THE WORLD BANK

RESEARCH OBSERVER

EFFECTS OF SERVICE QUALITY AND COST ON EDUCATION AND HEALTH

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Lyn Squire

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Cost and Quality Tradeoffs
Harold Alderman and Victor Lavy

The Impact of Health and Nutrition on Education
Jere R. Behrman

Macroeconomic Adjustment and Poverty in Africa:
An Emerging Picture
Lionel Demery and Lyn Squire

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“The Dangers of Decentralization” According to Prud’honme:
Some Further Aspects
David O. Sewell
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Recent years have seen a rapid increase in social sector investment by governments throughout the world. This trend is also apparent in the World Bank where lending for the social sectors increased from about 5 percent between 1981-83 to about 16 percent in 1995. Social sector lending for the poorest countries has increased even more rapidly, reaching 26 percent of all lending between 1991-94.

Is this the right level of investment? The answer depends on how the money is spent. Research shows that the results in such critical areas as student performance, dropout rates, and improvements in health care are highly sensitive to a number of factors. These include the quality of the service (and the response to that quality), the response of private sector suppliers to government programs, and the incentive structure governing service delivery in the public sector.

If these factors are really critical to the effectiveness of social sector programs, and if they have not been adequately accounted for in project design, then neither policymakers nor the intended beneficiaries will realize the full benefits of these investments. Two articles in this volume, by Alderman and Lavy and by Behrman, and two in the previous issue, Hanushek's and Kremer's, are drawn from papers presented earlier in a symposium aimed at understanding what factors affect the quality of investments in health and education and what accounts for their impact. A paper by Ainsworth summarizing four studies on fertility choices in Africa was also presented at the symposium. Two of these studies—Ainsworth, Beegle, and Nyamete, and Feyisetan and Ainsworth—appear in the January 1996 issue of The World Bank Economic Review. Two themes run through these papers.

First, readily available measures of success are very often misleading. Behrman demonstrates that factors that we do not—and often cannot—measure are likely to be important in explaining outcomes; in addition, he shows that it is difficult to assume the direction of error in measuring program performance without careful analysis. Similarly, Alderman and Lavy remind
us that it is possible to misrepresent the impact of user fees at health facilities if what appears to be a costly program is in fact justified by the quality of the service provided. Moreover, studies that fail to take into account the criteria for the location of a program may not consider that factors other than the program could influence the outcome, and thus the studies may not be valid.

Second, despite the difficulties in separating out the effects of the project from preexisting community and household characteristics, the studies imply that we know more about how households respond to improvements in quality than about what investments in health and education bring about desired outcomes. Thus Hanushek argues that a strategy calling for investments in education based on designating basic inputs is misplaced. What is needed instead is to change incentives and allow schools or local governments to determine the most effective means to achieve a desired outcome. While Kremer disputes some of Hanushek's analysis and places more emphasis on increasing the number of schools and the amount of inputs, he shares the view that decentralization will guide the choice of expenditures on schooling more effectively than general and centralized allocation decisions. Alderman and Lavy also discuss this theme from the perspective of investments in child health. In most cases, however, the implications for decentralized investments are based on inferences from programs that currently permit relatively limited local control; there is still a need for more direct evidence on incentive structures and on the impact of local decisionmaking on schools and clinics.

Despite the fact that all the authors discuss the complexity of evaluating social sector investments, they do point to additional actions that can be undertaken with the information available. Behrman, for example, points to the need to include investments in health as part of the mix of projects aimed at increasing schooling for the poor. Alderman and Lavy address those improvements in health quality that are most likely to benefit the poor. To a degree, there is a leap of faith; the authors point out what the available evidence implies, not what is known with comfortable certainty. The central message emerging from these studies, however, is clear: Research to ascertain what factors influence the effectiveness of investments in the social sectors will yield a high return.
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traded off against competing uses of time, both for labor and leisure), and by available medical technology. Changes in quality (making clinics more accessible, say) lower the cost of acquiring health care, and, as new processes are devised that permit increases in efficiency and productivity previously precluded by a lack of information, the technology constraints are relaxed. Thus household welfare can be increased by lowering the costs of achieving a given level of health. Governments do not invest in health services, however, to free up household resources for other purchases but to increase human capital by improving access to health care. Governments can do this by expanding publicly subsidized health services and by substituting private-sector services where these are cost-effective.

In this article we review recent research that asks whether consumers will take advantage of higher-quality health services if out-of-pocket payments are increased. We also investigate what kinds of improvements matter most to consumers, particularly low-income consumers, and whether complete cost recovery for these improvements is possible. Our interest in this question is not merely to guide cost recovery for a system of delivery but to find out, first, how policy changes affect that system's contribution to public health and, second, which services affect two indicators of community health—anthropometric measures of the nutritional status of children and child mortality rates. Despite the evidence that consumers are willing to pay more for better health care, price increases have measurable consequences for indicators of health, in part because quality improvements do not always match price movements, and in part because the poor cannot afford to take advantage of quality improvements without additional support.

The Effect of Quality on Demand for Health Care

Because those who use public medical facilities in developing countries are often charged nothing, measures of the availability of service, such as the distance or travel time to the nearest health facility, are often used as proxies for the demand for particular health services. Most studies of developing countries, however, consistent with the results in industrial economies (Manning and others 1987), suggest that where people pay for health services, the price of care does constrain demand (Alderman and Gertler 1989; Mwabu 1989; Gertler and van der Gaag 1990). Occasionally, user fees do not decrease demand (Akin and others 1988; Schwartz, Akin, and Popkin 1988) and in some cases even increase it (de Ferranti 1985). One reason for the diverse results, of course, is the diversity of settings. Moreover, several studies do not allow for different responses among income groups. Where the data permit this calculation, demand from low-income households tends to drop more when prices are increased than does demand among wealthier groups (Gertler and van der Gaag 1990). (Most of these estimates do not take into account the quality of the service, however.)
Similarly, studies that measure travel time often fail to indicate what kinds of services are available at the destination (Strauss 1990). Distant, but more comprehensive, health centers may offer better care (facilities, staff, supplies) that compensates for the increased travel time. Moreover, the studies often base the cost of services on expenditures per medical visit as reported by patients. But the sum paid by a consumer per visit depends not only on the price charged by that provider for a standard treatment, but also on the type of treatment and the quality of service chosen by the consumer. Estimated effects of service availability or prices can be biased unless the study takes into account differences in the quality of the service. For example, if prices increase but quality does not, the use of the service or facility can be expected to decline—a direct response to the increase in price. But if higher prices are associated with better quality and patients are willing to pay more for that improved quality, it is likely that the estimated price response will be understated. The studies reviewed here avoid that bias by explicitly addressing the role of quality in health care choice. All the studies are based on household surveys complemented by full surveys on the characteristics of the health facility. Many of the studies rely on data from Africa (Ghana, Kenya, and Nigeria). We also present related evidence from Cameroon based on an experiment that observed the effect of changes in prices when none of the other factors varied significantly.

Measuring Quality

Many definitions of quality for health care services have been suggested in the literature. Examples include the degree to which the health facility's actual performance or achievements correspond to established standards (Wouters, Adeyi, and Morrow 1993) or its capacity to perform certain specific health interventions, combined with some indicator of how well these interventions are carried out (Roemer and Montoya-Aguilar 1988). These criteria, however, do not provide a tractable approach to measuring the multiple dimensions of quality in the supply of and demand for health care services. An alternative measure is based on patients' perceptions of quality. In this approach, objectively measurable characteristics of health care facilities are linked to households’ subjective assessment of the probable outcome. Thus attributes that are easy to measure serve as proxies for those that are unobserved. These observable service components, which include physical facilities, number of staff members and level of supervision, availability of essential drugs and equipment, and provision of basic health services, are highly correlated with quality indexes (Garner, Thompson, and Donaldson 1990), thereby allaying concerns that the results may be sensitive to the choice of approaches.

Another concern is that measures of quality (or even availability) are liable to be inaccurate. For example, Thomas, Lavy, and Strauss (forthcoming) compare two measures of staffing in Côte d’Ivoire: the number of staff members listed in official records, and the number who were actually present in the twenty-four
hours preceding the interview. The actual number of doctors present had a favorable and significant effect on child health; the number on the books was irrelevant. The failure to take inaccuracies in official records into account may lead to incorrect inferences about the efficacy of public policies. Table 1 shows the various characteristics of quality included in the three studies that are the basis of the policy simulations below.

**How Changes in Quality Affect Consumers**

Lavy and Germain (1994) measured the quality of health care in Ghana in terms of infrastructure (electricity and running water); personnel (number of doctors and nurses); basic adult and child health services, including the availability of a laboratory and the ability to vaccinate children and to provide prenatal, postnatal, and child-monitoring clinical services; and the availability of essential drugs (ampicillin, chloroquine, paracetemol) and an operating room.²

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**Table 1. Quality of Care as Measured in Three Studies on Health Care**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ghana</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of facilities stocked with drugs</td>
<td>0.88</td>
<td>0.66</td>
</tr>
<tr>
<td>Number of nurses and doctors</td>
<td>0.92</td>
<td>2.00</td>
</tr>
<tr>
<td>Proportion of facilities with electricity and water</td>
<td>0.59</td>
<td>0.50</td>
</tr>
<tr>
<td>Proportion of facilities with adult and child services</td>
<td>0.37</td>
<td>0.76</td>
</tr>
<tr>
<td>Proportion of facilities with an operating room</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td>Distance to facility (km)</td>
<td>3.42</td>
<td>5.64</td>
</tr>
<tr>
<td>Price of consultation (100 cedis)</td>
<td>1.06</td>
<td>0.43</td>
</tr>
<tr>
<td>Proportion of consumers treated</td>
<td>0.35</td>
<td>0.14</td>
</tr>
<tr>
<td><strong>Nigeria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of facilities stocked with drugs</td>
<td>1.00</td>
<td>0.72</td>
</tr>
<tr>
<td>Physical condition of facility (1=good, 3=poor)</td>
<td>1.16</td>
<td>1.29</td>
</tr>
<tr>
<td>Expenditure on care per person in population</td>
<td>1.36</td>
<td>3.04</td>
</tr>
<tr>
<td>Price of consultation (naira)</td>
<td>2.22</td>
<td>1.19</td>
</tr>
<tr>
<td>Proportion of consumers treated</td>
<td>0.13</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>Kenya</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of drugs available</td>
<td>10.40</td>
<td>8.00</td>
</tr>
<tr>
<td>Number of medical staff</td>
<td>1.40</td>
<td>14.40</td>
</tr>
<tr>
<td>Days a year without antibiotics (log)</td>
<td>0.67</td>
<td>3.66</td>
</tr>
<tr>
<td>Days a year without malaria drugs (log)</td>
<td>0.67</td>
<td>3.83</td>
</tr>
<tr>
<td>Days a year without aspirin (log)</td>
<td>0.14</td>
<td>0.45</td>
</tr>
<tr>
<td>Distance to facility (km)</td>
<td>5.98</td>
<td>8.00</td>
</tr>
<tr>
<td>Price of consultation (Kenya shillings)</td>
<td>14.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Proportion of consumers treated</td>
<td>0.25</td>
<td>0.36</td>
</tr>
</tbody>
</table>

The first four quality factors had large and significant effects on demand. To illustrate, if the percentage of public facilities in Ghana with drugs available increased from 66 percent to 100 percent, the use of such facilities would increase by 44 percent (table 2). Similar changes would occur with other independent changes in infrastructure, services, and personnel. Simultaneous improvements in drugs, infrastructure, and services would increase the likelihood that patients would use public health facilities by 127 percent. Part of this change reflects shifts from the private sector to the public sector, and part represents a shift from self-care to the modern health sector. If the objective of policy improvements is to usher more people into the modern health care system, then quality changes alone could be expected to reduce the probability of self-treatment by about 14 percent.

Use of public health clinics in Ogun State, Nigeria, was affected by several quality variables, including operational costs per capita, the physical condition of the facility, the availability of drugs, and the number of functioning x-ray machines and laboratories. The number of support personnel, nurses, and doctors per capita did not have a significant effect. When both public and private

<table>
<thead>
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<th>Table 2. Simulated Response to Improved Public Health Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>(percent)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Simulation</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Ghana</td>
</tr>
<tr>
<td>Improve quality of public facilities</td>
</tr>
<tr>
<td>Drug availability increased</td>
</tr>
<tr>
<td>Infrastructure improvements</td>
</tr>
<tr>
<td>Service improvements</td>
</tr>
<tr>
<td>Personnel increased to three people</td>
</tr>
<tr>
<td>Drugs, infrastructure, services brought up to average level</td>
</tr>
<tr>
<td>Improve all quality factors simultaneously</td>
</tr>
<tr>
<td>(public and private)</td>
</tr>
<tr>
<td>Drugs, infrastructure, services brought up to average level</td>
</tr>
<tr>
<td>Nigeria</td>
</tr>
<tr>
<td>Drug availability increased (public and private)</td>
</tr>
<tr>
<td>Expenditure per person doubled (public and private)</td>
</tr>
<tr>
<td>Kenya</td>
</tr>
<tr>
<td>Increase two types of drugs at public facility</td>
</tr>
</tbody>
</table>

Note: Simulations are projected over the entire population, using point estimates at sample mean.
operational expenditures per person were doubled, some patients moved from self-care to public care, with no change in private-care usage (see table 2).

Improving the availability of drugs elicited a substantial response. Full availability of drugs in both public and private sectors induced many patients to move from self-care and the private sector to public care. Conversely, if drug availability were to fall to 50 percent for both types of facilities (a very low rate compared with existing availability—72.9 percent in the public sector and 99.6 percent in the private sector), both private and public clients would likely forgo care, with the private sector, where both availability and use were previously highest, recording a larger drop. If the quality of the public sector were improved to nearly match that of the private sector and all prices were doubled, the number of consumers who rely on self-care and private care would drop, but those using public care would increase.

A study of a rural district in Kenya (Mwabu, Ainsworth, and Nyamete 1993) looked at treatment-related measures of quality, including the availability of a variety of drugs and diagnostic equipment (although the size of the sample limited the number of variables used). The study found that demand was lower at facilities lacking aspirin. Curiously, demand was higher at facilities lacking antimalarial drugs. The likely explanation is that high demand depleted the stock, and not that stock shortages encouraged demand. The probability of a visit to a public facility was positively related and most sensitive to the availability of a broad number of drugs. For example, making two additional drugs available in government health facilities led to a 3.6 percent increase in the use of public facilities and a 4.1 percent reduction in the use of private providers (see table 2).3

These results are similar to, but larger in magnitude than, Hotchkiss's (1993) findings on the choice of obstetric care in Cebu, Philippines. His study included the following measures of quality: the availability of medical supplies (number of drugs available to treat diarrhea), practitioner training (doctor or midwife), service availability, facility size, and waiting time. Again, the quality of services provided had a significant effect on users' choices. For example, drug availability, waiting time, and the availability of doctors to perform deliveries were significant determinants of choice, although drug availability affected the choice of well-educated women, but not other consumers.

Many of these changes in health care choice involve users who shift between providers, rather than between seeking professional help or doing without care. This is also the case with respect to changes in distance and price. For example, if the average distance to the nearest facility in Ghana were reduced by 50 percent, demand at those clinics would nearly double; self-care would decline by only 2.6 percent (table 3). Thus much of the change would reflect a shift from private care. (This pattern was also observed in Pakistan by Alderman and Gertler 1989.)

Simultaneous price increases in public and private facilities are also possible. An experiment in Indonesia found that a change of fees in public facilities in-
Table 3. Simulated Response to Changes in Price and Access to Health Care (percent)

<table>
<thead>
<tr>
<th>Study</th>
<th>Increase in patient use of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self-care</td>
</tr>
<tr>
<td><strong>Ghana</strong></td>
<td></td>
</tr>
<tr>
<td>Public facilities</td>
<td></td>
</tr>
<tr>
<td>Reduce distance 50 percent</td>
<td>-2.6</td>
</tr>
<tr>
<td>Increase user fees 50 percent</td>
<td>0.1</td>
</tr>
<tr>
<td>Increase user fees 100 percent</td>
<td>0.3</td>
</tr>
<tr>
<td>Private facilities</td>
<td></td>
</tr>
<tr>
<td>Reduce distance 50 percent</td>
<td>-3.0</td>
</tr>
<tr>
<td>Increase user fees 50 percent</td>
<td>1.0</td>
</tr>
<tr>
<td>Increase user fees 100 percent</td>
<td>2.0</td>
</tr>
<tr>
<td>Public and private facilities</td>
<td></td>
</tr>
<tr>
<td>Reduce distance 50 percent</td>
<td>-5.0</td>
</tr>
<tr>
<td>Increase user fees 50 percent</td>
<td>1.0</td>
</tr>
<tr>
<td>Increase user fees 100 percent</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Nigeria</strong></td>
<td></td>
</tr>
<tr>
<td>Double public and private prices</td>
<td>7.0</td>
</tr>
<tr>
<td><strong>Kenya</strong></td>
<td></td>
</tr>
<tr>
<td>Reduce distance 20 percent (public)</td>
<td>-1.8</td>
</tr>
<tr>
<td>Increase public fees from zero to Kenya shillings 10</td>
<td>20.9</td>
</tr>
</tbody>
</table>


induced a similar change in private facilities (Gertler and others 1995). Table 3 indicates that if private fees in Ghana were to go up simultaneously by the same percentage as public fees, substitution would lead to increased use of public clinics as well as increased self-care.

Theory anticipates that, in deciding whether to seek care and which provider to consult, households base their choice on many factors, including the availability of drugs, doctors, hours, and clinical services; the adequacy of equipment; and the physical condition of health care facilities. Empirical studies also help predict the costs that can be recovered, but several factors can bias the response. First, if the study relies on respondents who have actually chosen the service in question, self-selection becomes a problem. Second, use may appear to decrease with improved quality if the services provided are effective in treating illness and thus in reducing overall population morbidity. Finally, some measures of quality (especially stocks of supplies) actually capture both supply and demand behavior. If demand is high and stocks are quickly depleted, it may appear that people are using a low-quality facility when, in fact, high demand has depleted available supplies.
These three issues could cloud the interpretation of results, but the studies cited are not particularly sensitive to the first concern because the quality data are collected from a sample of facilities rather than from users. The second concern is likely to lead to an underestimation of the demand for quality, providing a bound for estimates. A similar argument is plausible regarding the failure to include supply response. Both these a priori arguments, however, as well as econometric techniques used to control for selection biases, often have limited persuasive power. Supportive evidence can be provided if results derived from alternative methodologies converge on the econometric results from cross-section surveys. Thus we compare the results reported above with those from the field experiment described below.

In an experiment in the Adamaoua province of Cameroon, researchers measured consumers' willingness to pay higher fees for improved health services. In this study, revolving funds that use revenues from sales to replenish drug supplies and subsidize other services were established at each health center. Litvack and Bodart (1993) report that the probability of using health centers increased significantly in the treatment areas compared with those in control areas. When drugs became available at the local health center, the increase in the value of the service far outweighed the fee charged compared with the time, transportation, and treatment costs formerly borne by the patient, and thus the number of people treated rose.

Willingness to Pay for Quality Improvements

Can consumer response to quality be used to guide pricing policy? How much are individuals willing to pay for better care in existing public facilities or to reduce the travel time and costs to obtain treatment? Table 4 indicates the fees consumers in Ghana said they were willing to pay for various quality factors. The most important single factor is distance: households were willing to pay 2.6 percent (155 cedis in 1989) of their monthly income to reduce the distance (or travel time) to the nearest clinic by half. Second in importance is drug availability: people were willing to pay 53 cedis to ensure that the clinic is reliably stocked with basic drugs. The importance of these two factors is also evident from a simulation (not shown in the table) in which consumers are equally far from public and private facilities, and both facilities have the same drugs available. In this case the probability that patients would consult the public facility increased by 300 percent (because fees are lower), and the amount that people were willing to pay in such a scenario amounted to 5 percent of monthly income.

The table shows that households will pay smaller amounts to ensure that child care and immunization and laboratory services are available and to double the number of doctors and nurses. More important, they are willing to pay more for combined or simultaneous quality improvements than the sum of the discrete improvements. For example, a household at mean income is willing to pay 353 cedis (6 percent of monthly income) for simultaneous improvements in in-
Table 4. Willingness to Pay for Improved Health Services in Ghana, by Household Income Category

(prices in cedis: 175 cedis=$1)

<table>
<thead>
<tr>
<th>Improvement</th>
<th>One standard deviation below mean income (40,000 cedis)</th>
<th>At mean annual income (70,242 cedis)</th>
<th>One standard deviation above mean income (100,000 cedis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>106 (3.19)</td>
<td>155 (2.65)</td>
<td>178 (2.14)</td>
</tr>
<tr>
<td>Price</td>
<td>4 (0.13)</td>
<td>9 (0.15)</td>
<td>12 (0.14)</td>
</tr>
<tr>
<td></td>
<td>9 (10.28)</td>
<td>18 (0.31)</td>
<td>23 (0.27)</td>
</tr>
<tr>
<td>Quality</td>
<td>13 (0.39)</td>
<td>53 (0.91)</td>
<td>117 (1.04)</td>
</tr>
<tr>
<td></td>
<td>10 (0.31)</td>
<td>42 (0.71)</td>
<td>68 (0.81)</td>
</tr>
<tr>
<td></td>
<td>3 (0.09)</td>
<td>20 (0.18)</td>
<td>33 (0.40)</td>
</tr>
<tr>
<td></td>
<td>3 (0.08)</td>
<td>11 (0.18)</td>
<td>17 (0.20)</td>
</tr>
<tr>
<td></td>
<td>91 (2.72)</td>
<td>353 (6.03)</td>
<td>580 (6.95)</td>
</tr>
</tbody>
</table>

Note: Percentage of monthly income in parentheses.

Infrastructure and in drug and service availability—substantially more than the sum of each intervention (115 cedis).

Much of the policy debate about recovering the costs of public health services revolves around the concern that rising prices may reduce the overall utilization. Can part of the negative effect of prices on services be offset by improving quality? What if providers simultaneously improved the quality of care and raised fees? In the population referenced in Ghana, the demand for quality is so high that if the availability of drugs and services and the physical condition of public facilities were improved by 100 percent, the percentage of individuals choosing treatment in a public clinic would not decline unless prices were raised by more than 1,200 percent.

Similarly, the government could build fewer facilities, which would increase the average distance to the nearest public facility, but could offset this effect by improving quality. Consumer choice in Ghana is unaffected when the mean distance to the nearest public health provider is doubled if services are simultaneously improved 100 percent. In Cebu, Philippines, prices could double and...
still the probability of choosing a public hospital would actually increase by 1.8 percentage points for poor households and 4.4 percentage points for nonpoor households if crowding were simultaneously reduced to zero and the availability of drugs were doubled (Hotchkiss 1993).

Another way to assess willingness to pay is based on a survey of what consumers say they are willing to pay for certain programs. Researchers usually concede that the technique is experimental and interpret their findings with caution (see Griffin and others 1995). This approach was used, for example, in a study of rural households in the Central African Republic, which found that consumers were willing to pay for improved services and increased access to drugs (Weaver and others 1993). Not surprisingly, higher-income groups tended to be willing to pay more for quality improvements, but a willingness to pay was not confined to these groups. Similarly, in Tanzania, Abel-Smith and Rawal (1992) found that among low-income respondents, 45 percent were willing to pay 200 Tanzanian shillings (in 1989, 192 Tsh = US$1) for improved services in government hospitals or health centers, close to the 60 percent that the highest-income group was estimated to be prepared to pay. Moreover, a higher proportion of the wealthier households than low-income households were unwilling to pay any additional amount for quality improvements. In a comparison of the two types of quality improvements, more people said that they were unwilling to pay to reduce the waiting time to less than an hour than were prepared to pay for assured drug supplies.

These studies draw a very similar picture to the simulations mentioned earlier; user charges will not reduce utilization if the revenue generated is used to improve the quality of services. Conversely, the negative price response observed in most studies implies that, if the fees go into general revenues without generating higher-quality services, households will shift providers. Thus policymakers should focus on those quality improvements that will ultimately reduce the financial burden on the poor, such as reduced travel costs and assured drug supplies.

Who Benefits from User Fees?

Do quality improvements financed by increased user fees primarily benefit wealthier households? Not necessarily. In some cases the poor have been shown to take greater advantage of simultaneous increases in health care quality (drug availability) and fees than have the wealthy (as in the experiment cited above by Litvack and Bodart 1993). Often, however, willingness to pay for quality rises with income, so user fees may dissuade poor households, yet not substantially decrease overall demand. Table 4 shows that such a situation is possible; the price a household in Ghana will pay for a given quality of health care increases with income. There are combinations of prices and quality that will be chosen by the average consumer, yet deemed unaffordable by the poor. This choice is more pronounced with quality vari-
ables (drug availability, infrastructure, services, and personnel) than with distance or price.

Furthermore, as a percentage of income, willingness to pay for accessibility decreases as income rises, while in the case of quality factors, it increases in tandem with income. For example, low-income households in Ghana are willing to pay 3.2 percent of their monthly income to reduce the distance to the nearest public facility by half, but richer households are prepared to pay only 2.1 percent. In contrast, the poor are willing to pay only 2.7 percent of monthly income for improvements in all measured indicators of health service quality, compared with 7 percent in the case of the nonpoor. These results suggest that in low-income communities priority should be given to improved accessibility while ensuring some appropriate level of quality (especially the availability of drugs). In areas with more affluent populations, quality considerations, especially adequate availability of equipment and basic services, might be a greater priority.

*Are Quality Improvements Feasible?*

Are the fees households are willing to pay for better health care in line with the costs of providing such services? The willingness to pay for raising public health facilities to the level of those in the private sector in Ghana was equal to almost 1 percent of monthly income (60 cedis), or about two-thirds of the average fee in the private sector. When the distance was also equalized, the willingness to pay exceeded the average private-sector fee of 110 cedis by 10 cedis. Akin, Guilkey, and Denton (1995) found that when quality improved, the demand for public health facilities in Nigeria increased even when fees were raised to the level charged by private facilities.

A further perspective comes from comparing the willingness to pay for quality improvements with estimated costs per patient. Figures for Ghana from the World Bank and the Ministry of Health (Government of the Republic of Ghana 1991, 1994) indicate that the per patient cost in a rural health facility was 400 cedis in 1988; full cost recovery was obtained if twenty-five patients a day were treated. The amount consumers were willing to pay for quality services in such a center was 225 cedis. The corresponding unit cost for an urban facility was 600 cedis and thirty-eight patients a day, and the willingness to pay was 355 cedis. These comparisons suggest a high potential for cost recovery.

The simulations and field experiments reported here show that there is room for quality improvements financed—at least in part—by an increase in user fees. Obviously, a literal interpretation of the quality-price tradeoff would be an oversimplification. Drug and equipment availability, infrastructure, and physical conditions are almost certainly proxies for other quality characteristics. Quality in general would need to be significantly increased for the predicted shift to the public sector to occur.

Because the costs of various quality improvements were not analyzed in the demand studies reviewed, it is unclear whether the revenues raised would be

*Harold Alderman and Victor Lavy*
sufficient to make the quality changes needed to prevent any loss of usage. But the results strongly suggest that, if prices for public health services were raised and the revenues used to increase the quality of care, the use of both public and modern health care in general might, in fact, increase.

The Effect of Quality on Nutritional and Mortality Outcomes

The degree of use of government clinics provides little indication of the effect that government investments have on the health status of the poor or of the general population. To some extent the subject goes beyond the scope of this article; the evidence is too limited and variable to provide strong guidelines without a fair amount of discussion. A few general patterns, however, provide a perspective on the discussion of pricing policies and the demand for quality. First, in addition to determining which service provider is chosen, prices are important determinants of mortality and nutritional status. Second, the impact of service quality on these two health indicators depends on the level of education or income—or both. And third, the cross-sectional studies contain few regularities that can be used to prioritize improvements in services, but the diverse effects of quality variables hint at a need to consider decentralization and changes in incentives.

Prices and Outcomes

With few exceptions, the shorter the travel and waiting time for a service, the more it will be used. But the net effect on nutrition or mortality is less clear. Moderate changes in use of public facilities may reflect shifts from private providers; the net increase in the number of people using modern medical services may be fairly small. In such circumstances households benefit from a reduction in travel or in direct costs, but their overall health status may be unaffected.

What evidence is there about the consequences of price changes or travel time on mortality or nutritional status? Benefo and Schultz (1994) find that increased distances to clinics lead to higher mortality rates for children in Côte d'Ivoire and Ghana. (In Ghana, however, this was observed only for the children of more-educated women.) A similar study using the same data noted that mortality increased with greater distances to clinics in rural areas of Ghana (Lavy and others, forthcoming) but found no measurable impact from either increased availability of health facilities or services for children at clinics in urban areas (where services were in any case more accessible). A similarly, the price of antibiotics was a significant determinant of mortality in Ghana. Benefo and Schultz (1994) found that if drug prices were doubled, child mortality would increase by 50 percent. Because the nutritional status of children is sensitive to disease (Alderman and Garcia 1994), it is consistent to find that nutrition is also affected by drug prices. Taking availability of drugs as
a proxy for the effective price of those drugs, similar evidence comes from Côte d'Ivoire, where communities that did not have access to antibiotics had significantly worse measures of nutritional status. Drug supplies are associated with an increase in nutrition equal to a third of the gap between the average child height and international standards (Thomas, Lavy, and Strauss forthcoming).

Because both distance to clinics and the price of drugs tend to reduce the demand for health services, any increase in price without a concomitant increase in quality is likely to have a detrimental effect. It is not possible to infer precisely the joint effect of increased prices and better care, but it is only common sense to note that cost recovery fees should be used to ensure quality improvements. It cannot be assumed that, because the average consumer's demand for health does not change much in response to price changes, community health indicators do not change. The average is often not indicative of the most vulnerable population. The available evidence then implies either bounds for cost recovery or the need to implement parallel measures to protect this population simultaneously with the reform of health care, or both.

The Interaction of Education and Services

Just as price effects differ by income, the effect of health care services often differs appreciably according to the education of the family. For example, Frankenberg (1995) found that government health services had only a small effect on the average mortality rate in Indonesia, but she noted that the effect was three times larger for the children of uneducated women. In contrast, the reduction in child mortality attributed to the provision of both maternity clinics and doctors was higher if the mother had at least a primary education than if she were uneducated.

In Côte d'Ivoire, the availability of antibiotics or immunization services benefited children in households with no education more than in those with an educated parent (Thomas, Lavy, and Strauss forthcoming). This finding is paired with an observation that parallels Frankenberg's study—childbirth services provided greater benefits to households whose members had some education. In Ghana, only households with little education benefited appreciably from improved sanitation (Lavy and others forthcoming); the impact of clinic services on nutrition did not vary among education subgroups. The observation that sanitation—but not better health facilities—benefited households with little education parallels Barrera's (1990) results for the Philippines and Sastry's (1994) observations for the northeast of Brazil.

Educated households also have more of other resources, and not all the studies controlled for assets and family background. Thus the most prudent interpretation of differences in the level of education completed is not derived from education policy but from the differential impact of investments on different income groups. Thus Thomas, Lavy, and Strauss (forthcoming) emphasize that the significantly greater beneficial effect of basic services on less-educated house-
holds suggests that investing in immunizations or in the provision of pharmaceutical products will substantially improve the health of the poor. Similarly, Frankenberg's (1995) results for Indonesia show that investments such as government health clinics, in contrast to doctors or even maternity clinics, implicitly target poorer households. Stated somewhat differently, prioritizing services for low-education (low-income) communities can achieve much higher marginal returns than a similar investment that is not targeted. From a targeting perspective, the positive association between the effect of doctors and maternity clinics with levels of education or the similar association with specialized services implies that these services are, in effect, subsidies that benefit primarily upper-income groups.

Education can also be seen as a complement to certain services and a substitute for others. It may, alternatively or in addition, have a direct effect on health services—through changes of attitudes or the ability to process instructions. Educated mothers may use additional information or other assets to obtain higher returns from the use of community infrastructure. Or they may own assets or have access to information and services that substitute for publicly provided infrastructure and thus have less need for such services than do uneducated mothers (Haddad, Hoddinott, and Alderman 1994). Education may also shift the status of a woman within the family structure and indirectly contribute to her controlling more resources by shifting her status or position in the household.

Finally, although maternal education does not appear to explain child nutrition or mortality in Ghana and Côte d'Ivoire, some inputs have a significant effect in interaction with education in the studies cited. Such an interaction is equally an observation about education as about services; in the West African studies it implies that educating mothers has a limited impact on child health if the mothers do not also have access to health services.

**The Variability of Results**

The specific services that are most effective in improving the health of the public are by no means the same in each community. To illustrate, in rural Ghana, the height of children is related to the number of nurses, support staff, and beds as well as to the availability of drugs (Lavy and others forthcoming), but none of these services explains height for age in urban areas of the country (although the number of doctors does). Similarly, although this study used similar methodologies for data collection and analysis as Thomas, Lavy, and Strauss's (forthcoming) study of neighboring Côte d'Ivoire, there are as many differences as common factors in the variables that affect child nutrition.

To a degree differences across studies reflect different variable definitions and different aggregations used to form quality indexes. Moreover, few studies can control for program placement, that is, whether programs are located where they are needed most (which may lead to a false association between...
programs and malnutrition) or are placed where the most powerful consumers live (which may lead to an exaggerated belief that the programs reduced malnutrition). Of the cited studies, only Frankenberg (1995) controlled for placement effects. Her results, like the few other studies in the literature that look at health care placement, imply that cross-section results may be underestimations of the full effects of programs on nutrition and mortality. Yet it seems inappropriate to attribute the lack of compelling patterns to data inadequacies alone.

One explanation for the low impact of some programs is the availability of close substitutes, either in the form of privately provided care or other government services. For example, maternal clinics and family planning centers may regularly have large effects on nutrition and mortality because privately provided services are not close substitutes. Conversely, services for children and general facilities are often privately available; thus public facilities that provide such services mainly benefit households that have less access to private care. A similar interpretation may explain the general importance of drug availability as well as its limited effect in urban Ghana. It may also explain why some services substitute for education in some communities and may be complements in others at different levels of overall development.

Moreover, there often are community effects that appear to explain a fair amount of the variance in community health, yet are not directly observed by researchers. Benefo and Schultz (1994) found that, even with the inclusion of community services and prices as well as household resources, the average mortality rate of other households in a community explains the probability of child survival. They conclude, as did Alderman and Garcia (1994) in regard to similar variables for community morbidity, that this variable indicates important community factors that have not yet been isolated.

