of $L(\cdot)$. With the preceding coefficient, the marginal cost increases from 25 to 43 percent when the average tax rate rises from 10 to 20 percent, whereas the average cost goes from 16 to 25 percent of tax revenues.

III. THE TRADEOFF BETWEEN POVERTY REDUCTION AND GROWTH

This section evaluates the tradeoffs between poverty reduction and efficiency. Because our model postulates that policymakers may choose either income or asset redistribution to reduce poverty, the model is run with alternative values assigned to the two redistribution instruments, Z (income transfers) and H_i (asset transfers), changing the tax rate, T , in each alternative so as to satisfy the government budget constraint. The progressivity of the tax system is that assumed in the base-runs reported in table 1. Transfer targeting to the poor is assumed close to perfect, with only limited leakage to the middle class.

Table 2 shows the effects of net transfers, equivalent to 10 percent of their net base-run income, to the poor in both the steady-growth and adjustment scenarios. The alternatives assume that no transfers (first horizontal block), half (second block), and 100 percent (third block) of all transfers are made in the form of productive assets. The static tradeoff between poverty reduction and efficiency is represented by the results reported for year 1, when all transfers are made in current income. The dynamic tradeoff is shown by the results reported for subsequent years in the same horizontal block. The relative effects of income and asset transfers may then be assessed by comparing the three blocks in the table.

In the steady-growth scenario, both the static and dynamic efficiency costs of increasing the income of the poor appear limited. The instantaneous loss in output (mean gross per capita income) is 0.6 percent and in mean net per capita income is 0.4 percent. Mean net income falls by less than mean gross income because of the way in which the assumptions affect the government budget constraint. The taxes financing redistribution reduce the private savings, and hence investment, rate. The assumption that public investment is complementary to private implies that lower private investment frees government budget resources, which permits higher transfers for a given average tax rate. The overall leakage in the redistribution system is substantial, however. A 10 percent increase in the income of the poor represents 1.2 percent of GDP. But this net transfer requires an increase in the average tax rate equal to 2.3 percent of GDP.

The efficiency cost of poverty reduction increases with time because redistribution has a negative effect on savings. After ten years, however, the loss in output is only 1.7 percent, which is equivalent to approximately a year and a half of growth in the base-run. Of course this loss, as well as those reflecting the static tradeoff, depends heavily on our assumptions about the progressivity of the transfer system and the loss function $L(\cdot)$. Sensitivity experiments reported in Bourguignon (1989) show that both costs are, not surprisingly, approximately proportional to the marginal cost of taxation; that they would approximately double if transfers were strictly proportional to the transfer index (as in the total absence of targeting when $d = 0$ in equation 7); and that they would increase by 50 percent if the tax rate were constant across classes.

The assumption that redistribution is effected by asset transfers—the last two

blocks in table 2—obviously modifies the time profile of poverty reduction. The poor gain less in the short run. Their income even declines slightly when the entire transfer is in the form of assets because of the assumed complementarity between private and public investment: the complementarity increase in public investment tightens the government budget constraint, thus increasing the taxation borne by the poor. But the poor gain in the long run because of an acceleration in growth. Whether asset transfers are preferable to income transfers of the same amount depends on the time discount rate; when the discount rate is equal to the marginal product of capital, the two types of transfer are equivalent.

Table 2. *The Static and Dynamic Effects of Poverty-Reducing Redistribution Policies on the Model Variables: Per Capita Income, the Taxation Rate, and the Savings Rate*

Proportion of transfer made in productive assets ^a (percent)	Model variable	Percentage deviations from base runs in:				
		Steady-growth scenario			Adjustment scenario	
		Year 1 ^b	Year 5 ^c	Year 10 ^c	Year 1 ^b	Year 5 ^c
0	Net income					
	Poor	10.0	10.0	10.0	10.0	10.0
	Middle-income	0.3	0.3	0.4	1.8	-13.0
	Rich	-4.9	-5.9	-7.0	-4.0	-40.2
	Average	-0.4	-1.0	-1.4	0.2	-21.3
	Average output	-0.6	-1.2	-1.7	-0.4	-29.7
	Average tax rate	2.3	1.9	1.7	1.9	5.7
	Average savings rate	-1.9	-1.9	-1.9	-3.7	-16.1
50	Net income					
	Poor	3.9	10.9	16.4	4.1	-2.9
	Middle-income	-1.1	-0.3	0.6	0.0	-20.3
	Rich	-5.5	-7.4	-9.4	-4.2	-43.5
	Average	-2.1	-1.7	-1.4	-1.2	-27.9
	Average output	-0.7	-0.3	-0.2	-0.4	-27.8
	Average tax rate	2.5	2.2	2.0	2.0	7.2
	Average savings rate	2.3	1.1	0.4	-3.2	-10.8
100	Net income					
	Poor	-1.8	11.7	23.5	-1.7	-16.1
	Middle-income	-2.5	-0.8	0.9	-1.8	-28.5
	Rich	-6.1	-8.8	-12.0	-4.4	-46.5
	Average	-3.9	-2.4	-1.4	-3.0	-35.5
	Average output	-0.8	0.6	1.3	-0.6	-27.7
	Average tax rate	2.8	2.6	2.4	2.0	8.5
	Average savings rate	6.9	4.2	2.3	-2.8	-5.6

Note: Results are obtained by simulating the article's model under the alternative assumptions noted and calculating the changes from the base-run solutions. The assumed objective of the redistribution policies is to transfer the equivalent of 10 percent of their net base-run incomes to the poor.

a. Redistribution takes place through the transfer of productive assets or current income or both to the poor.

b. Results for year 1 indicate the static tradeoff between poverty-reducing redistribution and efficiency.

c. Results for years 5 and 10 indicate the dynamic tradeoffs. Year 10 is not reported for the adjustment scenario because in that scenario redistribution becomes infeasible before year 10.

Source: Calculations are based on data from Venezuela in Bourguignon (1989) and, where this is not available, other countries.

Results in the adjustment scenario are dramatically different. Redistribution decreases the mean savings rate, however the transfers are made, and the declines associated with income transfers are substantially greater than in the steady-growth case. This is because the shock-induced recession temporarily increases the income elasticity of savings, as indicated by the function $M(\cdot)$ in equation 11. Given the huge drop in output resulting from the initial shock (see the adjustment scenario in table 1), the economy is unable to maintain its level of per capita capital. In contrast to the reference simulation in the right-hand side of table 1, structural adjustment does not take place, and the economy enters into a state of decay. A 10 percent increase in the income of the poor becomes more and more costly over time—the tax rate is 5 to 8 percentage points (depending on the proportion of transfers made in assets) higher in year 5 than in the reference simulation—and accelerates the recession by a cumulative process. In fact redistribution is no longer feasible even before year 10—this being the reason that year is not reported on the right-hand side of table 2. Transfers to the poor in the form of assets rather than income slows the recession only marginally.

IV. EXPLORING THE SET OF OPTIMAL REDISTRIBUTION POLICIES

The simulations reported in table 2 have shown the effects of a poverty reduction policy implemented immediately after an economic shock has made necessary an adjustment process. We now address the question of whether such a rapid response to the increase in poverty is optimal, given the alternative parameter values of the social objective function.

Optimal redistribution policies are shown in table 3 for the steady-growth and, with more detail, the adjustment scenarios. In the first instance, it proves optimal to redistribute quite a significant share of GDP at the beginning of the period, even though the social welfare function's inequality aversion parameter ϵ (see equation 14) is moderate.

Given the distribution of income, an ϵ value of 1.2 means that policymakers would be willing to sacrifice 25 percent of total output to achieve perfect equality. The total net transfer to the poor is initially 60 percent of their income, approximately 7 percent of GDP, and this requires an increase of approximately 10 percent in the mean tax rate. More than half of that transfer is initially made in the form of assets, but this proportion rises very quickly over time. By year 10 the entire transfer is in the form of assets. At the same time the growing equality of gross income that results from asset accumulation in the poor makes transfers less and less desirable, so that there is a steady decline in the rate of transfer. Furthermore, redistribution increases the poor's propensity to save, which permits faster overall capital accumulation, which, in turn, fosters growth. As a result the efficiency loss in output resulting from the initial redistribution is fully compensated around year 10.

Of course, the optimal redistribution policy depends directly on the parame-

ters of the social welfare function. With low inequality aversion, ϵ , or a low time discount rate, θ , no redistribution takes place. For higher values, some redistribution is undertaken but by the least costly method in terms of growth, that is, through asset transfers. Redistribution through both current income and productive assets transfers is only effected above some critical values of ϵ and θ , and it would take extreme values of both parameters for redistribution to be made in current income alone. More generally, it may be shown that transfers of productive assets are preferred to transfers of current income along a steady-growth path if $r > \theta + \epsilon g$, where r is the rate of return on assets and g the rate of growth of the economy.

As before, results are dramatically different in the adjustment scenario. The second and third blocks of table 3 show the optimal redistribution policy for two values of the inequality aversion parameter, ϵ , when no foreign borrowing is allowed—foreign inflows, F , grow at the constant rate of the reference adjustment scenario in table 1. Even when equality is most highly valued ($\epsilon = 2.2$), it does not prove optimal to alleviate poverty during the first three years of the adjustment period. Some redistribution does take place in years 2 and 3, but it is in favor of the rich or middle class and corresponds to a forced savings policy by the government. Despite efficiency losses the government fosters adjustment and growth by increasing the taxes paid by the whole population and transferring the proceeds to the rich of the middle class—who will save more of the returns than the poor—in the form of productive assets. In this process not only do the poor receive nothing, but their net income falls because of the additional taxes they pay and the corresponding efficiency losses. The poverty reduction policy becomes optimal only when the economy starts to recover in year 4. As discussed above, transfers are all in the form of productive assets at the lowest value of ϵ , and predominantly in current income at the highest value, but take place only when the economic recovery is sufficiently advanced.

Optimality is not achieved in redistributing to the poor, either in current income or in productive assets, during the first three years of adjustment because of the very large opportunity cost of investment during those years. Under these conditions any weakening of the foreign financing constraint would be expected to drastically modify the optimal redistribution policy. The last block of table 3 shows the optimal policy for the lowest value of the inequality aversion parameter, when the economy receives a foreign loan of 7 percent of GDP in year 1. This is amortized during the ten years considered at a 10 percent rate of interest. In contrast to the preceding experiment the exogenous variable F is increased in year 1 and reduced in the nine subsequent years. As expected, redistribution in favor of the poor becomes optimal right at the beginning of the adjustment period, although the loan is not sufficiently large to prevent the forced savings phenomena observed above.

The preceding results must be treated with some care, however. Without an upper-bound on the rate of investment, the optimal policy results in an almost immediate and complete recovery of GDP to its pre-shock level, a rather unlikely

Table 3. *Transfer Choice and Output Change under Optimal Redistribution Policies in the Steady-Growth and Adjustment Scenarios*

<i>Transfers^a and output by scenario</i>	<i>Year</i>									
	1	2	3	4	5	6	7	8	9	10
<i>Steady-growth scenario</i>										
Inequality aversion, $\epsilon = 1.2$										
Total transfer to the poor	59.0	48.0	39.1	32.0	25.8	21.1	17.2	14.3	12.2	10.5
of which: current income	23.1	15.2	9.2	4.6	1.2	—	—	—	—	—
Transfer to the middle class	4.7	3.5	2.4	1.4	0.4	—	—	—	—	—
Transfer to the rich	—	—	—	—	—	—	—	—	—	—
Output ^b	95.0 (-3.7)	96.6 (-3.1)	98.3 (-2.5)	100.0 (-2.0)	101.7 (-1.4)	103.3 (-0.9)	104.8 (-0.6)	106.2 (-0.3)	107.5 (-0.1)	108.7 (0.0)
<i>Adjustment scenario without foreign borrowing</i>										
Inequality aversion, $\epsilon = 1.2$										
Total transfer to the poor	—	—	—	39.1	48.7	42.7	32.2	25.5	20.8	17.7
of which: current income	—	—	—	—	—	—	—	—	—	—
Transfer to the middle class	—	—	2.2 ^c	—	—	—	—	—	—	—
Transfer to the rich	—	3.0 ^c	—	—	—	—	—	—	—	—
Output ^b	71.2 (0.0)	71.4 (0.0)	73.6 (-0.7)	78.1 (-0.9)	83.4 (-0.6)	88.6 (0.2)	92.3 (0.5)	94.6 (0.5)	96.1 (0.4)	97.3 (0.4)

Inequality aversion, $\epsilon = 2.2$										
Total transfer to the poor	—	—	—	34.9	43.5	46.3	46.2	44.9	46.0	45.0
of which: current income	—	—	—	8.9	18.6	26.8	34.1	40.4	39.6	37.5
Transfer to the middle class	—	—	6.0 ^c	2.4	5.2	7.8	10.4	12.8	12.9	12.5
Transfer to the rich	—	—	—	—	—	—	—	—	—	—
Output ^b	71.2	71.4	73.6	78.1	82.2	84.9	86.6	87.4	87.7	88.2
	(0.0)	(0.0)	(-0.7)	(-0.9)	(-2.0)	(-4.0)	(-5.7)	(-7.1)	(-8.4)	(-9.0)
<i>Adjustment scenario with foreign borrowing in Year 1</i>										
Inequality aversion, $\epsilon = 1.2$										
Total transfer to the poor	67.5	32.0	29.6	23.9	19.5	16.2	13.5	11.3	9.3	12.1
of which: current income	—	—	—	—	—	—	—	—	—	—
Transfer to the middle class	—	—	—	—	—	—	—	—	—	—
Transfer to the rich	10.9 ^c	—	—	—	—	—	—	—	—	—
Output ^b	71.5	93.6	95.7	97.3	98.4	99.2	99.8	100.4	100.9	101.4
	(0.4)	(31.1)	(29.1)	(23.5)	(17.3)	(12.2)	(8.7)	(6.7)	(5.4)	(4.6)

—Not available.

Note: Optimal redistribution policies maximize a social welfare function with inequality aversion parameter, ϵ .

a. Transfers, in net terms, are expressed as a percentage of gross income.

b. Figures in parentheses are percentage deviations from the no-redistribution case (table 1).

c. Transfer, or part of it, is in productive assets.

scenario. The optimal policy when there is a limit on the rate of investment is not clear. The country could spend the foreign loan over a longer period, which would permit a reduction in taxes. It could also use a part of the loan to finance current income transfers, thus reducing poverty.

V. CONCLUSION

The applied framework developed here has proven a useful tool for evaluating the efficiency cost of poverty-reducing redistribution policies. Under what seem to be reasonable assumptions for a few key parameters—essentially the progressivity of the transfer system and its marginal efficiency costs—it has been shown that, in an economy on a steady-growth path, poverty can be substantially reduced at a rather low efficiency cost.

The optimal policy is quite different when the economy has suffered a strong adverse shock and is entering an adjustment period during which the marginal productivity of capital is temporarily much higher. Under the same set of assumptions, immediate redistribution (before the adjustment process has really started) would be optimal only in a society with an almost infinite aversion to inequality and, presumably, in which the initial level of poverty would not be as high as the one postulated in our numerical experiment. For less egalitarian policymakers, redistribution becomes desirable only after some adjustment has been achieved, possibly through the forced savings of the rich and the middle class. Depending on the initial conditions (the size of the shock) and on the speed of adjustment, the possibilities for early redistribution may be quite limited.

The scope for poverty-reducing redistribution depends on the size of feasible net transfers. How large a net transfer is feasible depends crucially, in our framework, on three factors: the transfer progressivity parameters, the efficiency loss parameters, and the true marginal productivity of savings and investment. Estimates of these parameters are required for a sensible decision about redistribution. Some countries have information on the progressivity of the transfer system, but very little is known about the actual efficiency costs of taxes and benefits. Because taxation reforms are being discussed or implemented in many developing countries, high research priority should be given to analyzing these costs. Similarly, more investigation of the marginal productivity of capital during periods of economic adjustment is needed. There is a prolific literature on the short-run management of the standard macroeconomic instruments, but little has been written on the medium-term capital requirements of effective structural adjustment.

Finally, the role played by our assumed foreign financing constraint must be stressed. It is only optimal to limit redistribution during major structural adjustment because our framework does not allow the economy to arbitrage intertemporally. Given the higher productivity of capital during the adjustment period, it would be beneficial to borrow abroad at a rate of interest proportionately higher than the long-run rate of return to capital. It has been shown here that part of

the loan could optimally be used, directly or indirectly, for a fast and significant reduction in poverty, without impairing the adjustment potential of the economy.

REFERENCES

- The word "processed" describes informally reproduced works that may not be commonly available through library systems.
- Ahluwalia, Montek, and Hollis Chenery. 1974. "A Model of Distribution and Growth." In Hollis Chenery and others, *Redistribution with Growth*. New York: Oxford University Press.
- Atkinson, Anthony B. 1970. "On the Measurement of Inequality." *Journal of Economic Theory* 2 (3): 244–63.
- Ballard, Charles, John Shoven, and John Whalley. 1985. "General Equilibrium Computations of the Marginal Welfare Costs of Taxes in the United States." *American Economic Review* 75 (March): 128–38.
- Bourguignon, François. 1981. "Pareto-Superiority of Unequalitarian States in Stiglitz Neo-Classical Model of Distribution." *Econometrica* 49 (6): 1469–75.
- . 1989. "Poverty Reduction, Adjustment, and Growth: An Applied Framework." World Bank, Human Resource Division, Latin America and the Caribbean Region, Washington, D.C. Processed.
- Bourguignon, François, and Christian Morrisson. 1980. "Progressivité et incidence de la redistribution des revenus en pays développés." *Revue Economique* 31 (2): 197–233.
- Bourguignon, François, W. Branson, and Jaime de Melo. 1989. "Adjustment and Income Distribution: A Counterfactual Analysis." NBER Working Paper 2943. National Bureau of Economic Research, Cambridge, Mass. Processed.
- Browning, Edgar. 1987. "On the Marginal Welfare Cost of Taxation." *American Economic Review* 77 (March): 11–23.
- Chenery, Hollis, Montek Ahluwalia, Clive Bell, John Duloy, and Richard Jolly. 1974. *Redistribution with Growth*. New York: Oxford University Press.
- Clarete, Ramon, and J. Roumasser. 1987. "A Shoven-Whalley Model of a Small-Open Economy: An Illustration with Philippine Tariffs." *Journal of Public Economics* 32 (2): 247–61.
- Clarete, Ramon, and John Whalley. 1987. "Comparing the Marginal Welfare Costs of Commodity and Trade Taxes." *Journal of Public Economics* 33 (August): 357–62.
- Cornia, G. A., R. Jolly, and F. Stewart. 1987. *Adjustment with a Human Face: Protecting the Vulnerable and Promoting Growth*. New York: Oxford University Press.
- Country Economics Department. 1989. *Adjustment Lending: An Evaluation of Ten Years of Experience*. Policy and Research Report 1. Washington, D.C.: World Bank.
- Country Economics Department. 1990. *Adjustment Lending Policies for Sustainable Growth*. Policy and Research Report 14. Washington, D.C.: World Bank.
- Dahl H., and P. Mitra. 1989. "Does Tax and Tariff Shifting Matter for Policy? An Application of General Equilibrium Analysis to Bangladesh." Paper presented at CRDE conference on Applied General Equilibrium and Economic Development, Montreal. Processed.

