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ON "HUNGER AND PUBLIC ACTION"
A Review Article on the Book
by Jean Drèze and Amartya Sen

Martin Ravallion

Recent writings on poverty and hunger agree broadly on objectives and means but diverge significantly in emphasis. Views differ on the importance and function of economic growth and on how much weight to give to direct public support. These differences can matter in policy choices. Hunger and Public Action, by Jean Drèze and Amartya Sen, is an important contribution to the literature on antihunger policy. This article critically examines the issues raised by the book, its differences with other recent writings, and the implications for both policy and future research on policy.

Drèze and Sen's book is a good starting point for a discussion of antihunger policy. The first book in a series reporting results of research sponsored by the World Institute for Development Economics Research, Hunger and Public Action is an outstanding contribution to the literature. It is also accessible, written with clarity of thought and economy of technique. But it is more than a book about specific policies; it is also an applied study in aspects of the theory of policy. It prescribes not only things to do but also a way to think about what we should do. New concepts are advocated for that task. This article's evaluation of the arguments of Hunger and Public Action aims to assess implications both for policy and for the way we think about policy.

Hunger and Public Action is a scholarly book, but it is one with a clear and potentially influential prescriptive message. I found myself in sympathy with that message. And I believe it is one around which a consensus could now be formed in the development community, particularly in the light of not

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dissimilar views expressed in other recent works on this topic, notably the United Nations Development Programme's Human Development Report 1990 and the World Bank's World Development Report 1990 (UNDP 1990; World Bank 1990). I did, however, feel uncomfortable with certain aspects of Hunger and Public Action's message and with some of the data and methods used to support it. The issues in question are not easy to resolve but are nonetheless important. This article will also try to identify points where further research on antihunger policy seems called for.

Concepts

Drèze and Sen define hunger to embrace all kinds of social as well as biological disadvantages associated with inadequate food intakes—a definition much broader than the concept frequently found in research and policy. For example, a person who adapts to low food energy intake by reducing activity may not consider himself or herself hungry; Drèze and Sen would, nonetheless, deem this a food-related deprivation within the scope of their study—in short, a problem of hunger.

I believe their broader perspective is warranted. Antihunger policies should surely help people who adapt to low food energy intake by diminishing their level of activity. Yet both research and practice sometimes (at least implicitly) dictate otherwise. One example is the common use of child anthropometric measures (such as weight-for-age) to indicate nutritional need. Children can maintain seemingly satisfactory physical growth rates at low levels of food energy intake by not playing (see, for example, Beaton 1983); that is surely a serious food-related deprivation for any child.

The concept of entitlement is used throughout Hunger and Public Action, following Sen's book Poverty and Famines (1981a). A person's entitlements over some time period are the various consumption bundles that are legally attainable from that person's initial endowments, given prevailing prices. Sen (1981a) made an enormous contribution in exposing the limitations of the view that famines are caused by a decline in aggregate food availability. Sen argued that this view has little analytical force in understanding some major famines of this century. Many of these were not associated with an obvious decline in availability of food. And even for those that were, the arithmetic of aggregate food statistics does not explain why similar shortfalls at other times or places did not also result in famines. Nor does it help us understand the incidence within a population of famine mortality or the extensive forms of nonfatal suffering during and after a famine.

Instead, Sen advocates study of the entitlements of famine victims. Of course, people may avoid or suffer starvation without a change in their entitlements; they may avoid it by illegal means or suffer it by choice. But, because it emphasizes how individual budgets are determined, the concept of entitle-
ments is useful in understanding how specific famines happen and how they may be averted. This perspective has clear antecedents in the literature on famines in India (see, for example, Bhatia 1967); indeed, recognition of the importance of entitlements goes back centuries in the subcontinent and elsewhere. Sen has contributed greatly in redirecting attention in analysis and policy to the role entitlements play in causing and relieving modern famines.

A theme of Hunger and Public Action is that the expansion of entitlements should not, however, be viewed as the final objective of human well-being. Rather it is the capability for doing valued things (called functionings) that ultimately matters: "Formally, a person's capability is a set of functioning bundles, representing the various 'beings and doings' that a person can achieve with his or her economic, social, and personal characteristics" (Hunger and Public Action, p. 12, n. 18; also see Sen 1985). The authors argue that the goal of public action should be to expand human capabilities rather than entitlements per se.

The capability central to the topic of Hunger and Public Action is that of being alive and healthy. Being adequately nourished is seen as essential for this capability. Here again the authors take a broad view, emphasizing the variability over time and between people in nutrient needs for good health as well as that access to health care, basic education, clean drinking water, and adequate sanitation are important complements to nutrition.