Because the results of studies vary widely and because unspecified common community factors are important, can one infer that health priorities should be determined at a local level? This is the basic thrust of Hanushek’s (1995) recent review of the effects of school quality on performance. He noted that because measured input into education jointly explained little about educational outcomes, and because few inputs were consistently significant in the studies reviewed, further work should follow an output-based approach to education. Although Kremer (1995) offers a different interpretation of this evidence, he reaffirms the basic theme that we echo: Because different inputs are effective in different circumstances, it often is advisable to decentralize decisionmaking for delivering health services. Local organizations may be in a better position to observe factors that are not measured by researchers or more distant policymakers. If so, it is important both to allow for discretionary allocation of the health budget at a decentralized level and to provide the proper incentives for targeted services. In some cases this may mean permitting health care centers to retain user fees, while in others performance-based budget support for public health measures may be effective.

Harold Alderman and Victor Lavy
Conclusion

In many environments significant increases in the share of resources going to the poor can be achieved by ensuring that services which are intended for the general population, such as primary health care and education, are in fact made accessible. To finance such services, many debt-stricken developing countries in Africa and elsewhere have embarked on policies designed to increase the share of operating expenses that health care systems raise from user fees. The evidence reviewed here confirms that new or increased user fees in public health facilities, when accompanied by an improvement in services, can increase use. Moreover, this increase will be positive for both the poor and the nonpoor, but much larger for the latter group. In particular, the poor are more likely to use modern health care that they pay for (if resources are of high quality) than to use subsidized public care that is ineffective.

These results are encouraging from the standpoint of raising user fees to finance a higher share of the recurrent costs of public primary health care and to free resources for quality improvements. These findings indicate only the potential, however. If quality improvements do not accompany cost recovery measures and if such measures fail to provide for exemptions targeted on the poor, these results imply serious consequences for community health. Unfortunately, in many countries, particularly in Africa, clinics do not retain user fees but are required to turn them over to the government. Similarly, few countries have successfully implemented sliding fee structures (Nolan and Turbat 1995). A further cautionary note comes from the observation that prices of privately provided services may rise in response to changes in prices of public services (Gertler and others 1995).

In one area—the increased provision of drugs—progress has been noted, especially in francophone Africa (Nolan and Turbat 1995; McPake, Hanson, and Mills 1993). Many of these countries, including Côte d'Ivoire subsequent to the period analyzed above, have been able to increase the supply of drugs to public clinics, albeit at higher prices.

The finding that drug availability is a priority for consumers is positive from a policy point of view. Unlike facilities, equipment, and human resources, drugs and vaccines can be readily provided by governments and can generate a rapid improvement in public health. The Zimbabwe government established a standard nationwide system of stock control and doubled the availability of essential drugs in health facilities over a four-year period (World Bank 1993).

From a different perspective, to the degree that drug availability is a common indicator of the overall quality of public services (McPake, Hanson, and Mills 1993; Jarrett and Ofosu-Amaah 1992), drug supplies may indirectly affect mortality by encouraging consumers to seek out health services. As such, cost recovery
and pricing policies for drugs will be enhanced or undermined in accord with the complementary improvements of other services.

But such services—training and placing clinic personnel, say—take considerably longer to accomplish than measures to increase supplies of drugs and vaccines. Although the availability of drugs may offset the shock of imposing user fees, the potential for delays in implementing other changes in the health environment suggests that these fees may need to be phased in. Moreover, after implementing initial cost recovery measures, authorities often fail to follow through with promised fee waivers and sliding fee scales to reflect income disparities. Thus the policy challenge is not how to keep health costs low but how to provide value for the fees charged.

Notes

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1. Although anthropometric measures of nutritional status are strongly related to the probability of mortality (Pelletier, Frongillo, and Habicht 1993), they measure different dimensions of child welfare that may respond to different interventions (Kielmann, Taylor, and Parker 1978).

2. Drug availability can range from 0, in the case where none of the drugs are available, to 1, if they all are present. If only one drug is present, the measure is defined as 0.33.

3. The sample means for public and private facilities are 8 and 10.4, respectively.

4. For the dependent variable, Benefo and Schultz (1994) use the proportion of children in the family who were born at least five years before the survey and died before their fifth birthday. Lavy and others (forthcoming) use the probability of survival (hazard of mortality) of all children born in the decade. Unlike Lavy and others, Benefo and Schultz do not have a separate regression for rural populations. They do, however, include a dummy variable for rural residence and its interaction with education (the former increases and the latter decreases mortality).

5. Most studies find that nutrition and child survival are responsive to food prices (Alderman 1993; Behrman, Deolalikar, and Wolfe 1988). Specifically, the studies from West Africa that provide much of the evidence on service quality described here also show that food prices have a pronounced effect on health indicators (Thomas, Lavy, and Strauss forthcoming; Lavy and others, forthcoming; and Benefo and Schultz 1994).

6. Thomas, Lavy, and Strauss (forthcoming) include a measure of household expenditures. Thus education is not merely a proxy for unobserved income. They do not test, however, whether the effects of infrastructure differ by income.

7. Cleland and van Ginneken's (1988) review found that the strong inverse relation of education and child mortality generally survives controls for income and assets, although not always without attenuation. For a similar observation on nutrition, see Thomas, Strauss, and Henriques (1991).
References

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


Griffin, Charles, John Briscoe, Bhanwar Singh, Radhika Ramasubban, and Ramesh Bhatia. 1995. “Contingent Valuation Meets the Cold Truth of Actual Behavior: Predicting Con-


THE IMPACT OF HEALTH AND NUTRITION ON EDUCATION

Jere R. Behrman

Child health and nutrition are strongly associated with educational achievement. But associations do not necessarily indicate causality; estimates generally are likely to be biased in one direction or the other. As a result analysts and policymakers should have much less confidence in findings about the effect of health on schooling success than has been claimed in previous surveys. The evidence is more nuanced and qualified than is often recognized but may still support the conclusion that health may have considerable effects on postschooling productivity. Policy implications point toward providing public subsidies for the collection, analysis, and dissemination of information about the links between health and education; and toward providing services to improve the health of poor children.

Better health and nutrition are positively associated with gains in schooling in many areas: enrollment at younger ages, less grade repetition, less absenteeism, more grades completed, and better performance on test scores. Recent surveys conclude that empirical studies constitute strong evidence showing that health and nutrition influence children's success in school (Leslie and Jamison 1990; Levinger 1992; Myers 1992; Pollitt 1990). Leslie and Jamison, for example, write that "the strongest case can be made for a negative effect of nutritional deficiencies on school outcomes. Research has consistently found protein-energy malnutrition and iron-deficiency anemia to have significant negative effects on tests of cognitive function in both pre-school and school-age children, and on attendance and achievement among the latter" (p. 197). These studies, together with more casual observations, have been used to win support for programs that lead to better child health and nutrition on the grounds that one very important payoff is a better-educated population, which will lead to subsequent increases in productivity.

Most of these studies are based on socioeconomic survey data that provide information about the associations between health and nutrition on the one hand and education on the other. But such associations do not necessarily imply causality, although they are so interpreted. Knowing the empirical magnitude of
such associations may be useful for predicting which students are more likely to
be successful in school or for targeting policies on particular groups of individu-
als when policymakers do not have reliable information on which to base their
decisions. For example, if the association between good health and education is
positive in many data sets, and policymakers want to target programs to serve
those in poor health, using low education as a proxy to identify program recipi-
teants might be effective.

The problem is that health, nutrition, and education are not randomly deter-
dined but rather are based, at least in part, on the choices made by individuals
and their families. These choices are made in response to possibly important
predetermined characteristics that policymakers and analysts cannot observe,
such as innate ability, motivation, genetic robustness, and the environment. Be-
cause these characteristics are not included in most socioeconomic data sets,
they are not captured by social scientists analyzing these data. Families make
choices, too, that typically are not observed, such as the amount of time that
parents spend educating children at home. Our grandparents knew through ca-
sual observations that family background and individual characteristics might
be critical in school success: Elizabeth had a lot of schooling because she was
smart and diligent, but Juan had little because he was lazy and more interested
in playing than studying; Pranee was always healthy because she was inherently
robust, but Kwame was constantly sick; Lee Ying's family connections assured
that she attended the best schools and got a good job, but Bhavani's family held
her back.

But most of the time academics from Cambridge to Bangkok and policy ana-
lysts from Washington to Santiago do not control for behavioral responses and
unobserved characteristics; they simply interpret associations to imply causal-
ity. Because associations in cross-sectional data may substantially over- or un-
derstate true causal effects, however, much less is known about the subject than
is presumed. Although the surveys noted above take into account some mea-
surement issues (such as the failure to control for intensity of schistosomiasis
infections), they pay very little, or no, attention to the problems of drawing
inferences from data that do not include relevant unobserved variables. Thus
the true underlying causal relations may be very different—either larger or
smaller—than those presented in the research.

In this article I survey what is known about the magnitude of the effect of
health and nutrition on schooling, sketching out a simple framework for esti-
mating the impact of health and nutrition on schooling. After summarizing sev-
eral empirical studies based on experimental and socioeconomic survey data,
the article concludes with three major points. First, most studies do not attempt
to deal with the estimation problems discussed in this analysis, which makes it
difficult to interpret their results. Moreover, studies based on past data cannot
provide much insight into what the effect might be if the incentives change a
great deal, say, as a result of market developments or educational reforms. Sec-
ond, the evidence suggests that good health and nutrition have more nuanced

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and qualified effects on schooling success than is often recognized but that these effects may still translate into a considerable improvement in postschooling productivity. And third, policy implications point to public subsidies to improve the health of poor children and finance the collection, analysis, and dissemination of information about the links among health, nutrition, and education.

A Simple Framework for Estimating the Effect of Health and Nutrition on Education

Often the frameworks that analysts and observers use are implicit. An explicit framework, however, has the advantage of clarifying which conditions reflect the effect of health and nutrition on education, and which conditions over- or understate their true causal effect on schooling success. To illustrate these possibilities, consider an explicit example of an important indicator of schooling success—cognitive achievement. Cognitive achievement is influenced by several individual, family, and community variables. Some of these variables can be observed by social scientists and policy analysts; others cannot ("unobserved" in this article). Table 1 shows how these variables might be classified. An explicit framework indicating how such variables affect a child's success in school is important for an accurate analysis of the causal effects of health and nutrition on education.

The simple association between the effects of good health and educational achievement holds if, first, it can be shown that health status affects cognitive achievement and not that children with higher achievement take better care of their health; and second, if the observed indicators (test scores, say) are not

<table>
<thead>
<tr>
<th>Variables</th>
<th>Observed by analysts</th>
<th>Unobserved by analysts</th>
</tr>
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<tbody>
<tr>
<td>Individual</td>
<td>Health indicators</td>
<td>Innate ability</td>
</tr>
<tr>
<td></td>
<td>(anthropometric measures, reported illness)</td>
<td>Motivation</td>
</tr>
<tr>
<td></td>
<td>Age, gender</td>
<td>Genetic endowment</td>
</tr>
<tr>
<td></td>
<td>School attainment</td>
<td>Capacity to concentrate</td>
</tr>
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<td>Family</td>
<td>Parental education</td>
<td>Household intellectual atmosphere</td>
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<tr>
<td></td>
<td>Parental occupation</td>
<td>Parental time devoted to cognitive development of child</td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td>Amount of food given to child</td>
</tr>
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<td>Community</td>
<td>Population size, density</td>
<td>General intellectual atmosphere</td>
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<td>Pupil-teacher ratio</td>
<td>Effectiveness of school management</td>
</tr>
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<td>Public health programs</td>
<td>Water quality</td>
</tr>
<tr>
<td></td>
<td>(mosquito control, availability of health clinics)</td>
<td>Nature of job market</td>
</tr>
</tbody>
</table>
correlated with unobserved variables (such as parental involvement) that affect achievement (because, if they are so correlated, the association between good health and achievement may represent the effect of the unobserved variables).

But, because many studies (see Strauss and Thomas 1995) show that households do make choices that affect their children's health and education, the two conditions noted in the previous paragraph are not likely to be satisfied in behavioral data and may not be satisfied in many experimental studies. If a factor is unobserved (by the analyst) and both affects the child's cognitive achievement directly and is correlated with the child's health, the estimated effect is biased. Moreover, the effect may be overstated (biased upward) or understated (biased downward).

The effect may be overstated if the dominant unobserved factor is, say, a robust constitution that increases the child's learning capacity as well as his or her health status relative to that of other children. Or if it is the amount of time parents devote to the child's intellectual and physical development, or the effect of more perceptive or more effective parents who can raise better educated and healthier children. Similarly, community-specific features, such as lower school or health service fees or higher expected returns to education that encourage and reward school attainment, may bias estimates upward.

On the other hand, the effect may be understated if the dominant factor is an unobserved individual, family, or community variable that favors intellectual development over child health in certain children. For instance, some children are innately smart and others are innately healthy; some parents care about or are good at developing their children's intellectual capabilities and other parents care about or are good at raising healthy children. In some communities the costs of cognitive development are low and the expected returns are high, and in other communities the costs of good health are low and the expected returns are high. The downward bias results because child health and nutrition are negatively correlated with the factor that is unobserved by the analyst and that directly affects the child's cognitive achievement. (A more extensive discussion of these possible biases is contained in Behrman and Lavy 1994.)

Estimating the Effect of Health and Nutrition on Schooling Success

How can we learn what effect health and nutrition have on school achievement? One approach is to analyze data from appropriately designed experiments. In an ideal experiment, children are randomly assigned to either a treatment group or a control group. The assignments are double-blind so that neither the children nor the administrators know which children are in which group. The group in treatment receives better health care than the control group, which receives an identical-appearing placebo. Changes in cognitive achievement are carefully measured. Such data would allow analysts to measure the impact of the treatment on cognitive achievement. But experiments are costly, maintain-
ing appropriate experimental procedures is not easy, and some experiments are unethical or impossible—withstanding food or vaccines, for example, to estimate the impact of disease or height on school attainment.

A second approach is to analyze behavioral data using statistical procedures that control for unobserved variables by purging the health and nutrition indicators of those components that are associated with unobserved variables. The usual methods for doing so, however, assume a set of observed variables, such as prices, that are not affected by the behavior that is being investigated and are not correlated with the unobserved variables. This assumption may not be valid, particularly if important variables are unobserved—such as the amount of time parents devote to their children. Many researchers in the past decade have attempted to evaluate the effect of health and nutrition on educational outcomes, but their results have been contradictory.

Studies Based on Experimental Data

Experimental studies in India and Indonesia assessing the effect of iron deficiency on children’s cognitive development and school performance found that iron supplements had significant positive effects on children who were initially anemic (Soemantri, Pollitt, and Kim 1985; Soemantri 1989; Soewondo, Husaini, and Pollitt 1989; Seshadri and Gopaldas 1989). The extent to which these results are generalizable is qualified, however, because the results obtained from similar studies in Thailand and analyzed by Pollitt and others (1989) were considerably different, although the analysts point out that the studies appear to have been conducted with at least as much care as those in India and Indonesia. In the Thai studies, which included about twice as many children as the total in the seven studies on India and Indonesia, researchers found significant positive associations between iron status and both ability and cognitive achievement. But they found no significant association between iron treatment and changes in ability or achievement during the study. Pollitt and his colleagues speculate that the true effect may have been obscured and identify two reasons for the apparent discrepancy. First, the control group benefited from a significant increase in iron status during the study (judging from the clinical examinations) that was about half as large as that of the treatment group. Second, even if iron supplementation helps to correct some attention disorders immediately, it does not remedy accumulated deficits in information. This sort of problem illustrates some of the difficulties of evaluating experimental research. In this case, the Thai study brings into question the results of the studies in India and Indonesia.

In two studies investigating the impact of parasitic and whipworm (Trichuris trichiura) infections on cognitive achievement in Natal, South Africa, Kvalsvig, Cooppan, and Connolly (1991) report their findings for 210 children (those most infected in the group of children for whom parental consent had been obtained). The first study’s results were consistent with the hypothesis that parasitic infections combine with nutritional deficits to impair cognitive processes.
But in determining parasitic loads, not all the relations were significant, and the studies did not control for the age of the child. The second study attempted to overcome this problem and also used a more comprehensive drug treatment program. This study found no association between treatment and educational attainment or memory function but indicated that a poor attention span was significantly associated with parasitic infection. The authors conclude that the results are suggestive, although "not conclusive," and note problems in selecting subjects, finding culturally appropriate tests, and measuring infection. Nokes and others (1992a, b) report on another double-blind placebo-controlled clinical trial of 103 Jamaican children with moderate-to-heavy infestations of whipworm. The children were randomly assigned to treatment and control groups. On three of eight cognitive tests (related to attentiveness and memory), children in the treatment group improved significantly more than those who had received the placebo and no longer differed significantly from uninfected children in the control group. No significant difference was detected in "the more global cognitive processes resembling classroom tasks (measured by the arithmetic and listening comprehension tests)" (Nokes and others 1992b, p. 545). The investigators concluded that moderate-to-heavy whipworm infection has a detrimental and rapidly reversible effect on certain aspects of cognitive development.

Finally, researchers have gathered information on food supplementation using experimental procedures but appear to have been even less successful than researchers studying parasitic infection in following such procedures satisfactorily. Among thirty-four rural Mexican children who were followed from birth through age nine, the half who received supplementary food generally performed significantly better on school tests, were more active in the classroom, and interacted more positively with their classmates than did the control group (Chavez and Martinez 1986). This study is consistent with a positive effect of child nutrition on school performance. But no information is provided on how to evaluate the rate of return of this intervention compared with using the resources in other ways, such as providing more textbooks. Nor did researchers control for the effect of increased income that families who participated in the program received in the form of food.

In another study, food supplements were provided to a much larger group of children in four Guatemalan villages during 1969–77, and the 72 percent of that sample who could be located were checked in a 1987–88 follow-up study by the Institute for Nutrition in Central America and Panama (Martorell 1993; Pollitt and others 1993). The results indicate that those who received the nutritious supplements averaged 0.6 standard deviations higher on tests for adolescent intelligence, a result that is consistent with the evidence that early childhood nutrition has important long-run effects on cognitive achievement. But because the group receiving the supplement was not randomly selected, the results may have been compromised. For example, those parents who enrolled their children in the program may have been different from the population at large. Even without the program, they might have elected to provide a more nutritious diet.
for their children and to invest more in them in other ways as well. If so, the estimated associations indicate that food supplementation has a stronger effect on intelligence than it may have in actuality.

Other experimental studies included educational and social interventions in addition to dietary supplements and health care. Pollitt (1990, p. 181) summarizes these studies as having observed "robust beneficial developmental effects . . . in tests of cognitive function during the preschool period and later on school performance." Because these studies involved massive multidimensional interventions, however, it is difficult to identify the contribution of the health and nutrition components alone.

Thus these experimental studies of the impact of health and nutrition on schooling provide much less support for such effects than often is asserted. Because the results frequently are contradictory and afflicted with methodological problems, their conclusions must be qualified.

**Studies Based on Socioeconomic Surveys of Behavioral Data**

Using socioeconomic surveys of behavioral data that find strong positive associations between health and school achievement (table 2), the authors of these types of studies conclude that the effects are strong and important. For example, Moock and Leslie (1986, p. 49) state that their results "add to the growing evidence suggesting that efforts to improve child nutritional status may have educational benefits as well as survival and health benefits. If the economic benefits of improving nutritional status can be legitimately calculated to include the higher productivity of a more educated adult population . . . , as well as the treatment savings from a better nourished, less disease-prone child population, it may turn out that an investment in child nutrition is one of the best investments a developing country can make."

These studies indeed indicate that chronic malnutrition is negatively associated with school performance in several developing countries. But without controlling for the effects of unobserved variables, the estimates may be biased, perhaps considerably. Even the direction of bias is unknown. Therefore these studies provide much less persuasive evidence than is claimed by their authors and by previous surveys.

Two recent studies use the 1988-89 Ghanaian Living Standards Measurement Study data collected by the World Bank to evaluate how robust the estimates are to some of the methodological problems with such data. The first, Behrman and Lavy (1994), presents alternative estimates of the relation between health and cognitive achievement in the simple framework discussed earlier. These alternatives suggest that the estimated effect varies considerably depending on the assumptions made about the behavior that determines child development. If it is assumed, first, that child health reflects household behavioral decisions that cannot be observed (that is, genetic endowment or a learning environment), but, second, that there are no unobserved inputs to child cogni-
Table 2. Studies Based on Socioeconomic Surveys that Report Strong Positive Associations between Child Health and Nutrition and Schooling Success

<table>
<thead>
<tr>
<th>Schooling success indicator</th>
<th>Child health/nutrition indicator</th>
<th>Location</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment rates</td>
<td>Height-for-age, weight-for-height(^a)</td>
<td>Terai, Nepal</td>
<td>Moock and Leslie (1986)</td>
</tr>
<tr>
<td>Age-specific grade attainment</td>
<td>Age-standardized height, weight-for-age</td>
<td>Northeastern Thailand</td>
<td>Chutikul (1986)</td>
</tr>
<tr>
<td>Age-specific grade attainment</td>
<td>Height-for-age</td>
<td>Gansu and Jiangsu, China</td>
<td>Jamison (1986)</td>
</tr>
<tr>
<td>Intelligence scores</td>
<td>Height-for-age</td>
<td>Guatemala</td>
<td>Johnston and others (1987)</td>
</tr>
<tr>
<td>Cognitive achievement scores</td>
<td>Height-for-age(^b)</td>
<td>Philippines</td>
<td>Florencio (1988)</td>
</tr>
<tr>
<td>Age-specific schooling</td>
<td>Height-for-age(^c)</td>
<td>Bukidnon, Philippines</td>
<td>Bouis (1992)</td>
</tr>
<tr>
<td>Dropout rates</td>
<td>Visual acuity(^d,e)</td>
<td>Cereal, Brazil</td>
<td>Gomes-Neto and others (1992)</td>
</tr>
<tr>
<td>On-time promotion</td>
<td>Visual acuity, skinfold thickness-per-age(^e)</td>
<td>Cereal, Brazil</td>
<td>Gomes-Neto and others (1992)</td>
</tr>
<tr>
<td>Cognitive achievement</td>
<td>Skinfold thickness-per-age(^e,f)</td>
<td>Cereal, Brazil</td>
<td>Gomes-Neto and others (1992)</td>
</tr>
</tbody>
</table>

\(^a\) But not weight-for-age nor hemoglobin counts.  
\(^b\) Significant relation in about a third of the cases. Generally no significant relation with hemoglobin.  
\(^c\) Significant for half of the age groups considered.  
\(^d\) But no significant association with skinfold thickness-per-age.  
\(^e\) But no significant associations with height-per-age or an index of vita capacity based on height, weight, and thorax circumference.  
\(^f\) But no significant association with visual acuity.
tive development reflecting the choices of households (such as the allocation of parental time), the effect of health and nutrition on children's cognitive achievement is actually two to three times greater than standard measures imply. That is, under these assumptions, the usual estimates are biased downward. But if the second assumption is dropped, and procedures adopted that control for unobserved family and community factors, the findings indicate that estimates of the causal impact of health and nutrition on schooling success are substantially overstated. Therefore, what appears to be a positive impact on cognitive achievement based on the procedures used in the studies summarized in table 2 (and that appears even stronger with the usual statistical methods of dealing with behavioral choices) is apparently due to unobserved household and community factors. That is, child health and nutrition may be a fairly good indicator of cognitive achievement, but it does not seem to cause cognitive achievement.

The second study (Glewwe and Jacoby 1995) investigated how health and nutrition affect the age at which children enroll in school, after demonstrating that this decision can have a substantial impact on lifetime wealth. The results, based on a range of estimates, indicate that early childhood malnutrition (as indicated by height, given the child’s age) is related to delayed enrollment. This effect is reduced substantially (by almost two-fifths), however, if the study controls for unobserved family and community variables, again suggesting that indicators of health and nutrition may serve in part as proxies for such factors.

These results thus raise considerable questions about the use of behavioral data in determining the relations between schooling and child health. Further exploration of whether these results carry over to other countries and other indicators of school success would be valuable.

Conclusion

Undertaking research on the relation of health and nutrition to schooling success is difficult. As noted, the ideal technique is a well-conducted, double-blind, experimental study with random assignment to treatment and control groups. But actual experimental studies often have major limitations that may compromise the results. And although studies using socioeconomic surveys ideally would approximate good experimental practice, in fact they usually cannot control for unobserved variables, which may also bias the estimates. Even the best studies based on data collected in the context of one set of institutions can provide only limited insight into the expected impact if incentives were to change, say, due to market developments and educational reforms.

Such difficulties are pervasive in socioeconomic and policy-related research, however, and must be put in perspective. For example, summaries that point to high rates of return to schooling are plagued by the same problems. Analyses by Colclough (1982), Psacharopoulos (1994), World Bank (1993), and the United Nations Development Programme (1990) are based on studies with a wide range
of results, some of which indicate no—or very small—effects. Most of these do not control for problems such as those discussed here, and those that do often report rates of return that are half or less than half those in the standard studies (see the surveys in Behrman 1990a, b, c). Recent studies for the United States, however, suggest that standard estimates may understate the effects of schooling on wages (see Behrman forthcoming for a brief survey and references). Card (1994) shows that the choice of instruments used in these estimates biases upward the estimated returns to schooling because it effectively overweights that part of the curve where the response is greatest, a point elaborated in a more general framework in Angrist, Graddy, and Imbens (1995).

Such difficulties are hardly limited to the analysis of human resource investments. Some of the basic tenets of current conventional wisdom about economic development policy, such as the advantages of uniform tariffs, are based on relatively weak empirical foundations with little control for estimation problems such as those mentioned in this article.

The point is that in most areas the empirical basis for policies is subject to a large number of qualifications. It would be desirable to obtain a firmer foundation by collecting better data (particularly longitudinal data) and subjecting the data to more careful analyses. Meanwhile, policies concerning the effects of health and nutrition on education have to be made. And although the empirical basis for such policies is not as strong as might be desired, policymakers cannot ignore what the better studies suggest, particularly since the information is as good as it is in many other areas.

For example, there seems to be some systematic evidence that iron deficiency and parasitic infections affect cognitive achievement. There also is considerable evidence about strong positive associations between health and educational achievement, although there is much more ambiguity regarding the effects on schooling of more general indicators of health and nutritional status.7

How might these effects translate into long-run productivity in the labor market? There are, to my knowledge, three studies of the impact of cognitive achievement on wage rates in developing countries that treat cognitive achievement as the outcome of behavioral choice: Boissiere, Knight, and Sabot (1985); Glewwe (1994); and Alderman and others (forthcoming). These studies suggest that health, nutrition, and education enhance cognitive achievement and increase wages—and presumably productivity.8 The effect may be fairly substantial. For example, if the 10 percent increase in cognitive achievement (after iron supplementation) found by Soemantri, Pollitt, and Kim (1985) and Soemantri (1989) persisted, it would, on the basis of the wage rates referred to above, translate into a 13–22 percent increase in wages. The increase in cognitive achievement attributable to an increase of one standard deviation in height-for-age in the Behrman and Lavy (1994) estimates for Ghana implies a 14–34 percent increase in wages if there is no control for unobserved factors (but this effect disappears when the methodology controls for such factors). Thus, at least for the poor, the effects of improved health and nutrition on schooling success may compare fa-
vorably with the effects of many other investments. And many other positive
effects have not been considered here, such as releasing resources (including the
time of parents and other family members as well as health and nutrition ser-
vice) that now are devoted to caring for family members in poor health.

The evidence suggests that better health and nutrition may pay off in terms of
economic growth as well as equity concerns by improving the educational per-
formance of poor people in the developing world. That productivity and equity
concerns probably are in harmony is an important plus. Policymakers, there-
fore, should seriously consider how various policies affect child health and nu-
trition and identify those policy changes that would improve it. Productivity and
equity concerns naturally raise another question. Who has the comparative ad-
vantage in these areas—governments or individuals, families, and other private
entities? Just because education or manufacturing or health has positive produc-
tivity effects does not mean that the government should provide or subsidize
such activities. But from an efficiency point of view, one area in which the gov-
ernment is likely to have a potentially important role is in collecting and dis-
seminating information about the benefits and sources of better nutrition.
Private entities are unlikely to collect and disseminate such information because
of its "public good" characteristics. (That is, one person's access to information
on malaria control, say, does not leave that information less available for oth-
ers.) And the development of reliable information is difficult and expensive.
Much of what previous surveys claim is "known" and "supported" by the lit-
erature, upon further examination does not distinguish persuasively between
association and causality. But careful studies can provide useful information on
the possible effects of health and nutrition on education. There also are alleg-
edly important externalities to knowledge acquired in schools. If these exter-
nalities in fact are important—a matter on which there is some controversy—
the empirical evidence is as strong for subsidizing child health and nutrition
among poor populations as for subsidizing teachers' salaries or textbooks.

Leaving aside information issues and related policies, improving the health
and nutrition of poor children can be an efficient way to improve school atten-
dance and enhance economic growth. This is the case not simply because more
learning translates into long-run productivity, but because the private incen-
tives, particularly for the poor, are to invest less in child health and nutrition
than would be socially desirable from a pure efficiency perspective for human
capital investments. The difference in private and social incentives for investing
in child health and nutrition is likely to be much larger for the poor both because
gains from positive externalities are likely to be concentrated among the poor
and because imperfect capital markets that result in weaker private than social
incentives for human resource investments are likely to be important constraints
primarily for the poor.

Perhaps the commonsense observation that poor health adversely affects
children's schooling is right. Perhaps it is sensible to design policies based on
that belief even if there is considerable uncertainty about the dimensions of such
effects. But policymakers are likely to make better policy decisions if they are sensitive to the possible problems of interpreting results that do not take unobservable characteristics into account. Furthermore, by generating and disseminating information on these interactions, countries will benefit from considerable social gains arising from improved policies.

Notes

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1. These surveys all are based primarily on a common set of studies.

2. This summary draws in part on Behrman (1993), which also reviews some older studies. There also are studies on industrial economies that fall into similar general patterns as the studies reviewed here (see, for example, Miller and Korenman 1993).

3. In this double-blind clinical trial to assess the impact of iron treatment on the IQ and educational attainment of 1,358 children ages nine to eleven, treatment involved taking either an iron tablet or a placebo tablet in school. Children were randomly assigned to the iron and the placebo groups. Before and after a sixteen-week course of treatment, Raven Progressive Matrices tests were administered to measure ability, and Thai language and mathematic tests were administered to measure achievement.

4. Chronic malnutrition is indicated by low height-for-age and poor visual acuity. Transitory malnutrition is indicated by weight-for-height and weight-for-age.

5. Several of these studies also have other estimation problems that make interpretation difficult. For example, most of them use school samples but do not control for selectivity regarding which children attend school, although Chutikul (1986), Bouis (1992), and Johnston and others (1987) use all the children in a household-based sample rather than school-based samples, so they probably do not have this selectivity problem.

6. Although these studies attempt to ascertain the robustness of their results to alternative assumptions, they, too, have limitations. The controls for unobserved family and community factors that use data on families with multiple children may exacerbate estimation biases toward zero because of measurement error, although the first study attempts to explore this possibility. These methods do not, moreover, control for unobserved individual factors. The second study assumes, further, that how the child is treated before age six affects school readiness through the child's health but not through cognitive development, which seems counter to the beliefs of many researchers.

7. The surveys noted in the introduction, in contrast, do not seem very sensitive to these ambiguities. Note, for example, that Leslie and Jamison (1990, p. 197), writing about anemia, seem to ignore some of the puzzles raised in the studies noted here, including those on Thailand, Nepal, and the Philippines. Their claim about the effects of protein-energy malnutrition completely ignores the problems of using behavioral data to determine the causal effects of health and nutrition on schooling.

8. The cognitive achievement-wage rate studies summarized here are sensitive to estimation issues and have attempted to explore how robust these estimates are and to control for them.
References

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MACROECONOMIC ADJUSTMENT AND POVERTY IN AFRICA: AN EMERGING PICTURE

Lionel Demery
Lyn Squire

The view that macroeconomic adjustment disproportionately hurts the poor in Africa has become commonplace. The popular media and the nongovernmental aid community frequently express this view in critiques of Bank-funded economic reform programs. Yet the evidence on which the claim has been based is flimsy and anecdotal. The emergence of more convincing data, from detailed household surveys in Africa, provides an opportunity to set the record straight.

The evidence from six African countries reviewed in this article demonstrates that poverty was more likely to decline in those that improved their macroeconomic balances than in those that did not. The critical factor is economic growth: the economy grew more rapidly and poverty declined faster in countries that improved macroeconomic balances, depreciating the real effective exchange rate. Changes in the real exchange rate also immediately and favorably affected rural incomes, benefiting the poor both directly and indirectly. But the findings also highlighted three causes for policy concern. First, many African governments have yet to display a real commitment to macroeconomic reform; second, the poorest of the poor have not benefited from recent growth in some countries; and, third, the prospects for the poor are not rosy unless there is more investment in human capital and better targeting of social spending.

How policy reforms in Africa affect poverty has been a subject of vigorous debate in recent years. Consider the following facts. More than thirty countries in Sub-Saharan Africa were embarked on economic reform programs of varying intensity during the second half of the 1980s and in the 1990s. At the same time, gross domestic product (GDP) per capita has stagnated in Sub-Saharan Africa. It declined in real terms by about 1 percent a year between 1988 and 1992. Real per capita consumption fell in twenty-three out of
forty-one Sub-Saharan African countries during the same period. Faced with this evidence, observers have been drawn almost inescapably to the conclusion that the economic reforms typically advocated by the World Bank and the International Monetary Fund (IMF) have failed. And in the process, the reforms have damaged the well-being of the poor.

But the conclusion is fundamentally flawed in one critical respect—it implicitly treats Sub-Saharan Africa as a homogeneous whole, where economic reform is uniformly implemented and outcomes are consistently disappointing. In fact, it is now clear that economic reforms have been very unevenly applied—indeed in some countries “reforms” have moved in the wrong direction. And outcomes, as measured by changes in the extent of poverty, have been very diverse. The most striking finding, however, is the systematic link between policy implementation and outcomes for the poor—effective reform programs are associated with reduced overall poverty, inadequate ones with worsening poverty.

The key development that makes a solidly grounded analysis feasible is the recent availability of household sample surveys in Africa that provide measures of poverty at two points in time. Hitherto, discussion had to rely on theory; on indirect evidence, often from modeling exercises (Bourguignon, de Melo, and Morrisson 1991; Bourguignon, de Melo, and Suwa 1991; Dorosh and Sahn 1993); or on more anecdotal evidence (Watkins 1995). The intention here is to take the discussion further by examining the newly available evidence from six African countries. The first part of this article, therefore, documents the survey information for Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, and Tanzania. Not all of the surveys are equally robust; nor do they cover all dimensions of well-being. Nevertheless, they are reliable enough to establish one key conclusion—changes in the well-being of the poor, at least as measured by real expenditures, are far from uniform. Some countries have experienced dramatic increases in poverty; others have seen significant declines.