- Diaz, F. G. 1987. "Some Lessons from Mexico's Tax Reform." In David Newbery and Nicholas Stern, eds., *The Theory of Taxation for Developing Countries*. New York: Oxford University Press.
- Hamada, Koichi. 1967. "On the Optimal Transfer and Income Distribution in a Growing Economy." *Review of Economic Studies* 34 (99): 295-99.
- Heller, Peter., A. Bovenbery, T. Catsambas, K. Chu, and P. Shome. 1988. *The Implications of Fund-Supported Adjustment Programs for Poverty: Experiences in Selected Countries*. Occasional Paper 58. Washington D.C.:IMF.
- Kakwani, Nanak. 1977. "Measurement of Tax Progressivity: An International Comparison." *The Economic Journal* 87.
- Lucas, Robert. 1988. "On the Mechanisms of Economic Development." *Journal of Monetary Economics* 22: 3-42.
- Morrisson, Christian. 1980. "The Redistributive Consequences of Public Choices According to the Development of Economies." In Karl W. Roskamp, ed., *Choix publics et Finances publiques* [Public Choice and Public Finance]. Proceedings of the 34th Congress of the IIFP, Hamburg. Paris: Editions Cujas.
- Pestiau, Pierre, and U. M. Possen. 1978. "Optimal Growth and Distribution Policies." *Journal of Public Economics* 9 (3): 355-72.
- Romer, Paul. 1986. "Increasing Returns and Long-Run Growth." *Journal of Political Economy* 94 (October): 1002-37.
- Sheshinski, Eytan. 1976. "Income Taxation and Capital Accumulation." *Quarterly Journal of Economics* 90 (1): 138-49.
- Shoven, John, and John Whalley. 1984. "Applied General Equilibrium Models of Taxation and International Trade: An Introduction and Survey." *Journal of Economic Literature* 22 (September): 1007-51.
- Stanley, Owen. 1978. "Distributional Goals and Optimal Growth." *Review of Economic Studies* 45 (140): 389-90.
- Stiglitz, Joseph. 1976. "A Neo-Classical Model of Income and Wealth Distribution." *Econometrica* 37 (2): 382-97.
- Stuart, Charles. 1984. "Welfare Costs per Dollar of Additional Tax Revenue in the United States." *American Economic Review* 74 (3, June): 352-62.

Distributional Effects of Adjustment Policies: Simulations for Archetype Economies in Africa and Latin America

François Bourguignon, Jaime de Melo, and Akiko Suwa

For developing countries the 1980s was a decade of external shocks whose adverse effects were compounded by domestic macroeconomic imbalances and structural inefficiencies. The performance of developing countries during this decade, however, was not uniform. The effects of terms of trade and interest rate shocks are simulated for two model economies, one representing an average Latin American economy and the other representing an average African economy. In addition to the effects of the shocks, the effects of different adjustment policies are examined. As expected, identical shocks and adjustment packages yield different outcomes for growth, poverty, and income distribution in the two economies. The differences in results can be traced to specific features of the models, and, to the extent that the archetypes created are representative of real economies, have implications for adjustment policy prescriptions.

It has long been recognized that so long as basic social services are provided to the poor, economic growth remains the primary means of reducing poverty and improving the quality of life. When growth slows markedly, however, as it did during the 1980s, the focus shifts toward the role of public policy in reducing poverty. Confronted with the macroeconomic crises of the 1980s, policies to alleviate poverty become more difficult to design because of the need to both stabilize the economy and promote restructuring so as to ensure long-term growth. The interaction of initial macroeconomic conditions and economic structure with stabilization and structural adjustment policies (or lack thereof) explains the divergent growth and distribution performance across countries during the past decade.

To recount briefly, the 1980s will be remembered as a decade of external shocks for developing countries. Weak demand from developed countries, declining terms of trade (prices for many primary commodities fell to their lowest

François Bourguignon is in the Département et Laboratoire d'Economie Théorique et Appliquée (DELTA) and the Ecole des Hautes Etudes et Sciences Sociales. Jaime de Melo is with the Trade Policy Division of the World Bank and Centre for Economic Policy Research. Akiko Suwa is also in the Département et Laboratoire d'Economie Théorique et Appliquée (DELTA). The authors thank Rebecca Sugui for her unfailing logistical support and the three referees for their comments on an earlier draft.

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levels since World War II), a diminishing supply of external finance, and an increase in the level and volatility of interest rates combined to produce an unusually unfavorable external environment. For many countries the need to adjust was also compounded by macroeconomic imbalances resulting from overly expansionary fiscal policies made possible by external borrowing before the crisis.

For all countries, a reduction in absorption was required to adjust to the terms of trade and interest rate shocks. But in countries where initial conditions were relatively favorable because of manageable macroeconomic imbalances and relatively little need to restructure, adjustment was accompanied by an acceleration of growth and an alleviation (or containment) of poverty. This was largely the case for East and South Asian countries, whose average real gross domestic product (GDP) per capita grew 1.5 to 2.0 percentage points faster per year during 1980–89 than during 1973–80.

In Sub-Saharan Africa and in Latin America and the Caribbean, initial macroeconomic imbalances were large or the need for structural adjustment was greater because of many years under heavily distorted incentive systems. Implementing the right policies was also often harder because of structural rigidities caused by weak institutions (Sub-Saharan Africa) or by distributional conflicts (Latin America and the Caribbean). The outcome was an average annual per capita GDP growth of -2.2 percent in Sub-Saharan Africa and -0.6 percent in Latin America and the Caribbean during the 1980s. For Sub-Saharan Africa per capita GDP growth during 1973–80 had been barely positive, but for Latin America and the Caribbean average per capita GDP growth had been 2.6 percent. It is, therefore, no surprise that the past decade has been called a lost decade for the poor in these regions. The *World Development Report 1990* (World Bank 1990) estimates that in 1985, 30 percent of the population in Africa and 12 percent in Latin America was in extreme poverty.

The strikingly different performance between the East and South Asian countries, on the one hand, and the African and Latin American and Caribbean countries, on the other, raises several issues. Was the difference mostly attributable to market characteristics (flexible versus nonflexible economies), levels of development (middle-to-high income versus low income), institutional development (economies financially developed and integrated into the world financial markets versus financially underdeveloped economies)? It would be useful to investigate how important these various differences are in practice. In particular how will growth and income distribution respond to similar (or identical) policies in these different economic environments? Is it likely that poverty and income distribution indicators will react in the same way in the African and Latin American economies?

This article is concerned with the interaction of “typical” stabilization and structural adjustment policies on income distribution in what we shall refer to as “typical” Latin American and African economies. This label is, of course, only suggestive, and one could just as well think of our archetypes as representative of low-income and middle-income economies or of flexible and rigid economies.

Because of stylized differences between the two archetype economies, the same packages or shocks can be expected to have different distributional effects in spite of the same classifications of sectors and socioeconomic groups.

To anticipate what is described in greater detail in the body of the article, we build two archetypical economies to which we apply the same external shock that will result in different effects because of different structures and initial conditions. The first typical adjustment package is arrived at by roughly calibrating the model to produce changes in average values of key macroeconomic variables like growth, external debt, and investment rates that were observed between 1979–81 and 1986–89. The result of this rough calibration exercise is labeled the *standard* (or average) adjustment package. It includes countries that implemented stabilization and adjustment policies advocated by the World Bank and International Monetary Fund (IMF) as well as countries that did not or that did so only intermittently. To keep things simple and to identify more clearly the effects of structural differences across archetypes, we identify the standard adjustment package with exchange rate adjustments. We first analyze in some detail the macroeconomic and distributional effects of this standard adjustment pattern with the alternative scenario of a no-shock growth path.

We then compare this standard adjustment package with three other typical packages. The rationing adjustment package can be characterized by the failure to reduce imbalances and alter economic structures by changing policy incentives. In our framework this amounts to resisting real exchange rate depreciation. The structural reform package corresponds to adjustment packages supported by the World Bank and the IMF. In that typical package, rationalization of trade and fiscal incentives is intended to help reduce the fiscal imbalance and restructure the economy. Finally, the redistribution package combines the reforms of the previous package with redistributive measures along the lines advocated in recent studies on poverty alleviation. One can think of this package as approximating the strategy advocated in the *World Development Report 1990*.

The remainder of the article is organized as follows. In the following section, we describe in some detail the main features of the simulation model, including the differences in model closures between the two archetype economies with respect to the functioning of labor, goods, and foreign exchange markets. Calibration to initial macroeconomic conditions in the early 1980s is then described, along with an analysis of the effects of the shock under the standard adjustment scenario. We compare adjustment under the standard package with adjustment under the three other typical packages described above, and then draw our conclusions.

I. MODEL OUTLINE

The model is designed to capture the short- and medium- to long-run effects of stabilization and structural adjustment policies on the distribution of income. It is fully described in Bourguignon, Branson, and de Melo (forthcoming) and is available upon request. We refer to the model as a “maquette” because of the

variety of closures afforded by the “micro-macro” linkages built into it. Micro-linkages come from the interactions across the six sectors included in the model. These long-run linkages are well known from the literature on computable general equilibrium (CGE) models and are not discussed here. Macro-linkages come from the standard IS-LM macro framework for an open economy (see Tobin 1969). These linkages are not discussed either, although they will become apparent from the description of the differences in our modeling of the labor, goods, and financial markets in the two archetype economies.

The construction of the archetypes draws on the work of Chenery and his colleagues (Chenery and Syrquin 1975 and Chenery, Robinson, and Syrquin 1987) and is detailed in the appendix. Archetypical economies have the same disaggregation across labor markets, goods markets, and socioeconomic groups, but, to reflect differences in their levels of development and economic structures, the relative importance of sectors, labor markets, and socioeconomic groups differ. For example, the agricultural labor market is more important in the African archetype economy than in the Latin American one. Initial conditions such as the size of the external debt and the rate of interest on the external debt also differ. Further, demand and supply elasticities are usually lower in the African than in the Latin American archetype, and, most important, the functioning of labor, goods, and financial markets differs between the two archetype economies.

In both archetype economies we distinguish five financial units: government, households, firms, the consolidated banking system, and the foreign sector. By assumption, governments do not lend, households do not borrow, and, because of thin (or nonexistent) equity markets in most developing countries, the equity market is modeled rudimentarily so that the endogenously determined proportion of household savings allocated to equity is made directly available to firms.

The different modeling assumptions are summarized in table 1. In the African archetype there is no market for government debt, the government holds all foreign debt, and household financial wealth is made up entirely of domestic financial assets (money and equity). By contrast, in the more developed financial markets of the Latin American archetype, part of the government debt is held in domestic bonds, households hold foreign assets, and firms have part of their debt in foreign currency.

Because it is difficult to sterilize capital flows in Latin American economies with relatively integrated financial markets, it is assumed that monetary authorities can only partially control the money supply in the Latin American archetype. The change in base money, H , is given by:

$$\Delta H = \Delta L_b - e\theta KA_p + \Delta B_b$$

where L_b is the liability of the banking system, e is the exchange rate (units of domestic currency per unit of foreign currency), KA_p is the private capital account, B_b is government issued domestic debt, and θ ($0 < \theta < 1$) measures the

Table 1. Assumptions of the Model

African archetype	Latin American archetype
<i>Financial sector</i>	
<ul style="list-style-type: none"> • Money supply exogenous ($\theta = 0$)^a • No bond market; government holds only foreign debt (B_w^*) • Households hold cash (H_b) and equities in firms ($p_a E$) • Firms use working capital (H_f) and liabilities of the banking system (L_b) 	<ul style="list-style-type: none"> • Money supply partly endogenous ($\theta = 0.3$)^a • Bond market; government holds domestic debt (B_b) and foreign debt (B_w^*) • Households hold cash and foreign bonds (F_b^*) in their portfolio as well as equities in firms ($p_a E$) • Firms use working capital (H_f), liabilities of the banking system (L_b), and foreign-denominated debt (L_w^*)
<i>Foreign exchange market</i>	
<ul style="list-style-type: none"> • Limit on government borrowing (B_w^*); firms and households have no access to the foreign capital market 	<ul style="list-style-type: none"> • Limit on government borrowing (B_w^*) and on firm borrowing (L_w^*), but no limit on foreign assets held by households (foreign and domestic assets are imperfect substitutes)
<i>Labor market</i>	
<ul style="list-style-type: none"> • Flexible wages for agricultural labor; downward nominal rigidity for modern sector labor 	<ul style="list-style-type: none"> • Flexible wages for agricultural labor: full indexation on cost of living (full real wage rigidity) for modern sector labor
<i>Goods market</i>	
<ul style="list-style-type: none"> • Flexible prices for all sectors 	<ul style="list-style-type: none"> • Mark-up pricing in modern sector; flexible prices in other sectors

a. θ is the monetized proportion of private capital movements.

degree of sterilization of foreign capital flows. Also, because of the evidence that inflation leads to flight from money, households' real demand for money, H_b , is

$$(1) \quad H_b = H_b (y, i, \hat{p}^e)$$

+ - -

where signs under the variables indicate the signs of the corresponding partial derivatives, y is real income, i is the nominal interest rate, and \hat{p}^e is the exogenously given expected inflation rate.

In the foreign exchange market with a normal external environment, that is, without shock, there is no constraint on foreign borrowing. The exchange rate is then predetermined, and endogenous government borrowing ΔB_w^* is given by:

$$(2) \quad -\Delta B_w^* = CA (i, e) + KA_p (i, e)$$

- + + -

where CA is the interest inclusive current account and, for the Latin America archetype, $KA_p = \Delta L_w^* (i, e) - \Delta F_b^* (i, e)$, where L_w^* is firm borrowing from

+ - - +

abroad, and F_b^* is households' holdings of foreign bonds. For a given domestic price, the current account responds positively to the exchange rate and negatively to the interest rate because of investment demand. For given expectations private firms (households) shift toward domestic debt (foreign assets) when the

exchange rate devalues (revalues) and when the interest rate rises (falls). In the African archetype the capital account is exogenous by assumption. In all simulations, except the no-shock scenario, it is assumed that each archetype faces an exogenously determined foreign exchange constraint and the government borrows an exogenously set amount ΔB_w^* . Money is the only financial asset held in the African archetype, so that when the amount of foreign borrowing is fixed, the fiscal deficit is financed from seignorage on the cash holdings of firms and households. In the Latin American archetype big farmers and capitalists hold a fraction of their financial portfolio in foreign assets and domestic bonds. The fiscal deficit is therefore also partly financed from domestic borrowing. Also, in the Latin American economy not only does the government face a foreign borrowing constraint, but firms can no longer borrow abroad, that is, $\Delta L_w^* = 0$. Households, however, continue to hold foreign bonds in their portfolios even when there is foreign exchange rationing. In addition we assume that foreign exchange controls are ineffective in the Latin American archetype, so that we are able to capture the widely documented phenomenon of capital flight. Thus, although foreign borrowing is constrained in both economies, households can shift their portfolios toward foreign-denominated assets in the Latin American archetype in response to changes in the domestic economic environment.

In both archetypes the economy is divided into six sectors—primary export, agriculture, nontraded informal (private services and cottage shop activities), consumer goods, intermediate and capital goods, and nontraded formal (construction and utilities)—and six socioeconomic groups—two capitalist groups (large farmers and modern-sector capitalists), small farmers, and three worker groups. The primary export sector is the standard export sector (a mineral or cash crop sector), whereas agriculture includes activities that compete with imported agricultural products. In both archetypes after-tax profits are largely distributed to the capitalist socioeconomic groups, whereas worker income comes primarily or exclusively from the sale of labor services. The appendix describes in more detail the output and final demand structures, taxes, the mapping of factor incomes into socioeconomic groups, and the holding of financial assets.

In the labor markets agricultural workers are assumed to be paid a competitive wage, and informal workers earn their average product. In the African archetype modern sector wages are downwardly rigid in nominal terms, but there is usually enough inflation to clear the modern labor market. In the Latin American archetype wages for modern sector workers are fully indexed to the cost of living. This reflects the combination of union power and workers' resistance to a cut in living standards. With real wage rigidity any disequilibrium in the modern labor market resulting in an excess supply of labor results in unemployment.

In the goods markets we assume that prices adjust to clear markets in the African archetype. In the Latin American archetype we assume that capitalists in

the modern sector will resist cuts in their profit rates. This implies a mark-up pricing rule of the type:

$$(3) \quad p^v = w_{-1} (1 + m) (1 + \alpha \hat{p}^e)$$

where p^v is the value added price, w_{-1} is last period's labor cost per unit of output, m is the mark-up rate, and $\alpha < 1$ depends on how much resistance there is to a cut in profits. In the modern sector, the rate of capacity utilization U is adjusted to clear the market in case of excess supply. Hence supply is given by $q^s = UF(\bar{K}, L)$, where \bar{K} is the fixed capital stock, L stands for labor, and $F(\cdot)$ is the sectoral production function. Thus in the Latin American archetype the combination of wage indexation with a mark-up pricing rule leads to an extremely rigid modern sector.

The government sector is modeled identically in both archetypes. The government collects taxes on domestic and imported goods and pays interest on internal and external debt. Noninterest government expenditures are divided into three components: wages, consumption expenditures, and investment expenditures. Government workers, whose employment level is exogenous, receive an exogenous wage. To simplify the interpretation of results, we assume that the marginal productivity of government investment is the same as for private investment. We also assume that all components of noninterest expenditures grow at 3 percent per period in all simulations. Thus we abstract from any productivity effects that would arise from changes in patterns of government expenditures. However, for a given monetary and exchange rate policy, any change in the fiscal deficit has an effect on private investment demand by clearing the money market.

