THE WORLD BANK

RESEARCH OBSERVER

Reforming Finance in Transitional Socialist Economies
Gerard Caprio, Jr., and Ross Levine

PUBLIC AND PRIVATE SECTOR ROLES
IN THE AGRICULTURE OF DEVELOPING COUNTRIES

How Do Market Failures Justify Interventions in Rural Credit Markets?
Timothy Besley

What Makes Rural Finance Institutions Successful?
Jacob Yaron

Animal Health Services: Finding the Balance between Public and Private Delivery
Dina L. Umali, Gershon Feder, and Cornelis de Haan

The Roles of the Private and Public Sectors in Enhancing the Performance of Seed Systems
Steven Jaffee and Jitendra Srivastava

POINT-COUNTERPOINT

The Impact of EC-92 on Trade in Developing Countries
A. J. Hughes Hallett

Is European Integration Bad News for Developing Countries? A Comment on Hughes Hallett
Gerhard Pohl and Piritta Sorsa

THE WORLD BANK

RESEARCH OBSERVER

The World Bank Research Observer is intended for anyone who has a professional interest in development. *Observer* articles are written to be accessible to nonspecialist readers; contributors examine key issues in development economics, survey the literature and the latest World Bank research, and debate issues of development policy. Articles are reviewed by an editorial board drawn from across the Bank and the international community of economists. Inconsistency with Bank policy is not grounds for rejection.

The journal welcomes editorial comments and responses, which will be considered for publication to the extent that space permits. On occasion the *Observer* considers unsolicited contributions. Any reader interested in preparing such an article is invited to submit a proposal of not more than two pages to the editor. Please direct all editorial correspondence to the Editor, *The World Bank Research Observer,* at the address in the copyright notice below.

The views and interpretations expressed in this journal are those of the authors and do not necessarily represent the views and policies of the World Bank or of its Executive Directors or the countries they represent. The World Bank does not guarantee the accuracy of the data included in this publication and accepts no responsibility whatsoever for any consequences of their use. When maps are used, the boundaries, denominations, and other information do not imply on the part of the World Bank Group any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

The World Bank Research Observer is published twice a year, in January and July. Single copies may be purchased for US$10.95. Subscription rates are as follows:

	Individuals	*Institutions*
1-year subscription	US$20	US$35
2-year subscription	US$36	US$66
3-year subscription	US$50	US$95

Orders should be sent to World Bank Publications, Box 7247–7956, Philadelphia, Pennsylvania 19170–7956, U.S.A. Readers with mailing addresses in developing countries and socialist economies in transition are eligible to receive complimentary subscriptions on request. Written confirmation is required every two years to renew such subscriptions.

Manufactured in the United States of America
ISSN 0257-3032

The World Bank Research Observer is indexed by the *Journal of Economic Literature,* the *Standard Periodical Directory,* ABI/INFORM, the Index to International Statistics, the Public Affairs Information Service, Inc., the Social Sciences Citation Index, and, online, by the Economic Literature Index and DIALOG. It is available in microform through University Microfilms, Inc., 300 North Zeeb Road, Ann Arbor, Michigan 48106, U.S.A.

THE WORLD BANK

RESEARCH OBSERVER

VOLUME 9 NUMBER 1 JANUARY 1994

Reforming Finance in Transitional Socialist Economies
Gerard Caprio, Jr., and Ross Levine 1

PUBLIC AND PRIVATE SECTOR ROLES
IN THE AGRICULTURE OF DEVELOPING COUNTRIES

How Do Market Failures Justify Interventions in Rural Credit Markets?
Timothy Besley 27

What Makes Rural Finance Institutions Successful?
Jacob Yaron 49

Animal Health Services: Finding the Balance between Public and Private Delivery
Dina L. Umali, Gershon Feder, and Cornelis de Haan 71

The Roles of the Private and Public Sectors in Enhancing the Performance of Seed Systems
Steven Jaffee and Jitendra Srivastava 97

POINT-COUNTERPOINT

The Impact of EC-92 on Trade in Developing Countries
A. J. Hughes Hallett 121

Is European Integration Bad News for Developing Countries? A Comment on Hughes Hallett
Gerhard Pohl and Piritta Sorsa 147

REFORMING FINANCE IN TRANSITIONAL SOCIALIST ECONOMIES

Gerard Caprio, Jr.
Ross Levine

Financial reforms initiated in most transitional socialist economies do not yet adequately provide many of the financial services associated with market-oriented financial systems. Such services—mobilizing resources, selecting firms and allocating capital, monitoring firm managers, and facilitating the management of transactions and risk—are a necessary condition for economic reform to improve living standards.

This article envisages four central strategies to guide reform of the financial sector:

- *Building an infrastructure based on clear and enforceable property rights, modern accounting and auditing standards, reliable payments systems, sound prudential and enforcement regulations, and professionals trained in finance*
- *Ending the shell game of trying to hide the losses of state-owned enterprises, and separating government decisions to finance "priority" firms from the allocation decisions of independent financial institutions*
- *Privatizing some financial institutions early—although not necessarily precipitously—in concert with the privatization of firms and supervisory capabilities, meanwhile cleaning up bank loans to maximize the chances that firms and banks will succeed as private entities*
- *Improving the tax system and stressing a prudent interest rate policy to reduce uncertainty, distortions, and excessive repression of the financial sector.*

A necessary condition for economic reform to improve living standards in transitional socialist economies (TSEs) is a financial system that provides more market-oriented service to firms. Financial sectors in socialist economies did not have to provide these services, and, although financial reforms have been initiated in most TSEs, governments are only now

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 1–24

beginning to learn what these services might entail and how to encourage the development of financial institutions to provide them.

Reform of the financial sector requires, first and foremost, the establishment of a sound financial infrastructure. For this purpose governments and managers need to concentrate on clarifying property rights; bringing accounting, auditing, and payments systems up to date; and training staff in modern, market-oriented, financial methods. Another prerequisite to effective reform is for governments to end the shell game of hiding the losses of state-owned enterprises. Early in the reform process, some financial institutions should be privatized, in concert with the privatization of firms, after bad debts have been cleared from the books, so that the reformed institutions start with a clean sheet. Finally, tax systems and interest rate policies need to be improved with the specific objective of reducing the uncertainty and distortions that currently encumber the financial sector in these economies.

Three assumptions are inherent in this study. First, it is taken as given that the TSEs have decided to move toward a primarily privately owned, free market system and that this decision is in part due to a reaction against government interference. The second assumption is that these economies have already adopted significant policies to liberalize prices and trade, so, monopoly problems notwithstanding, reasonable price signals are emerging to guide the allocation of resources. Third, we believe that reform in the financial sector is inseparable from reform in the enterprise sector. Consequently, the article repeatedly notes how the form and speed of enterprise privatization influence the nature and sequencing of financial sector reform, and how financial sector reforms that stimulate the availability of financial services will be necessary if economic reforms are to increase welfare.

The Growing Role for Financial Services in TSEs

To understand the role the financial sector should play in the transition to a market economy, it helps to recall both where the financial sector is going and whence it comes. In market economies, financial intermediaries as a group provide several services. They

- Make payments and facilitate transactions
- Mobilize savings
- Facilitate risk management (hedging and insurance)
- Monitor firm managers (corporate governance)
- Select firms to finance (credit assessment).

All financial systems, from the simplest to the most complex, perform these tasks. Although there are disagreements about which instruments excel at these tasks,[1] each of these financial services is important to economywide growth, efficiency, and welfare (see Caprio, Atiyas, and Hanson, eds., forthcoming, and

King and Levine, 1993 and forthcoming, for evidence that financial services promote economic development.)

Providing these services was not a matter of course in socialist economies before the transition process began. Banks, virtually the sole financial organizations before the transition, were charged with meeting the objectives of the planning ministry, and they essentially passively allocated credit in accordance with the ministry's economic plan, passed a bill back to the government at the end of the exercise to cover loan losses. Most socialist economies had one mammoth savings bank charged with mobilizing resources from sectors that ran a surplus—largely households—and passed these on to the central bank to allocate among the few specialized banks that gave credit to agriculture and industry. Payments were made largely by cash or barter. Providing an efficient monetary payments system was unimportant because the "coin of the realm" was rights to real resources, which were allocated according to the central plan. In this respect, socialist economies were the nearest approximation to a neoclassical economist's dream—a world in which money did not matter! Money and the financial system were simply a veil—an accounting device—for "real" activity.

Socialist banks did not devote much effort to selecting firms to finance, assessing their creditworthiness, or monitoring them; loan collection was not a priority, because the state budget was always available and routinely used to cover losses. State banks provided little in the way of risk management. Indeed, risk was a difficult concept to explain—even to the supposed bankers—at the start of the reform process because previously all risk had been borne by the state. Typically, the sole nonbank financial institution was a tiny insurance company that underwrote only trade-related risks. The state of demand for insurance, in fact, reflected the state of the reform process: only viable enterprises that were truly independent of the budget had any desire for insurance protection, because managers of nonviable state enterprises had much larger problems and believed that budget recourse was still available.

Far fewer financial services are provided in TSEs today than in other economies with comparable per capita income. For economic reforms to intensify, however, the provision of financial services will have to grow correspondingly; for economic reform to improve living standards, financial reforms will have to produce a financial sector that provides crucial services to the rest of the economy.

Payments Systems

One of the first areas where the need for expanded financial services reveals itself is in the payments system. The evolution from a centrally planned system to a market-oriented one entails an explosion of economic trades and financial transactions. In Russia, for example, the expansion in market transactions has overwhelmed the existing payments system: checks, even between banks within

Moscow, often take more than a month to clear. Similarly, in Poland a substandard payments system was subject to abuses that reduced confidence in the financial system. Long lags in payments or a lack of confidence in the payments system encourages barter or cash transactions; these were prolific in much of the former Soviet Union and Viet Nam in 1992. For market activities to expand, participants must be able to write and settle transactions quickly and confidently. A poorly functioning payments system, especially in an environment of high inflation, will discourage market interactions and retard the entire economic reform process.

Although private financial institutions can develop payments systems, an efficient and secure national payments system offers large social returns through increased economic efficiency. Many countries consequently view the provision of a payments system as a public responsibility. An immediate priority of central banks in TSEs should be to adopt and ensure the safety of a sound payments system, one that lowers clearing times to a few days and minimizes opportunities for abuse. Because payments systems are typically linked to banks, financial reform may need to focus on creating a set of stable banks to administer the system.

Savings Mobilization and Risk Management

In many TSEs there is also a noticeable dearth of services in savings mobilization and risk management. For example, in 1992 Russia had one savings bank, Sberbank, which held more than 90 percent of all household deposits. Sberbank offered depositors an annual interest rate on deposits of approximately 3 percent during extended periods when monthly inflation rates were more than 20 percent. Even during the first five months of 1993, Sberbank offered annual interest rates of 40 percent on demand deposits, but inflation was more than 400 percent. Limited competition for household deposits produced fewer opportunities for savers to avoid the inflation tax and thwarted the emergence of financial instruments to manage inflation risk. In Russia demand for foreign currency increased, as a store of value and a hedge against inflation. The economic implications of inadequate savings mobilization and poor risk management are severe: savings are channeled to less productive uses, increased uncertainty lowers investment, and human resources are diverted from socially productive endeavors to efforts to avoid the costs of inflation.

Governments, as the owners of the concentrated financial system, have a clear function to implement policies to create a more competitive environment so that a healthier array of services can be provided to households and enterprises. In addition to permitting private financial intermediaries to emerge and compete with state banks, goverments of TSEs will need to reorganize state-owned banks into smaller, more autonomous, competing banks and privatize existing components of the banking system. The critical issue here is that policies to increase competition need to be initiated early in the transition.

Establishing a legal and regulatory environment in which capital markets can develop may facilitate risk management. For example, the recent auctioning of treasury bills in Moscow created a new financial instrument that is a better inflation hedge than current savings deposits and encourages others to use the capital market. Similarly, in Hungary security markets have expanded operations during the past two years.

Corporate Governance

Public policies will also have to propagate financial systems that effectively oversee firms' activities. Under central planning, with ownership concentrated in the hands of the state, responsibility for monitoring and evaluating managers rests with the government and relevant ministries. For the private sector to blossom in the TSEs, other mechanisms for monitoring and evaluating managers will have to be devised.

In market economies large private firms are typically owned by a dispersed group. Because obtaining and analyzing information about firms is time-consuming and costly, firm owners frequently know less than their managers about how their firms work. But managers may have interests different from those of shareholders and may act in their own interests instead of maximizing the long-run value of the firm. This divergence of interests is manifest in many TSEs. As the government grants more autonomy to enterprises, managers have greater opportunities to expropriate assets from their firms; worse, managers purchase subsidiaries of the main enterprise at very low prices and then lease the services of these subsidiaries back to the main enterprise at very high prices.

Consequently, the conflict between the principal (shareholders and other creditors) and the agent (management) may have costly implications for the economy. Firms operate and invest less efficiently and therefore produce fewer and lower-quality goods and services. Similarly, the principal-agent problem will make principals reluctant to invest in firms, and savings and investment in the economy as a whole may decline as a consequence.

Coping with the principal-agent problem is critical in shaping financial instruments and institutions in market economies and will be equally crucial for a successful transition in TSEs. Market economies have developed a number of mechanisms for the purpose. Some involve aligning the interests of the principal with those of the agent by tying management compensation to the value of the firm. Reliance on the stock market to align the interests of management and owners requires the market to reveal information about the firm efficiently, and assumes that the values of firms are closely tied to management performance. If the economy faces large systemic risk (as in most TSEs), a firm's long-run performance and its stock market price may not be closely associated with good management. Luck and circumstance may play a big role. Moreover, linking management compensation to stock price may induce managers to

focus on short-run performance, not long-term profits. Finally, although linking pay to stock price may play a part in coping with the principal-agent problem in TSEs, stock markets are not sufficiently well developed to be considered very reliable sources of information about management performance. Establishing the legal and regulatory environment for developing a stock market, however, should make it easier for principals to write incentive contracts that encourage managers to act in the long-run interests of firms.

Banks, as creditors and hence in some sense owners, also influence management decisionmaking. The very nature of a loan helps in this regard. Loans oblige firms to make regular payments. Failure to pay permits the creditor to demand changes in management or even to force the firm into bankruptcy. This restricts the latitude of managers and also encourages banks to monitor firm activities closely so that banks are not exposed to losses. The monitoring and financing functions give banks influence over managers; if a bank with superior information abandons a firm, other creditors will be reluctant to fund that firm. Thus, managers have incentives to satisfy the objectives of creditors.

Bank surveillance can be complemented by other financial institutions. Insurance companies, pension funds, and mutual funds, by pooling the savings of many individuals, may also find it worthwhile to pay the costs of monitoring firms, costs that individual investors would be unwilling to pay. Thus, the financial structure—the financial instruments and institutions—can help ensure that firms act in the interests of owners and creditors.

In TSEs, however, many of the legal and institutional arrangements basic to corporate governance do not exist. For example, clearly defined property rights and confidence in the legal system's ability to enforce contracts are necessary for debt contracts to discipline managers. Financial statements and accounting procedures must be standardized, uniform, and audited so that performance evaluation is relatively easy. Yet property rights remain murky in most TSEs, legal enforcement of contracts is difficult, and few accounting standards exist. Moreover, banks in most TSEs are not ready to exert effective supervision: they have not been in the business of overseeing enterprise managers and need substantial training in market-oriented banking skills. Furthermore, bad loan portfolios, a very uncertain economic environment, and the ownership of many banks by the state or by the enterprises themselves all hamper the ability of banks to monitor firm managers. Because pension funds barely exist and the insurance industry is very small and state run, the government needs to fill the gap.

Reforms should begin with building a financial infrastructure: a sound legal system; trained financial professionals; standardized and transparent standards for accounting, financial reporting, and auditing; and prudential regulations and enforcement capabilities. But, to tackle the principal-agent problem, governments should at the same time initiate active public policies to reform banks and encourage the emergence of nonbank financial institutions.

Resource Allocation

Finally, in market-oriented economies, society in effect authorizes the financial system to allocate resources. Savers typically place their savings in financial intermediaries—banks, mutual funds, pension funds, and so on—which then evaluate investment opportunities and make allocation decisions. Better financial systems, by definition, are more skilled (among other activities) at choosing investments with the best opportunities.

Banks in TSEs have no experience in researching firms and allocating resources independently. Always costly, evaluation is further complicated by the enormous uncertainty these transitional economies face. Establishing financial institutions that can allocate scarce savings as efficiently as possible is crucial for successful economic reform.

Building Better Institutions and a Sound Financial Structure

Banks that issue loans are typically the principal conduits of external resources to promising enterprises. But in TSEs structural shocks have left banks with a large percentage of bad loans, and the environment is very uncertain. Even (especially) if these countries had the "best" banks, bankers, legal structures, and regulators, banks would probably be reluctant to finance emerging firms and hesitant to lend to all but the very best credit risks. Thus, other sources of finance, such as retained earnings and nonbank financial intermediaries, may need to play unusually large roles during the transition.

Nonetheless, a priority should be to build better banks, for two reasons. First, institutions bearing the title "bank" represent almost the entire existing financial system in TSEs, yet they do not provide many of the financial services provided by banks in market economies. Second, banks are a key component of financial systems around the world, even where bank debt is shrinking in relative terms as a funding source: payments systems are typically organized around banks, capital markets and nonbanks typically rely on banks for various transactions services, households tend to save in banks, and banks are commonly the largest external creditors to corporations. Even direct placements, such as commercial paper, rely on banks to supply backup lines of credit. Thus, financial reform in TSEs should confront the problems existing institutions face and establish a viable banking system, while at the same time encouraging supporting nonbank institutions.

Bank Reform: Ownership and Concentration

In TSEs the banking system is typically highly concentrated and ultimately owned by the government. During 1991–92, the top five banks in Bulgaria, the former Czechoslovakia, and Romania accounted for at least 60 percent of commercial lending; in China and Poland the corresponding figures are 42 and 90

percent, respectively. Similarly, in both Romania and Russia, the principal savings bank holds more than 90 percent of household deposits. The state's ownership of banks can be direct or circuitous. In Bulgaria, commercial banks are owned by the state-owned central bank, the foreign trade bank (which is owned primarily by the central bank), and major state-owned enterprises.

State or enterprise ownership and a very high concentration of bank activity create several problems. First, high concentration may reduce competition among existing banks, discourage the emergence of new banks, and slow improvements in efficiency. Second, when a few large enterprises control the bulk of the banking sector, lending may be skewed toward owners, and enterprises can use their control of bank credit to discourage competitors. Third, central bank ownership can conflict with responsible monetary policy and prudential regulation. Finally, when the state still owns most of the sector, political priorities can easily influence decisions about capital allocation and managerial incentives.

Whether or not existing banks are privatized, policymakers can stimulate improvement by restructuring the highly concentrated banking sector to foster competition and contestability. The form that restructuring should take will depend on the country's particular circumstances. For example, a few large commercial and savings banks could be broken into smaller banks to encourage competition in the retail and commercial banking market. Savings banks could be permitted to enter the commercial loan market, while commercial banks could be allowed to take household deposits, provide mortgages, and make other household loans. Where savings banks have a large branch network that holds almost all household deposits, and commercial banks have few branches and obtain most of their funds from savings banks, the central bank, and the government, components of the large savings banks could be merged with components of the large commercial banks.

Bank restructuring appears to be a prerequisite for increased competition, but its speed and scope should be tempered by the acute shortage of managers, staff, and bank supervisors competent to operate in a market-based economic system. Breaking up banks can create its own problems (indeed, many TSEs began by creating overly specialized banks from the initial monobank system). Breaking up banks along regional or operational lines may produce institutions that are functionally and financially specialized without stimulating competition, and successful reorganization typically requires above-normal managerial oversight for several years afterward.

Governments can facilitate competition and contestability by quickly devising legal codes, legal institutions, antitrust guidelines, licensing procedures, efficient payment mechanisms, and regulatory agencies necessary to support new banks. Some strategists even suggest letting new private sector enterprises and financial intermediaries bloom and grow until they overwhelm large state-owned institutions without necessarily fixing the problems with the state-owned institutions. Although encouraging new flowers to bloom is undeniably

important, pruning and rehabilitating existing structures may create a more prosperous country with a climate more hospitable to new entrants. New entrants have some significant advantages over the remnants of the monobank system. Existing banks are burdened with nonperforming loans and political dictates to issue credit to large enterprises. However, state-owned banks do not face a hard budget constraint, may confront easier tax requirements, and may enjoy greater confidence on the part of depositors than private banks. Thus, until existing banks are privatized and debts inherited from socialism are extinguished, the playing field is unlikely to be level.

Bank Reform: Privatization

Highly centralized banking systems must be broken down before they are privatized to avoid creating monopolies. Replacing highly concentrated state ownership with highly concentrated private ownership is unlikely to advance the cause of financial reform much. In the interim, investment trusts or independent boards of directors could be set up to establish targets for financial performance and incentives for managers that (with stated exceptions) mimic those of privately owned banks. Once banks have been restructured, efficiency and stability could be encouraged by privatizing some state-owned banks.

With unseasoned supervisory, regulatory, and licensing procedures and institutions, privatization of existing banks should proceed with caution. Nonetheless, authorities should begin privatizing the banking sector early even if implementation proceeds slowly. There is much to be done: at the beginning of 1992, private bank assets as a percentage of total bank assets were less than 5 percent in Bulgaria, the former Czechoslovakia, and Romania and were only 10 and 14 percent, respectively, in Hungary and Poland.

Demonstrating that privatization and increased competition are on the visible horizon may give remaining state-owned banks an incentive to improve operations. For example, some banks could be restructured, so that a few small state-owned banks are relatively unburdened with bad loans. These banks could be privatized early to establish the government's commitment to supporting a private, market-oriented financial system. The government should initiate this process even while considering more comprehensive approaches to coping with the inherited problem of bad loans. With such a strategy, the emerging private sector could be served by new banks and some privatized state banks.

A Role for Foreign Banks

Foreign banks and other financial institutions can be crucial in the transition process. Their skills and experience can be used to upgrade quickly the quality of financial services available to domestic firms (and households) and to local

bankers. The costs are, first, the potential political liability if foreign institutions earn substantial profits or gain excessive market share; second, the weakening of domestic banks' portfolios to the extent that foreign banks attract the best credit risks in the country; and third, the possibility that foreign banks might be more inclined than domestic banks to retrench in bad times. Most governments resolve these issues in favor of some foreign participation in banking, either as branches, subsidiaries, or joint ventures.

In Viet Nam wholly owned foreign subsidiaries and branches and joint venture banks are taking the lead in providing training to staff of the existing state banks. The historical ties and growing economic connections between Eastern and Western Europe suggest that substantial penetration by foreign banks is possible. Indeed, by the end of 1991, twenty-one joint venture banks with some foreign participation were already operating in Hungary. Furthermore the massive wave of privatization envisaged in the TSEs will substantially increase the need for the services foreign financial institutions can provide. Allowing foreign or joint venture banks an important role may be necessary if privatization is to advance rapidly.

The Function of Nonbanks and Capital Markets

In a highly risky environment, where banks that issue loans are reluctant to finance emerging firms, the decision by most TSEs to allow banks to purchase equity in firms increases the potential return (and risk) from financing risky ventures. Nonetheless, policymakers should assert prudential control over this process, because close ties between banking and industry have often had disastrous consequences, as they did in Chile in the 1980s. Most banks in TSEs are still learning the basics of commercial banking and, in addition to acquiring bad debt, may acquire bad equity as well.

Nonbank financial intermediaries, such as mutual funds, pension funds, insurance companies, investment banks, and venture capital funds, may be increasingly important in evaluating projects, financing enterprises, and monitoring managers. For example, privatization in the former Czechoslovakia involved the distribution of vouchers to the public to bid on enterprises. But, after the Harvard mutual fund and then other mutual funds "guaranteed" tenfold annual returns, most citizens gave their vouchers to mutual funds to bid on enterprises. Mutual funds quickly became enormously powerful, with major responsibilities for appointing and monitoring boards of directors, and the managers of the major funds turned out to be the two major banks. Thus, the structure of the financial system changed in short order, with economic power increasingly concentrated in two banks. Policymakers need to anticipate such developments and adopt regulatory guidelines and enforcement mechanisms to oversee the range of financial market activities likely to evolve.

Many TSEs in Central and Eastern Europe are moving quickly to establish securities markets. As well as facilitating corporate capital financing through

public offerings, these markets provide financial services that complement banks by increasing the liquidity associated with holding equity, making it easier for individuals to hold diversified portfolios and to adjust their portfolios after large-scale privatization occurs.[2] Securities markets may also contribute to the evolution of mutual funds, investment banks, and venture capital firms (see Pardy 1992). Thus, the financial services and institutions fostered by equity markets are important complements to bank funding and retained earnings in financing investment. By the same token the burgeoning capital markets require well-functioning banks, so that even public policies whose principal aim is to nurture capital markets should concentrate on creating a sound banking system.

Financing "Priority" Firms

Should governments fund specific industries or set credit guidelines for financial intermediaries?

Large state enterprises are large employers, and governments will likely be involved in their financing and restructuring. Government can provide credit either directly or through specialized institutions. In the interests of accountability and of keeping the balance sheets of state-owned banks from deteriorating further because of political considerations, the government should not require either the state-owned banks that are to operate on commercial principles or private banks to finance state-owned enterprises. Explicitly separating commercial from noncommercial credit decisions—for example, by having some state-owned banks lend to the state-owned enterprises—should enhance banking skills, incentives, financial discipline, and the ability to privatize the remaining banks.

Financing emerging enterprises in the private sector raises another set of policy issues. In a high-risk environment banks may retrench, especially from providing long-term capital, just when firms most need financing. And banks are rarely an important source of finance for start-up firms, who usually rely (often exclusively) on retained earnings. Long-term finance has thus been lacking, even in Hungary, which began reforms much earlier than other transitional economies (Vittas and Neal 1992). In addition, decisions on current loans are often strongly influenced by past loans and government guarantees, rather than by future profitability. TSE governments moving away from excessive involvement in economic activity may be reluctant to impose directed credit guidelines on financial intermediaries, but they could spell out a schedule for reducing the proportion of total credit extended to state enterprises. This approach would prevent new private sector firms from being crowded out and would set a deadline for decisions to restructure or privatize. If directed credit schemes are used for new firms, government interference in credit decisions should be transparent and broadly based and should allow banks discretion in choosing customers. Many of the steps mentioned in discussing reform of the financial

infrastructure will make the financial statements of local firms more transparent and accurate, which in turn will mitigate some of the informational problems that impede the provision of bank credit to emerging enterprises. Last, it is worth noting that in Hungary the resolution and restructuring of old debts is interfering with banks' current endeavors to make loans to emerging firms. So far, the Hungarian government's principal problem is not determining where to direct credit, but how to deal with the large inherited stock of debts.

Restructuring the Financial Sector

McKinnon (1991) takes the view that, because of problems of moral hazard, inherent risk, and insufficient supervision, all corporations should be financed through retained earnings and equity in the early stages of transition. He would also leave the privatization of banking until the reform process is complete. We agree that the environment is risky but would eschew his extreme position of banning debt finance, in part because the examples of financial systems that have relied solely on self-finance and equity are so few (McKinnon cites rural China in the 1980s and the Soviet Union during the 1920s). The absence of debt finance would probably limit investment and restrain growth, and without more rapid growth the entire reform process is in jeopardy. Moreover, TSE governments, in their desire to emulate the German-European universal banking model, may well be chary of a system without "real" banks.

An alternative would be to establish high ratios of risks to assets—15 to 20 percent or higher—to allow for the riskiness of the environment. A high capital ratio would automatically limit the number of commercial banks to be supervised, an important consideration for nascent supervisory systems. Such a ratio would also achieve the goal of a low leverage rate for nonfinancial firms. Similarly, as Caprio and Summers (forthcoming) argue, limiting the number of banks is one way to increase the franchise value of bank licenses. Preserving the franchise value of their banks then creates an incentive for bank managers and owners to operate prudently and effectively. Unaided by such self-monitoring, bank supervision alone might not ensure sound banking practices, particularly in TSEs. Governments can either hand out a limited number of licenses and allow the owners to accumulate substantial pools of assets to serve as a source of funds for new investment (as was done in the United States in the early 1800s), or charge a fee for admission, either by high posted capital requirements or by auctioning off the limited number of licenses. A special case of the franchise value or high capital option is discussed by Long and Talley (1993), who propose issuing a special class of bank license to a few banks as a way of gradually increasing the soundness of the Russian banking system.

Another extreme solution to the risk problem would be to set 100 percent reserve requirements. This approach, often dubbed the narrow banking model, would permit "banks" only to collect deposits and invest funds in short-term, low-risk instruments. Nonbanks (in common parlance, banks in every respect

but title) would be permitted to take deposits or equity shares (such as money market mutual funds) and make loans or hold equity positions in nonfinancial firms. These nonbanks would still need to hold capital and to be supervised, with capital ratios and supervision increasing according to the proximity of instruments to the payments system. That is, capital and supervision should be higher if the nonbanks are permitted to offer fixed-rate, checkable deposits than if they only offer equity-like claims, such as money market mutual funds (checkable) or noncheckable mutual funds. With banks essentially risk free, the government should not rescue nonbanks that get into difficulties. Indeed, these nonbanks could be restricted from calling themselves banks. Only banks would be part of the clearing system, so this alternative has the advantage of safeguarding the payments mechanism.

A drawback of this option, which is close to McKinnon's proposal to ban all debt finance, is the risk faced by banks if they are allowed to hold even very short-term paper of supposedly safe nonbanks or enterprises. Clearly, the greater the holdings of such paper, the greater the need for capital. Early in the reform process, only government paper might qualify as a potential asset for narrow banks. But, if citizens are risk averse—and demand for guaranteed deposits in narrow banks is consequently high—then small- and medium-scale firms in the private sector will be starved for funds.[3] And if citizens are not risk averse, nonbanks will get bigger, and large financial institutions—regardless of what they are called—tend to become eligible for government bailout if they fail. So this solution may merely transfer rather than resolve the problem. High capital requirements, or tight entry limits and highly profitable banking, appear to be the more promising solutions.

Bad Loans, Official Guarantees, and Interenterprise Arrears

Many state-owned enterprises in TSEs are sustaining huge losses. These enterprises cannot service their bank debts without receiving new bank credits, and, when the funds are not forthcoming, they simply do not pay suppliers. Coping with large, loss-making, state-owned enterprises is the most difficult economic problem facing TSEs.

The size of the bad loan problem is hard to estimate precisely but appears to be very large in most TSEs.[4] Estimates from selected audits in several Eastern European countries suggested that as little as 20 to 25 percent of total bank loans had a good probability of being repaid as of 1991. More serious than the stock of bad loans is the continuing flow of loans from state-owned banks to loss-making, state-owned enterprises, the growing use of implicit and explicit government guarantees to encourage banks to fund priority firms, and the ballooning of interenterprise arrears. Moreover these arrears typically do not net to zero: firms with negative value added—those using resources to produce output that is virtually unsalable—use arrears to cover their losses with little hope of ever repaying.

Microeconomic Implications

The inherited stock of bad loans, new loans to loss-making enterprises, and growing interenterprise arrears are impeding improvements in bank efficiency and distorting the allocation of credit. Instead of concentrating on establishing business relations with emerging private firms, banks are busy issuing credit to troubled firms to help them pay wages and service old debts. At the same time, having to cope with their banks' insolvency is diverting bank personnel from undertaking more profitable operations, such as learning to compete for deposits, assess credit risk, exert effective corporate control, and create useful financial instruments for clients. Furthermore the unresolved state of old debts and interenterprise arrears, their potential seniority to new debts, and the difficulties they introduce in attaching secure collateral claims for new loans hinder efficient allocation of capital. And, because interenterprise arrears essentially are involuntary loans extracted by borrowers, which can only be countered by demands for payment at delivery, they represent a particularly inefficient form of credit that inhibits sound capital allocation.

A further disadvantage of large, loss-making, state-owned enterprises is that they complicate the task of establishing sound bank supervision and regulation in TSEs: the size of nonviable banks makes it hard for regulators to close them down, political pressures on the state-owned banks to lend to specific enterprises may conflict with sound regulations, and standard capital adequacy requirements cannot be applied to major banks because the net worth of the banks is often negative. Inadequate supervision and regulation can increase uncertainty about the financial system, create more unstable financial institutions, and thereby reduce the provision of crucial financial services.

Finally, the bad debt problem complicates and delays bank privatization. Assessing the market value of bank assets is fraught with uncertainties, and the negative net worth of banks implies, first, that many banks might be quickly liquidated if privatized, and second, that new owners with little capital at risk might engage in extremely risky ventures that could magnify losses. Furthermore, in addition to lowering the value of enterprises, the large stock of bad loans may complicate and politicize the privatizing process. Domestic and foreign investors will have incentives to lobby the government to assume responsibility for past debts, which may produce case-by-case government involvement in managing enterprise debt and introduce delays and uncertainty into the privatization process. Privatizing existing state-owned banks (which compose the bulk of the financial system in these countries) in their current state could jeopardize the stability of the monetary and payments system.

Macroeconomic Implications

Macroeconomic stability in the TSEs will depend a great deal on how governments respond to fiscal pressures to fund the existing stock of bad debts in

the banking system; cover new loans to loss-making, state-owned enterprises; and settle interenterprise arrears. In addition to traditional expenditure and taxation pressures, TSE governments are confronted by substantial uncovered actual or contingent liabilities of the public sector, often described as "quasi-fiscal" activities, such as large foreign exchange debts (Hungary, Poland, and Yugoslavia), bad debts of commercial banks, unfunded pension liabilities, and government guarantees for loans to large state enterprises. These obligations are large, and the threats to macroeconomic stability substantial; as explicit or quasi-fiscal revenue requirements rise, the government will have to raise revenues or cut expenditures to fund them. On the margin, countries often resort to printing money to satisfy large fiscal obligations. Many countries (for example, Russia) have experienced inflation rates that run above 20 percent a month as authorities attempt to monetize state responsibilities.

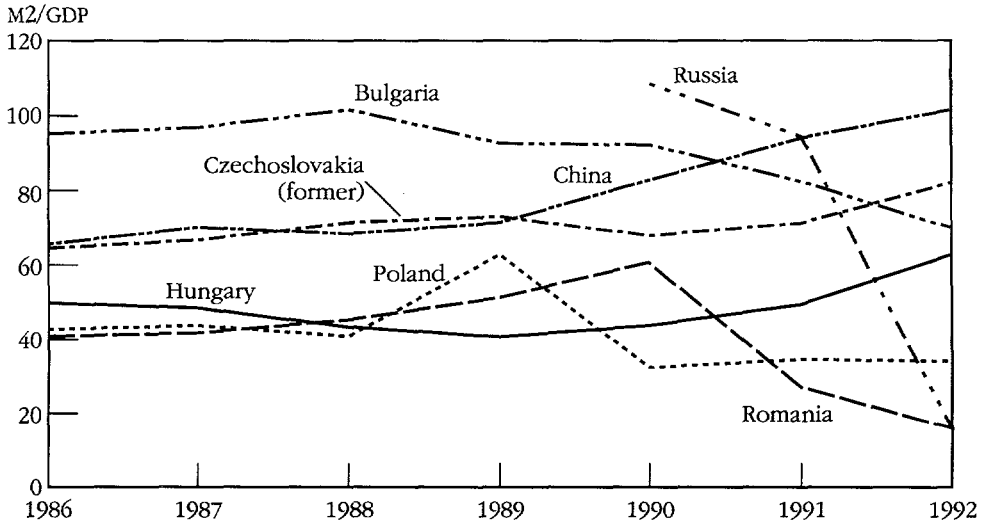
These macroeconomic developments have correspondingly important implications for the financial system. Growing fiscal revenue requirements increase uncertainty, which lowers productive investments; inflationary finance combined with rigid interest rates distorts prices; and large revenue requirements, especially in the absence of a well-developed formal taxation system, may encourage explicit or implicit taxes on financial market activities. All these impede the emergence of financial services and retard development of the financial sector. All sectors will have to bear the costs of adjustment, but the formal financial sector is an easy—although not necessarily an optimal—target for raising revenue.

Resolving the Problem of Old Bad Debts

None of the strategies for coping with large insolvent state-owned banks is attractive because they all involve the recognition and assumption of losses. Furthermore, the issue is not simply that there is a backlog of bad debts, but that continuing losses in the enterprise sector and an underdeveloped financial infrastructure may build up a new stock of bad debts, as has happened in Bulgaria, Poland, and Romania. Nonetheless, a cost-effective way to eliminate old bad debts must be sought as a first step toward formulating forward-looking financial sector reforms.

One option is to "tax" deposits. This tax could take many forms, from simple expropriation to inflation. In Bulgaria, Poland, Romania, and Yugoslavia (where government deposits in banks temporarily played an important role in restoring bank solvency), and more recently in Russia, inflation has lowered the value of deposits. As figure 1 illustrates, monetary depth—the ratio of broad money (currency plus demand deposits plus time deposits) relative to gross domestic product (GDP)—declined sharply when inflation accelerated in Romania and Russia in 1992. Because most TSEs have already reduced financial depth through inflation, ever higher inflation rates would be needed to activate this source of revenue.

Figure 1. *Financial Depth in Selected TSEs, 1986–92*



Note: M2 = broad money. Data for Russia are available only from 1990 onward, and the figures for 1990–92 are estimates.
Source: World Bank data.

A variant of the deposit tax strategy is a *deposit-equity swap*, which transforms a large fraction of deposits into equity claims on the bank. This device might encourage bank privatization but, if it is obligatory, it will raise questions of fairness, reduce confidence in the financial system, and depress the money supply without improving bank performance.

A second variant, the *debt-equity swap*, replaces bad bank assets with equities in the enterprises. One outcome, given the size of the bad debt situation, would be that banks would acquire very large shares of the enterprise sector—and it might be better for them to concentrate first on building banks, not enterprises. Furthermore, acquiring equity in nonviable firms does not resolve bank insolvency (put more succinctly, bad debt equals bad equity).

The most common approach to resolving the bad debt problem is the *debt-bond swap*—replacing loans with government-backed assets, such as bonds, guaranteed mortgages, or claims on privatization funds. But under current conditions it is difficult to distinguish bad loans from good loans, and the case-by-case, debt-bond swaps might politicize the process and create expectations of future government involvement. Levine and Scott (1993) suggest that the effect on the fiscal situation depends on the privatization process. If firms are sold to the public, a grand debt-bond swap is unlikely to increase the need to raise revenues significantly, whereas if shares in firms are simply distributed to the public, more revenues will have to be raised through traditional fiscal channels to satisfy the larger stock of government obligations.

We suggest that balance sheets should be cleaned on the eve of privatization. If an enterprise is sold to the public, all its debts to state-owned banks should be absorbed by the government. The enterprise would then start its private life free of debt, its valuation by the public would be easier, there would be fewer pretexts for government assistance following privatization, and the government would receive larger bids for the enterprise during privatization because the firms have fewer obligations to banks. If the government gives the firms away by distributing shares, then the need to raise revenue would rise by the value of the "good" debts—those debts that would actually be repaid to state-owned banks. Levine and Scott (1993) show that, because good debts apparently represent a fairly small fraction of total debts, the fiscal costs of the government assuming debts on the eve of privatization are small, and the efficiency gains large. But bank balance sheets should be cleaned only as a precursor to privatization. Injecting capital without fundamental changes in the bank only sets the stage for another round of losses.

Resolving the Problem of New Bad Debts

Coping with the flow of resources to inefficient state firms is crucial for the development of the financial sector. Therefore, although the broader issues surrounding the restructuring and privatization of state-owned firms are outside the scope of this article, some points need to be raised here about reducing the flow in relation to financial sector reform.

First, simply stopping the flow of bank credit to unreformed state enterprises will not staunch their losses, but only transfer the bad debts to suppliers, so that growing interenterprise arrears contaminate otherwise healthy firms and impede financial and economic reforms. Because the government is ultimately responsible for the losses, this shell game may obscure the problem but in no way resolves it. The problem of loss-making, state-owned enterprises can be resolved only by reforming or closing the enterprises.

Second, closing down loss-making firms will not immediately resolve the macroeconomic problems they cause. In most cases the government will cover at least part of the costs of unemployment and retraining. Loss-making firms are large, so the costs of the social safety net will probably also be large. Figure 2 shows some scenarios for explicitly covering these transition costs under simple assumptions about the percentage of loss-making firms (those not covering variable costs with market prices), the replacement ratio (fraction of wages replaced by unemployment benefits), and the unemployment bill. We assume the wage bill equals 60 percent of GDP, a rough figure for many industrial economies, and that replacement ratios are high (60–80 percent of average wages, as is now the case in Eastern Europe). Three cases are considered: in case 1, 10 percent of the labor force is in loss-making firms, and the replacement ratio is 60 percent, at the low end of the current range in TSEs. Case 2 assumes a higher percentage (20 percent) of loss-making firms (as measured by the labor force),

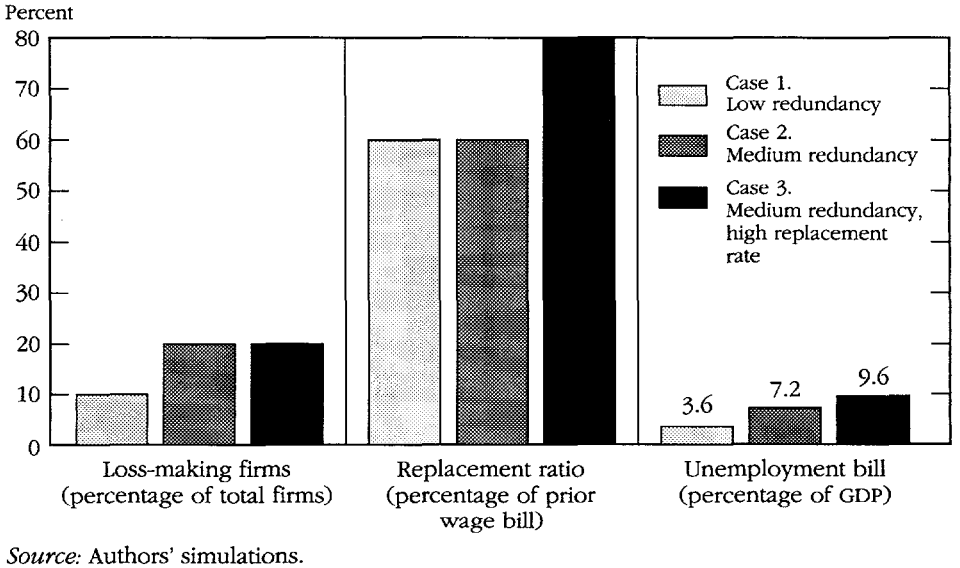
but with the same replacement ratio, while case 3 pairs the high percentage of loss-making firms with a higher replacement rate (80 percent).