These variations in outcome provide valuable information for assessing different policies. The second part of the article tries to identify which sets of policies have been associated with declining levels of poverty and which with worsening poverty. This analysis provides the most convincing evidence to date that economic reform is consistent with a decline in overall poverty—and, further, that a failure to reform is associated with increased poverty.

The association identified between economic policy and changes in poverty is interesting but does not by itself establish causality. The argument can be further substantiated, however, by a more detailed examination of two countries—Côte d’Ivoire and Ghana. Côte d’Ivoire’s failure to adjust effectively to external shocks during the period of study provides a convenient counterfactual to the success of Ghana’s reform efforts. Moreover, household data in these countries are particularly robust, offering an opportunity to examine the links between macroeconomic policy and the poor. This examination, undertaken in the third part of the article, highlights the pivotal role the exchange rate plays in ensuring effective equitable adjustment.
Poverty in Africa

Evidence on household welfare has improved in many African countries. We have household surveys for six countries at two points in time; the characteristics of the surveys are summarized in table 1. Survey dates vary, but they all cover the 1980s and 1990s, the years of so-called adjustment in Africa. Sample sizes are generally large, ranging from 498 households in Tanzania (1983) to 8,000 households in Kenya (1992-93). In all but one case, the surveys were designed to be nationally representative or representative of the rural population and were undertaken by national statistical agencies. The exception is Ethiopia, where the survey covered seven different areas of the country chosen to reflect the effects of the 1984-85 famine. The survey (initially carried out by the International Food Policy Research Institute and repeated by the Institute of Development Research in Addis Ababa) was designed to cover regional, ethnic, and agro-ecological diversity. Thus, although it is not nationally representative, the survey is sufficiently broad-based to be considered representative of a large section of rural Ethiopia.

In all cases, some data problems have been encountered. The results reported here are the best estimates available given these shortcomings. In broad terms the results reveal three things. First, changes in poverty have been quite diverse—one country shows a dramatic increase in the share of the population in poverty, one shows a roughly constant share, and four countries show significant declines. Second, whatever the change in poverty, economic growth or decline has been the principal influence; in other words, changes in inequalities of income (or expenditure) have played a secondary role. And third, the poorest of the poor have not always benefited, even when the poor on average have gained.

Table 1. Characteristics of Household Surveys in Six African Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Coverage</th>
<th>Year 1</th>
<th>Sample</th>
<th>Source</th>
<th>Year 2</th>
<th>Sample</th>
<th>Source</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d'Ivoire</td>
<td>National</td>
<td>1985</td>
<td>1,600</td>
<td>CILSS</td>
<td>1988</td>
<td>1,600</td>
<td>CILSS</td>
<td>Good</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Regional</td>
<td>1989</td>
<td>547</td>
<td>IFPRI</td>
<td>1994</td>
<td>1,453</td>
<td>CSAE/JDR</td>
<td>Good</td>
</tr>
<tr>
<td>Kenya</td>
<td>Rural</td>
<td>1982</td>
<td>5,800</td>
<td>RHBS</td>
<td>1992</td>
<td>8,000</td>
<td>SDA</td>
<td>Medium</td>
</tr>
<tr>
<td>Nigeria</td>
<td>National</td>
<td>1985</td>
<td>1,400</td>
<td>FOS</td>
<td>1992</td>
<td>1,400</td>
<td>FOS</td>
<td>Medium</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Rural</td>
<td>1983</td>
<td>498</td>
<td>RHS</td>
<td>1991</td>
<td>1,046</td>
<td>CERB</td>
<td>Poor</td>
</tr>
</tbody>
</table>


Source: Grootaert (1993); Dercon, Krishnan, and Kello (1994); Mukui (1994); Ferreira (1994); Canagarajah, Nwafon, and Thomas (1995); Coulombe and McKay (1995).
The Incidence of Poverty

The simplest measure of poverty is the head count index—the share of the population below some predetermined poverty line. The focus here is on absolute poverty; that is, the poverty line is held constant in real terms through time. No attempt, however, is made to use the same poverty line in the countries selected, in part because we rely mainly on secondary sources, but also because our interest is in changes in poverty, not in comparing levels of poverty between countries.

Table 2 shows the country-specific poverty lines and the corresponding shares in poverty for each survey. It reveals a diverse set of experiences. The incidence of poverty has changed significantly in some countries. These changes have occurred in relatively short periods of time (in all cases less than a decade) and have been in different directions in different countries. Thus the share of the population in poverty has increased by 16 percentage points in only three years in Côte d’Ivoire, whereas it has fallen by similar amounts in only five years in Ethiopia and eight years in Tanzania. The table also shows that for Kenya the incidence of poverty has remained roughly constant. Given the growth in population—3 percent a year or more—the number of poor in Kenya has undoubtedly increased. The data imply an increase of around 2 million rural Kenyans in poverty during the decade.

Growth and Inequality

The change in poverty shown in table 2 reflects the joint impact of a change in mean income (with inequality held constant) and a change in inequality (with mean income held constant). Decomposing the total change in poverty into these two constituent parts (table 3) allows us to identify the respective roles of growth and redistribution in reducing poverty. The result—that changes in mean income are consistently the principal agent of change in poverty—is consistent with results from other parts of the world. But table 3 also shows that the change in mean income and the change in inequality generally operate in opposite direc-

<table>
<thead>
<tr>
<th>Table 2. The Incidence of Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country and years of surveys</td>
</tr>
<tr>
<td>Côte d’Ivoire (1985/1988)</td>
</tr>
<tr>
<td>Ethiopia, rural (1989/1994)</td>
</tr>
<tr>
<td>Ghana (1988/1992)</td>
</tr>
<tr>
<td>Kenya, rural (1981/1991)</td>
</tr>
<tr>
<td>Tanzania, rural (1983/1991)</td>
</tr>
</tbody>
</table>

Source: Grooeraer (1993); Dercon, Krishnan, and Kello (1994); Mukai (1994); Ferreira (1994); Canagarajah, Nwafon, and Thomas (1995); Coulombre and McKay (1995).
Table 3. Effect of Changes in Economic Growth and Inequality on Poverty
(change in head count index in percentage points)

<table>
<thead>
<tr>
<th>Country</th>
<th>Effect of changes in economic growth</th>
<th>Effect of changes in inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d’Ivoire</td>
<td>+19.4</td>
<td>-3.5</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>-23.5</td>
<td>+5.5</td>
</tr>
<tr>
<td>Ghana</td>
<td>-4.8</td>
<td>-0.4</td>
</tr>
<tr>
<td>Kenya</td>
<td>-6.2</td>
<td>+3.4</td>
</tr>
<tr>
<td>Nigeria</td>
<td>-13.6</td>
<td>+4.7</td>
</tr>
<tr>
<td>Tanzania</td>
<td>-33.4</td>
<td>+19.3</td>
</tr>
</tbody>
</table>

Note: The results reported here are the average of two decompositions, one using the initial period mean and Lorenz curve, and the other using the terminal period mean and Lorenz curve. This procedure ensures an exact decomposition, that is, it eliminates any residual. Other procedures are possible, but the basic result reported in the text regarding the greater importance of growth is unlikely to be affected.

Source: Authors’ calculations, based on the following: Grootaert (1993); Dercon, Krishnan, and Kello (1994); Mukui (1994); Ferreira (1994); Canagarajah, Nwafon, and Thomas (1995); Coulombe and McKay (1995).

...tions as far as their effect on poverty is concerned. This result is not consistent with experience elsewhere (see, for example, Morley 1994 in the case of Latin America).

What Happened to the Poorest of the Poor?

The finding that changes in inequality and changes in mean income have generally worked in opposite directions can have especially important implications for the poorest of the poor. One possible outcome is immiserizing growth: the poor as a whole may benefit from growth despite worsening inequality, but the bottom decile may see their incomes decline. The other possibility is that the change in inequality protects the bottom decile when mean income is declining.

What happened to the well-being of the poorest groups in these six countries? Table 4 reports the incidence of poverty in five of the six countries, based on a poverty line that defines approximately 10 percent of the relevant population as poor in the base year. This line is then kept constant in real terms in estimating the incidence in the terminal year. The table shows that the incidence of “hard-core” poverty declined in Ghana and rose in Côte d’Ivoire, reflecting the trends observed in table 2.

But in three cases—Kenya, Nigeria, and Tanzania—real expenditure of the poorest of the poor declined, even though the incidence of poverty fell nationwide. This spending decline is particularly marked in Tanzania, suggesting that the poorest 10 percent of the population was noticeably worse off in 1991 than in 1983. These poorest 10 percent are reported to earn very low incomes—less than 6 percent of average income, and less than 14 percent of the upper poverty line. Analysis suggests that the incidence of poverty as a whole would have risen had the poverty line been set at levels equal to or less than 40 percent of the...
Table 4. Trends in Hard-Core Poverty

<table>
<thead>
<tr>
<th>Country and years of surveys</th>
<th>Lower poverty line</th>
<th>Percentage of population in poverty</th>
<th>Change (percentage points)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As a percentage of mean expenditure</td>
<td>As a percentage of upper poverty line</td>
<td>Year 1</td>
</tr>
<tr>
<td>Côte d'Ivoire (1985/1988)</td>
<td>27</td>
<td>50</td>
<td>10.0</td>
</tr>
<tr>
<td>Nigeria (1985/1992)</td>
<td>31</td>
<td>47</td>
<td>10.0</td>
</tr>
<tr>
<td>Tanzania (1983/1991)</td>
<td>6</td>
<td>14</td>
<td>10.3</td>
</tr>
</tbody>
</table>

a. This poverty line identifies 10 percent of the population as poor in the initial year. Thus, in the case of Côte d'Ivoire, the line is 27 percent of mean expenditure and 50 percent of the poverty line used in table 2.

Sources: Grootaert (1993); Mukui (1994); Ferreira (1994); Canagarajah, Nwafon, and Thomas (1995); Coulombe and McKay (1995).

upper line (Ferreira 1994). In Kenya the incidence of "hard-core" poverty increased by 4 percentage points. And despite the marked decline in poverty overall in Nigeria, the incidence of core poverty increased by 2.5 percentage points between 1985 and 1992. Indeed, poverty incidence would increase in Nigeria using any poverty line up to about 50 percent of the poverty line used in table 2. These results are a telling reminder that an exclusive focus on the poor as a homogeneous group can obscure the fact that some poor can be worse off even when the living standards of most poor are improving.

Policy and Poverty

A recent study of macroeconomic policy in Sub-Saharan Africa (World Bank 1994) has provided a valuable quantitative base for investigating the link between policy and poverty. The study provides a consistent set of data for key variables and a method of combining a range of macroeconomic policies—fiscal, monetary, and exchange rate—into a single index. To illustrate the approach, the fiscal component of the index is based on the overall fiscal balance and total revenue. Scores are applied on a consistent basis to performance in each of these areas and then added to arrive at the fiscal component of the index. A similar procedure is followed for the exchange rate and monetary components. The final index is a weighted average of performance in each of the three areas of policy, the weights reflecting the importance of each component in determining growth as revealed by cross-country regression analysis (table 5).

For the present purpose, the change in the index of macroeconomic policy has been calculated with reference to the periods covered by each country's two surveys. Specifically, the procedure adopted is as follows:
Table 5. Index of Changes in Macroeconomic Policies
(weighted average of performance)

<table>
<thead>
<tr>
<th>Country</th>
<th>First survey</th>
<th>Second survey</th>
<th>Change in fiscal policy</th>
<th>Change in monetary policy</th>
<th>Change in exchange rate policy</th>
<th>Overall change in macroeconomic policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d'Ivoire</td>
<td>1985</td>
<td>1988</td>
<td>-2</td>
<td>1.0</td>
<td>-2.0</td>
<td>-1.65</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1989</td>
<td>1994</td>
<td>-1</td>
<td>-1.0</td>
<td>2.0</td>
<td>0.55</td>
</tr>
<tr>
<td>Ghana</td>
<td>1988</td>
<td>1992</td>
<td>0</td>
<td>0.5</td>
<td>2.5</td>
<td>1.35</td>
</tr>
<tr>
<td>Kenya</td>
<td>1982</td>
<td>1992</td>
<td>1</td>
<td>-1.5</td>
<td>0.5</td>
<td>-0.45</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1985</td>
<td>1992</td>
<td>1</td>
<td>-1.0</td>
<td>3.0</td>
<td>1.79</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1983</td>
<td>1991</td>
<td>3</td>
<td>1.0</td>
<td>3.0</td>
<td>2.76</td>
</tr>
</tbody>
</table>

Note: For detailed method of calculating index, see note 3, page 57.

Source: All data for all countries except Ethiopia from Bouton, Jones, and Kiguel (1994, tables B1, B2, B4, B5, B7, and B8). Data for Ethiopia from IMF (1991, table 4 and appendix tables III and IXII); IMF (1994, table 2 and appendix tables V and XXXVII), and International Currency Analysis, Inc. (various years).

- The initial index is calculated as the average of the year of the first survey and the two preceding years. This index provides a measure of the macroeconomic stance before and during the period of the first survey.
- The final index is calculated, in the same way, as an average of three years—the year of the second survey and the two preceding years. This procedure allows for the effects of policy changes to work their way through the economy. The choice of three years is arbitrary, although some support is found in modeling exercises (such as Bourguignon, de Melo, and Suwa 1991).
- The change in macroeconomic policy is then the difference between the initial and final indexes.

The change in the index and the corresponding change in poverty are shown in table 6.

Table 6 presents the most compelling evidence to date that improvements in the macroeconomic policy regime of the kind usually associated with World Bank and IMF-supported adjustment programs are consistent with a decline in the inci-

Table 6. Macroeconomic Policy and Poverty

<table>
<thead>
<tr>
<th>Country</th>
<th>Survey years</th>
<th>Change in macro policy (weighted score)</th>
<th>Change in poverty (percentage points per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Côte d'Ivoire</td>
<td>1985/1988</td>
<td>-1.65</td>
<td>+5.30</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1989/1994</td>
<td>+0.55</td>
<td>-3.60</td>
</tr>
<tr>
<td>Ghana</td>
<td>1988/1992</td>
<td>+1.35</td>
<td>-1.95</td>
</tr>
<tr>
<td>Kenya</td>
<td>1982/1992</td>
<td>+0.45</td>
<td>-0.28</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1985/1992</td>
<td>+1.79</td>
<td>-1.27</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1983/1991</td>
<td>+2.76</td>
<td>-1.83</td>
</tr>
</tbody>
</table>

Source: Tables 2 and 5.
dence of poverty overall. Recall that an increase in the index measures improvement in fiscal policy, monetary policy, and exchange rate policy. The evidence shows that in the five countries experiencing progress on these fronts, poverty declined. And in the one country where policies deteriorated, poverty increased. These results do not establish causality, but, at least in the six countries for which we have evidence, we can conclude that failure to implement an adjustment program has been doubly harmful to the poor—they lose the benefits that adjustment can bring, and they suffer worse deprivation under likely alternative policy regimes characterized by larger fiscal deficits and overvalued exchange rates. This is a frequent finding of modeling exercises—heterodox policies, often designed to protect the poor, end up making matters worse for them.

How Policy Affects the Poor

Recent history in this handful of African countries, therefore, suggests close links between poverty on the one hand and macroeconomic balances and the rate of economic growth on the other. What is the nature of the connection, and what processes are at work? What would have happened to poverty had macroeconomic balances not changed in these countries? These questions are difficult to answer by simply tracing what happened over time. One approach is to use a computable general equilibrium (CGE) model, which can disentangle the effects of policy variables from other influences. This technique is used in several recent studies, notably in research at the Organization for Economic Cooperation and Development (OECD) (Bourguignon, de Melo, and Morrisson 1991) and Cornell University (Dorosh and Sahn 1993).

These CGE modeling exercises convey three important messages. First, the shocks that destabilized the developing world were harder on the poor than the adjustments that followed. Dorosh and Sahn (1993) conclude that the terms of trade shocks in Sub-Saharan Africa were so pervasive that the real incomes of most household groups suffered. Second, the models highlight the diversity of experience with structural adjustment, depending on the characteristics of the country, the shocks it faced, and the policy responses it applied. Finally, the models show that orthodox macroeconomic adjustment packages usually lead to more favorable outcomes for poverty than alternative (heterodox) adjustment strategies. For example, using an “archetypal” CGE model for Africa, Bourguignon, de Melo, and Suwa (1991) demonstrate that “rationing” adjustment through the application of import controls in many ways postpones adjustment and is worse for poverty than the orthodox package. Dorosh and Sahn (1993) obtain similar results from four African CGE model case studies.

The CGE model experiments highlight the processes through which macroeconomic adjustment can favorably affect the poor. The combined effect of exchange rate, fiscal, and monetary policies is to reduce the real exchange rate. A real exchange rate depreciation influences income distribution and poverty through three main channels. First, it raises overall economic growth, mainly
through export expansion. Evidence for this effect comes not only from CGE models (for example, Dorosh and Sahn 1993), but also from cross-country analysis. Countries that avoid fiscal deficits and overvalued real exchange rates grow faster (Bouton, Jones, and Kiguel 1994; Easterly and Schmidt-Hebbel 1993).

Second, real exchange rate depreciations affect the structure of output and the resulting distribution of incomes, favoring producers of tradable goods (exports and import substitutes) and consumers of nontradables (such as housing and retail services). CGE models invariably show that real exchange rate depreciation leads to resource reallocations toward agriculture, raising the incomes of rural households. And because the poor are to be found mainly in this sector, real exchange rate depreciations tend to raise their incomes disproportionately. For recent evidence in Africa, see Dorosh and Sahn (1993) and Sarris (1994b).

Finally, depreciations in the real exchange rate reduce rents derived from previous policy interventions, such as import quotas and exchange controls. These policies benefit the favored few who possess import licenses and have access to rationed foreign exchange. When these interventions are replaced by exchange rate adjustments, these groups (mainly middle- to upper-income urban households) lose their rents. As a result, governments have little room to maneuver in balancing efficiency and equity with political sustainability in designing macroeconomic adjustment. Removing distortions that improve efficiency and equity can lead to losses by politically powerful groups (Bourguignon, de Melo, and Morrisson 1991; van de Walle 1991).

The CGE models provide a useful analytical framework to guide our thinking about the effect of economic policy on the poor. Within this framework, the discussion that follows explores in more detail the link between policy and poverty in two countries—Côte d'Ivoire and Ghana. These two countries are chosen for two reasons. First, despite many similarities, they adopted very different policies with respect to the exchange rate. In a sense, each serves as the counterfactual example for the other. And second, the most reliable and detailed data on the poor are available for these countries.

A Comparison of Côte d'Ivoire and Ghana

These two West African countries, similar in many respects, but critically different in their responses to adverse external events, present a fascinating comparison. Both countries are highly dependent on one or two key exports—principally, cocoa—and both have therefore been affected by instability in world prices and have experienced dramatic declines in their terms of trade. Poverty is predominantly rural in both countries, much of it occurring among small-scale farmers and among the self-employed.

But as figure 1 reveals, the two countries have coped with external shocks in significantly different ways, with dramatic differences in outcomes. (For more detail on the adjustments in these countries, see Demery 1994 for Côte d'Ivoire...
and Alderman 1994 for Ghana.) First, both countries were destabilized by external shocks—notably a deterioration in the terms of trade—but whereas effective government collapsed almost completely in Ghana, in Côte d'Ivoire the government continued to play an active, possibly overactive, role. Ghana adjusted promptly, as early as 1983, with its Economic Recovery Programme (ERP). And the cornerstone of the ERP was a sharp depreciation in the exchange rate, combined with trade liberalization. Although inflation continued to dog the adjustment effort, the real exchange rate depreciated throughout the decade. Increasing government revenues meant that adjustment did not entail dramatic expenditure cuts, so effective government was slowly restored as a result. Growth was also restored and has been maintained at around 5 percent a year in real terms for much of the 1984–94 period. Real per capita private consumption has also grown steadily, although more slowly. But the adjustment in Ghana has not been without its limitations. The government has maintained its role in export-crop marketing, and the pace of privatization has been slow. The government has also faced difficulties in managing its fiscal deficit and controlling inflation.

Côte d'Ivoire, by contrast, was constrained by its membership in the CFA (Communauté financière d'Afrique) franc zone, involving fixed exchange rate parity with the French franc. When the terms of trade dipped sharply after a brief recovery in 1984–86, the French franc appreciated against the U.S. dollar, causing a marked and perverse appreciation in Côte d'Ivoire's real exchange rate. Attempts to implement trade liberalization and other trade policies to mimic a devaluation failed. As a result the government was obliged to adopt an internal adjustment strategy, relying heavily on cuts in public expenditure. The only way it could restore the macroeconomic balances was to depress economic activity. And that is just what happened: GDP (and with it per capita private consumption) declined for most of the 1980s and early 1990s (see figure 1).

Why did the Ivorian government persist with this adjustment strategy, despite its evident economic and social costs? The answer is to be found mainly in the complex political economy of the country. Van de Walle (1991) argues that two particular features of the political economy largely account for the government's failure to implement key structural reforms—the importance of the urban elite and the patrimonial roots of the political system. These features help explain why the government failed to loosen its control of the functioning of the economy and also why governments in the CFA franc zone persisted so long in maintaining seriously overvalued currencies, despite the evident costs of the policy. An overvalued real exchange rate had specific advantages for groups that supported the government, notably the urban elites who benefited at the expense of rural-based farmers. Because of these deep-seated political-economic pressures, the government delayed initiating fundamental change until 1994, when the CFA franc was finally devalued. Distributional considerations, therefore, figured prominently as causes of the failure to adjust.

To summarize, the key difference between the two countries lies in trade policy. Ghana liberalized and depreciated its exchange rate, whereas Côte d'Ivoire...
Figure 1. Macroeconomic Trends in Ghana and Côte d'Ivoire

Ghana

Côte d'Ivoire

was fettered in its attempts to do so. An expenditure-switching policy enabled Ghana to restore growth, whereas the internal adjustment strategy of Côte d'Ivoire effectively sacrificed the growth objective. What did these quite different policies mean for the well-being of the poor?

More disaggregated evidence on the changes in the poverty head count ratios in Côte d'Ivoire and Ghana is reported in Table 7. (The groups reported in the table were derived using similar methodologies; see Grootaert 1993 and Ghana Statistical Service 1995.) Three messages emerge from the findings of household surveys in these countries.

**Benefits of recovery versus costs of decline.** The deterioration in living standards in Côte d'Ivoire arising from the internal adjustment strategy has affected all groups. In Ghana, by contrast, most groups appear to have benefited from the ERP-induced recovery, a further confirmation of the key role played by economic growth in reducing poverty (see also Table 3). These findings in turn suggest that in these cases, the main effect of macroeconomic policy on poverty was through broad-based growth (Ghana) or decline (Côte d'Ivoire).

The intercountry regression linking growth in GDP per capita with its determinants, which was used to obtain the weights for the macroeconomic index (Bouton, Jones, and Kiguel 1994), can also be used to show how each country would have fared with the other's macroeconomic policies. Thus the predicted annual growth in GDP per capita for Ghana for the period 1987-92 would have

<table>
<thead>
<tr>
<th>Type of employment</th>
<th>Côte d'Ivoire</th>
<th>Ghana</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>poverty,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1985-88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(percentage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>points)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contribution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to poverty,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1988</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(percent)</td>
<td></td>
</tr>
<tr>
<td>Food-crop farmer</td>
<td>+15.6</td>
<td>52.4</td>
</tr>
<tr>
<td>Export-crop farmer</td>
<td>+18.1</td>
<td>17.7</td>
</tr>
<tr>
<td>Self-employed</td>
<td>+20.0</td>
<td>14.8</td>
</tr>
<tr>
<td>Public employee</td>
<td>+16.4</td>
<td>6.2</td>
</tr>
<tr>
<td>Private employee</td>
<td>+8.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Informal employee</td>
<td>+28.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Unemployed</td>
<td>+34.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Inactive</td>
<td>+13.6</td>
<td>3.5</td>
</tr>
<tr>
<td>Total population</td>
<td>+15.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

n.a. Not available.

These columns show the share of each group in the total population of poor in the terminal year. Thus, in Ghana, food-crop farmers accounted for 54.4 percent of the poor in 1992.

fallen from 0.15 percent (with Ghana's policies) to -6.74 percent (with Côte d'Ivoire's policies). Because it is based on the same regression, the corresponding exercise for Côte d'Ivoire shows the same difference in growth rate, from -4.39 percent (with Côte d'Ivoire's policies) to 2.50 percent (with Ghana's policies). These predictions are, of course, only as robust as the underlying regression model and cannot be relied upon as accurate indicators of the effects of macroeconomic policy in each case. But they illustrate the potential orders of magnitude involved. Macroeconomic policies made a critical difference to economic growth. There can be little doubt that they made a positive contribution in Ghana and a negative contribution in Côte d'Ivoire. And this made all the difference to poverty outcomes.

**Contrasting Fortunes of the Rural Poor.** It is clear that of all the groups in Ghana the rural poor appear to have benefited most, in direct contrast to their counterparts in Côte d'Ivoire. The majority (around 85 percent) of the poor in both countries are to be found among three predominantly rural socioeconomic groups—food-crop farmers, export-crop farmers, and the self-employed. In Côte d'Ivoire these groups experienced a serious decline in living standards (between 1985 and 1988), with increases in the incidence of poverty in the 15–20 percentage point range. This deterioration appears to have continued after 1988 (Grootaert 1994). In contrast, the survey evidence in Ghana suggests that the welfare of these same groups improved and poverty declined.

The factors responsible for these contrasting fortunes are complex. Weather can play a part. The final year of the Ghana data, 1992, was a good year for agricultural producers in the region compared with 1988, the final year for the Côte d'Ivoire data. The overall state of the economy in generating demand for food and labor would also strongly affect rural incomes. Under its internal adjustment strategy, Côte d'Ivoire's economy was functioning well below its capacity, with significant repercussions for the production of all goods—tradables and nontradables alike. In Ghana the recovery in output would imply the opposite process, with favorable effects on the demand for food and rural labor (as well as on production of export crops). There is evidence that the recovery in Ghana led to an increase in nonfarm self-employment, much of which was in trading activities. The share in the total income of the poor derived from nonfarm self-employment increased from 18 percent in 1988 to 25 percent in 1992 (World Bank 1995a). Trade liberalization in this period and the strong growth in imports would be consistent with this improvement. Rural poverty appears to have declined in Ghana in part because of income diversification and an increase in nonfarm activities, which resulted from a more favorable economic climate. In direct contrast to this experience, poverty among the self-employed in Côte d'Ivoire rose sharply as the economy deteriorated.

In addition to these across-the-board effects of adjustment and recovery, the real exchange rate adjustments would bring about more selective changes in rural incomes. How important were these expenditure-switching effects in in-
fluencing rural poverty in Côte d'Ivoire and Ghana? Grootaert (1993, 1994) concludes that the appreciation in the real exchange rate and the decline in terms of trade after 1985 were significant in increasing poverty among export-crop farmers in Côte d'Ivoire. The share of poor export-crop farmers in the total population of such farmers increased sharply between 1985 and 1988. Further big cuts in producer prices in 1989 and thereafter would certainly have made matters even worse for them.

In Ghana the story is more complex. It is clear from movements in the real exchange rate that the main expenditure-switching effect of the ERP occurred before 1987 (see figure 1). During the period covered by the household data, there appeared to be a “pause” in the adjustment, with the depreciation in the real exchange rate leveling off. This pause did not arise from any abandonment of the ERP, but rather was a reflection of its success. The ERP induced an inflow of net transfers from abroad (on the capital account of the balance of payments), which caused the exchange rate to stabilize (Younger 1992). In preventing further depreciation in the real exchange rate, these inflows had a “Dutch disease” effect, adversely affecting the returns to the production of exportable and importable goods. And this phenomenon was reflected in relative price movements during the decade. Sarris (1994a) shows that relative price effects were important in reducing poverty up to 1987–88; thereafter real prices of export crops fell—a result in part of further terms-of-trade losses, but also of continued taxation through cocoa pricing policy. Up to 1987, real food prices fell noticeably. Since then, no marked trend has been discernible.

The relative price changes that occurred before 1987 had profound effects on the rural economy, inducing a remarkable growth in real exports. Merchandise exports grew in real terms by 22 percent a year between 1983 and 1986. Cocoa output expanded during this period. Net payments to cocoa farmers increased from 5 billion cedis in 1983–84 (in constant 1985 prices) to more than 13 billion cedis in 1987–88 (Alderman 1994)—an immediate and dramatic result of the exchange rate adjustment. Other rural sectors, such as logging and mining, also benefited from the exchange rate policy. Log exports grew in real terms by more than 42 percent a year between 1983 and 1986. Overall, the share of exports in GDP rose from just 2 percent in 1983 to 16 percent in 1986 (World Bank 1995a). The shift in price incentives brought about by the real exchange rate depreciation before 1987, therefore, led to a strong export response from the rural sector, inducing a recovery in rural output and incomes, which was good for the rural poor. Using a model calibrated on 1987–88 data from the Ghana Living Standards Survey (GLSS), Sarris (1994a) demonstrates that these relative price (and other) changes were likely to have increased real incomes from both agriculture and rural nonfarm self-employment. He presents a strong case that the relative price changes up to 1987 sent powerful poverty-reducing signals through the economy. Although the increase in cocoa prices benefited some of the poor, this was not the only, or the main, source of the fall in poverty. While a high proportion of export-crop farmers are poor—37 percent in 1992, according to
estimates of the Ghana Statistical Service (1995)—their contribution to total poverty is not significant (fewer than 8 percent of the poor are in this category).

In sum, the evidence suggests that the expenditure-switching effects of the ERP were important in raising living standards in rural areas up to about 1987, but not during the period covered by the GLSS household surveys. The survey data confirm that declines in poverty between 1988 and 1992 appear to be attributable to the broader economic effects of the recovery. All groups (apart from public employees) seem to have benefited equally.

**BAD NEWS FOR THE URBAN POOR.** Despite their contrasting adjustment records, the urban poor in both countries experienced difficult times. In 1985 just 3 percent of the Abidjan population were poor. By 1988, 14 percent were poor. The episode of internal adjustment clearly harmed urban groups the most, despite the government’s intention to protect the incomes of the urban elites. Even if the very wealthy groups benefited from overvalued exchange rates, the majority of the urban population was hit badly by the policy-induced recession. Even some employees in the mostly urban-based formal sector joined the ranks of emerging “new poor”—the incidence of poverty rose to more than 20 percent for the public sector and 15 percent for the private sector. Whereas increased poverty is a predictable outcome of the internal adjustment strategy in Côte d’Ivoire, in the Ghanaian context it is more noteworthy. Living standards in the capital city, Accra, seem to have deteriorated during 1988–92, in contrast to the improvements elsewhere in the country (Ghana Statistical Service 1995). Although most sections of the Accra population have become worse off, there is evidence that middle-income groups suffered greater losses than the poor (World Bank 1995b). These losses are certainly linked to high inflation in Ghana and its adverse effects on those in wage employment.

**An Important Postscript**

The recovery in output and incomes in Ghana appears to have been broad-based in its effect. Yet these observed changes occurred over a relatively short period. Both countries are concerned to establish a more sustainable long-term growth path—Ghana is seeking to accelerate its growth, while the devaluation of the CFA franc (in January 1994) has renewed prospects and expectations for growth in Côte d’Ivoire. Will the poor benefit from future economic growth? For long-term growth to be effective in reducing poverty, two conditions must apply. The growth itself must be sufficiently labor-intensive, generating income opportunities for the poor. And the poor must have the means to acquire human capital—primarily, access to adequate education and health services—to enable them to respond to these opportunities (World Bank 1990). Typical economic reforms under structural adjustment (such as restoring competitive exchange rates and removing distortions in product and factor markets) should shift the economy toward a labor-intensive growth path. But the critical question for...
Côte d'Ivoire and Ghana is whether the human resources of the poor are of sufficient quality for them to benefit from future growth-promoting policies.

Are the poor in Côte d'Ivoire and Ghana supported adequately by investment, particularly government investment, in human capital? In the newly industrialized countries of East Asia at the start of their rapid economic growth, human capital was already considerably more developed than it is in Ghana and Côte d'Ivoire today. Literacy rates in Côte d'Ivoire of 54 percent (in 1990) and in Ghana of just 49 percent (1992) compare with 71 percent in the Republic of Korea (1960), 70 percent in Hong Kong (1960), 69 percent in Singapore (1970), 58 percent in Malaysia (1960), and 79 percent in Thailand (1970). The combined effects of economic recovery and education reforms have increased school enrollments in Ghana, but the education system still needs improvement; resources need to be better managed to improve the quality of service. Enrollments in Côte d'Ivoire, on the other hand, declined in the latter half of the 1980s, partly because of the deteriorating economic circumstances faced by households. Poor quality of service (resulting from very limited spending on nonsalary items, such as books, supplies, and building maintenance) exacerbates the problem for the Ivorian education system.

Similarly, the infant mortality rates in Côte d'Ivoire and Ghana are currently higher than were those of Korea, Malaysia, and Singapore in 1960, or Thailand in 1970 (World Bank 1992). Both countries made progress (especially Ghana) in providing preventive services to rural areas, but their health systems continue to be generally too urban-based.

Recent studies on the incidence of public social expenditures in Côte d'Ivoire (Demery, Dayton, and Mehra 1996) and Ghana (Demery and others 1995) show similar patterns in the two countries. Using “benefit incidence” methodology, the researchers allocate the in-kind subsidies embodied in the provision of health and education services to households depending on their use of the service. Households whose members enroll in publicly funded schools or who visit subsidized health facilities, in effect lay claim to an in-kind transfer from the state. Table 8 reports some preliminary findings of this exercise. The poorest 20 percent of the population gained just 11 percent of the total government health subsidy in Côte d'Ivoire and just 12 percent in Ghana; more than 30 percent of the subsidy went to the richest quintile in each country. For education, similarly, the poorest quintile gained just 14 percent of the total subsidy in Côte d'Ivoire and 16 percent in Ghana, with larger shares going to the richest quintile (especially in Côte d'Ivoire). These patterns are similar to those observed elsewhere in Africa. And they stand in stark contrast to the patterns in Colombia and Malaysia, where public services are targeted more effectively to the poor.

The figures in table 8 speak for themselves. Reforms in the education sector have achieved major gains in Ghana (reflected to some extent in the incidence results), but both countries need to target services to those facilities used by rural communities, with far less emphasis on urban-based services that mainly benefit the nonpoor.
Table 8. The Incidence of Public Social Expenditures, Côte d’Ivoire, Ghana, and Selected Countries

<table>
<thead>
<tr>
<th>Country and date</th>
<th>Health</th>
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<th>Education</th>
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<td></td>
<td>Poorest quintile</td>
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<tr>
<td>Côte d’Ivoire (1995)</td>
<td>11</td>
<td>32</td>
<td>14</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
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<td>Ghana (1992)</td>
<td>12</td>
<td>33</td>
<td>16</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Other countries</td>
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<tr>
<td>Colombia (1992)</td>
<td>27</td>
<td>13</td>
<td>23</td>
<td>14</td>
<td></td>
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<tr>
<td>Malaysia (1989)</td>
<td>29</td>
<td>11</td>
<td>26</td>
<td>13</td>
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Source: Demery, Dayton, and Mehra (1996); Demery and others (1995).