The immediate effect of the external shock considered here is to require a reduction in absorption relative to income. There is no room to increase supply since the economies are initially assumed to be at a full-employment equilibrium. With more rigidity in goods and labor markets in the Latin American archetype, the shock moves the economy inside its production possibility frontier, and the reduction in absorption is greater than in the more flexible African archetype. Of course resources are not actually fully and efficiently employed in the no-shock scenario, and structural adjustment policies were intended to move economies closer to their production frontier. We do not model directly this supply-augmenting effect, which structural adjustment policies were presumed to have, because of the lack of reliable information on the extent of resource idleness caused by inappropriate incentives. Rather we implicitly assume that in the no-shock scenario economies would have had sufficient access to external funding to have normal capacity use. In particular we do not take into account the possibility of immiserizing capital inflows caused by distortions (see Brecher and Diaz-Alejandro 1977).

In the longer run there is also an effect of adjustment on growth resulting from changes in the composition of absorption. Household savings of capitalists are

negatively affected by the incorporation of a wealth effect in the consumption function, and, for a given amount of savings, the allocation of savings to physical capital depends on the relative price of equities (that is, of physical capital) compared with other financial assets.

The other component of absorption is private investment. How it reacts to changes in the endogenously determined macroeconomic variables will largely determine the relative success of stabilization and structural adjustment policies. Investment demand by the private sector I_p is given by:

$$(4) \quad I_p = I_p \left(\frac{U(p^v \partial F / \partial K) / p_k}{(i_r - \hat{p}^e)} \right).$$

Investment demand is a positive function of capacity utilization and that sector's marginal revenue product of capital $p^v \partial F / \partial K$ and a negative function of the cost of capital p_k and the opportunity cost of borrowing $i_r - \hat{p}^e$, where i_r is a weighted sum of domestic and foreign interest rates adjusted for exchange rate changes. In turn the price of capital goods and the opportunity cost of borrowing is affected by the value of the real exchange rate.

How adjustment affects income distribution among socioeconomic groups is influenced by three factors. First is the standard effect coming from the mapping of factor incomes into socioeconomic groups. Incomes of factors employed relatively intensively in expanding sectors will rise. Likewise rents will rise in sectors that expand, with the real income of immobile factors changing more than those of mobile factors. Second, poor socioeconomic groups, which have consumption patterns that are not price responsive—because they are concentrated in necessities with low price (and income) elasticities of demand—will be more severely affected by changes in relative prices and real income. Third, poor socioeconomic groups, which have little equity and hold financial assets mostly in the form of noninterest-bearing money, will lose more from shocks that raise the inflation rate and lead to a real exchange rate depreciation. However, rich socioeconomic groups, which have more diversified portfolios and hold interest-bearing assets or assets denominated in foreign currency, are better protected against inflation and capital losses.

II. ADJUSTMENT TO AN EXTERNAL SHOCK IN THE TWO ARCHETYPE ECONOMIES

We now turn to an analysis of how interest rate and terms-of-trade shocks affect macroeconomic and distributional indicators in the two archetype economies. The terms-of-trade shock is a 20 percent increase in the foreign currency price of imports (p_m^*) in period 2 only. The interest rate shock is a permanent doubling of the interest rate (i^*) on foreign debt beginning in period 2 (simulations run for seven periods). Because the typical African economy holds publicly guaranteed debt disbursed under donor assistance, it has a relatively high grant element compared with the stock of external debt held by the typical Latin American country, where the proportion of commercial debt with a variable

interest rate is high. Hence the interest rate on foreign debt in the African archetype is doubled from 4 to 8 percent per year, whereas for the Latin American archetype the interest rate is doubled from 8 to 16 percent.

Assuming that the parametrization of the external shock is sensible, the plausibility of the archetypes and of the differing assumptions about market behavior, parameters, and initial conditions can be judged by comparing model outcomes with realized values of macroeconomic variables averaged over African and Latin American economies during 1979–86. We assume that if the external environment in the 1980s had been benign, average performance achieved during 1978–81 would have continued throughout the 1980s. We compare these average realized values for 1978–81 with period 1 values obtained with the simulation model, which indicate macroeconomic outcomes for most flow indicators over the entire simulation in the absence of an external shock. The realized average values of variables during 1986–89 are taken to represent the combination of the unfavorable environment resulting from the external shock and the standard adjustment to that shock. They are compared with model results from period 7 after the economies have settled down from the effects of the shock and of the standard adjustment package.

The realized values of macroeconomic indicators and the values generated by the model under the standard adjustment package are compared in tables 2 and 3. Looking at the realized values, four stylized outcomes stand out. First, growth slowed much more in Latin America than in Africa. But the larger population growth rate in Africa (3.2 percent per year versus 2.2 percent for Latin America) resulted in declining average per capita income in Africa. Second, the investment share in GDP fell drastically in both regions. Although some portion of the fall in investment rates was certainly compensated for by increases in the marginal efficiency of investment, it is implausible that efficiency gains compensated for the loss in investment volume. Third, the current account deficit worsened slightly for both regions because of the surge in interest payments on the external debt in spite of the sharp real exchange rate devaluation. Fourth, inflation skyrocketed in Latin America, whereas it remained stable in Africa in great part because of the influence of countries in the franc zone.

The model results broadly replicate these stylized outcomes, although there are some discrepancies. For the Latin American archetype the treatment of rigidities in the model magnifies the fall in growth rates when compared with the average realized values. Regarding inflation, in the Latin American archetype the exogenous treatment of expectations about inflation and devaluation in the simulations makes any outcome possible. In view of the very uneven inflation patterns both within and across countries, we have assumed “strong” inflationary expectations only during the period when the shock occurs. As a result an inflation bout occurs in period 2, and the economy settles back to a “normal” inflation pattern thereafter. Hence we are not modeling the dynamics of hyperinflation. With respect to the real exchange rate index, the two indicators are not strictly comparable, since the index calculated from the model corresponds

Table 2. *GDP Growth and Inflation: Africa and Latin America, 1978–81 and 1986–89*
(annual average in percent)

Indicator	Africa				Latin America			
	Actual value		Value generated by the model		Actual value		Value generated by the model	
	1978–81	1986–89	Without shock	With shock	1978–81	1986–89	Without shock	With shock
GDP growth per year	2.9	2.8	3.0	2.6	3.7	2.4	4.4	1.1
Inflation rate per year (CPI)	20.9	22.1	16.4	18.3	21.1	271.3	30.5	37.5

Note: Actual values are unweighted averages for the periods indicated. The values generated by the model are compounded seven-year average annual growth rates for the no-shock and shock simulations.

Source: World Bank data and authors' calculations.

Table 3. *Macroeconomic Indicators: Africa and Latin America, 1978–81 and 1986–89*
(percent unless otherwise indicated)

Indicator	Africa				Latin America			
	Actual value		Value generated by the model		Actual value		Value generated by the model	
	1978–81	1986–89	Period 1	Period 7	1978–81	1986–89	Period 1	Period 7
Investment/GDP	22.70	18.10	21.60	15.50	22.30	17.30	22.60	14.80
Current account/GDP	-4.80	-5.90	-4.60	-5.40	-4.60	-5.20	-3.30	-7.40
External debt/exports	0.89	3.59	1.07	1.89	1.16	3.35	0.99	2.89
Interest payments/exports	3.40	11.10	3.70	15.10	9.90	24.30	9.50	42.50
Real exchange rate (1980=1)	1.02	1.46	1.00	1.09	1.01	1.14	1.00	1.08

Note: Actual values are unweighted averages for the periods indicated.

Source: World Bank data and authors' calculations.

to the relative price of tradables, whereas the calculated value for regional averages corresponds to an index of external competitiveness rather than to an index of resource allocation within the economy. Because the model was designed for counterfactual analysis and not forecasting, one should not require exact replication of realized values. The comparisons indicate, however, that the main changes observed during the 1980s are captured by the standard adjustment package built into the model.

We now evaluate the effects of the external shock on income distribution under the standard adjustment package. In the favorable external environment base simulation, expectations are realized. The money supply, inflation, and expected devaluation (and actual devaluation) all grow at 30 percent per period for the Latin American base simulation and 15 percent for the African base simulation (except for the money supply in Africa, which grows at 20 percent per period). Under this scenario there is no foreign borrowing constraint, real exchange rates and real interest rates are nearly constant, and there is full employment of labor and full capacity use. As shown in table 4, the debt-to-export ratio doubles by the end of the seven-period simulation, with the fiscal deficit worsening in Africa mainly because of the rising external debt service. The value of exports grows less rapidly in Africa than in Latin America because of a bias toward primary products with low price and income elasticities of demand. This difference reflects the difficulties that African countries have had in expanding export earnings.

Because of higher population growth, the normal external environment for the African archetype is just sufficient to maintain poverty indicators constant throughout the simulation, although the distribution of income becomes significantly more equal according to the Theil index of inequality. However, the combination of higher GDP growth and lower population growth enables the Latin American archetype to achieve a reduction in poverty and a marginally more equal income distribution.

In the simulations with the unfavorable external environment, in which the interest rate on external debt is doubled for periods 2 to 7 and the foreign currency price of imports is hiked by 20 percent in period 2, the standard adjustment package is derived as follows. In the African archetype a limit on external borrowing is imposed with no changes in expectations or monetary policy. In the Latin American archetype the limit on public borrowing is complemented by a freeze on the portfolio choice of firms that see their foreign-denominated debt frozen to its period 2 value. No constraints are imposed on portfolio choices by households. Because of the rigidities built into this archetype, expectations of inflation and the rate of devaluation are raised to 35 percent in period 2 and 40 percent in period 3, with a corresponding increase in the money supply. For subsequent periods expectations and monetary growth resume preshock values. To simplify this adjustment package we have assumed no contractionary change in fiscal (or monetary) policy as a result of the shock. In other words we assume that the limit on foreign borrowing is met by varia-

Table 4. *Macroeconomic and Distributional Indicators for the Two Archetypes with and without Shock*
(percent unless otherwise indicated)

Indicator	African archetype				Latin American archetype			
	Without shock		With shock		Without shock		With shock	
	Period 2	Period 7	Period 2	Period 7	Period 2	Period 7	Period 2	Period 7
GDP (period 1 = 100)	103.0	120.0	103.0	117.0	104.0	129.0	101.0	107.0
Export value (in foreign currency units)	21.6	23.6	23.8	28.9	17.1	21.5	19.7	21.2
Investment/GDP (real)	21.5	20.5	18.9	15.5	21.4	23.6	13.8	14.8
Inflation rate (CPI)	16.8	16.9	20.7	18.1	35.4	30.0	108.3	30.0
Devaluation rate	15.0	15.0	27.0	17.6	30.0	30.2	108.0	31.4
Interest rate	20.1	21.2	20.3	23.4	35.9	34.1	49.0	42.1
Overall deficit/GDP	4.0	6.2	5.2	9.0	6.2	6.7	8.2	17.4
Primary deficit/GDP ^a	3.1	4.6	3.2	5.2	3.9	3.0	4.4	5.8
Debt/exports ^b	113.0	239.0	103.0	189.0	124.0	224.0	107.0	289.0
Debt service/exports ^b	4.5	9.3	8.3	15.1	11.3	21.0	17.2	46.2
Domestic debt/GDP	n.a.	n.a.	n.a.	n.a.	3.4	4.0	5.8	7.0
Domestic debt service/government revenue	n.a.	n.a.	n.a.	n.a.	7.1	9.0	4.7	18.0
Household foreign assets/exports	n.a.	n.a.	n.a.	n.a.	34.4	42.0	48.2	57.2
Theil index ^c	66.4	58.6	61.5	50.8	37.1	35.0	33.4	43.2
Poverty gap ^d	2.68	2.71	2.77	2.71	0.84	0.63	0.91	1.49
Poverty rate	30.4	31.1	29.9	29.5	11.8	10.5	12.1	19.5

n.a. Not available.

a. Does not include interest payments on public debt.

b. Public and private external debt.

c. A decrease in the value of the index indicates less income inequality.

d. The poverty gap indicates the percentage of income that must be redistributed to bring all those below the poverty line up to the poverty line.

Source: Authors' calculations.

tions in the exchange rate alone. This clearly overstates the laxity of fiscal policies pursued in a standard adjustment package, but it makes it easier to interpret the effects of differences in economic structure, initial conditions, and market mechanisms on adjustment policies.

The impact of the shock and the standard adjustment on macroeconomic variables in periods 2 and 7 is given in table 4. Private investment declines sharply in both economies (public investment grows exogenously), because of the combined effects of a higher price for imported capital goods (resulting from the devaluation of the real exchange rate) and a higher real interest rate (resulting from larger government borrowing from the Central Bank to finance interest payments). This effect is particularly strong for the Latin American archetype and is certainly in accord with the sharp rise in real interest rates that occurred during the past decade in many Latin American economies.

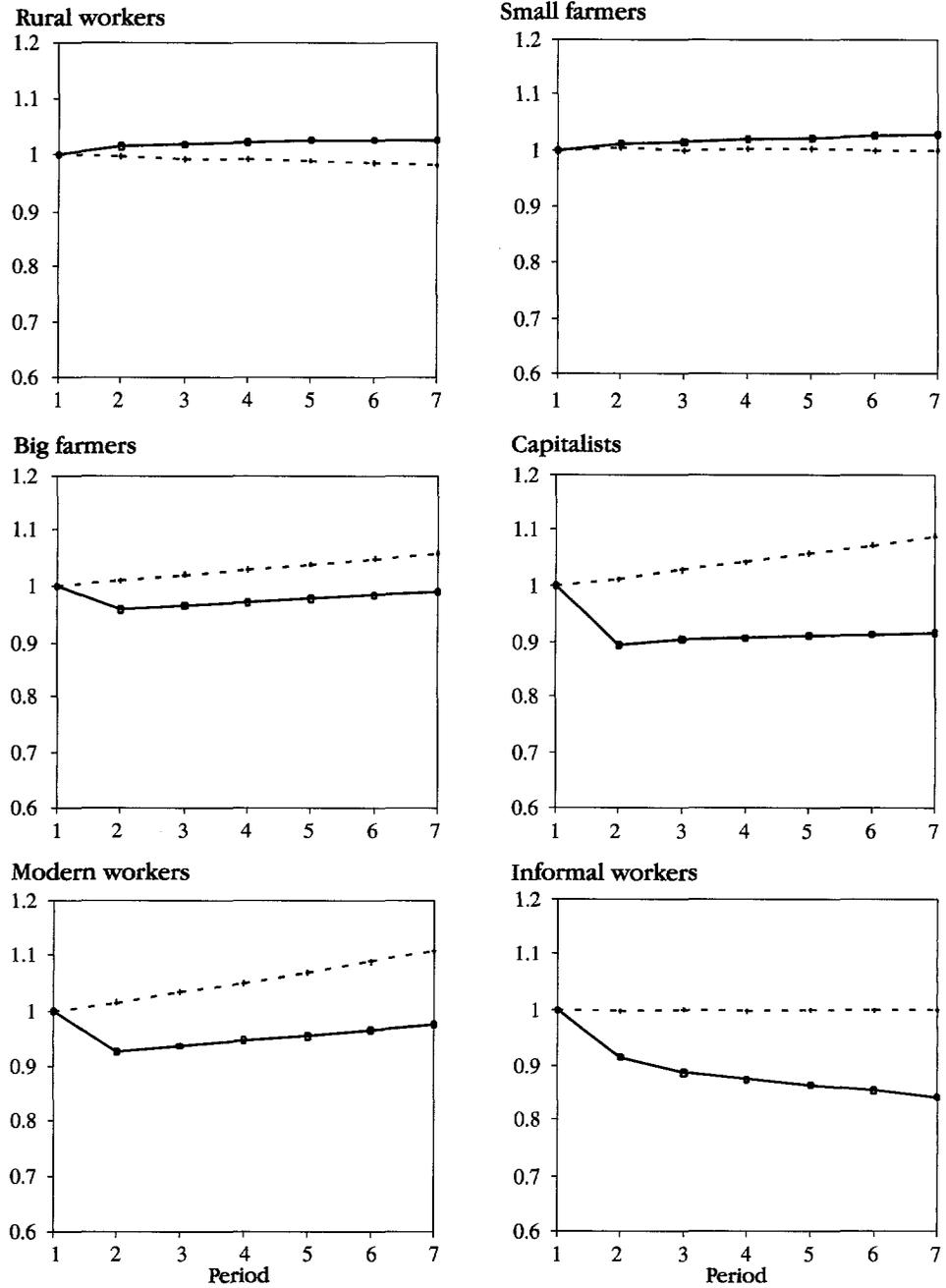
A second clear pattern is the deterioration in fiscal indicators, which is particularly pronounced for the Latin American archetype. Although the deterioration is rather extreme because we have purposely not built in contractionary fiscal policies in the standard adjustment package, it is interesting that the exploding fiscal deficit in the Latin American archetype is almost entirely due to interest payments on the internal and external debt.

This sharp fiscal deterioration in the Latin American archetype results from the price rigidities impairing resource use. Unemployment goes up sharply because of real wage rigidity in period 2, and capacity falls with a lag because of the resistance of capitalists to a fall in the profit rate in the modern sector. As a result, in contrast with the African archetype, in which the real exchange rate devaluation achieves expenditure switching with a concomitant increase in export earnings, in the Latin American standard adjustment pattern, export earnings remain at the same level as in the base simulation. Stagnant export earnings and a severe output contraction imply less government tax revenue. The deterioration in government revenue along with rising interest payments results in a large crowding out of private sector investment and a tripling of the real interest rate (compared with the no-shock simulation) by period 7.

For the African archetype the assumption of wage and price flexibility minimizes the adverse growth effects of the shock, and poverty and income distribution actually improve. As discussed below, the improvement in the poverty and distributional indicators comes from the expenditure switching policies, which raise the real income of the poor and improve their relative position. However, poverty and distributional indicators in the Latin American archetype are significantly worse because of three factors. First, wage and price rigidity slows growth and raises the fraction of the population in poverty. Second, the richer socioeconomic groups, which own capital, resist the cuts in living standards. Third, big farmers and capitalists are able to avoid capital losses by shifting their portfolios toward foreign-denominated assets.