The resulting deficits (4–10 percent of GDP) represent the costs of unemployment benefits—or the amount of subsidies paid to keep the plant open. We assume other budget expenditures are covered by revenues. These deficits represent a threat to macroeconomic stability, financial development, and economic reform. Thus, reducing expenditures on loss-making state firms must be coupled with encouraging the development of profit-making firms if TSEs are to become successful market economies. Allowing and supporting the development of the financial sector will bolster this effort.[5]

Third, financial reform should be well coordinated with the reform of enterprises. For many years there will be two economies—a growing private sector and a shrinking state sector—which might best be served by a correspondingly segmented banking system. One could envisage market-oriented banks serving both sectors, but a more plausible model is for the old state bank sector to be wound down or converted in line with the state enterprise sector, while new private banks and privatized parts of the state banking sector could serve the private sector. In the same vein enterprise reform should be paced with due regard to the state of the financial system. If the financial infrastructure can support only a limited private financial system, then the pace of reform should reflect those limitations.

To reduce the funding of loss-making firms and strengthen incentives for financial development, governments should explicitly recognize the size of enter-

Figure 2. *Costs of Closing Loss-Making Firms in Reforming Economies: Some Alternatives*



Source: Authors' simulations.

prise losses and take responsibility for those losses instead of trying to hide them. Although moving items from balance sheets to the government's official books is only an accounting exercise, recognizing losses and obligations when they are incurred may induce measures to curb their growth. For example, if governments issue a liberal supply of loan guarantees to avoid current expenditures, they merely defer the actual outlay. Prompt inclusion of loan guarantees in the current budget could limit the proliferation of loan guarantees by revealing probable liabilities. Similarly, if authorities immediately recognized the loan losses of state banks as a claim on the budget, then governments might be more ready to limit loans to loss-making, state-owned enterprises. Explicit and transparent recognition of losses would also reduce uncertainty, to the advantage of both the financial and nonfinancial sectors.

Finally, because requirements for fiscal revenue will be high, the financial system should not be exempt from taxes. But taxes on the financial sector should be explicitly compared with alternative revenue options, because restrictions on development of the financial sector may stymie economic growth (see King and Levine 1993, and Schiantarelli and others forthcoming). As seen in figure 1, the decline in broad money, relative to GDP, in Bulgaria, Poland, Romania, and Russia has already been large, and there is no clear evidence of any remaining monetary overhang,[6] as broad money is at or below what would be expected for countries of equivalent per capita incomes. In other words, depositors have already been taxed. Another example of large taxes on the financial sector are the limits set by Vietnamese authorities on deposit rates and maximum loan rates in 1992. Although the spread (13.7 percent) appeared generous, turnover taxes and high, essentially non-interest-bearing reserve requirements meant that the net spread was actually negative even before accounting for the costs of mobilizing deposits and lending them out. Excessive taxation of financial activities will impede the provision of financial services that are crucial to economic reform.

Interest Rate Policy

In most markets the argument for liberalizing prices rapidly is clear cut. But one price that should be dealt with carefully is the intertemporal price of money. Many economists view interest rates as just another price, but both the intertemporal nature of interest rates—in effect, an exchange of money now for the promise of money later—and the involvement of government through implicit or explicit deposit insurance, should give policymakers pause. The principal risk from premature attempts to liberalize interest rates is that, without ceilings on the rates, banks with little capital would bid up deposit rates to attract deposits as a way to fund continued loans to risky borrowers at the expense of worthier, safer ventures. Such practices would lead eventually to bankruptcies and a collapse of the banking system. The Chilean reforms of the

mid-1970s and Turkey's liberalization in the early 1980s, often cited as examples, entailed reported (ex post) real interest rates of 20 to 50 percent (and even higher in some cases) that were sustained for long periods. Bankruptcies also soared, particularly in Chile. Furthermore, high real rates may serve little purpose in TSEs: until state-owned enterprises (often monopolies) respond to competitive market signals, they will either pass on such costs or simply not pay.

In general, full liberalization of interest rates should be considered when

- Macroeconomic conditions are reasonably stable
- The financial condition of banks and their borrowers is sound
- Financial markets are reasonably sophisticated
- Financial markets are sufficiently competitive or contestable.

In some of the TSEs, none of these criteria is met. Controls on interest rates should be maintained wherever there is no control or market incentive system at the level of the firm; otherwise, risky or loss-making firms will not be eliminated from bidding for credit no matter what the interest rate (Dooley and Isard 1991). In Hungary (and Egypt, also in effect a TSE) indirect methods of monetary policy implementing through treasury bills are in use and appear to be working well, and many rates (those not associated with directed credit) are essentially driven by the market.[7]

Authorities in countries not yet ready to liberalize interest rates can try to rationalize their structure—that is, eliminate the largest interest subsidies—and aim for positive real rates. Given the difficulty of estimating expected inflation, attaining positive real rates will not be straightforward. Because monetary policy in most cases is being determined by aggregate credit targets, the authorities' main goal is to make sure that deposit rates are high enough to mobilize sufficient resources and that banks are allowed a sufficient spread. Unless a deliberate attempt is being made to erase a monetary overhang by inflation or by a wave of privatization, authorities should at least raise interest rates on very short-term deposits either when overall deposits cease to grow in nominal terms or (preferably) in line with some estimate of inflation. The banks should then be allowed to set remaining deposit rates themselves. Minimum deposit rates could be linked to a central bank discount rate, adjusting automatically whenever the latter varied.

In some TSEs competition is limited, with most borrowers in practice able to borrow only from one or two banks. In these countries a cap should also be considered for the *average* spread between deposit and lending rates. But the limit should be kept well above the average deposit rate to allow for the financing of projects with a high rate of return as well as to provide for adequate remuneration for banks, who will surely need to be taking liberal provisions on new loans in a risky environment. (This recommendation assumes that the banks' portfolios have already been cleaned; it should not be used to allow banks with numerous nonperforming loans to cover their losses with high spreads on new loans, the consequences of which are elaborated in World

Bank [1989].) A limit on spreads between average lending rates and average borrowing rates would provide more flexibility for banks to lend to somewhat riskier projects than an absolute limit on lending rates. However, it should be realized that banks can evade interest rate ceilings (for example, by charging commissions or requiring compensating balances), especially if the limits are allowed to persist.[8]

Concluding Notes

The arguments in this article are based on the notions that finance is important for economic development, that banks are needed to help with the transition of TSEs to market-oriented economies, and that private incentives are important for financial sector performance. On that basis, our analysis points out the pitfalls of certain strategies and gives a qualified green light to others. One firm recommendation is to end the shell game early in the transition process. It is important to consider the consolidated balance sheet of the government—that is, the balance sheet that includes assets and liabilities of state-owned enterprises and state-owned banks. Loss-making, state-owned firms that remain open must cover their losses through credit from the state-owned banking system, budget subsidies, or interenterprise credits or arrears. In any of these cases, the government—broadly defined—is incurring losses and should explicitly recognize them, rather than hiding them in bank or interenterprise accounts, because early recognition offers the best chance for limiting their growth. The government should assume responsibility for financing loss-making, state-owned enterprises and discourage reforming banks from issuing credit on the basis of nonmarket criteria.

We also suggest a mix of bold steps and caution in reforming existing institutions. Both of the two extreme positions on bank privatization—privatize everything or nothing—are strategically and economically unwise. Bank privatization should begin early, because incentives matter as much in the financial sector as in any other. Demonstrating a commitment to privatization, even by privatizing small banks or branches of banks, will vitalize competition in all financial institutions. Additional competition can be gained by very carefully breaking up mammoth state banks, encouraging the entry of foreign banks, and creating the necessary legal and regulatory environment for nonbanks and capital markets to flourish. Starting the privatization process early should stimulate the availability of financial services, but committing to a "big-bang" privatization of the whole financial sector could be disastrous. In countries with implicit or explicit deposit insurance and a large stock of inherited bad loans, rapid large-scale privatization could overburden existing supervisory capabilities and lead to a financial crisis that impedes the entire program of economic reform. Another mistake would be to privatize parts of the state-owned banking system with a bundle of losses still in existence. Thus, we rec-

ommend initiating privatization as soon as possible, but in conjunction with establishing a sound regulatory and supervisory system, and immediately after portfolios of existing banks have been cleaned.

A main message of this article is that much of what needs to be accomplished in the financial sector in many TSEs is development, rather than reform. Given the relatively high educational levels in TSEs, strategies that emphasize training and building skills in various aspects of finance and its supervision will yield high returns. Starting and maintaining the long process of building a sound financial infrastructure should be given the highest priority, or the necessary financial services will not be available when enterprises need them. Thus, writing and enforcing laws and prudential regulations, training financial specialists, establishing modern accounting and auditing standards, and operating a sound payments system will encourage the development of market-oriented financial services.

Finally, to promote the long-term development of financial intermediation, governments need to develop their formal tax systems so that they will not have to rely excessively on the financial system for tax collection. To do that TSEs must move as rapidly as possible to a regime of at least near-positive real interest rates and to allowing private intermediaries to allocate credit on market terms. The state may not be able to remove itself completely from setting interest rates or allocating credit for some years to come, but it is important to reduce taxation of the financial sector so that formal sector financial intermediaries become a more attractive place for mobilizing savings and allocating it on rational, market-based criteria.

Notes

Gerard Caprio, Jr., and Ross Levine are with the Finance and Private Sector Development Division, Policy Research Department, at the World Bank. This article has benefited from comments from Farid Dhanji, Alan Gelb, Millard Long, Diana McNaughton, Dan Mozes, Robert Pardy, David Scott, Andrew Sheng, Larry Summers, Samuel Talley, and Dimitri Vittas. Nonetheless, responsibility for views expressed herein lies solely with the authors.

1. For example, Mayer (1988) argues that bank-based systems, such as those found in Germany and Japan, do a better job of monitoring loans because they have closer links to their clients than do the more market-based systems of the United Kingdom and the United States. Others debate the comparative value of debt and equity in allowing funding units (principals) to control the borrowers (the agents).

2. Direct foreign investment, trade credits, and foreign loans may help fund corporate capital formation, but these matters are outside the scope of this article, which discusses international finance in the context of foreign financial intermediaries establishing or undertaking cooperative ventures with domestic financial institutions in TSEs.

3. If residents are quite risk averse, the interest rate on government paper might fall to zero, or below. For a discussion of narrow banks in a U.S. context, see Lawrence (1985), Lawrence and Talley (1987), and Litan (1986).

4. The debt problem appears to be smaller in Viet Nam, and may also be small in China, as a consequence of the superior macroeconomic climate.

5. In Viet Nam neither arrears nor bad debts have developed on the scale experienced in Eastern Europe and the former Soviet Union for two reasons. First, a large proportion of workers' pay consists of bonuses. These bonuses are paid only when there are profits after paying bank debt and suppliers. Thus, wages directly reflect firm efficiency. Second, a system of committees has exerted relatively tight oversight of corporate governance regarding interenterprise arrears and bank obligations.

6. Monetary overhangs—that is, excess supply of money given per capita income and other determinants of money demand—often result from the involuntary savings in many socialist countries that occur when goods are rationed.

7. In some countries, such as Romania, interest rates supposedly were liberalized but in fact were adjusted little, implying that these concerns are overstated. Actually, however, the central bank stopped setting rates but limited the average spread that banks could earn. The locus of authority for setting the structure of rates shifted to the state savings bank, which controlled about 70 percent of total deposits. The lending banks were able to borrow funds directly from the savings bank at rates far below the central bank's refinancing rate and then pass on funds to borrowers at rates constrained by the cap on spreads. So complete deregulation did not occur.

8. In China this type of administered interest rate policy has been followed with mixed results. The main success has been in the field of deposit mobilization, attributable in part to the maintenance of realistic deposit rates. Average real deposit rates were, with one exception, slightly positive in real (ex post) terms between 1970 and 1984 and have returned to positive levels following their drop in 1988–89. The absence of substantially negative real interest rates likely played a role in maintaining China's high savings rate. However, the authorities allowed only a very narrow spread (sometimes negative) between deposit and lending rates, and continue to allocate credit, thus contributing to a misallocation of resources, albeit one that is difficult to measure.

References

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

Caprio, Gerard, Izak Atiyas, and James Hanson, eds. Forthcoming. *Financial Reform: Theory and Experience*. London: Cambridge University Press.

Caprio, Gerard, and Lawrence H. Summers. Forthcoming. "Financial Reform: Beyond Laissez Faire." In Dimitri Papadimitriou, ed., *Financing Prosperity into the 21st Century*. London: Macmillan.

Caprio, Gerard, and Patrick Honohan. 1991. *Monetary Policy Instruments for Developing Countries*. A World Bank Symposium. Washington, D.C.

Dooley, Michael P., and Peter Isard. 1991. "Establishing Incentive Structures and Planning Agencies That Support Market-Oriented Transformations." IMF Working Paper WP/91/113. Washington, D.C. Processed.

Fischer, Stanley, and Alan H. Gelb. 1990. "Issues in Socialist Economic Reform." WPS 565, World Bank, Country Economics Department, Washington, D.C. Processed.

King, Robert G., and Ross Levine. 1993. "Finance and Growth: Schumpeter Might Be Right." *Quarterly Journal of Economics* (August):717–37.

———. Forthcoming. "Finance, Entrepreneurship, and Growth: Theory and Evidence." *Journal of Monetary Economics*.

Lawrence, Robert J. 1985. "Minimizing Regulation of the Financial Services Industry." *Issues in Bank Regulation* (Summer):21–31.

Lawrence, Robert J., and Samuel H. Talley. 1987. "An Alternative Approach to Regulating Bank Holding Companies." *Proceedings of a Conference on Bank Structure and Competition*. Federal Reserve Bank of Chicago.

Levine, Ross, and David Scott. 1993. "Old Debts and New Beginnings: A Policy Choice in Transitional Socialist Economies." *World Development* 21(3):319–30.

Litan, Robert E. 1986. "How to Take the Dangers Out of Bank Deregulation." *The Brookings Review* (Fall):3–12.

Long, Millard, and Silvia Sagari. 1991. "Financial Reform in Socialist Economies in Transition." WPS 711. World Bank, Country Economics Department, Washington, D.C. Processed.

Long, Millard, and Samuel Talley. 1993. "Strengthening the Russian Banking System." Paper prepared for the June 1993 World Bank/IMF Conference on Building Sound Finance in Emerging Market Economies.

Mayer, Colin. 1988. "New Issues in Corporate Finance." *European Economic Review* (May):1167–89.

McKinnon, Ronald I. 1991. *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*. Baltimore, Md.: Johns Hopkins University Press.

McNaughton, Diana. 1992. "Bank Privatization: Some Lessons from Experience." World Bank, Financial Policy and Systems Division, Washington, D.C. Processed.

Pardy, Robert. 1992. "Institutional Reform in Emerging Securities Markets." WPS 907. World Bank, Country Economics Department, Washington, D.C. Processed.

Rocha, Roberto, and Fernando Saldanha. 1992. "Fiscal and Quasi Fiscal Deficits, Nominal and Real: Measurement and Policy Issues." WPS 919. World Bank, Europe, Middle East, and North Africa Technical Department, Washington, D.C. Processed.

Scharfstein, David. 1992. "Japanese Corporate Financial Governance: Implications for the Privatization of Eastern European Enterprises." World Bank, Europe and Central Asia Regional Office, Washington, D.C. Processed.

Schiantarelli, Fabio, Izak Atiyas, Gerard Caprio, John Harris, and Andrew Weiss. Forthcoming. "Credit Where It Is Due: A Review of Macro and Micro Evidence on the Real Effects of Financial Reform." In Gerard Caprio, Izak Atiyas, and James Hanson, eds. *Financial Reform: Theory and Experience*. London: Cambridge Universiy Press.

Vittas, Dimitri, and Craig Neal. 1992. "Hungary: Recent Trends in Bank Competition and Efficiency." World Bank, Financial Policy and Systems Division, Washington, D.C. Processed.

World Bank. 1989. *World Development Report 1989*. New York: Oxford University Press.

PUBLIC AND PRIVATE SECTOR ROLES IN THE AGRICULTURE OF DEVELOPING COUNTRIES

The four articles that follow constitute an informal symposium on the roles for public and private activity in the agricultures of developing countries. The division of responsibilities between these two domains is a generic problem that actuates much economic debate, in our time as much as ever.

The authors argue that the division of functions between the public and private sectors depends on which specific microeconomic factors are operative. They therefore recoil from general pronouncements that are independent of conditions on the ground. Each component function in the areas of rural credit, seeds, and livestock services receives separate scrutiny based on its particular attributes and on the circumstances of individual countries.

This approach leads to an organizing structure for each article that is a matrix of sectoral functions and market shortcomings. The authors assess the importance of each market failure to each function and then whether governments can ameliorate the market failures identified. Beyond the specific issues considered, the articles provide a model for similar microeconomic inquiries into other aspects of agriculture as well as such sectors as infrastructure, education, health, or population.

HOW DO MARKET FAILURES JUSTIFY INTERVENTIONS IN RURAL CREDIT MARKETS?

Timothy Besley

Understanding of the economic causes and consequences of market failure in credit markets has progressed a great deal in recent years. This article draws on these developments to appraise the case for government intervention in rural financial markets in developing countries and to discover whether the theoretical findings can be used to identify directives for policy.

Before debating the when and how of intervention, the article defines market failure, emphasizing the need to consider the full array of constraints that combine to make a market work imperfectly. The various reasons for market failure are discussed and set in the context in which credit markets function in developing countries. The article then looks at recurrent problems that may be cited as failures of the market justifying intervention. Among these problems are enforcement; imperfect information, especially adverse selection and moral hazard; the risk of bank runs; and the need for safeguards against the monopoly power of some lenders. The review concludes with a discussion of interventions, focusing on the learning process that must take place for financial markets to operate effectively.

Interventions in rural credit markets in developing countries are common and take many different forms. Chief among them is government ownership of banks; India and Mexico, for example, nationalized their major banks in 1969 and 1982, respectively. In these cases the government can compel its banks to set up branches in rural areas and to lend to farmers. Governments in other countries, such as Nigeria, have imposed a similar obligation on commercial banks (see Okorie 1990). So the presence of a bank in a particular area is not sufficient reason to assume that the bank has chosen to operate there or that it is operating profitably.

Regulations have also affected the day-to-day operation of banking. Straightforward subsidization of credit is a standard policy in many countries;

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 27–47

one example is the system established by the government of the Philippines in which low-interest loans are financed by a low interest rate paid on deposits (World Bank 1987). Charging below-market interest rates generates excess demand for credit, and as a result bank operations have often been governed by rules for the selective allocation of credit; the Masagna-99 program that targeted rice farmers in the Philippines is a case in point. More generally, Filipino banks were required to allocate 25 percent of all loans to the agricultural sector, and the government has also limited their flexibility to set interest rates and lend according to private profitability. Foreign and private banks in India have also faced restrictions on the extent of their lending activity (India, Government of 1991).

Various governments have also required that lenders insure their loan portfolios. The apex agricultural bank in India has insured loans in agriculture for amounts up to 75 percent of outstanding overdues. Similar policies were pursued in Mexico, where the principal agricultural lender has had its loan portfolio compulsorily insured by a government-owned insurer. Because default rates on rural loans are typically quite high, such schemes also provide an explicit subsidy to rural financial institutions.

Thus, it seems fair to say that rural credit markets in developing countries have rarely operated on a commercial basis. Substantial subsidies are often implicit in the regulation schemes. A traditional view would see these interventions as part and parcel of development policy throughout much of the postwar era: an actively interventionist government controlling the commanding heights of the economy and taking the lead in opening up new sectors.

It is widely recognized that such policies, particularly below-market interest rates and selective allocation of credit, are not without cost. One view, associated with McKinnon (1973), is that these policies lead to financial repression: without a market allocation mechanism, savings and credit will be misallocated. Thus, it became popular to argue for financial liberalization and relaxation of government regulations, especially those that held interest rates on loans below market-clearing levels.

This type of intervention was also criticized by the Ohio State University group on the grounds that many of the policies were not consistent with such objectives as helping the poor (see, for example, Adams, Graham, and Von Pischke 1984). The group pointed to two central facets of many government-backed loan programs: first, default rates were typically very high, and, second, much of the benefit of these programs appeared to go to the wealthier farmers.

Criticism of existing policies has led to considerable rethinking about intervention in rural credit markets in developing countries. In particular, the view has gained ground that interventions should be restricted to cases where a market failure has been identified; this view is investigated here. The objective is to consider whether and how interventions can be—or are being—used to make up for shortcomings of existing (formal and informal) markets to allocate credit.

What Are Market Failures?

A market failure occurs when a competitive market fails to bring about an efficient allocation of credit. Credit, like other goods, has supply and demand. Some individuals must be willing to postpone some consumption so that others can either consume (with a consumption loan) or invest (with an investment loan). The price of credit—the interest rate at which a loan is granted—must therefore be high enough for some individuals to postpone their consumption and low enough for individuals who take out loans to be willing to repay, given their current consumption needs or investment opportunities.

In an idealized credit market, loans are traded competitively and the interest rate is determined through supply and demand. Because individuals with the best investment opportunities are willing to pay the highest interest rates, the best investment opportunities should theoretically be selected. Such a loan market would be efficient, in the standard economic sense of *Pareto efficiency*; that is, the market is efficient when it is not possible to make someone better off without making someone else worse off (no Pareto *improvement* is possible). Allowing two individuals to trade typically generates such an improvement. If one has an investment opportunity and no capital, for example, and the other has some capital, both may gain by having the second individual lend to the first. They need only to find some way to share the gains from their trade for both to benefit. Both must be at least equally well off with the trade for them to participate in it voluntarily.

An outcome is thus Pareto efficient when all Pareto improvements are exhausted—which happens for credit when the loans cannot be reallocated to make one individual better off without making another worse off. In particular, Pareto efficiency is achieved when an individual who gets a loan has no incentive to resell it to another and become a lender himself.

The first fundamental welfare theorem says that competitive markets with no externalities yield a Pareto-efficient outcome. But the standard model of perfect competition, where large numbers of buyers and sellers engage in trade without transactions costs, has some deficiencies as a model for credit markets, both in theory and in practice. The waters are muddied in credit markets by the issue of repayment, because a debtor may be unable to repay (for instance, if he is hit by a shock such as bad weather or a fire), or unwilling to repay (if the lender has insufficient sanctions against delinquent borrowers). For the latter contingency, credit markets require a framework of legal enforcement. But if the costs of enforcement are too high, a lender may simply cease to lend—a situation that may well arise for poor farmers in developing countries.

Credit markets also diverge from an idealized market because information is imperfect. A lender's willingness to lend money to a particular borrower may hinge on having enough information about the borrower's reliability and on being sure that the borrower will use the borrowed funds wisely. The absence of good information may explain why lenders choose not to serve some individuals.

Efficiency in the allocation of credit has to be examined in light of these practical realities. Suppose, for example, that a bank is considering providing credit for a project to someone who, after receiving the loan, will choose how hard to work to make his project successful. If the project is successful, then the loan is repaid, but, if it fails, the individual is assumed to default. As the size of the loan increases, the borrower's effort is likely to slacken, because a larger share of the proceeds of the project go to the bank. If the bank cannot monitor the borrower's actions (perhaps because doing so is prohibitively costly), a bigger loan tends to be associated with a lower probability of repayment. A bank that wants to maximize profits is therefore likely to offer a smaller loan than it would if monitoring were costless. This may result in less investment in the economy and, in comparison with a situation in which information is costless, would appear to entail a reduction in efficiency. With full information, the bank should be willing to lend more, to the advantage of both the borrower and the lender. Thus, tested against the benchmark of costless monitoring, there appears to be a market failure—that is, the market has not realized a potential Pareto improvement.

But in the real world monitoring is not costless and information and enforcement are not perfect. A standard of efficiency impossible to achieve in the real world is not a useful test against which to define market failure. The test of efficiency should still be that a Pareto improvement is impossible to find, but such an improvement must be sought taking into account the imperfections of information and enforcement that the market in question has to deal with—that is using the concept of *constrained Pareto efficiency*. By this standard, the outcome described above, where the lender reduced the amount lent to a borrower because of monitoring difficulties, could in fact be efficient in a constrained sense. The information problem may still have an efficiency cost to society, but from an operational point of view that cost has no relevance.

The argument that problems in credit markets result in a lower level of output, and perhaps too much risk-taking relative to some ideal situation where information is freely available, is frequently used to justify subsidized credit or the establishment of government-owned banks in areas that appear to be poorly served by the public sector. This argument is a non sequitur and should be resisted whenever encountered. In thinking about market failure and constrained Pareto efficiency, the full set of feasibility constraints for allocating resources needs to be considered. In this article, market failure is taken to mean the inability of a free market to bring about a constrained Pareto-efficient allocation of credit, in the sense defined above (see Dixit 1987 for a sample formal analysis). The rest of the article examines the implications of this concept.

Applying the criterion of constrained Pareto efficiency narrows the field for market failure, but it still leaves room for a fairly broad array of cases in which resources could end up being inefficiently allocated. In the illustration of Pareto improvement used above, only the well-being of the two individuals involved in a trade was considered. But if externalities enter the picture—in other

words, if a third party is affected, possibly negatively, by the decision of the other two—a Pareto improvement is clearly not guaranteed, even if the two principals are made better off. It is well known that markets operate inefficiently if there are externalities (see Greenwald and Stiglitz 1986 for a general discussion), and specific types of externalities may particularly afflict credit markets. One important role for government policy to improve the working of credit markets is to deal impartially with externality problems.

Significant Features of Rural Credit Markets

What makes rural credit markets in developing countries different from other credit markets? The three principal features distinguished here—collateral security, underdevelopment in complementary institutions, and covariant risks—characterize all credit markets to some extent. The distinction is in degree rather than in kind; these problems are felt much more acutely in rural credit markets, and in developing countries, than in other contexts in which credit markets operate. That is why those governments have regarded policy initiatives in this area as important.

Scarce Collateral

One solution to the repayment problem in credit markets is to have the borrower put up a physical asset that the lender can seize if the borrower defaults. Such assets are usually hard to come by in rural credit markets, partly because the borrowers are too poor to have assets that could be collateralized, and partly because poorly developed property rights make appropriating collateral in the event of default difficult in rural areas of many developing countries. Improving the codification of land rights is often suggested, therefore, as a way to extend the domain of collateral and improve the working of financial markets. This idea is discussed in greater detail below.

Underdeveloped Complementary Institutions

Credit markets in rural areas of developing countries also lack many features that are taken for granted in most industrial countries. One obvious example is a literate and numerate population. Poorly developed communications in some rural areas may also make the use of formal bank arrangements costly for many individuals. In addition, complementary markets may be missing. The virtual absence of insurance markets to mitigate the problems of income uncertainty is a typical example. If individuals could insure their incomes, default might be less of a problem. Another way to mitigate default problems is to assemble individual credit histories and to sanction delinquent borrowers. Such means of enforcing repayment are commonplace in more developed econ-

omies, but they require reliable systems of communication among lenders that seldom exist in rural areas of developing countries.

Deficiencies in complementary institutions are mostly ancillary to the credit market and suggest policy interventions of their own. Programs that raise literacy levels may improve the operation of credit markets yet could be justified without reference to the credit market. The benefits to credit markets should, theoretically, figure in cost-benefit analyses of such interventions, but in practice it might be too difficult to quantify the value of those benefits with any precision.

Covariant Risk and Segmented Markets

A special feature of agriculture, which provides the income of most rural residents, is the risk of income shocks. These include weather fluctuations that affect whole regions as well as changes in commodity prices that affect all the producers of a particular commodity. Such shocks affect the operation of credit markets if they create the potential for a group of farmers to default at the same time. The problem is exacerbated if all depositors simultaneously try to withdraw their savings from the bank. This risk could be averted if lenders held loan portfolios that were well diversified. But credit markets in rural areas tend to be segmented, meaning that a lender's portfolio of loans is concentrated on a group of individuals facing common shocks to their incomes—in one particular geographic area, for example, or on farmers producing one particular crop, or on one particular kinship group.

Segmented credit markets in the rural areas of developing countries often depend on informal credit, such as local moneylenders, friends and relatives, rotating savings, and credit associations. Informal credit institutions tend to operate locally, using local information and enforcement mechanisms.

The cost of segmentation is that funds fail to flow across regions or groups of individuals even though there are potential gains from doing so, as when needs for credit differ across locations. For example, a flood may create a significant demand for loans to rebuild. But because credit institutions are localized, such flows may be limited. Deposit retention schemes, which require that some percentage of deposits raised be reinvested in the same region, or the practice of unit banking may exacerbate the segmentation. Finding the optimal scope of financial intermediaries may require a tradeoff. Local lenders may have better information and may be more accountable to their depositors than large, national lenders. However, the latter may have better access to well-diversified loan portfolios.

Enforcement Problems

Arguably, the issue of enforcing loan repayment constitutes the central difference between rural credit markets in developing countries and credit markets

elsewhere. In this article, a pure enforcement problem is defined as a situation in which the borrower is able but unwilling to repay. Most models of credit markets discussed below do not concern themselves with enforcement and assume that, where projects are sufficiently profitable, loan repayment is guaranteed.

Enforcement problems are broadly of two kinds. First, the lender must attempt to enforce repayment after a default has occurred. But for this to be worthwhile, the lender must reap a benefit from enforcement that exceeds the cost. And the costs of sanctions, such as seizing collateral, may not be the only cost involved. It is sometimes argued that rich farmers who fail to repay are not penalized because the political costs are too high (see, for example, Khan 1979). Furthermore debt forgiveness programs—where a government announces that farmers are forgiven their past debts—are quite frequent. They have been common in Haryana State in India (see *India Today* 1991), for example, and *The Economist* (1992) has documented them in Bangladesh. So borrowers, aware that they can default on a loan with impunity, come to regard loans as grants, with little incentive to use the funds wisely.

Second, enforcement problems are exacerbated by the poor development of property rights mentioned earlier. In both industrial and developing countries, many credit contracts are backed by collateral requirements, but in developing countries the ability to foreclose on many assets is far from straightforward. Land—which, as a fixed asset, might be thought of as an ideal candidate to serve as collateral—is a case in point. In many countries property rights to land are poorly codified, which severely limits its usefulness as collateral. Rights to land are often usufructual, that is, based on using the land, and have limited possibilities for transfer to others, such as a lender who wishes to realize the value of the land as collateral. Reclaiming assets through the courts is similarly not a well-established and routine procedure. (For a general discussion of land rights issues and collateralization in three African countries, see Migot-Adholla and others 1991).

The difficulties of enforcement also help explain the widespread use of informal financial arrangements in developing countries. Such arrangements can replace conventional solutions, such as physical collateral, with other mechanisms, such as social ties (social collateral) (Besley and Coate 1991). Informal sanctions may persuade individuals to repay loans in situations where formal banks are unable to do so. Udry (1990), for instance, cites cases of delinquent borrowers being debarred from village ceremonies as a sanction.

Governments can help solve the collateral problem by improving the codification of property rights. In many countries, particularly in Africa, governments have taken steps to improve land registration. Whether these actions have the desired effect is debatable, especially in the short run, where attempts to codify rights may lead to disputes and increased land insecurity (Attwood 1990). Such programs also raise tricky ethical questions about the extent to which countries should be encouraged to adopt Western legal notions of property. In addition, the link between improved property rights and improve-

ments in the workings of credit markets, while intuitively clear, is not yet firmly established from empirical work. Interesting studies in this direction on Thailand (Feder, Onchan, and Raparla 1988) and on Ghana, Kenya, and Rwanda (Migot-Adholla and others 1991) explore the connections among property rights, investment, and credit.

In some important respects the government is itself part of the enforcement problem; indeed, government-backed credit programs have often experienced the worst default rates. In their pursuit of other (particularly distributional) objectives, governments have often failed to enforce loan repayment. Governments are often reluctant to foreclose on loans in the agricultural sector, in part because the loans are concentrated among larger, politically influential farmers (see, for example, Neri and Llanto 1985, on the Philippines). As a result, borrowers take out loans in the well-founded expectation that they will not be obliged to repay them and consequently come to regard credit programs solely as a pot of funds to be distributed among those lucky enough to get "loans." This lack of sanctions weakens incentives for borrowers to invest in good projects and strengthens those for rent seeking.

Appropriation of benefits by the richer, more powerful farmers has been a particular problem of selective credit schemes. The greater the credit subsidy, the higher the chances that the small farmer will be rationed out of the scheme (Gonzalez-Vega [1984] describes this as the "iron law of interest rate restrictions"). The evidence on this exclusion of small farmers is quite strong (see, for example, Adams and Vogel 1986). Given the political constituencies that governments have to serve, they are unlikely to be able to enforce repayments under certain conditions in programs that they back. Witness the reaction of the U.S. government, which, in the face of crises in the U.S. farm credit program, tends to protect the influential farming constituency by not foreclosing on delinquent borrowers or by helping them refinance their loans. A strong case may be made for privatizing credit programs to separate them from the government budget constraint. As noted above, state-owned banks are a common institution in developing countries.

The problem of weak government resolve is not confined to cases where the government actually sets up and runs the programs. Governments in various Indian states have made debt-forgiveness declarations binding on private creditors. Such practices, along with bailouts of bankrupt credit programs, give the wrong signals to borrowers if they engender expectations that bad behavior will ultimately be rewarded by debt being forgiven. Ultimately, the government's ability to commit itself credibly to a policy of imposing sanctions on delinquent borrowers is a significant aspect of the political economy of credit programs.

Imperfect Information

As discussed earlier, credit markets can face significant problems that arise from imperfect information. This section examines information problems that

cause market failure from the perspective of constrained Pareto efficiency. The two main categories of information problem discussed are adverse selection and moral hazard.

Adverse Selection

Adverse selection occurs when lenders do not know particular characteristics of borrowers; for example, a lender may be uncertain about a borrower's preferences for undertaking risky projects. (For analyses of credit markets under such conditions, see Jaffee and Russell 1976 and Stiglitz and Weiss 1981.) One much-discussed implication is that lenders may consequently reduce the amount that they decide to lend, resulting in too little investment in the economy. Ultimately, credit could be rationed.

The typical framework for analyzing such problems is as follows. Suppose that the projects to which lenders' funds are allocated are risky and that borrowers sometimes do not earn enough to repay their loans. Suppose also that funds are lent at the opportunity cost of funds to the lenders (say, the supply price paid to depositors). Lenders will thus lose money because sometimes individuals do not repay. Therefore, lenders must charge a risk premium, above their opportunity costs, if they wish to break even. However, raising the interest rate to combat losses is not without potentially adverse consequences for the lender.

Suppose (as do Stiglitz and Weiss 1981) that all projects have the same mean return, differing only in their variance. To make the exposition easier, suppose also that all borrowers are risk neutral. The adverse selection problem is then characterized as individuals having privately observed differences in the riskiness of their projects. If the interest rate is increased to offset losses from defaults, it is precisely those individuals with the least risky projects who will cease to borrow first. This is because these individuals are most likely to repay their loans and hence are most discouraged from borrowing by facing higher interest rates. By contrast, those who are least likely to repay are least discouraged from borrowing by higher interest rates. Profits may therefore decrease as interest rates increase beyond some point. A lender may thus be better off rationing access to credit at a lower interest rate rather than raising the interest rate further.

The key observation here is that the interest rate has two effects. It serves the usual allocative role of equating supply and demand for loanable funds, but it also affects the average quality of the lender's loan portfolio. For this reason lenders may not use interest rates to clear the market and may instead fix the interest rate, meanwhile rationing access to funds.

A credit market with adverse selection is not typically efficient, even according to the constrained efficiency criterion discussed above. To see this, consider what the equilibrium interest rate would be in a competitive market with adverse selection. Because all borrowers are charged the same interest rate, the

average probability of repayment over the whole group of borrowers, multiplied by the interest rate that they have to pay, must equal the opportunity cost of funds to the lender. Each borrower thus cares about the average repayment rate among the *other* borrowers because that rate affects the interest rate that he or she is charged. But an individual who is deciding whether or not to apply for a loan may ignore the fact that doing so affects the well-being of the other borrowers—which generates an externality as described above.

Situations of adverse selection give a lender an incentive to find ways to separate borrowers into different groups according to their likelihood of repayment. One device for screening out poor-quality borrowers is to use a collateral requirement (Stiglitz and Weiss 1986). If the lender demands that each borrower put up some collateral, the high-risk borrowers will be least inclined to comply because they are most likely to lose the collateral if their project fails. Given the scarcity of collateral and the difficulty of foreclosure discussed earlier, sorting out high-risk borrowers is certainly difficult and may be impossible. The discussion that follows therefore assumes that the lender is unable to distinguish between those borrowers who are likely to repay and those who are not.

The Stiglitz-Weiss model (1981) of the credit markets seems relevant for thinking about formal lending in a rural context, where it is reasonable to suppose that banks will not have as much information as their borrowers. The model also appears to yield an unambiguous policy conclusion that lending will be too low from a social point of view. In fact, it can be shown that a government policy that expands lending—through subsidies, for example—raises welfare in this model by offsetting the negative externality that bad borrowers create for good ones and by encouraging some of the better borrowers to borrow. In other words, adverse selection examined in the context of Stiglitz and Weiss's model argues for government intervention on the grounds of an explicit account of market failure.

How robust is their conclusion? DeMeza and Webb (1987) enter a caveat: instead of supposing that projects have the same mean, they suppose that projects differ in their expected profitability, with good projects more likely to yield a good return. They also suppose, as do Stiglitz and Weiss, that the lender does not have access to the private information that individuals have about the projects they are able to undertake. At any given interest rate, set to break even at the average quality of project funded, DeMeza and Webb show that some projects with a negative social return will be financed. Thus the competitive equilibrium has socially excessive investment levels. A corollary developed by DeMeza and Webb is that government interventions—such as a tax on investment—to restrict the level of lending to a competitive equilibrium are worthwhile.

Thus, both the Stiglitz-Weiss and DeMeza-Webb analyses conclude that the level of investment will be inefficient, but they recommend opposite policy interventions as a solution. The conflicting recommendations would not be especially disquieting except that the differences between the models are not

based upon things that can be measured with precision, but on assumptions about the project technology: for example, whether the mean return of the project is held fixed. So it is hard to know which of the results would apply in practice.

Moral Hazard

The Stiglitz-Weiss model of credit markets can also be extended to allow for moral hazard, a problem that can arise when lenders are unable to discern borrowers' actions. The central risk for the lender is that individuals who are in debt might slacken their efforts to make the project successful or they might change the type of project that they undertake. Borrowing money to invest in a project shares the risk between lender and borrower: if the project fails and the loan is not repaid, the lender bears the cost of the loan. There is a tendency, therefore, for the borrower to increase risk-taking, reducing the probability that a loan will be repaid.

Moral hazard is elaborated by Stiglitz and Weiss in their model where all projects have identical mean returns but different degrees of risk. As with their adverse selection model, they find that an increase in interest rates affects the behavior of borrowers negatively, reducing their incentive to take the actions conducive to repaying their loans. Riskier projects are more attractive at higher interest rates because, at the higher rate, the borrower will prefer a project that has a lower probability of being repaid. Once again, a higher interest rate may have a counterproductive effect on lenders' profits because of its adverse effects on borrowers' incentives. Stiglitz and Weiss again suggest the possibility of credit rationing—restricting the amount of money lent to an individual to correct incentives.

In cases of moral hazard, it is not clear-cut that the outcome is inefficient. Individuals who increase the riskiness of their projects when they are more indebted affect only their own payoff.[1] Thus, restrictions on the amount that an individual can borrow need not constitute a market failure, even though in a framework that allows for heterogeneous borrowers, such restrictions might compound the problems of adverse selection discussed above. There is no inefficiency from incentive effects if the lender is able to impose the cost of increased risk-taking on the borrower and no one else. This conclusion assumes, however, that the borrower borrows from a single lender.

In reality, that assumption may not hold (see, for example, Bell, Srinivasan, and Udry 1988). Some borrowers obtain funding for a project from more than one lender, very often mixing formal and informal lenders. Each lender typically prefers that the others undertake any monitoring that has to be done, and the monitoring may then be less vigorous and effective than otherwise. And if borrowers undertake several projects funded from different sources, effort on each project may not be separable, so that the terms of each loan contract may affect the payoff to the other lenders.

It is unclear whether either of these difficulties leads to too much or too little lending relative to the efficient level. Depending on the exact specification of the model, one can obtain a result in either direction, which from a policy viewpoint compounds the ambiguities found in the analysis of adverse selection. These arguments suggest the possibility of efficiency gains if a borrower deals with a single lender. Such an arrangement could internalize the externalities that arise when more than one lender is involved in a project.

Moral hazard may also lead to externalities in related markets, an obvious example being insurance. Individuals who have income insurance may make no effort to repay their loans, so that default ends up as a transfer from the insurer to the lender—a scenario reminiscent of the experience of some countries (for example, Mexico, as documented by Bassoco, Cartas, and Norton 1986).

The incentive effects of moral hazard need not in themselves argue for government intervention in credit markets, but if they are combined with multiple indebtedness, outcomes are likely to be inefficient, and government intervention designed to deal with such externalities may increase efficiency.

Investing in Information

The discussion has so far assumed that the amount of information available to lenders is unalterable. But lenders have many opportunities to augment information. They can, for instance, investigate the quality of projects and monitor their implementation. That information is costly does not necessarily imply that outcomes are inefficient (see Townsend 1978); one has to ask first whether lenders are likely to collect and process information efficiently. The answer may be negative if the "public good" nature of information is taken seriously—the fact that, once acquired and paid for by one lender, information may be exploitable by another. There seems to be no evidence of this theoretical possibility being practically important in rural areas of developing countries. Furthermore, the experience of industrial countries suggests that markets have effectively created mechanisms for generating information about borrowers that help to circumvent the public good problems. Private and independent credit-rating agencies have existed in the United States since the middle of the nineteenth century (Pagano and Jappelli 1992).

For rural financial markets of developing countries, lack of expertise in project appraisal and the high costs of monitoring and assessment relative to the size of a loan may mean that people are excluded from the credit market, even though they have projects that would survive a profitability test based on complete information. Braverman and Guasch (1989) suggest that the cost of processing small loans can range from 15 to 40 percent of the loan size (see also Adams, Graham, and Von Pischke 1984). But these kinds of transactions costs do not necessarily lead to inefficient exclusion from the credit market. It is at least possible that they reflect the real economic cost of serving a clientele

where information is scarce. Whether there is an inefficiency depends on whether the human capital and other factors that go into appraising loans are priced at their true economic costs. If not, the high figures for transactions costs discussed by Braverman and Guasch might indicate inefficiency.

The point is a reminder that parallel market failures may be important. If markets that provide inputs for the credit market are also imperfect, credit will be allocated inefficiently. From a policy viewpoint, therefore, the question is whether policy ought not to be focused on the real problem, rather than on the proximate problem of misallocated credit.