Summary and Conclusions

The debate over structural adjustment and poverty in Africa continues to attract a great deal of attention. In our view, the lack of data at the household level has been one source of confusion and disagreement. Many observers have relied either on pan-African generalizations or, at the other extreme, on anecdotal evidence of specific cases of improvement or hardship. Neither of these approaches is a reliable basis for policy formulation. With more recent data becoming available, there are now opportunities to begin putting the record straight. And a clearer picture is emerging. In short, where countries have applied rational and consistent responses to external shocks and have reversed previous inappropriate policies, there is evidence of a growth dividend. This recovery has generally benefited the poor. Earlier fears that the poor would bear a disproportionate share of the burden of adjustment in Africa appear not to have been well founded—at least judging from the data that are now at hand. In countries (such as Kenya and Côte d’Ivoire) that were ambivalent about the reform agenda or that delayed implementing much-needed policy changes, the poor have lost ground. These conclusions, however, must be subject to one important caveat: there is some evidence that the poorest of the poor have not benefited as much from economic recovery and in some cases have become worse off. If these poorest groups are, as Lipton (1988) suggests, dislocated from markets and infrastructure, economic recovery has little to offer them, which may explain why income inequalities in some of the countries reviewed here (Kenya, Nigeria, and Tanzania) widened with the recovery.

Two particular cases illustrate contrasting experiences with external shocks, adjustment, and poverty. Côte d’Ivoire was seriously fettered in its adjustment because of its obligations to maintain nominal exchange rate parity. Unable to follow an expenditure-switching policy and unwilling to introduce needed market liberalization to make its internal adjustment strategy work,
the country experienced negative growth and increasing poverty. If there is any message coming from the Ivorian experience, it is that delays in adjustment make matters much worse for the poor. In Ghana swift action with the exchange rate succeeded in bringing about a recovery in output following the desolate years of the early 1980s. Since then, a sustained annual growth of 5 percent appears to have been sufficiently broad-based to have reduced poverty among most groups in society. Apart from confirming the view that improved macroeconomic policy need not entail high social cost (rather the reverse), these cases emphasize the critical role of the exchange rate. Where the instrument was used consistently and with purpose to correct previous disequilibria, the outcomes were favorable both for stimulating growth and for reducing poverty. Persistence with overvalued exchange rates does nothing to improve the lives of the poor.

The findings should be no cause for complacency. The adjustment in Africa displays several weaknesses. From the evidence of recent policy actions, African governments have yet to display a real commitment to policy reform. Macroeconomic imbalances continue to characterize many economies, even those, such as Ghana, that have been engaged in adjustment for more than a decade. Governments continue to interfere in markets. This continuing ambivalence does not encourage private investors to commit themselves to the region, nor does it appear to favor the poorest segments of African society. Even apart from the indications that urban poverty appears to have increased significantly, the poorest of the poor may have lost during the period of recovery.

Furthermore, the gains during the recovery do not guarantee that the poor will benefit equally from future growth. Two conditions are necessary if this is to materialize. First, adjustment must propel African economies onto a growth path favoring labor-intensive activities. Weaknesses in even the better-performing countries (such as Ghana) suggest that vigilance is constantly needed to ensure that the policy environment is conducive to this objective. Second, African governments must take drastic steps to ensure that the populations at large have access to services, such as health and education, that will enhance human capital. Given the neglect of the past, this is a priority for the policy agenda, in both adjusting and nonadjusting countries.

A final caution is in order about the data. These continue to be weak in Africa despite the recent increase in the number of household surveys. And although the improvements have taken the debate further, with analysts teasing out key messages from noisy signals, the need for more and better household data in Africa is greater than ever.
Notes

Lionel Demery is a principal economist in the Poverty and Social Policy Department, and Lyn Squire is Director of the Policy Research Department of the World Bank. This article draws on several recent papers analyzing poverty in Africa; the authors would like to acknowledge in particular their debt to the efforts of Sudharshan Canagarajah, Harold Coulombe, Stephan Dercon, Luisa Ferreira, Christiaan Grootaert, Andrew McKay, John Mukui, John Ngwafon, and Saji Thomas, and to thank John Clark, Shanta Devarajan, Paul Glewwe, Christine Jones, Binayak Sen, and anonymous referees for their comments and support.

1. Changes in real expenditures and other measures of well-being such as health status need not always move in the same direction, especially over short periods.

2. The surveys undoubtedly advance information about African poverty, but difficulties with the data remain. Even in Côte d’Ivoire, where the data are considered generally reliable, the surveys were found to suffer from a change in sampling procedures and sampling frame in 1987, a problem that fortunately could be overcome by reweighting the data (Demery and Grootaert 1993). And in Ghana, which also fielded household surveys based on the Living Standards Measurement Survey design, changes in the questionnaire make comparisons over time difficult without applying some correction (see Coulombe and McKay 1995). Although based on an identical survey design, the Nigeria data required careful editing to make comparisons possible. Comparability was also an issue facing analysts working with the Kenyan and Tanzanian data. On the basis of the information available on these sources, we rate the quality of the surveys for Côte d’Ivoire, Ethiopia, and Ghana to be high. For these countries, intertemporal comparisons can be made with some confidence. Data for Kenya and Nigeria are placed in a middle category, while those for Tanzania are considered to be of poor quality. These data sets still provide useful information, but intertemporal comparisons must be interpreted carefully and in the light of various biases.

3. The macroeconomic policy index comprises three components—fiscal policy, monetary policy, and exchange rate policy. The score for each component is calculated as follows:

   **Fiscal policy scores.** A change in the fiscal deficit of less than −10 percentage points was given a score of −3; from −10 to −5, a score of −2; from −5 to −2, a score of −1; from −2 to 1, a score of 0; from 1 to 3, a score of 1; from 3 to 5, a score of 2; and a deficit change greater than 5, a score of 3. If the change in total revenues was less than −4, the fiscal score was decreased by 1; if the change was greater than 3, the score was increased by 1.

   **Monetary policy scores.** A change in seigniorage of greater than 4 was given a score of −3; from 2 to 4, a score of −2; from 1 to 2, a score of −1; −0.5 to 1, a score of 0; −2 to −0.5, a score of 1; −3 to −2, a score of 2; less than −3, a score of 3. A change in inflation of greater than 31 percent was given a score of −3; from 10 to 31, a score of −2; from 5 to 10, a score of −1; from −2.5 to 5, a score of 0; from −10 to −2.5, a score of 1; from −50 to −10, a score of 2; and less than −50, a score of 3. The overall monetary policy score was, where possible, a simple average of the seigniorage and inflation scores.

   **Exchange rate policy scores.** A change in the real effective exchange rate of less than −10 was given a score of −2; from −10 to −5, a score of −1; from −5 to 2, a score of 0; from 2 to 15, a score of 1; from 15 to 31, a score of 2; greater than 31, a score of 3. A change in inflation of greater than 50 was given a score of −3; from 15 to 50, a score of −2; from 4 to 15, a score of −1; from −10 to 5, a score of 0; from −30 to −10, a score of 1; from −100 to −30, a score of 2; and less than −100, a score of 3. The exchange rate policy score is a simple average of the real effective exchange rate and the premium score.

   The change in each constituent variable is calculated as the percentage difference in the average of the variable in the year of the first survey and the preceding two years and the average of the variable in the year of the second survey and the two preceding years. The final index is calculated by combining the three components using the following weights:
fiscal policy, 36.7 percent; monetary policy, 11.8 percent; and exchange rate policy, 51.5 percent. These weights were derived from regressions linking the indicators to growth. The scores and final index are as shown in table 5.

4. It should be emphasized that the evidence on what happened to rural output and incomes during this period is uncertain because of the weak data base (World Bank 1995b). And it should also be noted that not all the rural poor are indicated to be better off in 1992 compared with 1988, there being evidence of losses among some rural communities in Ghana (World Bank 1995b).

References

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


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MACROECONOMIC ADJUSTMENT TO CAPITAL INFLOWS: LESSONS FROM RECENT LATIN AMERICAN AND EAST ASIAN EXPERIENCE

Vittorio Corbo
Leonardo Hernández

Capital inflows to some developing countries have increased sharply in recent years. Impelled by better economic prospects in those countries, lower international interest rates, and a slowdown of economic activity in the capital-exporting countries, the inflows have furnished financing much needed to increase the use of existing capacity and to stimulate investment. But capital inflows can bring with them their own problems. Typical macroeconomic repercussions have been appreciation of the real exchange rate, expansion of nontradables at the expense of tradables, larger trade deficits, and, in regimes with a fixed exchange rate, higher inflation and an accumulation of foreign reserves.

Should government intervene to limit some of these side effects—and if so, how? The question is especially pressing in the wake of the Mexican crisis of December 1994. This article looks for answers in the experience of four Latin American and five East Asian countries between 1986 and 1993, examining the effects of the capital inflows on the economy and comparing the different ways in which these countries responded to the problem of “too much” capital.

The debt crisis of 1982 was precipitated by a sudden reduction in capital inflows at a time when highly indebted developing countries were facing a slowdown of the world economy, a large increase in international interest rates, and a sharp loss in terms of trade. Weak economic policies and institutions in many developing countries exacerbated the effects of these shocks. The cutoff of capital inflows forced a quick and steep increase in the size of the net external transfer—translating, in the short run, into sharply reduced domes-
tic expenditures and imports and, in the longer run, into damage to investment rates and economic growth.

During the decade following the initial shock, most of the highly indebted countries set about adjusting their policies and institutions to the new situation of severely restricted external financing. The goal of adjustment was to restore a sustainable balance of payments, at the same time laying firm foundations for growth. Some countries expected to return to international capital markets, but to rely this time less on debt and more on direct foreign investment and portfolio investment.

For the first few years after the debt crisis, most lending to these countries took the form of official loans from international financial institutions to support the policy and institutional reforms necessary to achieve these goals. Once countries began to make progress in their adjustment efforts, private capital inflows toward them increased significantly—financed in part by the repatriation of the capital that had fled these countries in the early 1980s. In fact, the capital account surplus (including net errors and omissions) for all developing countries increased from $48.7 billion in 1987, to a record level of $162.9 billion in 1993, before easing to $142.2 billion in 1994 (IMF 1995). The new inflows came from commercial bank lending, foreign direct investment, and portfolio capital (investment in stocks and bonds). Portfolio investment, which increased from $11.9 billion in 1987 to $58.9 billion in 1994 (IMF 1995), has been motivated by the potential for providing risk-sharing capital financing to expand the private sector. Host countries have encouraged foreign direct investment, with its promise of access to new technologies and markets, by dismantling restrictions and improving the macroeconomic environment by introducing market-oriented reforms. Other incentives to capital inflows have been the introduction of restrictive monetary policy in conjunction with some type of intervention in the exchange rate market. In any case, much of this inflow is an endogenous response to a change in policies and prospects in the recipient country.

The increase in capital inflows has relaxed the severe financial constraint that host countries faced during much of the 1980s. And the new wave of capital has an added advantage over earlier inflows in that the resources are going to the private sector and are predominantly in the form of equity capital rather than debt financing.

But—paradoxically, with the debt crisis so close in time—the early 1990s have revealed a downside to the inflows: the negative effects of receiving “too much” capital. One example is “hot money”—short-term, highly volatile inflows usually attracted by market imperfections or policy mistakes that create a large gap between domestic and foreign interest rates, the latter adjusted by expectations of devaluation. This type of inflow can be the source of undue or excessive volatility in rates of inflation and in nominal and real exchange rates. These fluctuations can have important economic costs. For example, imperfections in capital markets and barriers to entry in the export and import-competing sectors can
lead to an inadequate supply of capital and shortages in traded goods. Real costs of bankruptcy and reallocation of resources can similarly generate economic costs. So in many countries the economic authorities have tried to discourage hot money by correcting the imperfections and policy mistakes that encouraged such inflows in the first place or by controlling some of the side effects of capital inflows through different types of intervention.

Even predictable capital inflows can cause cyclical fluctuations in the real exchange rate, which in turn might affect the tradable sectors and macroeconomic management as a whole. Admittedly, more stable and lasting capital inflows, elicited by better prospects in the host country rather than by market imperfections, will also set in motion a macroeconomic adjustment process similar to the traditional “Dutch disease” (that is, the adverse effect on other sectors when an increase in the price or volume of an export generates an appreciation of the real exchange rate, thereby reducing incomes in tradable goods sectors except for the booming sector itself). There is no apparent economic reason to interfere with that adjustment process, except to smooth it over time.

This article first reviews the macroeconomic and other related effects of capital inflows as a basis for discussing why a country could be concerned about receiving “too much” capital and for analyzing the different economic policies that countries can use to deal with the side effects of capital inflows. From an examination of the principal mechanisms used for this purpose by nine developing countries, four Latin American and five East Asian, some conclusions are drawn on how to manage capital inflows to minimize their detrimental effects.

The issues are highly relevant for potential recipient countries, particularly in the wake of the Mexican crisis of December 1994. Indeed, the Mexican peso crisis highlights the critical importance of establishing sound macroeconomic fundamentals and avoiding large current account deficits with their associated appreciation of the real exchange rate. The postcrisis effects also illustrate how fundamentals in the host country matter: the so-called “tequila effect” (the impact of the Mexican crisis on other countries) was uneven and caused less distress in those economies with a stronger set of fundamentals, such as Chile, the Republic of Korea, Malaysia, and Thailand.

## Macroeconomic and Other Related Effects of Capital Inflows

Capital inflows tend to reduce interest rates and boost domestic expenditure. Increased domestic spending puts in motion a price adjustment process. For the purpose of analysis, suppose that a country produces and consumes three types of goods: an exportable, an importable, and a nontradable. The importable and exportable goods, assuming that the terms of trade between them are fixed, can be grouped into a single category—tradable. Given a pattern of demand for these two categories—tradable and nontradable—if
expenditure increases owing to reduced interest rates resulting from the capital
inflow, part of the increase will go into tradables and part into nontradables. The
increased spending on tradable goods will increase the size of the trade
deficit and in this way will accommodate the capital inflow. If this were all, the
adjustment would be easy. In particular, no real appreciation would result. The
only concern about capital inflows would be about their sustainability and the
country’s solvency.

But this is not all. At the existing relative price between tradable and
nontradable goods, the increase in demand for nontradable goods cannot be
fulfilled. That excess demand will result, independently of the exchange rate
regime, in an increase in the relative price of nontradable goods—in other words,
a real exchange rate appreciation. That appreciation, which makes tradables
cheaper, will, in turn, create incentives to reallocate factors from the production
of tradables toward the production of nontradables, and to switch consumer
expenditure from nontradable to tradable goods. The final result is a real ap-
preciation, a larger nontradable sector, a smaller tradable sector, and a larger trade
deficit. The real appreciation occurs either through an appreciation of the nomi-
nal exchange rate (under a floating exchange rate system) or through an in-
crease in the nominal price of the nontradable good (in a fixed or preannounced
exchange rate system).\(^3\)

The real appreciation is the price mechanism at work. The increase in domes-
tic expenditures, made possible by the initial capital inflow, puts the whole pro-
cess in motion and, together with the real appreciation and the demand and
supply characteristics for both types of goods, determines the final size of the
trade deficit. This is the standard macroeconomics of the transfer problem. The
same sort of process will be set in motion by any capital inflows that end up in
lower domestic interest rates or by a relaxation of a domestic credit constraint.
A similar adjustment process would result from a mineral discovery or a perma-
nent increase in the terms of trade. The only difference is that in the latter case
the export good that benefits from the price increase will end up with an in-
crease in production, while the rest of the tradable sector will lose resources to
the expanding export sector and most likely also to the nontradable sector. This
is the well-known “Dutch disease” problem referred to earlier (see Corden and

Two outcomes of capital inflows other than the macroeconomic effects just
described are important to consider. First, the larger amount of capital brought
into the country will expand the volume of funds being intermediated through
the domestic financial system and hence the volume of domestic financial assets
and liabilities. Second, in a fixed or predetermined exchange rate system, the
monetization of large capital inflows will temporarily increase inflation through
the rise in the price of nontradable goods that is part of the real appreciation.
Furthermore, in countries where wages and prices in general are indexed to past
inflation levels, indexation causes prices to increase for a period of time so that
the temporary increase in inflation could be quite long lasting.
Why Should More Capital Be a Cause for Concern?

The effects of increased capital inflows are far reaching, with implications for most economic sectors. For this reason governments do well to take account of a large increase in capital inflows, even if they are caused by better economic prospects in the host country. Because of its particular features, portfolio investment is singled out here for more detailed discussion.

*Implications for the Economy in General*

Recipient countries are usually concerned about a large increase in capital inflows for several reasons. First, in countries that have recently reformed or are reforming their trade policies to increase their integration into the world economy, the trade reform would bring an initial real depreciation accompanied thereafter by a fairly stable real exchange rate adjusted for fundamentals (Thomas, Matin, and Nash 1990). The real exchange rate appreciation that accompanies capital inflows would counter the real depreciation, delaying the supply response of export-oriented sectors and increasing the competition for the import-competing sectors. Thus, for countries that have initiated a trade reform, the real appreciation effect of the capital inflow—particularly of cyclical capital inflows—could work at cross purposes with the liberalization of trade and could undermine the credibility of the reform. A related consequence for countries with a more flexible exchange rate system could be excessive volatility in the nominal and real exchange rates, particularly in the case of hot money.

Second, in countries that are pursuing a stabilization program with a fixed or preannounced nominal exchange rate as an anchor for domestic prices, or where price stability is an objective, the authorities could be concerned about monetization effects. The expansion in high-powered money caused by large capital inflows will have a temporary inflationary effect through the increased price of nontradable goods (assuming that the increase in the supply of money exceeds the increased demand arising from lower interest rates and accelerated economic activity).

Third, for those countries with weak banks (that is, banks with low or negative net worth and a low ratio of capital to risk-adjusted assets) and poor supervision of the banking and financial system, the larger amount of funds to be intermediated may exacerbate the typical moral hazard problems associated with deposit insurance. That is, lenders may take on riskier projects, which could result in a financial bubble and eventually lead to a crisis.

Fourth, if capital inflows are volatile or temporary, their reversibility can have real adjustment costs that derive from resource reallocation, bankruptcies, hysteresis (meaning the asymmetrical problems resulting from the fact that it is easier to exit a business than to enter it), or other market imperfections. If the capital inflows are largely temporary, and if the authorities perceive that the private sector is making decisions based on the assumption that the flows are
permanent, governments may try to avoid the adjustment process entirely, since it will have to be reversed later—an expensive process when irreversible costs are involved.

Fifth is the concern about maintaining a sustainable current account deficit (as a ratio of gross domestic product GDP) in the long run. Too sudden an increase in this deficit, particularly if it comes with a consumption boom, could raise the country’s risk premium, restrict its future access to international capital markets, and entail important adjustment costs if the flow is reversed following negative political or economic developments at home or abroad.

Finally, there is a political economy argument. Many governments are subject to strong political pressure from interest groups in the exporting and import-competing sectors to avoid or limit the real exchange rate appreciation associated with the capital inflows. In such cases many governments will be forced to take actions to protect the real exchange rate.

**Portfolio Investment: A Special Case**

The previous discussion applies to capital inflows in general, not distinguishing among the different types. Portfolio investment (bonds and equity) has particular features, raising specific macroeconomic issues that warrant more detailed analysis.

**Volatility.** The most outstanding feature of portfolio investment—as opposed, for instance, to foreign direct investment, borrowing from international financial institutions, or long-term bank loans—is that, like hot money, it can be reversed in a very short time: foreign investors may suddenly decide to leave the country in which they are investing. The volatility that this risk of flow-reversal may cause in exchange rates, asset (stocks) prices, or interest rates can be very harmful. When capital inflows of this type have found their way into the banking system and have pushed up domestic expenditures and increased the current account deficit, their reversal can affect the domestic economy through a decrease in asset prices, a jump in interest rates, liquidity problems in the banking sector, or a devaluation of the currency. Furthermore, if the central bank does not react quickly enough and the stock of international reserves is low, the reversal may cause a balance of payments crisis.

Negative shocks—a crisis in another country, a drop in the price of the main exportable good, a rise in the price of the main importable good, a sharp increase in international interest rates, or a change in taxes affecting returns from the inflows—may induce foreign investors to take their money out of the country or to keep it there only if a higher return is provided. Either way, they will react by selling their domestic stock holdings and buying foreign currency with the proceeds. That will cause a fall in the general stock price index and, depending on the exchange rate system, either a loss of international reserves and an increase in domestic interest rates, or a depreciation of the nominal exchange rate, or both.
All these price movements can create considerable uncertainty, discouraging investment, whether foreign or domestic. At the same time, they can be very damaging for the economy as a whole if interest rates, asset prices, or exchange rates fluctuate too widely—because of bankruptcies and hysteresis effects when interest rates increase and, in the case of exporting and import-competing sectors, when the exchange rate appreciates.

**MACROECONOMIC FLUCTUATIONS.** Another important characteristic of portfolio investment, as opposed to other forms of capital flows such as bank loans, is its behavior during different phases of the macroeconomic cycle. In fact, it has been argued that bank borrowing reinforces the up- and downswings in economic activity that characterize the cycle. This is because banks are willing to lend more during upswings—the expansionary and recovery phases of the cycle—than during recessionary downswings. Private portfolio investors, on the other hand, will refrain from selling every time stock prices are too low (or buying every time they are too high) because they do not want to realize capital losses. This behavior will result in an endogenous smoothing of the cycle. Of course, this reasoning applies only when domestic and foreign assets are not perfect substitutes.

**Dealing with the Side Effects**

For countries with a well-functioning banking system, long-term capital inflows arising from improved economic prospects in the host countries are best accommodated by letting the transfer system work through a combination of a larger current account deficit and a real appreciation.

But if the current account deficit and real appreciation arising from long-term inflows appear too large to accommodate smoothly, the authorities may decide to intervene. In general, governments have been more inclined to intervene when capital inflows are short term or are associated with distortions or imperfections in the domestic economy, because the size or composition of the inflows is liable to create macroeconomic problems of the type discussed earlier. One type of distortion that encourages short-term capital inflows is providing free deposit insurance to weak, poorly regulated banks. Another distortion that could encourage such inflows is offering free currency risk insurance through a swap facility at the central bank (this happened, for example, in Chile until 1990). In such cases, governments should start by trying to eliminate the imperfection that is causing the inflow.

Similarly, short-term speculative capital inflows—hot money—could also be encouraged by a restrictive monetary policy introduced to compensate for an expansionary fiscal policy in a fixed or preannounced exchange rate system. In this case, changing the policy mix toward a more restrictive fiscal policy and a less restrictive monetary policy, by reducing domestic interest rates to a level closer to parity, reduces the incentives for the kind of inflows attracted by inter-
est rate differentials or the expectation of falling domestic interest rates—that is, bank loans and portfolio investment.

If the cause of disruptive inflows cannot be eliminated, governments may instead attempt, by direct or indirect methods, to control the extent and the impact of the flow.

**Direct Methods**

Direct methods of restricting capital inflows work either through the cost of bringing them in or through a quantity constraint—measures such as ceilings on banks’ foreign borrowing, minimum reserve requirements on foreign loans, or ceilings on foreign direct investment. Governments can also try to reduce the inflows by imposing a Tobin’s interest-rate equalization tax (requiring foreigners to pay a tax on the interest payments they receive from funds invested abroad). But the increasing integration of world capital markets has made it much easier to get around capital controls; at best, they retain some effectiveness in the short run (Mathieson and Rojas-Suarez 1993; Schadler and others 1993).

**Indirect Methods**

Indirect methods of dealing with the effects of capital inflows comprise foreign exchange intervention, fiscal adjustment, liberalization of the current account and of capital outflows, and floating the exchange rate.

*Foreign exchange intervention*—the purchase of foreign currency by the central bank (with accumulation of foreign reserves) to support the nominal exchange rate—takes two forms: sterilized and nonsterilized. Sterilized intervention involves open market operations carried out by the central bank to mop up the liquidity created by the initial purchase of foreign exchange, thus avoiding an increase in domestic expenditures and a temporary increase in inflation. Sterilization can also be achieved through other restrictions that reduce the money multiplier—examples are an increase in the required reserves for commercial banks or a ceiling on their total credit. These restrictions also help avoid the monetization effect of the purchase of foreign currency—that is, they limit the increase in the money supply. But the scope for action is limited by the degree of substitution between foreign and domestic assets. Moreover, sterilization policies have other costs. Generally, the more open the capital account and the higher the degree of substitution between domestic and foreign assets, the less effective the sterilization. It also usually increases the quasi-fiscal deficit of the central bank, and the introduction of higher reserve requirements on bank deposits and ceilings on banks’ credit increases the cost of financial intermediation and encourages informal financial activities. (For a recent review of the basic economics of capital inflows using a simple macroeconomic model, see Frankel 1994; for central bank intervention, see Edison 1993; and for the policy issues associated with capital inflows, see Calvo, Leiderman, and Reinhart 1993 and 1994).
The drawback of intervening without sterilization is that interest rates fall and credit expands, leading to an increase in domestic expenditures. Thus, to prevent the economy from overheating, governments in countries with a level of output close to full employment usually augment nonsterilized intervention with another policy to restrain aggregate demand.

Fiscal policy is used for its macroeconomic effect, as well as for the way it affects how money is spent (the expenditure composition effect). The first effect, other things being equal, is part of the policy mix aimed at counteracting the inflationary impact of an expansion in the money supply arising from purchases of foreign exchange inflows. The second effect is a higher (less appreciated) equilibrium real exchange rate, achieved by shifting the composition of aggregate expenditures away from government consumption and toward private expenditure. The reduction in appreciation occurs inasmuch as government consumption is more intensive in nontradable goods and private expenditures are more intensive in tradable goods.

Liberalizing the current account helps to ease the pressure on the domestic economy by shifting expenditure toward tradable goods. Like a restrictive fiscal policy, it has a composition effect that helps to achieve a higher equilibrium real exchange rate than otherwise. Tariff changes should be used for their microeconomic, resource allocation role, however, rather than as a mechanism for macroeconomic control.

Liberalizing capital outflows may induce domestic investors, such as pension funds, to take their capital abroad. This may partially compensate for the effects of capital inflows, although this result is uncertain: some models predict a larger capital inflow arising from liberalization of capital outflows (Labán and Larrain 1993).

Any move toward a floating exchange rate regime—for instance, by establishing or widening the band within which a fixed exchange rate is allowed to fluctuate—increases the exchange rate risk that market participants face, with correspondingly less incentive for short-term capital inflows.

**Dealing with Volatility**

The policies just discussed mainly affect the real exchange rate, the current account, and temporary inflation problems that can arise from a surge in capital inflows. The discussion that follows focuses on measures to counteract the volatility associated with portfolio investment.

Restrictions on capital outflows are sometimes used to reduce the risk of a flow reversal by limiting the amount of capital that foreign investors are allowed to take out of the host country within a given period of time. Although this policy can be effective in reducing the potential damage of a sudden capital outflow, it is also likely to reduce the amount of capital inflow in the first place, limiting the economic benefits of access to external sources of finance.
The opposite policy—*lifting restrictions on outflows* to enable domestic residents to invest in foreign assets—has two different effects: first, inflows may increase as foreigners perceive less risk of getting their investment stuck in the country; second, because domestic assets will be better diversified internationally, the effects of a negative shock will be less severe in the first place. The policy, if credible, will make a flow reversal less likely.

For similar reasons, *opening the current account* may limit the effects of a negative shock. The opening usually means that the host country's real economy will be more diversified, so that damage to one productive sector is less likely to spread through the economy as a whole.

The ultimate purpose of any measure to tackle volatility should be to build an economy more resilient to external shocks, so that foreign investors will be less inclined to flee if a shock occurs. *Maintaining long-term fiscal and monetary targets* has the added advantage of sending positive signals about the economy to foreign investors. In addition, it is essential to sustain a balanced budget in the short and medium terms to avoid an increase in inflation when a negative shock does occur, and to build a large stock of international reserves because of its buffer effect.

One policy tool that may prove useful in the short run is to mandate that the central bank exercise *greater discretionary power over the allocation of resources*. For example, requiring that private savings—such as pension funds—be invested in government bonds (or in foreign assets) may help to sterilize the expansion in high-powered money caused by a sudden capital inflow. Alternatively, restricting the amount of government bonds that domestic investors can hold may compensate for a sudden capital outflow that sharply reduces liquidity. This type of policy, however, may not be pursued in the long run because of its costs in terms of efficiency and distribution.

In sum, the risk of a reversal in flows of portfolio investment is better dealt with through mechanisms that absorb negative shocks and minimize their effects on the economy, rather than by restricting capital outflows.

**Dealing with Capital Inflows: Some Recent Experiences**

The typical response of recipient countries when capital inflows resumed in the late 1980s and early 1990s was, first, to absorb them into the economy through the price mechanism described earlier, and later to intervene when the movements in liquidity, exchange rate, interest rates, and current account balances became worrisome. This section reviews the interventions used in the nine countries that (apart from China) have received most of the capital inflows in recent years: four in Latin America (Argentina, Chile, Colombia, and Mexico) and five in East Asia (Indonesia, the Republic of Korea, Malaysia, the Philippines, and Thailand). The inflows for each country are plotted in figure 1.
Figure 1. Capital Flows, 1986–93

<table>
<thead>
<tr>
<th>Millions of U.S. dollars</th>
<th>Percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000-</td>
<td>10</td>
</tr>
<tr>
<td>80,000-</td>
<td>9</td>
</tr>
<tr>
<td>60,000-</td>
<td>8</td>
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<td>40,000-</td>
<td>7</td>
</tr>
<tr>
<td>20,000-</td>
<td>6</td>
</tr>
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<td>0</td>
<td>5</td>
</tr>
<tr>
<td>-20,000-</td>
<td>4</td>
</tr>
<tr>
<td>-40,000-</td>
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<tr>
<td>-60,000-</td>
<td>2</td>
</tr>
<tr>
<td>-80,000-</td>
<td>1</td>
</tr>
</tbody>
</table>

- Thailand
- Malaysia
- Chile
- Mexico
- Philippines
- Indonesia
- Argentina
- Colombia
- Rep. of Korea

a. Weighted average (ratio of the sum of capital flows and GDP for 1986–93).
b. Total flows are the sum of current account and change in reserves for 1986–93.


The responses are grouped in eight categories: (1) moves toward a more flexible exchange rate; (2) fiscal restraint; (3) sterilization by means of open market operations that offset the inflows; (4) sterilization to restrict the growth in money supply by using other offsetting means; (5) restrictions on capital inflows; (6) liberalization of the current account; (7) selective liberalization of the capital account (capital outflows); and (8) strengthening of the domestic financial system (table 1).

The specific policies are analyzed under these eight headings with a focus on those policies related to the way countries responded to the surge in capital inflows. Some of the policies, in particular those implemented by Argentina, Mexico, and the Philippines in the late 1980s and by the rest earlier in the decade, are also part of structural and stabilization programs undertaken primarily to foster economic growth. (Note that where these policies are part of a broader package of reforms, they are not identified with an “x” in table 1.)

Vittorio Corbo and Leonardo Hernández
Table 1. Major Economic Measures Employed

<table>
<thead>
<tr>
<th>Country</th>
<th>Moves toward a more flexible exchange rate</th>
<th>Fiscal restraint</th>
<th>Sterilization by open market operations</th>
<th>Sterilization by other means</th>
<th>Restrictions on capital inflows</th>
<th>Liberalizing the current account</th>
<th>Selective liberalization of the capital account</th>
<th>Strengthening the domestic financial system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Chile</td>
<td>x</td>
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<td>x</td>
<td>x</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Colombia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Indonesia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Rep. of Korea</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Malaysia</td>
<td>x</td>
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<tr>
<td>Mexico</td>
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<td>Philippines</td>
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<td>Thailand</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

a. Progress toward a floating exchange rate, including widening of the band within which the rate may fluctuate, limiting use of swap facilities, and pegging to a basket of currencies.
b. Includes expenditure reduction, expenditure switching toward public investment, and accelerated repayment of public debt.
c. Conventional sterilization through issuing government or central bank debt, or both, to absorb domestic liquidity.
d. Includes increase in banks' reserve requirements, increase in banks' capitalization, and depositing of public sector cash balances at central bank.
e. Includes taxes on capital inflows, minimum reserve requirements on foreign loans, and ceilings on foreign borrowing.
f. Includes tariff reductions.
g. Includes removing restrictions on overseas investments by residents.
h. Includes raising banks’ risk-adjusted capital adequacy requirements to the levels set out in the Basle agreement.

Source: Authors' analysis.
**Moves toward a More Flexible Exchange Rate**

Of the countries in our sample, Argentina has retained its fixed exchange rate system (introduced as the main anchor for its stabilization program in April of 1991). Colombia has maintained its crawling peg policy but widened the band within which the nominal exchange rate is permitted to fluctuate, while Malaysia has kept its policy of pegging to a basket of currencies and also allowed a greater variability of the spot rate. Korea pegs its currency to the U.S. dollar and maintains a narrow band within which the exchange rate can fluctuate on intraday trading according to market forces. In October 1993 Korea widened this range in response to pressures on the exchange rate from inflows, effectively introducing greater exchange rate risk for market participants.

As part of a broader package of reforms, the Philippines in September 1992 eliminated all restrictions on the use of foreign currency for both current and capital account transactions, lifted restrictions on access to dollar loans from offshore accounts, liberalized off-floor trading, and extended the trading hours of the foreign exchange market. As a result the value of the Philippine peso is now essentially market-determined but with greater variability. Chile has had a crawling peg policy in place since the middle of the 1980s. Initially pegging to the dollar and within a narrow band, Chile adjusted its exchange rate policy to increase the uncertainty of exchange rate movements and to accommodate a real appreciation of the exchange rate. To this end the Chilean authorities have appreciated the central parity rate on several occasions, widened the band around the central parity, and changed the peg from the dollar to a basket of currencies.

Mexico introduced an exchange rate band, which was subsequently widened. In December 1994 the central parity was devalued and immediately after that, the exchange rate was allowed to float. Indonesia, which maintains a managed float against the U.S. dollar, imposed limits on the use of facilities for currency swaps to discourage foreign borrowing, but it also widened the spot market bid-ask spread offered by the Bank of Indonesia to encourage more trading among market participants. Since the late 1980s, Thailand has pegged the baht to a basket of currencies, a significant component of which is the U.S. dollar, with the Bank of Thailand setting a day-to-day exchange rate. From 1993 a series of steps was taken to further liberalize the exchange rate system, particularly transactions and volumes of the capital account.