Does the attention paid to capabilities represent a significant departure from mainstream approaches to the welfare analysis of public policies? Drèze and Sen emphasize the inadequacies of regarding consumption of commodities as an end in itself (this is also a prominent theme of the Human Development Report). But these are not adequate grounds, in terms of theory at least, for their departure from mainstream thinking. Current welfare economics does not insist that income, or command over consumption, is the final objective of personal well-being. Nor does it insist that income is the sole determinant of individual well-being, or that personal characteristics do not matter, at given consumption levels. Whether we emphasize capabilities or stay with mainstream theory, we can conceive of well-being as dependent on the same basic ingredients: goods consumed, the time spent in various activities, and personal characteristics.

It is in the practice of policy analysis that the main difference becomes clear. Consideration of capabilities forces us to take a broad view of the range of factors relevant to individual well-being. The more eclectic nature of mainstream analyses readily allows certain special assumptions to be made in applications—often about those determinants of individual welfare that are difficult to observe. A common assumption of this sort is that income or consumption is an adequate indicator of individual well-being—in other words, that individuals are identical in all other respects. I doubt if this assumption would ever be easily accepted when applying the capabilities approach.
This may or may not matter. In some circumstances it can be innocuous to ignore non-income differences across individuals. But in other circumstances it could make a big difference to conclusions about policies. Social sector policies, for example, have sometimes been judged solely according to what they do for productivity and, hence, incomes. Even if one confined attention to that most basic of capabilities—to be healthy—one would not take such a narrow point of view.

Drèze and Sen also differ from some other writers in the importance they attach to the public provision of the goods needed for expanding human capabilities. A consensus has been emerging in recent literature that the development of human resources must be given a higher priority than in the past; see, for example, World Bank (1989, 1990) and UNDP (1990). There is less sign of consensus on the further question: What is the relative importance of private versus public provision as instruments for achieving human resource development? Many of the things important in developing and maintaining human resources are essentially private goods (in that the benefits are exclusive to the individual consumer), and so there is a possibility for efficient provision through markets. Human resource development will then require that people want and can afford these goods. The case for direct public provision then depends on the adequacy of policy instruments influencing incomes and their distribution, as well as on the existence of relevant market failures.

Some well-known arguments against public provision of private goods do not arise in the framework of Drèze and Sen. An example is the concern about the welfare losses that arise from imposing a common level of public provision when tastes vary. Within the Drèze-Sen approach, the case for public provision rests heavily on the strength of the relationship between capabilities and incomes. In the case of nutritional capabilities, if the link between incomes and hunger is weak relative to other factors, then Drèze and Sen are justified in putting less emphasis on generating incomes in reducing hunger (except insofar as growth facilitates the financing of public support, a function to which the book does attach importance).

Recent debates about the relationship between income poverty and hunger have bearing on this issue. A great deal of effort has gone into investigating how responsive nutrient intakes—particularly but not exclusively food energy intakes—are to changes in income. Recent econometric estimates using household-level data have suggested that food energy intakes are relatively unresponsive to income changes, even for the poor. (For a good survey, see Behrman 1990.) Although I agree that some estimates have overstated the response of individual intakes to changes in income, it does not follow that the capability of being adequately nourished for good health is also unresponsive to income changes. Whether it is or not will depend on how changes in intakes are reflected in health status, which will depend in turn on how far nutrients fall short of needs, as well as on other factors, such as the initial state of health. These interactions can strengthen the link between income poverty and hunger.
For example, measures of undernutrition in Indonesia have been found to respond quite strongly to income gains, even though caloric intakes at the individual level are relatively unresponsive (Ravallion 1990). In this instance, a capabilities perspective suggests that incomes may matter more than was otherwise thought, not less.

One familiar concept—food security—is conspicuous in its absence from *Hunger and Public Action*. Earlier inconsistencies in the usage of this term have largely vanished; food security is now widely defined as “access by all people at all times to enough food for an active and healthy life” (World Bank 1986, p. 1). Drèze and Sen are careful about words, and I am sure they have their reasons for avoiding this term. I expect they feel it gives undue emphasis to command over goods, and just one bundle of goods, food. Nonetheless, much of *Hunger and Public Action* is unquestionably about attaining food security, and the book clearly has much in common with other recent writings on food security, including the Bank’s policy paper on the topic (World Bank 1986).