The Effect of Redistribution

The discussion so far has justified why allocation of credit can be suboptimal. This section develops the idea that the distribution of capital in the economy becomes tied together with efficiency in such situations. Suppose that there are two individuals, one with a worthwhile project to invest in and the other with some capital. If the one with the capital is uncertain about the quality of the other's project, he may be unwilling to lend enough for the project to reach its full potential. But if capital is redistributed—that is, if the person with the project now has the capital as well—the project is more likely to be undertaken because the investor does not have to allow for the risk posed by inadequate information. (For a formal analysis of such redistribution, see Bernanke and Gertler 1990.) Clearly, there is no Pareto improvement, because one individual now has less capital; however, the information problems in the economy are now reduced. The outcome would be quite different in the absence of information problems, when it should not much matter which of the individuals owns the capital because each has full information about the quality of the investment project.[2]

When lenders face information problems, therefore, the distribution of assets matters for other than purely distributional reasons, which may help explain why such things as land redistribution can enhance growth. If severe information problems beset credit markets, land redistribution is tantamount to a redistribution of assets that can enhance investment by reducing the costs of information imperfections—assuming, of course, that the individuals to whom assets are redistributed really have access to superior investment technologies. Binswanger and Rosenzweig (1990) argue for that assumption on the basis of evidence that small farmers have good investment opportunities that go unexploited because of high risk and limited access to credit. Their argument is not, however, based on efficiency. It is either a straightforward redistribution argument, or it might be justified by adopting a social welfare function that attached special importance to investment.

In practice, there is little doubt that many arguments in favor of intervention in credit markets are motivated by a belief that those who have few assets nonetheless have good investment opportunities. Unwillingness of lenders with

little information about the poor to lend is thought to be costly in terms of investment efficiency. Sometimes intervention in credit markets emerges as an alternative to redistributing assets. Intervention may make sense for both political and incentive reasons, but it may have little to do with market failure as defined here.

Relevance of Imperfect Information Arguments for Rural Financial Markets

It seems obvious that the analysis of information problems has general relevance for rural financial markets in developing countries, because it is hard to imagine that unobservable actions and characteristics do not play some part in the way in which the formal credit sector deals with farmers. The concern here is to examine more precisely what institutional features of rural financial markets can be explained by information imperfections and how these features can be related to arguments for government intervention.

For example, information imperfections are potentially important in explaining the segmentation of credit markets. Information flows are typically well established only over relatively close distances and within social groups, making it likely that financial institutions, at least indigenous ones, will tend to work with relatively small groups. Among such groups, characteristics of individuals tend to be well known, and monitoring borrowers' behavior may be relatively inexpensive. Such considerations also suggest why informal finance is used so extensively in rural areas.[3]

This claim is consistent with the many studies of informal rural financial markets available, several of which are collected in a special issue of the *World Bank Economic Review* (1990: 4, no. 3, September). For example, Udry's (1990) study of Nigeria finds that individuals tend to lend to people they know in order to economize on information flows. Similar evidence has been found for Thailand (see Siamwalla and others 1990) and Pakistan (see Aleem 1990). The fact that individuals form into groups that intermediate funds is not inconsistent with efficiency in investment decisions once enforcement costs and information difficulties are recognized, although there may be a case for facilitating flows of funds across segmented groups.

In contrast to small local lenders, formal institutions can usually intermediate funds over larger groups. Formal institutions suffer from greater problems of imperfect information, however, and are most susceptible to the kinds of inefficiencies discussed above. In this context, the formal sector naturally suffers a greater default problem.

One view says that the informal sector serves as lender of last resort to those who are unable to obtain finance in the formal sector—the people to whom the formal bank is reluctant to lend because of their characteristics and the cost of collecting information about them. A related argument is that the transac-

tions costs of lending to this group are prohibitive, very often because the loans they demand are so small. This, by itself, does not argue for any kind of intervention, but shifting more people to the formal sector—through government subsidization of loans in the formal sector, for example—could bring a beneficial externality by making market segmentation easier to overcome. The argument for reducing the size of the informal sector does, however, rest crucially on the belief that a formal bank has a comparative advantage in certain activities, such as managing loan portfolios across areas.

Other Arguments for Intervention

Other functions that are often advanced as properly within the purview of government are protecting depositors, establishing safeguards against monopoly, and disseminating know-how and innovation in credit markets.

Protecting Depositors

Much regulation in credit markets is directed toward the relationship between a lender and the ultimate owners of the funds that are lent, depositors in many cases. Indeed, creating an environment in which savings can be mobilized in the form of deposits is an essential part of operating an efficient credit market. Depositors typically are concerned about the safety of their deposits as well as the return that those deposits yield.

Providing reliable receptors of savings in rural areas of developing countries may seem especially problematical because of the covariant risk discussed earlier. Particular problems arise if all depositors wish to retrieve their savings at the same time, which may lead to bank runs. This problem is compounded if the withdrawals occur when borrowers are having difficulty repaying their loans. In such situations market segmentation becomes particularly costly if it prevents funds from flowing toward regions where demands for retrieving deposits are greatest. The farm credit program in the United States, established with such issues in mind, provides a clearinghouse for funds to flow between regions. The program was necessitated, however, by restrictive legislation that disallowed branch banking in favor of unit banking, a kind of legislated segmentation of the credit market.

The economics literature studies cases in which depositors withdraw funds en masse, causing the bank to collapse. Two different views emerge on the efficiency of such situations. In Diamond and Dybvig's (1983) analysis, bank runs are inefficient. They are modeled as resulting from a loss of confidence. Once depositors lose confidence, a run becomes a self-fulfilling prophecy, because if depositors expect others to withdraw funds in a hurry, it is rational to follow suit, for fear that the bank will be bankrupt if they wait. The result is a cascading collapse of the bank. Such losses of confidence need not have anything

to do with a fundamental change in the economy. The whims of depositors are enough to lead to collapse.

Calomiris and Kahn (1991), among others, take an alternative view. They argue that bank runs are triggered by depositors who monitor the bank and have good information about its financial health. Because deposits are returned on a first-come-first-served basis, the more diligent depositors are able to withdraw their funds if they suspect that the bank's loan portfolio is bad. A run can develop if the uninformed depositors see the informed ones deserting the bank. Thus, in this view, bank runs are the natural product of a process in which banks are disciplined by their depositors and need not be associated with any efficiency cost.

Governments in many countries have used the threat of bank runs to justify regulation. Reserve requirements (for example, where a given amount of assets must be held in the central bank) and liquidity ratios are sometimes imposed on commercial lenders—nominally to protect depositors, but quite often in practice to exert monetary control by the central bank or to finance the government's budget cheaply. Another mechanism for protecting depositors is loan portfolio insurance, often used with agricultural loans.

In the United States federal deposit insurance is designed to protect depositors against bank failures. Opinion is divided about the efficacy of this policy response. According to one view, deposit insurance reduces monitoring of banks by depositors, and the quality of lenders' loan portfolios may deteriorate as a result. Even if bank runs occur entirely at the whim of depositors, deposit insurance could still bring adverse consequences if insured lenders change their behavior—for example, by increasing their lending toward riskier projects. Trying to relax credit market segmentation is arguably preferable to expanding deposit insurance (Calomiris 1989). The aim is to provide some direct way to shift funds toward regions that have experienced negative income shocks affecting a bank's clientele. Guinnane (1992) gives an interesting account of how the "Centrals" intermediated funds between credit cooperatives in nineteenth-century Germany, directing funds to those cooperatives in need. In contemporary developing countries, systemic shocks, such as those resulting from fluctuations in commodity prices, may threaten the integrity of a regional financial system if flows of funds are poor.

Providing some assurances to depositors is a prerequisite to building financial institutions that mobilize local savings. Local institutions, such as credit cooperatives, make it relatively easy for depositors to monitor the behavior of lenders and even borrowers (Banerjee, Besley, and Guinnane, forthcoming). Credit programs that are entirely externally financed cannot use this method of accountability. The tradeoff is between avoiding covariant risk and encouraging local monitoring of lender and borrower behavior. The appropriate policy response to the problem of bank runs is far from clear. The U.S. experience suggests that building clearinghouses for interregional flows of funds may have merits, but this approach has the drawback, particularly for developing coun-

tries, of requiring a complex network of institutions that may be costly to build and maintain.

In sum, protecting depositors is an important dimension of government regulation in rural credit markets. The tradeoff is between protecting depositors and blunting their incentives to monitor lenders. Two main types of intervention appear justified on this count. The first is deposit insurance, and the second is building structures to intermediate funds across groups and regions, thereby reducing credit market segmentation.

Market Power and Intervention in Rural Credit Markets

Market power may lead to inefficiencies in credit markets if trade is restricted to maximize profits and if goods are not priced at marginal cost. Thus, monopolies are often subject to regulation. There are good reasons to expect market power to develop in credit markets. In a world of imperfect information, those with privileged access to information may obtain some market power as a result. Village moneylenders are a case in point, and they are often held up as archetypal monopolists because of their ability to exploit local knowledge.

Market power may also be important because, as lenders grow larger, their ability to diversify risk improves and their lending activities take on monopolistic tendencies. In effect, this gives a decreasing average cost curve to the industry. One might, therefore, expect a market structure with a few large lenders, each of whom is able to intermediate funds for a large group of borrowers. This scenario may not characterize rural areas of developing countries very well because of the high costs of getting the information needed to operate across many different localities. Experience does suggest, however, that these large lenders in rural areas may attempt to use their market power (see, for example, Lamberte and Lim 1987 on the Philippines).

Monopoly does not always lead to an inefficiency. If the monopolist-lender is able to discriminate in the price charged to each borrower, the lender will be able to extract all of the consumer surplus from each borrower. Monopoly power has no efficiency cost in this case; it pays the monopolist to lend to the point where the marginal value of credit to each borrower is the same (a "discriminating monopoly" outcome). In that case loans will be made efficiently, even though they will be designed to extract all of the surplus from borrowers and the lender may be labeled as exploitative (for a discussion of these issues, see Basu 1989).

The usual monopoly inefficiency, where lenders restrict funds to increase their profits, arises only when loan arrangements cannot be tailored to each individual. In this case an argument for intervention can be made. Direct regulation of interest rates is one obvious option, but village moneylenders who operate informally may be difficult to regulate. Nonetheless, usury laws are common. A second option is to reduce the monopoly power of established

sources by providing alternative sources of credit. The system of credit cooperatives established in rural India was motivated this way. To consider the rationale for such policies, one needs to understand why, if moneylenders were making a profit, no one else attempted to enter these markets. One possibility is that moneylenders were effectively able to deter entry in ways that could not be regulated directly; another is that the costs of setting up and running credit institutions in rural areas were prohibitive. One could argue for subsidizing rural credit institutions as an indirect way of reducing market power, but experience has shown that it is very hard to make such schemes function effectively. The moneylenders' ability to collect information and enforce repayment is real and must be replaced by an institutional structure that can fulfill these functions equally effectively.

Learning to Use Financial Markets

The operation of financial markets in more developed countries has evolved over a long period and has entailed a learning process whose importance cannot be underestimated. That process can be thought of as a period of acquiring the human and organizational capital that is basic to the functioning of financial markets.

This learning process can be related to the case for intervention in two ways. One is based simply on asymmetric information between citizen and government. A government may have a better sense than its citizens of the pitfalls and problems associated with different financial structures and is arguably in a better position to observe past experience at home and abroad. The intervention called for here, then, is provision of information to potential operators of financial institutions. In practice, providing information can be difficult and costly in comparison with either setting up institutions as demonstration projects or subsidizing successful projects. The scope of arguments based upon the government knowing best is potentially wide, and acknowledging that range may be the thin end of a large wedge. Such arguments may, however, be used to justify intervention on efficiency grounds. The market failure arises because agents are uninformed about what has worked elsewhere, and the aim is to avoid a costly search and learning process.

Another learning-based argument for intervention might hold that individuals learn from the experience of others within a country. An inefficiency might develop if individuals hang back waiting for others to try things out. The slow diffusion of certain agricultural technologies has often been attributed to a reluctance to be the first user. An obvious role for government intervention is to subsidize early innovators. Thus experiments in institutional design, such as the Grameen Bank in Bangladesh, might serve as prime candidates for subsidization. Such arguments appear only to justify subsidizing new ventures, however, and subsidies should be phased out along the way. The creation of vested interests entailed raises tricky political economy issues.

Concluding Remarks

This article has reviewed some arguments associating market failures with the case for interventions in rural credit markets. Enforcement difficulties, imperfect information, protection of depositors, market power, and learning arguments all have implications for government intervention.

Where enforcement is an issue, governments may intervene by strengthening property rights to increase the scope and effectiveness of collateral, although this is not a direct intervention in the credit market. But government might be as much a part of the problem as the solution in this context, because many government-backed credit schemes fail to sanction delinquent borrowers.

Deposit insurance is an obvious option for protecting depositors, but it may blunt the incentives depositors have to monitor the performance of lenders. Measures intended to facilitate the flow of funds across groups and regions may be preferable to deposit insurance schemes.

Monopoly power may create tension because information is concentrated in lenders' hands, but market power (for example, of village moneylenders) is not necessarily socially inefficient, even though its redistributive consequences may be considered repugnant. Providing credit alternatives may be a reasonable response from the perspective of distributional concerns but, again, might have relatively little to do with market failure.

In summary, there may be good arguments for intervention, and some may be based on market failure. But as one unpacks each argument, the realization grows that, given the current state of empirical evidence on many relevant questions, it is impossible to be categorical that an intervention in the credit markets is justified. Empirical work that can speak to these issues is the next challenge if the theoretical progress on the operation of rural credit markets is to be matched by progress in the policy sphere.

Notes

Timothy Besley is with the Woodrow Wilson School, Princeton University. This article was originally prepared for the Agricultural Policies division of the World Bank. The author is grateful to Dale Adams, Harold Alderman, Charles Calomiris, Gershon Feder, Franque Grimard, Karla Hoff, Christina Paxson, J. D. Von Pischke, Christopher Udry, and seminar participants at the World Bank and Ohio State University for comments and to Sanjay Jain for assistance in preparing the first draft.

1. A caveat to this is the case where returns to borrowers are correlated and the lender is not risk neutral. In that case, the break-even interest rate for all borrowers depends on the decision of all borrowers as to effort, and an externality similar to that discussed for the adverse selection case obtains.

2. The argument is really a bit more subtle. Redistribution would still have potential income effects that might affect willingness to bear risk; a rich individual might be more willing than a poor one to undertake a risky project. Such influences could mean that, even without an information problem, individual circumstances could affect the decision of how much to invest in the project. The argument in the text is exactly correct only with risk-neutral individuals.

3. Stiglitz (1990) argues that this could be harnessed in group lending programs that encourage peer monitoring.

References

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

Adams, Dale W., Douglas H. Graham, and J. D. Von Pischke, eds. 1984. *Undermining Rural Development with Cheap Credit.* Boulder, Colo.: Westview Press.

Adams, Dale W., and Robert C. Vogel. 1986. "Rural Financial Markets in Developing Countries: Recent Controversies and Lessons." *World Development* 14:477–87.

Aleem, Irfan. 1990. "Imperfect Information, Screening, and the Costs of Informal Lending: A Study of a Rural Credit Market in Pakistan." *The World Bank Economic Review* 4(3, September):329–50.

Attwood, David A. 1990. "Land Registration in Africa: The Impact on Agricultural Production." *World Development* 18(May):659–71.

Banerjee, Abhijit V., Timothy Besley, and Timothy W. Guinnane. Forthcoming. "Thy Neighbor's Keeper: The Design of a Credit Cooperative, with Theory and a Test." *Quarterly Journal of Economics.*

Bassoco, Luz Maria, Celso Cartas, and Roger D. Norton. 1986. "Sectoral Analysis of the Benefits of Subsidized Insurance in Mexico." In Peter Hazell, Carlos Pomerada, and Alberto Valdes, eds., *Crop Insurance for Agricultural Development.* Baltimore: Johns Hopkins University Press.

Basu, Kaushik. 1989. "Rural Credit Markets: The Structure of Interest Rates, Exploitation, and Efficiency." In Pranab Bardhan, ed., *The Economic Theory of Agrarian Institutions.* Oxford: Oxford University Press.

Bell, Clive, T. N. Srinivasan, and Christopher Udry. 1988. "Agricultural Credit Markets in the Punjab: Segmentation, Rationing, and Spillovers." Yale University, New Haven, Conn. Processed.

Bernanke, Ben, and Mark Gertler. 1990. "Financial Fragility and Economic Performance." *Quarterly Journal of Economics* 105(February):87–114.

Besley, Timothy J., and Stephen Coate. 1991. "Group Lending Repayment Incentives and Social Collateral." RPDS Discussion Paper 152, Woodrow Wilson School, Princeton University, Princeton, N.J. Processed.

Binswanger, Hans T., and M. R. Rosenzsweig. 1990. "Are Small Farmers Too Poor to Be Efficient?" World Bank, LAC Technical Department, Washington, D.C. Processed.

Braverman, Avishay, and J. Luis Guasch. 1989. "Institutional Analysis of Credit Co-operatives." In Pranab Bardhan, ed., *The Economic Theory of Agrarian Institutions.* Oxford: Oxford University Press.

Calomiris, Charles W. 1989. "Deposit Insurance: Lessons from the Record." *Federal Reserve Bank of Chicago Economic Perspectives* (May-June):10–30.

Calomiris, Charles W., and Charles M. Kahn. 1991. "The Role of Demandable Debt in Structuring Optimal Bank Arrangements." *American Economic Review* 81(3, June):497–513.

DeMeza, David, and David C. Webb. 1987. "Too Much Investment: A Problem of Asymmetric Information." *Quarterly Journal of Economics* 102(May):281–92.

Diamond, Douglas W., and Philip W. Dybvig. 1983. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91(June):401–19.

Dixit, A. K. 1987. "Trade and Insurance with Moral Hazard." *Journal of International Economics* 23(November):201–20.

The Economist. 1992. "Begum Zia's Burden." April 4.

Feder, Gershon, Tongroj Onchan, and Tejaswi Raparla. 1988. "Collateral Guarantees and Rural Credit in Developing Countries: Evidence from Asia." *Agricultural Economics* 2:231–45.

Gonzalez-Vega, Claudio. 1984. "Credit-Rationing Behavior of Agricultural Lenders: The Iron Law of Interest-Rate Restrictions." In Dale W. Adams, Douglas H. Graham, and J. D. Von Pischke, eds., *Undermining Rural Development with Cheap Credit*. Boulder, Colo.: Westview Press.

Greenwald, Bruce, and Joseph E. Stiglitz. 1986. "Externalities in Economies with Imperfect Information and Incomplete Markets." *Quarterly Journal of Economics* 101(May):229–64.

Guinnane, Timothy W. 1992. "Financial Intermediation for Poor Borrowers: The Case of German Credit Cooperatives, 1850–1914." Yale University, New Haven, Conn. Processed.

India, Government of. 1991. *Report of the Committee on the Financial System.*

India Today. 1990. "Bluff and Bluster." March 31:45.

Jaffee, Dwight, and Thomas Russell. 1976. "Imperfect Information, Uncertainty, and Credit Rationing." *Quarterly Journal of Economics* 90:651–66.

Khan, A. 1979. "The Comilla Model and the Integrated Rural Development Programme in Bangladesh: An Experiment in 'Cooperative Capitalism.'" *World Development* 7:397–422.

Lamberte, Mario B., and Jospeh Lim. 1987. "Rural Financial Markets: A Review of the Literature." Working Paper 87–02, Philippine Institute for Development Studies, Manila. Processed.

McKinnon, Ronald. 1973. *Money and Capital in Economic Development*. Washington, D.C.: The Brookings Institution.

Migot-Adholla, Shem, Peter Hazell, Benoit Blarel, and Frank Place. 1991. "Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?" *The World Bank Economic Review* 5(1, January):155–75.

Neri, Purita F., and Gilbert M. Llanto. 1985. "Agricultural Credit Subsidy." *CB Review* (Central Bank of The Philippines) 37(October):8–16.

Okorie, Aja. 1990. "Rural Banking in Nigeria: Determining Appropriate Policy Variables." ARSSS Research Report 9. Winrock International Institute for Agricultural Development, Morrilton, Ark. Processed.

Pagano, Marco, and Tullio Jappelli. 1992. "Information Sharing in the Market for Consumer Credit." Università di Napoli. Processed.

Siamwalla, Ammar, and others. 1990. "The Thai Rural Credit System: Public Subsidies, Private Information, and Segmented Markets." *The World Bank Economic Review* 4(3, September):271–96.

Stiglitz, Joseph E. 1990. "Peer Monitoring and Credit Markets." *The World Bank Economic Review* 4(3, September):351–66.

Stiglitz, Joseph E., and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review* 71:393–419.

———. 1986. "Credit Rationing and Collateral." In Jeremy S. S. Edwards and Colin P. Mayer, eds., *Recent Developments In Corporate Finance*. London: Cambridge University Press.

Townsend, Robert. 1978. "Optimal Contracts and Competitive Markets with Costly State Verification." *Journal of Economic Theory* 21:265–93.

Udry, Christopher. 1990. "Credit Markets in Northern Nigeria: Credit as Insurance in a Rural Economy." *The World Bank Economic Review* 4(3, September):251–71.

World Bank. 1987. *The Philippines: A Framework for Economic Recovery*. Washington, D.C.

WHAT MAKES RURAL FINANCE INSTITUTIONS SUCCESSFUL?

Jacob Yaron

Providing affordable credit to the rural population has long been a prime component of development strategy. Governments and donors have sponsored and supported supply-led rural finance institutions both to improve growth and equity and to neutralize or mitigate urban-biased macroeconomic policies. But because of high risks, heavy transaction costs, and mounting loan losses, many of the programs have drained state resources to little purpose, reaching only a small part of the rural population and making little progress toward self-sustainability.

There are, however, a few success stories. This article reviews the policies, modes of operation, incentives, and financial performance of four publicly sponsored programs in Asia that are widely perceived to be successful, to find out what economic, social, and institutional factors contributed to their success.

Two objectives are paramount for a rural finance institution (RFI) to be successful: financial self-sustainability and substantial outreach to the target rural population. These criteria were used to assess the performance of four RFIs generally considered successful: the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand, the Badan Kredit Kecamatan (BKK) and the Bank Rakyat Indonesia Unit Desa (BUD) in Indonesia, and the Grameen Bank (GB) in Bangladesh.

The BAAC was founded in 1966, the BKK began operations in Central Java in 1972, the BUD initiated the KUPEDES program in 1983,[1] and the GB began as a pilot project in August of 1976, becoming an independent bank in October 1983 when it began to lend to self-help groups. By 1989 (the latest year for which the study has data),[2] the BAAC was serving the credit and savings needs of more than 2.6 million clients; the BKK offered credit to 500,000 rural clients for off-farm activities; the BUD's lending reached 1.6 million clients, and the GB served 660,000 rural clients, about 91 percent of whom were women. These four are not the only successful RFIs, but they are preeminent examples.

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 49–70

Assessing Performance

There is no generally accepted definition of a successful RFI. The traditional quantifiable measures of success—profit figures presented in standard financial statements—are not helpful in assessing the degree of self-sustainability an RFI has achieved and the extent of its outreach. The discussion that follows suggests some ways in which performance can be assessed according to these criteria.

Measures of Financial Self-Sustainability

Financial self-sustainability is achieved when the return on equity, net of any subsidy received, equals or exceeds the opportunity cost of funds. Dependence on subsidies is the inverse of self-sustainability. Traditionally, RFIs have been sustained by various types of implicit or explicit subsidies to ensure continued operations. The most common subsidies have been differences between the market interest rate and interest rates paid on concessional borrowing from the state or donor, state assumption of foreign exchange losses on loans denominated in foreign currencies, obligatory deposits by other financial or public institutions at a below-market rate, direct reimbursement by the state or donor of some or all operating costs, and exemption from reserve requirements or forced investment.

The value of any subsidy extended to an institution should be measured against the institution's volume of business. In view of high initial start-up costs, a dynamic approach is required to measure progress in reducing reliance on concessional funds over time. To eliminate dependence on subsidies, an RFI must:

- Have positive on-lending interest rates high enough to cover nonsubsidized financial costs, as well as administrative costs, to maintain the value of equity in real terms
- Achieve a high rate of loan collection
- Have deposit interest rates high enough to ensure that voluntary saving becomes increasingly significant in financing the loan portfolio
- Contain administrative costs through efficient procedures for assessing investment plans, screening borrowers, processing loans, collecting repayments, and mobilizing and servicing savings to ensure that lending rates do not become prohibitive.

Measures of Outreach

RFIs have often had different stated objectives for providing credit and other financial services to the rural population and sometimes to particularly disadvantaged population segments. Outreach is assessed here on the basis of the type of clientele served and the variety of financial services offered, including:

- The value and number of loans extended
- The value and number of savings accounts
- The type of financial services offered
- The number of branches and village sub-branches
- The percentage of the total rural population served
- The real annual growth of the RFI's assets over recent years
- The participation of women as clients.

The growth rate of an RFI's assets might, under given conditions, also serve as a crude proxy for new clients' access to financial services.

Before examining the performance of the four relatively successful Asian programs according to these criteria, it is worth briefly considering why RFIs have so frequently failed to achieve these objectives.

Why RFIs Have Failed

Generally, the performance of state- or donor-sponsored rural finance operations has fallen substantially short of expectations, and many of the credit programs have become a costly drain on government budgets. The programs have reached only a minority, often the wrong minority, of the rural population, generating an unintended "grant" in the form of negative on-lending interest rates, which are captured by wealthy and influential farmers. Administrative interventions have retarded the establishment of efficient financial markets and have impeded the development of other sectors of the economy, mainly by depriving the institutions of loanable funds and increasing their borrowing costs. Many of the large RFIs have been associated with heavy losses generated either by inadequate indexation in a highly inflationary environment (such as Brazil and Mexico) or by poor loan collection in a stable economy (such as India).

Specialized agricultural credit institutions established to implement targeted and often subsidized loans have suffered from inadequate planning and inefficient operation or have been hamstrung by economic, political, social, and institutional environments inimical to their effectiveness. Among their most important deficiencies has been the imbalance between the institutions' sizable, supply-led loan portfolios and mobilization of savings. Inadequate, depressed deposit interest rates have combined with concessional funds from state or international donors to discourage savings mobilization. The RFIs have consequently ended up as mere disbursement windows, rather than balanced, full-service financial institutions, and often the costs of the indirect subsidization implicit in this access to cheap sources of finance have not been properly disclosed.

Unmotivated by commercial imperatives, these institutions have suffered from inadequate credit evaluation, management, and monitoring, with inevitably poor loan collection. Meanwhile, their attempts to ensure the eligibility of borrowers and to avoid diverting funds not only have resulted in high costs

but also have imposed high transactions costs on borrowers, who must wait long periods to receive their loans. Legally imposed ceilings on lending interest rates, prevalent in developing countries, have not allowed compensation for the high risk necessarily present in lending to agricultural operations, given their exposure to the vagaries of nature. To minimize the risk and administrative costs, RFIs have often favored large-scale borrowers at the expense of small-scale entrepreneurs.

Policies of Four Asian Programs

How have the few managed to steer clear of the shoals on which the many have foundered? The four RFIs reviewed here differ from each other in many respects, and extrapolating from their experience should be done with caution. Nonetheless, an examination of both the differences and the similarities has highlighted some critical issues that must be taken into account in any exploration of the routes to success.

The RFIs reviewed have differed in their target clientele, in their years of experience in providing financial services, and, notably, in their objectives. Only the BAAC has devoted funds exclusively to agricultural producers; the other three have financed any rural income-generating activity, with a concentration on nonfarm operations. Among the four institutions, the GB's performance in banking is outstanding in reaching a distinct target group of very poor people—the more so considering that the GB, in addition to its regular financial programs, provides nonfinancial services to its clients in such areas as health, education, and nutrition. Any assessment or comparison of the GB with the other three RFIs should take into account that these extra services clearly increase the GB's operational costs.

The difference in economic status of the clientele served is noteworthy: the BUD and the BAAC have had an average outstanding loan size of about $300 and $500, respectively, whereas outstanding loans for the BKK and the GB have averaged less than $100.[3] The gap between these two pairs is crucial to understanding some of the differences in the delivery mechanisms and procedures applied. The effect of loan and deposit size on administrative costs per dollar lent cannot be overestimated. It heavily influences an institution's potential and progress toward self-sustainability. An RFI's performance in pursuit of financial sustainability—as well as of outreach—should thus be evaluated in the context of the clientele served.

Financial Policies

The financial policies of principal importance in RFI activities concern the nominal and real interest rates on loans and deposits, financial incentives for inducing better repayment and collection, and loan security requirements.

All four RFIs have charged positive real interest rates on their loans, with nominal rates ranging from 11 to 130 percent a year (the upper bound has been charged only on a very small share of the BKK short-term loans). For the BUD and the BKK, real rates have been greater than 15 percent annually, and for the BAAC (which has specialized in "mass production" of uniform short-term loans to self-help groups) and the GB, real rates have been less than 6 percent. These data support the notion that access to credit, rather than the subsidy embodied in negative interest rates, has been the important factor for the ultimate borrowers. Some of the RFIs would have had to increase rates or reduce lending, if their access to cheap sources of funds had been eliminated. Despite the positive and frequently high on-lending rates used, the rates were still significantly below those prevailing in informal money markets. The BAAC and the GB have functioned within legally imposed ceilings on lending interest rates, but the other two RFIs have been free to adjust lending rates.

All four institutions have provided savings services, with varying degrees of success when the amounts were measured against the value of their loan portfolios. All four started as supply-led credit institutions whose primary function was to deliver credit rather than to meet the demand for deposit and savings services. Only later did the mobilization of savings become significant in the growth of the BUD, and the most rapidly growing financial resource for the BAAC. Deposit rates have been positive for the BUD and the BAAC, with the average value of deposits significantly higher than those of the BKK and the GB. Rates applied by the BKK and the GB to obligatory savings were lower than the lending rates, implying higher effective lending interest rates and a smaller effective loan size.

The RFIs have used an array of incentives to ensure financial discipline and to build a positive relationship between the lender and borrowers. Both the BKK and the GB, the two RFIs that targeted the lowest-income clientele, have required obligatory savings. This requirement has introduced and enhanced financial discipline among inexperienced, first-time, small-scale borrowers and has also reduced the RFIs' financial risk.

The two Indonesian RFIs have offered a monthly interest rebate on the original loan value for timely repayments—0.5 percent of the loan for the BUD and 1 percent for the BKK. In view of the declining balances of the loans extended by the BUD and given the typical monthly repayments involved, the rebate has amounted to about 12 percent on an annualized basis for a loan scheduled for repayment in twelve-month installments—a substantial rebate and an effective incentive for prompt repayment. The BAAC, by contrast, has preferred to impose a penalty rate of 3 percent a year on arrears, equivalent to about a quarter of its nominal lending interest rate.

Strict collateral requirements are frequently incompatible with small-scale loans to the poor. How the RFIs solved the loan security problem, while simultaneously obtaining high rates of loan collection, is crucial to understanding their success. the BKK and the GB, characterized by very small average loan size,

have extended loans without collateral; the BKK used character references exclusively; and the GB used joint liability mechanisms.

The BAAC too has relied on joint liability for short-term loans, using a small, homogeneous group that did not pose the "free rider" problem that would be inherent, for example, in its lending to large cooperatives.[4] A joint liability can be effective only within a small homogeneous group, in which peer pressure can be brought to bear. The BAAC has required collateral only for individual loans exceeding $2,400. The BUD has required cosigners, usually the applicant's spouse, as well as evidence of ownership of assets such as land, buildings, or other property. A statement of ownership based on land tax payments signed by a government official was sufficient to receive a loan up to the equivalent of $540; certificates of ownership were necessary for loans exceeding that amount. Foreclosures in Indonesia are rare and difficult to execute. Even though the BUD cannot economically foreclose on the collateral on all bad loans, the threat that it could do so has deterrent value, especially if willful default is suspected. Three of the four institutions, therefore, have departed significantly from the traditional requirements established by supply-led credit institutions and, despite conspicuously different methods of securing their loans, have successfully obtained adequate loan collection.

Delivery Mechanisms

The four Asian programs have devised a variety of delivery mechanisms to avoid the deficiencies that have impeded the progress of traditional RFIs toward self-sustainability and significant outreach. Two problems in particular confront RFIs: first, ensuring efficient and relatively low-cost operational procedures for screening borrowers, processing and monitoring loans, and mobilizing and servicing voluntary savings; and second, achieving adequate loan collection so that continued operations are feasible without constant reliance on state concessional funds or bail-outs.

LOAN PROCESSING. All four of the RFIs have processed loans efficiently, although each has applied a procedure tailored to its specific clientele. The flexible repayment patterns in the two Indonesian institutions have meant that loan repayments could be adjusted to the wide variety of activities financed and their typical cash flow patterns. The BKK generally has collected repayments weekly; the BUD, monthly. Through its small loan amounts, flexible repayment terms, and delivery mechanisms tailored to client needs, the BKK's services have resembled those provided by money lenders. Although standard loans have predominated, the BKK has permitted balloon repayments and even daily repayment schedules when justified. The time between submitting an application and disbursement of the loan has ranged between one and two weeks for first-time borrowers for all four RFIs; the BKK, however, has required only one day for a repeat borrower, thanks to a one-page application form. The four

systems have differed markedly from those of supply-led financial institutions, whose pervasive red tape has led to high transactions costs for their clients.

SOCIAL MECHANISMS. All four programs have used existing social structures or have formed social and peer groups to ensure that borrowers are selected appropriately and repayments are made on time—two key areas in which the problem of asymmetric information puts the formal RFI at a distinct disadvantage (Llanto 1990; Hoff and Stiglitz 1990).

The two Indonesian RFIs have used the authentic and official leadership in the village to help screen loan applicants and secure prompt loan collection. The banks have relied on the reputation, authority, and official and social status of the village leader to overcome one of the principal deficiencies of formal RFIs: inadequate information on the creditworthiness of potential borrowers. The penalty for poor performance was immediate: additional borrowing was prohibited, and the borrower's access to credit was eliminated. By contrast, a sound collection record enhanced the status of the village head, who inevitably became the link between formal lenders and the village, both for first-time borrowers and for repeat borrowers who became eligible for larger loans. No information is available on whether applicants paid the village heads for approving loans. But even if they did, the overall costs to the borrower are estimated to be significantly lower than those charged by money lenders.

The GB and the BAAC have leaned heavily on self-help groups to promote and deliver loans, thus generating substantial savings in their transactions costs. The smallness of the group (five members in the GB and up to thirty in the BAAC) has eliminated or drastically reduced the emergence of free riders. Each individual's performance is crucial in determining the group's success or failure, thereby creating a sense of affiliation that has resulted in efficient, successful financial intermediation. As Joseph Stiglitz (1990, p. 361) points out, "the members of the peer group must be provided with incentives to monitor the actions of their peers. In the Grameen Bank this is provided by the fact that members of the peer group are jointly liable for repayment of loans, and by the fact that they cannot gain access to credit until the debts of the group are discharged." Formation of the group itself, however, has imposed some costs on the GB.

LOAN REPAYMENT. The GB and the BAAC have applied a standardized, rigid structure of loan repayments to achieve financial discipline. The GB has introduced poor, inexperienced borrowers to financial discipline by requiring fifty equal weekly loan repayments followed by two weekly interest payments. The pattern of frequent repayments has been critical in preventing borrowers from accumulating cash that they might have been tempted to spend rather than using it to repay the loan. This rigid pattern of repayment, buttressed by routine meetings of the GB group members in which social pressure was applied to achieve prompt repayments, has also probably saved administrative costs and

loan losses. Because these meetings are concerned with social, health, and education issues, a common bond between members existed, making voluntary default an occasion for loss of social standing.

With short-term loans accounting for 75 percent of its annual disbursements, the BAAC's standardized structure required a balloon repayment of principal and interest eleven months after loan disbursement. Prompt payment was a condition for a follow-up loan one month later. Borrowers unable to pay on time were expected to borrow elsewhere to cover the full amount due; indeed, they sometimes preferred to incur the high financial costs of borrowing from money lenders rather than lose their eligibility to borrow from the BAAC—the only possible access to formal credit.

By contrast, the standard three-month loan repayment procedure for BKK loans has been flexible and transparent, making it easy for both the client and staff member to calculate the amount required for each weekly installment. Each of the twelve weekly payments made within the three-month period was equivalent to 10 percent of the original value of the loan, with the first ten repayments covering the principal, the next for obligatory savings, and the final installment serving as the interest payment. This simple system has proven to be understandable even to inexperienced, often illiterate, clients.

The type of clientele, the nature of the business financed, and the variety of services provided have determined the different procedures the four RFIs used for loan repayment. The two RFIs that have been associated with group lending (the BAAC and the GB) have preferred the standardized rigid repayment pattern. Both these RFIs have been motivated to save on transactions costs, probably because they both have faced a legal ceiling for on-lending rates, and, because their clientele has been more homogeneous, a standardized and rigid repayment pattern has been a reasonable way to reduce administrative cost per dollar lent.

Under all four programs, borrowers who made timely repayments gradually increased the amount of credit they were eligible to receive; in fact, timely repayment has become the only assured way to gain access to repeated loans at the lowest financial cost available. In both the BAAC and the GB, default by any member disqualified all participants in the joint liability group; thus, maintaining and increasing the group's eligibility has been a crucial incentive for timely repayments. In most cases, losing this eligibility would have meant facing significantly higher financial costs (from money lenders) or even aborting the proposed investment.

All four RFIs have used components of mobile banking as an innovative way to provide low-cost savings and lending services to very poor clients. A BKK field staff member, for example, visited a different village each day of the week, often on market day, collecting savings deposits and weekly loan repayments. This practice has greatly reduced transactions costs for both the client and the BKK. The BAAC too has offered investment assistance at the village level,

although disbursements and repayments were handled at the more central branch locations.

STAFF INCENTIVES. The four RFIs have instituted regimes that reward staff members for better performance in assessing, extending, and collecting loans and in promoting and servicing savings. The BKK has distributed 10 percent of a branch's profits to its staff. The BUD has provided a yearly bonus of up to one month's salary and special awards for outstanding performance. The BAAC has based its promotion system on three quantifiable factors: loan extension, loan collection, and savings mobilization. The GB has also promoted staff members according to the profits a branch made, as well as distributing 10 percent of those profits to its staff. By tying employee bonuses to quantifiable performance criteria, these incentive programs have succeeded in increasing accountability and motivating staff.

Performance Indicators: Self-Sustainability and Outreach

All four RFIs have made profits. But profit figures are of limited use as an indicator either of self-sustainability (because some of the four have benefited from subsidies not captured in conventional accounting reporting) or of level of outreach (because profits do not reflect the nature of financial and nonfinancial services provided to the target population). Because dependence on subsidies is in inverse proportion to self-sustainability, a subsidy dependence index (SDI) is suggested for tracking the progress an RFI makes in reducing its dependence over time, and for comparing the degrees to which RFIs that provide similar services to a similar clientele depend on subsidies. For outreach, assessment must be based on the different, stated objectives of each RFI in terms of services offered, intended outcomes, and clientele served.

Self-Sustainability

The subsidy dependence index measures the percentage increase in the average on-lending interest rate required to compensate for eliminating subsidies, including the subsidy an RFI receives through paying interest below the market rate on its borrowed funds (mostly rediscounting facilities with the central bank or soft loans from donors). The index assumes for simplicity that an increase in the lending rate is the only change made to compensate for loss of subsidy;[5] it should not be inferred, however, that adjusting the interest rate is always required, feasible, or even desirable. The subsidy is measured against the interest earned on the RFIs' annual average outstanding loan portfolio because lending is the prime activity of a supply-led RFI.

A meaningful assessment of subsidy dependence must recognize that RFIs differ in their ratio of debt to equity. An RFI with a low debt-to-equity ratio

might appear to be performing better that an RFI with a higher ratio because a smaller subsidy is needed for a given volume and complexity of operations. This is because an RFI's equity is presented as a costless item in accounting terms, while the financial obligations of a more leveraged RFI incur interest costs. To resolve the debt-to-equity bias in measuring the subsidy dependence of an RFI, the cost of equity is imputed.

The approximate market rate the RFI would pay on financial resources in the absence of concessional borrowed funds is difficult to establish precisely, particularly in undeveloped financial markets. Precision is not essential here, however, for what is needed is information on the order of magnitude and trends. For example, treasury bill rates or certificates of deposit with maturities of six months to one year (with adequate risk premiums) could serve as a reference rate. The SDI is a sensitivity test that shows the required change in the average on-lending interest rate, all things being equal, for the RFI to maintain its operations without a subsidy; it does not pretend to shed light on how the subsidy was used and whether it benefited the clients or shored up a bloated, inefficient bureaucracy.

An SDI of zero means that an RFI is fully self-sustainable. An SDI of 100 percent indicates that a doubling of the RFI's average on-lending rate is required if subsidies are to be eliminated. A negative SDI indicates that the RFI not only has achieved self-sustainability, but that its annual profits, minus its imputed return on capital as calculated by applying the approximate market interest rate, exceed the total annual value of subsidies—or that the RFI does not receive any subsidies, and the return on equity exceeds the cost of imputed capital. A negative SDI also implies that the RFI could have lowered its average on-lending rate while simultaneously eliminating any subsidies received in the same year.

The SDI for the four institutions was calculated for the most recent year for which financial statements were available and for two years earlier to determine whether an RFI was actually making progress toward self-sustainability (table 1). Data indicate that the four RFIs have differed substantially in their level of dependence on subsidies. This information was not included in the audited financial statements that supplied much of the data used to calculate the index. Furthermore, all of the RFIs presented profits in their income statements from 1986 to 1989, despite an enormous variance in the SDI results. The BUD's SDIs of 3 percent and −8 percent in 1987 and 1989, respectively, mean that it depended marginally on subsidies in 1987 and no longer depended on them by 1989. The speed with which the BUD reached that negative level of subsidy dependence may be linked to its ability to build onto the existing infrastructure of its parent system at the village level, thereby avoiding the large investments often required as start-up costs.

In contrast, the figures for the GB indicate a high level of dependence on subsidies. The GB's SDI of 180 percent in 1987 suggests that its on-lending interest rate would have had to be increased by 180 percent, from 13.3 percent to 37.2

Table 1. *Subsidy Dependence Index*
(percent)

Indicator	BKK 1987	BKK 1989	BUD 1987	BUD 1989	BAAC 1986	BAAC 1988	GB 1987	GB 1989
Index reading	24	20	3	−8	28	26	180	130
Effective annual lending rate	35.8	33.8	41.9	40.1	12.3	11.9	13.3	12.0
Effective lending rate required to eliminate all subsidies	44.4	40.5	43.0	37.1	15.7	15.0	37.2	27.6

Note: The index represents the percentage change the RFI would have to make in its on-lending rate to eliminate subsidies.
Source: Author's calculations.

percent a year, or by 23.9 percentage points, to compensate for full elimination of subsidies. The GB made significant progress in reducing its SDI to 130 percent in 1989 but was still far from self-sustainable. The International Fund for Agricultural Development provided the GB with low-cost credit funds, many of which were held in private banks as high-return time deposits. The GB's 1989 SDI means that, to eliminate its subsidies fully, it would have had to more than double its average on-lending rate, from 12.0 to 27.6 percent, or about 15.6 percentage points.

As mentioned earlier, four factors critical for eliminating dependence on subsidies are positive on-lending interest rates, high rates of loan collection, the encouragement of voluntary savings, and the containment of administrative costs.