The evolution of the distribution of income across socioeconomic groups is shown in figures 1 and 2. In the African archetype the real exchange rate

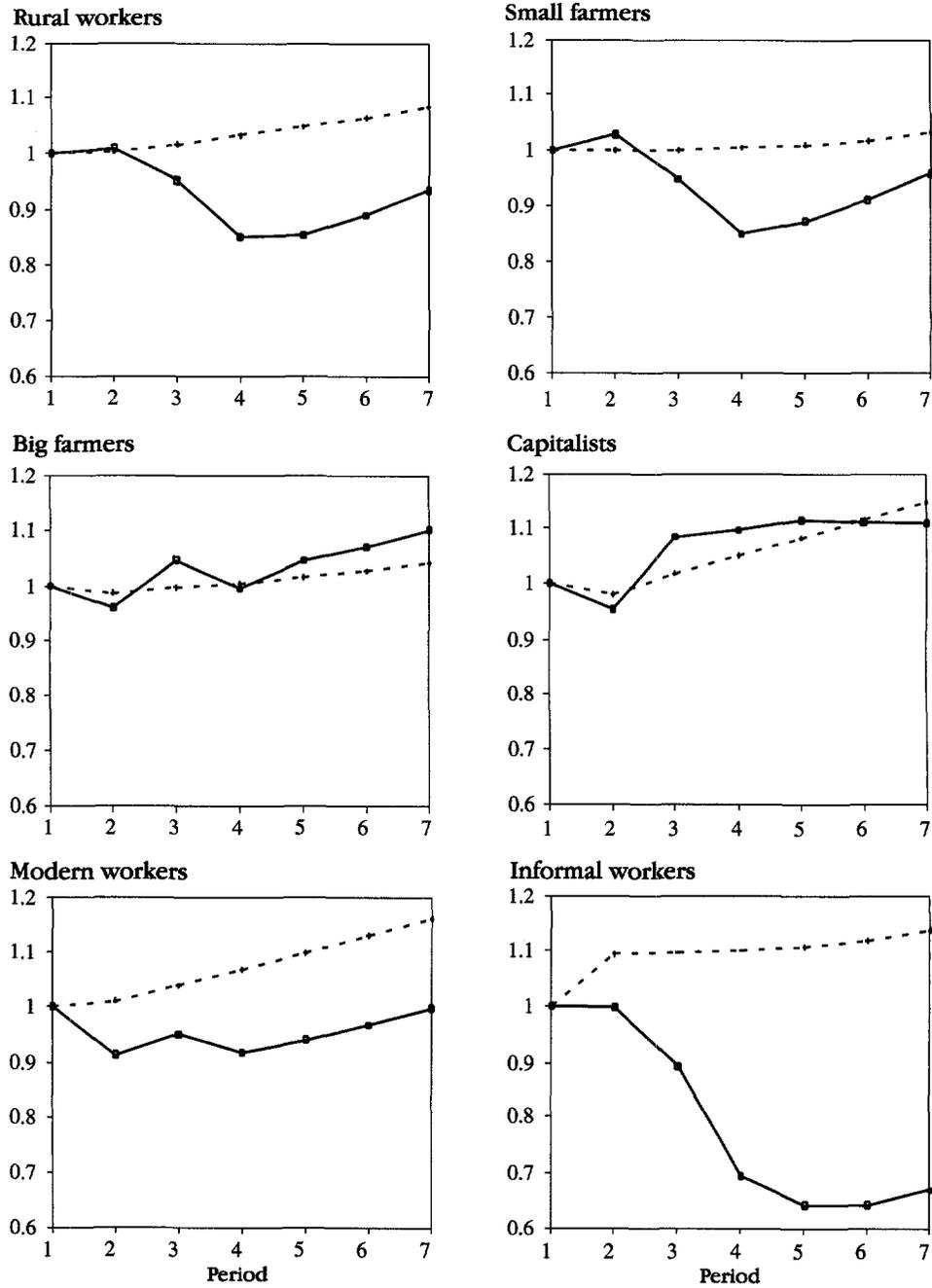
Figure 1. Distributional Effects of External Shock in the African Archetype
(real income per capita index)



Note: —■— With shock, + - - - without shock.

Source: Authors' calculations.

Figure 2. Distributional Effects of External Shock in the Latin American Archetype
(real income per capita index)



Note: — With shock, + - - - without shock.
Source: Authors' calculations.

devaluation raises the real income of rural workers beyond levels reached in the no-shock environment, and small farmers, who earn part of their income from wages in the export sector, lose very little from the shock. The burden of adjustment falls most heavily on workers in the nontraded informal sector, who lose not only because of the fall in the relative price of nontradables but also because of the decline in the real income of capitalists, who have a high income elasticity of demand for informal sector services. Modern sector workers lose somewhat less than capitalists because their average wage includes the exogenously set real wage of civil servants. Mobility across modern sectors also mitigates the effects of the shock. The distribution of income becomes less unequal in the African archetype as a result of the shock because devaluation protects the poorest socioeconomic groups, rural workers, and small farmers.

A strikingly different pattern emerges under the standard adjustment pattern in the Latin American archetype. Despite the sharp recession under adjustment, capitalists and big farmers manage to maintain and even improve their absolute real income. All wage earners suffer, and real income falls in the informal sector. Modern sector workers lose on average in spite of real wage resistance in great part because of increased unemployment, which results in decreased per capita income in the sector. Finally, the fate of small farmers and rural workers is similar, with both losing because of recession. Clearly, under this adjustment scenario in which the poor have to share income with the unemployed and cannot protect their money holdings from the inflation tax, the shock widens income disparities among socioeconomic groups.

III. DISTRIBUTIONAL EFFECTS OF ALTERNATIVE ADJUSTMENT PACKAGES

We have seen that differences in assumptions about market adjustment and about household opportunities to protect themselves from shocks can account for radically different distributional effects of identical external shocks and adjustment policies. We now evaluate the distributional effects of the three adjustment packages described in the introduction. As before all policy changes occur in period 2.

In the rationing adjustment package, adjustment occurs through import rationing, with the Central Bank sticking to an exchange rate policy that maintains a constant real exchange rate pegged to CPI domestic inflation. This adjustment scenario reflects a policy of postponing adjustment, which we assume can last for the seven years in the simulation. The proceeds of the rents accruing from the premium on imports are distributed pro-rata (as dividends) to each sector. (Rents from the premiums on noncompetitive imports are distributed to the formal nontraded (commercial) sector.) Otherwise all other assumptions are identical to those describing the standard adjustment package. Again, to clearly trace the effects of the differences built into each archetype, we abstract from the use of the standard fiscal, monetary, and exchange rate instruments.

In the structural reform package, starting from the standard adjustment package, we apply the trade and tax reforms advocated by the IMF and the World Bank. (Tax and tariff structures across sectors in each archetype are given in appendix tables A-1 and A-2.) Export taxes are abolished for both archetypes. Uniform tariff rates are set at 15 percent for Africa and 20 percent for Latin America. Sales taxes are also equalized at 7 percent for Latin America and 3 percent for Africa, and profit and income taxes on modern sector capitalists are set at 10 percent in both archetypes. To reflect difficulties in tax administration, all tax reforms apply only to the modern sector; the nontraded informal and the two agricultural sectors are not taxed. The equalization of tax rates is designed to yield broadly the same revenue levels in period 2 as in the standard adjustment package. These tax rates may not be at the exact level actually found in the regions, but the composition of tax receipts across the categories of trade taxes, direct taxes, and indirect taxes broadly conforms to average patterns for low- and middle-income countries.

Finally, in the redistribution package the structural adjustment package is augmented by food subsidies and a public works program. Because our simulation model is not sufficiently disaggregated, especially with respect to the social sectors, this strategy, which is intended to simulate the elements of the strategy advocated in the *World Development Report 1990*, cannot reflect all the targeting and redistributive policies that would be included in a complete strategy of poverty alleviation. A food subsidy of 7 percent for the African archetype and of 5 percent for the Latin American archetype is applied to sales of agricultural products from period 2 on. The public works program is implemented so as to result in the same exogenous government nominal wage bill as in previous experiments while achieving full employment at the same time. In the African archetype average public sector wages are frozen in real terms with an increase in public employment, thereby drawing labor out of the formal sector. In the Latin American archetype average public sector real wages fall, reflecting the hiring of unskilled workers in the public works program. In this archetype government sector increases in employment come out of the pool of unemployed.

The macroeconomic and aggregate distributional effects of each one of these packages are contrasted with the standard adjustment package in table 5 and figure 3. For both archetypes the rationing adjustment package results in severe import rationing by the end of the simulation period, with premium rates on imports exceeding 100 percent. Under this scenario both poverty indicators also worsen, which is not surprising since the rents accruing from rationing redistribute real income from the poor and middle to the richer socioeconomic groups. Figure 3 indicates that the population in poverty increased from 30 to 40 percent in Africa and from 12 to 36 percent in Latin America. These estimates are very high and may exaggerate the actual adverse impact on poverty of adjustment in an economy in which rent-seeking and nonmarket mechanisms

Table 5. Macroeconomic and Distributional Indicators for the Two Archetypes under Different Adjustment Packages
(percent unless otherwise indicated)

Archetype and indicator	Standard adjustment		Rationing adjustment		Structural reform		Redistribution	
	Period 2	Period 7	Period 2	Period 7	Period 2	Period 7	Period 2	Period 7
<i>African archetype</i>								
GDP (period 1 = 100)	103.0	117.0	102.0	121.0	103.0	117.0	103.0	117.0
Investment/GDP (real)	18.9	15.5	20.5	25.5	19.3	15.3	17.2	13.1
Inflation (CPI)	20.7	18.1	22.3	16.7	19.6	18.3	19.3	19.4
Devaluation rate	27.0	17.5	22.0	17.3	22.0	18.0	21.0	18.2
Premium rate ^a			27.5	102.3				
Interest rate	20.3	23.4	18.4	15.0	19.8	23.0	21.5	26.6
Government revenue/GDP	15.3	15.0	15.5	16.5	15.0	15.2	12.5	12.8
Overall deficit/GDP	5.2	9.0	6.8	12.6	5.5	8.5	8.0	11.1
Theil index ^b	61.5	50.8	61.1	47.9	57.6	46.6	55.8	45.4
Poverty gap ^c	2.8	2.7	3.5	4.8	2.3	2.3	1.9	2.1
Poverty rate	29.9	29.5	33.9	39.2	26.0	26.0	22.9	24.3
<i>Latin American archetype</i>								
GDP (period 1 = 100)	101.0	107.0	100.0	100.0	101.0	108.0	104.0	108.0
Investment/GDP (real)	13.8	14.8	13.9	16.1	14.4	14.6	13.4	14.2
Inflation (CPI)	108.3	30.1	102.8	27.8	102.6	30.7	108.9	30.6
Devaluation rate	108.0	31.4	100.0	26.3	103.0	31.9	109.0	32.1
Premium rate ^a			10.0	115.4				
Interest rate	49.0	42.1	48.4	37.4	47.9	42.7	49.3	43.3
Government revenue/GDP	11.5	12.6	13.7	12.9	10.9	12.8	10.2	11.5
Overall deficit/GDP	8.2	17.5	8.7	23.9	8.7	17.8	9.3	18.4
Theil index ^b	32.7	43.0	32.6	45.6	31.8	41.0	32.4	42.3
Poverty gap ^c	0.9	1.5	1.0	3.8	0.7	1.2	0.6	1.2
Poverty rate	12.1	19.5	12.5	28.2	10.3	16.9	9.7	17.3

n.a. Not available.

Note: Under the standard adjustment package the exchange rate is devalued, with the rationing adjustment package there is import rationing, with the structural reform package there is tax equalization, and under the redistribution package there are tax equalization, food subsidies, and public works.

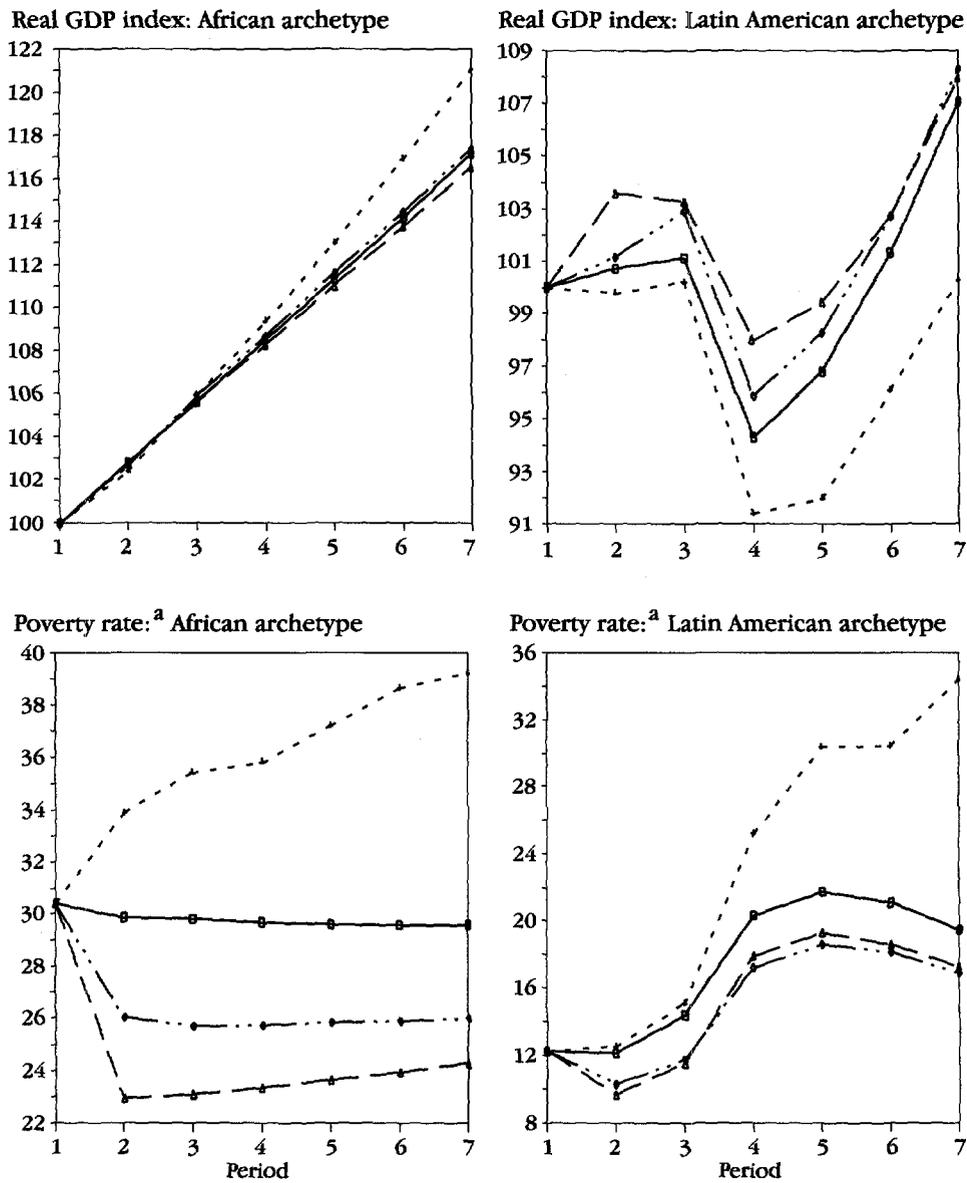
a. Premium rate on imports under rationing.

b. A decrease in the value of the index indicates less income inequality.

c. The poverty gap indicates the percentage of income that must be redistributed to bring all those below the poverty line up to the poverty line.

Source: Authors' calculations.

Figure 3. Growth and Poverty under Alternative Adjustment Packages



Note: —□— Standard adjustment, +-+ - rationing adjustment, ····◆···· structural reform, —●— redistribution.

a. Head count index.

Source: Authors' calculations.

are commonplace. The higher growth in Africa with the rationing adjustment package is induced by a strong Kaldorian effect. Income is redistributed from households to firms and capitalists through the quasi-rents on imports. Given that capitalists have a higher propensity to save, the rate of interest drops and investment expenditures increase. Of course this expenditure-switching phenomenon occurs because wage and price flexibility ensures that the economy is at full employment. Over time the increased share of investment in GDP also leads to substantially faster growth.

The overall effect on income distribution is mixed. The drop in household consumption contributes to a fall in agricultural prices and thus in the real income of all rural groups, including poor rural workers and smallholders. Big farmers in the primary export sector also lose a substantial proportion of their income, however, because the real exchange rate does not fall as in the standard adjustment scenario. Since the Theil measure of inequality is very sensitive to changes at the top of the distribution, the overall result is a slight drop in inequality. Some other measures of inequality would indicate the opposite.

Although the preceding effects also operate in the Latin American archetype, resistance to real wage cuts and price rigidity in modern sectors prevents the preceding Kaldorian expenditure-switching phenomenon. Because of price rigidities, import rationing cuts real expenditures and reduces economic activity. The rate of unemployment thus is much higher than in the standard adjustment package, with a consequent deterioration in poverty indicators. The outcome is that real GDP stands at the same level as in the base year at the end of the seven-year simulation. At the same time, in spite of a lower real cost of servicing the external (and internal) debt, the overall fiscal situation is worse under this scenario because of forgone trade tax revenues caused by the refusal to devalue the real exchange rate. In sum the rationing adjustment scenario has strongly adverse effects on poverty.

Compared with the rationing adjustment scenario, the two reform packages (structural reform and redistribution) yield relatively smaller effects of the shock precisely because the reforms are once-and-for-all measures introduced in period 2. Overall, with either reform package, the macroeconomic indicators are very close to the values achieved under the standard adjustment package, although there is a slightly larger fiscal deficit in the redistribution package at the end of the simulation. As can be seen in figure 3, the change in the poverty rate occurs in period 2, as soon as the reforms are implemented. Significantly, the redistributive effect achieved in the African archetype in period 2 is largely maintained throughout the entire simulation. Clearly, if it is possible to carry out trade and tax reforms that improve allocative efficiency by equalizing incentives across sectors and to implement revenue-neutral redistributive measures, then it is possible to reduce poverty.

At a more general level structural reforms will be largely unsuccessful when there are rigidities, as in the Latin American archetype, that prevent adjustment in relative prices. Under those circumstances reforms will not induce firms to

work closer to full capacity. From the simulations with the African archetype, in which (effective) indirect taxes are relatively low and production structures are relatively rigid because of largely noncompetitive imports, reforms have a negligible effect in the small modern sector. Hence efficiency gains are small. Of course abolishing export taxes benefits the agricultural sector, reduces poverty, and equalizes income, but the expansionary effect on output is negligible because of diminishing returns in agriculture.

IV. CONCLUSION

The question raised in the introduction to this article was whether differences in economic and market structure and levels of institutional development were important in the analysis of adjustment policies on poverty and income distribution. We asked whether these differences could result in identical adjustment policies applied in response to a common external shock having radically different, and even opposite, effects on poverty and income distribution. Although such an outcome is not in itself surprising, differences in magnitudes and in the channels that account for these results were often found to be interesting and at times surprising. These results suggest a payoff to the careful modeling of relevant differences across countries in an economywide setting when analyzing the effects of adjustment policies on poverty and income distribution.