**Data and Methods**

The methods of empirical analysis in *Hunger and Public Action*, like the concepts, are distinctive—although this time not so much for their sophistication as for their lack of it. Drèze and Sen seem particularly shy of econometric methods. Possibly they were concerned to make the book accessible to readers unfamiliar with these methods. But surely accessibility is determined more by the way results are presented than by the methods used to obtain them. Nonetheless, as someone who uses econometric methods routinely, I was struck by how far the authors seem to be able to take us with little more than the investigative tools of 100 years ago.

One example should suffice. *Hunger and Public Action* presents some devastatingly simple estimates of the number of women “missing” in the world owing to the gender bias in mortality. There are 1,050 females to every 1,000 males in Europe and 1,022 to every 1,000 in Sub-Saharan Africa. The corresponding figures are as low as 941, 931, and 905 per 1,000 in China, India, and Pakistan; these numbers represent 44 million, 37 million, and 5 million missing women, respectively, when judged against the African ratio of females to males. Drèze and Sen attribute this discrepancy to higher rates of female mortality, which are taken to reflect sex bias in access to food and health care. They do not discuss other possible explanations. For example, the same factors that lead to such biases would presumably also yield some underreporting of females in household surveys. Nonetheless, these unsophisticated figures hint at an alarming problem of gender bias in parts of the developing world.

But this sort of empirical analysis can take us only so far. A great deal of data that bear on this and other questions raised in *Hunger and Public Action* have not been exploited in the book. I suspect that at least part of the reason...
is that the more sophisticated methods needed to learn from such data have been shunned. For example, hardly a scrap of household-level data on living standards has been used, despite the fact that many of the countries mentioned in the book now have such data available, and often for more than one point in time. And these are data with quite direct bearing on assessments of capabilities (as well as on more conventional measures of welfare). An understanding of the circumstances of the poor at the household or individual level can greatly inform antihunger policies (Lipton 1988; World Bank 1990).

In discussing progress in reducing chronic hunger in part 3 of Hunger and Public Action, Drèze and Sen rely almost exclusively on a few social indicators, such as aggregate child mortality and average life expectancy. I found this surprising. These indicators are useful up to a point, but they can be rather uninformative about the quality of the lives that people live—their capabilities, if you wish. One could hardly contend that they are good indicators of the attainment of the most basic capabilities, beyond being alive. In making comparisons over time, they may also be deceptively sensitive to very small improvements in primary health care, particularly when the mortality rate is high to begin with. Preventing the common infectious and parasitic diseases such as malaria is undeniable progress, but there is a lot more to the elimination of chronic hunger and related deprivations. Real progress—or lack of it—in reducing the persistent poverty underlying chronic hunger may show up little in these aggregate social indicators.

Famines

A large part of Hunger and Public Action is devoted to policies for preventing famine, building on Jean Drèze’s recent work (particularly Drèze 1990a; 1990b), as well as Amartya Sen’s well-known earlier writings (particularly Sen 1981a). The key policy issue is how to avoid the contractions in entitlements suffered by vulnerable groups. This is not just a matter of avoiding transient distress, although that is ample motivation. Longer-term chronic hunger is both a cause and an effect of suffering during a famine. Protecting the entitlements of the poor at such times can play an important role in development (both in the narrow sense of economic growth and in the richer sense of expanded human capabilities). Drèze and Sen further expose the fallaciousness of classifying public actions in this context into mutually exclusive categories of relief and development.

Markets and Famines

The first step in formulating sound policies is to understand the workings of existing institutions for allocating resources, of which markets are generally the most important. The crucial response of markets to impending famine, and the
role of public action, is given adequate attention in *Hunger and Public Action*, but some of the issues bear elaboration, and some points are not particularly well covered in the book. The main policy issues in question concern both the spatial and intertemporal performance of food-grain markets.

There can be no presumption that spatial food movements through private trade will alleviate a famine; the food will probably move according to market prices which need not be higher in the worst-off regions (sufficient to cover transport costs). Following Sen (1981a), *Hunger and Public Action* points to the fact that there have been examples of food export from famine-affected regions. The term “slump famine” has been coined for this phenomenon, to indicate that famine often arises from contractions in purchasing power in affected regions.

There is a risk of some confusion here. The export of food during a famine does not mean that external trade has not helped stabilize domestic consumption. The crucial question is whether food exports declined, or imports increased, during the famine. This begs two further questions: Did food-grain exports respond to changes in relative prices? Did the relative prices facing traders reflect domestic scarcities? *Hunger and Public Action* does not address these questions. The evidence on at least one supposed case of slump famine—the severe famines in British India around the turn of this century—does not support the view that trade destabilized consumption (see Ravallion 1987a). Equally, there can be no presumption that government restrictions on food movements will improve matters, and there is evidence that they have not (Ravallion 1987b). A better strategy, well advocated in *Hunger and Public Action*, is to raise food purchasing power of the poor in affected regions.