INTEREST RATES. All four institutions have applied positive interest rates, which have compared favorably to the rates offered by informal money market lenders. When positive and relatively high, on-lending interest rates allow improved coverage of the institution's operational costs and loan losses. Combined with increased efficiency obtained over time, this can significantly decrease dependence on subsidies by reducing the administrative cost per dollar lent or serviced in savings accounts. Although it is argued that the poor clientele need low, subsidized interest rates, it is access to credit, not its price, that has been the most important factor for the clientele these financial institutions intend to serve.

LOAN COLLECTION. Attaining a high rate of loan collection is a necessary condition for an RFI to become self-sustainable; loan losses often have been the largest cost borne by RFIs and the principal cause of insolvency, illiquidity, and increased reliance on state bail-outs. The four RFIs have reported high annual collection rates, ranging between 80 and 98.6 percent (table 2).[6] Even those with lower recovery rates—the BKK with 80 percent and the BAAC with 83 percent (for individual loans)—could not be considered to have a serious loan loss

Table 2. *Arrears and Related Financial Ratios*
(percent)

Arrears and ratios	*BKK*	*BUD*	*BAAC*	*GB*
The RFIs' definition of arrears	Due date for final installment	Due date for final installment	Amount not paid on due date	1 year past maturity
Annual loan collection/old overdues + current maturities that fall due in the year	80	95 (est.)	83 individuals 40–43 cooperatives	98.6
Arrears/total outstanding loan portfolio	20	5.4	18	1.4
Annual provisions for loan losses/average annual loan portfolio	—	2.9	1.0	0.4

— Not available.
Source: Financial statements of the RFIs.

problem. The BKK's rate was adversely affected by arrears accumulated in the past, and the BAAC, where reporting on arrears was well advanced, eventually recovered the lion's share of the due-date arrears. The high collection rates were attributable in large measure to the success of the four RFIs in promoting financial discipline among their borrowers—this is perhaps the principal achievement that distinguishes them from most traditional supply-led credit programs.

Table 3 provides the information needed for an age analysis of the BAAC's arrears and an ultimate assessment of its loan losses. This unique and advanced reporting system is based on information presented annually in the BAAC's au-

Table 3. *Collection Records of Overdue Short-Term Working Capital Loans from the* BAAC
(millions of baht)

Loan cohort (loan falling due during the year)	*Amount falling due during the year*	*Overdue at the end of the*					
		Year	*Second year*	*Third year*	*Fourth year*	*Fifth year*	*Sixth year*
1981–82	7,444	1,765	1,141	545	361	258	193
1982–83	8,451	1,883	760	346	251	180	
1983–84	10,493	2,298	1,169	637	413		
1984–85	12,056	2,865	1,374	623			
1985–86	12,782	2,593	925				

Source: *BAAC Annual Reports*, as reported in Siamwalla and others (1990).

dited financial statements. It demonstrates how arrears, measured in relation to their original maturity dates, become loan losses after several years of belated arrears repayments. Because past performance of arrears recovery is taken into account, this method of reporting allows a sound assessment of the adequacy of the provision against loan loss and of the pricing of the cost factor attributable to loan losses in adjusting lending interest rates.

MOBILIZING SAVINGS. Promoting better deposit and savings facilities is essential for rural development. Improved savings facilities encourage the rural population to store value in an efficient way and thus increase domestic savings. For most RFI clients, the exposure to deposit and savings facilities is often the only way to obtain services offered by a formal financial institution. An RFI's success in mobilizing savings is crucial to its becoming self-sustainable. (Mobilizing savings is also, of course, important to outreach; see table 8 in the discussion of outreach indicators, below.) The financial ratio of the value of an RFI's savings deposits to its loan portfolio and changes in this ratio over time indicate how successful the RFI has been in replacing concessional funds from the state or international donors with savings (table 4).

An RFI's savings facilities can potentially reach a far greater number of clients than its lending activities, with the average outstanding value of deposits and the savings account significantly smaller than that of the average loan extended. When the financial intermediary is genuine, and not a mere disbursement window, it generally provides savings services to far more depositors than borrowers. Frequently, borrowers use their savings as their equity contribution in financing an investment, with the rest of the funds lent by the financial institution. Of the four RFIs, the BUD has clearly been the most successful in mobilizing

Table 4. *Savings Ratios and Interest Rates, 1989*
(percent)

Rate	*BKK*	*BUD*	*BAAC*	*GB*
Total savings as percentage of loan portfolio	20	110	42	31
Voluntary saving as percentage of loan portfolio	5	110	42	0
Annual real deposit interest rate	—	2.3–8.9	1.2–4.0	−1.4[a]

— Not available.

a. In the GB, savings are actually compensating balances that are part of the package involved in getting loans. As a matter of fact, their negativity should be looked at as a higher cost paid for getting loans.

Source: Financial statements of the RFIs and author's calculations.

savings, with 6.7 million depositors compared with only 1.8 million borrowers at the end of 1989—a ratio of 3.7 to 1. The BKK has been much less successful in backing its loan portfolio with voluntary savings, with a ratio of savers to borrowers of only 1 to 1. The BKK's comparatively poor performance reflects the unattractive savings options it provided—in particular, the lack of passbooks that would allow low-income clients immediate access to their savings.

Savings requirements have varied among the RFIs. To ensure the mobilization of savings, it is essential to protect the value of savings in real terms and to ensure convenient accessibility. Stable economies can better guarantee the value of savings. Mobile banking techniques have dramatically and efficiently enhanced accessibility and have helped reduce transactions costs to creditors, borrowers, and savers. In particular, when very small savings amounts have been involved and when weekly or biweekly visits could satisfactorily meet the financial needs of the depositor or borrower, mobile banking has allowed a tremendous saving in the RFI's transactions costs without causing inconvenience or significant increase in transactions costs to its customers.

The BUD's outstanding success in mobilizing savings over five years—moving from a ratio of 31 percent of its loan portfolio in the first year of operation (1984) to 110 percent in 1989—is a remarkable finding. It strongly suggests that traditional supply-led credit institutions have underestimated their clientele's demand for savings, and that states or donors could, and possibly should, limit the financial assistance extended to RFIs to the period required for the value of savings to match the outstanding bankable loan portfolio. A program of financing designed on a sliding scale could help a newly established RFI to build up a savings base, which increasingly would substitute for reliance on external or state funds.

ADMINISTRATIVE COSTS. Clearly, keeping administrative costs within bounds is of paramount importance for self-sustainability; RFIs designed to benefit rural poor or small-farmer populations are notorious for their high administrative costs per dollar lent. Indeed, the inevitably high transactions costs of lending to low-income rural populations have often deterred commercially oriented financial intermediaries. For the four RFIs reviewed, administrative costs as a percentage of annual average total assets varied for the last year reviewed from 3.0 percent for the BAAC to 12.7 percent for the BKK. As a percentage of the annual average loan portfolio, administrative costs ranged from 4.7 percent for the BAAC to 16.7 percent for the GB (table 5). The rising administrative costs for the BKK and the GB were not surprising given their focus on servicing very poor clients. The GB's apparently deteriorating performance was principally attributable to rapid growth and a corresponding increase in training costs. The BKK's poor showing could simply have reflected the introduction of more revealing accounting procedures, which have shifted directly to the BKK expenses previously ascribed to "others." The BUD improved its performance significant-

Table 5. *Administrative Expenses Measured against Assets and Loan Portfolio*

Administrative and operating costs as a percentage of	*BKK*		*BUD*		*BAAC*		*GB*	
	1987	*1989*	*1985*	*1989*	*1986*	*1988*	*1985*	*1989*
Annual average total assets	11.6	12.7	15.6	10.2	3.5	3.0	7.6	9.3
Annual average loan portfolio	12.9	14.3	20.6	15.9	4.3	4.7	16.5	16.7

Note: Administrative expenses exclude foreign exchange losses and provisions for doubtful loans.
Source: Financial statements of the RFIs and author's calculations.

ly during the same period, lowering its administrative costs from 20.6 percent of average loan portfolio in 1985 to 15.9 percent in 1989.

The BAAC's administrative costs related to average annual total assets and to annual average loan portfolio have been exceptionally low—a superb performance compared with the other RFIs reviewed and with the performance standards of traditional rural credit institutions. The BAAC's veteran status—it started operations in 1966—gave it advantages unavailable to the younger RFIs. Its extensive coverage—52 percent of the farming population of Thailand—meant that, unlike the BUD and the GB, it did not need to engage in extensive promotion efforts because it was already well known to its potential clientele. The BAAC's modest real annual rate of growth of assets of 4 percent, against the BUD's 36 percent and the GB's 34 percent growth rates over 1987–89 (see table 8, below), has allowed it to maintain a very efficient ratio of administrative costs to outstanding loan portfolio.

A consistently high growth rate of total assets is likely to require opening new branches that initially perform less well and entail high training costs. The BUD, founded in 1984, has dedicated a substantial amount of resources to training and other operations where improved efficiency and a decline in administrative costs measured against assets has been expected to be achieved only over time. Training costs have been even higher for the GB, accounting for about 29 percent of its total administrative and personnel costs, compared with only about 7.5 percent for the BUD in 1989; the GB's training costs amounted to 4.7 percent of its annual average loan portfolio, compared with 1 percent for the BUD. The GB's training costs alone, measured against the annual average loan portfolio, were equal to the BAAC's total administrative and personnel costs as a share of annual average loan portfolio (4.7 percent).

Much of the BAAC's efficiency (as measured by the ratio of total administrative costs to annual average loan portfolio) is attributable to the relatively large size of its loans, group-lending techniques, and the mobilization of sizable financial resources on account of the obligatory deposits of other banks. Those deposits generated enormous savings for the BAAC, allowing it to avoid a costly system of mobilizing and servicing voluntary rural savings. Unlike the BAAC, the BUD has emphasized voluntary saving, which is costly to mobilize and service. Savings accounted for 110 percent of the BUD's loan portfolio value but

for only 42 percent of the BAAC's loan portfolio value in 1989 (see table 4, above). The BAAC intensively used mass production of repeat, group-based lending, whereas the BUD emphasized individual lending for a wide variety of activities with diversified maturity and flexible and frequent repayments. The BUD has served as a window for payments for services such as school fees and electrical bills, which has generated administrative costs. However, when properly priced, these services can generate income through fees and encourage potential clients to save with or borrow from an RFI.

The stage of growth of an RFI and the rates at which cost per dollar lent and cost per dollar saved decline as a typical branch matures are important determinants of the ratio of administrative costs to annual average assets, as the data for the GB in table 6 indicate. Data on the BUD's personnel costs also provide supporting evidence: these costs declined sharply, from 44 percent of the annual average loan portfolio in the first year of operation (1984) to 17.2 percent in 1985 and to only 9.2 percent in 1989.

The BAAC has been constrained by a legal ceiling on interest rates on agricultural loans. Two factors have accounted for the BAAC's remarkably low spread between lending and deposit interest rates. First, it has achieved a significantly lower administrative cost per dollar lent than the other RFIs, and second, it has benefited from obligatory low-cost deposits from the Thai commercial banks, which have enabled it to tap substantial financial resources without incurring the high administrative costs associated with attracting and servicing small deposits. This observation regarding the BAAC's advantage is demonstrated by reviewing the financial ratio of the amount of interest paid measured against the amount of interest earned. This ratio is influenced not only by the spread between the on-lending and deposit interest rates, but also by the RFI's debt-to-equity ratio, its access to concessional funds, and the interest income unrelated to the loan portfolio.

The financial ratio of interest paid to interest earned in 1989 was 11 percent for the BKK, 37 percent for the BUD, 30 percent for the GB, and 56 percent for

Table 6. *Unit Costs of Operating Grameen Bank Branches, by Branch Age, 1984–85*
(thousands of taka)

Age of branch	*Personnel expenses (I)*	*Other administrative expenses (II)*	*Total personnel and administrative expenses (III) = (I)+(II)*	*Outstanding annual average loan portfolio (IV)*	*Personnel and administrative expenses as a share of outstanding loan portfolio (percent) (V) = (III)/(IV)*
Up to 6 months	30.8	9.6	40.4	165	24.5
3+ years	107.6	20.8	128.4	2,259	5.7

Source: Hossain (1988).

the BAAC. The BKK's equity-to-assets ratio of about 45 percent was exceptionally high, a clear departure from the typical pattern of equity ratios of financial institutions. This high equity ratio and the BKK's access to low-cost concessional funds generated the very low figure of 11 percent. For the BAAC, the amount of interest paid represented a high percentage of interest earned (56 percent), showing how the BAAC had become an efficient financial intermediary. In contrast, the GB's lower ratio (30 percent) could be maintained only through generous access to concessional funds that helped to cover its relatively high administrative costs and resulted in a very low average cost of borrowed funds.

Comparing the financial expenses illustrates the importance of subsidies relative to access to concessional funds. Although the BUD and the BKK both operated in Indonesia, the BUD paid the equivalent of 9.5 percent of its annual average assets in financial expenses in 1989, while the BKK's expenses were only 5.2 percent. The GB's financial expenses were very low, only 3.0 percent of its annual average assets in 1989. The BAAC's cost of funds dropped from 9.1 percent of annual average assets in 1985 to 6.2 percent in 1989. A distinct type of cost structure was found in the BKK and the GB, the two programs that concentrated on very low-income clients. Administrative expenses accounted for more than 70 percent of total expenses (administrative plus financial) in 1989, a likely indication that subsidies have been received in the form of a very low financial cost (the GB) or a very high equity ratio (the BKK). Another revealing feature is the volatility of the GB's cost structure, with financial expenses dropping from 46 percent in 1985 to 24 percent in 1989.

Outreach

Performance indicators of outreach (table 7) need to be considered in the context of the stated objectives of each RFI, which define the target clientele. Of course, the differences in these objectives, and in the working definitions of targeted clientele, make comparison of achievement in this respect very complicated—a problem compounded by lack of data (which, even when available, often apply to different years). Nonetheless, the information presented below does give some indication of the level of outreach achieved by the four RFIs.

Both the BKK and the GB want to reach the rural population, but the BKK's objective has been to finance off-farm, income-generating activities, whereas the GB has aimed to improve economic conditions in general by providing financial and nonfinancial services. The difference is far from semantic. The GB has shouldered a wide array of nonfinancial activities along with its primary activity of extending credit (to groups with five members). The BKK's half million borrowers in 1989 represented 1.8 percent of the rural population in central Java. In 1986 the GB's borrowers totaled 17.2 percent of the rural poor (defined as households with less than half an acre of land or assets worth less than one acre of land) in the five districts of Bangladesh in which the GB was active—about 4 percent of the total rural population at that time.

Table 7. *Outreach: Performance Indicators*

Indicator	*BKK*	*BUD*	*BAAC*	*GB*
Target coverage				
Region/country	Central Java	Indonesia	Thailand	Bangladesh
Clientele	Rural poor	Rural, low/mid-income	Farmers, low/mid-income	Rural poor
Activities	Off-farm, income-generating	Rural, income-generating	Agricultural production	Rural, income-generating
Indicators				
Number of borrowers[a]	510,000	1,600,000	2,600,000	660,000
Number of staff	1,875	13,666[b]	6,900	6,000[c]
Town branches	502	2,843	96	729[d]
Village posts/units	2,938	835	584	n.a.

n.a. Not applicable.

a. BKK (1989); BUD (1989) (loans outstanding as proxy for total number of clients); BAAC (1988); GB (1990).

b. When supervisory staff in regional offices are included, the total for the BUD is 15,000.

c. Approximate figure.

d. A branch typically covers 15 to 20 villages (200 groups, 1,000 borrowers).

Source: Financial statements of the RFIs, author's calculations, and Hossain (1988).

The BUD and the BAAC have directed their efforts to a clientele in the low- to medium-income range, but whereas the BUD's credit and saving facilities are intended to cover the rural population as a whole, the BAAC's credit operations are confined to agricultural producers. Its 2.6 million borrowers in 1988–89 represented 52 percent of the targeted farming population.

The relation between the number of village posts and town branches illustrated in table 7 gives an idea of the different hierarchies of banking units used. Two of the RFIs, the BKK and the BAAC, had 85 percent of their service units at the village level. With the BKK and its sister institutions in other provinces already firmly entrenched at the village level, the BUD has offered its services predominantly at the town level, with a ratio of three village posts for every town branch, financing nonagricultural activities of low- and medium-income clients. The GB's several hundred small town offices had active outreach to villages: each branch supervised the activities of 15 to 20 villages (around 200 groups, 1,000 clients).

For all four RFIs, the data indicate a significant level of outreach as measured by the volume of outstanding loans and savings, the number of loan accounts and saving deposits, and real annual growth rates over 1987–89 (see table 8). The most recently established RFIs, the BUD and the GB, each had a real annual growth rate in total assets exceeding 34 percent a year, although they served completely different socioeconomic strata. The more experienced RFIs, the BKK and the BAAC, had significantly lower growth rates.

A cost-effective process for reviewing loan applications is important to keep down administrative costs for the RFI and transactions costs for the client. All four RFIs were able to disburse funds within two weeks of receiving an application, but they differed in the amount of responsibility for loan approval each assigned to the local manager. The BKK branch heads could approve loans in amounts up to only $14 (when the average outstanding loan was $26), with the subdistrict manager responsible for larger amounts. The BUD's village office manager could approve loans up to $837 (when the average outstanding loan was $434), and the branch manager reviewed amounts higher than this threshold. The GB developed a participatory system, which included group members, bank workers, and the area manager in the approval process. The BAAC's approach appeared more centralized, because the branch manager reviewed all loan requests. But none of the four systems could be considered purely centralized because the self-help groups (for the BAAC and the GB) and the local village heads (for the BKK and the BUD) played a substantial role in selecting and approving borrowers.

Table 8. *Outreach: Loans and Saving, 1989*

Indicator	*BKK*	*BUD*	*BAAC*	*GB*
Volume of loans outstanding	$13 million	$478 million	$1.1 billion	$30 million
Average annual assets: real growth rate over preceding three years (percent)	15	36	4	34
Minimum loan size	$5	$14	—	—
Average outstanding loan	$26	$290	$560	$80
Number of savers per staff member	267	458	—	127
Value of savings deposits per staff member	$1,400	$39,400	$58,800	$2,800
Number of loans per staff member	272	120	203	127
Value of outstanding loan portfolio per staff member	$6,900	$29,300	$131,800	$4,900
Number of savings accounts (millions)	0.50	6.30	1.68	0.66
Value of average savings account	$6	$85	$274	$24
Volume of savings	$2.6 million	$539 million	$460 million	$17 million

— Not available.

Note: The staff workload information should not, of course, be taken to imply that the entire staff is directly involved in either portfolio management or savings mobilization.

Source: BAAC *Annual Reports,* as reported in Siamwalla and others (1990).

Another indication of outreach is found in the workload of the average staff member. The number of savers per staff member varied widely, from 127 for the GB to 460 for the BUD. For size of savings deposits, the differences were even more pronounced, with a low of $1,400 per staff member for the BKK and a high of $58,800 for the BAAC. The average outstanding loan portfolio managed per staff member demonstrated the greatest variability of all, ranging from $4,900 for the GB to $131,800 for the BAAC. Although the BAAC's average loan size was in the same range as the BUD's, a BAAC staff member managed four times as much in total value of loans. A conspicuous difference between the two Indonesian RFIs emerged: the BUD's average outstanding loan size was about sixteen times greater than that of the BKK. The RFIs, in their pursuit of financial survival, might be inclined to increase their loan size to save on transactions costs. The BUD has systematically and significantly increased its average outstanding loan size over time in real terms, by 23 percent in 1988 and 16 percent in 1989.

Women have accounted for 91 percent of the GB's borrowers and 60 percent of the BKK's clients; in contrast, women made up only 25 percent of the BUD's beneficiaries. (No data are available on women's share of the BAAC's lending.) The GB and the BKK were poverty-oriented, and their loans were typically very small, with the average outstanding loan less than $100. The correlation between the smaller loan size and high female participation is not a coincidence. Generally, women have had limited access to material and human resources, and their businesses have been likely to be among the smallest (Holt and Ribe 1991). Their restricted mobility, because of the need to cope with other family roles, and their relatively limited ability to offer collateral, have therefore made them prime clients for the BKK and the GB. Not surprisingly, then, the two programs that have been more oriented to poverty alleviation have benefited women most.

Conclusions

Any attempt to replicate the achievements of one of the more successful RFIs by imitating its mode of operations should be carried out with great caution. A solution that works in one socioeconomic environment will not necessarily work in another, where social values are different. Nonetheless, the experiences of the four RFIs reviewed here do highlight a series of critical issues that must be considered when tackling the complex issue of providing financial services to the rural population.

One key to success appears to be the introduction of a social mechanism that lowers transactions costs, while supplying effective peer pressure for screening loan applicants and collecting loans. The quest for such a social mechanism should include a careful review of the past track record of similar programs in the country involved and the targeted clientele's experience and

perception of the moral obligation associated with loan collection. Local cultural barriers could make it difficult for other RFIs to replicate the social intermediary methods used by the RFIs reviewed. For instance, the use of the village head as an intermediary, so successful for the BKK and the BUD, may be quite unsuitable in societies with entrenched caste systems. Other techniques and procedures (for instance, mobile banking) need to be assessed in the context of local features, such as population density and existing physical and human infrastructure, which may offer special limitations or opportunities.

Financial resources made available by the state or donors (not necessarily at a subsidized interest rate) can contribute substantially to developing a newly established RFI during the initial, negative cash flow stage. How much support is needed and how long it should continue before being phased out will depend on specific conditions such as initial staff training, the development of new branches, and the speed at which clients become independent and no longer need the institution's special services. Savings mobilization should not become the minor residual balance—as it too often is in supply-led credit institutions—that constitutes the difference between the loan portfolio and concessional borrowed funds. On the contrary, state or donor lending to the RFI should assist only in temporarily closing the gap between an RFI's fully motivated savings mobilization and its bankable loan portfolio.

The BUD's impressive demonstration that mobilization of savings can be the driving force behind an RFI's expansion suggests that less support over a shorter period of time is needed than has been the rule in the past. Obviously, servicing new clients, opening new branches, and providing services to an increased share of the rural population can and should, if necessary, prolong the period and increase the financial support rendered to the RFI. The BUD's example indicates that its access to funds was important to its rapid growth only during the initial stage of development. However, the BUD's negative SDI in 1989 demonstrates that a subsidy in the form of concessional borrowed funds carrying a cheap interest rate was unnecessary for that growth. Availability of funds, not their cost, was the issue to be resolved during the BUD's initial stage of operations.

State or donor support to an RFI should concentrate on institution-building. Careful institution-building often constitutes the difference between an RFI that could eventually become self-sustaining after a few years of support during its start-up period and an RFI that would need permanent subsidies and bail-outs. Often, supply-led credit institutions have failed to pay enough attention to institution-building. Too few resources are committed to guarantee adequate training, efficient managerial information systems, incentive systems, promotion of savings mobilization, and the like, all of which are crucial to making RFIs independent, well balanced, and increasingly self-sustainable.

Notes

Jacob Yaron is with of the Agriculture and Natural Resources Department of the World Bank. He would like to thank colleagues Lynn Bennett, Aric Chupak, James Coates, Josef Duster, Bernard Dussert, Laurie Effron, Gershon Feder, Chaim Helman, Sandra Holt, Millard Long, Charles Magnus, Silvia Sagari, and John D. von Pischke for helpful comments and insights. The article was further assisted by comments from I. K. Kuiper of the Ministry for Development Cooperation of the Government of the Netherlands, Don Johnston and Richard Hook of the Harvard Institute for International Development, Elizabeth Rhyne of USAID, David Lucock of the USAID/DAI Financial Institutions Development Project, and Professor Muhammed Yunus, the founder and managing director of the Grameen Bank. Special thanks go to Mike Goldberg and Lorrie Mitchell for significant contributions and to Gale Langseth for patient editing.

1. The BRI-Unit Desa KUPEDES program is designated by the abbreviation BUD in this paper. The Unit Desa system is a separate profit center within BRI, which has operated many branches in both rural and urban areas. The figures presented are taken from several internal World Bank documents, unless otherwise cited. Correspondence from Mr. Kuiper of the Ministry of Development Cooperation of the Government of the Netherlands indicates that the BRI system has its historical roots in the Volkskredietbank experiment begun in 1969 in Yogyakarta.

2. Unless otherwise stated, all figures and financial data mentioned in this article for the BKK, the BUD, and the GB are for 1989; for the BAAC, they are for the fiscal year ending March 1989.

3. All figures presented are stated in U.S. dollar equivalents, although all lending and savings activities were carried out in local currency. The exchange rates are based on *International Financial Statistics* (IMF) for 1989. All annual averages are based on the sum of balances of the first and last day of the year, divided by two. Therefore, seasonal variations may not be adequately reflected in the averages presented.

4. "Free riders" are members who do not fully bear the individual costs of participating in group activities, knowing that they will be able to reap all or most of the benefits associated with group membership.

5. In reality, an RFI might respond to a loss of subsidy in several ways, including eliminating its loss-generating activities, using stricter criteria for assessing investment plans and processing loans, and applying more aggressive and efficient loan collection.

6. Defined as annual loan collection divided by the sum of overdues at the beginning of the year plus maturities that fall due during the year.

References

Hoff, Karla, and Joseph E. Stiglitz. 1990. "Imperfect Information and Rural Credit Markets." *The World Bank Economic Review* 4(3, September):235–50.

Holt, Sharon L., and Helena Ribe. 1991. *Developing Financial Institutions for the Poor and Reducing Barriers to Access for Women.* World Bank Discussion Paper 117. Washington, D.C.

Hossain, Mahabub. 1988. *Credit for Alleviation of Rural Poverty: The Grameen Bank of Bangladesh.* Washington, D.C.: International Food Policy Research Institute.

IMF (International Monetary Fund). 1989. *International Financial Statistics.* Washington, D.C.

Llanto, G. M. 1990. "Asymmetric Information in RFMs: Puzzles and Policy Perspectives." *Savings and Development* 14(2):141.

Siamwalla, Ammar, Chirmsak Pinthong, Nipon Poapongsakorn, Ploenpit Satsanguan, Prayong Nettayarak, Wanrak Mingmaneenakin, and Yuavares Tubpun. 1990. "The Thai Rural Credit System: Public Subsidies, Private Information, and Segmented Markets." *The World Bank Economic Review* 4(3, September):271–95.

Stiglitz, Joseph E. 1990. "Peer Monitoring and Credit Markets." *The World Bank Economic Review* 4(3, September):351–66.

ANIMAL HEALTH SERVICES: FINDING THE BALANCE BETWEEN PUBLIC AND PRIVATE DELIVERY

Dina L. Umali
Gershon Feder
Cornelis de Haan

Growing fiscal deficits and greater awareness of the huge economic cost of often-inefficient government activities have renewed interest in transferring the delivery of important services from the public to the private sector in developing countries. This article, drawn from a longer study, offers a framework for determining the appropriate roles of the public and private sectors in delivering animal health services, such as veterinary surveillance, disease vector control, vaccination, clinical treatment of sick animals, inspection of livestock products, and veterinary research and extension.

The profitability and therefore the supply of private veterinary services is governed by several factors arising from economies of scale, such as the size of the livestock enterprises in the locality, the nature of potential or actual diseases, and the types of animals raised in the production systems. Thus, in areas where private veterinary work is unprofitable or where other types of market failure occur, economic or social concerns may make some type of public intervention necessary. The transfer of animal health services from the public to the private sector must be done selectively, and government support may be needed to ensure the success of such transfers.

The livestock sector plays a crucial role in the economies of many developing nations by producing protein-rich food supplies, generating vital income and employment, and earning much-valued foreign exchange. For many farmers in the developing world, their animals are also a form of stored wealth, a cushion against starvation when food is scarce, a

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 71–96

source of fertilizer or fuel, a means of transportation, and a source of traction in crop production.

Whether the livestock sector attains its full productive potential is heavily influenced by the availability and quality of animal health services. Such services reduce mortality rates and minimize the effect of disease on animal growth, fertility, quality of livestock products, and work output of cattle and horses. Poor health in animal herds and flocks, however, now constrains livestock development in many countries. Losses in Sub-Saharan Africa from disease-induced deaths and lower meat and milk production in livestock amount to an estimated $2 billion a year (FAO 1985, cited in de Haan and Nissen 1985).[1] In Latin America production losses from foot-and-mouth disease, hog cholera, tuberculosis, brucellosis, and rabies have been estimated at $900 million a year (FAO 1990). In Argentina alone, according to the National Animal Health Service, approximately $455 million would have been saved in 1984 if the main diseases in cattle, sheep, and horses had been eradicated (FAO 1989).

At the same time, growing fiscal deficits in many developing countries and, more recently, the shift from planned to market economies in Eastern Europe and the former Soviet Union have energized the perennial debate over liberalizing markets and privatizing public services. Questions about the possible transfer of economic functions from the public to the private sector have extended to the delivery of agricultural support services in general and animal health services in particular. Key issues in deciding whether to privatize agricultural services include the efficiency of private sector delivery and the welfare implications that arise if different segments of the population, particularly small farmers and the rural poor, do not have equitable access to these services.

This article examines the roles of the public and private sectors in delivering animal health services and applies economic principles to determine the most efficient channel for their delivery. The extent of public and private sector participation in delivering animal health services worldwide is reviewed. The factors influencing the demand for, and supply of, private veterinary services are then examined, illustrated by an analysis of break-even levels of operation of a private veterinary practice in Uganda.

The study concludes that each service must be classified according to its economic character to determine whether private delivery is feasible and will result in a socially optimal level of supply. Animal health services cannot and should not all be privatized. Instead, a policy of selective privatization should be pursued.

Functional Classification of Services

Animal health services in broad terms include preventing disease (in both animals and humans) and curing diseases in livestock. Preventive services include immunization of animals with vaccines; eradication or control of carriers

or vectors, such as ticks and tse-tse flies; other disease control measures, such as veterinary surveillance, quarantine, slaughter of infected animals, and control of the importing and exporting of live animals; and inspection and control of animal products to prevent the transmission of disease to humans (Leonard *1990*).

Table 1 lists major livestock diseases and measures for their prevention, treatment, and control. For some of these diseases, prevention is the only satisfactory approach because the disease, once contracted, is fatal. Vaccines that provide short-term or permanent immunity exist for most of the diseases, however, and their use is standard in most livestock health programs.

Although veterinarians are the primary providers of health services, many developing countries also rely on paraprofessionals (field technicians, auxiliaries, and farmers) to assist or complement veterinarians. Veterinarians are in short supply in some developing countries, and even when there seems to be enough of them, they are often unwilling to work in rural areas. Paraprofessionals provide care in areas where veterinary care would otherwise be unavailable. They perform such relatively simple duties as teaching farmers about proper animal care and sanitation as well the more complicated work of immunizing animals, assisting veterinarians to perform surgical procedures, and diagnosing and treating minor diseases (de Haan and Nissen 1985; Leonard 1990; de Haan and Bekure 1991).

Commercial livestock growers, along with farmers, pastoralists, and people who raise livestock in their backyards are the direct users of animal health services. Livestock farmers sometimes organize themselves into producer associations, cooperatives, or some other form of collective organization to provide these services. Consumers have a direct interest because humans can contract some livestock diseases (known as zoonotic diseases). These include anthrax, tuberculosis, brucellosis, rabies, and certain parasitic diseases transmitted through animal products.

Economic Principles for Determining Optimum Delivery

To assess the most efficient methods of delivering animal health services, each service should be classified according to its economic character, using the principles of subtractability and excludability to determine whether a service is closer to being a public or private good. Subtractability applies when one person's use or consumption of a good or service reduces (or subtracts from) its value to others. The veterinarian who treats an animal's broken leg, for example, has less time available to treat other animals. Excludability applies when only those who have paid for a product or service benefit from it; the farmer who owns the injured animal is the sole beneficiary of the treatment. A private good is characterized by high subtractability and excludability; a public good has low excludability and subtractability. Private firms are unwilling to

Table 1. *Some Major Diseases of Livestock and Their Treatments*

Disease	*Host*	*Transmission*	*Virulence*	*Treatment*	*Prevention*	*Control*
Viral						
African Swine Fever	Pigs	Contact, ticks, garbage feeds	Fatal		No vaccine	Slaughter, quarantine
Foot-and-Mouth Disease	Cattle, sheep, goats, pigs	Saliva, urine, feces, milk products, meat and bones	Fatal to young, debilitating to adults	Drugs	Vaccination 1–3 times a year	Slaughter, quarantine import ban[a]
Hog Cholera	Pigs	Hog urine, meat, mice, manure, horse-flies, earthworms	Fatal to young, chronic for adults	Drugs	Vaccination for short-term immunity	Compulsory slaughter
Newcastle Disease	Chickens	Contact, wild birds	Fatal (up to 100%)		Vaccination for permanent immunity	Burning or burying in quicklime
Peste des Petits Ruminants	Goats, sheep	Contact with infected animals	Fatal	Drugs	Vaccination for permanent immunity	Vaccination plus antibiotic treatment
Rinderpest	Cattle, buffalo sheep, goats, pigs	Meat, skins, offals, manure, food, contact with infected animals	Fatal (20–100%) or chronic		Vaccination for permanent immunity	Slaughter, quarantine
Bacterial						
Anthrax	Cattle, sheep, pigs, humans	Soil, food, inhalation of spores, meat and bone meal	Fatal: sudden death for cattle, sheep; 2–4 days for pigs	Drugs	Vaccination for short-term immunity	Slaughter
Black Leg	Cattle, sheep	Soil, food	Fatal (1 day)	Drugs	Vaccination for permanent immunity	Slaughter

Brucellosis	Cattle, goats, sheep, humans	Fetal and placental tissues, uterine discharges, unpasteurized milk, genital system of bull	Induces abortion	None	Vaccination for permanent immunity, milk pasteurization	Control of sale of aborted cows, slaughter
Contagious Bovine Pleuro-Pneumonia (CBPP)	Cattle	Recovered animals, respiratory droplets, urine, milk	Debilitating, 50% fatality in early stages, chronic	Drugs	Vaccination for permanent immunity	Slaughter, quarantine
Hemorrhagic Septicemia	Cattle, buffalo	Soil, stagnant water	Fatal (85–95% in <3 days)	Drugs	Vaccination for short-term immunity	None
Mastitis	Cattle	Contact	Reduced milk production	Drugs	Good hygiene and milking practices	None
Rickettsial						
Heartwater	Cattle, sheep, goats	Ticks	Fatal (50–90% in <7days)	Drugs	No vaccine, natural exposure + antibiotic treatment gives 6–18-month immunity	Dipping
Protozoal						
Anaplasmosis	Cattle	Ticks, flies	Fatal or long recovery period		Natural exposure of young, vaccination	Dipping
Babesiosis (Tick Fever)	Cattle, sheep, goats, horses, pigs	Ticks	Fatal to susceptible breeds (50–90%) or debilitating up to 3 weeks	Drugs	Natural exposure of young, vaccination	Dipping

(Table continues on the following page.)

Table 1. *(continued)*

Disease	*Host*	*Transmission*	*Virulence*	*Treatment*	*Prevention*	*Control*
Theilerosis (East Coast Fever)	Cattle, buffalo	Ticks	Fatal to unexposed cattle, weakness	Drugs	Recovered animals have permanent immunity	Dipping, quarantine, slaughter
African Trypanosomiasis (African Sleeping Sickness)	Cattle, sheep, goats, pigs, horses, camels, humans	Tse-tse fly	Fatal or chronic weakness	Drugs	Prior treatment with prophylactic trypanosomidal drugs	Vector control
Parasitic Diseases						
Liver Fluke	Cattle, humans	Snails, grass	Poor performance	Drugs	Rotational grazing	Vector control
Schistosomiasis	Cattle, pigs, humans	Snails, canals and slow-moving waters, grass	Poor performance in adults, fatal to young	Drugs	Vaccination for cattle	Vector control
Tapeworms	Cattle, pigs, humans	Manure, infected meat	Poor performance, sometimes fatal	Drugs	Hygiene	Meat inspection, freezing, thorough cooking
Intestinal parasites	All species	Feeds	Poor performance	Drugs	Rotational grazing	

a. Countries completely free of foot-and-mouth disease will import meat only from other countries free of the disease because the virus can be transmitted in fresh and frozen meats.

Source: McCauley 1982; Miller and West 1978; *Merck Veterinary Manual* 1991.

supply services with public good characteristics because it is usually impossible to restrict the benefit only to people who pay for it—the free-rider problem. An individual livestock farmer will not be willing to pay for aerial spraying to control the tse-tse fly because it would require spraying not only his farm but all other adjacent farms, wildlife reserves, and other habitats favorable to the fly's survival. So this service will have to be provided by the government, which can use its powers of taxation to compel all beneficiaries to pay for it (Head 1974; Feldman 1980).

Purely private and purely public goods occupy opposite ends of the economic spectrum. Some animal health services lie between these limits. Some produce externalities, or spillover effects. These occur when an individual, in rendering (or consuming) some service for which payment is received (or made), coincidentally also renders services to other people from whom payment cannot be exacted or renders disservices to others whose claims for compensation cannot be enforced (Pigou 1946). Immunizing an animal against a contagious disease—foot-and-mouth disease, for example—also reduces the risk of infection of other animals. Typically, the individual responsible for the externality will not consider its positive or negative effects when deciding what levels of service to produce or consume. This may mean that either too little (for positive externalities) or too much (for negative externalities) is produced or consumed. These externalities may therefore justify government intervention of some kind, such as subsidizing an activity that results in a positive externality to raise private consumption to socially desirable levels.

Some kinds of veterinary services also raise moral hazard problems, which arise when consumers are unable to assess the quality of the product they are purchasing—for example, whether or not a vaccine will be effective. Because the producer of the vaccine knows the true quality and the consumer does not, the producer may decide to supply a substandard good to the consumer.[2] To overcome a moral hazard problem, the government may establish quality standards or even perform the quality control itself.

These concepts provide a basis for classifying animal health services. Veterinary epidemiological services, which involve monitoring the presence of disease, are a purely public good. The information benefits the whole sector and cannot be appropriated by any individual livestock farmer (table 2). Because of free riders (in this case individuals who would obtain information on the occurrence of diseases without paying for it), private firms will have no incentive to provide this service because it will not be in the interest of any individual to pay for it. If the service is to be provided, the government will have to provide it or pay a private provider to do so.

Animal health extension services may be private or public goods, depending on the medium used and the ease with which information flows to other farmers. Extension services conducted through public channels are a public good; an example might be a radio broadcast on the improved hygiene and sanitation of livestock. Extension services tailored to the needs of an individual or a select

Table 2. *Economic Classification of the Types of Livestock Services*

Service	Type of economic good		Measures to correct for		Sectoral delivery	
	Public	Private	Externality	Moral hazard	Public	Private
Clinical intervention						
Diagnosis		X*				YY
Treatment		X**				YY
Preventive						
Vaccination		X*			Y	YY
Vaccine production		X				YY
Vector control						
Tick control		X*			Y	YY
Tse-tse control	X	X*			Y	YY
Veterinary surveillance						
Vet Epidemiology	X				YY	
Diagnostic support		X*			Y	YY
Quarantine			X		YY	
Drug quality control				X	YY	
Food hygiene/inspection				X	YY	
Veterinary research	X	X			YY	YY
Veterinary extension	X	X			YY	YY
Provision of veterinary supplies						
Production		X				YY
Distribution		X				YY

Note: *, private good with consumption externalities; **, private good with consumption externalities only for infectious diseases; X, good classified as public or private; YY, economically justified; Y, economically justified under special circumstances.

group are a private good. Similarly, the products of veterinary research may be public or private goods, depending on whether property rights have been defined. A research product protected by patents is a private good.[3]

From the perspective of their producers, vaccines and veterinary pharmaceuticals are purely private goods. Entrepreneurs producing these products can capture all the benefits available from producing and selling them. Thus, private entrepreneurs will have an incentive to provide these products at socially desirable levels. Government policies influence private participation in these industries to the extent that they affect the economic incentives. Restrictions on importing veterinary pharmaceuticals and price controls on these products are barriers to entry. In some countries, increasing competition in pharmaceuticals has induced these firms to provide other animal health services, such as free extension services, to attract more customers.

The use of vaccines and veterinary pharmaceuticals, however, involves externalities. That is, vaccination programs, tick control, and diagnostic support are private goods whose consumption produces externalities. Vaccination and

dipping for tick control protect animals from disease: the farmer who owns the animal(s) is the sole beneficiary of the procedure, and no one else is able to benefit from the service during that time. The externality arises because the procedure reduces the risk of exposure of other animals (and humans in the case of zoonoses) to the disease. Similarly, laboratory analyses enable farmers to discover which disease is affecting their livestock as well as to inform nearby farmers of its existence. The effectiveness of these programs in preventing an outbreak of disease will depend on the compliance of the region's livestock producers with the program.[4] Thus, effective enforcement is critical. The improper use of veterinary pharmaceuticals can result in negative externalities, such as drug resistance, and although dipping helps to control the spread of tick-borne diseases, disposal of the insecticide mixture used in the dips may pose serious environmental problems. These negative externalities may then require public intervention.

Control of tse-tse flies in open ranges is ordinarily a public good because the benefit extends to the whole community. Where individual farmers can control the fly to some degree by installing screens and traps (as in several African countries), however, control would be classified as a private good with externalities.

Although the externalities associated with diagnostic support, vaccination, use of veterinary drugs, and vector control justify government intervention, these services can also be provided by the private sector if mechanisms can be devised to ensure that those who produce services are paid by those who benefit from them. The extent of government involvement then becomes a function of the degree to which the private sector is able to internalize these externalities. The nature of public sector intervention depends upon the type of externality and may range from monitoring and regulation to ensure compliance to imposing penalties for noncompliance, subsidizing services to raise consumption to socially optimal levels, or, in extreme cases, providing the service.

Clinical treatment of an animal is generally considered to be a private good, but there are externalities associated with the treatment of an infectious disease. Although the treatment itself is a private good, it has externalities because it may reduce the risk of transmitting the disease to other animals and thus reduce the economic losses of other farmers. Clinical intervention, however, does not always result in complete cures. In some cases (brucellosis and rinderpest), the animal continues to be a carrier of the disease even though it no longer shows any clinical symptoms. Consequently, preventive measures such as vaccination or the slaughter of diseased animals may be the best strategy. Reimbursing farmers for their slaughtered animals may require public subsidy, although animal insurance plans funded by fees collected from farmers can also provide compensation.

Theoretically, if the service involves externalities, public intervention is economically justified to reduce (for negative externalities) or raise (for positive externalities) utilization to socially optimal levels. In practice, however, some

activities, such as clinical interventions (which the private sector can efficiently provide) and vaccination and diagnostic support (which may require public intervention) may not always be completely separable. For example, a veterinarian who provides all three services may have to travel to a clinical post to provide them. If the transport costs to provide the latter two services require public subsidy, identifying the transport costs associated only with clinical intervention becomes administratively difficult. In such cases, a subsidy to promote diagnostic support and vaccination may unavoidably subsidize clinical intervention as well. This should not be perceived, however, as justifying subsidies specifically for clinical intervention. Clinical intervention should be a private sector activity, and only private goods with externalities (such as vaccination and diagnostic support) should be considered for subsidization.