**Fiscal Restraint**

Several countries in the sample explicitly used fiscal adjustment to counteract the effects of the capital inflow in expanding expenditure and causing the real exchange rate to appreciate. Argentina reduced the fiscal deficit as part of its stabilization program and, following the reversal in capital inflows associated with the “tequila effect,” introduced a major fiscal adjustment program. In Indonesia the timetable for implementing several public investment programs was
extended to improve the fiscal position. Korea’s fiscal accounts, driven more by the level of domestic activity and tax revenues to avoid an overheating of the economy than by attempts to compensate for the effects of capital inflows, have been strengthened since 1991. Malaysia systematically reversed its public sector deficit of 11 percent of gross national product in 1986, to a surplus of 0.2 percent of GNP in 1993. In the process, expenditures were oriented toward investment, particularly in infrastructure, while fiscal surpluses were used to accelerate repayment of external public debt.

In the early 1980s Mexico strengthened its fiscal accounts but relaxed them again in 1994. The Philippines reduced its public sector deficit from 5.5 percent of GDP in 1990, to 1.7 percent in 1992. Thailand’s fiscal adjustment was even more impressive, moving from a public sector deficit of 5 percent of GDP in 1984–85 to a surplus of 5 percent in 1989–90, with most of the turnaround coming from reduced government consumption. Coupled with improvements in efficiency and changes to the tax system, which have made Thai government revenues and expenditures more sensitive to the Thai business cycle, fiscal balances have deteriorated in recent years to a deficit in 1994 of 0.8 percent of GDP, reflecting heightened emphasis on redressing income inequalities across rural and urban areas.

Sterilization by Open Market Operations

All the countries in the sample except Argentina intervened to sterilize—that is, offset—the inflows. Chile used the policy quite intensively to avoid a sharp appreciation of the nominal exchange rate within the band, offsetting the increase in the money supply from growing foreign reserves by issuing central bank bonds of different maturities. Colombia’s sterilization took the form of placing central bank bonds denominated in foreign currency at market-determined rates. Indonesia’s strategy was to mop up the liquidity associated with the foreign reserve accumulation by increasing the interest rate on Bank of Indonesia certificates to make them more attractive to domestic financial institutions.

Since 1986, when big current account surpluses brought large accumulations of foreign reserves to Korea, the government’s policy has been to place foreign exchange and monetary stabilization bonds. Similarly, Malaysia, where foreign reserves have accumulated at the rate of 4.3 percent of GDP a year since 1986, has sterilized the resulting monetization in part through placing government bonds. Mexico issued bonds from 1990 until January 1994 denominated both in pesos and dollars; in Thailand the Bank of Thailand issued its own bonds; and in the Philippines, the central bank issued substantial numbers of its own securities to mop up some of the liquidity brought by the foreign exchange accumulation.

Sterilization by Other Means

Three countries in the sample—Colombia, Malaysia, and the Philippines—have increased reserve requirements along with sterilization to restrict the growth
of money supply brought by the foreign reserve accumulation. In addition, Colombia forced commercial banks to invest in dollar-denominated instruments and the Philippines increased treasury deposits in the central bank. Malaysia restricted lending by commercial banks for credit cards and the purchase of specific consumer products and transferred the deposits of the Employee Provident Fund (a government-administered pension fund) to designated accounts in the central bank.

Among the other countries, Indonesia required public enterprises to shift deposits from commercial banks to the Bank of Indonesia, reducing net domestic credit to compensate for the expansion in high-powered money, and Thailand tightened monetary policy by imposing "voluntary limits" on commercial bank lending to "nonproductive" activities, such as consumer loans, mortgage loans, and the construction of luxury condominiums. Since 1989 Thailand has also been reducing the scope of its preferential credit system for priority sectors, decreasing lending amounts and increasing interest rates.

Restrictions on Capital Inflows

Several of the sample countries have imposed controls on capital inflows that vary considerably in type and extent. Chile introduced a compulsory noninterest-bearing deposit at the central bank for a whole year (or a paid-in-cash tax equivalent to the interest cost of a deposit for the same amount). This compulsory deposit, which started at a level of 20 percent of the inflow and then increased to 30 percent, applies to all investment except foreign direct investment in projects previously screened by the appropriate authorities. In September 1993 Colombia introduced a 47 percent unremunerated reserve requirement on short-term (up to eighteen months) external borrowing by firms. Mexico restricted foreign currency liabilities of commercial banks to 10 percent of total liabilities and then introduced a reserve requirement of 15 percent on all foreign-denominated external borrowing.

Indonesia limited external borrowing by commercial banks and imposed ceilings on annual foreign borrowing by public enterprises. The Philippines introduced some restrictions on foreign loans in late 1994. Thailand reintroduced a 10 percent tax on interest payments on foreign borrowing in March 1990. During the first half of 1994, Malaysia imposed ceilings on the external liabilities of commercial banks that were not related to trade or investment, prohibited residents from selling short-term monetary instruments to nonresidents, and required commercial banks to deposit the ringgit funds of foreign banking institutions in noninterest-bearing accounts of the central bank.

Liberalizing the Current Account

All countries in the sample continued to liberalize their trade regimes, in part to counterbalance the real exchange rate appreciation associated with inflows.
In Argentina the government accelerated and completed a major trade liberalization program that eliminated all export taxes and all quantitative restrictions on imports, except for automobiles, and reduced the maximum import tariff from 115 percent in 1988 to only 20 percent by 1992. Later on, as the real exchange rate continued to appreciate, the authorities compensated export and import-competing sectors by increasing a tax rebate applicable to exports and imposing an import surcharge. The rationale here was to improve the relative price of goods made by import-competing sectors without changing relative prices between import-competing items and export goods.

In Chile import tariffs were reduced from 15 percent to 11 percent in 1991, and in early December 1995, the government was considering a further reduction of the tariff as a way to increase the equilibrium real exchange rate. Colombia also accelerated its trade liberalization to counterbalance the appreciation effects of the capital inflows, while Indonesia increased support programs for exporters and has recently accelerated liberalization, in particular by reducing (and sometimes abolishing) import tariffs and removing import licensing restrictions. Malaysia reduced some import tariffs in 1989–90 and introduced a more comprehensive trade liberalization program in 1993. Korea implemented an import liberalization program during 1992–94, covering 133 items, with further liberalization scheduled for 1995–97. Following the recent liberalization, Korea's average weighted import tariff eased to 8 percent in 1994, from 11 percent in 1991.

During the period under review, Mexico reduced its average import tariff to 13 percent. In the Philippines the surge in capital inflows coincided with a previously announced gradual reduction of tariffs. Thailand also accelerated trade liberalization: tariffs on capital goods used in manufacturing were reduced from 20 percent to 5 percent, and all exceptions were eliminated, with the net effect of reducing the average tariff level to 9 percent in 1992, down two percentage points from 1990.

Selective Liberalization of the Capital Account

The selective opening of the capital account was generally intended to reduce the volume of net capital inflows, although liberalizing capital outflows was sometimes part of a broader liberalization effort. For example, Argentina reduced most restrictions on capital movements as part of its overall liberalization strategy, while Chile, as part of its strategy to avoid too sharp a real appreciation, allowed pension funds to invest some of their assets abroad, liberalized investment outflows for selected private enterprises, and progressively reduced (and most recently abolished) mandatory surrender requirements of Chilean exporters. In mid-1993 Colombia took steps to further liberalize its capital account, allowing residents to hold foreign assets and permitting access to foreign credit, as well as removing all restrictions on foreign exchange transactions.
Indonesia has had an open capital account all along that facilitated the diversification of assets. Korea selectively liberalized its capital account to facilitate capital outflows by being more lenient when approving requests from firms for foreign direct investment, allowing small- and medium-sized domestic firms to raise capital abroad, and allowing domestic institutional investors and individuals to make foreign portfolio investments. The Philippines eliminated all restrictions on foreign currency operations. Thailand allowed foreign exchange earners to open foreign exchange accounts with domestic banks and domestic investors to transfer up to $5 million freely for direct investment. Although some restrictive regulations were maintained, residents were readily allowed to invest in property and securities abroad, and requirements for approval to repatriate dividends and loan repayments were abolished. In Malaysia, the capital controls adopted during the first half of 1994 were abolished in August of that year, and the remaining controls on capital outflows were principally aimed at monitoring these flows. Those controls included a requirement that residents obtain permission to borrow more than one million ringgit from abroad, a ban on offshore borrowing of ringgit, and approval for nonresidents to gain access to ringgit credit facilities.

Strengthening the Domestic Financial System

Argentina’s method for strengthening the financial system was to increase capital requirements for banks even above those outlined for all banks by the Basle agreement (an accord adopted by industrial countries that implies a capital-asset ratio of 8 percent, adjusted for risk). Some of the other countries introduced a gradual increase in capital requirements as part of their strategy for moving to the Basle norm. Generally, countries in the sample moved toward strengthening commercial banks. Indonesia instituted more stringent capital and reserve requirements for banks, both to strengthen the financial system and to reduce credit expansion.

Colombia implemented the Basle agreement and went even further by requiring banks to make special provisions on loans to local governments. These loans, which were growing rapidly, were considered riskier than those covered under standard Basle rules. In addition, the government intensified its monitoring of the banking system to avoid the undue risk-taking made possible by the availability of foreign loans.

Economic Policy: Some Observations and Lessons

The outcomes of the different policies implemented to compensate for the monetary and real effects of the recent surge in inflows of private capital can be expressed in terms of a set of macroeconomic indicators of performance. When these outcomes are tabulated (table 2), some important general obser-
Table 2. Selected Macroeconomic Data

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<tr>
<td><strong>Argentina</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall capital account balance&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2,304.0</td>
<td>3,134.0</td>
<td>3,318.5</td>
<td>-2,995.2</td>
<td>-1,590.0</td>
<td>1,806.3</td>
<td>10,549.1</td>
<td>11,179.4</td>
</tr>
<tr>
<td>As a percentage of GDP</td>
<td>2.2</td>
<td>2.9</td>
<td>2.6</td>
<td>-3.9</td>
<td>-1.1</td>
<td>1.0</td>
<td>4.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Government consumption&lt;sup&gt;b&lt;/sup&gt;</td>
<td>n.a.</td>
<td>4.9</td>
<td>4.3</td>
<td>4.5</td>
<td>8.4</td>
<td>8.8</td>
<td>9.4</td>
<td>n.a.</td>
</tr>
<tr>
<td>Average inflation&lt;sup&gt;c&lt;/sup&gt;</td>
<td>90.1</td>
<td>131.3</td>
<td>343.0</td>
<td>3,079.8</td>
<td>2,314.0</td>
<td>171.7</td>
<td>24.9</td>
<td>10.6</td>
</tr>
<tr>
<td>Real effective exchange rate&lt;sup&gt;d&lt;/sup&gt;</td>
<td>121.3</td>
<td>123.4</td>
<td>133.9</td>
<td>88.1</td>
<td>184.5</td>
<td>256.4</td>
<td>308.2</td>
<td>338.1</td>
</tr>
<tr>
<td>Current account balance&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-2.7</td>
<td>-3.9</td>
<td>-1.2</td>
<td>1.4</td>
<td>3.3</td>
<td>-0.2</td>
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<td><strong>Chile</strong></td>
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<td>947.6</td>
<td>955.7</td>
<td>1,234.1</td>
<td>2,747.3</td>
<td>1,032.1</td>
<td>2,906.4</td>
<td>2,410.3</td>
</tr>
<tr>
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<td>4.0</td>
<td>4.4</td>
<td>9.0</td>
<td>3.0</td>
<td>6.8</td>
<td>5.3</td>
</tr>
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<td>Government consumption&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12.6</td>
<td>10.9</td>
<td>10.4</td>
<td>9.9</td>
<td>9.8</td>
<td>9.5</td>
<td>9.4</td>
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<td>19.9</td>
<td>14.7</td>
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<td>15.4</td>
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<td>108.0</td>
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<td>127.9</td>
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<td>152.9</td>
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<td>-1.8</td>
<td>0.3</td>
<td>-1.6</td>
<td>-4.6</td>
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<td>615.3</td>
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<td>86.4</td>
<td>-414.7</td>
<td>490.2</td>
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<td>0.9</td>
<td>0.2</td>
<td>-1.0</td>
<td>1.0</td>
<td>4.4</td>
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<td>9.8</td>
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<td>10.3</td>
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</tr>
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<td>Overall capital account balance&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>2,628.5</td>
<td>5,637.0</td>
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<td>3,898.9</td>
<td>3,623.8</td>
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<tr>
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<td>5.4</td>
<td>2.0</td>
<td>2.8</td>
<td>5.3</td>
<td>5.3</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
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<td>9.0</td>
<td>9.4</td>
<td>9.0</td>
<td>9.1</td>
<td>9.5</td>
<td>9.9</td>
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<tr>
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<td>9.3</td>
<td>8.0</td>
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<td>9.9</td>
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<td>89.7</td>
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<td>-2.1</td>
<td>-1.9</td>
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<td>Government consumption</td>
<td>Average inflation</td>
<td>Real effective exchange rate</td>
<td>Current account balance</td>
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<td><strong>Rep. of Korea</strong></td>
<td>-4,411.0 -8,615.0 -11,001.5 -2,187.4 1,765.3 7,636.0 7,942.9 2,725.7</td>
<td>-4.1 -6.3 -6.0 -1.0 0.7 2.6 2.6 0.8</td>
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<td>2.8 3.0 7.1 5.7 8.6 9.3 6.2 4.8</td>
<td>101.4 112.0 134.9 155.4 160.1 168.8 168.5 171.7</td>
<td>4.3 7.2 7.8 2.3 -0.9 -3.0 -1.5 0.1</td>
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<td>1,140.2 -1,164.6 -2,883.1 1,000.0 2,908.7 5,355.2 8,584.9 11,632.4</td>
<td>4.1 -3.7 -8.3 2.6 6.8 11.4 14.8 18.0</td>
<td>16.9 15.4 14.3 14.4 14.0 14.2 13.1 12.6</td>
<td>0.7 0.3 2.6 2.8 2.6 4.4 4.8 3.5</td>
<td>96.9 99.6 98.2 97.6 100.4 103.0 116.5 119.4</td>
<td>-0.4 8.3 5.2 0.7 -2.1 -8.9 -2.8 -3.8</td>
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<tr>
<td><strong>Mexico</strong></td>
<td>2,651.4 3,979.0 -3,310.1 6,540.9 10,928.5 22,725.0 25,923.4 29,521.3</td>
<td>2.0 2.8 -1.9 3.2 4.5 7.8 7.8 8.1</td>
<td>9.1 8.8 8.6 8.5 8.4 8.9 9.9 10.7</td>
<td>86.2 131.8 114.2 20.0 26.7 22.7 15.5 8.7</td>
<td>78.2 80.5 104.5 115.8 128.4 146.7 165.3 178.4</td>
<td>-1.3 2.1 -2.2 -3.0 -3.1 -5.1 -7.4 -6.4</td>
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<td>243.2 -60.0 530.3 2,000.6 2,597.4 3,284.6 2,653.3 4,144.4</td>
<td>0.8 -0.2 1.4 4.7 5.9 7.2 5.0 7.6</td>
<td>8.0 8.4 9.0 9.5 10.1 9.9 9.7 10.1</td>
<td>0.8 3.8 8.8 12.2 14.1 18.7 8.9 7.6</td>
<td>92.0 94.6 100.3 109.2 111.5 117.1 137.4 139.0</td>
<td>4.0 0.6 0.8 -3.4 -6.1 -2.3 -1.9 -6.0</td>
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</table>

(Table continues on the following page.)
Table 2. (continued)

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<tr>
<td>Overall capital account balance&lt;sup&gt;a&lt;/sup&gt;</td>
<td>652.8</td>
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<td>6,978.0</td>
<td>10,426.0</td>
<td>12,075.9</td>
<td>8,849.0</td>
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<td>As a percentage of GDP</td>
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<td>6.3</td>
<td>9.7</td>
<td>12.2</td>
<td>12.2</td>
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<td>Government consumption&lt;sup&gt;b&lt;/sup&gt;</td>
<td>12.8</td>
<td>11.3</td>
<td>10.0</td>
<td>9.5</td>
<td>9.4</td>
<td>9.3</td>
<td>10.0</td>
<td>10.3</td>
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<tr>
<td>Average inflation&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.8</td>
<td>2.5</td>
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<td>110.2</td>
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<td>-0.7</td>
<td>-2.7</td>
<td>-3.5</td>
<td>-8.3</td>
<td>-7.5</td>
<td>-5.5</td>
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</tbody>
</table>

<sup>a</sup> In millions of U.S. dollars  
<sup>b</sup> As a percentage of GDI  
<sup>c</sup> Percent  
<sup>d</sup> 1985 = 100  
<sup>e</sup> n.a. Not available  

vations and policy lessons emerge, along with conclusions specific to individual countries.

**General Observations**

- In all the countries the increase in inflation was brief. In fact, since the early 1990s, inflation in Argentina, Chile, and Mexico has been decreasing and has remained fairly stable in the other six countries.
- The countries that received the largest capital inflows (as a percentage of GDP, see figure 2) on average during 1986–93 are not those that experienced the largest appreciation of the real exchange rate. Indeed, appreciation in those countries (Chile, Malaysia, and Thailand) has been relatively low.
- Those countries—Chile, Indonesia, Malaysia, and Thailand—in which government consumption has been decreasing as a percentage of GDP are also those in which real exchange rate appreciation has been lower (see figure 3).
- Those countries that did not employ a restrictive fiscal stance relative to GDP—Argentina, Korea, Mexico, and the Philippines—show the highest real exchange rate appreciation, even though they were not the largest recipients of capital inflows.

**Figure 2. Capital Flows and Change in the Real Exchange Rate, 1986–93**

Percentage change in the real exchange rate

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage Change</th>
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<tbody>
<tr>
<td>Argentina</td>
<td>60</td>
</tr>
<tr>
<td>Mexico</td>
<td>50</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>40</td>
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<tr>
<td>Philippines</td>
<td>30</td>
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<tr>
<td>Chile</td>
<td>20</td>
</tr>
<tr>
<td>Thailand</td>
<td>10</td>
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<tr>
<td>Indonesia</td>
<td>10</td>
</tr>
<tr>
<td>Colombia</td>
<td>10</td>
</tr>
<tr>
<td>Malaysia</td>
<td>10</td>
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</tbody>
</table>


Overall, the evidence does not indicate any clear regional difference in the way countries have responded to the surge of capital inflows, although arguably the Asian countries (except for Korea and the Philippines) have tended to rely more on restrictive fiscal policy than the Latin American group (other than Chile). Some conclusions about economic policy specific to individual countries can, however, be drawn from the cases studied:

- The experiences of Chile and Colombia clearly illustrate the difficulties that a country faces in the more integrated and global capital markets of the 1990s when it wants to combine a restrictive monetary policy intended to combat inflation with policies to manage the real exchange rate. The lesson is that, when restrictive monetary policy accompanies an exchange rate target, sterilized intervention tends to exacerbate, rather than ameliorate, capital inflows. That happens because sterilization tends to maintain or even increase the differential between domestic interest rates and expected foreign interest rates (adjusted for expected devaluation). Furthermore, as the experience in Chile and the Philippines also shows, sterilized intervention may significantly worsen the quasi-fiscal deficit of the central bank.
A comparison of the experiences of Indonesia, Malaysia, and Thailand with those of Colombia, Korea, Mexico, and the Philippines suggests that, where minimizing the real exchange rate appreciation is an objective, sterilized intervention is most effective when accompanied by fiscal restraint. The former countries substantially tightened fiscal policy while implementing sterilized intervention, whereas fiscal adjustment in the latter group was less severe.

Policy Lessons

The experiences of the nine countries examined in this study afford some pointers for policy.

The central bank can play at least a temporary role in averting some of the side effects of capital inflows.

In the long run a tight fiscal policy seems to be the most effective means of minimizing the appreciation of the real exchange rate normally caused by a capital inflow. The resultant increase in public savings leaves more room for the inflows to finance investment in the private sector, and a firm fiscal stance increases the confidence of the international investor community.

A mixed policy seems preferable to a purely fiscal policy in the short run because fiscal policy is generally too inflexible to deal on its own with volatile capital flows. Nevertheless, in the medium and long terms, the high volatility of portfolio investment flows predicates a consistent fiscal policy aligned with fundamentals.

Sterilized intervention has been ineffective in protecting the real exchange rate from appreciating. The policy may work in the short run, but the maintained or even increased domestic interest rates that go along with it provide additional incentives for capital inflows. Finally, this policy is not sustainable on its own in the long run because, in worsening the quasi-fiscal deficit of the central bank, it has an expansionary effect that eventually leads to real appreciation—which in turn may bring speculative attacks on the exchange rate.

Moving toward a floating exchange rate and increasing the extent to which it is determined by market forces—a step taken by most of the sample countries—appears to be more successful than a fixed exchange rate regime: first, in supporting an effective monetary policy; second, in increasing the exchange rate risk faced by market participants and thus in discouraging, at least to some extent, speculative capital inflows; and, third, in relieving some of the upward pressure on inflation that is stimulated by capital inflows.

Letting domestic interest rates fall to levels consistent with international interest rates (augmented by expected depreciation) seems necessary to abate the inflows of short-term, speculative capital. As the experiences of Colombia and Indonesia show, letting the domestic interest rate adjust reduces the incentives for capital inflows and eliminates the quasi-fiscal losses of the central bank. The
aggregate effects on demand of the lower interest rate need to be handled through a fiscal adjustment.

Quantitative constraints or ceilings on foreign borrowing by banks or other large borrowers, or sterilization, through forcing large investors (pension funds or public enterprises) to purchase liabilities of central banks may prove effective in the short run as long as domestic interest rates and capital inflows do not rise in the process. But given the worldwide integration of financial markets and the sophistication of financial intermediaries, such policies do not seem to work in the long run, and they may also damage the economy as a whole because of related pervasive effects on resource allocation and efficiency. These policies will probably also be a disincentive to international investors.

In sum, the benefits for economic growth that capital inflows can bring to developing countries—namely, relaxing the balance of payments constraint and facilitating investment—can be realized if the associated macroeconomic adjustment problems are properly handled. By the same token, mismanagement in the recipient country can virtually eliminate the benefits and may even ultimately cause a reversal of flows. The key to higher sustainable rates of investment and growth seems to be fiscal policy—not only because of the highly integrated financial markets around the world, but also because monetary policy becomes less effective whenever there is a nominal exchange rate target. This is particularly true for those flows that are highly volatile, such as private portfolio investment. For more long-term capital inflows, the authorities should allow the adjustment mechanism to work through a real appreciation, accompanied by a fiscal adjustment to reduce the size and smooth out the required appreciation.

Notes

Vittorio Corbo is professor of economics at the Catholic University of Chile, and Leonardo Hernández is on the staff of the International Economics Department of the World Bank. This article is a revised and expanded version of Corbo and Hernández (1993), a paper presented at a World Bank conference on portfolio investment in developing countries. The authors are extremely grateful to Alistair Boyd for his assistance in revising the paper and to two anonymous referees for their helpful comments and suggestions.

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

2. Another lesson from the Mexican crisis concerns the taking of undue risks in managing internal and external debt. This issue, although extremely important, is not discussed in this article.

3. The dynamics of an economy with a floating exchange rate system are different from the example given here, but the final outcome—a real exchange rate appreciation—remains; see Dornbusch 1976 and Calvo and Rodriguez 1977.

4. On an empirical basis, there is no conclusive evidence concerning the different degree of volatility of the different types of foreign financing (see Claessens and others 1993).
References

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


SAVING AND INVESTMENT:
PARADIGMS, PUZZLES, POLICIES

Klaus Schmidt-Hebbel
Luis Servén
Andrés Solimano

The 1990s have seen a renewed interest in issues of capital accumulation and growth. New paradigms for saving, investment, and growth have been advanced to address theoretical and empirical puzzles and to guide the design of better policies. This paper provides a policy-oriented review of recent theoretical and empirical work on the determinants of saving and investment and on their links to growth. It takes stock of new findings as well as still unresolved questions and gives particular attention to empirical regularities and to the policy issues relevant to developing countries.

The mid-1990s have seen a resurgence of interest in themes of capital accumulation, technological progress, and economic growth. This renewal of interest reflects, on the one hand, a shift from the 1980s and early 1990s, when macroeconomic discussion was dominated by a concern with short-term adjustment and stabilization; it marks, on the other, the new consensus among development economists that better living standards and the elimination of poverty must be based on the sustained expansion of output.

Although questions of capital formation, technological progress, and saving have been at the core of economic analysis for two to three centuries, the connections among them and the directions of causality are still far from clear. Several factors may start and support growth. The transformation of an initial growth spurt into sustained expansion of output requires the accumulation of capital and its corresponding financing. Expansion, in turn, sets in motion a self-reinforcing process by which the anticipation of growth encourages investment, investment supports growth, and increased income raises saving.

The links in this process may be weak, however. As recent experience in Latin America shows, the resumption of investment and growth after a period of adjustment and depressed economic activity is far from automatic. Coordination failures, pervasive uncertainties, and irreversibilities in investment explain in
part why the recovery of growth is hard to achieve. The ability of governments to boost saving is often limited, moreover, and the scarcity of foreign financing can pose a binding constraint. Booms may produce problems as well, as has been recently illustrated in Mexico, for they may generate unsustainable growth trajectories and spending frenzies that eventually lead to busts. These transitional problems, although exciting for analysts, are a nightmare for policymakers. Steady growth remains elusive, and experiences of high growth sustained for several decades (as in East Asia since the 1960s) are exceptional and hard to replicate.

This article reviews recent theoretical and empirical work on saving and physical investment and their relation to growth. Because the research and policy agendas on saving and physical investment are broad, the discussion includes only those issues that evince new theoretical developments, significant policy shifts, or puzzles that theorists and policymakers have not yet been able to resolve. The empirical research reviewed concentrates on the evidence from developing countries.

**Saving, Investment, and Growth: Correlations and Causalities**

Saving and investment are subject to serious measurement problems, particularly in developing countries (see appendix). Nevertheless, the available international evidence on long-term patterns of saving and growth appears to support the conventional wisdom that virtuous circles of development and saving exist along with traps of undersaving and poverty.

Figure 1 shows the increasing disparity of saving rates in the developing world over the past thirty years. (Similar trends are observed for gross domestic investment rates.) From 1960 to the early 1990s, gross domestic saving more than doubled in East Asia relative to gross domestic product (GDP)—from 14 percent of GDP in the early 1960s to more than 35 percent in the 1990s. During the same period, saving rates stagnated in Latin America and collapsed in Sub-Saharan Africa—where they fell from about 12 percent of GDP in the 1960s to 6 percent in the early 1990s.

These divergent saving and investment experiences closely mirror the regions’ respective growth performances. During the past twenty years, per capita growth in GDP averaged almost 5 percent in East Asia, about 1 percent in Latin America, and less than 0.5 percent in Sub-Saharan Africa. The apparent implication for policy might be that raising domestic saving should be a high priority in ensuring a sustainable path toward high per capita growth.

Recent economic research, however, has shed new light on the links among saving, investment, and growth. We draw from this research to examine three basic questions: What is the relation, and, specifically, the direction of causality, between growth and saving? What is the link between saving and investment, and is national saving translated into domestic investment? What is the contri-
Saving and Growth

Although the strong correlation between saving and income growth is firmly established, researchers have difficulty identifying the precise links between them. To start, consider the way in which saving reacts to cyclical income fluctuations.

Theory suggests that when households have access to credit and when they take the future into account in making their consumption and saving decisions, most temporary income fluctuations will be reflected by changes in saving rather than by changes in consumption. Ample evidence for industrial countries, how-
ever, and less systematic results for developing countries show that saving is not so strongly procyclical, responding to temporary income by less than what theory predicts.

Turn now to the relation between trend income (income averaged across cycles) and private saving, a connection that is more relevant from the viewpoint of long-term growth. Most cross-country empirical studies that include growth in real income as a determinant of saving report a strong positive effect of income growth on saving. Carroll and Weil (1994), however, note that these results are skewed, because they are driven largely by the outlying saving and growth performances of Japan and the newly industrialized economies of East Asia.

From the viewpoint of textbook consumption theory, this skewedness poses a puzzle. The two leading models of consumption—the permanent-income model of identical consumers planning consumption over an infinite horizon, and the life-cycle overlapping-generations model encompassing cohorts of finite-lived consumers—predict a negative effect of growth on saving as individuals adjust current consumption upward in anticipation of higher future income. A different result is obtained through the latter framework if it is assumed that growth takes place between cohorts, rather than within each cohort’s lifetime. In such circumstances, growth increases aggregate saving for the simple reason that the income (and thus the saving) of the active cohorts is larger than the income (and dissaving) of the retired cohorts. But Carroll and Summers (1991) show for three industrial countries and Deaton (1989) shows for developing countries that actual age-consumption profiles are not consistent with the predictions of life-cycle theories, thereby undermining the empirical importance of this mechanism.

Several less conventional hypotheses on consumer behavior attempt to explain the positive link between saving and growth, but they are largely untested. One addresses the concentration of growth in households with high saving rates, such as rich or middle-aged households (Collins 1991). A related explanation is that growth raises poor consumers above a subsistence level of income below which they cannot save. Another suggests that saving by rich or older households may be driven by the desire to leave bequests to heirs, so that within a certain income range, higher income will be reflected primarily in higher saving leading to larger bequests.

Consumption habits that change slowly despite increased income may also contribute to higher saving rates in the face of rapid growth (Carroll, Overland, and Weil 1994). And a mixture of strong consumption habits with uncertain incomes (giving rise to precautionary saving) may also be a promising avenue for further research (Carroll and Weil 1994). A final unconventional hypothesis, reminiscent of classical thinking, is that consumers value both consumption and wealth (or capital). Higher growth raises wealth, but because wealth and consumption are interchangeable, consumption rises less than proportionately, thereby raising saving (Cole, Mailath, and Postlewaite 1992; Fershtman and Weiss 1993; Zou 1993).
An alternative explanation considers the reverse causality, that saving is automatically translated into capital accumulation and thereby growth, and that this translation is simply the mechanism underlying the positive correlation between saving and growth that is observed in practice. Some empirical evidence that this may not be the whole story is provided by Carroll and Weil (1994), who argue that saving typically follows, rather than precedes, growth. They conclude that the observed correlation between saving and growth reflects at least in part a reverse causation from growth to saving and that traditional estimates that fail to take into account such two-way endogeneity are likely to overstate the contribution of saving to growth, even under the maintained hypothesis that saving is fully translated into investment.

**Saving and Investment**

Understanding the link between saving and investment is important for at least two reasons. First, as just argued, it may hold the key to the positive correlation between saving and growth. Second, if capital accumulation is indeed the engine of growth, understanding the interaction between saving and investment is crucial to assessing the validity of the traditional recipe that raising saving is the surest way to increase growth, a notion that implicitly requires that each country's extra saving be automatically translated into higher domestic investment.

Textbook macroeconomics emphasizes that the determinants of saving are different from those of investment, that saving depends mainly on income and wealth, and that investment depends on profitability and risk. Because saving and investment result from two independent decisions, they clearly can differ *ex ante*. Nevertheless, in a closed economy, national saving and domestic investment must be equal *ex post*; if saving rises, investment must also rise. According to the textbook, the adjustment mechanism making this equalization possible would be a reduction in income, a reduction in interest rates, or a reduction in both.

Matters are more complicated in an open economy, because capital flows introduce a distinction between *ex post* national saving and domestic investment. National saving need not be used for domestic investment; it may be invested abroad. In a world of unrestricted capital mobility, each country's saving ideally would flow to whatever part of the world offers the highest private rate of return. An increase in national saving would thus be reflected primarily in a larger current account surplus (or reduced deficit), rather than in higher domestic investment and growth. This mechanism seems all the more relevant in view of the substantial decline over the past twenty years in barriers to international capital flows, especially among the industrial countries.

This reasoning, however, directly contradicts the empirical evidence reported by Feldstein and Horioka (1980) and updated by Feldstein and Bacchetta (1991) that in the long term gross national saving and domestic investment rates show a strong positive correlation. For a sample of industrial countries, these authors
find a correlation coefficient close to 0.9. Other studies find a similarly strong correlation for developing countries, although at a somewhat lower magnitude (Dooley, Frankel, and Mathieson 1987; Summers 1988).

There has been considerable debate about whether this result is evidence of international capital immobility. One view, defended by Feldstein and his associates, holds that international capital mobility is indeed limited, that even though barriers to mobility are relatively low, capital fails to move across national borders because its owners prefer to keep it at home to avoid currency and political risks (Feldstein 1994). Studies of international portfolio diversification, which find a significant "home-country bias" in investment portfolios, seem to support this view (Mussa and Goldstein 1994; Tesar and Werner 1992). Thus national saving is largely retained in the home country, where it increases domestic investment (albeit through unspecified mechanisms).

An alternative view is that the observed correlation between saving and investment says little about international capital mobility and is mainly the result of policy reactions or common third factors that cause saving and investment to move together over the long term. A wide variety of mechanisms have been proposed to explain a strong saving-investment correlation even in the presence of high capital mobility (see Obstfeld 1994 for a comprehensive overview). Frankel (1992) argues, for example, that even under perfect capital mobility, shifts in saving alter the real interest rate, which in turn moves investment in the same direction as saving. This implies, however, that real interest rates will differ across countries even in the long term, so that, if differentials in international real interest rates reflect expected movements in real exchange rates, real exchange rates will have to keep changing even in the long term. A second explanation, by Obstfeld (1986), underscores the role of slowly changing demographic and technological factors that push saving and investment in the same direction. In the same vein, Taylor (1994) shows empirically that relative price and demographic variables influencing both saving and investment can account almost entirely for the Feldstein-Horioka result. A third alternative attributes the link between saving and investment to the operation of the economy's long-term budget constraint (Obstfeld 1986); in the long term, if the economy is close to a constant ratio of foreign assets to GDP, it is possible to demonstrate that saving and investment ratios cannot diverge much.

A different line of argument shifts the focus from international to domestic capital immobility, underscoring the close link between corporate investment (which accounts for the bulk of private investment in industrial countries) and retained earnings. Indeed, retained earnings typically represent the main source of corporate investment financing in industrial countries. The strong correlation in these countries between retained earnings and corporate investment may be the key to the aggregate saving-investment correlation, assuming that household saving does not decline and thereby offset a rise in saving by firms aimed at financing investment. This mechanism seems particularly relevant for developing countries, where capital market imperfections are widespread and borrow-
ing constraints are the norm, not only for organized corporations, but especially for households and firms in the informal sector, which in many developing economies accounts for the bulk of private investment.