Several important differences emerged in the comparisons of different adjustment packages across the two archetype economies. As an illustration, we recall three results. The first is the result that, in the standard adjustment package, *inequality increased significantly for the Latin American archetype but decreased significantly for the African archetype*. We traced these differences to two factors: the ability of the rich to protect their financial assets through capital flight in the Latin American archetype and the flexibility in the African archetype, which helps the poor as the real incomes of the rural areas are raised through higher export earnings induced by the real exchange rate depreciation. The second result, often stressed by structuralists, is that adjustment can lead to a sharp redistribution of income from groups with low marginal propensities to save toward groups with high marginal propensities to save. In the context of supply- (rather than demand-) constrained economies, such Kaldorian redistributive effects will tend to raise investment and growth, which helps reduce poverty. The third result is that redistributive policies through trade and tax reforms that improve allocative efficiency by equalizing incentives across sectors can reduce inequality significantly, provided that governments are able to implement these revenue-neutral redistributive measures.

There were also other interesting differences. These included the relatively small effects of reforms on growth and income distribution in both archetypes, even though the reasons for this were found to be different for each one. Perhaps most significantly, we showed that our macro-micro model replicated broadly the stylized changes in the value of the macroeconomic indicators during the

1980s (lower growth, a fall in the investment share in GDP, a current account deterioration because of higher interest payments on the external debt, and a surge in inflation in Latin America). In this context wage and price rigidities built into the Latin American archetype caused the distribution of income to worsen significantly as a result of the external shock. However, wage and price flexibility built into the African archetype insulated the distribution of income from the external shock.

APPENDIX

This appendix details briefly the assumptions made in the construction of each archetype economy. The production and final demand structure for the two archetype economies and the tax structure across sectors and socioeconomic groups is given in tables A-1 and A-2. The structure is a slight modification of what Chenery and Syrquin call the "standard" cross-country model (see Chenery, Robinson, and Syrquin 1987, chapter 3). We constructed the African (Latin American) archetype from their low-income (middle-income) cross-country model. In addition to differences in structural composition, the two economies have differences in interindustry linkages, as reflected in the lower value added to gross output ratio in the Latin American archetype. Interindustry linkages for the two archetypes are adapted from table 5.2 of Chenery, Robinson, and Syrquin (1987).

Tables A-3 to A-5 describe the initial distribution of physical and financial assets across socioeconomic groups, and the assumptions about initial publicly held foreign debt and the share of total debt held in domestic bonds. Assumptions about financial ratios for firms and the economy as a whole are given in table A-5. The African archetype initially has a lower share of external debt. The same log variance of income is used for corresponding socioeconomic groups across economies, and dispersion in within-group income is assumed to be higher for capitalists than for workers.

Table A-1. *Production and Demand Structure of the African Archetype*
(percentage of total value added)

Sector	Output	Value added	Consumption		Investment		Exports	Imports	Intermediate demand
			Private	Public	Private	Public			
Primary exports	16.7	13.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0
Agriculture	30.0	24.8	18.8	0.7	0.0	0.0	0.0	3.9	14.5
Light industry	28.6	10.7	7.8	0.7	0.0	0.0	0.7	6.7	26.1
Heavy industry	8.4	3.6	1.3	0.7	5.6	1.9	0.2	13.7	12.4
Services	47.3	27.9	21.0	1.2	11.3	3.9	2.2	4.6	12.4
Government	9.0	9.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0
Informal	13.0	11.0	10.83	0.0	0.0	0.0	0.0	0.0	2.2
Total	153.0	100.0	59.7	12.3	16.9	5.8	19.8	28.8	67.4

Tax structure (percent)				
Sector	Indirect tax	Corporate tax	Tariff	Export tax
Primary exports	14	0	0	8
Agriculture	0	0	10.6	0
Light industry	4	0	24.8	0
Heavy industry	5	0	16.8	0
Services	9	0	0	0
Noncompetitive imports			16.0	
Percentage of total tax revenue	49	0	25	10
Income tax on capital: 10 percent (16 percent of total tax revenue)				

Source: Adapted from Chenery, Robinson, and Syrquin (1987), tables 3.4 and 5.2.

Table A-2. *Production and Demand Structure of the Latin American Archetype*
(percentage of total value added)

Sector	Output	Value added	Consumption		Investment		Exports	Imports	Intermediate demand
			Private	Public	Private	Public			
Primary exports	6.1	4.3	0.0	0.0	0.0	0.0	4.6	0.0	1.5
Agriculture	11.4	8.0	7.7	0.0	0.0	0.0	0.0	3.0	6.7
Light industry	46.1	17.0	21.0	0.0	0.0	0.0	4.6	4.0	24.5
Heavy industry	31.4	15.7	3.6	0.0	7.8	1.1	2.9	13.2	29.2
Services	55.4	32.8	22.0	0.0	12.8	1.9	5.1	4.3	17.9
Government	6.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0
Informal	20.0	16.2	15.0	0.0	0.0	0.0	0.0	0.0	5.0
Total	170.4	100.0	69.4	0.0	20.6	3.0	17.2	24.5	84.8

Sector	Tax structure (percent)			
	Indirect tax	Corporate tax	Tariff	Export tax
Primary exports	2	0	0	5
Agriculture	0	0	8	0
Light industry	1	8	45	0
Heavy industry	2	8	40	0
Services	4	8	0	0
Noncompetitive imports			41	
Percentage of total tax revenue	31	5	48	2
Income tax on capital: 10 percent (14 percent of tax revenue)				

Source: Adapted from Chenery, Robinson, and Syrquin (1987), tables 3.5 and 5.2.

Table A-3. *Private Sector Distribution of Assets and Liabilities in the African Archetype*
(percent unless otherwise indicated)

<i>Factor of production</i>	<i>Production sector</i>	<i>Socioeconomic group</i>					<i>Total</i>	
		<i>Capitalists</i>	<i>Big farmers</i>	<i>Small farmers</i>	<i>Landless agricultural workers</i>	<i>Modern workers</i>		<i>Informal workers</i>
<i>Distribution across socioeconomic groups</i>								
Land	Primary export	20	80					100
	Agriculture		55	45				100
Labor	Primary export		1.8	7.8	11.8			21.4
(labor units)	Agriculture		4.2	18.2	27.4			49.8
	Consumer goods		0.8			3.2		4.0
	Intermediate and capital goods					0.4		0.5
	Nontraded formal		1.2			4.6		5.8
	Informal						14.0	14.0
	Total		8.1	26.0	39.2	8.2	14.0	95.5
Capital	All sectors	62.0	27.4	1.4	6.3	0.7	2.2	100.0
<i>Financial assets ratios</i>								
	Money/income	10	10	10	10	10	10	
	Savings/income	42	26	2	1	6	3	

Source: Authors' calculations.

Table A-4. *Private Sector Distribution of Assets and Liabilities in the Latin American Archetype*
(percent unless otherwise indicated)

Factor of production	Production sector	Socioeconomic group					Total
		Capitalists	Big farmers	Small farmers	Landless agricultural workers	Modern workers	
<i>Distribution across socioeconomic groups</i>							
Land	Primary export	20	80				100
	Agriculture	10	55	35			100
Labor	Primary export		0.3	1.8	5.6		7.7
(labor units)	Agriculture		0.8	4.2	12.3		17.3
	Consumer goods	0.8				11.6	12.4
	Intermediate and capital goods	0.4				6.7	7.1
	Nontraded formal	0.8				11.4	12.2
	Informal						27.0
	Total	2.0	1.1	6.0	17.9	29.7	83.7
Capital ^a	All sectors	33.6	4.7	0.2	0.5	16.3	60.0
<i>Financial assets ratios</i>							
	Foreign assets/financial wealth	30	20				
	Domestic bonds/nonmonetary assets	70	30				
	Money/income	10	10	10	10	10	10
	Savings/income	41	21	2	2	8	5

a. This does not add up to 100 percent because of the assumption of 40 percent retained earnings.

Source: Authors' calculations.

Table A-5. *Financial Assumptions*
(percent)

<i>Sector</i>	<i>Firm financial ratio</i>					
	<i>African archetype</i>			<i>Latin American archetype</i>		
	<i>Liabilities/ assets</i>	<i>Working capital/sales</i>	<i>Foreign debt/ total debt</i>	<i>Liabilities/ assets</i>	<i>Working capital/sales</i>	<i>Foreign debt/ total debt</i>
Primary export	5	10	0	5	15	0
Agriculture	5	10	0	5	15	10
Consumer goods	30	10	0	25	15	10
Intermediate and capital goods	30	10	0	25	15	10
Nontraded formal	30	10	0	25	15	0
Informal nonagriculture	0	10	0	0	0	0
	<i>Economywide ratio</i>					
	<i>African archetype</i>		<i>Latin American archetype</i>			
Debt/exports	164		100			
Money supply/sales	15		40			
Domestic bonds/government debt	0		25			

Source: Authors' calculations.

REFERENCES

- Bourguignon, François, W. Branson, and Jaime de Melo. Forthcoming. "Adjustment and Income Distribution: A Micro-Macro Model for Simulation Analysis." *Journal of Development Economics*.
- Brecher, Richard, and Carlos Diaz-Alejandro. 1977. "Tariffs, Foreign Capital, and Immiserizing Growth." *Journal of International Economics*: 317-22.
- Chenery, Hollis, and Moshe Syrquin. 1975. *Patterns of Development: 1950-70*. New York: Oxford University Press.
- Chenery, Hollis, Sherman Robinson, and Moshe Syrquin, eds. 1987. *Industrialization and Growth: A Comparative Study*. New York: Oxford University Press.
- Tobin, James. 1969. "A General Equilibrium Approach to Monetary Theory." *Journal of Money, Credit, and Banking* (February): 15-29.
- World Bank. 1990. *World Development Report 1990: Poverty*. New York: Oxford University Press.

How Did Workers Benefit from Bolivia's Emergency Social Fund?

John Newman, Steen Jorgensen, and Menno Pradhan

Bolivia's Emergency Social Fund (ESF) was established to cushion the adverse effects on the poor of the economic crisis and subsequent stabilization program in the 1980s and to facilitate transition through the phases of structural adjustment. The ESF provided temporary employment opportunities by funding small-scale, labor-intensive projects that were proposed by local governmental and nongovernmental organizations. This article measures the impact of the ESF program on employment and income of workers in the ESF projects. For the average ESF worker, hourly wages were 12.8 percent higher, the work week was 9.5 hours longer, and weekly earnings were 32 percent higher than what they would have been without the ESF. Taking into account the probability that the individual may not have worked without the ESF leads to larger gains. The greatest benefits from participating in the program were received by those who would have been least well-off without it.

Bolivia's Emergency Social Fund (ESF) represented one of the first World Bank-funded efforts to address the social costs of adjustment through creating a separate compensatory program, rather than by modifying the implementation of a structural adjustment program in light of the expected social costs. Although the primary emphasis of this program was to provide temporary employment opportunities, it differed from more typical government works projects in several important ways. First, the program was intended to be demand-driven. The management team of the ESF approved or rejected funding requests for small-scale, labor-intensive projects that came from local governmental and nongovernmental agencies, but did not propose any projects themselves. Second, the ESF did not directly employ the workers. Rather, the projects were executed and the workers hired by private subcontractors working under the supervision of the local agency and the central management team of the ESF. Third, the ESF was established explicitly as a temporary financial institution outside of the normal bureaucratic structure of the government.

There are several avenues through which a compensatory program such as the

John Newman is in the Population and Human Resources Department, and Steen Jorgensen is in the Southern Africa Department, both at the World Bank. Menno Pradhan is currently a Ph.D. candidate at the Universiteit van Amsterdam. The authors would like to thank Marcelo Mercado and Alejandro Mercado of the Instituto Nacional de Estadística of Bolivia and Fernando Campero of the Fondo Social de Emergencia of Bolivia for their assistance in this project.

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ESF can affect the transition through the structural adjustment process. It may contribute political support to carry out the adjustment policies, create infrastructure that reduces the cost of producing tradable goods, and alter workers' incentives to move toward favored sectors. As in any program designed to alleviate the social costs of the adjustment process, there is a tension between easing the adverse impact and counteracting the necessary reforms. Because the ESF's economic infrastructure projects generated employment in the nontraded goods sector, they did not directly contribute to shifting the structure of production toward traded goods. Indeed, they raised the return to employment in the nontraded goods sector. If the ESF is to aid in the transition, its contribution toward easing the transition (the economic infrastructure and the income maintenance) must in some sense outweigh its negative effect in counteracting the reforms (the impact on nontradables).

Quite apart from the ESF's role in the adjustment process, interest has been expressed in Bolivia's experience with the demand-driven mechanism used to distribute the funds. Under the auspices of the ESF, substantial external funds were generated and channeled to a large group of smaller governmental and nongovernmental organizations. Rapid disbursements were facilitated by the ESF's use of the market and its reliance on local groups to propose projects and mainly private subcontractors to execute them. The ESF's success in quickly disbursing large sums has motivated efforts to establish similar social investment funds in other countries (notably in Guatemala, Haiti, and Jordan), either with or without a connection to a structural adjustment program.

Because different groups have been interested in different aspects of the ESF, there is no single criterion for measuring the success of the program and, consequently, no single source of information on which to judge the program. At the risk of oversimplification, one can identify four different views of the ESF. Depending on the perspective of the observer, the ESF was (a) a Keynesian aggregate demand policy designed to keep the economy from contracting further during the structural adjustment process, (b) an institution to channel externally generated funds down to local groups that previously had no access to this type of funding, (c) a program to compensate those who suffered the greatest loss due to adjustment, or (d) a program to protect the poor and vulnerable during adjustment. (Those individuals in group d. are not necessarily the same as those in group c.)

Initially, the predominant view of ESF's role was that it should generate external funds and quickly inject them into the economy. External funds were necessary because financing the project out of domestic funds would have made it that much harder to achieve the budget deficit reduction objective of the structural adjustment program. To judge how well the ESF did in this regard, one need only consult the administrative record. By the end of 1988, the ESF had raised more than \$100 million in foreign currency, an amount equal to about one-fourth of the current account deficit in 1988. Most of the foreign financing received has been in the form of grants. There is reason to believe that foreign aid inflows

would have been considerably lower without the ESF; several donors have begun or resumed programs in Bolivia because the ESF was able to ensure efficient and speedy implementation. In addition, the ESF's administrative costs amounted to no more than 3 percent of its budget, and the average lag between dates of commitment and disbursement of all funds was less than one year in the ESF, shorter than even fast-disbursing balance of payments support. The ESF was effective in making resources available to municipalities, community organizations, and nongovernmental organizations (NGOs), which, because of their size, do not typically receive funding from international organizations. By the end of 1988, the ESF had committed about \$20 million or 20 percent of its total commitments to NGOs.

Despite the initial view of the ESF's role, the viability of social investment funds and the benefits of a program like the ESF cannot be judged solely on the basis of the administrative record. The administrative record provides a measure only of the inputs (the expenditure of the investment fund) and not the outputs of the investment fund. Moreover, it remains an open question whether the success the ESF has had as a temporary institution operating to a large extent independently of the line ministries and outside of many normal constraints can be replicated in a permanent institutional framework. The experience that will come with the successor to the ESF in Bolivia (the Social Investment Fund) and with social investment funds elsewhere will be a strong test of the institutional viability of a permanent social investment fund.

Judging the effectiveness of the ESF's institutional structure, its role in compensating those adversely affected by the structural adjustment, and its contribution toward protecting the poor during adjustment necessitates information on the outputs of the program—the value of the infrastructure created and the impact of the program on beneficiaries. Grosh (1990) describes evaluations of some facets of the ESF that have been conducted, including (a) a technical audit of the technical and engineering quality of its civil works; (b) an early evaluation and monitoring report conducted by a team of economists and sociologists; (c) a community participation study conducted by anthropologists through open-ended but structured interviews; (d) an *ex post* cost-benefit analysis of a small sample of completed projects; (e) a study of the macroeconomic impact, which compares the results of investing through the ESF with results from investing through alternative channels; (f) a study of the impact on institutions with which the ESF worked; (g) a study of its impact on one particular community; and (h) a study on the geographic targeting of projects.

This article is concerned with measuring the impact of the ESF program on the employment and income of workers in the ESF projects. Two aspects of the ESF's effect that are not addressed in this article are worth mentioning. First, given the relatively small size of the ESF program, we do not estimate spillover effects of the program on the urban labor market in general. Second, we are not concerned here with estimating the value of the economic infrastructure created (see Herrick 1989 for a benefit-cost analysis of the infrastructure created). Neverthe-

less, it is important to recognize that some of the objectives of the program not evaluated here, namely, to generate productive economic infrastructure and to generate and disburse funds quickly, imposed constraints on the extent of employment generation and income maintenance that resulted from the ESF. For example, because economic infrastructure projects were managed by subcontractors who decided whom to hire, almost no women were hired. This is not surprising because these were construction projects and extremely few women work in the urban construction sector in Bolivia. If the infrastructure output of this employment and income maintenance program is highly valued, then it may still be appropriate to fund such projects even though the mix of the workers hired does not match the desired targets.

Our analysis of the effect of the ESF projects on employment and incomes is based on the results of a survey administered to workers in ESF infrastructure projects and to the population at large by the Instituto Nacional de Estadística of Bolivia. In the first part of the article we identify the characteristics of the workers in the ESF infrastructure projects and compare these workers with the population in general and workers in the construction sector in particular. In the second part of the article we perform a counterfactual simulation, asking what would have been the position of the ESF workers without the ESF program. Based on this simulation, we infer the employment and income effect of the ESF program on its beneficiaries.

I. BACKGROUND TO THE ESF

The Bolivian economy deteriorated rapidly and continuously after 1980, reaching a point of chaos by 1985. In retrospect, the causes are clear. In the 1970s, an artificial boom, fed by capital inflows, followed the discovery of substantial hydrocarbon resources. The boom lasted as long as access to foreign financial resources was easy. When capital inflows slowed in 1980, economic performance deteriorated sharply: net foreign transfers became strongly negative, gross domestic product (GDP) fell in real terms, and capital flight accelerated. Economic policies became erratic and inconsistent. By September 1985, inflation had reached 24,000 percent a year, real GDP per capita had fallen by more than a fifth since 1980, and public sector deficits were about one-fourth of GDP.