Animal quarantine is a public sector intervention that serves as another defense against diseases. Because farmers are not likely to consider the potential effect that diseases of their livestock will have on the livestock of other farmers and because they tend to underinvest in preventive measures such as vaccination or vector control, quarantine offers additional protection against the spread of disease.[5] Quality control and food hygiene and inspection are similar public sector responses to the moral hazard problems associated with processing and distributing veterinary pharmaceuticals and livestock products.

Because many developing countries face serious fiscal constraints, subsidizing these services has often resulted in tradeoffs between quantity and quality. Anteneh (1985) found that government recruitment of newly trained veterinary graduates in several West African countries in the 1970s and 1980s placed increasing and unsustainable pressure on the budget. In some cases, salaries accounted for more than 80 percent of the operating budget for animal health services; the availability and quality of services then declined. Cost recovery has been recommended to ensure the sustainability of public sector programs (de Haan and Nissen 1985; de Haan and Bekure 1991), and how farmers respond to cost recovery programs should be analyzed carefully.

Some recent studies indicate that farmers are willing to pay for reliable service. The Uasin Gishu Project in Kenya, financed by the International Fund for Agricultural Development and the Danish government, found that farmers were willing to pay for dipping if it was guaranteed to be effective (de Haan and Bekure 1991). A county in Jiangsu Province in China recovered 85 percent of total expenses by charging for essential services, and the province paid the remaining 15 percent plus staff performance bonuses. The county achieved high levels of vaccination coverage: 100 percent for pigs, 90 percent for buffalo, and 75 percent for poultry. In contrast, the income from charges levied against the 3.6 million rural households in the Chinese province of Jilin was estimated to be less than 18 million yuan, about 50 percent of the provincial budget of the Animal Health Bureau. Poor performance was due in part to fiscal constraints (World Bank 1987).

The Supply of Services

Both quantitative and qualitative data on the supply of animal health services are scant, and approximate measures must be used. A simple approach to measuring availability is to estimate the number of veterinary livestock units (VLUs) per veterinarian and per veterinary auxiliary.[6] Sandford (1983) suggests 20,000 VLUs per veterinarian as the appropriate ratio for curative and preventive work in the extensive and low-input livestock production systems in Africa and the Middle East and 2,500 VLUs per veterinarian in the high-density and capital-intensive production systems found in European countries. For regions characterized by a combination of extensive and intensive production systems (North America, South America, Asia, and Oceania), the average (12,500 VLUs per veterinarian) of the recommended ratios for extensive and intensive systems is taken as the standard. These ratios are very approximate because an accurate determination would require much more detailed information than is available on the benefits and costs of veterinary services.

The results of our analysis are presented in table 3. Countries in the Middle East had ratios ranging from 653 to 16,170 VLUs per veterinarian in 1989, all substantially below the recommended ratio of 20,000 VLUs per veterinarian; these ratios indicate a surplus of veterinary personnel. By contrast, twenty-seven of the forty-eight African countries (56 percent) exhibited a shortage of veterinarians. Because the supply of trained veterinarians in Africa is limited, great reliance is placed on auxiliary personnel. Their greater number, compared with other regions, is manifested in the number of VLUs per auxiliary, with most of the African countries having relatively low ratios of 2,000 to 15,000 VLUs per auxiliary.

Most European countries displayed ratios well within the standard of 2,500 VLUs per veterinarian, but seven countries (Denmark, the former East Germany, France, Ireland, the Netherlands, Poland, and Romania) displayed ratios above the standard, indicating an excess demand for veterinarians. In contrast, North America and Oceania had more than an adequate supply of veterinarians. Central America, South America, and Asia displayed a broad range of ratios, but most countries were below the average ratio of 12,500 VLUs.

Auxiliary personnel possess anywhere from a couple of weeks to a few years of formal veterinary training. Although field experience can greatly enhance their capabilities, auxiliaries are seldom adequate substitutes for trained veterinarians. Thus, the proportion of veterinarians relative to auxiliary personnel can indicate the quality of veterinary services that are potentially available.[7] Based on such a standard, the quality of animal health services would appear to be far lower in Africa than in any other region.

Delivery of Services

The provision of animal health services has historically been in the domain of the public sector, but that has changed in individual countries over time. In

Table 3. *Livestock and Livestock Services: Selected Data*

Region/country	Livestock (1988) as a percentage of Agriculture	Livestock (1988) as a percentage of GDP	VLUs (1989) per Veterinarian	VLUs (1989) per Auxiliary	Ratio of government to private veterinarians 1984	Ratio of government to private veterinarians 1989	Ratio of auxiliaries to government plus private veterinarians 1984	Ratio of auxiliaries to government plus private veterinarians 1989
Africa								
Algeria	41.50	1.70	7,813	6,105	309.00	8.00	4.25	77.78
Angola	31.80	2.90	53,139	12,382	—	11.67	—	8.13
Benin	20.76	6.52	22,774	6,927	30.50	32.00	5.48	3.98
Botswana	88.43	5.32	97,483	1,800	9.33	18.00	17.42	85.53
Burkina Faso	27.27	6.37	59,981	11,432	—	16.67	—	8.02
Burundi	5.68	0.36	10,362	1,438	21.00	21.50	0.09	9.29
Cameroon	15.79	1.77	55,530	22,914	—	29.33	—	2.96
Cape Verde	—	—	7,788	1,684	—	—	1.83	6.17
Central African Republic	31.68	10.28	126,639	7,363	6.00	—	45.57	86.00
Chad	38.99	20.52	90,141	10,527	—	—	—	11.18
Congo	9.68	0.68	2,038	469	—	1.00	—	26.08
Côte d'Ivoire	5.14	1.32	16,727	1,776	10.00	13.33	16.06	12.05
Djibouti	—	—	56,400	13,271	—	—	5.67	4.25
Egypt	26.52	6.20	431	642	31.67	8.62	0.20	0.89
Equatorial Guinea	—	—	1,589	2,043	—	—	—	1.00
Ethiopia	40.06	22.85	117,754	24,363	—	—	33.90	5.50
Gabon	10.47	0.28	12,680	3,623	—	0.00	—	5.83
Gambia, The	15.15	7.08	31,177	2,316	—	—	17.92	25.00
Ghana	9.16	2.31	16,185	2,154	84.00	35.67	10.74	8.88
Kenya	37.51	9.81	26,223	7,086	7.08	20.16	—	4.38
Lesotho	69.47	15.47	46,841	13,212	7.00	16.00	6.13	4.59
Liberia	9.13	—	18,900	4,423	6.00	5.00	5.57	7.83
Libya	49.68	1.45	5,256	2,766	—	42.17	3.70	2.21
Madagascar	26.74	18.87	110,243	11,622	—	16.20	—	11.58
Malawi	11.79	7.07	43,271	2,230	—	17.00	11.64	37.72
Mali	44.07	17.90	13,576	11,247	52.00	29.00	19.74	10.78
Mauritania	84.04	16.18	229,607	15,454	—	—	11.41	14.86
Mauritius	13.19	1.16	2,180	2,378	—	5.00	—	1.38
Morocco	35.13	—	17,082	4,534	3.71	2.92	3.09	5.47
Mozambique	20.10	12.72	21,505	5,544	—	—	6.19	6.19
Namibia	81.67	12.93	84,911	15,587	4.71	2.63	11.73	7.14
Niger	47.08	13.47	111,688	6,556	—	—	—	25.11
Nigeria	17.88	5.88	11,323	3,942	—	3.30	—	4.07
Reunion	24.36	—	5,743	4,307	—	0.14	—	1.75
Rwanda	10.85	3.01	24,435	1,825	20.00	15.00	33.76	17.16
Senegal	21.05	3.45	59,126	7,558	30.50	9.75	—	12.37
Sierra Leone	11.67	3.06	24,452	7,034	11.00	8.50	4.00	3.84
Somalia	72.50	49.13	43,577	9,566	—	—	—	6.31
South Africa	49.20	3.78	11,739	22,336	0.21	0.19	1.03	0.65
Sudan	58.30	21.23	34,390	36,852	—	—	1.66	1.08

Table 3. *(continued)*

Region/country	Livestock (1988) as a percentage of Agriculture	Livestock (1988) as a percentage of GDP	VLUs (1989) per Veterinarian	VLUs (1989) per Auxiliary	Ratio of government to private veterinarians 1984	Ratio of government to private veterinarians 1989	Ratio of auxiliaries to government plus private veterinarians 1984	Ratio of auxiliaries to government plus private veterinarians 1989
Swaziland	24.35	7.68	43,810	3,319	12.00	6.50	33.54	17.60
Tanzania	22.63	20.47	60,962	6,923	—	15.00	—	16.73
Togo	11.35	2.71	11,238	6,591	—	5.60	—	3.15
Tunisia	29.53	4.10	4,499	5,138	25.29	6.82	1.63	1.48
Uganda	14.23	8.25	13,531	2,708	26.62	23.47	15.12	5.71
Zaire	5.22	1.47	2,737	1,537	1.25	2.54	3.78	3.10
Zambia	32.07	4.67	28,854	5,723	6.00	30.00	10.69	15.61
Zimbabwe	22.87	4.41	21,892	4,162	0.95	1.31	21.29	6.86
North America								
Canada	37.85	1.34	3,306	4,149	0.27	0.16	0.24	0.84
United States	46.70	1.33	2,912	5,660	0.13	0.06	0.26	0.66
Central America								
Belize	—	—	8,075	8,972	—	5.00	1.50	1.50
Costa Rica	38.26	7.52	4,489	19,086	0.39	0.37	0.29	0.26
El Salvador	25.40	3.49	6,871	18,821	0.83	0.54	0.54	0.38
Guatemala	26.31	4.11	7,300	14,567	0.36	0.35	0.59	0.58
Honduras	27.07	4.26	23,310	20,175	0.77	1.67	1.40	1.39
Mexico	47.04	4.45	5,694	4,807	8.40	0.38	1.30	1.68
Nicaragua	33.79	—	22,245	26,694	3.06	0.80	0.93	1.00
Panama	44.53	4.83	4,448	7,623	1.23	0.89	0.90	0.63
South America								
Argentina	47.56	9.23	10,748	53,550	—	0.15	—	0.20
Bolivia	46.59	11.44	8,362	273,329	1.42	0.07	0.25	0.03
Brazil	30.14	3.93	7,295	20,307	—	1.79	—	0.58
Chile	41.30	4.80	2,615	71,209	0.87	0.23	—	0.04
Colombia	42.96	7.69	4,708	70,056	—	0.63	—	0.09
Ecuador	88.00	16.32	93,967	44,621	—	—	2.18	2.39
Paraguay	28.16	13.97	9,556	5,807	0.79	0.93	0.30	1.90
Peru	39.66	5.29	3,588	22,503	0.97	0.47	0.29	0.20
Surinam	24.49	0.19	16,711	7,520	4.00	8.00	4.40	2.22
Uruguay	78.83	17.16	7,933	16,691	—	0.19	3.21	0.48
Venezuela	59.59	2.99	4,098	19,077	0.40	0.14	0.14	0.24
Asia								
Afghanistan	41.62	—	24,828	13,659	—	9.43	—	2.53
Bangladesh	15.13	5.63	31,136	—	89.40	29.92	3.35	—
Bhutan	25.58	7.77	31,784	1,847	—	—	35.50	65.40
Hong Kong	73.86	0.12	5,923	870	0.89	0.41	13.35	9.00
India	19.34	5.32	10,861	5,280	22.00	45.04	2.39	2.32
Indonesia	9.97	2.25	7,630	17,919	—	0.60	—	0.79
Japan	54.14	0.34	569	—	1.47	0.57	—	—
Korea, Dem. Peop. Rep. of	14.25	—	508	106	—	0.46	—	5.06

(Table continues on the following page.)

Table 3. *(continued)*

Region/country	Livestock (1988) as a percentage of Agriculture	Livestock (1988) as a percentage of GDP	VLUs (1989) per Veterinarian	VLUs (1989) per Auxiliary	Ratio of government to private veterinarians 1984	Ratio of government to private veterinarians 1989	Ratio of auxiliaries to government plus private veterinarians 1984	Ratio of auxiliaries to government plus private veterinarians 1989
Korea, Rep. of	33.44	1.14	839	—	0.34	0.62	—	—
Lao P.D.R.	34.22	41.11	63,231	1,114	—	—	—	113.48
Malaysia	14.85	2.31	4,607	—	—	1.07	—	—
Mongolia	77.85	—	5,899	2,328	—	—	—	3.19
Myanmar	12.27	—	8,008	19,668	2.09	1.22	0.59	0.45
Nepal	31.10	14.72	63,286	7,699	39.50	26.83	—	8.51
Pakistan	41.67	14.91	20,215	9,241	—	—	—	—
Philippines	20.58	3.52	3,364	5,517	0.36	0.34	—	1.34
Singapore	97.70	0.69	3,189	1,400	0.67	0.57	9.33	3.15
Sri Lanka	9.16	2.26	13,393	3,995	8.12	12.47	3.76	3.86
Thailand	16.84	3.17	14,186	3,258	—	1.20	—	6.23
Viet Nam	22.47	23.90	5,478	983	—	79.60	—	6.50
Middle East								
Bahrain	—	—	653	1,100	9.00	3.00	1.20	1.19
Iraq	34.68	—	1,126	1,839	—	18.20	—	1.31
Israel	44.65	1.30	1,443	5,232	1.55	1.00	0.71	0.52
Jordan	53.37	3.10	4,786	18,824	1.90	45.33	0.41	0.32
Kuwait	—	—	2,843	2,378	5.20	2.40	1.44	1.21
Lebanon	38.94	—	4,806	8,278	1.27	0.64	0.84	0.88
Oman	—	—	4,840	3,267	—	9.00	—	3.00
Qatar	—	—	1,649	4,829	0.73	7.50	0.11	0.41
Saudi Arabia	54.12	1.13	16,170	10,054	—	—	—	1.61
Syrian Arab Rep.	33.93	8.06	1,238	2,804	—	0.34	1.73	0.49
Turkey	22.71	5.15	6,482	—	—	1.25	—	—
United Arab Emirates	—	—	1,965	3,189	3.88	0.30	1.33	0.63
Europe								
Albania	43.45	—	877	1,612	—	—	—	22.23
Austria	66.66	1.81	1,449	—	—	1.30	—	—
Belgium	72.65	1.92	1,773	—	0.03	0.06	—	—
Denmark	69.51	3.25	3,075	45,071	0.56	0.42	0.03	0.11
Finland	75.28	1.23	2,476	35,564	5.58	3.57	0.04	0.11
France	51.62	1.88	5,008	15,468	0.08	0.09	0.24	0.37
German Dem. Rep.	60.95	—	3,015	4,230	—	60.00•	—	5.71
Germany, Fed. Rep. of	69.36	1.27	2,012	3,209	0.20	0.15	—	1.23
Greece	28.14	2.82	1,528	9,739	1.77	2.56	0.22	0.20
Hungary	48.95	12.61	2,089	—	0.74	0.60	0.37	—
Ireland	85.98	8.78	4,738	—	0.26	0.22	—	—
Italy	37.38	1.00	1,310	—	0.70	0.59	—	—
Luxembourg	—	—	—	—	0.32	0.15	—	—

Table 3. *(continued)*

Region/country	Livestock (1988) as a percentage of Agriculture	Livestock (1988) as a percentage of GDP	VLUs (1989) per Veterinarian	VLUs (1989) per Auxiliary	Ratio of government to private veterinarians 1984	Ratio of government to private veterinarians 1989	Ratio of auxiliaries to government plus private veterinarians 1984	Ratio of auxiliaries to government plus private veterinarians 1989
Netherlands	77.92	3.42	3,894	12,181	0.19	0.15	0.12	0.52
Norway	78.23	0.99	1,236	—	0.52	0.47	—	—
Poland	45.24	12.54	2,891	4,693	—	105.36	—	0.77
Portugal	44.00	2.55	2,199	—	—	3.34	—	—
Romania	35.07	—	5,286	1,675	—	—	4.19	3.80
Spain	35.15	1.83	1,384	—	—	2.94	—	—
Sweden	60.47	0.88	1,918	16,207	2.94	1.96	0.19	0.39
Switzerland	76.63	0.94	2,244	24,687	0.15	0.15	—	0.16
United Kingdom	63.77	1.21	2,489	7,673	0.57	0.08	—	0.37
Yugoslavia	46.74	6.30	2,405	1,494	—	—	—	1.88
Oceania								
Australia	6.43	3.38	8,173	14,691	0.21	0.22	1.22	0.65
New Zealand	—	—	12,204	14,170	0.38	0.23	2.02	1.15

— Not available.

Note: One veterinary livestock unit (VLU) equals 1 cow or camel; or 2 horses, pigs, or donkeys; or 10 small ruminants; or 100 fowl.

Source: VLUs were estimated using livestock and population figures from FAO-WHO-OIE (1989). Gross domestic product (GDP) figures were from the World Bank data base, and the livestock and agricultural production values were from USDA (1990). The numbers of government and private veterinarians and veterinary auxiliaries were from FAO (1989).

most developing nations, animal health services still remain a government responsibility. In the more developed countries, some service functions are being performed in partnership with, or have been transferred to, the private sector. In some developing countries (the Central African Republic, India, and Morocco), donor agencies have facilitated the transfer of responsibilities from the public to the private sector. The following discussion reviews the nature and extent of public and private sector participation in various countries and is based on a survey of expert opinion and a review of the literature.[8]

Although veterinary surveillance remains a public sector activity worldwide, responsibility for quarantine services, pharmaceutical quality control, and food hygiene and inspection has been subcontracted to private veterinarians in Chile, Denmark, Germany (Leonhardt 1990), Ireland, and the United Kingdom. Although private veterinarians perform these services, any potential moral hazard problem is surmounted because the public sector still sets the level and controls the quality of services.

Governments in Africa and most of Asia and Latin America continue to monopolize animal health extension services. In Argentina (World Bank 1989),

Australia, Brazil (World Bank 1990), North America, the Philippines, and Western Europe, extension services are an integral component of the private sector's marketing strategy. To promote and strengthen customer loyalty and expand market share, private veterinarians and sales agents of agribusiness and veterinary pharmaceutical companies often provide free information on livestock upgrading, improved production practices, hygiene and sanitation, and feeding. In Argentina and Brazil the structure of the livestock industry has led to flourishing private consulting firms that specialize in providing technical services. These firms have succeeded because their services are tailored to individual needs, minimizing free-rider problems. Moreover, a tendency toward market segmentation is growing in both countries. Private consulting firms cater to the specialized needs of large-scale farmers, while government efforts concentrate on medium- and small-scale enterprises. This trend may have developed because, typically, only large-scale farmers can take advantage of economies of scale in using private consulting services.

The survey showed that veterinary research continues to be a public sector function in almost all developing countries, in large part because the market for new veterinary products in many developing countries is small and research by private firms remains unprofitable. Other constraints include scarce scientific resources and expertise. In industrial countries agribusiness, veterinary pharmaceutical companies, and privately funded research institutes also conduct research on developing feed additives and new vaccines and drugs. These firms generally cater to larger or multiple markets (domestic or foreign), and thus they are able to take advantage of economies of scale. Furthermore, because they usually hold proprietary rights to their research, they are able to collect the return on their investments. Consequently, there is greater incentive for private research.

Clinical intervention is conducted exclusively in the private sector in almost all industrial countries. In the rest of the world, public sector involvement varies significantly. In some developing countries the private sector provides clinical services primarily to medium- and large-scale livestock enterprises, while the government supplies the clinical needs of small-scale farmers. This segmentation of the market is largely the result of economies of scale. A survey by Wise (1988) of 894 beef and dairy cattle producers, 338 hog producers, and 395 sheep producers in the United States showed that the cost of veterinary services per animal generally declines as herd size increases (table 4). The combined costs per animal of health products and veterinary services decreased as cattle, hog, and sheep operations increased in size, except that medium-size hog and sheep enterprises displayed a slight increase in the cost of veterinary services and medium-size sheep enterprises showed a slight increase in the cost of animal health products. Dairy production exhibited economies of scale in veterinary services as size increased but showed diseconomies of scale in costs of animal health products. In all cases, farmers spent proportionately more on livestock health products and less on veterinary services as their scale of operation increased.

Table 4. *Livestock Health Expenditures in the United States, 1985*

Variable	*Herd size* 1–49	50–99	100
Beef cattle			
Times used veterinarian per year	3	4	6
Health expense per animal ($)			
Animal health products	6.35	5.38	4.65
Veterinary service	5.19	3.08	2.10
Total	11.54	8.46	6.75
Dairy cattle			
Times used veterinarian per year	15	20	25
Health expense per animal ($)			
Animal health products	13.16	13.38	14.49
Veterinary service	13.16	13.31	10.87
Total	26.32	26.69	25.36
Hogs			
Times used veterinarian per year	5	6	6
Health expense per animal ($)			
Animal health products	13.33	12.92	5.27
Veterinary service	5.00	5.83	1.08
Total	18.33	18.75	6.35
Sheep			
Times used veterinarian per year	4	5	6
Health expense per animal ($)			
Animal health products	5.67	7.08	4.12
Veterinary service	3.73	3.12	1.76
Total	9.40	10.20	5.88

Note: All values are median values.
Source: Wise (1988).

Our survey showed that public sector involvement in vaccination programs ranges from mere regulation to complete provision. In Africa and Asia vaccinations are predominantly or exclusively administered by government veterinarians and veterinary auxiliaries. In Argentina (World Bank 1989), Brazil (World Bank 1990), Morocco, and the industrialized countries, the government subcontracts its vaccination functions to the private sector, particularly for the more critical infectious diseases, such as foot-and-mouth disease and brucellosis. However, the government strictly monitors compliance by farmers by inspecting the vaccination receipts issued by private veterinarians. In Africa, Asia, and Latin America medium- and large-scale farms that raise improved breeds use private veterinarians to vaccinate their animals, while small-scale farmers rely on the government. Inadequate coverage and the occasional unreliability of government operations have induced medium- and large-scale farmers to undertake their own vaccination programs.

Diseases that have an effect at the national level may necessitate government intervention to ensure the effectiveness of a vaccination program or adequate use of clinical services. Moreover, because many countries ban imports of livestock products from countries with highly contagious diseases and foot-and-mouth disease, Argentina, Brazil, and other countries whose livestock products account for a large proportion of exports have found it in their best interest to assume control of vaccination programs. Otherwise, the inaction of individual farmers might lead to bans on the country's exports as a whole.

Vector control worldwide is largely the shared responsibility of the public and private sectors, but private sector participation has been rising. In North America and Oceania, farms generally operate their own dip or spraying facilities. In Kenya, medium- and large-scale enterprises generally manage their own dip or spraying facilities, while small-scale farms rely mainly on government-operated facilities (World Bank 1986b). Controlling tse-tse flies on open rangelands remains in the public domain in several African countries because of its public-good character. In the Central African Republic, however, livestock farmers install special screens and traps near their own herds to control these flies. In Germany compensation for the slaughter of infected animals is covered by insurance, such as the Enzootics Control Fund, which is funded equally by the state and livestock farmers (through fees). The fund also enforces measures to control enzootic diseases, pays for diagnostic examinations in state veterinary clinics, and compensates private practitioners for participating in epizootic control programs.

In most developing countries, animal vaccines are produced by government research laboratories, although private companies (mostly subsidiaries of multinationals) have set up local production plants. Private production of vaccines is often integrated with the production of veterinary drugs. Both the public and private sectors supply animal vaccines in Australia, Brazil, the Netherlands, the United Kingdom, and Uruguay, but vaccines are the sole province of private firms in Argentina, Canada, Chile, the United States, and most of Western Europe. In China, the Animal Health Bureau prepares vaccines for hog diseases in state laboratories (World Bank 1987).

Factors Influencing Farmer Demand

Livestock owners must take many things into account when deciding whether or not to make use of animal health services. The most important are:

- The nature of the potential or actual disease
- The size of the herd
- The nature of the livestock production system
- The availability and quality of veterinary services
- The relation of possible benefits to actual costs.

The Nature of the Disease and the Type of Animal

Assessing the possible effects of disease is no simple matter for the livestock owner. Different diseases have different effects on livestock, and the economic impact on the livestock enterprise therefore may also be different. Brucellosis, for example, causes cows to abort their unborn young. Thus, the owner of a dairy herd (whose total milk production may be seriously affected because of death among the next generation of milk cows) may be more inclined to take steps to combat brucellosis than to deal with foot-and-mouth disease. Although the latter disease is debilitating to adult milk cows, its net effect on milk production may not be as severe.

Economic losses from the same disease may also differ among different livestock breeds. For example, the economic losses from reduced milk production of dairy cattle infected with foot-and-mouth disease are generally significantly higher than losses for infected cattle raised for meat. Dairy farmers may therefore have more incentive to prevent the introduction of foot-and-mouth disease than cattle farmers.

Another factor in the owner's decision on how to deal with disease may be the breed of the livestock involved. Zebu cattle in Kenya, for example, are known to have greater resistance than other strains of cattle to the various diseases transmitted by ticks, such as East Coast Fever. One study found that owners of small herds of Zebu cattle tended to skimp on the standard preventive measure of dipping the cattle in pesticide solutions (World Bank 1986).

The Size of the Herd

As the literature on the subject shows, the size of a herd of livestock can have many different ramifications for veterinary care. A general (although not infallible) rule of thumb is that, as the herd or flock increases in size, the veterinary cost per animal decreases. From the farmer's perspective this cost differential can become a screening device as to who can afford veterinary services, because only the larger commercial farmers may be able to afford the service.

Under the right circumstances, owners of small herds can still take advantage of economies of scale by becoming members of producer associations. The fees each member pays allow the association to hire one or more veterinarians (and veterinary paraprofessionals) to provide animal health care to all of its members. Because the veterinarians serve all members of the association, the problem of free riders that comes with the provision of some services may also be reduced. Associations provide a mechanism for internalizing externalities associated with some services. For example, the association can enforce the compulsory vaccination of members' herds or flocks.

In some developing countries the number of producer associations has become quite large. In 1970 the national and some of the state governments of

India (with World Bank assistance) established an association of smallholder dairy cattle farmers to increase milk production and market it more effectively as well as to provide the herds with animal health care. The association had 1.8 million members by 1981, and 4.9 million members by 1986. As a result the volume of milk marketed more than doubled, from 2.6 million liters to 7.9 million liters during the same period (Doornbos and Nair 1990).

In 1982 the National Federation of Livestock Producers in the Central African Republic assumed full responsibility for marketing and distributing animal health pharmaceuticals when the government livestock service experienced serious operational difficulties. International donor assistance provided an initial subsidy to the federation to set up its operation, while the government set up programs to train livestock farmers to use the drugs properly. An assessment by the World Bank concluded that the herders were steadily becoming more adept at treating their animals, and 90 percent of the owners had learned how to administer drugs for intestinal parasites correctly (World Bank 1986a). In 1986 the Association of Milk Cooperatives of Indonesia employed twenty veterinarians to ensure that farmer members would have access to livestock health and production services (Winrock International Institute for Agricultural Development 1986).

The Nature of the Livestock Production System

The potential for disease transmission is affected by the type of livestock production system. In Argentina, for example, cattle breeding is undertaken on large ranches where animal density is relatively low, which minimizes the risk of the spread of contagious diseases and thus the demand for preventive services such as vaccinations. In contrast, the livestock farmers in the high-density, cattle-fattening areas have a higher demand for preventive services because the risks of disease outbreaks are higher (World Bank 1989).

The Availability and Quality of Veterinary Services

The availability and quality of veterinary services also help determine how and when animal health care is provided. In Kenya, for example, the owners of medium- and large-scale cattle enterprises generally operate their own facilities for dipping or spraying animals to protect them against insect pests. These owners have concluded that operating their own facilities makes more economic sense than sending the animals to government installations, which are not considered as reliable and where herds are mixed and thus may be exposed to animals infected with contagious diseases.

The Relation of Benefits to Cost

Ultimately farmers will demand animal health care only if the benefits of the care exceed its costs. Because of export considerations, for example, the

Brazilian government requires cattle owners to vaccinate their animals against foot-and-mouth disease. Cattle owners in the extensive cattle-growing areas frequently seek to evade the law, however, because the profits on livestock production are low, and the cost involved in vaccinating the animals further depresses profits (World Bank 1990).

To illustrate the varying incentives farmers receive for using animal health services for different diseases, Felton and Ellis (1978) report a cost-benefit ratio of 1:8 for the rinderpest vaccination campaign in Nigeria. In another study, Domenech and Coulomb (1981) calculated an internal rate of return between 12 and 53 percent for brucellosis control in Chad.

Factors Influencing Private Supply

Private veterinarians and paraprofessionals will offer their services so long as they can maintain profitable operations. The profitability and sustainability of private practice are influenced by several factors, which include the costs of operating the practice, the magnitude of farmer demand for services, and the degree of competition from both public and other private practitioners. Because of the large fixed costs of operating a veterinary practice—a clinic, a vehicle to visit farmers, animal examination, and laboratory equipment—private veterinarians must have a specific minimum level of business to earn a reasonable profit. Therefore, an area where a large demand exists, such as a region dominated by large commercial livestock farms, is better able to support a private veterinary practice than an area with small, dispersed herds. Private veterinarians, however, cannot compete with public veterinarians, even if demand exists, if the public veterinarians are subsidized so that they can offer their services at lower rates or for free.

To illustrate the factors that influence the profitability of a private veterinary practice and therefore the supply of veterinary services, the following section examines how livestock density and the option to sell veterinary pharmaceuticals can influence the costs and returns of setting up a private practice in Uganda.

Private Practice in Uganda: A Case Study

Private entry into the animal health services sector depends on whether an economically profitable practice can be sustained. An important concern for private practitioners is the minimum number of animals they must treat to break even (net profit = 0). The following discussion presents the results of an estimation of break-even VLUs under three different production systems in Uganda: traditional, intermediate, and high intensity. It is assumed that the traditional production system is characterized by smallholder-pastoralist farming and low productivity (fewer than 500 liters of milk a year and less than 12 percent offtake—the percentage of total stock sold each year), while the

intermediate production system is typified by more capital-intensive operations and higher productivity (from 500–2,500 liters of milk a year and 12–18 percent offtake). The high-intensity production system is assumed to be capital intensive, with milk production greater than 2,500 liters a year and offtake greater than 18 percent. It is assumed that the average fee per animal is $2, $12, or $20 under the traditional, intermediate, and high-intensity systems, respectively, and that the veterinarian could earn additional revenue by adding a markup of either 25 or 50 percent to the cost of drugs. Table 5 lists the costs involved

Table 5. *Costs of Private Veterinary Practice in Uganda, 1990*

Item	*Cost per year ($)*
Depreciation	2,528
Vehicle	450
Veterinary equipment	2,078
Operating expenses	3,500
Supplies:	
Hypodermic syringe, nylon	30
Hypodermic needles, packs of 12	20
Nylon suture material, cassette	70
Nylon suture material, refills	30
Catgut sutures, cassette	250
Calving rope (nylon)	20
Disposable uterine catheters, 25s	20
Teat canulae, packs of 12	10
Chemicals	200
Insurance	650
Rent for clinic	1,500
Utilities	400
Stationery and postage	200
Subscriptions and memberships	100
Fuel and maintenance (per trip[a])	
100 trips per year	720
200 trips per year	1,440
240 trips per year	1,728
Cost of capital (per trip, at 38 percent per year)	
100 trips per year	2,564
200 trips per year	2,838
240 trips per year	2,947
Total costs (per trip)	
100 trips per year	9,312
200 trips per year	10,306
240 trips per year	10,703

a. Assumes $0.18 per kilometer; 40 kilometers per trip.
Source: World Bank data.

Table 6. *Number of VLUs by Production System for a Private Veterinary Practice to Break Even or Earn Profits of $1,000 a Year in Uganda, 1990*

Production system	Fee per animal ($)	Break-even: Pure vet service[a]	Break-even: Vet service + 25% margin	Break-even: Vet service + 50% margin	Net income = $1,000: Pure vet service	Net income = $1,000: Vet service + 25% margin	Net income = $1,000: Vet service + 50% margin
Traditional	2						
100 trips per year		4,656	3,319	1,982	5,156	3,819	2,482
200 trips per year		5,153	3,816	2,478	5,653	4,316	2,978
240 trips per year		5,352	4,014	2,677	5,852	4,514	3,177
Intermediate	12						
100 trips per year		776	553	330	859	636	414
200 trips per year		859	636	413	942	719	496
240 trips per year		892	669	446	975	752	530
High intensity	20						
100 trips per year		466	332	198	516	382	248
200 trips per year		515	382	248	565	432	298
240 trips per year		535	401	268	585	451	318

Note: Break-even VLU = (depreciation costs + operating costs − drug sales margin)/fee per animal.
a. Consulting fees only.
Source: Umali, Feder, and de Haan (1992).

in operating a private practice (see Umali, Feder, and de Haan [1992] for a detailed listing of the costs of veterinary practice).

The break-even VLUs under traditional, intermediate, and high-intensity systems are presented in table 6. The sources of revenue are the consulting fees (pure veterinary services) and markups on drug sales. The results illustrate the importance of drug sales in the viability of private veterinary practice. The results also imply that, assuming 200 trips a year and a 25 percent margin on drug sales, a private veterinarian must treat an additional 500 VLUs a year under the traditional system, an additional 83 under the intermediate system, and an additional 50 under the high-intensity system to earn a net income of $1,000.

Conclusion

Animal health services should be privatized selectively. As a first step, services that are basically private goods should be shifted to the private sector. For those services that entail externalities, moral hazard, or free-rider problems, mechanisms to correct these market failures are needed to ensure that the private sector provides the services at socially optimal levels. Otherwise, public sector intervention will remain essential.

Transferring responsibility for animal health services to the private sector will ease the financial burdens of the government. To promote these shifts,

governments should remove barriers to private development by lowering trade barriers, removing price subsidies on publicly provided drugs, eliminating restrictions on private practice, and abolishing public sector drug supply monopolies that bar private sector participation.

Governments should also explore promoting private practice by removing barriers to entry and establishing an effective legal framework to enforce particular activities (such as issuance of vaccination certificates), subcontracting services to the private sector, promoting livestock insurance plans, and creating the enabling environment for the development of smallholder producer organizations. In areas where animal health services are necessary but unprofitable to private providers, targeted subsidized delivery should be explored.

Veterinary auxiliaries can play an important role in providing preventive services and performing simple clinical procedures. Although they cannot substitute for veterinarians, they supplement the veterinarian's work, expanding the number of farmers served. Because their opportunity costs are lower than those of veterinarians, their services are more affordable to farmers. More important, because it takes substantially less time and money to train them than to train veterinarians, auxiliaries can provide developing countries a cheaper, quicker way to accumulate veterinary personnel.

Notes

Dina L. Umali, Gershon Feder, and Cornelis de Haan are with the Agriculture and Natural Resources Department of the World Bank.

1. All dollar amounts are in U.S. dollars.

2. Blankart (1987, p. 350) suggests that markets can develop devices to overcome the deficiency of uncertain quality. For such goods, which he refers to as "experience goods,""the customers can extrapolate their experiences of previous transactions, and the suppliers accumulate goodwill in order not to disappoint the consumer's expectations." Brand loyalty developed through guaranteed quality of products is an example.

3. See Umali and Schwartz (1993) for more detailed discussion on the roles of the public and private sectors in delivering agricultural extension services and Umali (1992) for more detailed discussion on the roles of the two sectors in agricultural research.

4. The failure of several producers to follow the requirements of the program (for example, to vaccinate all animals properly) can cause a resurgence of the disease and jeopardize the health and productivity of the livestock of all other farmers.

5. In some countries, such as Australia and the United States, where most major diseases have been completely eradicated domestically, quarantine is used as the first line of defense to prevent the reintroduction of these diseases from foreign countries.

6. A veterinary livestock unit (VLU) is a device for statistically standardizing the work requirements for animal health care of different livestock species. A VLU is equivalent to 1 cow or camel; or 2 horses, pigs, or donkeys; or 10 small ruminants; or 100 fowl (de Haan and Bekure 1991). The values used to calculate these ratios are national averages of livestock population and the number of veterinarians and auxiliary personnel. Differences in availability within the country are not considered.

7. That veterinarians are available does not necessarily imply that they are able to practice their vocation to the fullest extent possible. Government restrictions, lack of access to veterinary

supplies, and inadequate transport facilities and infrastructure are among the factors that may constrain them.

8. The information on activities in the public and private sectors was compiled primarily by interviewing livestock and agricultural specialists in the World Bank, the U.S. Department of Agriculture, and various embassies; information from recent literature on the topic supplemented those interviews.

References

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

Anteneh, Addis. 1985. "Financing Livestock Services in Some Countries of East and Southern Africa." Livestock Policy Unit Working Paper 6. International Livestock Centre for Africa, Addis Ababa. Processed.

Blankart, Charles B. 1987. "Limits to Privatization." *European Economic Review* (Netherlands) 31(February/March):346–51.

de Haan, Cornelis, and Nico J. Nissen. 1985. *Animal Health Services in Sub-Saharan Africa.* World Bank Technical Paper 44. Washington, D.C.

de Haan, Cornelis, and Solomon Bekure. 1991. *Animal Health Services in Sub-Saharan Africa: Initial Experiences with New Approaches.* World Bank Technical Paper 134. Washington, D.C.

Domenech, J. L., Jacques Coulomb. 1981. *Brucellosis in Chad: Impact of Animal Disease Control in Africa.* Berlin: Deutsche Stiftung für Entwicklungshilfe.

Doornbos, Martin, and K. N. Nair. 1990. *Resources, Institutions, and Strategies: Operation Flood and Indian Dairying.* New Delhi: Sage Publications India Pvt. Ltd.

Feldman, A. M. 1980. *Welfare Economics and Social Choice Theory.* Boston: M. Nijhoff Publishing.

Felton, M. R., and Peter R. Ellis. 1978. *Studies on the Control of Rinderpest in Nigeria.* Study 23. Reading, U.K.: University of Reading.

Food and Agriculture Organization (FAO). 1989. *Argentina Agricultural Services Project Annexes.* Report 90/89 CP-ARG-12 PB. Rome: FAO/World Bank Cooperative Programme Investment Centre.

———. 1990. "Strengthening Animal Health Services in Developing Countries." Rome. Processed.

Food and Agriculture Organization, World Health Organization, and International Office of Epizootics. Various issues. *Animal Health Yearbook,* Rome.

Head, John G. 1974. *Public Goods and Public Welfare.* Durham, N.C.: Duke University Press.

Leonard, D. K. 1990. "Research Proposal on the Organization of Animal Health Services in Africa." Paper presented at the International Livestock Centre for Africa. Addis Ababa. Processed.

Leonhardt, H. G. 1990. "Animal Health System of the Federal Republic of Germany." Paper presented at the Second Round Table on Livestock Production in Eastern Europe, sponsored by the European Association of Animal Production. Berlin. Processed.

McCauley, E. H. 1982. "Animal Diseases in Developing Countries: Technical and Economic Aspects of Their Impact and Control." World Bank, Washington D.C. Processed.

Merck & Co., Inc. 1991. *Merck Veterinary Manual.* 7th Edition. Rathway, N.J.

Miller, W. C., and G. P. West. 1978. *Black's Veterinary Dictionary.* 9th ed. London: Morrison and Gibb Ltd.

Pigou, A. C. 1946. *The Economics of Welfare.* 4th ed. London: Macmillan.

Sandford, Stephen. 1983. *Management of Pastoral Development in the Third World.* New York: John Wiley and Sons.

U. S. Department of Agriculture. 1990. *World Agriculture Trends and Indicators 1970–89.* Statistical Bulletin 815. Washington, D.C.

Umali, D. L. 1992. *Public and Private Sector Roles in Agricultural Research: Theory and Experience.* World Bank Discussion Paper 176. Washington, D.C.

Umali, D. L., Gershon Feder, and Cornelis de Haan. 1992. *The Balance Between Public and Private Sector Activities in the Delivery of Livestock Services.* World Bank Discussion Paper 163. Washington D.C.

Umali, D. L., and Lisa Schwartz. 1993. "Public and Private Agricultural Extension: Beyond Traditional Frontiers." Agricultural Policies Division, Agricultural and Natural Resources Department, World Bank. Washington, D.C. Processed.

Winrock International Institute for Agricultural Development. 1986. "A Review of the Livestock Sector in the Republic of Indonesia." A report prepared for the Asian Development Bank and the Republic of Indonesia. Morrilton, Ark. Processed.

Wise, J. K. 1988. "Animal Health Expenditures by Livestock Producers." *Journal of the American Veterinary Medical Association,* 2:236–38.

World Bank. 1986a. "Central African Republic National Livestock Project." Staff Appraisal Report 5909-CA. Washington, D.C. Processed.

———. 1986b, "Kenya Animal Health Services Project." Staff Appraisal Report 6367-KE. Washington, D.C. Processed.

———. 1987. *China: The Livestock Sector.* Washington, D.C.

———. 1989. "Argentina Agricultural Sector Review, Volume II: Technical Annex." Report 7733-AR. Washington, D.C. Processed.

———. 1990. "Brazil, Key Policy Issues in the Livestock Sector: Toward a Framework for Efficient and Sustainable Growth." Sector Report 8580-BR. Washington, D.C. Processed.

THE ROLES OF THE PRIVATE AND PUBLIC SECTORS IN ENHANCING THE PERFORMANCE OF SEED SYSTEMS

Steven Jaffee
Jitendra Srivastava

Seeds are crop-based agriculture's most important input, yet few developing countries have succeeded in establishing efficient seed production and supply systems. In many developing countries the large-scale, centralized state farms and public seed corporations established to multiply and disseminate improved seeds of selected crops have proved ineffectual, failing to meet the diverse crop and varietal requirements of farmers. Governments and assisting agencies are currently reassessing their strategies, paying greater attention to the potential contributions of private firms, cooperatives, other nongovernmental organizations (NGOs), and farmers themselves.

This article contributes to that reassessment. It defines the scope for involving the private sector in an array of seed-related activities, identifies critical and complementary roles for the public sector, and reviews seed system development in industrial and developing countries, with a primary focus on institutional dimensions. The article advocates a phased withdrawal of the public sector from the commercial side of seed production and marketing, while recognizing a continued important role for the public sector in plant breeding research, germplasm and varietal maintenance, training, quality control, and consumer protection.

Nothing is more fundamental to agriculture than the seed. Seeds, which embody the genetic potential of plants, determine the upper limits on plant yield and therefore the productivity of other agricultural inputs as well. Seeds whose genetic makeup or physical and physiological properties have been improved can substantially boost agricultural productivity and sustainability at relatively little cost (Cromwell, Esbern, and Turner 1992).

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 97–117

The development and distribution of improved seed entails a series of distinct, yet highly interdependent, activities. This chain begins with the development and release of new varieties (or hybrids) through applied scientific research and testing, continues through the several stages of seed multiplication, involves the processing (drying, shelling, cleaning) and storage of seed, and ends with various seed marketing functions.

In theory farmers could test, select, multiply, process, and supply all the seed themselves, without relying on formal research institutions and specialized seed producers and suppliers. That is possible because seeds, unlike other farm inputs, grow into plants, which in turn produce new seeds.