Nor, according to popular opinion, are markets very good at the intertemporal allocation of food during famines; panic buying and excessive hoarding often exacerbate current scarcities. Some experts endorse this opinion: a well-known handbook on famine and disaster relief, for instance, recommends various actions against food hoarding (see Masefield 1967). The very existence of private food stocks during famine has understandably given rise to anxiety, not least among those threatened with starvation.

But markets may have a part to play in encouraging storage—a potentially important means of stabilizing consumption over time, which could improve the prospects for survival of the poor, as well as the profits of speculative stockholders. How well markets will work in this regard will depend on how competitive they are and on how shrewdly traders have anticipated future scarcity.

These are difficult empirical questions. In the major famine in Bangladesh in 1974, there is evidence of very harmful destabilizing speculation. Errors in price forecasting appear to have been positively correlated with readily available information on damage to the future harvest (Ravallion 1987b). Traders therefore stored more rice against these anticipated production losses than they would have if markets had been functioning efficiently. Rice prices rose to record levels in the months between the flooding and the arrival of the next
(depleted) harvest, and prices fell sharply in the week or two preceding the arrival of that harvest. The severe contraction in the food entitlements of the poor led to a sharp increase in mortality, which also peaked before the decline in aggregate food availability (Ravallion 1987b).

The evidence on the Bangladesh famine also calls into question the performance of nonmarket food institutions. Rice prices in Bangladesh are influenced by changes in the government's food-grain stock, itself determined by previous imports (including foreign aid) and internal procurement efforts. Thus traders' expectations of the effect of preharvest crop damage on future prices require an assumption about the government's response to shared information. The most plausible conclusion is that the stockholders' overoptimistic price expectations or anticipations of future rationing during the 1974 famine were premised on a belief that the government would be unable to respond suitably to the reported damage to the future crop (Ravallion 1987b).

A ban on grain hoarding is not the most effective government response. It is unlikely to work (stocks are easy to hide) and may even make matters worse by fuelling excessive price expectations, premised on a lack of confidence in the government's credibility. Rather, public action should be geared to supporting public confidence in future food availability and the stability of prices, through open market operations and food distribution policies, backed up by adequate stocks or stabilizing external food trade or aid policies. By such means, Bangladesh has done a better job of avoiding famine in the 1980s (Osmani 1987).

**Food or Cash?**

Direct food delivery to famine-affected areas is the most common policy instrument for famine relief. This method has two distinct functions: raising aggregate food availability and raising the food entitlements of vulnerable groups. Drèze and Sen argue that there is a potential gain from separating these two functions. Selling food aid or imports in domestic markets and using the proceeds to reach the needy may be more effective than directly delivering food. Cash transfers can also help even if aggregate food availability cannot be increased; for example, the authors point to the success of the state government of Maharashtra, India, in avoiding famine in 1972–73 using a rural public employment scheme, even when food supply could not be rapidly increased.

The development community remains divided on the merits of monetizing food aid. (For discussion of the various views, see Reutlinger 1984; Berg 1987; and Singer, Wood, and Jennings 1987.) Drèze and Sen are persuasive in arguing that whether cash transfers or food relief will be more helpful to those in need must be judged according to the specific setting, including the performance of food-grain markets.

Under competitive conditions, the case for cash relief is strong either if food prices in the affected region are below world prices at the border (since recip-
ients can then purchase more food locally with the cash than the aid agency can obtain with the same money on world markets) or if private traders can deliver the food more efficiently than the aid agency. The case is weaker if local markets perform poorly, although even then the change in policy can be preferable, provided that traders can still deliver food at lower cost than the aid agency (Coate 1989).

A common criticism of cash relief is that it will lead to higher food prices. Drèze and Sen argue that this outcome is fine provided that the higher food prices are the result of an effectively targeted cash transfer policy; those in need will still be better off. One could quarrel with the theoretical generality of the authors’ argument here; the conditions we are discussing by no means rule out the possibility that the recipient’s initial gains are substantially eroded by subsequent changes in relative prices (Ravallion 1987b).

But a reader becoming mired in that debate would risk missing the main point of Hunger and Public Action, which is to stimulate a more creative approach to the formulation of policy and careful consideration of the relative merits of the options. As elsewhere in the book, Drèze and Sen demonstrate that clearer thinking in distinguishing ends from means can enhance the prospects for effective public action against hunger.