Finally, Summers (1988) has suggested that restrictions on countries’ current account imbalances may explain the correlation between saving and investment. Whether these restrictions are caused by lending constraints imposed by world capital markets on deficit countries or by systematic (and successful) current account targeting by policymakers, the result will be a strong ex post correlation between saving and investment. In the extreme situation of low (or zero) access to foreign capital, a condition faced by many developing countries during the 1980s, national saving and domestic investment will be highly (indeed perfectly) correlated. In such a circumstance, moreover, the supply of foreign saving will directly affect domestic saving and investment. This is in stark contrast to the textbook case of perfect capital mobility, in which foreign saving is determined residually by the excess of domestic investment over national saving, and any extra gross capital inflows are completely offset by gross outflows. Argimon and Roldan (1994) find, in this regard, that, in European Community countries enforcing capital controls (presumably to target the external balance), saving and investment display virtually unit correlation, and saving appears to precede investment.

Investment and Growth

The strong association between gross domestic investment ratios and long-term growth performance is well established. East Asia, the region most successful during the past thirty years in achieving rapid and sustained growth, is a good example. The East Asian economies have been able to maintain rates of GDP expansion on the order of 7–8 percent a year, supported by rates of gross capital formation of about 30 percent of GDP; high growth and high investment have thus gone hand in hand.

This critical role of investment in the growth process was challenged by the neoclassical growth theorists of the 1960s and 1970s. The neoclassical (Solow) model asserts that capital accumulation affects growth only during the transition to the steady state; long-term growth is determined only by the rate of technological change, which is assumed to be exogenous. This view attracted considerable criticism (for example, Kaldor 1957, Robinson 1962) on the grounds that the separation between investment and innovation (or technological change) was artificial, because most technological innovation is embodied in new machinery and equipment, a notion that dates back to Allyn Young (1928) and Schumpeter (1934).

Early growth-accounting exercises based on the neoclassical model appear to confirm that cross-country differences in investment ratios explain only part of the differences in growth during long periods and that technological change (or, more honestly, unidentified residual factors) might play a leading role in long-
term growth. The arithmetic of the Solow model, however, does not square well with the strong correlation between investment ratios and growth performance that is observed in practice. Recent work on this issue has brought capital accumulation back to center stage, suggesting an enhanced, albeit less direct, role for investment as a principal determinant of growth.

One line of research considers the complementarities between investment in physical capital and investment in human capital. New and technologically advanced equipment requires operators with adequate skills and education. The identification and design of profitable and innovative investment projects require resourceful, skilled entrepreneurs with an awareness of business opportunities. Along these lines, Mankiw, Romer, and Weil (1992) extend the Solow model to include human capital. Assuming that the accumulation of human capital is guided by that of physical capital, they find that investment performance can account directly and indirectly (through the parallel accumulation of human capital) for the bulk of the variation in growth across countries.

A second line of research emphasizes the close links between the accumulation of physical capital and technological change. If productivity growth is endogenous, rather than exogenous, and is related to the accumulation of physical (or human) capital, an increase in the rate of investment can raise the rate of growth in the steady state. This thinking, again, has old roots, most notably the "vintage capital" extension of the neoclassical model, in which technological progress is embodied in successive generations of capital equipment of increasing efficiency, and in Kenneth Arrow's "learning by doing" model, which makes society's stock of knowledge dependent on cumulative gross investment.

The correlation between technological progress and investment has also been documented. De Long and Summers (1993) estimate the determinants of total factor productivity growth for a large sample of developing countries and show a positive and statistically significant correlation between total factor productivity growth and the ratio of investment in equipment to GDP. In addition, if all firms benefit from economywide technological progress and if that progress is driven by aggregate investment, capital accumulation by any one firm will benefit other firms, creating an externality that opens a gap between the private and social returns to investment. In this vein, Romer (1987) estimates that the social marginal product of capital may be more than twice as high as the private marginal return.

**The Contribution of Investment to Growth.** The empirical correlation between investment and growth has been explored in some depth. Levine and Renelt (1992) test alternative specifications of the growth process to find the one that is least sensitive to changes in additional explanatory variables, to the sample of countries, and to the choice of periods. They find that the only robust regressor, across countries and time, is the ratio of physical investment to GDP.
This result is supported by other empirical analyses of the determinants of growth for different regions of the world.

The recent literature also considers the composition of investment and its consequences for real output and growth. De Long and Summers (1991, 1993) disaggregate investment into its "structures" (construction) and equipment components. Using a sample of both developing and industrial economies, they find that equipment investment contributes much more to per capita GDP growth than does structure investment. Although this conclusion agrees with the notion that technological progress is largely embodied in new machinery, the robustness of the results for some of the samples has recently been challenged by Auerbach, Hassett, and Oliner (1994).

An active line of research begun by Aschauer (1989a, 1989b) considers the impact of public investment on growth. Using an aggregate production function in which output depends on labor, private capital, and public capital, Aschauer estimates with U.S. data an extremely high rate of return for public capital—between two and five times as high as for private capital. He also finds that the accumulation of public capital has a sizable positive effect on private investment. These results would seem to suggest that an aggressive public investment strategy can be instrumental in raising growth.

Aschauer's work has been followed by a rapidly growing literature reexamining his results (see Gramlich 1994 for extensive references), which remain highly controversial. A strand of this literature has extended the empirical analysis to other countries (Berndt and Hansson 1992; Argimon, Gonzales-Paramo, and Roldan 1995). Servén and Solimano (1993) examine the impact of public investment on private investment in developing countries and show a positive and significant correlation in a panel of developing countries, as well as in separate studies of Latin America and East Asia.

For the most part, however, the literature has centered on the role of aggregate public investment, identifying it explicitly or implicitly with public infrastructure. Although this focus may be adequate for some industrial countries (such as the United States), where the public sector's involvement in commercial and industrial activities is negligible, it may be quite misleading for other countries (including most developing countries), where the state is engaged in multiple activities. In such circumstances, different types of public investment are likely to have different effects on private investment and overall growth. Public investment in ports, roads, and telecommunications builds the basic infrastructure needed for the profitable operation of private investment projects and is likely to have a maximum impact on growth. Public investment in conventional industrial and commercial activities, however, in which public enterprises compete with private firms, is likely to discourage private investment and to have a less favorable impact on growth.

This presumption is confirmed empirically by Easterly and Rebelo (1993), who use a large cross-country sample to explore the relation of different kinds of public investment to growth. Subject to some reservations about the quality
of the information available to them, they find that central government investment, which is most likely to include infrastructure projects, is positively correlated with both growth and private investment. Investment by public enterprises, however, which presumably competes more closely with private investment, is negatively correlated with growth. By sector, they find that the strongest growth effect corresponds to public investment in transport and communications.

**IS INVESTMENT NECESSARY FOR GROWTH? IS IT SUFFICIENT?**

Although the empirical results reviewed above underscore the link between investment and growth, they say little about the direction of causation. As with saving, the distinction between the cycle and the long term may be relevant. In the short term, investment has been shown to depend on the rate of output growth, the rate of capacity utilization, or both, as indicators of future demand and the severity of liquidity constraints faced by firms—two variables critical to decisions to expand productive capacity. Thus, during the course of the business cycle, output may lead investment in an accelerator-like fashion (Servén and Solimano 1993). It is worth noting that this sensitivity of investment to cyclical variations in output (or other short-term factors) suggests that a short-term recession may have long-term effects by causing a deep investment slump that permanently traps the economy in a low-growth, low-investment equilibrium. In other words, the growth process may be path-dependent.

Development economics has traditionally maintained that capital accumulation is a fundamental *cause* of growth over the long term. Recently, however, this view has been challenged by the argument that the co-movement of investment ratios and growth rates may be largely caused by the action of a third factor—technological innovation—that is driving both capital accumulation and output expansion (Benhabib and Jovanovic 1991; King and Levine 1994). An extreme interpretation of this view would hold that capital accumulation is a consequence, rather than a cause, of the growth process, which is caused by technological factors. Along these lines, Blomstrom, Lipsey, and Zejan (1993), using a large cross-country sample, argue that growth appears to precede, not follow, investment.

This extreme view seems implausible. Few would dispute that investment is a *necessary* condition for sustained growth, and it is difficult to find countries that have been able to grow at high and sustained rates for long periods without an important effort at capital formation. The simplistic, albeit popular, notion that physical capital accumulation is *sufficient* to guarantee long-term growth, however, is clearly untenable. Sustained growth depends not only on the accumulation of physical capital, but on two additional ingredients as well.

The first ingredient is the accumulation of other complementary inputs, notably, human capital and technological knowledge. Expenditures on their acquisition are treated mainly as consumption in conventional national accounting, although their economic role is similar to that of investment in physical capital. The second ingredient is the efficiency (or quality) of physical investment. A
large effort at capital accumulation may have little effect on growth if it is con-
centrated in activities with low social productivity. The experience of many de-
veloping countries in the 1970s, when massive foreign borrowing was used to
finance capital-intensive industrial projects that proved to be white elephants, is
an example; these low-quality investments were one of the main factors behind
the explosion of the debt crisis in the early 1980s. Similarly, low-quality invest-
ment has been blamed for Europe’s inferior growth performance relative to the
United States—despite a higher investment rate in Europe—and for the growth
slowdown in Japan since the late 1970s—despite a very high investment rate in
Japan.

One primary determinant of the social productivity of investment is the de-
gree of distortions in the economy. If distortions are severe, increased investment
may do more harm than good; it may actually lower social welfare and reduce
growth as measured at shadow (that is, distortion-free) prices. Extreme cases of
this situation may be found among the former socialist economies, in which de-
cades of massive capital accumulation in pursuit of scale economies yielded little
growth or welfare (Easterly and Fischer 1994). Other less extreme examples are
provided by developing countries with high barriers to market forces or foreign
trade, or with relative price misalignment, mandatory credit allocation schemes,
investment licensing practices, and so forth. In such environments, additional
investment tends to exacerbate the welfare cost of the distortions, because the
extra capital is misallocated to socially inefficient activities. In general, invest-
ment involves giving up current consumption in exchange for higher output and
thus increased consumption in the future. Economic distortions tend to make the
tradeoff more adverse by reducing the social payoff to investment for future
consumption, by raising the cost of investment for current consumption, or both,
thereby lowering the rate of investment that is socially desirable.

To conclude, the recent literature supports the view that investment may not
be the sole engine of growth, but it continues to place capital accumulation at
the center of the growth process. One of the main merits of the recent work lies
perhaps in its renewed emphasis on technological change and on the external
effects of physical investment as principal determinants of growth—filling what
Romer (1993) labels the “idea gap,” as opposed to the “object gap.” The latter
can be filled simply by accumulating material inputs. As noted above, the notion
that technological progress is largely embodied in new capital goods is hardly
new to growth theory. From this perspective, the recent literature’s emphasis on
the importance of productivity gains for long-term growth enhances, rather than
lessens, the significance of capital accumulation for the growth process.

The extent to which “ideas” matter in practice, however, remains contro-
versial. Alwyn Young (1994a, 1994b) forcefully argues that, except for Hong
Kong, East Asia’s stellar growth performance can be explained largely by its
unusually high investment ratios, not by any extraordinary growth in pro-
ductivity, which, by Young’s estimates, has proceeded at a rate fairly close
to the world average.
Saving: Unresolved Questions

Saving is the aggregate perhaps most resistant to both economic definition and the influence of policy. Whatever definition is used, however, saving shows large differences over regions and over time (see figure 1). Even within countries, the variations are striking. In Mexico gross domestic saving rates shrank from 26.4 percent of GDP during 1980–87 to 20.7 percent during 1988–94, thus contributing to the 1994–95 crisis. In Chile saving rates grew from 17.0 percent of GDP during 1974–87 to 28.8 percent during 1988–94, thus contributing to Chile’s economic success. In the United States saving rates fell from 19.7 percent of GDP during 1960–79, to 17.4 percent during the 1980s, and to 15.3 percent during 1990–93.

Recent research on saving and consumption has gone beyond the structuralist two-class consumption theories of the 1950s and the neoclassical permanent-income and life-cycle hypotheses (although the latter are still the two most popular paradigms used to explain consumption and saving behavior). Newer hypotheses address precautionary saving (uncertainty, separation of risk, and intertemporal substitution), borrowing constraints (buffer stocks, housing), bequests, and consumption habits. Although each of these theories sheds light on a particular aspect of intertemporal consumption decisions, none individually is able to explain the large international differences in saving levels, the strong cross-country correlations between saving and growth, or the large shifts within countries in saving rates since 1960.

This section reviews questions on saving behavior that remain unresolved but are central to policy design in developing countries. The questions address three areas in which policy shifts have been particularly large: the contribution of public saving to national saving, the influence of foreign resource inflows on domestic saving, and the effectiveness of financial and tax incentives in raising private saving.

How Effective Is Fiscal Policy in Raising National Saving?

It is useful to distinguish between the transfer aspect of fiscal policy that affects overall consumer wealth (for example, by raising taxes or cutting government consumption) and taxes or subsidies that aim primarily at changing the net rate of return on saving and thus the intertemporal allocation of lifetime resources. The two dominant paradigms in modern neoclassical macroeconomics offer strikingly opposite views on the effectiveness of fiscal policy in raising national saving. When the economy is seen as an aggregation of different generations, each saving primarily for retirement, public saving should affect national saving (and, in a closed economy, investment), because it shifts resources across generations that are only weakly, or not at all, connected to each other. Alternatively, when the economy is seen as an infinite succession of generations, closely related through gifts and bequests, and when, in addition, each of these
cohorts adjusts its expenditures in response to the taxes that their offspring will pay in the future, changes in public saving should be exactly offset by changes in private saving. What matters for private consumption decisions is the level of current government expenditure; it does not matter whether it is financed by taxes or by debt. The latter paradigm is the well-known Ricardian equivalence proposition.

What does the evidence show? Most surveys of the empirical evidence for industrial countries reject Ricardian equivalence. Recent studies for developing countries also dismiss it in its pure form but agree that private saving offsets some public saving (Haque and Montiel 1989; Corbo and Schmidt-Hebbel 1991; Easterly, Rodriguez, and Schmidt-Hebbel 1994; Edwards 1995). Rejection of Ricardian equivalence could imply, however, that real world consumption is bound by many features assumed away by the proposition. These might include weak intergenerational links, financial market imperfections (including borrowing constraints), consumer myopia, and precautionary saving resulting from uncertainty.

Existing country estimates of the extent to which private saving offsets public saving are few, dissimilar, and based on widely differing samples. Even when they use a common methodology, the estimates of these public-to-private saving offset coefficients vary widely. Corbo and Schmidt-Hebbel (1991), for example, develop an encompassing framework that distinguishes among Keynesian, permanent-income, and Ricardian consumption hypotheses, and they apply that framework to a cross-sectional sample of thirteen developing countries. They find an overall public-to-private saving offset coefficient of 0.47; this result, however, conceals, a large variation across individual countries. Edwards (1995) reports offset coefficients for a sample of industrial and developing countries that show similar variation, from 0.43 to 0.58, depending on the regression specification. This frequent rejection of Ricardian equivalence implies that public saving is an effective tool in raising national saving.

Do Foreign Resource Inflows Crowd Out Domestic Saving?

Foreign and national saving decisions may affect each other in either direction. As noted above, the higher the mobility of international capital, the greater the degree of endogeneity of foreign saving to domestic investment and national saving decisions. What does the empirical literature say, however, about the influence of foreign resource inflows on domestic saving? We look first at the consequences of overall foreign saving and then at the effects of foreign aid.

Two analytically essential points should be, but seldom are, addressed in the empirical literature. First, a distinction should be made between nonconcessional foreign resource inflows (foreign investment plus nonconcessional lending) and foreign aid (unilateral transfers plus the grant component of concessional lending); only the latter implies a wealth transfer. Second, the issue of resource fungibility must be explicitly addressed. External resources are perfectly fungible,
for example, when the recipient country does not raise spending in response to additional foreign lending but simply accumulates foreign assets instead.

Chenery and Strout (1966) find a negative initial effect of foreign capital inflows on domestic saving, although second-round effects on capacity growth tend to increase saving. Giovannini (1983) finds that coefficients on foreign saving for developing countries have mixed signs and are insignificant in regression equations for domestic saving. Fry (1978, 1980) and Giovannini (1985) find that the effects of capital inflows are significant and negative, although small. Schmidt-Hebbel, Webb, and Corsetti (1992) show a significant negative effect of foreign saving on household saving for a panel sample of ten developing countries. Gupta (1987), who obtains the most extreme results, reports crowding-in (instead of crowding-out), as reflected by positive coefficients on foreign saving that are significant for Latin America, although not for Asia.

Studies of the effects of foreign aid typically focus on the way it is spent on consumption and investment, that is, on empirical estimates of the marginal propensities to consume (MPC) and invest (MPI) from foreign aid transfers. Griffin (1970, 1971), using ordinary least-squares regressions for a cross-section of developing countries, finds a negative correlation between saving and aid, with an implied MPC of aid equal to 0.73. Subsequent studies by Weisskopf (1972), Papanek (1972, 1973), and Chenery and Eckstein (1970) generally find lower consumption propensities, implying that foreign aid is more effective in financing investment. Chenery and Syrquin (1975), however, find that, on average, only 45 percent of an increase in foreign resources is translated into higher investment, with the remainder financing higher consumption. More recently, Levy (1988) finds an MPC from anticipated foreign transfers equal to 0.4. The Global Coalition for Africa (1993) claims a negative and significant effect of foreign aid on domestic saving for a sample of Sub-Saharan countries. The World Bank (1994a) reports an MPC of 0.4 and an MPI of 0.6 for net transfers received by Sub-Saharan countries in the late 1980s.

Much of this literature is haunted by biases stemming from data measurement errors, misspecification, and simultaneity (including selectivity), as well as from an inadequate treatment of resource fungibility. A recent study by Boone (1994) corrects for the more severe sources of bias and uses a large panel data base of ninety-seven developing countries to estimate marginal propensities to consume and invest out of foreign aid. When his sample is restricted to the eighty-two countries in which foreign aid accounts for less than 15 percent of gross national product (GNP)—that is, most of the developing countries—he finds that all of the aid is spent on consumption. When he uses the full sample—including the fifteen small Sub-Saharan African and island economies that receive more than 15 percent of their GNP in aid—the estimated MPC drops to 0.45 and the MPI climbs from zero to 0.35, suggesting that the lack of resource fungibility is severe in poor countries receiving massive aid financing mainly investment projects.
Foreign aid may affect saving and investment indirectly through higher productivity growth. Private investment and growth may rise, for example, if the conditionality attached to foreign aid promotes beneficial policy reforms and a better allocation of public expenditure, thereby raising the productivity of private investment. Boone's results show, however, that foreign aid does not encourage growth in the overwhelming majority of developing countries, where it accounts for less than 15 percent of GNP, but that it assists growth in those fifteen small countries where it exceeds 15 percent.

We draw two conclusions from this research. First, empirical estimates of the effects on saving of foreign aid (and of foreign saving in general) vary widely with the samples, model specifications, and empirical methods used. Second, the extent of resource fungibility is a critical determinant of the extent to which nonconcessional external loans and foreign aid are channeled into higher domestic consumption or investment.

Do Financial and Tax Incentives Raise Private Saving?

Governments have tried to raise private saving through interest liberalization, direct tax incentives, capital market reforms, and other means. The failure of many of these attempts, however, raises questions about the responsiveness of saving to such policies.

Is private saving sensitive to the real interest rate and to tax incentives? The evidence generally shows that interest rates and tax incentives have little or no effect on saving. There are two ways of looking at this relationship. One is by testing for the interest effect on saving or consumption levels. By this traditional method, country and cross-country studies generally show that interest rates do not much influence saving (Giovannini 1983, 1985, Corbo and Schmidt-Hebbel 1991; Deaton 1992; Edwards 1995). In those exceptional cases in which saving shows a positive response to the interest rate, that response is very small (Gupta 1987; Fry 1988). There are many possible explanations for this finding. One is that the effects of a rise in interest rate on real income and on the allocation of consumption over time may offset each other when consumers do not face borrowing constraints (Schmidt-Hebbel 1987 and Arrau 1989 for the Southern Cone countries). Another is that savers respond little to changes in interest rates or tax incentives when borrowing constraints are binding, although evidence shows that borrowing constraints themselves have a significant and positive effect on private and national saving rates (Jappelli and Pagano 1994, Easterly, Rodríguez, and Schmidt-Hebbel 1994). Reynoso (1988) provides evidence that a nonmonotonic relation may exist between saving and interest rates arising from income concentration when interest rates rise. Such a relation would imply that at low and negative real interest rates, higher rates would increase saving, whereas at high interest rates, the saving schedule would bend backward.

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A less conventional way of looking at this issue is by testing how sensitive the rate of consumption growth is to the interest rate, that is, the extent to which consumers substitute future for current consumption when the interest rate rises. Evidence reported by Deaton (1989) suggests a weak positive effect across a large number of countries. Giovannini (1985) finds positive substitution effects for five developing countries and no effects for thirteen. Econometric studies for the United States surprisingly fail to find significant positive effects (Deaton 1992).

If private saving is generally insensitive to the (after-tax) real interest rate, three policy implications should follow. Fiscal stabilization that lowers the real interest rate would not automatically depress private saving. Financial reform that raises the real interest rate would not automatically raise private saving (although it may shift savers' portfolios from flight capital to domestically held assets). And tax incentives for saving would be ineffective in raising private saving.

Much research has examined the effect of tax incentives on saving in industrial countries, using cross-sectional household data that are typically unavailable in developing countries. The results of studies for U.S. saving incentive plans (such as IRAs, 401(k) plans, and other plans that offer tax deductions on contributions and accrual of interest but impose limits on annual contributions and withdrawals) are inconclusive with regard to their effects on overall national saving. Engen, Gale, and Scholz (1994) find that although U.S. saving incentive plans appear to have been ineffective in raising national saving, they may raise saving after two generations as a result of shifting income toward future generations.

CAN FINANCIAL AND CAPITAL MARKET REFORMS RAISE PRIVATE SAVING? Financial and capital market reforms may affect private saving through various channels, the effects of which may be negative or positive. First, capital market reforms (and macroeconomic stabilization) may reverse capital flight, thereby raising the portfolio share of domestic assets and increasing measured income, measured net exports, and measured domestic saving, but having little effect on overall (correctly measured) private saving. Second, financial liberalization and capital market deepening may raise the efficiency of intermediation, thereby increasing growth and thus private saving. Third, financial liberalization, and the consequent increase in geographical density of financial institutions, the range of financial instruments, and the quality of financial regulation and supervision, typically lead to financial deepening that will be reflected in a permanent increase in the stocks (and a temporary increase in the flows) of financial savings. Although this increase might simply reflect a portfolio shift, and not an increase in overall private saving, it has been argued for East Asia that financial deepening has contributed to the observed growth in overall saving (World Bank 1993). Fourth, but in the opposite direction, financial liberalization typically leads to expanded consumer lending and to less stringent constraints on consumer borrowing, both of which will decrease private saving.
Studies have typically used a measure of broad money to serve as a proxy for financial deepening, but broad money may be negatively correlated with consumer borrowing constraints (and thus positively with consumption) and positively correlated with consumer wealth (and, again, with consumption). Its relation with saving is therefore ambiguous, and so are the results for cross-country samples. Corbo and Schmidt-Hebbel (1991) and Schmidt-Hebbel, Webb, and Corsetti (1992) report negative effects of broad money on saving in developing countries; Edwards (1995) reports positive effects for both industrial and developing countries.

Variables that more closely reflect borrowing constraints are reported to have less ambiguous effects on saving. Jappelli and Pagano (1994) find a significant negative effect of loan-to-asset-value ratios on net national saving in industrial countries; Edwards (1995) finds a negative, but statistically insignificant, effect of consumer credit on private saving in both industrial and developing countries.

A final question arises about the potential effects on private and national saving of the introduction of mandatory pension plans and the replacement of pay-as-you-go (PAYG) pension systems by fully funded plans. These effects on saving are typically analyzed in the framework of an economy that is an aggregate of different generations saving primarily for their own retirement and not for their offspring.

Useful results are obtained from simulations of general-equilibrium models considering both the transfers across generations that result from pension systems and the factor market distortions of PAYG schemes. Results for the United States show that starting unfunded social security reduces long-term saving and output levels by modest amounts (Auerbach and Kotlikoff 1987). Results for a group of representative economies show that the long-term effects of tax-financed transitions in pension reform are small to moderate and reaped only in the very long term (Arrau and Schmidt-Hebbel 1993; Cifuentes and Valdés-Prieto, forthcoming). The dynamic effects on saving and long-term growth through capital market deepening and labor shifts from informal to formal markets may be much more significant, however, and reaped much earlier (Corsetti and Schmidt-Hebbel, forthcoming).

By contrast, the considerable econometric evidence for industrial countries based on single-equation consumption or saving functions shows little or no effects of unfunded social security on contemporaneous private saving levels (World Bank 1994b). A significant exception is Feldstein's (1974, 1995) work for the United States, which shows that social security programs reduce overall private saving by 40 to 60 percent. Econometric evidence for developing countries suggests that government social security benefits (typically through PAYG schemes) lower private saving (Edwards 1995). Some evidence on Singapore's fully funded Central Provident Fund shows that it has boosted aggregate saving (World Bank 1993, 1994b). And evidence for Chile suggests that the substitution of fully funded for PAYG plans after 1981 has contributed to Chile's large increase in private saving (Corsetti and Schmidt-Hebbel, forthcoming).
These findings may reflect two points. First, leaving bequests may be a more important motivation for saving than saving for retirement, so that starting a mandatory PAYG system will not affect private saving much. This is because pensioners will undo the mandatory PAYG transfer they receive from active workers by leaving higher bequests to their offspring. This conclusion is supported by indirect evidence from household surveys around the world that show saving rates for the elderly are as high as or higher than rates for younger households (Deaton 1995). Second, even if saving for bequests dominates saving for retirement, there are still large numbers of households that are credit-constrained and saving little. Starting a fully funded pension plan (as in Singapore) or substituting a fully funded scheme for PAYG (as in Chile) will force these households to save more than they voluntarily would save, thus raising overall saving ratios.

Investment: New Developments

This section reviews recent developments in three areas of inquiry: uncertainty and investment irreversibility, investment incentives, and the investment impact of property rights and income distribution.

Uncertainty and Irreversibility

Conventional investment theories focus on the cost of capital and the replacement cost, as opposed to market value, of new capital goods. They fail to consider, first, that most investment decisions face inherent uncertainty about future benefits and costs; the best investors can do is to attach (subjective) probabilities to the net returns of various investment projects; second, that investors can control the timing of investment, waiting for relevant information that may reduce investment uncertainty; and, third, that most investment decisions are partly or completely irreversible; once the capital stock is installed, it cannot be put to new uses without incurring a substantial economic cost (Dixit and Pindyck 1994).

These crucial features have led to a new option approach that sees an investment opportunity as an option to buy an asset at different points in time, balancing the value of waiting with the opportunity cost of postponing investment decisions. The option approach shows that the standard net-present-value rule of investment (invest when the purchase and installation cost equals the expected return) must be modified. The correct rule is that the anticipated return on the new investment project must exceed the purchase and installation cost by an amount equal to the value of keeping the investment option alive.

Recent empirical studies of investment confirm the practical relevance of the value of waiting (Pindyck and Solimano 1993). Simulation studies reveal that, at the corporate level, the value of waiting may be considerable, especially in a highly uncertain environment. Econometric estimates using aggregate invest-
ment data for a few developing countries also show that, in the face of uncertain-
ty, investment may display strong inertia and an insensitivity to changes in
profitability (Servén and Solimano 1993). An important policy implication of
these studies is that uncertainty tends to make investment less responsive to
incentives such as subsidies and tax concessions and that huge incentives would
therefore be necessary to counteract the adverse impact of high uncertainty on
private investment.

The option view of investment is particularly applicable in addressing condi-
tions of economic and political instability. Large external shocks, financial cri-
eses, exacerbated social and political conflicts, all typically create considerable
uncertainty about variables that are critical to decisions to invest. The result is a
large increase in the value of waiting for new information with which to revise
the probabilities attached to the various eventualities. Thus, even when external
and domestic conditions for investment improve (say, after adoption of an ad-
justment program), it takes time before potential investors revise their expecta-
tions significantly; in the meantime, there is a protracted investment slump.

Political instability that is reflected in rapid government turnover may also
hamper investment if it leads to an unstable incentive and policy framework
(Alesina and Perotti 1993; Mauro 1993). An adverse impact on investment is
especially likely if the political change involves a redefinition of the basic “rules
of the game” (investment codes, property rights, tax laws) and, in particular, if
it raises the risks of expropriation (as in Egypt in the 1950s and Nicaragua in the
1980s).

Investment Incentives

In both industrial and developing countries, a variety of policy instruments
have been used to affect aggregate investment and its distribution across sec-
tors, assets, and time by affecting the rate of return on capital. In theory, invest-
ment incentives can be justified by the existence of market failures that lead to
socially insufficient investment—for example, the public-good nature of some
investments in research and development (R&D), imperfect information among
financiers about the quality of projects, imperfect competition, and scale
economies.

Tax concessions are by far the most commonly encountered investment
incentives. They take a variety of forms: preferential tax rates for specific
types of investment, tax holidays, accelerated depreciation allowances, in-
vestment tax credits, and so forth. At a very general level, tax incentives may
be characterized in three ways. First, they may be automatic (available to
any firm or investor meeting specific standards about the type, size, and
location of the investment) or discretionary (granted on a case-by-case ba-
sis). Automatic incentives are more transparent and certain than discretion-
ary incentives and are thus likely to be more effective than the latter, which
are comparatively more responsive to noneconomic factors. Second, tax in-
centives may be temporary or permanent; temporary incentives are more likely to affect the timing of investment than the long-term capital stock. Third, tax incentives may be general or selective (with eligibility determined by considerations such as the type of asset or economic sector). In general, and in the absence of market failures, selective incentives are bound to distort the allocation of investment across sectors or assets.

The recent investment literature examines the impact of tax incentives in both industrial and developing countries (Feldstein 1987; Jorgenson and Landau 1993; Cummins, Hassett, and Hubbard 1995). Most empirical studies of industrial countries find only small effects (Chirinko 1993). In developing countries, the effectiveness of investment incentives is severely limited by the weakness of the tax administration system and by market distortions such as credit rationing or administrative intervention in the allocation of foreign exchange. In the presence of such conditions, tax concessions may affect the allocation of rents more than they affect investment decisions (Shah, forthcoming).

Some conclusions may be drawn about the effectiveness of the specific types of tax incentives most commonly used in developing countries. Preferential corporate tax rates are shown to be poor instruments for promoting new investment, because the tax concession is not directly related to the volume of new investment. Its impact on fiscal revenue loss is therefore often larger than its impact on extra capital. An extreme form of such an incentive is the granting of tax holidays. These are relatively common in developing countries and pose the added problem of encouraging the shift of taxable income into the firms enjoying the holidays (Mintz, forthcoming). Investment tax credits for R&D and the acquisition of equipment embodying advanced technologies are, by contrast, analytically more defensible and empirically more effective.

The use of fiscal incentives also presents several practical problems that are likely to be particularly severe in developing countries. It is difficult to identify and measure the divergences between social and private rates of return on investment that justify special fiscal treatment, and the administration of any fiscal incentives places significant burdens on the tax management system. Tax concessions encourage lobbying by potential beneficiaries. The loss of fiscal revenue—implicit in incentive schemes—has an obvious opportunity cost. And attempts to fine-tune the tax system to direct the allocation of resources may lead to profound systemic distortions (Bird 1992).

Stability and predictability of the tax regime are thus prerequisite to the effectiveness of investment incentives. Indeed, a regime of stable corporate tax rates at international levels offers greater promise for investment than a system of large incentives with high and unstable rates (Shah, forthcoming). This conclusion agrees well with the results from the irreversibility literature summarized above. In sum, from the perspective of investment, tax incentives are probably less effective than is the elimination of disincentives such as unstable policies, infrastructural deficiencies, and inadequate regulatory codes.
Recent strands of the investment literature have begun to consider nonconventional determinants that are thought to be of particular relevance for developing and transitional economies. Among these are the enforcement of property rights, the elimination of unnecessary regulation, and the implications of income distribution for a stable investment climate.

The importance of property rights for investment is well established. From a practical point of view, however, the formal definition of property rights must be complemented by a judicial system that guarantees their effective enforcement (Shleifer 1994). The lack of impartial mechanisms to resolve contractual disputes increases the cost of doing business by increasing the probability that contracts will not be respected and that expenses such as bribes will become necessary to enforce them.

The issue of corruption is a critical matter for investment projects because implementing the project may involve many administrative steps, particularly in highly regulated economies. The cost of doing business may rise substantially if the investor is forced to pay bribes to expedite passage through the system. Corruption thus effectively amounts to a tax on investment. Recent cross-country work by Knack and Keefer (1994) and Mauro (1995) shows that higher levels of corruption and poor contract enforcement are associated with a significantly worse-than-average investment performance.

Eliminating unnecessary regulations and reforming the civil service to reduce corruption can therefore promote investment and growth. If, to eliminate corruption, it is necessary to raise taxes to increase salaries of civil servants, it may appear that formal taxation will just replace informal corruption levies, leaving capital formation and growth unaffected. Ethical issues aside, however, the two regimes still differ in critical respects; most important among these is that corruption "contracts," unlike formal contracts, are notoriously difficult to enforce and thus leave unresolved the central question of property rights.

Income distribution affects capital accumulation by influencing the choice of public policies and the degree of social and political stability. An uneven distribution of income may encourage workers' demands and incite labor militancy, increasing the degree of political conflict. It might also compel governments to seek populist policies of rapid redistribution of income that may be fiscally and economically destabilizing, as witnessed several times in Latin America during the past few decades (Dornbusch and Edwards 1991). If redistributive policies are, in turn, financed through higher taxes on capital, they will further discourage investment and growth.

Because the relation between investment and income distribution is filtered through political institutions, it may be stronger in democracies than in nondemocracies. Persson and Tabellini (1992) show for a cross-section of industrial countries a positive and marginally significant correlation between equality in income distribution and the ratio of investment to GDP, although the in-
come distribution data used, which are typically derived from household surveys, are subject to serious bias (see appendix).

Alesina and Rodrik (1992) obtain similar results. In cross-sectional regressions using the ratio of total physical investment to GDP as the dependent variable and controlling for the type of political regime (democracies or nondemocracies), they find a positive correlation between the degree of income equality and the investment ratio. They obtain a similar result when using average GDP growth rates as the dependent variable, thus suggesting that investment is an important channel through which income distribution affects the growth of GDP.