When the government of President Paz-Estensoro took office in August 1985, an orthodox, wide-ranging stabilization package was introduced. The package freed most prices, deregulated the trade system and the labor market, established a uniform exchange rate (determined through daily auctions), and cut public sector deficits. Inflation was immediately curtailed and has remained low; inflation was 11 percent in 1987 and 21 percent in 1988 and 1989. Public sector deficits have been brought under control, and the exchange rate has remained unified. Growth was impeded by serious negative terms of trade

shocks in the first year of the program, but the economy grew slowly in 1987, 1988, and 1989.

The effects of the economic program on the public sector were especially dramatic. The government set out to fundamentally change the role of the public sector. The public sector's new role was to efficiently provide basic public services, engage in only limited extraction and processing of natural resources, and provide a "level playing field" for the private sector. The state mining sector was closed for restructuring, and 90 percent of its employees were fired. Public sector salary policy was left to individual departments to determine under a fixed wage bill, and the accounting and control system in the public sector was reformed.

From the outset of the adjustment program, the Bolivian government attached a high priority to preventing any further deterioration in social conditions. This was the result not only of concerns over the effect of economic dislocation on the already very low living standards of the Bolivian poor, but also of fear that increased hardship would strengthen opposition to the government's policies. Several plans were considered for alleviating the social costs of adjustment before deciding on the ESF. The early discussions in 1985 revolved around more traditional programs of widespread distribution of food or medicines, or direct subsidies for selected items. These approaches presented a number of difficulties. First, the administrative cost of directly providing or subsidizing the purchase of commodities to low-income groups would be high. Second, providing free food (particularly if taken from international donations) would discourage domestic food production and increase the country's dependence on food imports. Third, permitting recipients more discretion in the use of assistance (providing money instead of food, for example) would be more consistent with the new reduced role of the state. Fourth, the government did not wish to impose a uniform method of assistance, but rather to respond to the demands of local groups that would be in a better position to evaluate the most immediate needs.

In answer to these concerns about traditional programs, the ESF was established in November 1986 to provide funds for small-scale, labor-intensive projects, mostly in infrastructure. The program was to be demand-driven, meaning that the ESF would finance projects proposed by local groups. The focus on labor-intensive, infrastructure projects was adopted to increase employment among the poor while at the same time providing services to the community that would aid development. The ESF was primarily a financing institution. It was not involved in implementing projects, except for some supervision and technical support. The organizations that received funding were responsible for hiring workers and ensuring that projects moved toward completion.

The ESF was designed as a temporary institution, scheduled to disappear in December 1990. It was hoped that in four years' time growth would have picked up enough to solve the employment problem, and the need for austerity mea-

asures would be lessened, which would allow increases in social spending as part of the regular budget. The ESF's total program was planned as \$180 million over the life of the institution, with \$8 million coming from the Bolivian government and the rest from external sources in the form of grants or loans at concessional rates.

The ESF funds projects in four basic categories: economic infrastructure, social infrastructure, social assistance, and production support. Economic infrastructure (amounting to 37.8 percent of committed funds) encompasses infrastructure closely related to productive activities, including road maintenance and upgrading, urban improvement, irrigation, flood control, and reforestation. Social infrastructure (47.6 percent of committed funds) covers infrastructure for health and education, water and sanitation, basic housing (mostly self-construction), and some cultural projects (for example, repairs of historic buildings). Social assistance (8.8 percent of committed funds) covers recurrent costs in education and training, vaccinations, school breakfasts, and production of school materials. Production support (5.7 percent of committed funds) is mainly credit provided through ngos to productive units that are outside of the formal financial system, such as microenterprises producing for the informal sector and small cooperatives in mining and agriculture.

II. THE DATA

The ESF management team commissioned *ex post* evaluations of the economic returns of the projects and surveys of the beneficiaries of the employment-generating projects. Information on ESF workers was obtained from a special survey conducted by the Instituto Nacional de Estadística. Information on the general population was obtained from the 1988 Encuesta Permanente de Hogares, part of a continuing survey that has been conducted yearly by the Instituto since 1976. The 1988 Encuesta survey took place in May and covered urban households in nine provincial capitals. For the ESF survey, the Instituto selected all projects in execution that were in capital cities, in operation at the time of the Encuesta survey, and in economic infrastructure (that is, explicitly employment-generating). A total of sixty-four projects employing 3,051 workers met these requirements. The Instituto staff then visited the projects to determine the actual number of workers employed at the projects and drew a random sample of 600 workers from the list of all workers. The ESF workers were visited in their homes and were administered the same household questionnaire as that of the Encuesta sample. Table 1 indicates the distribution of all workers in the sixty-four projects and of the sample across all cities.

ESF workers were surveyed separately for two reasons. First, at the time of the survey the number of ESF workers was small, so the probability of finding a sample of ESF workers sufficiently large for analytical work in a sample of the general population was low. The 3,051 ESF workers in the capital cities constituted just 0.3 percent of the economically active population and 2.7 percent of the

Table 1. *Distribution of Workers in Sixty-Four ESF Economic Infrastructure Projects*

<i>Capital city</i>	<i>Number of project workers in ESF projects</i>	<i>Number of project workers in random sample</i>
Cobija	86	17
Cochabamba	403	80
La Paz	1,296	255
Oruro	492	96
Potosi	401	79
Santa Cruz	82	16
Sucre	173	34
Tarija	118	23
Total	3,051	600

Source: Instituto Nacional de Estadística (1988); Fondo Social de Emergencia (1988).

unemployed in these cities. Second, previous pilot surveys indicated that many of the workers in ESF-financed projects did not know that the ESF was a funding source. (And when the Instituto visited the ESF workers for the 1988 survey, having obtained their names and addresses from the subcontractors, most of the workers had not even heard of the ESF.) To guarantee that ESF workers would be properly identified and interviewed, therefore, a separate sample consisting only of ESF workers was drawn.

III. ESF WORKERS: CHARACTERISTICS, EARNINGS, HOURS WORKED, AND WAGES

The workers in these ESF projects are, for the most part, prime-age married males who are heads of households. Ninety-nine percent are male, and 71 percent are married. Ninety-one percent are between twenty and sixty-five years old, and 93 percent are reported as head of the household. These workers are the primary income earners in their households, and the earnings from the ESF projects are their main source of income. In 62 percent of the ESF households there is only one reported income earner, in 25 percent there are two, and in 9 percent there are three. Only 7.2 percent of the ESF workers have a secondary job.

Most of the ESF projects in the capital cities are in the construction sector, and 91 percent of the ESF workers work in construction. This percentage is high because of the selection of only projects in economic and social infrastructure. We compare the ESF workers with other workers in the construction sector and with workers in general, using information from the Encuesta sample. Compared with other workers in the construction sector, ESF workers are less educated. The distribution over the different educational levels is given in table 2.

Thirty-nine percent of the sample responded that they were looking for work before working in the ESF project, whereas 54 percent reported that they had a job before joining. Of those who had a job, 60 percent worked in construction, either as an independent or wage worker. That is, a little over 30 percent of all

Table 2. *Educational Levels of Surveyed Workers*
(percent)

<i>Level of education attained</i>	<i>Percentage of ESF workers</i>	<i>Percentage of all construction workers</i>
None	6.2	4.4
Basic	41.1	36.8
Intermediate	24.1	15.8
Middle	25.9	26.9
Technical	0.6	3.5
Normal	0.2	0.6
University	1.9	12.0

Source: Instituto Nacional de Estadística (1988a, 1988b).

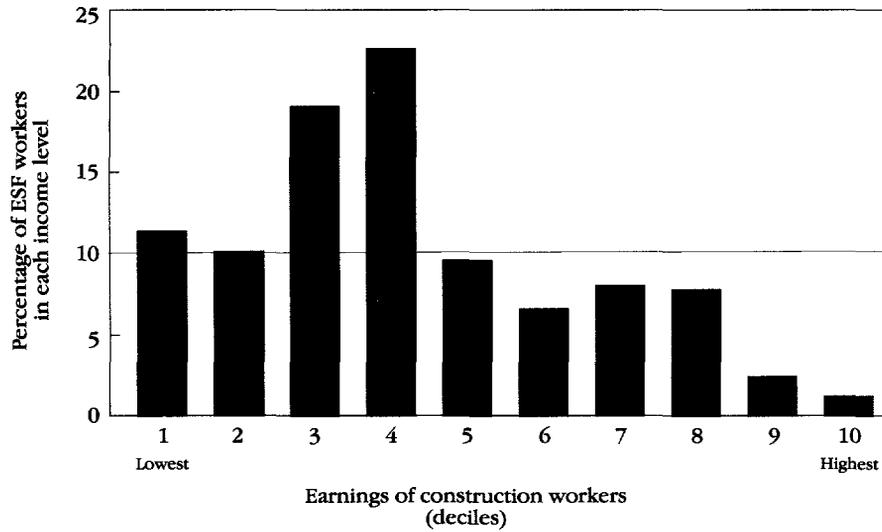
those working in ESF projects were working on construction jobs before working on the ESF projects.

Although the ESF workers have low skills relative to the *average* construction laborer, their mean monthly earnings of 225 bolivianos (Bs225) exceeded those of other low-skilled construction workers in the Encuesta sample (Bs194). Mean monthly earnings were Bs375 for the average prime-age male construction worker in the Encuesta sample, and Bs348 for the average prime-age male in the population at large. The median monthly earnings were Bs194 for workers in ESF projects, Bs220 for prime-age males in the construction sector, and Bs230 for prime-age males in the population in general.

Figure 1 presents the distribution of ESF workers across the deciles of monthly earnings of males 18 to 65 years old in the construction industry. Figure 2 presents a similar distribution of ESF workers across the monthly earnings deciles of all males 18 to 65 years old in the Encuesta sample. The height of the bars indicates the percentage of ESF workers with monthly earnings that would place them in the given decile in the Encuesta sample. For example, in figure 1, 11 percent of the ESF workers receive monthly earnings that place them in the poorest decile of construction workers. Compared with both construction workers and urban workers in the Encuesta sample, ESF workers tend to be overrepresented in the third and fourth poorest deciles and severely underrepresented in the richest deciles. Although the earnings of all ESF workers are low relative to earnings in other countries, figures 1 and 2 illustrate that not all the workers in the ESF projects are low-income workers by the standards of the urban Bolivian work force. Similarly, data on the distribution of family income of ESF workers indicates that ESF families fall disproportionately in deciles 3 through 6 and are underrepresented in the lower and upper deciles.

The workers in the ESF projects work more hours, on average, than the prime-age males in the Encuesta sample: 50.3 hours a week compared with 46.8 for the Encuesta workers. Compared with other prime-age males in the construction sector and the population in general, the distribution of hours worked by ESF workers is less variable, with 56 percent of the workers working 46–50 hours a week, and 95 percent working more than 40 hours a week. In the Encuesta sample, 39 percent worked 46–50 hours a week, and 77 percent worked more than 40 hours.

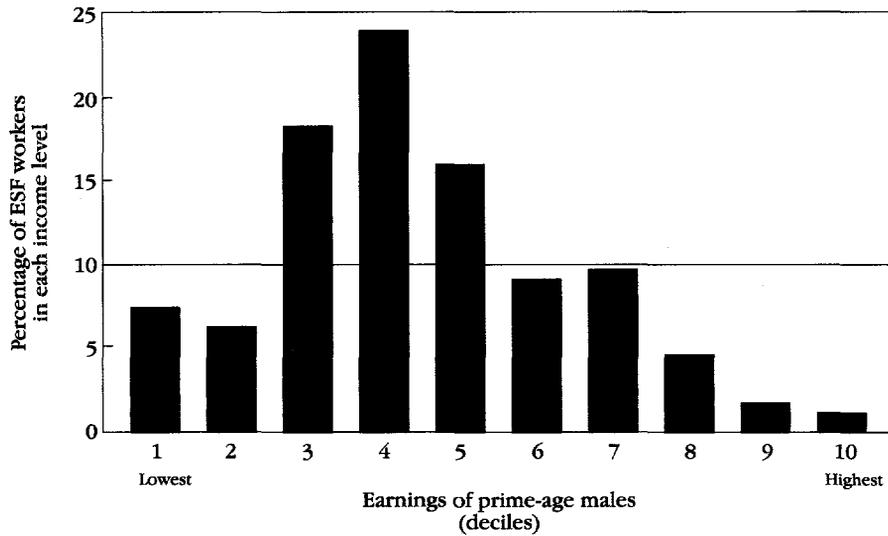
Figure 1. *Earnings of ESF Workers Compared with That of All Construction Workers*



Note: Decile ranges are calculated from all construction workers' earnings (Encuesta sample).

Source: Instituto Nacional de Estadística (1988a, 1988b).

Figure 2. *Earnings of ESF Workers Compared with That of All Prime-Age Males*



Note: Decile ranges are calculated from all workers' earnings (Encuesta sample).

Source: Instituto Nacional de Estadística (1988a, 1988b).

Table 3. *Distribution of ESF Families by Family Earnings and Food Expenditure*
(percentage of ESF families)

<i>Family earnings (quartile)</i>	<i>Food expenditure (quartile)</i>				<i>Total</i>
	<i>Lowest</i>	<i>Second lowest</i>	<i>Second highest</i>	<i>Highest</i>	
Lowest	12.9	5.5	2.4	0.7	21.5
Second lowest	16.5	19.2	7.0	1.0	43.7
Second highest	4.3	9.6	9.6	2.9	26.4
Highest	0.9	2.2	2.9	2.4	8.4
Total	34.6	36.5	21.9	7.0	100.0

Source: Instituto Nacional de Estadística (1988b).

The mean hourly wage of workers in the ESF projects was Bs1.16 compared with a mean hourly wage of Bs2.28 for all construction workers in the Encuesta sample. The median hourly wage is Bs0.98 for ESF workers and Bs1.29 in the Encuesta sample.

Table 3 presents the distribution of ESF families by family earnings and food expenditure. In general, the ESF families appear to be worse off if judged by their position within food expenditure quartiles as opposed to family earnings quartiles. For example, 34.6 percent of the ESF families are in the lowest food expenditure quartile, whereas only 21.5 percent of the ESF families are in the lowest family earnings quartile. And 17 percent of the families are in the highest two earnings quartiles and the lowest two food expenditure quartiles. Although it is possible that measurement error in either food expenditure or family earnings resulted in a misclassification of some families into the wrong cell, the observed relation between expenditure and income is what one would expect given the temporary nature of ESF jobs. The ESF families may not have changed their expenditure patterns in response to the temporary gain in income, so that movement into a higher earnings quartile was not accompanied by movement into a higher food expenditure quartile.

Eleven percent of the families in the lower two earnings quartiles are in the highest two food expenditure quartiles. The workers in this group may have come from relatively well-off households, because low earnings did not lead the household to have low food expenditure; they may have drawn on other financial resources that were not reported in the survey. The families who are in both the high earnings and the high food expenditure quartiles (17.8 percent) may have been relatively well-off households to begin with, or the high earnings may have raised the households' food expenditure. With limited information on the household characteristics of ESF workers, we can not tell which is the more likely explanation.

IV. IMPACT OF THE ESF PROGRAM

To ascertain the effect of the ESF on the labor market, we ask a counterfactual question: what would have been the position of the ESF workers and other

individuals in the labor market without the program? In principle, the positions of both types of workers could be estimated by holding constant local labor market conditions (the size and structure of demand) and estimating the incremental effect of the ESF program on wage offers. Because the ESF increases the demand for labor, one would expect it to increase the level of wages offered, the probability of working, and hours worked. To infer the effect on workers of the ESF program, one would compare expected wages, probabilities of working, and hours worked with the incremental effect of the ESF program with the corresponding values obtained by setting the incremental effect to zero.

Such a procedure requires an accurate indicator of the size of the ESF program in the different capital cities. At the time of the survey, there was substantial variation both in local labor market conditions and in the size of the ESF program. The variation in the ESF program, however, was not random. The actual size of the program reflected the number and size of proposals that were received from each city and the funding decision rules of the ESF's management team. The management team attempted to fund projects in cities where wages were low and where unemployment and underemployment were high. Because of this nonrandom allocation, the inclusion of a direct measure of ESF size (for example, the number of ESF workers or expenditure in each city) would generate biased estimates of the program's effect. The ESF measure would be correlated with the error terms in the equations explaining wages and labor force participation because of its correlation with unobserved local labor market conditions.

This is a common problem in evaluating government programs (Rosenzweig and Wolpin 1986) and is typically solved by incorporating information on the program implementation to distinguish between the effects of the allocation and the impact of the program. Evaluating a demand-driven program such as the ESF can be even more difficult than the typical case if the applications for the projects are correlated with the variables of interest. If the applications and other variables are uncorrelated (as would be the case if the underlying capacity to generate proposals was randomly distributed across cities), then information on the applications could serve as an instrument for the size of the ESF program. No additional information on the decision rules would be needed. If the initial applications are not randomly distributed across the cities, however, then even knowledge of the management's decision rules may not overcome the problem of a nonrandom allocation of the ESF program. Additional information would have to be available on the ability of a city to generate fundable proposals.

Our attempts to measure the incremental effect of the ESF program using the dollar amount of applications in each city as an instrument for the size of the program were unsuccessful. The ESF applications were in fact highly correlated with the population and unemployment rate in the city. Consequently, it proved impossible to measure any spillover benefits of the ESF program on other workers who do not participate in the program. Given, however, that the total amount of workers employed in capital cities at the time of the survey amounted to just 0.3 percent of the economically active population and 2.7 percent of the total unemployed, any spillover effects would be expected to be minimal. Thus

we focus exclusively on measuring the benefits of the ESF program to the workers who participate in the program.

The Econometric Specification

We estimate the workers' expected gains from participating in the ESF program using two models. Both are based on Heckman's (1974) model describing the determination of wages, the probability of working, and the hours of work (see also Amemiya 1985, pp. 391–93). Our first model consists of four equations that describe wage offers in the general population, the marginal value of leisure of individuals in the general population, wage offers in the ESF, and the marginal value of leisure of ESF workers. In this model, we assume that the errors in the equations for the general population are independent of the errors in the equations for the ESF. This implies that ESF workers differ from those in the general population only in their observed characteristics, not in unobserved characteristics, and it allows us to estimate the wage-offer and marginal-value-of-leisure equations separately for each group.

Given the characteristics of the workers and the labor market (city) they are in, one may calculate wages, hours of work, earnings, and the probability of working from the estimated structural equations. An estimate of the workers' expected gains from participating in the ESF program is then obtained by comparing the expected wages, hours of work, and earnings while participating in the program with estimates of what they would have been without it. Under the assumptions of this first model, the counterfactual wage offers and marginal values of leisure are obtained by inserting the characteristics of the ESF workers into the estimated wage-offer and marginal-value-of-leisure equations of the general population.