Historically, farmers have collected and stored their own seed, selecting among local planting materials, taking advantage of natural outcrosses and mutations in plants, and exchanging seed with one another. Only with the advent of the science of genetics and modern advances in seed technology were more formal institutions established to supply farmers with seed with genetic or physiological properties superior to that produced and disseminated through traditional systems. Even today a large proportion of the seed planted is either saved by farmers or exchanged on a farmer-to-farmer basis. In the mid-1980s farmer-saved seed accounted for an estimated 35 percent (or $18 billion) of the total estimated value of $50 billion for all agricultural seed used worldwide (Groosman, Linnemann, and Wierena 1988). In developing countries an estimated 80 percent of the seed used in the early 1980s was farmer-saved seed (Delouche 1982).

At the other theoretical extreme, all seed could be developed and supplied by some combination of public and private organizations not directly involved in crop production. Such entities might include public research institutes, public or private universities, farmer cooperatives, state-owned seed enterprises, nonprofit NGOs, extension service agencies, seed trade associations, and an array of small, medium, and large private enterprises.

Past efforts to create such formal seed supply systems have had mixed success. Most often governments in Africa, Asia, the Near East, and Eastern Europe (and international development agencies) tried to establish national and provincial seed corporations and public seed farms to multiply and distribute improved seeds of selected crops. Public corporations attempted to meet national seed production targets, frequently with inadequate regard to product quality, little coordination between research institutions and seed multiplication organizations, and without realistic assessment of current or future demand. In most cases little attention was paid to the potentially important roles that private firms, cooperatives, other NGOs, and farmers themselves might play.

Although some of these public seed corporations have expanded seed output and contributed to the initial spread of high-yielding varieties (or hybrids) of rice, wheat, and maize, most such enterprises have operated well below capacity, have been a major financial liability for their governments, and have directly or indirectly crowded out seed ventures in the private sector. Influenced

more by political than by economic pressures or consumer preferences and having limited technical, financial, and other resources, the public seed enterprises have not been able to meet the diverse crop and varietal needs of different categories of farmers and other seed users in their countries.

The uneven pattern of seed system development worldwide is illustrated in table 1. The data, based on a survey conducted in 1985 by the UN Food and Agriculture Organization (FAO), indicate the proportions of those countries within each region that have created advanced systems of varietal development and of seed production and distribution, those with partially developed systems, and those without any system at all.

Three main conclusions can be drawn from the table. First, outside of South America, only a relatively few developing countries have created advanced systems of seed improvement and distribution for any set of crops. Although agroecological and other technical factors have been important in this pattern, institutional and policy factors have also been critical. In most of the developing countries with advanced seed supply systems—such as Argentina, Brazil, Chile, and Thailand—the private sector plays a major, if not dominant, role in improving and marketing seed.

Second, although many countries now have relatively advanced systems of varietal research and development, systems for seed production and distribution

Table 1. *Level of Development of Seed Industries, by Type of Crop*
(percentage of countries within the region)

Region/crops (number of countries surveyed)	*Undeveloped*		*Partially developed*		*Advanced*	
	Varietal development	*Seed production, distribution*	*Varietal development*	*Seed production, distribution*	*Varietal development*	*Seed production, distribution*
Africa (37)						
Food crops	6	0	72	72	22	28
Industrial crops	36	64	56	25	8	11
Vegetables	61	64	39	36	0	0
Asia (30)						
Food crops	10	11	31	48	59	21
Industrial crops	55	61	10	11	35	28
Vegetables	41	58	35	21	24	21
Central America (14)						
Food crops	28	36	14	43	58	21
Industrial crops	43	65	21	21	36	14
Vegetables	50	50	43	50	7	0
South America (11)						
Food crops	0	0	0	0	100	100
Industrial crops	18	18	9	0	72	82
Vegetables	55	64	18	36	27	0

Source: FAO (1987).

have lagged behind. This pattern is particularly noticeable for food crops among Asian and Central American countries and presumably has delayed or prevented small-scale farmers from gaining access to improved varieties that have already been tested and released (CIMMYT 1987; Lipton and Longhurst 1988; Timothy, Harvey, and Doswell 1988; Cromwell 1990). Without improvements in seed supply systems, many of the benefits from plant breeding achievements will not be realized in farmers' fields.

Third, across all regions, systems to develop and distribute seed are typically far more advanced for staple food crops than for industrial crops (such as cotton, tobacco, and oilseeds) and vegetable crops. This is understandable, given national concerns about food security and the goals of the international agricultural research centers. However, limited or nonexistent systems for industrial and vegetable crops have weakened the competitiveness of many developing countries in the international markets for many high-value agricultural commodities. Even among food crops, varietal development and seed distribution have been more successful for rice and wheat and for irrigated areas than for sorghum, millet, cassava, and food legumes and for rain-fed and upland areas (Dalrymple 1986a, 1986b; McMullen 1987; Kloppenberg 1988).

The large variation in sources of seed is illustrated in table 2, which shows the estimated values and percentages of maize seed supplied by public and private commercial organizations and saved by farmers in twenty-one developing countries in the mid-1980s. In Chile, for example, 98 percent of the (value of) maize seed planted by farmers came from private commercial firms and only 2 percent from farmers themselves. In Indonesia, by contrast, 95 percent of all maize seed was farmer-saved, and only 4 percent was obtained from commercial sources. In China, matters were quite different, with 92 percent of all maize seed being provided by the government, 8 percent by farmers themselves, and none at all from private commercial sources.

Budgetary pressures, concern about the inefficiency and ineffectiveness of public seed enterprises, an increasing demand for high-quality seed, and a growing awareness of the opportunities and challenges associated with biotechnology are leading many international development agencies and developing country governments to reconsider their approach to seed system development and the appropriate roles of the public and private sectors, including farmers themselves. By defining the scope of private sector involvement in seed supply activities, identifying the critical complementary roles of the private and public sectors, and reviewing past experiences in developing seed systems, this article seeks to help improve strategies for establishing viable seed systems in developing countries and among formerly centrally planned countries.

Seed System Functions

As noted above, the use of improved seed begins with the manipulation of germplasm and identification of a suitable variety or hybrid, continues through

Table 2. *Maize Seed Values and Private Sector, Public Sector, and Farmer-Saved Shares in Twenty-One Developing Countries, 1985–86*

Country	Value (millions of US$)			Private sector (percent)		Total seed value (percent)		
	Farmer-saved seed	Commercial OPV seed	Commercial hybrid seed	OPV sales	Hybrid sales	Farmer-saved	Private sector	Public sector
Africa								
Ethiopia	3.6	1.3	0	0	0	67	0	33
Ghana	4.7	1.2	0	0	0	80	0	20
Nigeria	32.3	7.5	3.0	74	100	75	19	6
Tanzania	15.3	1.8	2.7	—	—	78	—	—
Zimbabwe	1.1	0.1	12.6	100	100	8	92	0
Total	88	22	35	57	95	61	33	6
Asia								
China	13.3	0	145.9	0	0	8	0	92
India	21.2	2.4	7.3	67	63	69	20	11
Indonesia	50.5	1.8	0.8	81	100	95	4	1
Philippines	11.6	6.6	1.8	25	100	58	13	29
Thailand	2.2	10.8	4.7	89	98	12	79	9
Total	113	26	176	60	10	36	11	53
Asia non-communist	96	24	28	62	62	65	22	13
Latin America								
Argentina	0	0	82.3	n.a.	100	0	100	0
Bolivia	14.1	1.2	0	—	n.a.	—	—	—
Brazil	10.0	7.3	115.6	80	97	8	89	3
Chile	0.1	0.4	4.5	100	100	2	98	0
Colombia	4.0	0.4	2.5	15	50	58	18	24
Ecuador	0.9	0.5	0.1	75	100	60	31	9
Mexico	20.5	5.9	13.0	62	47	52	27	21
Total	61.0	19.0	236.0	70	96	19	74	7
Middle East								
Afghanistan	1.8	0.9	0	0	n.a.	67	0	33
Egypt	3.3	1.6	0.5	73	100	61	30	9
Syrian Arab Rep.	0	0.2	2.2	0	0	0	0	100
Turkey	1.7	0.7	7.4	0	55	17	38	45
Total	6	4	11	29	42	29	27	44

n.a. Not applicable.
— Not available.
Note: OPV, improved open pollinated variety.
Source: CIMMYT Maize Survey Data Base (1987).

a series of production and distribution activities, and ends when farmers buy and plant this seed. The principal steps in the process include:

- *Varietal development and release,* whereby new varieties are developed through selection, mutation, hybridization, or genetic engineering processes;

are evaluated for yield and other performance characteristics; and are approved for use in specific agro-ecological areas.

- *Seed multiplication,* whereby small quantities of genetically pure "breeder seed" (or inbred lines for hybrids) provided by the plant breeder are multiplied through several generations to obtain enough seed for general distribution. The technical terms for generations and the actual number of multiplications vary among countries. It is not uncommon to find a three-stage process whereby breeder seed is multiplied once to become "foundation seed," which in turn is multiplied one or two generations to get "certified seed." Where seed is not officially certified, this last generation is commonly called "commercial seed."
- *Seed processing,* involving drying, shelling, and sizing; the removal of inert material and alien seed; and various chemical treatments to protect the health of the seed and to combat insects, fungi, and bacteria.
- *Seed marketing and distribution,* involving handling, transport, storage, market research, field demonstrations and advertising, wholesale and retail buying and selling operations, and the related functions of risk-bearing and financing.

Activities to control quality are an integral part of seed multiplication, processing, and marketing. Quality controls, such as seed crop inspection, seed testing, and seed certification, make it possible to identify breakdowns in production and distribution and to reduce the flow of low-quality and alien seed (such as weed seed) to farmers.

Some of the steps mentioned above can be bypassed by importing seed. Imported seed may be a finished product, suitably conditioned and packaged for direct distribution to farmers, or it may be foundation seed, requiring further multiplication and subsequent treatment before distribution. Local field evaluation of imported new varieties or hybrids is necessary before seed can be distributed to farmers. Imported seeds may also be subjected to quarantine regulations to prevent the simultaneous importation of pests and plant diseases.

The steps listed above are highly interdependent, both technically and economically. The outputs from each step serve as primary inputs into the subsequent activities, and the economic returns to each activity depend on effective performance of the others. The interdependent set of seed-related activities, the firms and individuals who perform them, and the network of trading and other institutional arrangements that coordinate them are the constituent elements of national seed systems.

Improved seeds can be an effective lever for raising productivity while making agricultural production systems more flexible and environmentally sustainable. To be that lever, seeds must be available and affordable to farmers and must overcome the problems encountered by farmers, such as poor yield, limited labor resources, pests, and diseases. The seed must also yield a crop that has the quality and storage attributes preferred by farmers, other consumers, and agricultural processors. To meet these objectives, national seed systems

need to be effective not only in inducing varietal replacement (the development and dissemination of new, genetically improved varieties and hybrids), but also in the efficient resupply of high-quality seeds (of well-known and used varieties) on a periodic and seasonal basis.

National seed systems do not operate independently. Their parameters are set by such elements as international plant breeding activities and seed markets; the structure of domestic agricultural research, production, and marketing systems; agroclimatic conditions; governmental trade, macroeconomic, and agricultural policies; and parallel systems of agricultural extension, credit, and other agricultural inputs. Developments in the markets for food, industrial, and other crops will strongly influence the need for seed and the profitability of its production and distribution.

The Roles of the Public and Private Sectors

The major components of seed supply systems have different economic and technical characteristics. In gauging the incentives for private sector involvement and the justification, if any, for public sector intervention, we examine each activity separately. We focus here on the following primary characteristics of the activities:

- *Economies of scale.* Are there large initial fixed costs for those who decide to engage in the activity, meaning that substantial advantages accrue to those who operate on a relatively large scale? If so, private entry may be constrained, at least in the early stages of developing a seed system. This may result in a lack of private investment altogether or in a noncompetitive market. Economies of scale in certain activities may also result in certain areas or segments of the market being poorly served. Hence, for reasons of either efficiency or equity, some form of public action may be warranted.
- *Externalities.* Does the activity produce either positive or negative spillover effects that the supplier may not take into account when considering the level of investment and effort? If so, the private delivery of the service may be at levels less than or greater than the social optimum. Again, some form of public action may be warranted.
- *Excludability.* Can those who perform a function exclude nonpaying parties from using the good or service? If not, the return on investment in that activity may be quite low, deterring at least certain types of private entities from undertaking the activity. If investment falls below the social optimum, the government may need to intervene, either to induce greater private investment or to undertake the activity itself.
- *Problems of information or quality.* Are farmers and other seed users uncertain about the quality of the product or service, and will that uncertainty undermine the market? If so, effective quality management and consumer

protection measures will be needed. The issue of quality is especially sensitive because some seeds have unwanted characteristics that are unobservable and therefore not detectable until after the seed is used.

In discussing the major seed system functions below, we examine not only the presumed incentives for private sector participation and the possible rationale for public sector intervention but also the actual patterns of public and private sector involvement in these activities in selected industrial and developing countries. Our information comes from a review of the literature on the seed industry and a survey we conducted of seed and agricultural specialists at the World Bank and within the CGIAR (Consultative Group on International Agricultural Research) network, the academic community, and the private sector. Readers interested in the breakdown of private and public sector roles for specific seed crops and specific countries should consult Jaffee and Srivastava (1992).

Varietal Development

The development of new varieties and hybrids—the starting point in the process—can be a profitable activity for specialized research and development firms or firms that also produce and distribute seed. For several reasons, however, the amount and direction of private sector investment in these activities may be insufficient or inappropriate to meet society's objectives.

First of all, the high fixed costs of entry may constrain private investment in plant breeding. A critical mass of scientists, physical facilities, and germplasm is needed to undertake an effective development program. There are thus certain economies of scale, which in very small markets might deter private investment in plant breeding or allow one firm to monopolize this activity.

Second, the externalities associated with plant breeding work are potentially significant, because benefits may accrue to researchers or producers of other crops or in different regions. The breeder may develop a new plant type with improved characteristics that other breeders may further improve for their own specific purposes. The breeder may not consider these broader benefits and, from a social point of view, may therefore underinvest in varietal development.

Third, excluding nonpaying farmers or firms from benefiting from new varieties of seed is often difficult. Competing firms can utilize the information within the seed to develop their own varieties. Farmers can multiply and remultiply the seeds themselves, perhaps paying only for the initial supply. The plant breeder may thus not be able to reap the full financial benefits from its products and therefore may not earn a sufficient return on its investment.

The significance of these factors varies among crops, depending in large measure on whether the seed is hybrid or self-pollinating. Because the desirable properties of hybrids are attenuated in each successive generation, farmers must buy new hybrid seed if they want to achieve undiminished yields. The

originator of a new hybrid seed can thus easily exclude competing seed firms and farmers from the benefits of the new varieties if they have not paid for access. In addition the hybridization process is complex, and competitors cannot easily replicate it. This natural protection to the breeder can be supplemented by government assignment of proprietary rights to the originating firm.

In contrast, breeders of new self-pollinated varieties may capture little of the benefit because others (including farmers) can easily duplicate the variety without paying for it. Hence, private investment in developing improved self-pollinated crops is likely to occur only when varietal proprietary rights can be enforced, when a particular market niche can be targeted, or when such research is at least partially funded by the public sector. Where these conditions are not met and there is thus no incentive for innovative breeders to develop new varieties of self-pollinating crops, public sector involvement is strongly justified, both directly, through government research stations and public universities, and indirectly, through financing and training to stimulate private sector investment.

For hybrids (and also for specialty crops, such as vegetables and industrial crops), direct public sector involvement in varietal development can be justified in two situations: first, in the early stages of development, when trained local scientists are scarce, resources are limited, and demand for the new seeds is uncertain; and, second, in very small markets where private investment is unlikely (Pray and Ramaswami 1991). In either case, the public sector can reduce the risks to private investors by conducting basic research and germplasm enhancement, sharing inbred lines with private researchers, providing support in obtaining germplasm from international sources, training plant breeders, and allowing needed research equipment to be imported.

The literature review and the survey found that the public sector (sometimes including international agricultural research centers) plays a dominant or exclusive role in plant breeding research for wheat, rice, and other self-pollinated crops in most countries. The major exceptions to this pattern are in Argentina, Chile, and several industrial countries, where the private sector has undertaken plant breeding geared toward hybridizing wheat or rice and creating crop varieties suitable for specific agro-ecological areas (James 1990; Pray 1991). These countries also recognize and enforce plant breeders' rights, thus protecting breeders against unauthorized use of their varieties by competing firms. In addition the public sector is also widely involved in basic research and germplasm collection, evaluation, and enhancement—the building blocks for commercial varietal and hybrid development. Even in the United States, where private investment in crop research is substantial, more than 50 percent of the wheat and soybean seed, 90 percent of the barley and dry bean seed, and 95 percent of the rice seed planted consist of publicly bred varieties (Knudson 1990).

In both industrial and developing countries, private research has been heavily concentrated on hybrids of major food, industrial, and horticultural crops. By far the greatest attention and resources have been devoted to maize hybrids.

In the United States, for example, more than 250 full-time plant breeders or geneticists were working on maize breeding within the private sector in 1989, compared with between 15 and 40 scientists working on alfalfa, wheat, cotton, sorghum, and sugar beets (James 1990). In India the bulk of expenditure for private plant breeding has gone toward developing hybrids for maize, sorghum, pearl millet, and sunflower (Pray and others 1989).

In many industrial and developing countries, private sector research on hybrid crops has depended on support from the public sector, particularly to supply germplasm and inbred lines, to train scientists, and sometimes to provide financial support or tax incentives. In India in the 1960s, for example, public sector breakthroughs in developing high-yielding varieties of wheat and rice and hybrids for maize, sorghum, pearl millet, and cotton created the demand as well as the products that led to the subsequent development of private seed companies. Private Indian companies continue to rely on public institutions for much of the genetic material and inbred lines for major food crops (Pray and others 1989). The Brazilian public research institute known as EMPRABA sells parent lines to private national companies, which then produce double hybrids for sale to farmers. This process has benefited small- to medium-size firms that have only limited resources for applied research work (Sorj and Wilkinson 1990). Even in the United States, some 72 percent of the maize hybrids in 1979 had at least one inbred line of public sector origin (Butler and Marion 1985).

Because high costs and technical demands are involved, most of the private firms active in plant breeding are large companies that are also active in seed production and sales. Private sector breeding in many developing countries is undertaken primarily by multinational corporations, joint venture companies, or large local firms with diverse agricultural and industrial interests. Except for China, each of the Asian and Latin American countries that has developed advanced seed systems for food or other crops has attracted considerable private foreign investment during the past decade. That investment has been stimulated by the potentially large commercial seed market in these countries and by policy changes pertaining to imports and exports of seed and germplasm, private sector access to publicly bred varieties, domestic seed marketing and pricing, and the repatriation of investor profits.

Seed Production and Processing

The skill requirements and technical and commercial risks associated with seed multiplication are considerably lower than those associated with varietal research. Hence the economic and technical barriers to entry by the private sector are lower. Although individual farmers may find it cost-effective to save their own seed for certain crops, private companies have ample opportunity to find profitable niches in the production of hybrids, specialty crop seed, and replacement seed for self-pollinated crops.

A common problem in seed multiplication is quality assurance. Care must be taken to maintain both genetic and physical purity. This can be done through a combination of internal measures, such as supervision and incentives for laborers and contract farmers, and external measures, such as field inspection of seeds and seed certification.

A breakdown in the quality of seed for self-pollinated crops can generate negative externalities, because the seed may be subsequently multiplied, used, and remultiplied. If seed for a staple food crop is involved, food security may be adversely affected. Such negative multiplier effects generally do not occur in hybrids and can be avoided in specialty crops, other than those from which clonal materials are used for planting, such as sugarcane.

Because harvested grain of self-pollinated crops is so close in character to that of commercial seed, farmers or competing firms can, with relative ease, reproduce the seeds without significant loss of quality. Exclusion is thus a serious problem, and the price that one can charge for a well-established variety can only be modestly above that of commercial grain.

Multiplication of hybrids and specialty crop seeds is far more costly and technically demanding, and the seeds produced by hybrid plants generally result in significant declines in productivity in subsequent plantings. Hence seeds will be replaced annually, which substantially lessens the scope for unauthorized or unlicensed seed multiplication. Profit margins can also be significantly higher than the profits on the seeds of self-pollinated crops.

Thus the private sector can have strong incentives to engage in seed multiplication, although the players differ across different types of crops. For self-pollinated crops, under suitable agro-ecological conditions, farmers themselves are likely to be major seed producers. The only other parties who might profit from this activity are small seed companies that carry low overheads, yet can produce high-quality replacement seed or the seed of new improved varieties. Where demand has been established, a potentially strong incentive exists for larger or more specialized private seed companies to organize the production of hybrids and specialty crop seeds.

Public sector involvement in seed multiplication is economically justified under several circumstances and in several capacities. Direct production of foundation seed for self-pollinated crops may be warranted either in the early stages of developing a country's seed system or when a new variety is being introduced and the amount of available breeder seed is limited. Equity reasons may justify public sector intervention in the multiplication of seeds for minor crops or for narrow agro-ecological areas for which demand is insufficient to attract private investment. This intervention need not be done directly on a public seed farm. The government can support production by private firms, cooperatives, or other nongovernmental agencies. The public sector, through the extension service, also plays a potentially important role in teaching farmers how to improve their techniques of seed selection.

Direct public sector production of hybrid and specialty crop seeds can be justified only in the early stages of developing a seed system or agroindustry, when the private sector is still very weak and demand not yet established. Once private production has taken off, the public sector should support and promote it, rather than compete with it.

Because seed drying, cleaning, chemical treatment, and packaging activities may either require or be more efficiently performed with mechanized equipment, the processing of new varieties of seeds frequently needs a larger capital investment than any other function in the seed system. Processing the seeds of vegetable, oilseed, and forage crops is technically demanding; seed for field crops is less problematic. Generally, seed processing can be a value-adding activity for private seed producers and traders or a profitable activity for private enterprises providing custom processing services. Public sector involvement in processing may be economically justified only where the technical skills and investment required to process a particular seed crop are not readily available in the private sector or where transport costs can be saved by integrating processing activities with existing public sector seed multiplication operations. In more advanced seed systems neither of these conditions would be applicable.

The literature review and the survey indicated that the private sector is far more extensively involved in seed production and processing than it is in varietal development. In the advanced seed systems of North America, Western Europe, and Japan, the private sector (comprising large companies, cooperatives, and small localized companies) dominates the production of foundation and commercial or certified seed and seed processing for the full range of crops. In the United States there are specialized foundation seed producers; in Japan cooperatives are given exclusive rights to multiply the breeder seed provided by public research institutions. For commercial seeds in these countries, medium- to large-scale companies have focused their production on the more profitable hybrids and specialty crops. A combination of cooperatives, small companies, and specialized seedsmen have undertaken multiplication of (publicly bred) self-pollinated varieties targeted to particular locations and agro-ecological zones. It should be noted, however, that some 75 percent of the seed of small grains (wheat, barley, oats) planted annually in the United States is farmer-saved.

The dominant pattern among the developing countries is use of farmer-saved seed, especially for staple food crops, as table 3 illustrates. Even in India and Thailand, where the national seed systems have advanced considerably, almost all of the seed planted for major food crops is farmer-saved or derived from local, informal sources. Farmers apparently purchase replacement seeds from commercial sources only once every eight years or so in India and once every three or four years in Thailand. Farmer-saved seed accounts for some 95 percent of seeds planted in Ethiopia, Nigeria, and many other countries of Sub-Saharan Africa. Farmer-saved seed is somewhat less common in Egypt, Mexico, and Zimbabwe, where hybrids are more widely used. Still, most of the seed

Table 3. *Proportion of Seed Used That Is Farmer-Saved (or Otherwise Supplied Informally)*
(percentage of planted seed)

Crop	*Egypt*	*Ethiopia*	*India*	*Mexico*	*Nigeria*	*Thailand*	*Zimbabwe*
Maize	73	88	91	76	93	70	2
Wheat	21	90	92	0	99	n.a.	42
Rice	41	n.a.	87	0	99	75	n.a.
Sorghum	n.a.	83	97	0	99	70	65
Bean, cowpea	99	99	97	73	99	75	99

n.a. Not applicable.
Source: Agrisystems (1990); Pray (1990); Friis-Hansen (1991); Seed Technology Laboratory (1991); *Cultivar* (1991); Venkatesan and Jaffee (1992); and private commercial seed sources.

used to produce Mexico's two leading crops—maize and beans—is farmer-saved.

Examining formal systems of seed production and processing in developing countries shows the typical institutional pattern to be a mixture of public and private sector activities. Only in Argentina and Chile are seed multiplication and processing entirely handled by the private sector. Public sector involvement is most widespread in the production and processing of seed for high-volume self-pollinated crops, such as rice, wheat, barley, and various legumes, and for cross-pollinated varieties of maize. Because such seed accounts for most of the formal seed production in most developing countries, public seed enterprises continue to account for a majority of total formal seed production among developing countries.

In the past, public seed enterprises or research institutes in many developing countries directly produced foundation seeds on their own farms. This pattern is now changing, with foundation seed production being increasingly contracted out to medium- to large-scale farmers. Contracted production is now also the norm for certified seed production for self- and cross-pollinated crops. Although public agencies continue to bear the market risk for such seed, supervise its production, and frequently provide financial or technical backing, the actual seed multiplication is done by farmers. In Nigeria and some other countries, production is contracted to a few large-scale farmers who are expected to develop their own small seed enterprises in the future. In India, Pakistan, and Sri Lanka, government agencies supervise the contracted seed production of several thousand small- to medium-scale growers. Only in a handful of countries (including Bangladesh, China, Egypt, Ethiopia, and Indonesia) do state farms continue to account for a large proportion of certified seed multiplication.

In several developing countries (including India and Mexico), public seed enterprises have also produced selected hybrid and specialty crop seeds, some-

times in competition with the private sector. Various factors have driven the public sector into such activities, including government concern about the development of "strategic" export or agroindustrial sectors, government interest in using income from the sale of hybrid and specialty seeds to cross-subsidize losses from the production of low-value seeds of self-pollinated varieties, and a perception that the private sector is developing too slowly to spread hybrids and improved varieties effectively. But where commercial markets for such seeds have developed and where public sector monopolies have not been imposed (or maintained), private sector or joint venture enterprises account for dominant shares of local production. For example, the private sector's share of commercial sales of hybrid and improved open-pollinated varieties of maize in 1985–86 was 94 percent in Latin America, 80 percent in Africa, 62 percent in noncommunist Asia, and 39 percent in the Middle East (CIMMYT 1987).

Private sector shares are probably even higher for vegetable seed, thanks in part to the establishment of export-oriented horticultural seed ventures by domestic or joint venture private companies. These ventures have involved either contract farming or the vertical integration of production and marketing. Such ventures have been successful in several developing countries, including Chile, India, Kenya, Thailand, and Turkey.

Seed Marketing, Distribution, and Quality Control

We now examine the economic characteristics of the seed marketing and distribution functions to discover whether public sector participation can be justified on economic grounds. In this line of activity, where quick responsiveness to farmer demand is an important criterion for success, the private sector has its greatest potential advantage over the public sector. Nevertheless, seed marketing functions have certain properties that may make private sector performance inadequate from society's viewpoint.

Economies of scale can be realized in seed distribution—for example, in market research and in seed storage and distribution networks—which can result in competitive disadvantages for small enterprises and the neglect of small markets or isolated areas. In extreme cases competition may be lacking in the sector as a whole. Although seed imports may alleviate some of these problems, importation raises other difficulties, as discussed below. Especially in remote areas, where farmers may face localized supply monopolies that charge above-market prices, governments and NGOs should support farmer-based seed multiplication and dissemination schemes.

Seed promotion is associated with information (moral hazard) problems and with possible externalities. Because some quality characteristics are unobservable, the seed promoter (and the seed distributor) may make false claims about quality that result in unnecessary costs or low productivity for farmers and perhaps reduce farmer confidence in the value of commercially supplied seed. Although competitive pressures will improve seed quality, the establishment and

enforcement of quality standards and rules regarding seed labeling and the development of systems for seed evaluation and certification can strengthen the development of the private market.

Promotion also may have positive spillover effects on seed companies, who benefit as farmers become more aware of the advantages of purchasing improved seed; local agroprocessors, who benefit if the improved seed results in larger supplies of raw materials; and distributors of other farm inputs, whose sales may increase as seed purchases rise. Such externalities can be at least partly internalized through promotion activities by seed associations and through the integration of seed supply with the marketing of other agricultural inputs or commodities.

Distribution of seed for self-pollinated varieties raises the problem of exclusion, because competing distributors and farmers can also multiply the seed. Hence a firm's marketing success in one season may not be repeated the next season. Private sector solutions to these problems include brand name promotion and the supply of additional inputs or services.

Seed imports raise the problems of uncertain quality and potential negative externalities if the bulk seed also contains pests, diseases, or weed seeds. Prudent—yet not unduly obstructive—rules for importing, testing, and temporary quarantine of seeds (by public or private institutions) can minimize these hazards.

In short the private sector can profitably perform most seed distribution functions. Direct distribution of seed by public sector agencies can be justified only in the early stages of seed system development, when private distribution channels are weak. As the private sector gets stronger, the public sector should supplement and support private activity, encourage competition, provide additional information and consumer protection, and protect against negative externalities. Potentially important support and regulatory roles might include supporting the distribution of seed of minor crops and seed distribution in remote areas, testing seed and disseminating test results, promoting new varieties, and enforcing quality standards and truth in advertising.

In advanced market economies the private sector plays a dominant role in seed marketing, and government intervention is confined to enforcing quality and truth-in-labeling standards. In the United States even seed certification is handled by nongovernmental associations at the state level. The forms of private marketing institutions vary among countries. Cooperatives play a central role in seed distribution in Japan and parts of Western Europe, but not in the United States. There, seed is distributed primarily through farmers (who serve as commissioned dealers for maize, soybean, and alfalfa seed), agricultural processors (for industrial crop seed), and supermarkets and garden centers (for vegetable and turf seed).

In most developing countries the public sector continues to play some role (sometimes even a dominant role) in seed marketing and distribution. Public corporations are particularly active in seed storage, wholesaling, and promo-

tion of self-pollinated staple food crops. In some countries (including China, Egypt, Ethiopia, Mexico, Nigeria, and Syrian Arab Republic), public institutions also supply this seed directly to farmers, either through credit agencies or special agricultural projects. The government usually subsidizes the cost of the seed, and in some cases credit is contingent upon the farmer purchasing seeds of high-yielding varieties ("no seed, no credit").

Nevertheless small private firms and cooperatives in most developing countries have been able to compete with public seed distribution. These small organizations have been aided by their willingness to earn low margins, their right to purchase both public and private seed varieties, their provision of additional services, and the uneven or low quality of the seed supplied to farmers by public agencies. Once farmers acquire the improved seed of self-pollinating varieties, it is commonly reproduced and distributed widely throughout rural communities through informal supply arrangements among farmers (Garay and others n.d.; Tetley and others 1988; Pray and others 1989; Crissman 1989). These informal seed supply channels are especially important in meeting the needs of farmers in remote regions and narrow agro-ecological zones, such as the mountainous areas of Nepal and Peru. NGOs have promoted localized seed multiplication and dissemination programs in remote areas, but with varied success (Cromwell, Wiggins, and Wentzel 1993).

The distribution of hybrid, horticultural, and other specialty seeds involves both public and private sector entities in most developing countries, although the private sector frequently dominates these markets. The seed (or other planting materials) for important industrial and export crops is often distributed by the major processing or commodity trading firms, whose ownership structure varies among countries. Continued public sector involvement in seed distribution has frequently been part of a strategy of cross-subsidizing losses from the distribution of self-pollinated seeds. Several public seed corporations in India, for example, have continued to produce types of seed in which the private sector has demonstrated a strong interest. Such public sector involvement in high-value seed markets reduces the pace of private sector development.

The competitive structure of private and semiprivate seed distribution systems in developing countries varies significantly. The markets for hybrid maize seed illustrate some of these variations. In Zimbabwe, for example, a seed cooperative, protected by the government, had until recently monopolized the production, processing, and wholesaling of hybrid maize seeds. In Kenya a joint venture company has held a virtual monopoly over the hybrid maize seed market, with protection against competing (foreign) firms justified on the basis of food security. Ethiopia and Malawi have also protected joint venture monopolies that controlled the market for hybrid maize seeds. In contrast a dozen or more foreign and local companies in India and Thailand compete in the hybrid maize seed market, utilizing hundreds of distribution outlets. This competition has stimulated private sector investment in new product development and improved distribution services.

Policy Environment for Private Sector Development

For many years the governments of developing countries did not support most private sector participation in seed production and trade and often erected barriers to private activity. During the past decade, though, several developing countries have implemented reforms that have increased private investment in the seed industry. Effective policy changes have included:

- Liberalizing restrictions on the entry and use of breeding lines and improved seed of foreign origin
- Removing restrictions on private access to breeding lines and improved seed from public research institutions
- Liberalizing varietal registration procedures and requirements
- Removing government subsidies for public sector seed activities
- Phasing out of direct public sector seed multiplication and distribution activities in favor of contract growers and private distributors
- Adopting investment codes that encourage foreign and joint venture investments
- Removing restrictions on the export of seeds.

Recent events in India illustrate the potential impact of policy reforms (Pray and Ribeiro 1990). Before the 1980s restrictions on landholdings, germplasm and technology imports, and foreign ownership, and limits on the size of domestic companies permitted to participate in the seed industry hampered private sector activities. Most private companies lacked the financial resources to undertake their own research and concentrated on multiplying and distributing public varieties and hybrid seeds for staple food crops and vegetables.

In the early 1980s private firms were permitted to obtain breeder seed directly from the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) and from Indian public research institutes. This change, and subsequent changes in industrial licensing policies, foreign investment rules, and seed import policies have contributed to a boom in private seed company activity. By 1990 the private sector accounted for 70 percent of the country's commercial seed sales. Private growth was especially notable in the markets for sorghum, pearl millet, cotton, and vegetable seed. Although foreign investment has increased substantially, the larger Indian seed companies have shown that they can compete with multinational firms. Many new companies have emerged as spin-offs from other companies. One firm alone, Maharashstra Hybrids, has given birth to at least eight additional private companies since the mid-1970s.

Conclusions

No ideal structure exists for a national seed system. The most efficient mix of public and private activities varies among countries, types of crops, and the

stage of development of the seed system. Both the public and private sectors have important roles, yet each is substantially limited in what it can do on its own. The critical challenge for policymakers is to devise policies and investments that lead the two sectors to complement one another in the performance of seed-related activities.

In designing new strategies for seed system development, policymakers must consider not only the needs of farmers, but also their capacity to produce, save, and disseminate seed. Farmers should not be viewed simply as the consumers of the output of commercial seed supply systems. Farmers can produce and store the seeds of major self-pollinated crops, test different varieties in their fields, exchange information with other farmers about new varieties and improved methods of seed production and storage, and trade seed with each other. Significant benefits can therefore be gained from measures to improve informal seed systems through training and technical assistance. In most countries, once a seed system is in place, formal seed or trading enterprises will have to supply only a small proportion (5 to 25 percent) of the seed required for self-pollinated crops. These enterprises will need to provide both the initial seed of new improved varieties and high-quality replacement seeds.

Just as farmers depend on formal seed systems for replacement seed and seed of new improved varieties, the success of profit-oriented seed enterprises depends on farmers' awareness of the benefits of improved seeds and of the cultural practices necessary to achieve these benefits. Programs to help farmers test, multiply, or store new seed can be an effective way to increase this awareness.

Experience shows that no single enterprise or type of enterprise—public or private—can cater to the diverse seed needs of different categories of farmers. Most public seed corporations have had their activities confined to a limited range of crops and have had their priorities determined more by political than by economic considerations. Commercial private companies have focused their attention on hybrid seeds or the seeds of specialty, high-value crops. Other actors, including cooperatives, NGOs, and small local companies, should be supported in their efforts to multiply, save, and distribute the seeds of self-pollinated food crops. Such institutions would benefit from policies and programs that improve access to imported or publicly bred germplasm and seed, eliminate subsidies for public sector seed distribution, and provide reliable, yet not overly restrictive, quality control systems.

Experience also suggests that the public sector should withdraw from the importation, production, processing, and marketing of seeds. Where not already in private hands, seed trading activities should be the first area where the participation of public institutions should be phased out. Certified seed production would be the next candidate for privatization, beginning with hybrid and specialty crop seeds, and followed by self- and open-pollinated crop seeds. Temporary arrangements, some falling short of the ideal of free and competitive markets, may be required. These might include the exclusive re-

lease of publicly developed seed varieties to particular private or cooperative firms and guaranteed government purchases of seed.

The privatization process might then shift to the production of foundation seed for self- and open-pollinated crops and move toward the withdrawal of the public sector from the market for hybrid seeds. This can be accomplished within the next few years in countries with relatively advanced seed systems; elsewhere the process will be slower. For some minor crops or for seeds suitable for narrow agro-ecological zones, the public sector may need to remain involved in producing and distributing seed for a longer period, although this involvement need not be direct and could entail sponsoring (subsidizing) other parties. The relatively high investment requirements could mean that privatization of processing facilities might take many years, although interim steps (custom seed-processing services, facility leasing, and management contracts) are possible.

Even as the public sector withdraws from seed production and distribution, it will retain its other roles: basic scientific research, support for or actual performance of plant breeding work for self-pollinated and minor crops, support for private research and development, training of seed technicians, variety testing and registration, plant material inspection and quarantine, germplasm and varietal maintenance, implementation and enforcement of seed standards, enforcement of fair business practices and truth in advertising, enforcement of phytosanitary regulations, support for seed associations, and support for farmer- or community-based seed programs.

Note

Steven Jaffee is a consultant working in the Agriculture and Environment Division of the Southern African Department, and Jitendra Srivastava is with the Agriculture and Natural Resources Department, of the World Bank. This article is based in part on Jaffee and Srivastava (1992).

References

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

Agrisystems (Overseas) Ltd. 1990. "Ethiopia Seed Corporation Seed Marketing Study." Final Report. Processed

Butler, L. J., and B. W. Marion. 1985. *The Impact of Patent Protection on the U.S. Seed Industry and Public Plant Breeding*. North Central Regional Research Publication 304. Madison: University of Wisconsin Press.

CIMMYT (Centro Internacional de Mejoramiento de Maiz y Trigo). 1987. *1986 CIMMYT World Maize Facts and Trends: The Economics of Commercial Maize Seed Production in Developing Countries*. Mexico City.

Crissman, Charles C. 1989. *Seed Potato Systems in the Philippines: A Case Study*. Lima: International Potato Center.

Cromwell, Elizabeth. 1990. *Seed Diffusion Mechanisms in Small Farmer Communities: Lessons from Asia, Africa, and Latin America.* ODI Agricultural Administration Network Paper 21. London: Overseas Development Institute.

Cromwell, Elizabeth, Esbern Friis-Hansen, and Michael Turner. 1992. *The Seed Sector in Developing Countries: A Framework for Performance Analysis.* ODI Working Paper 65. London: Overseas Development Institute.

Cromwell, Elizabeth, Steve Wiggins, and Sondra Wentzel. 1993. *Sowing beyond the State:* NGOs *and Seed Supply in Developing Countries.* London: Overseas Development Institute.

Cultivar. 1991. *Seed Business.* Lille, France: Groupe Liaisons Agriculture.

Dalrymple, Dana G. 1986a. *Development and Spread of High-Yielding Wheat Varieties in Developing Countries.* Washington, D.C.: U.S. Agency for International Development.

———. 1986b. *Development and Spread of High-Yielding Rice Varieties in Developing Countries.* Washington, D.C.: U.S. Agency for International Development.

Delouche, James. 1982. "Seed Quality Guidelines for the Small Farmer." Paper prepared for Centro Internacional de Agricultura Tropical Seed Unit Workshop, Cali, Colombia.

Friis-Hansen, Esbern. 1991. "The Zimbabwe Seed Industry." World Bank, Southern African Department. Washington, D.C. Processed.

FAO (Food and Agriculture Organization of the United Nations). 1987. FAO *Seed Review 1984–85.* Rome.

Garay, A. E., P. Pattie, Jorge Landivar, and J. Rosales. n.d. "Setting a Seed Industry in Motion: A Nonconventional Successful Approach in a Developing Country." Working Document 57. Centro Internacional de Agricultura Tropical, Cali, Colombia. Processed.

Groosman, A. J. A., Anita Linnemann, and Holke Wierena. 1988. *Technology Development and Changing Seed Supply Systems.* Tilburg: Instituut Voor Ontwikkellingsvraagstukken.

Jaffee, Steven, and Jitendra Srivastava. 1992. *Seed System Development: The Appropriate Roles of the Private and Public Sectors.* World Bank Discussion Paper 167, Washington, D.C.

James, N. 1990. "A Survey of Public Plant Breeding Programs in the United States, 1989." *Diversity* 6(2):32–33.

Kloppenberg, Jack. 1988. *First the Seed.* New York: Cambridge University Press.

Knudson, Mary K. 1990. "The Role of the Public Sector in Applied Breeding R&D: The Case of Wheat in the USA." *Food Policy* 15(June):209–17.

Lipton, Michael, and Richard Longhurst. 1988. *Modern Varieties, International Agricultural Research, and the Poor.* CGIAR Study Paper 2. Washington, D.C.: World Bank.

McMullen, Neil. 1987. *Seeds and World Agricultural Progress.* Washington, D.C.: National Planning Association.

Pray, Carl E. 1990. "The Potential Impact of Liberalizing India's Seed Laws." *Food Policy* 15 (June):193–98.

———. 1991. "Private Sector Rice Research: Implications for Public Sector Priority Setting." Paper presented at the Workshop on Rice Research Prioritization. International Rice Research Institute (IRRI), Los Banos, Philippines. Processed.

Pray, Carl E., and Bharat Ramaswami. 1991. *A Framework for Seed Policy Analysis in Developing Countries.* Washington, D.C.: International Food Policy Research Institute.

Pray, Carl E., and Sharmila Ribeiro. 1990. *Government Seed Policy, the Development of the Private Seed Industry and the Impact of Private R&D in India.* New Delhi: Agency for International Development.

Pray, Carl E., Sharmila Ribeiro, Rolf Mueller, and Parthasarathy Rao. 1989. "Private Research and Public Benefit: The Private Seed Industry for Sorghum and Pearl Millet in India." Economics Group Progress Report 89. Hyderabad, India: ICRISAT. Processed

Scheidegger, Urs, G. Prain, Fernando N. Ezeta, and C. Vittorelli. 1989. "Linking Formal R&D to Indigenous Systems: A User-Oriented Potato Seed Programme for Peru." Agricultural

Administration (Research and Extension) Network Paper 10. Overseas Development Institute, London. Processed.

Seed Technology Laboratory. 1991. "Egyptian Seed Sector: Description and Analysis." Mississippi State University. Processed.

Sorj, Bernardo, and John Wilkinson. 1990. *Biotechnology and Developing Country Agriculture: Maize in Brazil.* OECD Developing Country Technical Paper 17. Paris.