Conclusions and Policy Implications

Despite the virtuous circles of high saving, investment, and rapid growth experienced by some countries (notably in East Asia), the connections among these three variables are complex, and causality may run in several directions. Nevertheless, the recent theoretical and empirical literature supports four main conclusions. First, saving and growth reinforce each other—causality runs in both directions. Second, saving and investment are highly correlated due to low capital mobility, domestic policies that restrict large current-account imbalances, or common factors that push both variables in the same direction. Third, physical investment is a necessary, but not sufficient, condition for growth. And fourth, human capital investment, technological innovation, and appropriate policies are also necessary for sustained high growth.

Encouraging Saving

Ensuring adequate levels of saving remains a central policy concern, not only to guarantee sufficient financing for capital accumulation, but to avoid an excess of investment over saving, which may create inflationary pressures or balance of payments disequilibria. In developing countries, moreover, where extensive capital market imperfections and liquidity constraints on firms and households are the norm, increasing private saving may be essential to expanding investment.

Five lessons about the effectiveness of policies may be derived from our discussion of saving determinants and their relevance in developing countries. First, raising public saving is an effective and direct way to raise national saving, because the evidence shows that public saving does not crowd out private saving one to one. Indeed, available data show that the private sector offsets each dollar of public saving by dissaving only $0.25 to $0.50.

Second, inflows of foreign saving should be allowed and encouraged to support domestic investment—even if they help to finance consumption—as long as the country’s domestic economic policy framework is sustainable, its banking
system effectively regulated and supervised, and its government restrained from providing guarantees on foreign credit flows. Foreign aid, however, is less effective than nonconcessional capital inflows in boosting domestic investment. The historical literature suggests that foreign aid finances consumption and investment in roughly equal proportions. More recent and systematic evidence, however, estimates that most aid is spent on consumption and that little goes to investment, with the exception of those countries receiving aid in excess of 15 percent of GNP. For these countries, the effects on consumption and investment are approximately equal, a result that shows that the larger the recipient economy is in relation to the amount of aid, the more fungible are foreign aid resources.

Third, one should not expect private saving to rise in response to interest rate liberalization. The evidence shows that market-determined interest rates are likely to improve financial intermediation, the quality of investment, and the quality of portfolio choices (thus avoiding or reversing capital flight and possibly raising measured saving flows). Interest rates will be ineffective, however, in increasing overall saving flows.

Fourth, financial deepening, as reflected by larger stocks of financial savings, has ambiguous effects on private saving. Relaxing constraints on consumer borrowing depresses private saving, sometimes contributing to unsustainable consumption booms, such as those in Latin America during the early 1980s and in Mexico during the early 1990s. Fifth, the evidence on the effects of mandatory unfunded social security on private saving rates is mixed, possibly because saving for bequests takes precedence over saving for retirement. Because large numbers of (poor and young) households have little or no access to credit, however, and are not saving much for retirement, starting a mandatory, fully funded pension system may boost private saving significantly.

**Raising Investment**

If investment and innovation are essential to sustainable growth, is an activist investment and innovation policy necessary to boost growth? In theory, the need for an activist policy can be justified by the existence of investment externalities—implied, for example, by the “public-good” nature of many technological innovations and R&D activities—that result in insufficient social investment. To correct the externality, the conventional policy response would involve subsidies, tax exemptions, or both. Alternatively, encouraging investment in public infrastructure or in human capital, both of which show strong complementarities to private investment, could also promote growth.

Although a direct intervention policy involving tax concessions and subsidies might theoretically boost growth, there are, in practice, serious limitations to the administrative and institutional abilities of government agencies to target the “right” investments and to avoid rent-seeking. In addition, recent investment studies show that, under conditions of uncertainty or
macroeconomic instability, large investment incentives will be necessary to overcome the "value of waiting" and to have a material effect on private investment.

A less direct, but potentially very effective, way to promote capital formation, product innovation, technological advancement, and growth is to provide a supportive policy and institutional framework. Such a framework would consist of four ingredients: (1) macroeconomic stability, to reduce the uncertainty surrounding investment; (2) a comparatively distortion-free relative price structure, to raise the productivity of investment; (3) a well-defined (and effectively enforced) code of property rights, to create an environment conducive to a low cost of doing business; and (4) adequate political institutions, to foster social consensus and political stability.

Appendix: Data Measurement and Quality

Available data for income, saving, and investment suffer from inadequacies, inconsistencies, and biases that undoubtedly affect the quality of empirical work (discussed in detail by Visaria 1980; Berry 1985; Fry 1988; Gersovitz 1988; Deaton 1989; and Srinivasan 1993, 1994). The following list of problems is surely not meant to stop empirical research. Its purposes are to raise awareness of possible sources of bias in existing data and to call for better data.

Saving, Investment, and Consumption

Aggregate data from national income and product accounts (NIPAs) suffer from accounting deficiencies and inconsistencies in accounting methods across time and countries.

Much income and production is excluded from NIPAs; in particular, that of informal and illegal sectors, subsistence agriculture, and households. The omission of noncash (more generally, nonrecorded) components from both income and consumption causes ratios of saving and investment to GDP to be overstated. The omission of noncash investment from income causes saving and investment ratios to be understated. The levels of saving and investment are unaffected by the omission.

Saving and investment are systematically undermeasured because purchases of consumer durables and resources spent on human capital formation (education, health, training) are misrecorded as consumption instead of investment. Theory suggests that a more adequate consumption measure should be based on the flow of services of currently owned consumer durables and part of the services rendered by human capital.

Unrecorded capital flight (underreporting of net exports) is an overestimation of external saving. It implies an underestimation of gross domestic saving, an overestimation of gross domestic investment, or both.
**Investment**

Gross domestic investment is often obtained as the sum of additions to overall capital by capital categories, that is, machinery and equipment, construction, and inventories. Gross investment by the public and private corporate sectors is often independently estimated from reported corporate statements. Gross investment of the rest of the economy (households and unincorporated businesses) is a residual between gross domestic investment and corporate sector investment.

The distinction between inputs and capital goods in production sectors is frequently arbitrary. The difference between gross and net investment (and saving) flows often results from arbitrary depreciation calculations for which methods vary across countries.

Maintenance of public sector capital is typically misrecorded as current expenditure, that is, as government consumption. In the United States, current and capital public expenditures are not separated; all public expenditure is misclassified as current.

Intertemporal comparisons of investment are partly spurious because they involve capital of different vintages and quality. (A similar point may be made about consumption goods.) Even in the spatial dimension, capital heterogeneity makes it difficult to compare and aggregate investment from different sectors of origin.

**Consumption and Saving**

Some countries construct their NIPAs by computing consumption from independent household surveys. In most cases, however, aggregate consumption is obtained residually as GDP minus investment and net exports.

Estimates of public sector consumption are obtained from central and local governments. Private consumption is typically obtained as the residual difference between aggregate and public consumption. Household consumption is residually defined as private consumption minus consumption by nonprofit institutions.

Aggregate and sector saving data are the ultimate residual: they are defined as income minus (typically residual) consumption. In addition to reflecting the errors and biases in measuring all preceding variables, this definition of saving follows an arbitrary accounting convention that bears little relation to economic theory. The reason is that reported saving is inconsistent with changes in nonhuman wealth stocks because it excludes the capital gains on assets held by the consumer. For instance, private interest income from public debt and external assets (and, thus, private saving) is overstated by the inflation component of nominal interest payments on public debt and by the exchange rate depreciation component of nominal foreign interest payments. Private saving also excludes the capital loss from inflation suffered by money holders and, more generally,
any other net capital loss or gain caused by changing asset prices. Some research has been done on adjusted saving measures that include capital gains on some assets and liabilities, but such measures are typically not comprehensive because assets and liabilities are underreported.

Aggregate (NIPA) saving data also suffer from the problem of aggregation over age cohorts, income groups, or any other relevant dimension. This problem is avoided by using household survey data, which provide microspecific information. The standard household survey, however, severely underestimates overall, and thus individual, income and saving levels. Many surveys report grossly implausible values for saving; they show, for example, large numbers of dissaving households. Because income is underreported in relation to consumption, saving ratios and levels are underestimated. The most severe discrepancies are for nonlabor income and self-employed income. In addition, household survey data suffer from accounting problems similar to those affecting aggregate data, including the omission of capital gains and losses. Finally, household data are for households, not individuals, and they reflect features that are not valid at the individual level.

Notes

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1. The unweighted average saving ratios depicted in figure 1 are for twenty-one industrial countries and ninety-seven developing countries. Within the latter group the figure depicts separately unweighted average saving ratios for eight East Asian, twenty-five Latin American and Caribbean, and thirty-nine Sub-Saharan African countries.

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


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VALUING AND ACCOUNTING FOR LOAN GUARANTEES

Ashoka Mody
Dilip K. Patro

To achieve certain policy objectives, governments frequently provide private borrowers with loan guarantees that cover some or all of the risk that the borrower will be unable to repay the loan. Such guarantees are extremely valuable, and their value increases with the riskiness of the underlying asset or credit, the size of the investment, and the duration of the loan. The flip side of a guarantee's value to a lender is its cost to the government. Such a cost is not explicit but is real nevertheless. When providing guarantees, governments therefore must establish accounting, valuation, and risk-sharing mechanisms. This article describes methods of valuing guarantees; reports estimates of the value of guarantees in different settings; and summarizes new methods of accounting designed to anticipate losses, create reserves, and channel funds through transparent accounts to ensure that the costs of guarantees are evident to government decisionmakers.

Governments have long used loan guarantees that cover some or all of the risk of debt repayment to pursue a variety of policy objectives, including protecting bank depositors, promoting exports and foreign investment, supporting ailing industrial sectors, and even bailing out firms in financial distress. Today, especially in developing countries, governments are increasingly using guarantees to stimulate private lending for infrastructure projects. Partial guarantees—or guarantees targeted to specific policy or regulatory risks inherent in infrastructure sectors—mitigate those risks that the private sector cannot evaluate or will not bear. At the same time, partial guarantees can substantially diminish the government's financial obligation in cases where the only alternative is for the government to finance the project and bear all the risk.

Governments primarily guarantee debt. The instruments that governments guarantee include commercial bank loans and bonds issued on capital markets. Guarantees provide substantial comfort to the lender, especially as the underlying risk and the term of the loan increase, but they also entail a cost to the
government, which is often overlooked. This cost—and consequent obligation—is not always explicit but is nevertheless real. When the government provides a guarantee, it incurs a *contingent* liability. That is, the guarantee is conditional on some future event. Although contingent liabilities do not demand immediate payment, they do require careful accounting and administration. When the magnitudes of such liabilities are large and not adequately accounted for, the payments resulting from default can have severe consequences for the government budget and can result in significant intergenerational inequity (Iden 1990).

One reason why governments do not account for contingent liabilities is because government budgets are typically maintained on a cash basis. Thus a *direct government loan* of $100 is recorded as an outflow of $100. But a *government guarantee* of a loan for the same amount from a private lender is not recorded at all, because nothing has been spent in that accounting period. Only when a default occurs and the obligation has to be honored is the cost of the guarantee accounted for. Fiscal prudence is maintained by setting a largely arbitrary upper limit on the total value of government guarantees. Guarantees are counted against this upper limit in various ways; in extreme cases, they are carried at the full face value of the underlying loans plus interest, even though the expected probability of default is slight.

History shows that defaults of guaranteed loans do occur, however, and when they do, guarantees, along with their significant implicit subsidy, have a serious impact on budgeting. (The subsidy reflects the fact that the interest rate is lower than the market rate and the difference is not made up by a guarantee fee.) A study of government-guaranteed loans for infrastructure projects in the nineteenth century supports the view that defaults arose in part from the poor design of the guarantees, which transferred all risk to the government (Eichengreen 1995). Allocating risk is a continuing concern because guarantees have been an important policy instrument in recent decades. In the 1970s, U.S. government guarantee programs, including loans to corporations, mortgage and deposit insurance, and trade and exchange-rate guarantees, grew at an extremely fast pace. These liabilities did not show up explicitly in the budget, however, and in the late 1980s, policymakers and the public felt the cost of such liabilities when the federal deposit insurance program had to make up the losses suffered by the savings and loan industry (Bosworth, Carron, and Rhyne 1987; Iden 1990; CBO 1989; Towe 1993). That crisis and similar defaults on loan guarantees in Canada prompted the search for more prudent methods of accounting and led to new budgetary practices to account for contingent liabilities.

A systematic accounting system that accurately reflects the government's liabilities and improves the allocation of resources can be achieved by recording in the budget the present value of expected outlays minus fees received for the guarantee. This methodology, which provides a *more* accurate picture of government liabilities (and takes into account the value of the implicit subsidy), gives the government a tool to decide between alternative projects.¹ Such procedures have been implemented to varying degrees in Canada and in the United...
States. Several other countries are actively considering implementing similar accounting methodologies for guarantees.

This article brings together two streams of research on procedures to establish the value of guarantees and methods to account for the government’s contingent liabilities. Although there is a significant body of research on valuing other kinds of contingent claims, such as futures, options contracts, and exotic derivative securities, only recently have these pricing techniques begun to be applied to government liabilities arising from guarantees (Lewis and Pennachi 1994; Kau, Keenan, and Muller 1993; Ronn and Verma 1986; Merton 1977). Researchers have also looked at the issue of budgeting for such liabilities, but there is no single treatment on valuing and accounting. This article combines both subjects in an overview that should provide policymakers with benchmarks and guidelines for decisionmaking. Examples are drawn primarily from industrial countries—especially the United States—where substantial experience has accumulated. With the use of guarantees increasing in developing countries, the analytical methods and findings should be of value to policymakers there as well.

Financial Characteristics of Loan Guarantees

The main purpose of a guarantee is to convert a risky loan into a risk-free loan. Such a guarantee is valuable to a lender because, if the borrower fails to repay the debt, the guarantor pays the lender. This presumption holds when there is no risk that the guarantor will default on the commitment. In practice, no guarantee is completely free of the risk of default, and its value depends ultimately on the creditworthiness of the guarantor. To the extent that governments are more creditworthy than private lenders, governments are more likely to honor their obligations (although governments can renege on commitments). Mechanisms such as escrow accounts can be used to bolster the credibility of a guarantee, but they add to the cost of financing.

To illustrate, assume a “risk-free” guarantee—one that is certain to be honored. In this example, adapted from Merton and Bodie (1992), a borrower buys a loan guarantee for $1. After surrendering the guarantee to the lender, he then borrows $10 at the risk-free interest rate of 10 percent. Thus the borrower effectively receives $9 in return for a promise to pay back $11. The implicit rate (in this case 22.22 percent) reflects both the risk-free rate and the charge for the guarantee. From the lender’s point of view, the return on the $10 risk-free loan is 12.22 percent, the implicit rate (22.22 percent) minus the risk-free rate of 10 percent, which reflects the perceived risk of default.

Maintaining Incentives

Once a guarantee is provided, however, lenders have little incentive to monitor the performance of the firm. Eichengreen (1995) reports that because
government-guaranteed loans for infrastructure (usually railways) in the late nineteenth century were not monitored, speculators diverted government funds, and the public interest was frustrated. Several different approaches—including partial guarantees and specific debt structures—have been devised to maintain incentives, although each approach has its drawbacks.

**Partial Guarantees.** In the example above, if the borrower obtains a guarantee that covers only part of the risk, the cost of borrowing should be between 10 percent (for a completely risk-free loan) and 22.22 percent (when all risk is borne by the lender). Because the guarantee covers only part of the transaction, the borrower has an incentive to be efficient and the lender has an incentive to monitor the borrower’s activities. These incentives are similar to those at work in auto insurance deductibles, which give drivers an incentive to drive carefully. Similarly, the World Bank guarantees only a portion of the private lender’s risk, leaving intact incentives for private parties to contain and manage commercial risks.

The expectation is that a partial guarantee will filter out bad borrowers and attract those better positioned to assess and manage risk. The process is one that can add value by providing the project with credibility and expertise in project and financial analysis. If the guarantor has the expertise to evaluate projects at a cost below that of other financial institutions, the costs attributable to adverse selection (that is, the inability of lenders to distinguish between good and bad risks) can be reduced further.

**Structuring Debt.** An alternative—or complement—to the use of partial guarantees is to structure the debt in a way that maintains the lender’s incentive to monitor the project. For example, if the debt has senior and junior components, with senior debt holders having the first right on loan repayments, a guarantee on this senior loan dilutes the incentive for mitigating risk (Jones and Mason 1980) because senior debt holders lose their incentive to monitor the loan. The incentives of junior debt holders are more complex in this situation; they have a continued—perhaps even an increased—incentive to monitor, especially if the guarantor is perceived as unable to impose a discipline on the senior creditors. Because monitoring is costly, however, its thoroughness will depend upon the expected benefits. And when the value of the borrowing firm is low relative to its debt, junior debt holders have less of an incentive to monitor because they foresee limited gains from improved performance. By the time senior debtors have been repaid, the value of the firm’s assets may be close to nil.

In contrast, guaranteeing junior debt gives senior debtors a strong incentive to remain diligent. Jones and Mason (1980), however, note that the cost of guaranteeing junior debt is higher than the cost of guaranteeing an equal amount of senior debt because the existence of prior claims (senior debt) increases the likelihood of a default on junior debt. (They suggest that the cost of the guarantee should be lowered by restricting the amount the firms may pay out in dividends, thus leaving more cash available to repay debt.)
The Guarantee as a Put Option

A guarantee may also be viewed as a put option, a mechanism used in securities markets that gives the owner the right, but not the obligation, to sell an asset for a prespecified price (called the exercise price) on or before a certain maturity date. A risk-free loan, which is equivalent to a risky loan and a guarantee, is also equivalent to a portfolio of a risky loan and a put option. A guarantee is a put option on the assets of the firm with an exercise price equal to the face value of the debt.

Consider the following: let $V$ be the value of a firm's assets and $F$ be the face value of its debt. For simplicity, assume there are no coupon payments and all the debt matures on a specified date. Also consider a put option purchased by the lender on the assets of the firm, with an exercise price $F$.\footnote{Note: $V =$ value of firm's assets; $F =$ face value of debt.}

Two scenarios are possible: either the value of the firm is greater than the debt, in which case full repayment can be expected and the put option is not exercised (so its value is zero); or the value of the firm is less than the debt, and the put option is exercised. The lender receives the exercise price, $F$, for assets that are worth $V$. Also, when the value of the firm ($V$) is greater than $F$, the value of the risky debt is $F$. But when $V$ is less than $F$, the value of the debt is $V$ since debt holders have first claim on the assets of the firm. If the debt is risk-free, its value is $F$, by definition. The difference between the value of the risky debt and that of the risk-free debt is also the value of the put option (see table 1).

From this analysis, it follows that the value of a risky loan equals the value of a risk-free loan minus the value of the put option. But we also know that the value of a risky loan equals the value of a risk-free loan minus the value of the loan guarantee. Thus the value of the guarantee can be estimated by computing the value of the put option.

Identifying a guarantee as a put option serves both a substantive and a practical purpose. Although the value of a guarantee could apparently be measured as the present value of future guarantee payments, in practice this is not possible except in the simplest cases because the value of the guarantee depends on parameters that change over time. The guarantee, or option, value is thus sensitive to such factors as the time to maturity, the volatility of the underlying asset, the value of the underlying asset, and the claims of other debt and equity holders. To capture the time-varying effects of these and other parameters, a fully speci-

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<thead>
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<th>Table 1. The Guarantee as a Put Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of</td>
</tr>
<tr>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Risky debt</td>
</tr>
<tr>
<td>Put option</td>
</tr>
<tr>
<td>Risk-free debt</td>
</tr>
</tbody>
</table>

Ashoka Mody and Dilip K. Patro
fied dynamic model is needed, as in contingent-claims, or option-pricing, analysis. The use of present-value methods is also complicated because it is unclear what discount rate to use for contingent claims such as loan guarantees. (A discount rate arises from the fact that money to be received in the future is considered to be worth less than the same amount today.) The appropriate discount rate should reflect only that risk that is inherent in the market and cannot be eliminated by diversifying a portfolio, but for contingent claims—such as put options—no methodology is available for estimating their nondiversifiable risk.

Academics and practitioners have therefore relied on methods that price contingent claims as functions of more fundamental claims such as stocks and bonds. These methods have been used extensively to value guarantees, including government-guaranteed deposit insurance such as that provided by the Federal Deposit Insurance Corp. in the United States (Ronn and Verma 1986; Pennachi 1987a, b). One of the best-known methods for pricing contingent claims was devised by Fisher Black and Myron Scholes in 1973 (see appendix for methodology).

Value of Guarantees to Lenders and Indirect Beneficiaries

When a full or partial guarantee is provided, the risk of default is reduced and the borrower is able to obtain lower interest rates. Studies show that the pecuniary value of guarantees—the full extent of the possible saving in interest costs—is often very large. As may be expected, the value of a guarantee increases with the volatility (or risk) of the underlying asset or credit, the size of the investment, and the time to maturity. Guarantee values of 15 percent of the underlying debt are not uncommon and can often be much larger in risky and long-maturity situations.

The value of a guarantee is shared by the guaranteed debt holder, the borrower, and others who have claims on the assets of the borrower. The guarantee may be of little benefit to the actual recipient (that is, the lender), unless the provision of the guarantee was unexpected. Equity holders benefit indirectly because the borrower's firm is able to borrow at a lower rate. Nonguaranteed debt holders, however, may be worse off because they will have a secondary claim on assets in the event of a bankruptcy.

A clarification is in order. Guarantee values referred to here are the gross values, or the effect that guarantees have on reducing the spread (that is, the difference between the interest rate without a guarantee and the interest rate with a guarantee) charged by bondholders and other lenders. Because the lender pays a premium or a fee for the guarantee, a net value calculation must be made to determine if the gain from lower financing costs is greater than the fee paid. The implicit assumption is that a net positive gain accrues to the borrower and that this net gain results from the guarantor's assessment that the market value of the risk is greater than the true risk (the guarantor in turn spreads its risks of default over a large number of projects). Bland and Yu (1987), who estimated
the cost of borrowing minus the guarantee fee for 445 insured and 694 uninsured bonds offered in 1985, found the net gain to be positive and inversely related to credit ratings.

Several methods are used to determine the value of guarantees. One is the "rule of thumb" approach, which compares the market value of the debt (or the relevant underlying variables) with a risk-free asset and, based on the difference, determines the value of guaranteeing the risky debt. The calculation is approximate in most cases because it does not account for the changing value of assets, but it may be the only practical approach when sufficient data are not available. A second approach is the market-valuation method, which compares similar assets with and without guarantees, and a third is based on option-pricing methods. Procedures for estimating option values differ depending upon the specific features of the underlying credit (whether, for example, the debt is junior or senior), and the specific features of the guarantee (whether it is partial or full, and whether it is available for a limited period or to maturity).

**Rule-of-Thumb Methods.** To illustrate the principles of valuing guarantees, Merton (1990b) estimated the implied value of loan guarantees for ten corporate bonds as the difference between the known market price of the bonds and an estimated default-free price (table 2).5

On May 19, 1990, none of the bonds was in default. Merton also assumed that there were no call provisions, that is, that none of these bonds could be retired before maturity. ("Call" features or other options require the use of option-pricing methods.)

The estimated implied value of the guarantees is rather high, varying from a low of 11.5 percent to a high of 87 percent of the market price. One explanation

<table>
<thead>
<tr>
<th>Table 2. Implied Values of Guarantees on Corporate Bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Continental Airlines</td>
</tr>
<tr>
<td>MGM/UA</td>
</tr>
<tr>
<td>Mesa Capital</td>
</tr>
<tr>
<td>Navistar</td>
</tr>
<tr>
<td>Pan Am</td>
</tr>
<tr>
<td>RJR</td>
</tr>
<tr>
<td>RJR Nabisco</td>
</tr>
<tr>
<td>Revlon</td>
</tr>
<tr>
<td>Union Carbide</td>
</tr>
<tr>
<td>Warner Communications</td>
</tr>
</tbody>
</table>

<sup>a</sup> Estimated by discounting the expected principal and coupon payments at 9 percent, approximately the rate on U.S. Treasury bonds and notes on May 19, 1990.
<sup>b</sup> The closing prices as reported in The Wall Street Journal (May 11, 1990).
<sup>c</sup> Implied guarantee value is equal to the default-free price minus the market price.

Source: Merton (1990b).
is that these were lower grade, and therefore riskier, bonds. Moreover, the benchmark is completely risk free, which is rarely the case; more often the guarantees in practice are partial.

A simple back-of-the-envelope calculation of this type is appropriate when the guarantee covers the full term of the debt. In such a situation the risky debt is converted into risk-free debt and the value of the guarantee is computed as the difference between the two. In most situations, however, such as when guarantees provide partial coverage (only interest payments, say) and secondary-market prices do not indicate the probability of default on every payment, it is more appropriate to base the value of the debt and the guarantee on contingent-claim methods.

Despite its limitations, the rule-of-thumb approach is popular because the detailed information needed for more sophisticated valuation is often unavailable. In the case of sovereign risk assessment, for example, U.S. agencies, such as the Commodity Credit Corporation, the Export-Import Bank, and the Agency for International Development, which provide guarantees to investors or exporters, are required to operate under a uniform method of assessing sovereign risk, primarily to compute the subsidies for budgetary purposes. The problem here, unlike the Merton example, is that the market price of the underlying sovereign debt is not known.

In such cases a two-step process is followed: first, countries are placed into one of eleven risk categories, and subsidy costs for each category (and varying time periods) are established. A score of 1 indicates that payment problems are unlikely, and a score of 11 indicates that severe losses are expected. (The interagency group has correlated its credit ratings with those of Moody’s and Standard and Poor’s.) Based on a country’s category, a risk premium is calculated as the historical average of the risk premiums of commercial bonds (with the same ratings) over investment-grade bonds. (A risk premium is that part of the return to capital that compensates the lender for the risk involved.) The subsidy cost is calculated as the difference between the present value of loan payments at the Treasury rate and a rate that is the sum of the Treasury rate and the risk premium (see table 3). As the date of maturity and the risk level rise, the expected gross cost of the guarantee increases. Reserves must be set aside to ensure that funds will be available to pay off such large contingent subsidy costs.

**Market Values with and without Guarantees**

Where comparable instruments with and without guarantees are traded, guarantee values are the difference in price between the two securities, assuming that the market has fully assessed the coverage provided by the guarantee. This is the case where standard guarantees are issued for municipal infrastructure investments in the United States. Market valuation is also possible where market values of a security exist before and after a guarantee.

Hsueh and Kidwell (1988) studied the Texas School Board Guarantee Program, which received a full faith and credit guarantee from the state govern-
Table 3. Subsidy Costs by Risk and Date of Maturity

<table>
<thead>
<tr>
<th>Risk category</th>
<th>1 year</th>
<th>5 years</th>
<th>10 years</th>
<th>30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.2</td>
<td>0.8</td>
<td>1.3</td>
<td>3.1</td>
</tr>
<tr>
<td>B</td>
<td>0.4</td>
<td>1.2</td>
<td>2.1</td>
<td>3.6</td>
</tr>
<tr>
<td>C</td>
<td>0.8</td>
<td>2.3</td>
<td>4.1</td>
<td>9.7</td>
</tr>
<tr>
<td>C-</td>
<td>1.8</td>
<td>4.5</td>
<td>6.5</td>
<td>13.6</td>
</tr>
<tr>
<td>D</td>
<td>3.7</td>
<td>8.7</td>
<td>11.2</td>
<td>20.4</td>
</tr>
<tr>
<td>D-</td>
<td>5.2</td>
<td>11.4</td>
<td>16.1</td>
<td>27.5</td>
</tr>
<tr>
<td>E</td>
<td>8.0</td>
<td>16.4</td>
<td>24.6</td>
<td>38.6</td>
</tr>
<tr>
<td>E-</td>
<td>11.6</td>
<td>23.0</td>
<td>33.4</td>
<td>48.9</td>
</tr>
<tr>
<td>F</td>
<td>17.9</td>
<td>33.9</td>
<td>46.5</td>
<td>61.8</td>
</tr>
<tr>
<td>F-</td>
<td>23.4</td>
<td>42.4</td>
<td>55.6</td>
<td>69.6</td>
</tr>
<tr>
<td>F--</td>
<td>32.4</td>
<td>54.6</td>
<td>67.3</td>
<td>78.4</td>
</tr>
</tbody>
</table>

a. Subsidy cost divided by loan size times 100.

Source: GAO (1994).

ment that raised the credit rating of all the agency’s bonds to the highest AAA category. They found that savings on interest were highest for bonds that had had low ratings before the credit enhancement; the savings ranged from a high of 98 basis points (100 basis points equal 1 percent) for bond issues rated Baa to 40 basis points for bond issues originally rated A. Districts rated AA did not achieve any cost savings. The risk-free interest rate was slightly above 9 percent, implying a savings of more than 10 percent in interest costs for the lower-grade bonds. The study also found that the state guarantee increased the number of bidders for school bonds with a low intrinsic credit rating. Of note to public policy consideration was that as the supply of AAA-rated bonds increased following the introduction of the guarantee program, municipalities that were not covered by the program had to pay about 50 basis points more in interest than those benefiting from the guarantee.

Although private insurance firms also issue guarantees to local governments, their exposure is usually limited to a portfolio with relatively low levels of default risk. In contrast, public guarantors are compelled to take on greater risks because of equity considerations (Hsueh and Kidwell 1988). Quigley and Rubinfeld (1991) examine the cost of borrowing with private insurance (guarantees) in the secondary market for municipal bonds during 1987–89. They observed the same bond with and without a guarantee and found, on average, that insurance lowered the yield on municipal debt by 14 to 28 basis points for unrated bonds or bonds rated Baa-1 or lower, relative to an average yield to maturity of 7.8 percent for an uninsured bond. The lower gains from private insurance in the after-market compared with those from Texas state guarantees suggest that the inherent risk of the bonds insured in the secondary market is lower and the gains smaller.
A study of the loan guarantees used to bail out Chrysler Corp. shows that the U.S. government's commitment to alleviate the company's financial distress made a very significant difference to financing costs (Chen, Chen, and Sears 1986). The method adopted measured returns to the company's equity and debt following specific government announcements about and actions taken to implement the guarantee program. Both the announcements and specific actions resulted in gains to equity holders and bondholders. An interesting finding is that equity owners realized greater gains than did bondholders, who were directly guaranteed. The authors suggest that, as residual claim owners, equity holders benefit significantly even when the guarantee is targeted only to debt repayments because the guarantee improves the value of the firm and therefore the value of their equity. This finding justifies an innovative pricing approach for the guarantee. In the past, when the government bailed out corporations in financial distress (such as Lockheed Corp. in 1971), the taxpayers had, in effect, taken the downside risk but had not gained from the upside when the companies recovered. Pricing for the Chrysler loan guarantee corrected this asymmetry by including not only a 1 percent fee on outstanding debt but also warrants. A warrant is a call option on the company's equity that gives the buyer the right to buy the asset for a specified price on or before a certain date.

A study on loan pricing in the context of project finance also finds that guarantees create significant value (Kleimeier and Megginson 1994). The mean spread over LIBOR (the London Interbank Offered Rate on which the cost of borrowing is based) in the sample loans was 100 basis points. For a guaranteed loan, the spread was 55 basis points. A limitation of this study, however, is that it does not take into account the extent of the guarantees provided or the sources (host government, export-import bank, or private sponsor).

Using Contingent-Claims Theory to Price Guarantees

Unlike market-based analysis, which compares several slightly different instruments to arrive at "implied" guarantee values, contingent-claims models value the guarantee based on the underlying dynamics of the assets and liabilities. If these underlying dynamics conform to a broad class of models and follow certain assumptions, contingent-claims analysis allows estimation through direct computation or numeric simulation (a method of solving complex nonlinear equations) of the value of the guarantee based on the payout structure implied by the guarantee. (For an explanation of contingent-claims analysis, see appendix and Merton 1990a.) In evaluations of loan guarantees to individual firms, input into a contingent-claims model typically includes the market value of the firm's assets, the book value of the firm's debt, the volatility of the underlying assets and liabilities, and the time horizon of the guarantee.

Sosin's (1980) option-pricing method for establishing the value of guarantees is a useful starting point because the main findings are echoed in other studies. The guarantees he examines were similar to those used by the U.S. Department
of Commerce in June 1978 to guarantee loans to the steel industry. Designed for instances in which financial assistance was not otherwise available, the Commerce Department program guaranteed up to 90 percent of the value of the loan. At least 15 percent of the cost of the project was to be supplied as equity capital or as a loan repayable in no less time than the guaranteed loan. There was no charge for the guarantee.

The value of a guarantee and who benefits from it depend on the structure of the financing. Under the steel program, new (guaranteed) debt was subordinate to existing debt. As a result the guarantee did not benefit senior debt holders. Holders of the new subordinated debt received the guarantee in exchange for lower returns. The main gain thus went to the steel company's equity holders who benefited both because the company paid lower interest rates on the new debt and also because the guarantees raised the stability and thus the value of the firm. Guarantee values are low when risk and maturity are low but rise rapidly with risky, long-term loans. According to Sosin, whose model is based on Merton (1977), the guarantee value also rises when the firm is highly leveraged because as the share of debt in total financing rises, the probability of default on junior debt rises.

Baldwin, Lessard, and Mason (1983) use the option-pricing method to determine the value of a guarantee on a $200 million loan to two firms with very different characteristics: International Harvester and Dominion Textiles (table 4). Even though the guarantees are for the same amount, the value of the guarantee is higher for International Harvester because it is more likely to default, which is also reflected in the low market value of equity in relation to the value of the firm; in addition, current liabilities in relation to the value of the firm are also much higher. These factors add up to a higher probability of default for International Harvester; hence the guarantee has a higher value.


<table>
<thead>
<tr>
<th>Table 4. Risk Profile and Guarantee Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(in millions of U.S. dollars unless specified)</td>
</tr>
<tr>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Business risk (standard deviation of annual returns in percent)</td>
</tr>
<tr>
<td>Current liabilities</td>
</tr>
<tr>
<td>Long-term obligations</td>
</tr>
<tr>
<td>Annual payouts</td>
</tr>
<tr>
<td>Market value of equity</td>
</tr>
<tr>
<td>Value of firm</td>
</tr>
<tr>
<td>Value of guarantee</td>
</tr>
</tbody>
</table>

a. Obtained by numerical simulations as outlined in Jones and Mason (1980).

providing the guarantee were twofold: International Computers Ltd. was a major employer with 24,000 workers; it was also the sole manufacturer of computers in Britain and the government was eager to avoid a takeover by a foreign company. The existing debt was of various maturities.