A problem with this model is that ESF workers may differ from individuals in the general population in ways that are not captured by their observed characteristics. That these workers chose to participate in the ESF indicates they perceived working in the ESF to be better than their alternatives and, therefore, suggests that they might be different from the general population. Our second model takes this into consideration in estimating what the ESF workers would receive without the program. It adds an equation determining participation in the ESF and allows the error terms in the participation equation to be correlated with the errors in the wage-offer and marginal-value-of-leisure equations of ESF workers and the general population.

In this section we briefly describe the estimation procedure for the first, simpler model. The second, more complicated model is explained in the appendix.

The equation describing wage offers in the general population, w^o , is

$$(1) \quad \ln w^o = X_1' \beta_1 + u_1$$

where X_1 is a vector of explanatory variables, and u_1 is a random error term. Wage offers are assumed not to depend on the hours of work, although this assumption could be relaxed.

The individual's marginal value of leisure, w^r , is specified as a function of a set of exogenous variables and the individual's hours of leisure, (total time available minus the hours of work):

$$(2) \quad \ln w^r = Z'_1 \alpha_1 + \gamma_1 H + u_2$$

where Z is a vector of explanatory variables, H is the hours of work, and u_2 is a random error term. Errors between the wage-offer and the marginal-value-of-leisure equations for the general population are allowed to be correlated to take account of possible measurement error.

Similarly, the equation describing wage offers in the ESF, w^o_{ESF} is

$$(3) \quad \ln w^o_{\text{ESF}} = X'_2 \beta_2 + u_3$$

and the equation describing the marginal value of leisure of workers in the ESF is

$$(4) \quad \ln w^r_{\text{ESF}} = Z'_2 \alpha_2 + \gamma_2 H_{\text{ESF}} + u_4$$

Again, correlation between u_3 and u_4 is allowed.

Because everyone who participates in the ESF works, we do not have to consider their decision whether or not to work. We do have to consider this decision for those in the general population, however. An individual in the general population will work if the offered wage is greater than the marginal value of leisure evaluated at zero hours of work, often referred to as the reservation wage:

$$(5) \quad \ln w^o > \ln w^r (H = 0) \equiv Z'_1 \alpha_1 + u_2$$

or, substituting from equation 1 and rearranging, if

$$(6) \quad u_1 - u_2 > Z'_1 \alpha_1 - X'_1 \beta_1.$$

Individuals who work will do so up to the point at which the marginal value of leisure is equal to the wage offer. The wage and hours worked are determined by solving equations 1 and 2 simultaneously with the condition that

$$(7) \quad \ln w = \ln w^o = \ln w^r.$$

Thus, for individuals who work, we have the following two equations:

$$(8) \quad \ln w = X'_1 \beta_1 + u_1$$

$$(9) \quad \ln w = Z'_1 \alpha_1 + \gamma_1 H + u_2$$

or, solving equation 9 for hours of work,

$$(10) \quad H = \frac{1}{\gamma_1} \ln w - Z'_1 \frac{\alpha_1}{\gamma_1} - \frac{1}{\gamma_1} u_2.$$

Provided there are variables that affect the marginal value of leisure that do not also affect wage offers, all structural parameters of the model (given by equations 8 and 9) are identified.

The model was estimated using maximum likelihood techniques. The princi-

ple behind this estimation method is to choose values for the population parameters that maximize the probability of having observed the actual sample drawn. Once an assumption is made about the distribution of the error terms (u_1, u_2, u_3, u_4), it is possible to write down a likelihood function that gives the probability of observing the actual sample in terms of the parameters to be estimated. The parameter estimates that maximize the likelihood function are then found by an iterative numerical procedure. The likelihood function for the general population, L , is

$$(11) \quad L = \prod_0 \int_{-\infty}^{UB} f_{u_1 - u_2}(v) dv$$

$$\prod_1 f_{u_1, u_2'}(\ln w - X_1' \beta_1, H - \frac{1}{\gamma_1} \ln w + Z_1' \frac{\alpha_1}{\gamma_1}, -\rho_{1,2})$$

where $u_2' = -(1/\gamma)u_2$, $UB = Z_1' \alpha - X_1' \beta_1$, v is a dummy of integration, and $\rho_{1,2}$ is the correlation between u_1 and u_2 . The product over 0 consists of all individuals who are not working, and, for each of these individuals,

$$\int_{-\infty}^{UB} f_{u_1 - u_2}(v) dv$$

is the probability that $u_1 - u_2 \leq Z_1' \alpha - X_1' \beta_1$, that is, the probability that equation 6 does not hold and the individual does not work. The product over 1 consists of all the individuals who are working, and, for each of these, $f_{u_1, u_2'}(\cdot, \cdot)$ is the probability that the individual works and chooses the observed number of hours. L is thus the probability of drawing the observed sample, given in terms of the population parameters of interest, $\beta_1, \alpha, \gamma, \sigma_1, \sigma_2$, and $\rho_{1,2}$. For the sample of ESF workers, the likelihood function consists only of the product over 1 (with u_3 replacing u_1 , and u_4' , defined analogously, replacing u_2'), because all ESF workers are employed. Indeed, one could just as well estimate the parameters of interest by seemingly unrelated regression to take account of the correlation between u_3 and u_4 .

The variables that affect the marginal value of leisure are age, a dummy variable equal to 1 if married, nonlabor income, years of schooling, and the number of other family members 12 years or older (included as a measure of the total number of potential workers). The variables in the wage-offer function for the general population include age, years of education, the overall unemployment rate in the city of residence, and the size of the market as measured by the number economically active in the city. In lieu of price indices for each city, we include in the wage-offer function a cost factor employed by the ESF management team in setting administrative guidelines on wages paid in ESF projects. The guidelines allowed for paying higher wages where the nominal wage paid in the market was higher. Including the cost factor accounts somewhat for these differences but does not allow one to distinguish whether nominal wages are higher because the price level is higher or because the demand for labor is higher. This is

not important for the purposes of this article. Because the ESF jobs considered here are exclusively in construction, the wage-offer function for ESF jobs is made a function of the unemployment rate in the construction sector instead of the unemployment rate of the economy as a whole. All other variables in the wage-offer functions are the same. The means of all the explanatory variables for males 18 to 55 years old in the ESF sample and in the general population are presented in table 4.

As discussed above, the second model differs from the first in that it accounts for the determinants of the decision to participate in the ESF. The propensity to participate in the program, Y^* , is modeled as a function of a vector of observed exogenous variables, Ω , and a random error term, u_5 . An individual participates in the ESF only if the latent participation variable, Y^* , passes a threshold. The propensity is not observable: we only observe the determinants and whether or

Table 4. *Explanatory Variables for Males 18 to 55 Years Old*

Variable	<i>ESF workers, mean</i>	<i>General population, mean</i>
Proportion working	1.00 (0.00)	0.61 (0.49)
Weekly hours worked	50.0 (7.00)	29.0 (25.0)
Log wage ^a	-0.03 (0.45)	0.13 (0.78)
Wage ^a	1.07 (0.52)	1.11 (1.10)
<i>Variables in wage-offer equation</i>		
Age	32.0 (10.0)	32.0 (10.0)
Years of schooling	6.6 (3.6)	11.6 (4.6)
Unemployment rate ^b	0.18 (0.04)	0.12 (0.02)
Economically active/100,000 ^c	2.29 (1.76)	1.47 (1.43)
Cost factor	0.98 (0.13)	1.03 (0.18)
<i>Variables in hours equation</i>		
Married (dummy)	0.73 (0.45)	0.59 (0.49)
Other family members 12 or older	2.0 (1.70)	3.1 (2.0)
Nonlabor income/1,000	0.003 (0.012)	0.042 (0.14)
Sample size	452	4,185

a. For the general population, the mean log wage and the wage are calculated only for those who work. All other mean values refer to the combined working and nonworking population.

b. For the ESF workers, the unemployment rate is the unemployment rate in construction. For the general population, it is the overall unemployment rate.

c. This is an indicator of market size, measured as the number of the economically active in the city (divided by 100,000).

Source: Instituto Nacional de Estadística (1988a, 1988b).

not a worker is in the ESF, which we model as a dummy variable, I . The equations for participation are specified as

$$(12) \quad Y^* = \delta\Omega + u_5$$

with

$$\begin{aligned} I &= 1 \text{ if } Y^* \geq 0 \\ &= 0 \text{ otherwise.} \end{aligned}$$

The variables in the Ω vector include all those in the wage-offer and marginal-value-of-leisure equations, together with the monetary value of the accumulated applications to the ESF as of the date of the survey in each capital city and a dummy variable indicating whether the individual had ever heard of the ESF. In cities where ESF applications are higher, one would expect higher participation in the ESF. The dummy variable on knowledge of the ESF is included as a proxy for information costs. If the individual has heard of the ESF, this would be expected to reduce the information costs associated with finding employment in the ESF and make it more likely that the individual would participate. It is not a perfect predictor of being in the ESF because many who were working in projects funded by the ESF had never heard of it.

Results

Because almost all ESF workers were males 18 to 55 years old, we limited our sample of the general population to males in this age group. We also excluded as outliers from both samples those who reported working more than 350 hours a month and those more than two standard deviations away from the mean n wage. The exclusion criteria reduced the ESF sample by nearly 25 percent and the Encuesta sample by 6 percent. Table 5 presents the estimated coefficients for the restricted and unrestricted models for males 18 to 55 years old in the general population. The simpler restricted model, as discussed previously, has no equation for participation in ESF and therefore implicitly assumes no correlation between errors in the participation equation and the wage offer or marginal value of leisure ($\rho_{15} = \rho_{25} = 0$). The coefficients of the variables entering the hours-of-work equations were estimated as α_1/γ_1 and α_2/γ_2 , respectively. Because estimates of γ_1 and γ_2 are available, the structural parameters of the marginal value of leisure for both the general population and the ESF workers could be recovered if so desired.

In this sample, one cannot reject the hypothesis that the restrictions are valid, namely that both ρ_{15} and ρ_{25} are zero. The point estimate of ρ_{15} is negative, meaning that those more likely to participate in the ESF are, given their observed characteristics, more likely to have lower wage offers in the general population. This parameter is imprecisely estimated, however, even in this large sample. The point estimate of ρ_{25} is small and is also imprecisely estimated. The value of the likelihood function changes only slightly between the two models, and all estimated coefficients are virtually identical. Except for the estimates of ρ_{15} and ρ_{25} ,

all coefficients are statistically significant at the 5 percent level with the expected signs. The correlation between the error terms in the marginal value of leisure and the log wage equations (ρ_{12}) is positive, or equivalently, the correlation between the error terms in the equations for the hours of work and the log wage is negative.

Table 5. *Coefficients for the Restricted and Unrestricted Models for the Wage and Hours of Males 18 to 55 Years Old in the General Population*

Variable	Restricted model ^a	Unrestricted model
<i>Wage-offer equation</i>		
Constant	-0.84* (0.13)	-0.84* (0.14)
Age	0.0073* (0.0016)	0.0073* (0.0016)
Years of schooling	0.054* (0.003)	0.054* (0.003)
Unemployment rate	-3.61* (0.56)	-3.61* (0.56)
Economically active/100,000 ^b	-0.03* (0.008)	-0.03* (0.01)
Cost factor	0.75* (0.08)	0.75* (0.08)
σ_1 standard deviation	0.76* (0.01)	0.76* (0.01)
<i>Hours-of-work equation</i>		
Constant	14.0* (4.0)	14.0* (4.0)
Age	0.47* (0.08)	0.48* (0.08)
Married	24.0* (1.00)	24.0* (1.00)
Years of schooling	-1.70* (0.2)	-1.7* (0.2)
Other family members 12 or older	-2.3* (0.2)	-2.3* (0.2)
Nonlabor income/1,000	-11.0* (1.0)	-11.0* (2.0)
Log wage	17.0* (3.00)	17.0* (4.00)
σ_2 standard deviation	2.24* (0.35)	2.23* (0.35)
<i>Correlation coefficients</i>		
$\rho_{1,2}$	0.70* (0.04)	0.70* (0.04)
$\rho_{1,5}$		-0.43 (0.44)
$\rho_{2,5}$		-0.01 (0.44)
-Log likelihood	4,508.42	4,506.72
Sample size	4,185	4,185

Note: Figures in parentheses are standard errors. * = significant at the 5 percent level.

a. Assumes no correlation in the error terms, u_1 with u_5 , and u_2 with u_5 ($\rho_{15} = \rho_{25} = 0$).

b. Indicator of market size, measured as the number of the economically active in the city (divided by 100,000).

Source: Authors' calculations based on data from Instituto Nacional de Estadística (1988a, 1988b).

The estimated increase in the wage from an additional year of schooling is 5.4 percent. An increase of 1 percent in the unemployment rate would lead to a 3.6 percent decrease in wage offers. The results also indicate that those with more nonlabor income and those in families with more potential workers have a higher marginal value of leisure and will work less. An increase of Bs1,000 a year in nonlabor income decreases hours worked per week by 11. Conversely, marriage and age are associated with higher hours of work. A 1 percent increase in the wage is estimated to lead to an increase of 0.17 hours worked. At the sample unconditional mean of 29 hours, this amounts to a 0.6 percent increase in hours worked. Thus the estimated labor supply elasticity is 0.6.

Although more educated people have higher wage offers, they also have higher marginal values of leisure. Thus the effect of education on hours worked depends on the combined effect. On the one hand, an increase of one year of education increases the log wage by 0.054 which, in turn, increases hours worked by 0.92 hours. On the other hand, an increase of one year of education, acting through its effect on the marginal value of leisure, decreases hours worked by 1.7 hours. An additional year of education, therefore, is associated with a 5.4 percent higher wage in the general labor market and 0.78 hours less work a week.

Table 6 presents results of the restricted and unrestricted model for the ESF workers. Because this sample is roughly one-tenth the size of that of the general population, it is not surprising that the coefficients are estimated with less precision. Although the coefficients in the wage-offer equation follow the same pattern as for the general population and are generally precisely estimated, this is not the case for the coefficients in the hours equation. This is undoubtedly because of the much lower variation in hours in the ESF sample. Not only do all ESF workers work, but, also conditional on working, their hours vary less than in the general population.

In contrast to the case with the general population, for the ESF workers we can reject the hypothesis that both $\rho_{3,5}$ and $\rho_{4,5}$ are equal to zero. The negative $\rho_{4,5}$ indicates that those with a larger positive u_5 , who hence are more likely to participate in the ESF, are those with a lower u_4 , and hence a lower marginal value of leisure. This means that those individuals are more likely to work longer hours. One possible explanation is that those individuals well suited to unskilled construction work may be more likely to work in the ESF and have the stamina to work more hours. Alternatively, it may be that those more likely to work in the ESF have a higher marginal utility of income and are prepared to work longer hours. It is, of course, impossible to distinguish among alternative explanations for associations between the unobserved errors.

The estimated coefficients in the wage-offer function do not change dramatically between the restricted and the unrestricted model. As expected, given the low-skilled nature of the construction work, the return to education is only 1.6 percent—considerably lower than in the general population. The coefficients in the hours equation do change considerably between the restricted and the unre-

Table 6. *Coefficients for the Restricted and Unrestricted Models for the Wage and Hours of Males 18 to 55 Years Old in the ESF Sample*

Variable	Restricted model ^a	Unrestricted model
<i>Wage-offer equation</i>		
Constant	-1.70* (0.31)	-1.59* (0.25)
Age	0.0086* (0.0023)	0.0076* (0.0025)
Years of schooling	0.021* (0.006)	0.016** (0.009)
Unemployment rate	-1.10** (0.62)	-1.29* (0.52)
Economically active/100,000 ^b	-0.01 (0.01)	0.01 (0.01)
Cost factor	1.51* (0.27)	1.29* (0.25)
σ_3 standard deviation	0.40* (0.01)	0.41* (0.01)
<i>Hours-of-work equation</i>		
Constant	49.0* (2.0)	20.0* (3.0)
Age	-0.01 (0.05)	0.01 (0.05)
Married	1.0 (1.0)	0.3 (1.0)
Years of schooling	-0.0 (0.1)	-0.7* (0.1)
Other family members 12 or older	-0.3 (0.2)	-0.6* (0.2)
Nonlabor income/1,000	22.0 (22.0)	-32.0 (21.0)
Log wage	2.0 (2.0)	13.0* (3.0)
σ_4 standard deviation	4.11 (4.71)	1.11* (0.18)
<i>Correlation coefficients</i>		
$\rho_{3,4}$	0.32* (0.11)	0.39* (0.16)
$\rho_{3,5}$		0.14 (0.18)
$\rho_{4,5}$		-0.91* (0.02)
-Log likelihood	1,878.73	1,863.66
Sample size	452	452

Note: Figures in parentheses are standard errors. * = significant at the 5 percent level. ** = significant at the 10 percent level.

a. Assumes no correlation in the error terms, u_3 with u_5 , and u_4 with u_5 ($\rho_{35} = \rho_{45} = 0$).

b. Indicator of market size, measured as the number of the economically active in the city (divided by 100,000).

Source: Authors' calculations based on data from Instituto Nacional de Estadística (1988a, 1988b).

stricted model, but, because the restricted model has so little precision, one should not make too much of the changes.

The top part of table 7 presents mean expected wage, weekly hours worked, and weekly earnings based on the estimated coefficients from tables 5 and 6.

Table 7. Mean Expected Wages, Hours, and Earnings Based on Coefficients of the Restricted and Unrestricted Models

Variable	Restricted model		Unrestricted model,
	General population	ESF workers	ESF workers
<i>Conditional on working</i>			
Wage (bolivianos per hour)	1.19	1.15	1.06
Weekly hours	35.4	50.2	49.6
Weekly earnings (bolivianos)	46.3	57.7	52.4
Probability of working (percent)	72	100	100
<i>Unconditional</i>			
Wage (bolivianos per hour)	0.95	1.15	1.06
Weekly hours	27.7	50.2	49.6
Weekly earnings (bolivianos)	33.3	57.7	52.4
<i>The expected position of ESF workers without the program</i>			
<i>Conditional on working</i>			
Wage (bolivianos per hour)			0.94
Weekly hours			40.1
Weekly earnings (bolivianos)			38.7
Probability of working (percent)			82
<i>Unconditional</i>			
Wage (bolivianos per hour)			0.80
Weekly hours			34.1
Weekly earnings (bolivianos)			34.6

Note: At the survey date 1 boliviano was worth approximately \$0.50. Values are mean conditional earnings and unconditional wages, hours, and earnings, obtained by averaging over all individuals. For example, the mean conditional earnings were calculated as $\frac{1}{N} \sum_i W_i \times H_i$. This is not equal to $\bar{W} \times \bar{H}$.