Tetley, Khaleel, Paul W. Heisey, Zulfigar Ahmed, and Munir Ahmad. 1988. "Farmers' Seed Sources and Seed Management." In Paul Heisey, ed., *Transferring the Gains from Wheat Breeding Research and Preventing Rust Losses in Pakistan.* Mexico City: CIMMYT.

Timothy, David, Paul Harvey, and Christopher Doswell. 1988. *Development and Spread of Improved Maize Varieties and Hybrids in Developing Countries.* Washington, D.C.: U.S. Agency for International Development.

Venkatesan, V., and Steven Jaffee. 1992. "Nigeria: National Seed and Quarantine Project." World Bank, West Africa Department, Washington, D.C. Processed.

POINT-COUNTERPOINT

An occasional series of articles and comment, presenting differing views.

THE IMPACT OF EC-92 ON TRADE IN DEVELOPING COUNTRIES

A. J. Hughes Hallett

How is the attempt of the European Community (EC) to create a single market going to affect the developing countries? This article argues that the net direct effects of EC-92 may be rather small: the trade creation and trade diversion effects brought about by the program may cancel each other out, with few repercussions for the developing countries as a group. The expected changes in trade flows arising from relatively small changes in nominal prices and aggregate incomes, the changes in market structure, the removal of internal barriers, and a predicted 5 percent increase in EC output may be important to European policymakers, but they are rather remote from the developing countries.

The threat of EC-92 to the developing countries lies elsewhere: from diversion of investment from those countries to the EC and from the resurrection of protectionism by the EC, especially in the form of nontariff barriers, toward the outside world.

> "We are not building a single Market in order to turn it over to hungry foreigners." (Willy de Clerq, while Commissioner for Foreign Relations in the EC, quoted in Hamilton 1991.)

The principal goal of the EC-92 program is free trade among the member countries of the European Community. For the developing countries, the question is whether the reforms will have a correspondingly liberalizing effect on trade between the EC and the rest of the world—or whether they will more likely become bastions of a newly protectionist "Fortress Europe." The rhetoric of European policymakers (of which de Clerq's remark quoted above gives a flavor) is not reassuring. Far from bringing the promise of reform, trading arrangements such as the EC's 1992 program have lowered expectations of what the current talks to revise and extend the General Agreement on Tariffs and Trade (GATT) might achieve. And the recent breakdown of the GATT talks has reinforced fears that the liberal multilateral trading system, built up since World War II, was degenerating into a system of regional

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 121–46

trading blocs practicing a new form of protectionism characterized by multilateral, rather than unilateral, restrictions and by nontariff barriers, such as technical and environmental standards. These new trading arrangements may have profound implications for the developing countries.

The prospect of East Asian and North American trading blocs with an interest in undermining the GATT's free trade objectives seems unlikely (see Schott 1991).[1] The prospective East Asian bloc is too dispersed and diverse in income levels and market structures; its external trade outweighs its internal trade by two to one and remains very dependent on access to U.S. markets. The proposed North American bloc is more cohesive economically, but its external trade is one and a half times the internal trade, and each member needs to cure a persistent current-account deficit; the bloc consequently needs to expand its exports to the rest of the world. Both blocs thus have an incentive to support the GATT trading rights and discipline.

The EC, by contrast, is relatively cohesive as a trading bloc (table 1), and the logic of its EC-92 program suggests that greater barriers will be needed against the rest of the world to ensure success on the scale foreseen. It therefore makes sense to look at the EC single market initiative as the source of change and a possible threat to production and trade in the developing countries. For

Table 1. *Export Markets of the Emerging Trading Blocs*
(billions of U.S. dollars)

	1980		*1986*		*1989*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
EC						
Intraregional	309	48	451	49	678	52
North America	47	6	85	9	101	8
East Asia	26	3	36	4	66	5
Rest of the world	322	42	245	38	456	35
North American bloc						
Intraregional	100	24	129	29	205	28
EC	68	16	59	13	100	14
East Asia	52	12	59	13	116	15
Rest of the world	205	48	195	44	304	42
East Asian bloc						
Intraregional	90	24	116	19	224	23
EC	42	11	59	9	100	11
North America	68	17	153	24	207	22
Rest of the world	187	48	298	48	418	44

Note: EC member countries are Belgium, Denmark, France, Germany, Great Britain, Greece, the Republic of Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. The North American bloc consists of Canada, Mexico, and the United States. The East Asian bloc includes Australia, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan (China), and Thailand.

Source: Schott (1991).

those countries, the question is twofold: will the reforms in and of themselves have sizable repercussions, either for better or worse; and will Europe's commercial policies prove protectionist, and hence damaging, in effect rather than in word?

General Implications of the Proposed Reforms

Completing the internal market in Europe entails removing all the barriers to trade between member countries of the EC. That nearly 300 separate directives are needed to secure the free movement of goods, services, and factors of production indicates how fragmented the existing market is. Indeed, differing national controls and restraints (especially on capital, labor, and services) and differing health and safety standards were making that market even more fragmented. Many of the changes are directed at improving market access for EC participants; some are intended to make markets function more flexibly (to improve competitiveness, set standards, or establish pollution controls); and some are to promote competition or to exploit comparative advantage or economies of scale.

The Development of Prices and Incomes

Analysts broadly agree that EC-92 will bring benefits to EC countries; they agree less about the size of the benefits and how they will be distributed across the EC. There is even less agreement—indeed, there is very little analysis—on how strong the effects will be on economies outside the EC, or even whether the net effects will be positive or negative.

In general terms, the EC countries can expect higher income levels and lower prices as internal barriers to trade come down. Increased competition, greater efficiency through economies of scale and the wider scope for investing according to comparative advantage, the removal of internal customs duties and other transactions costs, the removal of price discrimination, competitive tendering for government contracts, free circulation of goods from the cheapest supplier, and a lower cost of capital through more efficient (integrated) financial markets—all these will reduce prices within the EC. Falling prices will in turn expand EC markets and consequently raise income levels in real as well as nominal terms. This should have a continuing effect through increased investment, both internally and from outside the EC, if foreign investors are tempted to establish a base within the union.

Some effects may, however, offset these nominal price falls and income gains. If health and safety standards or pollution controls are tightened to match the most stringent within the EC, then industry's costs must rise. Similarly, if external barriers (tariffs, quotas, or voluntary restraints) increase while the internal barriers are being dismantled, then cheaper external suppliers will

be shut out and prices will rise. Firms might also collude to overcome competitive pressures, a practice that the EC Commission might condone to gain support for its program. Indeed this has already happened in activities such as air transport, car production, electronics, banking, and food production. Aggressive reciprocity or discriminatory standards could exclude non-EC imports. But these counter-effects are generally expected to be insignificant.

The key questions are then: how much will prices fall and incomes rise, and what are the repercussions for the non-EC economies? The empirical evidence on the first question is slight and conflicting, except that the gains in EC variables are likely to be fairly small. Optimistic estimates from the Cecchini report (Cecchini 1988; European Economic Community 1988a, 1988b) suggest 1 percent added to gross national product (GNP) for each of five years and a 0.5 percent improvement in the EC's terms of trade. The spillovers onto countries outside the EC could be quite large, however, if they are smaller economies dependent on EC trade—such as the ex-colonial countries of the Lomé Convention[2] or the countries of East Europe.

Trade Creation and Trade Diversion

The two factors that will determine the spillover effects are the proportion of EC trade conducted with third countries (currently just over 40 percent, ranging from 52 percent for the United Kingdom and Denmark to 25 percent for the Netherlands) and the share of exports in the third country's gross domestic product (GDP). The relevant parameters will therefore be the price and income elasticities of third country exports, since these determine the amount of trade diversion (exports lost as EC prices fall with increasing competitiveness), and the amount of trade creation (exports gained as EC incomes rise with market expansion and efficiency). The balance between these two effects will largely determine whether the trade spillovers are positive or negative overall. A terms-of-trade effect may also occur as the prices of EC exports fall and EC penetration into foreign markets rises. In that case, price elasticities of imports in non-EC countries may also play a role. Indeed, there may be offsetting price and income effects in the third country as the domestic price index falls with import prices and export industries expand toward greater economies of scale, so that incomes may start to rise there too. But these would be second-order effects. Finally, the spillover effects may be complicated if EC-92 reduces market access, tightens local content requirements, or raises other trade barriers for non-EC producers.

Investment Diversion

That is not the end of the spillover story, however, because investment expenditures are likely to rise in the EC. The repercussions elsewhere will depend

on the extent of investment creation versus investment diversion. If the net effects on trade are positive—that is, if more trade is created than diverted—then some new investment will be induced in third countries to supply that trade. But if the net trade effects are negative, or if local investment funds originate in either the EC or other industrial countries that wish to invest in the post-1992 EC, then investment will be diverted from third countries. Whether there is much investment diversion depends on the elasticity of savings in the industrial countries. If they are highly elastic, savings will rise while interest rates remain constant—leading to investment creation as the rate of return on the marginal investment project is not increased. But if they are inelastic, total investment will remain constant, and the rate of interest will rise as investment in third countries is displaced to make room for projects in the EC with higher rates of return. In fact private consumption and savings, largely financed from current income according to a life-cycle pattern, are unlikely to be affected by changes in financial conditions. So, unless EC-92 increases taxes and hence public savings, we must conclude that savings will not respond to the changing investment opportunities in Europe and that the developing countries are likely to suffer some investment diversion and loss in technology transfers.

It is possible, however, that some investment in labor-intensive activities, or in cheaper but environmentally unhealthy technologies, will be diverted to the developing countries as economies of scale and tighter regulation take hold in the EC. Moreover, investment diversion has dynamic implications because, once low labor costs are weakened as an incentive to investment, productivity and technical capacity in developing countries will fall further behind—reducing their competitiveness and their ability to attract new investment. Falling investment means falling expenditures and a lower supply capacity later on. These effects may be more important for Latin America and Southeast and East Asia, both because they have been the principal recipients of foreign investment and because they have manufacturing industries that are large and sophisticated enough to compete with EC firms for investment funds.

The Influence of Commercial Policy

Two distinctions are important here: first, between the consequences of removing barriers that operate on prices or costs versus the consequences of removing barriers that operate on quantities; and, second, between the case where the internal trade barriers only are reduced and where they are reduced for the EC's external trade as well.

Examples of barriers that operate on prices are import duties; price discrimination, market segmentation, local cartels, or discrimination in government contracts; transactions costs; extra testing formalities; and barriers to economies of scale or comparative advantage in production. Capital market imperfections, currency transactions costs, risk premia, or inadequate financial market access would have the same effect on investment.

Examples of quantity barriers are import quotas, voluntary trade restrictions, purchasing agreements, local content requirements or other restrictions that prevent economies of scale from being realized, and environmental controls. And barriers to investment include capital controls or ownership "cartels" that block a free market in corporate control. In fact, most of the EC-92 measures, whether they operate on prices or quantities, are designed to improve market access and the competitiveness of EC firms—through increased mobility of labor and capital, the free internal circulation of goods, and larger expenditures on research and development.

These measures will have different effects on EC and non-EC firms, so they must potentially cause trade to be diverted rather than created. Meanwhile, a reduction in external barriers (such as quotas, voluntary restraints, common external tariffs, and standards) would result only in trade creation. But it is not clear that these external barriers will actually be reduced. Standards may be harmonized at the highest level, quotas and tariffs may be maintained to allow the internal changes a smoother passage, and price supports (above world prices) on such fundamentals as agricultural products, coal, and steel, which already operate on an EC-wide basis, are unlikely to change much. So it is not clear how much trade will be created.

THE EFFECTS IN PERFECTLY COMPETITIVE MARKETS. The traditional analysis of trade creation versus trade diversion assumes perfect competition and segmented markets (that is, no spillovers between markets). Together, those assumptions imply that prices equal marginal costs and that no other markets gain from spillovers after the internal barriers are removed. The increase in competitiveness would then equal the sum of the barriers removed—for the EC, that is said to total about 1 to 2 percent of the value of the EC's internal trade (Winters 1991).

Certain markets offer greater scope than that because they are not competitive or because prices are fixed by intervention: for example, agriculture, coal, steel, textiles, and certain high-tech manufacturing. Although there is obvious scope for reorienting and increasing trade in these markets, it is reasonable to assume that the EC's intervention schemes will not be dismantled. Certainly, that has been the impression left by the Uruguay Round of the GATT negotiations. That would certainly moderate the scope for greater gains. At the same time, the existence of spillovers between markets would change the results since the effect of lower prices in one market is to produce cheaper inputs in others. However, where there are capacity constraints, the consequent rise in demand (in either factor or product markets) may produce price rises that offset the cost reductions. So, once again, we should probably not expect too much in overall gains.

THE EFFECTS OF INVESTMENT DIVERSION. There is already evidence that investment flows have been influenced both by accelerator effects based on growth

expectations and by a lower cost of capital. Stronger influences are probably the desire to invest where comparative advantage or scale economies are (as yet) unexploited or to establish plants that can satisfy local content restrictions.

How large is the investment diversion likely to be? Imagine two firms before EC-92, each with its own national tariff. After EC-92, the more efficient of the two will capture the market, and the other will vanish. The more efficient firm will either match world prices or need an EC-wide tariff; had it been capable of matching world prices before, it would have done so and would have expanded to its optimal size by exporting what could not be sold domestically (Corden 1972). Hence, there are limits to the EC-92 gains: investment designed to capture economies of scale or comparative advantage can reduce costs only to the extent of the pre-1992 barriers. Had the potential been greater, it would have been exploited earlier. The EC's import competing firms are therefore unlikely suddenly to become exporting firms. That limits trade diversion to eliminating the EC's existing imports—and probably rather less than that. If the loss in intra-EC trade from internal barriers is 1 to 2 percent of the gross value of that trade, the extent to which new investment can divert trade in those markets is still only 1 to 2 percent. That may not seem a great deal; but for a developing country or East European economy dependent on a few export markets, it may represent a substantial loss in exactly those sectors that are crucial for development and growth. And to that we must add the possibility of changes in aggregate supply: greater efficiency brings EC firms closer to the optimal production size (Muller and Owen 1985). Average industry costs will then fall, expanding the size of the market—but putting yet further pressure on the external producers.

THE EFFECTS IN IMPERFECTLY COMPETITIVE MARKETS. The possibilities for reorienting trade in imperfectly competitive markets are much larger. Here, the less efficient firms in one EC market may find that their domestic market share shrinks as lower-cost producers elsewhere in the EC move in. Such firms would get smaller or vanish. Conversely, the opening of other EC markets might allow these firms to expand toward greater economies of scale in a way that was previously blocked by the fragmented nature of the market and the pre-1992 trade barriers. In that case EC-92 would enable them to survive in the EC and to capture more of the third countries' markets through their increased competitiveness in relation to the rest of the world (Smith and Venables 1988). Thus, in imperfectly competitive markets, the developing countries may have something significant to worry about: EC firms may not only displace third country producers from EC markets but also start exporting into the corresponding third country markets. For them, the costs of EC-92 would be trade diversion beyond the 1 to 2 percent postulated for perfectly competitive markets and may even include trade reversals (Norman 1989).

In fact EC-92 may not have any strong pro-competitive effects. For one thing, the existence of fixed costs means that, as prices fall with lower barriers

and increased competition, the number of firms will start to fall. But there is no reason to expect the number of non-EC suppliers to increase. Consequently, a smaller number of EC suppliers will tend to reinforce imperfect competition, reviving profit margins while reducing costs through greater economies of scale. Indeed, models of oligopoly relate markups positively to market share. Thus, if EC producers gain a larger share of their home (and, hence, world) markets, EC export prices may rise—which, if import prices are falling, would leave the non-EC economies with worsening terms of trade.

Another factor is that EC-92 can lead to less market segmentation in the EC, so the procompetitive spillovers from one market to another will be larger than before. That will multiply the instances of falling prices and costs in the EC and, hence, of trade diversion. However, these outcomes assume an elastic supply of the factors of production in the EC. If firms run into supply constraints, such as insufficient mobility of labor, costs will start to rise faster, offsetting some of the pressure for trade diversion.

EC Trade Policy: The GATT as a Cooperative Game

The impact of EC-92 on non-EC economies will obviously be affected by changes in EC trade policy, although what those changes will be is an open question. For example, will a system of EC-wide quotas replace national import quotas? If it does and the level of the lowest quota is chosen, trade with non-EC partners will be encouraged; if the level of the highest is chosen, trade will be suppressed. But, even with an unchanged average level of quotas, the volume of trade with non-EC countries will change because, without Article 115 of the Treaty of Rome (which limits the movement of restricted goods among member countries), trade will automatically be redirected. If the more restricted markets are in the larger economies, then trade will expand. But if they are in the smaller economies, it will contract. Nor can the use of antidumping policies, discriminatory standards, and voluntary restraints or the aggressive use of reciprocity and tighter rules of origin be ruled out. All such policy responses would worsen the position of the developing economies.

So what trade policy should we expect after 1992—Fortress Europe or a more open EC? No clear pronouncements have been made; the stalled GATT negotiations provide no pointers, and the European Commission has no manifesto or established ideology to guide us.

The only indicators of what might happen are the interests of the EC's constituency and the EC's track record. That takes us into the realm of political economy and, as Wolf (1987) points out, makes greater protectionism look more likely. Wolf argues that the GATT's fragility, each country's veto on sanctions, and the lack of self-enforcing controls have allowed regional integration (and the EC's policy in particular) to weaken the whole arrangement. That has happened because of the EC's increasing use of trade policy as an instrument for satisfying special interests.

Recent research has focused on the role of special interest groups in strengthening any tendency to protectionism. Grossman and Helpman (1993), for example, show that the interaction between the granting of political support and economic performance will lead governments to develop higher import tariffs or export subsidies than they would have done in the absence of political interaction from special interest groups. Explicit cooperation between those governments weakens that result, however. Thus the EC, as a coalition with its own pressure groups within the GATT, would be increasingly protectionist—even if less protectionist than its members might have been if left to themselves. Certainly the EC's performance over agricultural policy in the Uruguay Round is consistent with that conclusion. De Melo and others (1992) have the same result with a different slant. Forming a coalition dilutes the impact of special interest groups and therefore the latent protectionism, but only if there is symmetry of preferences. With sufficient asymmetry the dilution effect will be more than offset, and the larger the number of countries in the coalition the more likely is that to happen. Once again one would expect the EC as a coalition in the GATT to be more protectionist, unless the degree of convergence in preferences in the EC were significantly larger than that within the GATT as a whole.

Wolf argues that the postwar trading system has been a cooperative regime in which there is no advantage in unilateral liberalization—but there are advantages (for all) in multilateral liberalization so long as all "play the game." The threat of discrimination against those who broke ranks, in particular denial of access to the large U.S. market, sustained this process of liberalization for many years. But, as in all cooperative regimes, there is often little sanction against individuals who revert to their best noncooperative policies—and quite possibly none at all against those who form a coalition against the rest. First, participants may judge retaliation to be uncertain, unreliable, and costly for the injured party. Second, countries may be reluctant to incur the costs of retaliating against dissidents whose unilateral actions do not affect them much. Similarly, those who would be affected will be reluctant to afford trade benefits to those who, by putting private interests ahead of the gains from cooperation, fail to play the game. It is preferable to try to lock one's immediate trading partners into a policy of liberalization and market access by creating a mini-GATT, which has the credible threat of expulsion and loss of market access, and ignore the rest, than to attempt a looser or less effective arrangement to encompass the more remote trading partners. That in itself would start to produce coalition groupings, and, once two or more larger "players" are operating, the pressure for freer trade would fade, because the competitive offering of access to the coalitions' markets would secure much of the cooperative gains for the coalition members, while reciprocal discriminatory trade policies would ensure that free trade in a wider sense is always denied to some group(s). Indeed, it might be possible to form a coalition that was able to secure greater benefits for its members than would have been enjoyed under full cooperation.

The cost would be worse outcomes for those outside—who might then form a coalition in self-defense.

From this perspective, the EC is just such a coalition, with North America and East Asia as its rivals. On that basis, one should expect the EC to follow protectionist policies with respect to nonmembers. The EC has been reluctant to extend most-favored-nation status to competitors in certain fields (for instance, to East European or East Asian economies); it has kept its preference areas (such as the Lomé Convention countries and the general system of preferences); and it has used commercial policy to further its special interests and the process of economic integration. Once again, one would have to conclude that the EC is likely to become more, rather than less, protectionist. But exactly what form that protectionism might take is difficult to predict because each measure has different effects on the EC members, damaging some as it helps others.

As a result, EC trade restrictions are not systematic but reflect a patchwork of improvised deals. This may explain, in part, why the GATT negotiations have stalled in the face of an apparently intransigent EC position, even though recent developments may signal some softening. It may also explain why the EC is able to maintain a position ostensibly consistent with the GATT while imposing restrictions that in practice are more protectionist. The standard instruments (outside agriculture) are tariffs (the GATT's main concern), quotas, voluntary export restraints, and nontariff barriers covering health, technical standards, or environmental protection. The EC now uses tariffs very infrequently, having removed most of them since World War II. It has also been reluctant to impose nontariff barriers except in specific industries where it can differentiate the product in a technical sense (Greenaway 1992; Wolf 1987). General restrictions of this type damage most member states while helping only specific states or industries. It is far easier to use quotas and antidumping or export restraints that can be targeted rather precisely and are otherwise invisible. Perhaps more important, the effects of nontariff barriers on taxation, redistribution (or subsidies), and rent transfers are largely invisible both inside and outside the EC.[3]

Reducing the general barriers, while maintaining and possibly increasing particular nontariff barriers, therefore allows the EC to retain policies which are consistent with the rhetoric of the GATT, while achieving rather different effects in practice. Not that such a strategy is in any way unfair, but it does make it extremely difficult to tell whether the EC's policies are actually consistent with the GATT or not.

What the Developing Countries Might Fear

Which of the preceding arguments matter for the developing countries? Until recently their concern about EC-92 was muted, and it is easy to see why. The overall effects of EC-92 on Europe seem likely to be limited and the consequences for developing economies correspondingly small. And because devel-

oping countries are usually seen as suppliers of inputs, rather than of competing products, any gains in the EC should spill over onto them.

Several areas, however, have emerged where the developing countries could encounter significant difficulties. First, nearly all the analysis on the subject (and the EC Commission's own evaluation [Cecchini 1988] in particular, has focused on trade in goods, whereas one of the main effects is likely to be investment diversion. Economic development in the developing countries is particularly sensitive to foreign capital and investment.

Second, what is small to the EC may be very important to the developing countries. Here, the EC's rhetoric is important. In sixteen volumes of studies of the EC-92 program, the EC Commission made scarcely any references to the rest of the world. And then there are the statements such as de Clerq's about restricting outsiders' access to any benefits. The developing countries are also painfully aware that for every ECU (European currency unit) spent on aid, roughly two ECUs are spent on restrictions to keep their exports out.[4]

Third, developing countries are not exclusively commodity producers; trade has switched substantially to manufactures, especially in Latin America and the newly industrialized economies (NIEs) or near-NIEs of Asia. Their manufactures are competitive with EC products and therefore subject to trade diversion, which might well outweigh any trade creation.

Fourth, the developing countries have already seen how increasing protectionism can damage their prospects, not only in agriculture and food products, where liberalization is no nearer, but also in textiles, steel, and light manufacturing. The EC's stubbornness in the Uruguay Round, and the fact that East Europe was able to secure concessions on debt, which were denied to the developing countries, also suggest that the developing countries should not expect greater market access to help offset any trade diversion that may occur.

Evidently the consequences of EC-92 will be specific to countries or groups of countries. We need to distinguish manufacturing economies from commodity producers and distinguish countries by such characteristics as their dependence on foreign capital, trade in services, or receipts from migrant labor.

Trade in Manufactured Goods

The removal of national barriers will create and divert trade only if no new EC barriers are introduced to replace them. But new restraints are likely (Silbertson 1989), partly to satisfy the special interests that pressed for the original restraints and partly because the EC sees no reason why foreign producers should benefit as much as EC producers. The barriers that, if retained, would be important to developing countries' producers are those on textiles—the Multifibre Arrangement (MFA)—clothing, footwear, light manufactures, consumer electronics, cars, and agricultural commodities. Indeed external barriers already exist for cars. Pressure from French and Italian car firms has led to an EC-wide restraint on Japanese cars that could easily be extended to Korean or

Malaysian cars. The significance of this should not be underestimated; cars represent a symbolically and economically important sector, and the Commission might find it convenient to allow such restrictions in other sectors because that gives the Commission greater control over trade policy.

The argument that such arrangements would be transitional is not compelling. That argument was used to introduce the Short-Term Arrangement on Cotton Textiles in 1961 and subsequently extend it into the MFA. Thirty years later these restraints still exist. The source quotas here are maintained by Article 115, but that could easily be replaced by an EC-wide restraint. And there is pressure for some kind of transitional arrangement for clothing, especially from the southern European producers who have gained significantly from trade diversion. Although just one or two developing countries would be affected by trade restraints on cars, a wide range of developing countries would be losers if restraints continued on textiles and clothing.

Trade in Services

Services is a large sector (about 50 percent of GDP in the developing countries and more than that in the EC), so EC-92 could have a strong impact in that sector. But most of the output is not tradable, so few of the changes would spill over to the developing countries. The three components that will become more widely tradable after EC-92 are financial services, government procurement, and transport. Messerlin (1990) provides a useful summary of the EC's policies regarding services.

The market for financial services has been very fragmented in Europe, and its integration would be a major source of the gains from EC-92. The opportunities for developing countries to profit from expansion in this sector may be very limited, however, because they are not big suppliers of financial services and the EC Commission has clearly indicated that it will enforce aggressive reciprocity rules for market access.

Government procurement contracts are also potentially lucrative to outsiders. The Cecchini report estimates the gains from greater competition in this area to be worth 0.5 percent of European GDP (EEC 1988a), and there is no doubt that the internal barriers will come down. But it is not clear that any outsiders will benefit. Some sectors (such as water, transport, and energy) where developing countries could have contributed will be reserved for nationals. Local content rules may also be applied, with non-EC suppliers having to demonstrate that 50 percent (or more) of a contract's value is locally supplied in order to qualify for government business. That may remove the incentive for producers in developing countries and may also divert investment from them to local EC plants. Finally, EC governments may, as in financial services, demand reciprocity for their firms before opening up access to their contracts.

Removing restrictions on transport also offers the prospect of considerable gains for the EC, but the interests of outsiders will once more raise issues of rec-

iprocity and equal access, particularly in relation to airlines. The EC, which will take over the negotiation of routes on a bilateral basis, may not want to relax the price support given to the national carriers or to open up the already fairly extensive transport rights within the EC area without concessions elsewhere. Tourism, however, offers the developing countries much better prospects. For many countries tourism is an important foreign exchange source and has a high income elasticity. Growth in the EC should produce strong growth in tourist receipts.

Standards

Firms outside the EC fear the setting of standards as something over which they have no control. Standards could be manipulated against the interests of non-EC firms. Greenaway (1992) cites the case of high-definition television, where no standards have yet been adopted. The EC might set standards somewhat different from those of the rest of the world to suit its own producers and place other producers at a disadvantage. Testing—particularly important for agricultural food and health products—could also be complicated, which raises transactions costs for outsiders.

Factors of Production

Removing barriers to the mobility of labor and capital (harmonizing qualifications or social security arrangements and removing capital controls, for example) is an essential part of EC-92. This issue has two implications for developing countries. The first is that increasing capital mobility makes it easier to divert investment away from outsiders. Second, the EC has traditionally absorbed large numbers of unskilled workers from North and West Africa, Turkey, and the Indian subcontinent: there have been few internal barriers for the past decade, so new internal migration on any scale seems unlikely. But with the advent of a single market (and then a single currency) accentuating regional inequalities in unemployment, the pressure for internal migration will inevitably grow. As that happens, EC citizens will presumably get priority over non-EC migrants. The EC's immigration rules will also have to be harmonized. That harmonization may well be downward to meet the demands of the most restrictive members. Arguably this is already happening, with East European labor likely to displace labor from developing countries. Thus, the developing countries stand to suffer losses of remittances from their migrant workers, which in many cases are a vital source of foreign exchange and, in a smaller way, of capital.

Aid

Three issues are important here: the general system of preferences, the Lomé Convention, and aid disbursements. The system of trading preferences is

already severely constrained by quotas and the general reduction of tariffs. The EC-92 program is not intended to change that. The Lomé Convention is also intended to continue as it is.

EC-92 may affect direct aid disbursements for the poorer developing countries in two ways. First, aid may be tied to the EC as a whole rather than to a specific country. Donor countries tie aid in order to internalize some of the benefits, so they are unlikely to give up the practice. But the main gain here would be the ability of developing countries to choose the cheapest supplier within the EC, raising the real value of that aid. The completion of the internal market, however, will accentuate the structural adjustment needs of the poorer, declining, and peripheral regions of the EC. Regional inequalities within the EC are already much larger than within any of its constituent countries, and they are widening. The single market is likely to accelerate that process. At the same time, pressure to reduce fiscal deficits in the EC countries is also increasing. It therefore seems inevitable that more public money will be devoted to fiscal transfers and structural adjustment programs within Europe. On top of that, monetary integration requires greater fiscal activity if regional divergences are to be contained. It is hard to see how all this can occur without reducing the aid budgets for the developing countries.

The Impact of EC-92 on Developing Countries' Trade: Empirical Estimates

Few empirical studies of the effects of EC-92 on trade are available, even though the central questions—trade creation versus trade diversion, the terms of trade, and the impact of imperfect competition and investment diversion—are essentially empirical. The EC's own analysis of the effects of EC-92 emphasized the increase in total output resulting from the efficiency and income gains within the EC itself (EEC 1988b). Other things being equal, this implies increased imports. But there are also going to be lower prices within the EC. If the relative costs between the EC and other suppliers change, then applying a conventional measure of income elasticity, without allowing for an unfavorable relative price effect on outside suppliers, is not correct. Further, a higher estimate of the effect on income (or finding a dynamic effect on the rate, and not just the level, of growth), which would increase external trade, can occur only if the initial trade effects are also positive.

Trade Creation Outside the EC

The EC's analysts calculated that the rise in EC income as a result of the single market would be 5 percent over five years.[4] That implies a small but plausible increase of roughly 1 percent in GDP each year. Any conventional import elasticity can be applied to this. If developing countries are assumed to be con-

strained by balance of payments problems—a reasonable assumption at the moment—an upper limit for their gains can be obtained. The results tend to be small because the EC forms only part of their markets and tends to import goods relatively insensitive to changes in income. These income effects are higher for the more advanced exporters of manufactures. Given the low shares and import elasticities in the EC and rather higher elasticities in the developing countries, the relation is likely to be less than half a point in income growth for every extra point on EC growth and substantially below that for the poorest countries (Page 1991).

A standard estimate of the income elasticity of EC imports would be about two, implying that the demand for non-EC products would rise by 10 percent over five years, or 2 percent each year, as a result of EC-92. That income elasticity estimate would not be accepted by all, and the range of estimates in the literature does suggest that the trade creation effect is likely to vary considerably over different product groups and different supplying countries (Page 1991). And within individual product groups the additional effects of EC commercial policies (quotas on textiles, voluntary restraints on consumer electronics and cars, domestic agricultural price supports, coffee excise taxes, and so on) will become increasingly important. We have no specific information on the average effect of the external barriers to be expected after EC-92.

Trade Diversion Outside the EC

Trade diversion will be greatest for low-value, undifferentiated, price-elastic goods such as textiles, clothing, footwear, leather, consumer products and simple electronics, metals, and chemicals. It will be lowest for noncompeting primary goods and specialized high-value goods. In other words, the typical NIE and middle-income developing country stands to lose its export trade in manufactures to EC firms (Page 1991). But the commodity producers and the non-European economies of the Organization for Economic Co-operation and Development are likely to be relatively unaffected by trade diversion.

The EC's estimates of trade diversion suggest that EC imports will fall about 2.5 percent as a result of removing internal barriers to trade and a further 7.5 percent as a result of removing restrictions that have impeded scale economies and full comparative advantage across the EC (Cawley and Davenport 1988). On top of this decline, the Cecchini report (EEC 1988a, 1988b) estimates that the terms of trade for the non-EC countries will deteriorate by about 0.5 percent. Thus, according to the EC's own estimates, the trade creation and trade diversion effects on outsiders will roughly cancel each other out—leaving the non-EC countries somewhat worse off because of the terms-of-trade effects on their own imports. However, since the literature contains a wide variety of estimated price and income elasticities, different authors may come up with alternative assessments, especially if they look at different product groups or producing countries. For example, Davenport (1990), who estimates income

elasticity at about 2, sees trade diversion canceling out trade creation for developing country manufactured exports, whereas Langhammer (1990), whose estimates of income elasticity are much higher (5.5), contends that trade creation would outweigh trade diversion by a factor of four.

Investment Diversion Outside the EC

To complete the estimation of the effects of EC-92 on outsiders, we need some idea of the size and likely consequences of investment diversion. Unfortunately, there have been no studies on which to base firm estimates, but the effect must be to worsen the position of developing countries somewhat further and may easily turn an insignificant loss on the trade account into a significant loss overall.

Trade Creation and Diversion in Imperfectly Competitive Markets

Our earlier discussion suggested that imperfect competition before 1992 would exaggerate the gains (and losses) because more trade would be reoriented, perhaps even to the extent of converting trade diversion into a trade reversal. Smith and Venables (1988) explore this possibility in a ten-industry model and find that EC-92 would, for those industries, raise both trade within the EC and EC exports to the rest of the world, while also reducing EC imports and raising the EC's GDP. The size of the change would vary from industry to industry, depending on the production structure and degree of imperfect competition. Winters (1991) quotes a typical example (office equipment) with 45 percent more internal trade, but 26 percent fewer imports into the EC and 6 percent greater exports from the EC. That is not going to do the developing countries (or other non-EC economies) any good at all. Even stronger results may be obtained in the more concentrated industries with larger economies of scale and more integrated markets. The point here is that imperfect competition clearly matters more than eliminating internal barriers, causing sharper falls in EC imports and possibly starting a trade reversal in which the EC increases its share of the markets in other countries. The question then is how much of that imperfect competition will actually get removed by integrating existing markets.

Many of the calculations designed to gauge the effects of EC-92 on different industries and countries must, of necessity, be incomplete or approximate. As a result, the empirical assessments offered by different authors tend to vary depending on the definitions, assumptions, and data used. The scope of this article does not allow us to adjudicate between the estimates, but the direction of the effects (good, bad, or indifferent) can be assessed by combining the theoretical propositions described in the introductory discussion with the empirical evidence presented in subsequent sections (table 2). Even if some of the

Table 2. *Summary of Likely Effects of EC-92 on Non-EC Economies*

Likely effect	*Non-EC relative to EC countries*	*Developing relative to non-EC industrial countries*	*Exporters of manufactures relative to exporters of commodities*
Individual EC-92 changes			
No internal legal barriers	–	0	–
No country preferences	0	0	0
Transport restrictions	–	–	–
No border controls	–	–	–
Private services	?	?	?
Public procurement	?	+	–
Standards	–	–	0
Total effects on goods			
Increased trade from higher income	–	–	+
Trade diversion: competitive markets	–	+	–
Trade diversion: imperfectly competitive markets	–	?	–
Net effects: competitive markets	–	?	?
Net effects: imperfectly competitive markets	–	?	?
Effects on investment			
From structural changes	?	+	+
From increased income	–	–	–
Effect on labor	–	–	?

Source: Adapted and extended from Page (1991).

individual empirical estimates lack credibility, the signs of spillover effects of EC-92 look fairly convincing on both theoretical and empirical grounds.

Dissenting Estimates: Will Anything Happen at All?

At this point it is worth pausing to consider whether EC-92 really will produce the increases in competitive pressure, as well as the higher growth and lower prices that have been predicted. That nothing at all may happen is, perhaps, an extreme view. But Kay (1991) points out that removing internal barriers, harmonizing standards and mutual recognition, or creating simpler financial conditions for exporting will actually make exporting and multilateral control (that is, mergers and acquisitions) more attractive. Conversely, barriers tend to foster collaboration or the establishment of plants abroad to get around these constraints. And the empirical evidence for 1983–88 supports that; mergers and acquisitions in the EC have increased as market access has increased. In fact, during that period, collaborative or complementarity agreements have been maintained only across (as opposed to within) the EC boundaries. Exactly

similar trends can be found in the development of the United States as an established single market.

Increased merger and acquisition activity, with the remaining firms trying to go it alone in the expanded EC market, is bound to have some anticompetitive consequences. It will certainly ensure the continued fragmentation of European industry, instead of promoting greater scale economies and comparative advantage. Thus, according to Kay, the EC Commission's own evidence does not support its own arguments.[6] If he is right, the gains in incomes and prices may well turn out to be much smaller than advertised.

Another dissenting voice is Hamilton (1991), who argues that removing national import quotas and the internal barriers of Article 115 will have little, if any, effect on prices within the EC. He also argues that any increase in EC income levels will have little impact on many developing country exporters because the thousands of voluntary export restraints are defined in terms of volumes. Hence, as the EC economy expands, those restraints will tighten and transfer larger rents abroad. Thus, unless the voluntary restraints are repealed (and that hardly seems likely), EC-92 will have only a small effect on the developing countries—and a considerably smaller effect than estimates based on fixed exogenous restraints (including estimates of price and income elasticities based on the assumption of fixed restraints) would suggest. This conclusion is very much at variance with the "official" estimates (Cecchini 1988; Sapir 1990; Winters 1988). Once again, it is important to note these arguments and to be prepared to revise one's estimates of the impact of EC-92 down rather than up.

EC-92's Effects on Manufacturing and Commodity Trade

Langhammer (1990) points out that price and income elasticities vary among different classes of goods; and that, in practice, the elasticities themselves (as well as the product-by-product differences between them) tend to rise with increasing disaggregation. But the cross-price elasticities and the impact of the budget constraints from developments in other markets must go in the opposite direction because, even if certain market (or commodity) responses become more elastic individually, they cannot at the same time become more elastic in aggregate. If they did, any rise in national income (or fall in the price level) would trigger a larger total expenditure and hence burst a budget constraint somewhere. Instead the greater elasticities found on disaggregation will be compensated by adjustments in other markets. Hence partial equilibrium results on a product-by-product basis, which assume no interactions between markets, are of little interest because they ignore the spillovers onto or restrictions leading back from neighboring markets. We need to use general equilibrium results instead.

Similarly, price and income elasticities for individual countries or for the developing countries or the NIEs as a group will differ from any estimates for the

non-EC countries taken as a whole because of differences in economic structure, trade patterns, and economic policies.

At this stage, general equilibrium analyses of the impacts of EC-92 are in their infancy and have been undertaken only for the European Free Trade Association and for Japan and some Asian NIEs (Haaland 1990; Stoeckel, Pearce, and Banks 1990). Nevertheless, it is possible to give broad estimates, based on the usual partial equilibrium approach of the likely effects of EC-92 on product groups such as manufactures, primary commodities, and services or on certain country groups such as Asian NIEs, the Organization of Petroleum Exporting Countries (OPEC), the Association of Southeast Asian Nations (ASEAN), Sub-Saharan Africa, and Latin America. Davenport (1990), Davenport and Page (1990), Page (1991), Langhammer (1990), Matthews and McAleese (1990), Nicolaides (1990), and Stevens (1990) give disaggregated results of that kind. The partial nature of such an approach may not be too restrictive if the product groups can be chosen to fit with the usual separability patterns of demand systems.

Trade Patterns after EC-92

The EC imports more primary than manufactured goods from developing countries. The trade-creation and trade-diversion effects will reinforce this tendency. Manufactured goods may well have higher-than-average income elasticities, as Langhammer (1990) claims, but the relatively simple manufactures that developing countries export (textiles, clothing, food products, consumer products, chemicals, and steel) also have higher price elasticities. Moreover, competition from aggressive emerging industries in southern Europe is likely to increase. So a significant expansion of the trade in developing country manufactures is not likely; and trade diversion will tend to offset any trade creation.

Conversely, the income elasticities for primary commodity exports may be smaller than those for manufactures. But the price elasticities are, in most cases, smaller still. Consequently, trade creation is more likely to dominate any diversion here. The net effect will be to reinforce existing trade patterns and to obstruct both those developing countries that are making a serious attempt to diversify away from dependence on one or two primary commodity markets (especially if their strategy is to diversify into manufacturing industries) and those Latin American and Asian countries that are trying to diversify away from dependence on the U.S. or Japanese markets (see Page 1991).

The Impact on Manufacturing Output by Country Group

If EC-92 reinforces existing trading patterns, how are the developing economies likely to fare? Table 3, which is taken from Page (1991), gives some typical estimates by country group. The total effects on any one group are pretty small. Positive trade-creation effects are offset by negative trade-diversion fig-

Table 3. *Estimates of EC-92 Effects on Exports from Developing Countries*
(millions of ECUs; constant 1987–88 values)

Country group	Additional exports to the EC: Primary	Additional exports to the EC: Manufactures	Diversion effects (in all manufactures)	Percentage of exports to the EC	Percentage of total exports
All developing countries	2,804	4,434	–5,655	+1.5	+0.3
ACP	534	315	–477	+2.3	+1.0
Maghreb countries	244	370	–534	+0.9	+0.5
South Asia and China	86	920	–1,125	–1.0	–0.1
Four Asian NIEs	12	2,574	–4,077	–6.1	–0.9
ASEAN countries	102	344	–464	–0.3	–0.0
Western Hemisphere	502	495	–751	+1.3	+0.3
OPEC	1,156	515	–847	+3.8	+1.1

Source: Page (1991).

ures, so that none of the groups' total exports is changed by more than 1 percent. Of course, the effect on exports to the EC itself is larger; 6 percent down for the NIEs, 4 percent up for OPEC, with the other country groups falling somewhere between the two. But those figures are also remarkable for being so small when year-on-year changes in exports of 10–20 percent are not unusual.

Very small price elasticities for primary commodities and fuels ensure that the diversion effects are all felt in the manufacturing sector. The conjecture that EC-92 will reinforce existing trade patterns is therefore confirmed; trade creation expands the EC's imports of primary commodities, but trade diversion outweighs trade creation in manufactures in every case. Thus:

- EC-92 will dampen trade in manufactured goods in all developing country groups, making their attempts to diversify more difficult and reinforcing their dependence on prices in a few commodity markets.
- EC-92 will have a small but positive effect on developing country exports to the EC but the gains will be very unevenly distributed. Commodity-dependent economies, such as those in the African, Caribbean, and Pacific states (ACP) and OPEC countries, will gain on average. But those with significant manufacturing activities, principally the Asian NIEs and ASEAN economies, will lose out by almost as much as the others gain. Most of the African and Latin American economies will be less affected.
- The net effects of EC-92 on output and trade in the developing countries are likely to be quite small (0.3 percent of total exports offset by a negative terms-of-trade effect as well as an ambiguous import effect because the demand for competing imports will fall while some inputs to production become cheaper). The more serious effects are the obstruction of diversification and the problems caused by investment diversion. Damage here would have serious long-term consequences (as yet unquantified).