Because the firm's debt was not actively traded, the authors measured the value of the firm indirectly, basing their estimations on the market value of equity and following Merton (1974). For a loan maturity of two years, the value of the guarantee was estimated at £83.38 million, assuming that new debt was junior to existing debt. Of this, the cost of the subsidy (that is, the gain to the equity holders and other bondholders) amounted to more than half (£42.56 million) which, in turn, is more than a fifth of the value of the loan. The rest of the guarantee value (£40.83 million) accrued to senior bondholders. The guarantee on the junior debt in effect triggered early redemption of the senior debt at its full face value—a perverse effect because of the way the guarantee was structured. The longer the maturity of the senior bond, the lower the prevailing market value of that bond is likely to be relative to its face value and, if the guarantee is triggered, the higher the wealth transfer to senior bondholders. Such a structure negates the usefulness of guaranteeing junior debt because, by de facto guaranteeing the senior debt, it dilutes, if not eliminates, the incentive of senior bondholders to monitor the firm's performance.

When guaranteed debt has the same seniority as unguaranteed debt, the wealth transfer to bondholders without guarantees is much less and can even be negative because they have to share the proceeds of the assets with the holders of guaranteed debt. And, because prior claims are eliminated, the subsidy value of the guarantee falls to just over 10 percent, reducing the risk of default.

Borensztein and Pennachi (1990) used the contingent-claim method to value interest payment guarantees on developing country debt. In this instance, the market price of the interest payment guarantee is estimated as if the guarantee were traded in financial markets. The value of the guarantee is estimated as the value of a portfolio of two put options. When underlying conditions are good, all debt payments can be made and the guarantee is not called. When conditions are especially poor, the full guarantee on all interest payments would be called. (This is modeled as a short position in a put, that is, a promise to sell at a future date an asset that the seller does not currently own—in this case the put.) The authors of this approach use the price of the developing country debt in secondary markets as a proxy for the country's debt condition. A feature of their estimation, which is not present in the earlier studies cited, is that they allow for the interest rate to vary, creating an additional source of uncertainty that raises the value of the guarantee.

The guarantees are for four years at a floating rate, with semiannual coupons tied to the yields on six-month U.S. Treasury bills. The results indicate that the value of a hypothetical current interest payment guarantee for four years ranges between the full value of interest payments when the market price of that debt is about 30 cents on the dollar to half of all interest payments when the market
The price of debt is 60 cents on the dollar. The high values of the guarantees essentially reflect the market’s assumption that repayment is far from certain (making it unlikely that values would increase enough to prevent triggering the guarantee).

The option-price approach attaches a higher value to the four-year interest payment guarantee than does the “rule-of-thumb” approach. Thus the market values the debt at a higher level and assumes it will be repaid (which implies that the short-term interest payment guarantee will be less costly) because it is more concerned—and more optimistic—about long-run repayment.

Managing Contingent Liabilities

Because most governments do not record guarantees in the budget and no liability is entered, no reserves are set aside in the event that the guarantee is called. For example, Seguiti (1988) draws attention to budgetary practices in Italy, where, even though the government accounts for interest subsidies in the budget, guarantees are reported only if default occurs. Similarly, before enactment of the Credit Reform Act of 1990, the subsidy costs of contingent liabilities were not recorded in the U.S. budget.

Experience with loan guarantees in Canada makes the case for proper accounting. In the first half of the 1980s, the government spent about C$3 billion that had not been budgeted to pay off guarantees or provide supplementary budget support to beneficiaries of guarantees in danger of defaulting. To guard against any recurrence, the Canadian government in 1986 instituted management and budgetary procedures to minimize the risk of large disruptive payments.

The studies reviewed here demonstrate that, far from being free, guarantees entail a cost to the provider, and the more valuable the guarantee is to investors and lenders, the greater that potential cost. When markets have full information, the value is identical to the cost (the expected payment to cover default). Where market perceptions are more pessimistic than warranted, the cost may be less than the value. Thus, except when the market assessment is truly out of line with underlying conditions, governments providing guarantees must prudently manage their exposure by sharing risks with private lenders to ensure that the projects are monitored, charging fees to create the right incentives for using guarantees, building reserves in the event of default, and finally, instituting a rational system of accounting.

Sharing Risk

The principle of sharing risk with the lender through incentives to ensure good performance is becoming more widely accepted. When guarantees benefit private firms or projects, it is common to limit the guarantees to debt payments;
equity is not covered because equity holders are presumed to be willing to take on greater risk in return for higher expected returns (although as noted, equity holders also benefit from guarantees). In other cases, guarantees shift some of the risk to the project sponsors by covering less than 100 percent of the debt or by providing coverage for a limited time. In Canada risk sharing is an explicit part of the government's guarantee policy, and the government attempts to keep its exposure to a minimum. In developing countries, governments offering guarantees for private power projects have also sought to limit their exposure to sovereign or political risks and to require private investors to bear commercial risks. But because the power purchaser is often a government agency with a poor credit rating, the government ends up taking the commercial risk as well. Policy reforms to privatize the power sector and allow it to charge commercially viable tariffs will be needed to shift commercial risk to private parties. Thus effective risk-sharing depends on policy reforms.

Charging for Guarantees

Governments often do not set a price for guarantees; when they do, there is no clear rationale for the price. In the steel industry program described by Sosin (1980), for example, no fees were charged. Government guarantees to cover political risk in infrastructure projects are also typically free, although this practice is beginning to change. In many cases export credit agencies charge fees for guarantees based on the riskiness of the underlying credit. Although the fees tend to vary substantially, they can be as high as 10 to 15 percent of the value of the loan (Zhu 1994).

Pricing is desirable because it creates a market test for guarantees, reduces the inevitable temptation of private lenders to seek all available guarantees, shifts at least a portion of the cost of guarantees to the consumers of the services provided rather than to the general taxpayer, and provides ongoing information on the value of available guarantees.

In addition to charging a fee for guarantees to cover downside risk, governments may seek to share in the upside potential by acquiring warrants. This was the case in the U.S. government's loan guarantee to Chrysler Corp. The possibility of using such warrants is also an element of Canada's policy on loan guarantees, although the option has so far not been used.

Accounting Principles

If the government provides guarantees and records the fees received, the guarantee program actually reduces the budget deficit. The revenues that the government obtains reinforce the incentive to issue guarantees. Moreover, guarantees are preferable to loans, which are counted at their full face value. A more appropriate accounting system that places loans and guarantees on an equal footing based on the net present value of a government commitment would
eliminate this distortion. Table 5 illustrates the budget impact of a direct loan of $1,000 and a guarantee for a loan of the same amount. The full amount of the direct loan is recorded in the budget authorization and outlay, but there is no authorization for the loan guarantee because there is no cash outflow. In fact, the guarantee fee of $10 is recorded as a negative outlay, or an inflow.

In this case, because the underlying opportunity cost to the government is the same under either action, the loan and the guarantee should be recorded at the $200 subsidy cost. Thus the new accounting system decreases outlays for loans and increases outlays for guarantees in the year of disbursement. The subsidy appropriation of $200 for the guarantee and the guarantee fee of $10 must be set aside as reserves, which earn interest. This amount covers future claims caused by defaults. A contingent liability program is said to be funded when the premiums for the guarantees and reserves created through budgetary appropriations are equal to the expected payments. Liabilities are considered fair when the premiums are paid by those who benefit from the guarantees (Towe 1993).

**Valuing Contingent Claims**

A first step in establishing the value of claims that arise from issuing the guarantee is to distinguish between guarantees for programs and guarantees for ad hoc projects. Programs provide guarantees to a large pool of risk bearers (as in student-loan or mortgage programs). In contrast, ad hoc guarantees are issued to specific companies either to support high-risk new developments or to bail the firms out of financial distress; in either case the government views the guarantees to be in the national interest. This rationale is not unlike that advanced in developing countries for attracting private finance to infrastructure projects.

Assessing liability for loan programs is straightforward and is often based on a history of defaults. When data are not available or are not reliable guides to future liabilities, however, a forward-looking, risk-based assessment is required, and option-pricing models can be used to estimate premiums. The U.S. government is beginning to use these sophisticated methods to measure the costs of

<table>
<thead>
<tr>
<th>Item</th>
<th>Budget authority</th>
<th>Outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before accounting reform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct loan</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Loan guarantee</td>
<td>0</td>
<td>~10</td>
</tr>
<tr>
<td>After accounting reform</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct loan</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Loan guarantee</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

*Source: Adapted from (BO 1991).*

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government guarantees. Option-pricing methods can also be used for ad hoc projects where the project or the firm has either directly measurable market values and measures of risk or appropriate proxies (Babbel 1989), but the applicability of these methods is limited because many newer projects do not have sufficiently long histories to provide needed data. Market-based methods are typically not used because there are not enough traded securities with and without guarantees to estimate guarantee values.

One alternative for evaluating the cost of guarantees on ad hoc projects is to use more direct measures of default potential, such as those used by credit rating agencies. These agencies categorize project risks in great detail and assign them a rating that summarizes the risk of default. Traded securities in that risk category are then used to estimate the value of the guarantee as the difference between the value of risk-free debt and the present value of risky debt of a similar maturity. When even such estimates are not possible, it is still worth imputing an approximate cost to guarantees. In Canada, all government departments seeking guarantees for ad hoc projects from the finance ministry are required to set aside 25 percent of the value of the underlying loan from their regular appropriations. Future payments resulting from defaults are charged against the amounts set aside. This practice creates a clear opportunity cost for the department seeking a guarantee. The value of 25 percent was arrived at somewhat arbitrarily and therefore does not differentiate risks by projects; with experience, the cost will be further refined. Even when estimations are more sophisticated, however, they suffer from a series of measurement errors stemming from inappropriate assumptions about the probability distribution of losses and the parameters of the distribution. Hence, all estimates need to be subjected to stringent sensitivity tests.

As noted earlier, the longer the period of time during which the risk is covered, the greater the exposure and the higher the value of the contingent claim. A corollary of the time dimension is that the value of the guarantee changes over time; typically it declines. Not surprisingly, the U.S. Credit Reform Act requires a continual valuation of liability because, during the life of a long-term loan, certain risks—adverse external shocks, say—may be accentuated. This legislation spells out procedures to measure the cost of federal credit programs.

The U.S. Credit Reform Act

Under the provisions of this 1990 act, which applies to most federal loan and loan guarantee programs (but not to federal insurance activities), the cost of interest subsidies and defaults in credit programs must be estimated on a discounted present-value basis when new credit is extended, and the costs must be recorded in the budget. Thus credit programs are made equivalent to other federal spending.

Since fiscal year 1992, the budget has had to reflect the outlays needed to cover the cost of subsidies associated with new loans and loan guarantees. The
subsidy cost of a loan guarantee is defined as “the present value of cash flows from estimated payments by the government (for defaults and delinquencies, interest rate subsidies, and other payments) minus estimated payments to the government (for loan origination and other fees, penalties, and recoveries)” (GAO 1994). The cost of a particular loan or loan guarantee is charged against the relevant agency. New guaranteed loans cannot be disbursed unless Congress has passed an appropriation for the subsidy. The full cost of the subsidy is recorded as an outlay when the loan or the guaranteed loan is disbursed. In addition, the costs of credit assistance must be reestimated in the budget at the beginning of each fiscal year following the year in which the disbursement is made.

Not everyone agrees that the legislation is beneficial. Weil (1992) argues that budgetary accounting is a veil that is not necessarily effective in a world where the government and all agents discount actions undertaken. Thus, whether the guarantee is accounted for when it is issued or at the time of default should not influence taxes or welfare, although under the act, budget deficit estimates are higher early on than they would have been under the previous system and decline later. Weil concedes that when agents are “myopic,” setting aside reserves against contingent liabilities induces the right behavior. But he notes that the Credit Reform Act introduces accounting inconsistencies by including only some guarantee programs and excluding others. For example, dropping large-ticket programs (such as deposit insurance) from the purview of the legislation reflects a political decision adopted to hold down the reported size of the budget deficit. Thus Weil is skeptical of the subsidy calculations that will be provided under the law. In particular, he cautions against the use of option-pricing techniques, which are highly sensitive to the assumptions used. Finally, he notes that when the government does guarantee a loan, it does not always have to self-insure by taking the guarantee on its own books. Where possible, he suggests, it should sell the guarantee, thereby eliminating the need to monitor the performance of the loan and make revenue adjustments in response.

In a comment on Weil, Taylor (1992) argues that credit reform was only one element in meeting the objectives of the 1990 Budget Act, which placed caps on discretionary spending and linked entitlement spending with taxes. As a consequence, any new entitlement program had to be balanced by a cut in other programs or an increase in taxes. Excluding loan guarantees from the discipline imposed by the Credit Reform Act would have led to an explosion of loan guarantees, given the caps on budgetary spending. Although the inconsistency created by not including all guarantee and insurance programs is undesirable, excluding loan guarantees from budgetary discipline would have been worse, Taylor concludes.

System of Accounts

The Credit Reform Act created five accounts for each federal agency that administers credit programs: a credit program account, a financing account, a liquidating
account, a noncredit account, and a receipts account. Subsidy costs are expressed in terms of budget authority and outlays in the program and the financing accounts. There are separate financing accounts for loans and guarantees.

The program account receives an appropriation from Congress for the administrative and subsidy costs associated with a credit activity (for details of budgeting for administrative costs, see CBO 1992). For the agency, the budget authority is equal to the appropriation, and its outlays are the subsidy costs that occur when the loans are disbursed. Thus, in their annual request for appropriations, the agencies need to include estimates of subsidy costs for new loans and guarantees. If an agency exhausts its subsidy appropriations in a fiscal year, it cannot provide further credit assistance in that year. When a loan or a guaranteed loan is disbursed, the financing account receives the subsidy costs from the program account. In addition, the financing account records borrowings from the Treasury, guarantee fees, recoveries from past loans, and payments made to cover defaults. If the subsidy estimates are accurate, the financing account inflows and outflows should balance over time.

The liquidating account is a temporary account that handles liabilities incurred through loans and guarantees made before October 1, 1991. This account continues the cash treatment used before passage of the reform legislation. It has permanent, indefinite budget authority (that is, it does not need an annual appropriation) to cover any losses. The noncredit account is for activities such as grants, which were earlier included with credit accounts. The receipts account collects any negative subsidies in those cases in which the federal activity shows a profit.8

Budgeting for Eximbank

New accounting practices are being used for U.S. government-guaranteed loans to exporters of U.S. goods by the Export-Import Bank (Eximbank). Before credit reform, the Eximbank’s net cash flows, new credit, income statements, and balance sheets were recorded in three separate budget documents. The operating income in any year lumped together payments from decisions reached in many different years. Thus the accounting system did not provide even a rough estimate of the cost of credit assistance in any given period.

Table 6 shows how credit reform affects accounting for Eximbank. Before credit reform, the revolving fund would have simply shown net outlays of -$823.1 million. The net “outlays” would be negative because salaries and expenses were paid from a separate administrative account so that other allocations were less than repayments received. Under the credit reform law, the estimated subsidy costs (sum of the subsidy cost for loans and guarantees) are reflected in the budget in Eximbank’s program account and are separated from nonsubsidized cash flows. When the loan or guaranteed loan is disbursed, the financing account receives the subsidy cost for that particular loan. The liquidating account handles all loans and guarantees made before October 1, 1991.
Table 6. Budgetary Treatment of Eximbank
(in millions of U.S. dollars)

<table>
<thead>
<tr>
<th></th>
<th>Before credit reform</th>
<th>After credit reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing revolving fund</td>
<td>-823.1</td>
<td>-</td>
</tr>
<tr>
<td>Program amount</td>
<td>-</td>
<td>264.8</td>
</tr>
<tr>
<td>Financing account (loans)</td>
<td>-</td>
<td>425.6</td>
</tr>
<tr>
<td>Financing account (guarantees)</td>
<td>-</td>
<td>-458.5</td>
</tr>
<tr>
<td>Liquidating account</td>
<td>-</td>
<td>-1,014.0</td>
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— Not available.


The outlays consist of disbursements of tied aid (in which a condition of the assistance is the purchase of a given product or service), disbursements of subsidy costs associated with credit assistance, and administrative expenses. All other cash flows are treated as a means of financing and recorded in the financing account, which is not part of the budget.

Conclusion

As instruments for supporting private enterprise and attracting private finance to priority endeavors, guarantees provide significant value. Their value increases with the underlying riskiness of the project and the maturity of the loan being guaranteed. This survey shows that the value in the case of high-risk, high-maturity loans can be worth hundreds of basis points in interest costs or, equivalently, that expected default payments can be a very substantial portion of the loan.

Any policy using guarantees thus needs to address several tradeoffs. In guaranteeing loans the government takes on the risk of default and thereby reduces the incentives of the lenders and project sponsors to monitor project performance actively. To create an incentive for continued project monitoring and to filter out lenders who have little ability to manage risk, governments seek to share risks with private lenders by guaranteeing less than the full amount of the loan. The amount of risk-sharing in the cases surveyed has not been large, but governments are increasingly conscious that they need to lower their exposure and, as the Canadian example shows, some movement in this direction is likely. The value of the guarantee also depends upon the structure of financing. Guaranteeing junior debt creates incentives for senior debt holders to be vigilant but raises expected costs to the guarantor.

The high value of loan guarantees, the costs of losses, and the trend toward budgetary discipline have led countries to adopt a more rational approach to accounting for subsidies to ensure that the costs of guarantees are evident to decisionmakers. Although problems exist in estimating subsidy costs, experi-
ence will make it easier to estimate these costs more precisely. Better data would make it possible to predict future performance on the basis of past experience and would also permit the use of sophisticated contingent-claim valuation methods for pricing guarantees.

The growth of contingent liabilities, especially those associated with guarantees to lenders and other investors in private infrastructure projects, has become a source of concern in many developing countries. Some governments have chosen to restrict guarantees severely or even deny them. Guarantees against certain risks are often required, however, to finance the project. Where guarantees must be provided, the methods described in this article become relevant. The use of these methods is under serious consideration in the Philippines and Colombia. In the first instance, the methods adopted are likely to be less sophisticated than some of those described here; however, any effort at good housekeeping will be a step in the right direction.

Appendix: The Basic Black-Scholes Option-Pricing Analysis

In this analysis, a guarantee is akin to a put option because the lender has, in effect, an option to sell the debt at an agreed-upon price. Such an option—which can be on various underlying assets (bonds, stocks, currencies, or commodities)—gives its owner the right to sell that asset for a specified price (called the exercise price) on or before a certain date. (If the option can be exercised only at maturity, it is referred to as a European option; in contrast, an American option can be exercised anytime before maturity.)

The price paid by the buyer of the option is referred to as the option premium. A fair premium is equal to the present value of the cash flows from the option. The methodology used to compute this premium is referred to as option pricing or, more generally, as contingent-claims valuation.

Black and Scholes (1973) determined the premium for a European stock option in terms of parameters that are directly observable or that may be estimated using historical data (such as the current price of the underlying asset, the volatility of the return on the asset, the time to maturity, the exercise price of the option, and the risk-free rate of interest). The formula assumes that the stock price follows a particular stochastic—Ito—process and pays no dividends during the life of the option; that given the price today, the stock price in the future has a log-normal distribution; that the risk-free rate of interest and the asset's volatility are constant; and that there are no transaction costs or taxes.

Given the assumptions about the behavior of the asset price, a six-month put option on a $100 stock, carrying an exercise price of $90, a risk-free interest rate of 10 percent a year, and a volatility of 50 percent a year, would be priced at $6.92. A higher exercise price, longer time to maturity, and greater volatility would lead to a higher option price.
Underlying the model is the concept of no arbitrage—alternative assets with identical future cash flows and risk characteristics should all have the same price today. In the context of options, the basic method relies on being able to form, at a specific moment in time, a riskless portfolio of the option and the underlying asset. The no-arbitrage condition implies that such a riskless portfolio will earn the instantaneous risk-free interest rate and thereby determines a partial differential equation that describes the evolution over time of the relevant variables. Because the same sources of uncertainty affect both the underlying stock and the option, there is a correlation between the stock price and the option price; hence, the riskless asset is formed by buying either the asset or the option and selling the other.

Subsequent researchers have been able to relax the Black-Scholes assumptions and hence extend the conditions under which derivative securities can be priced. Cox and Ross (1976) discuss option pricing under alternative processes, including processes with jumps. Merton (1976) discusses option pricing when the underlying returns are discontinuous. Geske (1979) discusses valuation of compound options—a stock option is compound when, for example, it is valued based on the underlying value of the firm, not on the stock price. Roll (1977) derives an analytical formula for American call options with stocks whose dividends are known. Hull and White (1987) discuss option pricing on assets with stochastic volatilities.

Source: Hull (1993); Black and Scholes (1973); Merton (1973).

Notes

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1. Similarly, for budget purposes, government loans should be recorded at the value of the subsidy rather than the full value of the principal amount.

2. This conclusion apparently conflicts with the findings of a 1988 study by Selby, Franks, and Karki; but in that study, guarantee of junior debt is accompanied by a de facto guarantee of senior debt, and so the incentive effects disappear.

3. As a practical matter, the put option need not be on the assets of the firm itself, since these are unlikely to be liquid and tradable, but rather on other assets that are heavily correlated with the value of the firm, including the prices of the firm’s inputs and outputs (Babbel 1989).

4. Option-pricing techniques are a class of contingent-claims valuation methods. Contingent-claims analysis usually refers to the general framework for “pricing,” or costing out, various claims that are contingent on certain triggering events or conditions but are not necessarily linked directly to a tradable security. Options pricing, on the other hand, is viewed as the subset of contingent-claims analysis associated with pricing financial option products based on an underlying tradable security.

5. The price of a bond is the value in current dollars of future cash flows (principal and coupon payments) discounted at a rate that reflects the risk of default. If there is no de-
fault, the appropriate discount rate is the yield on Treasury securities of similar duration. The bonds Merton used were not actually guaranteed but carried an implied cost of being guaranteed.

6. The eleven categories are A, B, C, C-, D, D-, E, E-, F, F-, and F--.

7. This is modeled as a "long position," that is, buying a put option with exercise price $D (1 + i_j)$, where $D$ is the principal of the debt and $i_j$ is the interest rate applicable for the $j$th payment.

8. When subsidy costs are negative, no appropriations are required. For such a program, the negative budget authority and outlays are transferred from the financing account and recorded in the federal budget as proprietary receipts. These receipts are not available for use by the agencies unless the authority to do so is provided by law.

References

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"THE DANGERS OF DECENTRALIZATION" ACCORDING TO PRUD'HOMME: SOME FURTHER ASPECTS

David O. Sewell

The article by Remy Prud'homme in the August 1995 issue of the Research Observer presents his views on "the dangers of decentralization from the viewpoints of redistribution, stabilization, and allocation" (p. 201). Although a response by Charles McLure accompanied the article, my commentary is intended to focus attention on additional issues raised by Prud'homme. I find it quite appropriate that subnational governments should participate in redistribution, as they do in practice; indeed, I suggest that subnational governments are best suited to perform some types of interregional redistribution. Some participation by subnational governments in stabilization policy is also sensible. Finally, the case for decentralization is fundamentally based on efficiency considerations, and I see no reason to accept the paradoxical proposition that central governments would be more efficient in providing such local services.

Interpersonal Redistribution of Income

Whereas Prud'homme considers that "it is hard to think of a country that carries out redistributive policies at subnational levels" (p. 202), this writer finds it hard to think of one that does not! Regulatory policies widely allocated to local governments, such as land use and rent controls, have profound distributional implications, as do functions often assigned to subnational governments in general, most notably public health care and public education. The constitutions of many federal states often explicitly assign responsibilities for social welfare functions and redistributive tax instruments to subnational governments. The failure to discuss federal systems of government, which include some of the largest developing and transition countries, such as Brazil, India, and Russia, constitutes one of the more puzzling shortcomings in Prud'homme's article. Nowhere, perhaps, does the assignment of responsibilities for redistribution differ more strikingly from the centralist model than in Switzerland, where functions of health care, education, and welfare are for the most part exclusive duties of the cantons and
where the cantons have priority in levying taxes on personal income and wealth. The Swiss example illustrates most clearly that there are workable alternatives to assignment of distributional authority to a central government.

The constitutional assignment of distributional functions to subnational governments is not limited to federal states, however. The relatively large size of local governments in the Scandinavian countries is explained in part by their responsibilities for distributional programs. In Denmark, for example, where local governments account for more than half of general government expenditures and about a third of gross national product, social security and welfare account for more than half of local government budgets (McMillan 1995). These local governments are substantially financed by local income tax rates, which are, in turn, “piggy-backed” on a central government tax base that is progressive in incidence. The Scandinavian example exerts a substantial influence on the development of neighboring countries in transition, particularly the Baltic states.

There is also plenty of evidence that subnational jurisdictions systematically incorporate distributional preferences into choices on spending decisions (see, for instance, Behrman and Craig 1987) and that these preferences may differ substantially by subnational jurisdiction. On the latter point, Wildasin (1991) notes that monthly average benefits for Aid to Families with Dependent Children vary by a factor of five among U.S states, observes that such differences have persisted over long time periods, and asserts that “decentralized redistribution is a fact of life that must be dealt with as a practical matter” (pp. 768–69). Such evidence poses problems for the traditional analysis that assigns responsibility for interpersonal income redistribution to central governments.

Prud'homme’s arguments incorporate several assumptions about labor market adjustment, some of which appear to be in conflict. He assumes that the response of migration to income differentials is reasonably swift, so that “the generous jurisdiction [in terms of income redistribution] will soon be unable to sustain its policy” (p. 202, emphasis added). And he goes on to say that “regional disparities exist in most countries ... and, contrary to standard economic theory, they do not disappear with economic development” (p. 202). It is precisely because migration takes place to equalize incomes and factor prices, however, that the conventional wisdom asserts that decentralized redistribution of income is self-defeating and the function should be assumed by central government.

Many would also dispute Prud'homme's assertion about regional disparities not narrowing over time. He uses the United States as an example and argues further that net fiscal benefits from subnational governments make income disparities worse, “increasing the gap in income between regions. Decentralization can therefore be the mother of segregation” (p. 203). In fact, the evidence appears to point to a substantial narrowing of regional income differentials in the long run (Barro and Sala-I-Martin 1991, 1992; Wysocki 1995).

As Prud'homme points out, however, considerations of factor mobility have traditionally been taken to imply that redistribution has to be carried out by higher levels of government. When working taxpayers and transfer recipients
can move among jurisdictions, differences in distributional policy among these jurisdictions may attract transfer beneficiaries, repel taxpayers, and create externalities among areas in response to changes in taxes and services. Some recent contributions to this literature reconcile the implications of such labor market mobility with the assumption that local preferences for redistribution differ. Redistribution reemerges as either a desirable central function or one that should be coordinated, but with some interesting differences from the traditional analysis. In particular, Wildasin (1991) argues that an optimal solution is to provide grants that, because of differing subnational preferences for redistribution, are non-uniform by jurisdiction but lead to identical levels of transfer payments.

A further practical consideration is that, although factor markets influence the appropriate locus for distributional policy, the relevant factor markets may be subnational in cases in which, say, language or migration costs impose barriers to mobility or even supranational in cases where such factors are not important, as perhaps for some skills in the European Union. Thus in most of the countries in transition, where mobility is still limited because of lack of housing, local redistributive policies may acquire added importance and be less constrained than in other countries. The fact that housing is a responsibility of local governments in most of the countries in transition means that these local governments may be much more important than their counterparts elsewhere in affecting the distribution of income.

**Interregional Transfers**

Differences in net fiscal benefits (the benefit taxpayers receive from public services minus their tax payments) that result from the activities of subnational governments create problems for central government goals of equity and efficiency. These differing net fiscal benefits may arise because those subnational governments whose residents have higher per capita incomes can finance a given amount of public services with less residence-based tax effort (for instance, lower tax rates on income taxed where the recipient resides) or for other reasons (a subnational government may have access to source-based taxes such as natural resource revenues, for example; see Boadway and Flatters 1982). An efficiency problem occurs if there is “fiscally induced migration” to collect these net fiscal benefits. The significance of such efficiency losses, however, is in some doubt (see Mieszkowski and Toder 1983; Watson 1986). The case for a redistribution of net subnational fiscal benefits to ensure equity probably deserves more weight than that arising from their efficiency costs. The equity problem for the central government derives from the “horizontal” equity goal of treating likes alike no matter where they reside in the country. The problem is that the central government's attempts to attain this goal are implemented through tax and transfer systems that deal only with the market or taxable incomes of individuals. The net fiscal benefits from subnational government activity may, however, lead
to substantial differences in the real or comprehensive incomes of their residents over and above those arising from their market incomes. It is difficult to think of practicable ways in which a central government can deal with such local benefits by adjusting its own personal taxes and transfers. It would be impractical and politically unacceptable to levy different central government income tax rates in different jurisdictions, for instance. The practical solution that has been advocated is to undertake intergovernmental transfers to equalize subnational per capita fiscal capacities so that it is financially possible to achieve horizontal equity goals. In developing countries, Shah (1994) lists equalization as a factor in revenue-sharing transfers from central to local governments in Brazil, Colombia, India, Mexico, Nigeria, and Pakistan, and one could add Chile and Morocco to this list (World Bank 1993; Sewell 1994).

Financing such transfers with central government revenues may be inappropriate, however, if the revenues are raised from different sources than those received by subnational governments. (Following the usual principles of tax assignment, higher level governments tax more mobile resources, and local governments tax more immobile resources, such as property.) In some cases subnational governments own natural resources that yield substantial revenues—a state of affairs that led to great difficulties for Canada’s centrally financed program of equalizing provincial government revenues when oil prices rose substantially in the 1970s. The obvious method of dealing with this problem is for direct redistribution to take place between subnational governments so that the “have” subnational governments contribute to a revenue pool that is then redistributed to the “have not” localities. A well-known example occurs between the länder (state governments) in the Federal Republic of Germany, and the Swiss version of equalization is similar (Spahn 1994). There are also examples of voluntary direct transfers among local governments, such as among the 201 municipalities in the Minneapolis–St. Paul area. Alternatively, central governments, among them Sweden and Denmark, have required such transfers to be undertaken between local governments based on fiscal capacity. Nor are all examples of direct transfers limited to mature industrial countries; Chile has a system of direct transfers from rich to poor municipios.

Stabilization Policy

Prud’homme states that fiscal policy “is an instrument that only the central government can manipulate, because local authorities have few or no incentives to undertake economic stabilization programs” and that economic stabilization is in any case an unsuitable function for a subnational government because “most of the impact would be outside its jurisdiction” (p. 205). Further, he asserts that for a central government’s fiscal policy to be effective, its budget must be large in relation to the budgets of local governments and must account for a substan-
tial share of gross domestic product. He also cites examples of countries in which he believes subnational actions have been fiscally perverse and have adversely affected stabilization goals.

In contrast, findings from examination of this question in Canada, where the subject has received close examination, suggest that the growth of subnational budgets has generally had a stabilizing effect on the economy (Economic Council of Canada 1977, 1982; Fortin 1982a, 1982b; Rabeau 1986; Sheikh and Winer 1977; Royal Commission on the Economic Union and Development Prospects for Canada 1985), and that “relatively extreme assumptions about discretionary non-cooperation by junior jurisdictions are needed to conclude stabilization by the central authorities would not work at all simply because of this lack of cooperation” (Sheikh and Winer 1977, p. 195).

Although arguments about specific cases may not settle anything, the reasons why subnational fiscal activity has been found to be stabilizing in this literature may apply elsewhere. For instance, the major expenditure responsibilities likely to be assigned to the larger subnational governments in industrial and developing countries—such as public funding of health and education—act as automatic stabilizers because they are recurrent and not very flexible. Increased reliance on direct taxes (such as personal income taxes) in subnational financing has also been found to have a stabilizing effect. Further, technical objections to the idea of regional stabilization policy based on the assumption of substantial interregional leakages have been found not to apply in practice (Rabeau 1986).

Finally, stabilization policy may be another illustration of the fact that the relevant “domain for concern,” to use McLure’s phrase, may occur below the national level, because regional swings in the business cycle can be very disparate, and frequent demand disturbances of regional origin are well documented. To offset such shocks, it may well be economically costly and politically difficult to differentiate central government budgets on the scale required, and a good case can be made for some participation by larger subnational governments in stabilization policy (Fortin 1982a, 1982b).

Decentralization and Efficiency

The case for decentralization is fundamentally based on efficiency considerations, and Prud'homme offers several qualifications to this case. The classic argument is that in a democratic society decentralization results in a better match of supply and demand for local public goods. Although one may agree with Prud’homme that this argument need not hold in the less-than-democratic circumstances that apply in some developing countries, there is no reason to expect that a central government’s performance will be better in this respect, and it may be a great deal worse (Sewell and Wallich 1995). Prud’homme does not think economies of scale are important for local government functions, and much
additional survey evidence can be adduced in support of this point (Bird and Hartle 1972; Eden and McMillan 1991; McMillan 1995). Finally, while Prud'homme postulates that central governments may attract more able local officials because they can offer better career prospects than can local governments, well-functioning national markets for local officials exist in many countries.

Nothing in Prud'homme's arguments suggests that it is necessary to qualify the case for decentralization on grounds of efficiency, and it may be worth emphasizing how important this case is. The principle of user cost recovery for local infrastructure and utility services is central to the efficiency rationale of local governments; subsidies for such infrastructure services often have regressive effects and are not recommended as a means of attaining distributional goals (World Bank 1994). Local governments the world over provide such infrastructure and utility services in areas including transportation (roads, public transport) and environmental services (water, sewers, trash collection). Among the member countries of the Organization for Economic Cooperation and Development (OECD), local governments alone are responsible for about half of all government capital formation, although this is often achieved with the aid of substantial transfers from higher levels of government (McMillan 1995). All subnational governments are responsible for even greater levels of public investment. In a survey of the nineteen OECD countries for the latest year in which data are available (1989-90), Austria recorded the median percentage of public investment by subnational governments, with a share of 71 percent (Sewell 1994).

Conclusion

Decentralization may entail other difficulties; it is more inconvenient for those involved in lending operations to deal with a host of subnational governments rather than with a central government. Decentralization may also cause difficulties for international financial institutions, whose charters oblige them to lend only to their sovereign member governments. A great deal of attention is currently focused on the resulting "on-lending" problem of getting these funds to subnational governments. These problems are inevitable, however, where important functions for which lending takes place, such as the provision of infrastructure, are principally the concern of subnational, rather than national, governments. They may pose difficulties for international financial institutions, but they should not be thought of as "Dangers of Decentralization."

Note

David O. Sewell is a member of the Technical Department of the World Bank’s Europe/ Central Asia and Middle East/North Africa Regions.
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David O. Sewell


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The authors discuss foreign direct investment, determinants of private investment (domestic and foreign), and the effects of foreign direct investment, determinants of private investment (domestic and foreign), and the effects of institutional factors on investment.

Tables and graphs of updated statistics track gross domestic product, the amounts of private versus public investment, and investment shares for East Asia, Latin America, South Asia, and Sub-Saharan Africa.

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