Source: Author's calculations based on data from Instituto Nacional de Estadística (1988a, 1988b).

These expectations are first calculated conditional on working, and then they are multiplied by the predicted probability of working, to yield the unconditional expectations. The mean expected values are calculated for each observation in the sample and then averaged. In a likelihood ratio test of the two models of the ESF workers, the restricted model was rejected in favor of the unrestricted model at the 5 percent level of significance. Thus the expected values of the unrestricted model are the ones to focus on. Because the restricted model for the general population was not rejected, however, we present the results for the restricted model of ESF workers solely for the sake of comparison.

The mean expected wage of ESF workers, conditional on working, is Bs1.06 an hour, very close to the actual mean wage in the ESF sample. The mean expected weekly hours conditional on working is considerably higher for the ESF workers than for the general population (49.6 versus 35.4 hours). It is this difference that accounts for the higher mean expected earnings of the ESF workers (Bs52.4 versus Bs46.3 a week). Because all ESF participants work, there is no difference between their conditional and unconditional expectations. The mean probability of working for the general population is 72 percent, however, so that the unconditional expected wage, hours, and earnings of the prime-age males in the general population are correspondingly lower.

The expected position of ESF workers without the program is calculated by replacing the estimated coefficients from the ESF equations with those of the general population and recalculating the expected wage, hours, and weekly earnings. These calculations are presented in the bottom part of table 7. Both the conditional and unconditional wages of ESF workers are lower than those of the comparator population here, but they have a greater probability of being employed (even without the ESF program) than do the comparator population (82 percent) and have a higher expected number of hours worked.

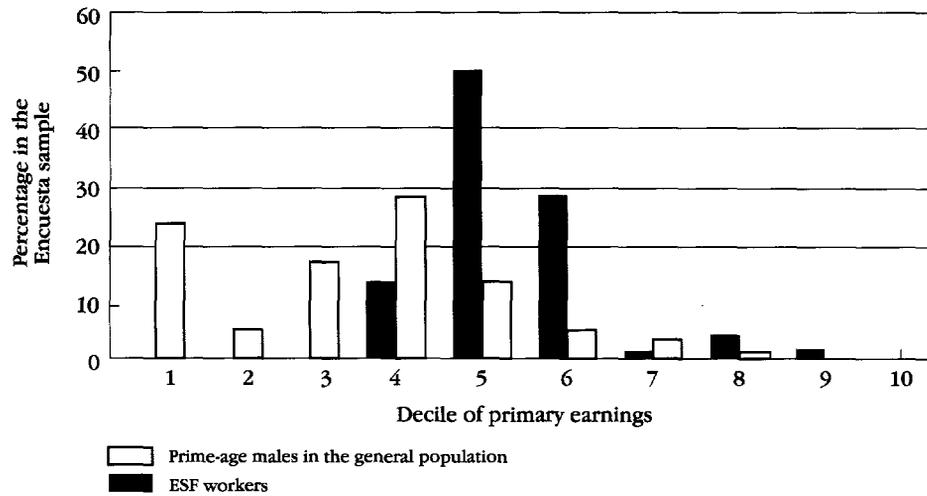
To measure the benefit from working in the ESF, we calculated the difference in expected wage, hours, and earnings for a worker in the ESF and for the worker without the ESF conditional on being employed. This enables us to look not only at the average benefit over all ESF workers, but also at the distribution of the benefits. The average ESF worker experiences increases of 13 percent in wages, 9.5 hours in weekly work, and 35 percent in weekly earnings over expected levels without the ESF. Taking into account the possibility that the individual may not have worked without the ESF leads to larger gains. The unconditional comparison indicates that, for the average ESF worker, wages are 33 percent higher, the work week is 15.5 hours longer, and weekly earnings are 51 percent higher.

An examination of the distribution of gains over all ESF workers indicates that the greatest benefits from participating in the program were received by those who would have been least well-off without the program. We define the least well-off group as those whose estimated conditional wage without the program would have placed them more than one half of a standard deviation below the actual mean wage of prime-age males in the general population. Twenty-five percent of the ESF sample consists of individuals in this group. Participation in the ESF gives this group an absolute increase of Bs0.37 an hour in their expected wage (a 64 percent increase), an increase of 20 hours worked, and an absolute increase in earnings of Bs29 a week (a 171 percent increase) over their position if they worked without the ESF. Taking into account the probability that they might not work yields corresponding absolute increases of Bs0.57 an hour, 30 hours of work a week, and Bs38 a week.

The next group of ESF workers to be considered consists of those whose estimated conditional wage without the program would have placed them within one-half of a standard deviation (plus or minus) of the actual mean wage of prime-age males in the general population. Seventy-three percent of the sample fall into this category. Because this group has higher wages and earnings than the less well-off group, their percentage gains will be smaller. Conditional on working, the absolute increases for this group are estimated to be Bs0.03 a week in wages (a 3 percent increase), 5.7 hours worked, and Bs7.4 in weekly earnings (a 15.9 percent increase). The unconditional comparison yields average increases of Bs0.15 an hour, 10.4 hours a week, and Bs16.5 a week.

A further indication of the benefits of participation in the ESF is provided by comparing the estimated wage of workers with the ESF program to the actual

Figure 3. *Estimated Earnings of ESF Workers Compared with the Actual Mean Wage of Prime-Age Males in the General Population*



Note: Decile ranges calculated from males 18 to 55 years old in the Encuesta sample.

Source: Authors' calculations based on data from Instituto Nacional de Estadística (1988a, 1988b).

mean wage of prime-age males in the general population (figure 3). With the increased wage received in the ESF program, only 6 percent of the ESF workers are estimated to be in the least well-off group (as defined above), 91 percent of the ESF workers in the middle group, and 3 percent in the highest group. The biggest effect was in moving individuals out of the least well-off category. Because ESF workers in the lowest groups also experienced the largest increase in expected hours worked, their relative benefits in weekly earnings compared with the better-off groups are even larger than their hourly wage gains.

ESF workers benefitted in terms of estimated wages and actual earnings. The ESF program resulted in a substantial temporary increase in earnings, with most of the beneficiaries moving out of the lowest deciles toward the middle deciles.

V. CONCLUSIONS

Returning to the four views of the ESF, it is apparent from the administrative records and the survey data that the ESF was more successful in fulfilling some of its promises than others. The ESF generated and rapidly disbursed external funds. To the extent that it successfully transferred these funds to lower-income groups who consume mainly domestically produced goods, the expenditure would be expected to have a larger multiplier effect. It generated substantial temporary gains in earnings of workers in the projects over what they would have received without the program, with the lowest income groups receiving the

greatest increases in earnings. Although the ESF did not target the former miners and former public sector employees that are generally considered the ones most affected by the structural adjustment program, it did employ workers that came primarily from the construction industry, which was also hurt by the economic crisis.

To a large extent, the outcomes resulted from the extensive use of existing local institutions and private subcontractors. The success of the ESF depends first on the presence of local institutions capable of preparing projects. ESF experience has indicated that this can be a problem, particularly in low-income areas, and that active promotion on the part of the management team is needed. Working with existing institutions undoubtedly contributed to the ESF's ability to generate external funds and rapidly disburse them. Once the subcontractors received the funds, it is readily apparent from the Instituto survey that they paid market wages for unskilled construction laborers. This is not surprising because the ESF did not exert control over whom the subcontractors hired, but did judge them on the progress of the project. In this respect the program differs from other temporary employment schemes that aim to be an employer of last resort by offering below-market wages. In those schemes, the quality of the infrastructure created would be expected to be lower.

By virtue of working through the subcontractors, all targeting of benefits takes place in the initial selection of projects. Because unskilled construction workers are low-income individuals, the ESF program succeeded in reaching poorer groups of families. Although these workers are certainly poor by other countries' standards, however, they are not the poorest groups or, necessarily, the groups most adversely affected by the structural adjustment program. These groups would be helped only with this type of demand-driven program if they chose to seek work in the ESF and if the private subcontractors were as willing to hire them as they were to hire more experienced construction workers. It was also to be expected that some subcontractors, faced with the need to meet performance standards on the quality of the projects, would hire workers who were already employed in the construction sector.

The administrative success of the ESF as a temporary financial institution generated interest in replicating the central ideas more permanently and as part of a compensation package in a structural adjustment program. The program's use of private subcontractors was seen to rapidly generate temporary benefits to a mostly low-income group with low administrative costs. The likely effects of a similar program in other countries depends on labor market conditions, the administrative capability of existing ministries, and the strength of local governmental and nongovernmental organizations. For example, a demand-driven program such as the ESF is unlikely to have much effect on unemployment resulting from educated youth waiting for a job in the modern sector. The program is more likely to be a success if there are projects promising high returns using low-skilled workers, if there is unemployment in the construction sector and construction workers are at the low end of the income distribution, and if

paying below-market wages is considered undesirable—either because of the potential impact it could have on the quality of the project or because of the administrative costs of monitoring to ensure that low wages are actually paid. If these conditions prevail, as they did in Bolivia, then this type of temporary employment scheme may be a viable alternative to programs in which the government directly hires workers.

APPENDIX

The second model consists of five equations that describe (a) participation in the ESF, (b) wage offers in the general population, (c) the marginal value of leisure of individuals in the general population, (d) wage offers in the ESF, and (e) the marginal value of leisure of ESF workers. If participation in the ESF were simply a function of the relative wage offers between the ESF and the general labor market, there would have been no need to include a separate participation equation. But because work in the ESF differs along other dimensions—for example, it offers full-time work over a short period—a separate participation equation was included.

Participation in the ESF is modeled with a latent variable structure. An individual participates in the ESF only if the latent variable passes a threshold. Thus, we specify:

$$(A-1) \quad \begin{aligned} Y^* &= \delta\Omega + u_5 \\ I &= 1 \text{ if } Y^* \geq 0 \\ &= 0 \text{ otherwise} \end{aligned}$$

where I is a participation indicator, Ω is a vector of exogenous variables affecting the participation decision, δ is a vector of coefficients to be estimated, and u_5 is a random error term. In this and all other equations, the subscripts pertaining to the individual have been suppressed.

The underlying latent variable Y^* is not observed. We observe only I , whether the individual participates in the ESF or not.

The wage-offer and marginal-value-of-leisure equations are the same as in the text (equations 1–4). The error terms (u_1, u_2, u_3, u_4, u_5) have a multivariate normal distribution with the following covariance structure:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} & 0 & 0 & \sigma_{15} \\ & \sigma_{22} & 0 & 0 & \sigma_{25} \\ & & \sigma_{33} & \sigma_{34} & \sigma_{35} \\ & & & \sigma_{44} & \sigma_{45} \\ & & & & \sigma_{55} \end{bmatrix}.$$

Because participation is a zero-one decision, it is not possible to separately identify δ , the coefficients in equation 1, from σ_1 . Following the usual practice, we normalize σ_5 to be equal to 1. The covariance among errors in the wage-offer and marginal-value-of-leisure equations of the general population, on the one

hand, and among corresponding equations of the ESF (σ_{13} , σ_{14} , σ_{23} , and σ_{24}), on the other hand, cannot be estimated because the individual works either in the ESF or in the general labor market. Thus they are set to zero. Errors in the wage-offer and marginal-value-of-leisure equations in the general population are allowed to be correlated, thereby picking up measurement error between hours and wages. Similarly, errors in the wage-offer and marginal-value-of-leisure equations in the ESF population are allowed to be correlated.

The main difference between this model and the simpler one in the text is that in the text the implicit assumption is made that errors in the equation determining participation in the ESF are uncorrelated with wage offers and marginal values of leisure both in the ESF and in the general population, that is, $\sigma_{15} = \sigma_{25} = \sigma_{35} = \sigma_{45} = 0$. Under these assumptions, the multivariate normal distribution of the errors collapses to the product of independent distributions:

$$(A-2) \quad f(u_1, u_2, u_3, u_4, u_5) = f(u_5) \cdot f(u_1, u_2) \cdot f(u_3, u_4).$$

Thus in the first model one may estimate the wage offers and marginal values of leisure in the ESF independently of the participation decision or of the wage-offer and marginal-value-of-leisure equations in the general population.

To allow for the possibility that ESF workers could differ in some unmeasured characteristics from those in the general population, we relax the covariance restrictions of the simpler model. Under a more general covariance structure, those individuals more likely to participate in the ESF could have higher or lower wage offers than the general population. Under the less restrictive assumptions, the distribution of multivariate normal errors is:

$$(A-3) \quad f(u_1, u_2, u_3, u_4, u_5) = f(u_5) \cdot f(u_1, u_2 | u_5) \cdot f(u_3, u_4 | u_5).$$

In the previous case, $f(u_1, u_2 | u_5)$ was assumed equal to $f(u_1, u_2)$ and $f(u_3, u_4 | u_5)$ equal to $f(u_3, u_4)$. Because this is no longer the case, we now must consider the participation decision in order to arrive at the expected wages and earnings of ESF workers without the program. We estimate this model in two steps.

In the first step, we predict the probability that a prime-age male would work in the ESF. Our problem is complicated by having to estimate the participation decision with a combined sample of ESF and Encuesta survey observations, with an overrepresentation of ESF workers. We know that those individuals taken from the ESF sample were program participants. Although there may be some unidentifiable ESF workers in the Encuesta sample, their proportion is so low that we assume their presence does not affect the distribution of workers in the population in any significant way. Thus we consider the Encuesta sample to consist of nonparticipants in the program.

In combining information from the two samples, it is important to recognize that the ESF workers must have chosen to work in the ESF projects at least in part because they viewed that work as preferable to their alternatives. Because the two samples are not distinguished solely on the basis of an exogenous variable

such as age, but rather on a choice that was made, we face the problem of analyzing the participation decision using a choice-based sample (see Manski and McFadden 1981, and Amemiya 1985, pp. 319–38). Because we know the size of the ESF program in each of the capital cities, however, we can follow the weighted likelihood function approach of Manski and Lerman (1977) in estimation. In this approach, one weights the log likelihood pertaining to the outcome of each group by the ratio of the probability of encountering a member of a particular group in the population to the probability of drawing a member of that group from the sample.

In the second step, by virtue of the independence of the error terms in the ESF and general population conditional on the participation error $f(u_1, u_2 | u_5)$ and $f(u_3, u_4 | u_5)$ we can work with the ESF sample separately from that of the population. For the general population, we need to modify the likelihood function given in equation 11 in the text by replacing the bivariate density function $f(u_1, u_2')$ with the conditional bivariate density function $f(u_1, u_2' | u_5)$. The conditional density function is bivariate normal, with

$$(A-4) \quad f(u_1, u_2' | u_5) \sim N[\rho_{15}\sigma_1 u_5, \rho_{25}\sigma_2' u_5, \sigma_1^2(1 - \rho_{15}^2), \sigma_2'^2(1 - \rho_{25}^2), \rho]$$

where

$$\rho = \frac{\rho_{12} - \rho_{15}\rho_{25}}{\sqrt{(1 - \rho_{15}^2)}\sqrt{(1 - \rho_{25}^2)}}.$$

Because the conditional means depend upon u_5 , the error term from the participation equation will enter the likelihood function. Because u_5 is not observed, however, it must be integrated out of the likelihood function over its relevant range. From equation A-1, for those who don't participate in the ESF, $u_5 < -\delta\Omega$. Thus the relevant range for u_5 is from $-\infty$ to $-\delta\Omega$. The resulting likelihood function for the general population will now be:

$$(A-5) \quad L = \prod_0 \int_{-\infty}^{-\delta\Omega} f_{(u_1, u_2' | u_5)}(v) \cdot f(u_5) dv du_5$$

$$\prod_1 \int_{-\infty}^{-\delta\Omega} f_{(u_1, u_2' | u_5)}(\ln w - X_1\beta_1, H - \frac{1}{\gamma_1} \ln w + Z_1 \frac{\alpha_1}{\gamma_1}, -\rho_{1,2}) f(u_5) du_5.$$

As in the estimation of the ESF sample in the simpler model, only the second part of the likelihood function given in equation A-5 would appear for the ESF equations, with u_3, u_4 substituting for u_1, u_2 . Because the condition for workers to participate in the ESF is $u_5 > -\hat{\delta}\Omega$, the limits of integration of u_5 for the ESF workers are from $-\hat{\delta}\Omega$ to ∞ . If ρ_{34} were equal to zero, this estimation procedure would be exactly equivalent to Heckman's (1979) two-step procedure of including the estimated value of the Mills ratio as a regressor on single-equation ordinary-least-squares regressions of $\ln w_{\text{ESF}}$ and H_{ESF} .

REFERENCES

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Amemiya, T. 1985. *Advanced Econometrics*. Oxford: Basil Blackwell.
- Fondo Social de Emergencia. 1988. Internal documents. Processed.
- Grosh, M. 1990. "How Well Did the ESF Work: A Review of Its Evaluations." In S. Jorgensen, M. Grosh, and M. Schacter, eds., "Easing the Poor through Economic Crisis and Adjustment: The Story of Bolivia's Emergency Social Fund." World Bank, Latin America and Caribbean Technical Department, Washington, D.C. Processed.
- Heckman, James. 1974. "Shadow Prices, Market Wages, and Labor Supply." *Econometrica* 42: 679-93.
- . 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47: 153-61.
- Herrick, Bruce. 1989. "Ex Post Project Evaluation: Emergency Social Fund, Bolivia." World Bank, Latin America and Caribbean Technical Department, Washington, D.C. Processed.
- Instituto Nacional de Estadística. 1988a. "Encuesta Integrada de Hogares." La Paz. Processed.
- . 1988b. "Encuesta a Obras del Fondo Social de Emergencia." La Paz. Processed.
- . 1988c. "Informe de la Encuesta a Obras del Fondo Social de Emergencia." La Paz. Processed.
- Manski, C. F., and S. R. Lerman. 1977. "The Estimation of Choice Probabilities from Choice-Based Samples." *Econometrica* 45: 1977-88.
- Manski, C. F., and D. McFadden. 1981. "Alternative Estimators and Sample Designs for Discrete Choice Analysis." In C. F. Manski and D. McFadden, eds., *Structural Analysis of Discrete Data with Econometric Applications*. Cambridge, Mass.: MIT Press.
- Rosenzweig, M. R., and K. Wolpin. 1986. "Evaluating the Effects of Optimally Distributed Public Programs." *American Economic Review* 76: 470-82.

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