The estimates of income and price elasticities underlying table 3 are between 0.5 and 0.7 for nonfuel primary commodities, 1.2 for fuels, and from around 2 for manufactures to 2.4 for machinery and transport (Page 1991). Price elasticities are effectively zero for primary commodities as a group (intercommodity substitution among these developing country groups being negligible). They are around 5 for chemicals, machinery, and transport (because these are easily substituted by EC products) and 2 for other manufactures that are less easily substituted. Such estimates fit into the range of figures preferred by most authors looking at the pattern of overall EC trade (see, for instance, Winters 1991; Davenport 1990; Cecchini 1988; Matthews and McAleese 1990). But there have been other estimates. Langhammer (1990), with a higher income and lower price elasticity, concludes that created trade will outweigh diverted trade by a factor of four. On that basis, the results in table 3 would be reversed, and the developing countries would gain from EC-92 on all counts—including diversification and investment. But Langhammer does not explain why his estimated elasticity (at 5.5) is so much higher than those of other studies (in a wide-ranging survey, Goldstein and Khan [1985] find income elasticities of 1 to 2.5 for different categories of manufactured imports). Moreover, Langhammer's positive price elasticity (+1.5), which implies that falling EC prices would divert trade toward the developing countries, could only be appropriate in the unlikely event that the existing national quotas are abolished instead of translated into EC-wide quotas. Langhammer also acknowledges that the effects of EC-92 on developing country manufactures are not likely to be dramatic and notes that EC imports of developing country manufactures have actually been falling compared with U.S. imports of the same throughout 1968–85, a period of greater integration and liberalization of the European markets. Both of those observations support the estimates set out in table 3 rather than the alternatives.

Davenport (1990) also concludes that the effects on developing country manufactures will be relatively minor because trade created roughly balances trade diverted. Most countries in his sample of eighteen Asian or Latin American developing countries show small gains in certain industries (for example, textiles), but those gains are substantially smaller than the average annual growth of 5 to 7 percent experienced during the past decade. According to Davenport greater negative effects are to be expected from diverting investment and from tightening either the existing national import quotas or voluntary restraints, or even from extending the restrictions to an EC-wide basis, because that would end the current practice of transferring unused quotas from one national import market to another. Calculations for textiles suggest that developing country exports to the EC would increase by only a fifth of the potential expansion implied by EC-92's trade creation. One may expect further quota restrictions on consumer electronics (to safeguard Europe's high-tech potential), footwear, household goods, and cars, because investigations of the EC's vulnerability in these markets are already under way or complete. Davenport argues that these

are likely to involve EC-wide voluntary restraints that lie outside the scope of EC-92. But, as usual, no figures on investment diversion are forthcoming.

The Impact on Commodity Producers

Finally, Matthews and McAleese (1990), in their study of the effects of EC-92 on producers of primary commodities, provide further evidence to support the estimates in table 3. They put the growth effect across four commodity groups at an extra 6 percent of exports to the EC, or an extra 1.2 percent of total exports. To this, the change in the terms of trade would add another 0.1 percent. But of the total increase of 1.3 percent, just one-quarter would go to non-oil producers and three-quarters to the oil countries. And of that one-quarter share, most (two-thirds) would go to food and beverages, so the minerals producers would see very little benefit. Thus, the effects continue to be small and poorly distributed across different product groups and commodity producers. But the net outcome is at least positive in each case.

Matthews and McAleese also note that the fiscal regime, more than the agricultural supports within the Common Agricultural Policy, will have a big effect on commodity producers. One problem here is the harmonization of value added tax among EC members, which will raise EC taxes on food imports because food is zero-rated in some member countries. Technical and health standards on food products could also be important. Finally, the Common Agricultural Policy has a whole range of price supports that distort trade in foodstuffs. As always, it is not clear what will happen to these items, but it is unlikely that existing taxes and restrictions will be lowered. So the estimates in table 3 probably give a reasonable picture of the effects of EC-92 on different commodity producers.

Conclusions

EC-92's greatest effect on developing countries will probably not come from marginal changes in trade flows dependent on relatively small changes in prices and incomes. Nor will it come from cuts in average costs, from the removal of internal barriers to trade and the free movement of factors, or from a 5 percent increase in EC output. Those changes may be important to European policymakers, but they are only of remote interest to developing countries. The main threats to developing countries are the diversion of investment funds to EC countries, the continuation of external barriers (especially administrative, nontariff barriers) and perhaps significant changes in market structure.

The EC expects the single market to promote higher growth and lower prices as firms exploit comparative advantages and economies of scale more effectively—and as competition among firms increases. The net effect on developing countries of removing internal trade barriers depends on developing countries'

income and price elasticities with the EC. Current estimates suggest that the effect will be small.

Competition among European firms is likely to increase if the single market reduces collaborative agreements between firms. But those gains may not materialize if firms merge or cooperate to increase their market share or compete against U.S. or Japanese firms. Similarly if new external barriers emerge or if EC-wide barriers replace national barriers in an effort to protect EC firms, developing countries' trade in manufactures or services will suffer. But perhaps the most damaging development would be EC-92's tendency to reinforce the developing countries' dependence on existing trade patterns, thwarting their attempts to diversify away from such risky markets to a wider economic base with better growth prospects.

Investment in EC countries may increase to meet the extra demand, growth, or trade diversion resulting from EC-92. That could lead to increased investments in developing countries. However, given limited financial resources, tight monetary policies and the indebtedness in developing countries, it is more likely to divert investment funds from developing countries, thus limiting their future growth. And U.S. and Japanese firms, fearing greater EC barriers and local-content rules, may decide to establish bases in the EC.

Technical standards in EC-92 may be tougher than national standards in member countries, which could hurt exporters in developing countries. An increase in voluntary export restraints, a tightening of local-content rules or reciprocity agreements, and subsidies for public sector enterprises or agriculture could also make life more difficult for them.

Is Fortress Europe likely? The EC Commission says no, but the Community's record so far is not good. The Common Agricultural Policy is the most blatant example of protectionism. Another example is the local-content requirement. Others are the pyramid of preferential trading agreements and the increasing use of nontariff barriers against low-tech, labor-intensive exports from the developing countries and against high-tech exports from the United States and Japan.

These barriers are likely to remain; no official commitment to their removal has been forthcoming. The question is whether the (average) barriers will be raised to protect the least efficient producers in the EC and whether they will be raised to the level of the highest preferential trading agreements. If national barriers are converted to EC-wide protection, there is a good chance that external barriers will increase. If so, they may do so by only a small amount, because a single market will force Article 115 to be abandoned. An external tariff that allows efficient producers to profit from the protection of the less efficient would conflict too obviously with the stated objective of greater internal competition.

Notes

A. J. Hughes Hallett is with the Department of Economics at Princeton University and the University of Strathclyde, Glasgow. This article arises out of a larger project of the International

Economics Department at the World Bank to analyze structural changes in world trade and identify their effect on exports from developing countries.

1. Consisting, respectively, of Australia, Hong Kong, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, and Thailand (that is, the Asia-Pacific Economic Cooperation initiative, plus Hong Kong and Taiwan); and of the United States, Canada, and Mexico.

2. The Lomé Convention comprises a series of trade and economic cooperation agreements, first signed in Lomé, Togo, in 1975 and ratified and extended periodically thereafter, between the EC and the countries from the African, Caribbean, and Pacific states (ACP).

3. Wolf (1987) points to those taxation effects; Hamilton (1991) focuses on the gains to non-EC suppliers from the rent transfers implied by the EC quota system.

4. This figure, often used by the media when reviewing EC aid policy, appears, if anything, to be an underestimate. Greenaway (1991) sets direct aid expenditures by EC countries at between 0.05 percent of GNP for Ireland and 0.4 percent of GNP for the Netherlands. The EC average is around 0.25 percent of GNP. Meanwhile, EC trade with the developing countries as a whole amounts to 3.4 percent of the EC's GNP (EEC 1989). Hence, to spend two ECUs on keeping out imports from developing countries for every ECU spent in aid would involve trade barriers amounting to 0.5 percent of the EC's GNP, or the equivalent of a 14.3 percent tariff on the prices of developing country imports. But the agricultural policies of the EC countries are estimated to have increased agricultural prices in those countries by 70 percent (Anderson and Tyers 1990). Because the remaining EC trade barriers cost up to 2 percent of that trade (Winters 1991), nonagricultural exports from developing countries cannot suffer less than the equivalent of a tariff of 2 percent—actually much more because trade in textiles, clothing, footwear, consumer electronics, and so on are subject to much sharper restrictions than that. The share of agriculture in developing country production is approximately 18 percent overall (World Bank 1989). Based on those figures, the average tariff equivalent on exports from the developing countries is 14.2 percent, which equals 0.5 percent of EC GNP, or two ECUs for each ECU of aid.

5. This estimate must be regarded as very tentative. Baldwin (1989) argues that it is too small by a factor of two. But Peck (1989) and Backhoven (1990) think it is too large by a factor of two. The EC's preferred estimate is therefore a midpoint, and it is said to incorporate most of the dynamic gains.

6. This is because the EC Commission apparently manipulated its survey questions and made selective use of the results to obtain the evidence it quotes. A wider view of the evidence, according to Kay (1991), suggests the opposite conclusions.

References

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

Anderson, Kym, and Rodney Tyers. 1990. "How Developing Countries Could Gain from Agricultural Trade Liberalisation in the Uruguay Round." In Ian Goldin and Odin Knudsen, eds., *Agricultural Liberalisation*. Paris: OECD.

Backhoven, A. F. 1990. "An Alternative Assessment of Macroeconomic Effects of Europe 1992." In Horst Siebert, ed., *The Completion of the Internal Market*. Tubingen: Mohr & Co.

Baldwin, Richard. 1989. "The Growth Effects of 1992." *Economic Policy* 9:247–82.

Bond, Marian E. 1987. "An Econometric Study of Primary Commodity Exports from Developing Country Regions of the World." *IMF Staff Papers* 34: 191–277.

Cawley, Richard, and Michael Davenport. 1988. "Partial Equilibrium Calculations of the Impact of the Internal Market Barriers in the European Commission." *EC Economic Papers (International)*. 73:1–58.

Cecchini Report: Summary (see Cecchini 1988); Analysis (see EEC 1988a); Evidence (see EEC 1988b).

Cecchini, Paolo. 1988. *The European Challenge 1992: Benefits of a Single Market.* Aldershot, U.K.: Wildwood House.

Corden, W. Max. 1972. "Economies of Scale and Customs Union Theory." *Journal of Political Economy* 80:465–75.

Davenport, Michael. 1990. "The External Policy of the Community and its Effects on Manufactured Exports of the Developing Countries." *Journal of Common Market Studies* 29(December):181–200.

Davenport, Michael, and Sheila Page. 1990. *The Effects of 1992 on the Developing Countries.* London: Overseas Development Institute.

EEC. 1988a. "The Economics of 1992." *European Economy* 35. Luxembourg: EC Publishing Office.

———. 1988b. *Research on the Costs of Non-Europe: Basic Findings.* 16 volumes. Brussels: EC Commission.

———. 1989. "Facing the Challenges of the Early 1990s." *European Economy* 42. Luxembourg: EC Publishing Office.

Goldsbrough, David, and Iqbal M. Zaidi. 1986. "How Performance in Industrial Countries Affects Developing Economies." *Finance and Development* (December):6–9.

Goldstein, Morris, and Mohsin S. Khan. 1985. "Income and Price Effects in Foreign Trade." In Ronald W. Jones and Peter B. Kenen, eds., *Handbook of International Economics.* Volume I. Amsterdam: North Holland.

Greenaway, David. 1992. "An Overview of Concerns of Nonmember Countries about the Single European Act and Its Implementation." *Journal of Development Planning* 21:91–116

Grossman, Gene, and Elhanan Helpman. 1993. "Trade Wars and Trade Talks." NBER Working Paper 4280. NBER, Cambridge, Mass. Processed.

Haaland, Jan I. 1990. "Assessing the Effects of EC Integration on EFTA Countries: The Position of Norway and Sweden. *Journal of Common Market Studies* 28(June):379–400.

Hamilton, C. B. 1991. "European Community External Protection and 1992: Voluntary Export Restraints Applied to Pacific Asia." *European Economic Review* 35:378–87.

Kay, Neil. 1991. "Industrial Collaboration Activity and the Completion of the Internal Market." *Journal of Common Market Studies* 29(June):347–62.

Langhammer, Rolf T. 1990. "Fueling a New Engine of Growth or Separating Europe from Non-Europe?" *Journal of Common Market Studies* 29(December):133–55.

Matthews, Alan, and Dermot McAleese. 1990. "LDC Primary Exports to the EC: Prospects Post 1992." *Journal of Common Market Studies* 29(December):157–80.

de Melo, Jaime, Arvind Panagariya, and Dani Rodrik. 1992. "The New Regionalism: A Country Perspective." WPS 1094. World Bank, Country Economics Department, Washington, D.C. Processed.

Messerlin, Patrick S. 1990. "The European Community." In Patrick S. Messerlin and Karl P. Sauvant, eds., *The Uruguay Round: Services in the World Economy.* Washington, D.C.: World Bank.

Muller, J., and N. Owen. 1985. "The Effect of Trade on Scale." In J. Schwalback, ed., *Industry Structure and Performance.* Berlin: Sigma.

Nicolaides, Phedon. 1990. "Responding to European Integration: Developing Countries and Services." *Journal of Common Market Studies* 29(December):201–15.

Norman, Victor D. 1989. "EFTA and the Internal European Market." *Economic Policy* 9:423–66.

Page, Sheila. 1991. "Europe 1992: Views of Developing Countries." *Economic Journal* 101(November):1553–66.

Peck, M. J. 1989. "Industrial Organization and the Gains from Europe 1992." *Brookings Papers on Economic Activity* 2:277–300.

Sapir, André. 1990. "Does 1992 Come before or after 1990?" In Ronald W. Jones and Anne O. Krueger, eds., *The Political Economy of International Trade.* Cambridge, Mass.: Basil Blackwell.

Schott, Jeffrey J. 1991. "Trading Blocs and the World Trading System." *The World Economy* 14:1–17.

Silbertson, Aubrey. 1989. "The Future of the Multifibre Arrangement." London: HMSO.

Smith, Alasdair, and Anthony Venables. 1988. "Completing the Internal Market in the European Community." *European Economic Review* 32:1501–25.

Stevens, Christopher. 1990. "The Impact of Europe 1992 on the Maghreb and Sub-Saharan Africa." *Journal of Common Market Studies* 29(December):217–41.

Stoeckel, A. B., David Pearce, and Gary Banks. 1990. *Western Trade Blocs: Game, Set, or Match for Asia-Pacific and the World Economy*. Canberra: Centre for International Economics.

Winters, L. A. 1988. "Completing the European Internal Market: Some Notes on Trade Policy." *European Economic Review* 32:1477–99.

———. 1991. "International Trade and 1992: An Overview." *European Economic Review* 35:367–77.

Wolf, Martin. 1987. "An Unholy Alliance: The European Community and Developing Countries in the International Trading Systems." *Aussenwirtshaft* (Switzerland) 42:41–64.

World Bank. 1989. *World Development Report 1989: Financial Systems and Development*. New York: Oxford University Press.

IS EUROPEAN INTEGRATION BAD NEWS FOR DEVELOPING COUNTRIES?

A Comment on Hughes Hallett

Gerhard Pohl
Piritta Sorsa

Mr. Hughes Hallett argues that "trading arrangements such as the European Community's 1992 program have lowered expectations of what . . . the current GATT talks might achieve . . . [and] reinforced fears that the liberal multilateral trading system, built up since World War II, was degenerating into a system of regional trading blocs practicing a new form of protectionism. . . ."

In our view multilateral and regional approaches can be complementary. Certainly, multilateral trade negotiations under the auspices of the General Agreement on Tariffs and Trade (GATT) and with the leadership of the United States have succeeded during the past forty years in lowering tariffs on industrial goods to almost negligible levels, at least among the major industrial countries. Historically, however, bilateralism was just as successful: Britain's bilateral trade treaties in the nineteenth century set off an infectious wave of tariff-cutting across Europe and beyond (Irwin forthcoming). And few would doubt that economic integration among the fifty states of the Union has been beneficial to them and to the rest of the world. Economic integration in the European Community (EC) has the same objective: not only to eliminate all barriers to the movement of goods, services, capital, and persons, but, more important, "to lay the foundation for institutions which will give direction to a destiny henceforward shared" (Treaty of Rome 1958).

EC policies toward developing countries are not perfect—far from it. But the creation of the EC has imparted a liberalizing trend to the trade policies of most of its members by lowering tariffs and reducing nontariff barriers. The effects of European integration must be compared to what would have happened in its absence. Generally, moves to strengthen integration—in the early 1960s and again since 1985—have been accompanied by reductions in external trade barriers, whereas periods of slow integration have also witnessed a resurgence of protectionism and the introduction of new trade barriers (see Pohl and Sorsa 1992).

The World Bank Research Observer, vol. 9, no. 1 (January 1994), pp. 147–55

Regionalism versus Multilateralism

No *a priori* reason or evidence proves that multilateralism is superior to regionalism. Both could help or hinder liberalization. Regional integration behind high tariff walls—1950s Latin American style—did not work and is discredited today. But it was the prevailing paradigm of import-substitution-led industrialization that kept tariff walls high, not the desire for *regional* integration as such. The new regionalism of the 1980s and 1990s has an entirely different motive: to promote economic integration beyond tariff elimination. This new regionalism (in North America, Northern and Eastern Europe, and Latin America) is, in part, inspired by the success of the EC.

The experience of the EC also offers some sobering lessons about the difficulties of economic integration. "Free trade"(zero tariffs) is only a first step toward full economic integration. Once high tariff barriers are eliminated (or reduced to the low levels now prevailing among industrial countries), a great many smaller obstacles to trade suddenly move to the foreground in a surprising variety of forms—incompatible technical standards, public health inspections, public procurement rules, taxation, corporate law, public subsidies, and so on. Most of these "nontariff" measures that distort competition were introduced for other, perhaps perfectly valid, reasons, so removing them is far more difficult to achieve than reducing tariffs. Technology and growth of services, in which most barriers to trade are nontariff ones, increase the challenges to remove nontariff barriers to integration or multilateral trade liberalization. The simple tariff-cutting formulas that oiled the wheels of multilateral trade negotiations in goods in the past will no longer suffice; liberalizing services or protecting innovation implies complicated negotiations on measures that go far beyond simple border protection.

Eliminating nontariff measures (other than quotas) requires a degree of economic and regulatory harmonization that is likely to prove difficult among a large group of heterogeneous countries. Cooperation among a smaller group of like-minded countries is likely to be easier—the basic rationale for regionalism. Such regionalism does not conflict with a multilateral approach but is additional and complementary and may blaze the trail for eventual adoption of a similar framework among a larger group of countries—perhaps even the full set of GATT members. The experience of the EC also shows that full harmonization of economic laws may be unattainable, and perhaps even undesirable. The new approach—embedded in the single market project known as EC-92—relies on harmonizing essential rules while recognizing differing subsidiary rules and practices.

The fact that nontariff measures are more intractable than tariffs does not mean that multilateral trade negotiation has run its course. First, there are still high tariffs and other trade barriers in many developing countries and tariff peaks in industrial countries that need to be tackled. Second, industrial countries have introduced several protectionist nontariff barriers, such as quota

restrictions under the Multifibre Arrangement (MFA) or "voluntary"export restraints (VERs), that should be phased out. Third, protectionist abuses of safeguard measures, such as antidumping provisions, need to be curtailed through better rules of conduct.

Fourth, multilateral trade rules do provide some discipline to external trade policies of the most important trading blocs as well. Requests for reciprocity, for example, in public procurement or services, can be constrained by improved GATT rules. Retaliation is a two-way street. The EC does have interests in outside markets, which will call for collaborative behavior and restrain demands for border protection. Successful completion of the Uruguay Round would extend some of the single market benefits to outside countries. Finally, multilateral liberalization can be extended to tackle nontariff barriers in new areas, such as services, even if the reforms remain limited to a "least common denominator" rather than to the "largest common factor" of regional integration schemes.

In the absence of high tariff barriers, trade patterns tend to be spatially concentrated. Two-thirds of the trade of neighboring nonmember countries is with the EC, and the same pattern is true of the countries of North America and their neighbors, even without regional free trade agreements. Countries close to each other have more mutual trading opportunities and more scope for arriving at mutually acceptable rules than those that are faced with the natural barriers to trade—or "transactions costs"—posed by longer distances. Similar considerations apply to trade among countries at similar stages of development: rules about practices that distort competition in certain high-technology goods (aircraft subsidies or pricing of integrated circuits, for example) may be of great interest to the United States, the EC, and Japan but of little interest to other trade partners. Regionalism can thus be complementary to multilateralism, provided that agreements do not discriminate or raise barriers against outsiders.

EC Trade Relations with Developing Countries

The EC's trade relations with developing countries are complex, because of the many special relations between some members and their former colonies or territories that had to be accommodated. In this respect, developing countries fall into three categories: first, the eighty-one developing countries (in Africa, the Caribbean, the Mediterranean, and the Pacific) that have association agreements with the EC, providing for duty-free access for industrial goods and preferential access for some agricultural products; second, the large majority of other developing countries that have (somewhat less) preferential access under the Generalized System of Preferences (tariff rebates and duty-free quotas); and third, a small number of dynamic newly industrializing economies in East Asia that face, by and large, nonpreferential "most-favored nation" tariffs and

have borne the brunt of EC safeguard actions and "voluntary" restraints in textiles and several other "sensitive" industrial goods.

Except for agriculture, the EC is a relatively open market for developing countries. Tariffs on imports from developing countries average only 2 percent. More than seventy developing countries have quota- and duty-free access to EC markets. Outside agriculture, EC-wide nontariff barriers are few; the most important are restrictions under the MFA against imports of textiles and clothing from some twenty developing countries, accounting for about one-half of EC textile imports. These vary considerably in product coverage and allowed growth rates, with the most stringent restrictions applying to a few Asian suppliers. The main effect of these restrictions has been to slow down import growth from most restricted suppliers and shift EC imports to other low-income countries, particularly Mediterranean suppliers. Most other nontariff barriers are residual national measures, predating the establishment of the EC.[1] National barriers and EC-wide safeguard actions—such as antidumping measures—are also aimed mostly at a few Asian exporters and affect about 1 to 2 percent of their exports to the EC. Prohibitively high, variable levies are applied to imports of most temperate agricultural staples from all sources, with limited exceptions for some preferential partners. Fruits and vegetables face moderate barriers, and tropical products generally encounter moderate tariffs.

Preferential arrangements for the African, Caribbean, and Mediterranean countries have had little positive effect, except to provide some protection to infant exporters. Instead, the most restricted developing countries have maintained high export growth to the EC, while, as a group, the most preferred countries have performed poorly. Preferences have had a visible effect only for products with high levels of protection, such as agricultural products and textiles. In textiles and clothing, tariff exemptions for preferred suppliers, combined with relatively tight quantitative restrictions on the most dynamic Asian exporters, have enabled a few preferred exporters to achieve exceptionally high growth rates. By contrast, the accession of Greece, Portugal, and Spain to the EC has diverted very little trade from developing countries (Pohl and Sorsa 1992). The most successful exporters from developing countries have been from those countries that have faced most of the restrictions. This suggests that other factors, such as domestic conditions and policies—overvalued exchange rates, wrong incentives, and poor infrastructure—are bigger barriers to exports than border protection in the EC.

The Single European Market

The decision in 1985 to create a single European market, EC-92, was the first significant effort to reanimate economic and political integration in Europe since the early 1970s. It is a large liberalization and deregulation program, implemented simultaneously in twelve countries (and, soon, in six countries of

the European Free Trade Association). The program includes measures, such as public procurement regulations and uniform health standards, that are taken for granted in most national markets; deregulation measures, such as trucking and airline deregulation, that have been introduced elsewhere in the past ten or fifteen years; and other measures, such as interstate banking, electronic payment standards, and rules on government subsidies to industry, that have not yet been introduced in some large national markets. The single market project will not eliminate all trade barriers among member countries. Its pragmatic approach aims rather to achieve among the twelve members the market integration that characterizes transactions within each national market.

The internal gains are expected to be substantial. Most of them are expected to come from removing technical barriers in industry, opening national public procurement markets to EC-wide competition (particularly for high-tech goods, such as communications equipment), and further opening national markets in highly regulated service industries (finance and insurance, trucking, air transport, and so on).

The Effects of EC-92 on Outsiders

The effects of EC-92 on other countries are threefold. First, the project will change the commercial policy of the EC toward outsiders, either implicitly—for example, as European-wide standards are introduced in place of twelve different national standards—or explicitly—for example, by eliminating national import quotas (or rendering them ineffective). Second will be indirect economic effects, leading to trade creation (because of higher growth, stimulated by the single market) and trade diversion from external suppliers to EC firms (because European firms should become more competitive once barriers within the EC are eliminated). Third, the program will affect the commercial policies of third countries, both through direct emulation and, perhaps more important, through the introduction of single market issues into multilateral trade agreements. The complete abolition of borders within the EC implies that a fully unified Community policy has to take the place of residual national trade restrictions and trade-related domestic policies, such as technical standards and certification procedures.

The "Fortress Europe" bogey overlooks some of the essential features of the 1992 program. First, the program is a vast exercise in deregulation and trade liberalization. Extending residual national restrictions to the Community would be against the spirit of the program. Second, protectionist lobbies in member countries do not care much whether the competition comes from within the EC or elsewhere. Third, the adoption of qualified majority voting requires a large majority vote to introduce protectionist measures: one small and two large liberally minded member countries are sufficient to stop new protectionist measures. Of course, the new political arithmetic also applies the other

way around: a protectionist minority may thwart a liberalization move. Because most nontariff barriers are residual national measures and because commercial interests vary considerably across even similar countries, the process in most cases is tilted in favor of liberalization. Fourth, free movement of goods makes enforcement of national protectionist measures difficult.

The much stricter criteria applied by the European Commission since 1988 in approving border measures to implement residual national restrictions indicate that most of these restrictions are being phased out on schedule. So far, EC-wide measures have been substituted for national measures only in a few cases, including automobiles, bananas, textiles, and footwear. These measures are meant to be temporary; in most cases they do not seem to restrict access to formerly open national markets, and they provide for a phase-out of quantitative barriers.

Effect on Developing Countries

We agree with Mr. Hughes Hallett that the single market's net trade effect on developing countries is likely to be modest. But we question his assessment of the sectoral impact of the changes and of the importance of investment diversion.

Sectoral Effects

Exports to the EC from developing countries are concentrated in labor-intensive products or commodities where the single market will have little effect on EC firms. The bulk of the adjustments engendered by the single market program are concentrated in regulated high-tech industries and services where developing countries do not (yet) have comparative advantage. The scope is limited for further economies of scale or intra-industry specialization within the EC in textiles, footwear, and other labor-intensive goods. In these sectors the EC has been losing comparative advantage for some time, and substantial rationalization has already taken place under pressure from imports. For example, production of clothing and footwear in the EC declined by more than 20 percent between 1985 and 1991. Trade diversion toward EC firms in these sectors will be very limited, and trade creation from income growth, continued loss of comparative advantage, and reduction of trade barriers is likely to remain significant. Mr. Hughes Hallett gives less emphasis to the growth effect and more to the trade diversion from price changes within the EC. In our view price effects will be felt mostly in other industrial countries that compete more directly in sectors—such as services and high-tech industries—where the single market program bites.

Elimination of bilateral national quotas—with or without EC-wide quotas—will redistribute trade among developing countries in favor of the most

competitive suppliers. Maintaining external openness would favor the more competitive suppliers to the disadvantage of beneficiaries of existing preferences. Residual national barriers apply primarily to the most competitive developing country suppliers and would become unenforceable without internal borders.

Developing country exporters will also benefit from the reduced transaction costs. These include not only the savings from reduced border formalities and lower transshipment costs within the EC but, more important, the reduced information and compliance costs related to national standards, certification, and all kinds of paperwork. These savings should reduce entry barriers particularly for new and smaller exporters. From now on exporters can deal with a single importer of their choice within the EC to comply with formalities (including technical standards) and can rely on domestic distribution systems throughout the EC.

The growth and openness of trade in the 1990s will also depend on overall macroeconomic developments beyond the single market and adjustment pressures from the changes within the EC. Growth makes adjustment easier, whereas recession tends to strengthen protectionist lobbies. Current forecasts project further declines in commodity prices, reducing gains for exporters of primary goods. Growth in the near term will be sluggish, which makes initial adjustments to the single market more difficult. Better prospects for the remainder of the decade should ease adjustment and reduce the protectionist pressures, and make full implementation of the single market easier.

We believe that the main effect of the single market program on developing country exports will be from the dynamic gains derived from growth and related structural change beyond the simple trade preferences. Structural change within the EC will improve growth by enhancing efficiency. Higher growth will benefit all exporters, but in relation to their competitiveness and the elasticity of demand for their exports. The shift of resources to high-tech goods and services should shift comparative advantage of EC firms further into skill- and technology-intensive goods. This should promote international specialization in trade with developing countries where relative factor endowments are more important, benefiting especially labor-intensive exports.

Overall, because of the income effect, exporters of manufactures are likely to gain the most, with gains proportional to the sophistication of the products exported. The apparent income elasticity of imports of manufactured goods from developing countries has remained high (around 4 –5), reflecting the still-modest market share of developing countries and shifting comparative advantage.[2] At the other end, some small developing countries that depend on agriculture and preferences could actually lose out. Exporters of manufactured goods will benefit most, because demand for their products increases as income grows. Exporters of goods with low income elasticity (most primary goods) will not benefit much, because income elasticities for most primary goods are low (ranging between 0.3 and 1.0), and environmental concerns and progress

in resource-saving technologies will also make life harder for exporters of primary products. In addition, continued high protection in temperate agricultural products and competition from the southern EC members in fruits and vegetables and from Eastern Europe in temperate products may affect import growth in the sector from developing countries. Oil exporters will benefit more because of the importance of oil in current trade flows and its sensitivity to income growth: a quarter of EC imports are from the developing countries.

Investment Diversion

Both foreign and domestic investment in the EC are likely to increase as a result of the single market. Indeed, the EC has experienced an investment boom since the single market program was announced in 1985. The reasons for higher investment are many: the cyclical upturn since the mid-1980s, the positioning of companies for a larger market, strategic moves to thwart obstacles to market access, and so on.

But we do not believe that increased investment in the EC—local or foreign—will divert foreign direct investment inflows from developing countries. The determinants of investments between high- and low-income locations are so different that the two kinds of locations do not compete for similar investments. In the EC investors look for closeness of markets, highly skilled labor, well-developed infrastructure, closeness of competitors, or technology, which most developing countries cannot offer. As with goods and services discussed above, investment from the single market program is more likely to be diverted at the cost of other industrial countries.

Access to EC markets is unlikely to be a principal determinant of investments in developing countries. Domestic policies, stability of the economic environment, infrastructure, and availability of cheaper labor count more for investment decisions than do modest trade barriers. The experience of the African, Caribbean, and Pacific countries demonstrates the point: despite fully free market access in most products, these countries have not attracted much foreign investment for export production for the EC. If market barriers are raised against a particular set of economies, production will shift to other developing economies (for example, as barriers were raised against footwear in Taiwan, production shifted to China and Indonesia). Differences in labor costs are more important to investors than differences in environmental regulation or other standards. Labor costs in Germany, for example, are twenty times those in many developing countries. Environmental costs in most industrial countries range between 1 and 2 percent of production costs and are, on their own, too small to cause a locational shift toward developing countries.

The single market program will probably help to create investment in developing countries, because it will accelerate structural change in Europe into skill- and technology-intensive sectors and services. That will make European

firms uncompetitive with the labor-intensive, low-skill manufactures produced in developing countries.

Notes

Gerhard Pohl is with the Technical Department of the Europe and Central Asia Regional Office and the Middle East and North Africa Regional Office of the World Bank, and Piritta Sorsa is with the Geneva office of the World Bank.

1. National restrictions outside textiles were mainly applied by France and Italy and affected about 1 to 2 percent of tariff items in each country. Since internal border controls have been abolished, these restrictions have become unenforceable, except perhaps in automobiles, where registration could be used as an enforcement mechanism. Antidumping duties affected 0.6 percent of EC imports from developing countries and 0.9 percent of imports from newly industrializing economies in Asia (Pohl and Sorsa 1992).

2. In discussing estimates of elasticities, the distinction between estimates for developing countries and those for all sources of supply is important. Most existing estimates give higher elasticities for manufactured products from developing countries. Regression results by Langhammer (1990) and Alizadeh and Griffith-Jones (1991) show higher numbers, 5.5 and 3.5, respectively, from past trends. Goldsbrough and Zaidi (1986) give 4.3. The only sectoral estimates available are those of Alizadeh and Griffith-Jones; those for typical developing country industries are low: 2.5 in textiles and clothing, 3.7 in leather, and 3.4 in metal manufacture. Higher estimates are in higher-technology industries: 13.5 in office and data processing industry and 7.7 in electrical machinery. The empirical estimates that use data from the 1980s are likely to reflect the fluctuations in the dollar/ECU (European currency unit) exchange rate, low initial level of exports, and supply factors, which may not continue in the 1990s.

References

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

Alizadeh, Parvin, and Stephany Griffith-Jones. 1991. "European Integration and its Implications for LDCs: Some Proposals for LDCs' Strategic Responses." UNCTAD, Geneva. Processed.

Goldsbrough, David J., and Iqbal M. Zaidi. 1986. "How Performance in Industrial Countries Affects Developing Economies." *Finance and Development* (December):6–9.

Irwin, Douglas A. Forthcoming. "Multilateral and Bilateral Trade Policies in the World Trading System: An Historical Perspective." In Jaime de Melo and Arvind Panagariya, eds., *New Dimensions in Regional Integration*. London: Cambridge University Press.

Langhammer, Rolf. 1990. "Fueling a New Engine of Growth or Separating Europe from Non-Europe?" *Journal of Common Market Studies* 29(2, December):133–55.

Pohl, Gerhard, and Piritta Sorsa. 1992. *European Integration and Trade with the Developing World*. Policy and Research Series 21. Washington, D.C.: World Bank.

World Bank Publications Order Coupon

CUSTOMERS IN THE UNITED STATES:
Complete this coupon and return to

The World Bank
Box 7247-8619
Philadelphia, PA 19170-8619
U.S.A.

To have your order shipped faster, charge by credit card by calling (202) 473-1155 or send this completed order coupon by facsimile by dialing (202) 676-0581.

CUSTOMERS OUTSIDE THE UNITED STATES:
Contact your local World Bank Publications distributor for information on prices in local currency and payment terms. (For a complete list of distributors, see back.) If no distributor is listed for your country, use this order form and return it to the U.S. address. Orders that are sent to the U.S. address from countries with distributors will be returned to the customer.

Title	Stock Number	Price	Qty.	Total

Subtotal US$ _____

Shipping and Handling* US$ _____

Total US$ _____

* SHIPPING AND HANDLING charges are $5.00 per order. If a purchase order is used, actual shipping will be charged. For air mail delivery outside North America, add $8.00 for one item plus $6.00 for each additional item.

CHECK METHOD OF PAYMENT

❑ Enclosed is my check payable to The World Bank.

❑ Charge my ❑ VISA ❑ MasterCard ❑ American Express

_____
Credit card account number

_____ _____
Expiration Date Signature

❑ Bill me. (Institutional customers only. Purchase order must be included.)

PLEASE PRINT CLEARLY

Name _____

Address _____

_____

City _____ State _____ Postal Code _____

Country _____ Telephone _____

Distributors of World Bank Publications

Prices and terms vary by country

ARGENTINA
Carlos Hirsch, SRL
Galeria Guemes
Florida 165, 4th Floor-Ofc. 453/465
1333 Buenos Aires

AUSTRALIA, PAPUA NEW GUINEA, FIJI, SOLOMON ISLANDS, VANUATU, AND WESTERN SAMOA
D.A. Information Services
648 Whitehorse Road
Mitcham 3132
Victoria

AUSTRIA
Gerold and Co.
Graben 31
A-1011 Wien

BANGLADESH
Micro Industries Development Assistance Society (MIDAS)
House 5, Road 16
Dhanmondi R/Area
Dhaka 1209

Branch offices:
Pine View, 1st Floor
100 Agrabad Commercial Area
Chittagong 4100

76, K.D.A. Avenue
Kulna 9100

BELGIUM
Jean De Lannoy
Av. du Roi 202
1060 Brussels

CANADA
Le Diffuseur
151A Boul. de Montagne
Boucherville, Québec
J4B 5E6

Renouf Publishing Co.
1294 Algoma Road
Ottawa, Ontario K1B 3W8

CHILE
Invertec IGT S.A.
Av. Santa Maria 6400
Edificio INTEC, Of. 201
Santiago

CHINA
China Financial & Economic Publishing House
8, Da Fo Si Dong Jie
Beijing

COLOMBIA
Infoenlace Ltda.
Apartado Aereo 34270
Bogota D.E.

COTE D'IVOIRE
Centre d'Edition et de Diffusion Africaines (CEDA)
04 B.P. 541
Abidjan 04 Plateau

CYPRUS
Center of Applied Research
Cyprus College
6, Diogenes Street, Engomi
P.O. Box 2006
Nicosia

DENMARK
SamfundsLitteratur
Rosenoerns Allé 11
DK-1970 Frederiksberg C

DOMINICAN REPUBLIC
Editora Taller, C. por A.
Restauración e Isabel la Católica 309
Apartado de Correos 2190 Z-1
Santo Domingo

EGYPT, ARAB REPUBLIC OF
Al Ahram
Al Galaa Street
Cairo

The Middle East Observer
41, Sherif Street
Cairo

FINLAND
Akateeminen Kirjakauppa
P.O. Box 128
SF-00101 Helsinki 10

FRANCE
World Bank Publications
66, avenue d'Iéna
75116 Paris

GERMANY
UNO-Verlag
Poppelsdorfer Allee 55
D-5300 Bonn 1

HONG KONG, MACAO
Asia 2000 Ltd.
46-48 Wyndham Street
Winning Centre
2nd Floor
Central Hong Kong

HUNGARY
Foundation for Market Economy
Dombovari Ut 17-19
H-1117 Budapest

INDIA
Allied Publishers Private Ltd.
751 Mount Road
Madras - 600 002

Branch offices:
15 J.N. Heredia Marg
Ballard Estate
Bombay - 400 038

13/14 Asaf Ali Road
New Delhi - 110 002

17 Chittaranjan Avenue
Calcutta - 700 072

Jayadeva Hostel Building
5th Main Road, Gandhinagar
Bangalore - 560 009

3-5-1129 Kachiguda Cross Road
Hyderabad - 500 027

Prarthana Flats, 2nd Floor
Near Thakore Baug, Navrangpura
Ahmedabad - 380 009

Patiala House
16-A Ashok Marg
Lucknow - 226 001

Central Bazaar Road
60 Bajaj Nagar
Nagpur 440 010

INDONESIA
Pt. Indira Limited
Jalan Borobudur 20
P.O. Box 181
Jakarta 10320

IRAN
Kowkab Publishers
P.O. Box 19575-511
Tehran

IRELAND
Government Supplies Agency
4-5 Harcourt Road
Dublin 2

ISRAEL
Yozmot Literature Ltd.
P.O. Box 56055
Tel Aviv 61560

ITALY
Licosa Commissionaria Sansoni SPA
Via Duca Di Calabria, 1/1
Casella Postale 552
50125 Firenze

(continued on reverse)

JAPAN
Eastern Book Service
Hongo 3-Chome, Bunkyo-ku 113
Tokyo

KENYA
Africa Book Service (E.A.) Ltd.
Quaran House, Mfangano Street
P.O. Box 45245
Nairobi

KOREA, REPUBLIC OF
Pan Korea Book Corporation
P.O. Box 101, Kwangwhamun
Seoul

Korean Stock Book Centre
P.O. Box 34
Yeoeida
Seoul

MALAYSIA
University of Malaya Cooperative Bookshop, Limited
P.O. Box 1127, Jalan Pantai Baru
59700 Kuala Lumpur

MEXICO
INFOTEC
Apartado Postal 22-860
14060 Tlalpan, Mexico D.F.

NETHERLANDS
De Lindeboom/InOr-Publikaties
P.O. Box 202
7480 AE Haaksbergen

NEW ZEALAND
EBSCO NZ Ltd.
Private Mail Bag 99914
New Market
Auckland

NIGERIA
University Press Limited
Three Crowns Building Jericho
Private Mail Bag 5095
Ibadan

NORWAY
Narvesen Information Center
Book Department
P.O. Box 6125 Etterstad
N-0602 Oslo 6

PAKISTAN
Mirza Book Agency
65, Shahrah-e-Quaid-e-Azam
P.O. Box No. 729
Lahore 54000

PERU
Editorial Desarrollo SA
Apartado 3824
Lima 1

PHILIPPINES
International Book Center
Suite 1703, Cityland 10
Condominium Tower 1
Ayala Avenue, H.V. dela Costa Extension
Makati, Metro Manila

POLAND
International Publishing Service
Ul. Piekna 31/37
00-677 Warzawa

For subscription orders:
IPS Journals
Ul. Okrezna 3
02-916 Warszawa

PORTUGAL
Livraria Portugal
Rua Do Carmo 70-74
1200 Lisbon

SAUDI ARABIA, QATAR
Jarir Book Store
P.O. Box 3196
Riyadh 11471

SINGAPORE, TAIWAN, MYANMAR,BRUNEI
Information Publications Private, Ltd.
Golden Wheel Building
41, Kallang Pudding, #04-03
Singapore 1334

SOUTH AFRICA, BOTSWANA
For single titles:
Oxford University Press Southern Africa
P.O. Box 1141
Cape Town 8000

For subscription orders:
International Subscription Service
P.O. Box 41095
Craighall
Johannesburg 2024

SPAIN
Mundi-Prensa Libros, S.A.
Castello 37
28001 Madrid

Librería Internacional AEDOS
Consell de Cent, 391
08009 Barcelona

SRI LANKA AND THE MALDIVES
Lake House Bookshop
P.O. Box 244
100, Sir Chittampalam A. Gardiner Mawatha
Colombo 2

SWEDEN
For single titles:
Fritzes Fackboksforetaget
Regeringsgatan 12, Box 16356
S-103 27 Stockholm

For subscription orders:
Wennergren-Williams AB
P. O. Box 1305
S-171 25 Solna

SWITZERLAND
For single titles:
Librairie Payot
Case postale 3212
CH 1002 Lausanne

For subscription orders:
Librairie Payot
Service des Abonnements
Case postale 3312
CH 1002 Lausanne

THAILAND
Central Department Store
306 Silom Road
Bangkok

TRINIDAD & TOBAGO, ANTIGUA BARBUDA, BARBADOS, DOMINICA, GRENADA, GUYANA, JAMAICA, MONTSERRAT, ST. KITTS & NEVIS, ST. LUCIA, ST. VINCENT & GRENADINES
Systematics Studies Unit
#9 Watts Street
Curepe
Trinidad, West Indies

UNITED KINGDOM
Microinfo Ltd.
P.O. Box 3
Alton, Hampshire GU34 2PG
England