Reaching the Vulnerable

Whether in the form of cash or food, if transfers are to prevent or relieve famine they must be genuinely redistributive. The benefits of a well-targeted transfer scheme are plain enough, although the costs to the poor may not be insignificant. Without the necessary administrative capabilities, targeting is not easy. For example, as Drèze and Sen point out, the underlying intrahousehold allocation of food will often adjust to thwart attempts to reach certain individuals through supplementary feeding programs. The goal must be to protect the household entitlements of vulnerable individuals.

Among the alternative targeting mechanisms, Drèze and Sen argue for a combination of employment provision to help those willing to work at low wages and unconditional relief to those who are obviously unemployable. Direct provision of employment, as an element of a comprehensive safety net for the poor, also gets favorable reviews in other recent literature (see, for example, ILO 1988; World Bank 1990, chap. 6; and UNDP 1990). Rural public works schemes have proved repeatedly in South Asia and recently in parts of Africa and Latin America that they are effective in reaching the able-bodied rural poor in times of need. (Ravallion 1991 surveys the theory and evidence for South Asia.)

The reason relief work schemes seem to be well targeted is that they impose a cost (forgone income, transport cost, disutility of work) on would-be participants, and this cost tends to be lowest for those in greatest need. Critics have argued that this is a deadweight loss, but that ignores the fact that alternative
policy instruments—such as perfectly targeted lump-sum transfers—that allow costless redistribution in this setting are simply not available (Ravallion 1991). In any case, the cost of participation for the poor is unlikely to be high at times when famine threatens, so that the net transfer is likely to be a reasonably high proportion of wage receipts.

An aim of this type of public action is to avoid the onset of famine by protecting the entitlements of the vulnerable; they need not already be starving, but they can see the impending risk. An effective system of famine relief should be ready to go into action as soon as it is needed—usually well before external food aid can arrive. And it should ideally fall out of use when it is not needed. Public administrative capabilities will constrain the policy options in practice, although much can still be done. Hunger and Public Action discusses a number of success stories in famine prevention through such domestic public action, such as Maharashtra in 1972–73, and Botswana in 1982–87.

Saving lives is the overriding goal, but is not the only reason to favor effective protection of entitlements through public action. Although I have not seen any estimates, it is surely plausible that even the narrowly defined current financial costs of an effective system of early response are well below the costs of belated famine relief and rehabilitation. A timely domestic policy response can also avoid the potentially disastrous consequences to the poor of their more desperate later responses, such as sale of assets and migration. Although individually rational, these responses can readily add up to a higher collective risk of death, through exposure to disease, and leave those lucky enough to survive this time facing longer-term destitution because of a diminished asset base or more debts. In such cases, the provision of an effective safety net for the poor complements the longer-term alleviation of poverty through economic development.

Chronic Hunger

It is one thing to prevent famine and quite another to eliminate chronic hunger. Most of Hunger and Public Action's discussion of chronic hunger concentrates on earlier experiences in using direct policy intervention in raising nutritional and related capabilities over the longer term. In characterizing these experiences, a distinction is made between growth-mediated security and support-led security; the former relies on growth to finance public support, while the latter does not. The central question addressed in the book is whether direct intervention can work.

Drèze and Sen examine in detail the outcome of some relatively successful efforts at longer-term public support in developing countries, as indicated by rates of improvement in social indicators, particularly under-five mortality. Expanding on earlier work by Sen (particularly 1981b), the authors show how countries such as Chile, China, Costa Rica, Cuba, and Sri Lanka have used
direct intervention in public provision to achieve the social indicators typical of richer countries. For example, Sri Lanka's life expectancy of about seventy years is higher than that of many countries with far higher average incomes—such as Brazil, where life expectancy is sixty-five years for a country with roughly four times Sri Lanka's gross national product per capita.

_Hunger and Public Action_ gives a lot of attention to the interesting comparison of the performance of China and India in public support over the past forty years or so (see also Sen 1989). The relative success of China in enhancing longevity (with, the authors argue, similar rates of economic growth), is contrasted with the greater success of India in avoiding famine since the 1950s. Drèze and Sen argue that China was able to raise longevity through active intervention in health care and food distribution. But, whereas India has successfully avoided famine through effective public intervention over this period, China experienced what was arguably the worst famine in recorded history in 1958–61; the estimates of people who died in that famine vary from 17 million to 30 million. India's freer press and more open political environment is cited as an important impetus for its more successful efforts in avoiding famine, which is far more newsworthy than chronic hunger.

Drawing on these experiences, Drèze and Sen are encouraging about the scope for direct support-led security. Similar views are found in FAO (1987), Berg (1987), UNDP (1990), WHO (1990), Brown University Faculty (1990), and a series of public declarations in recent years. There is a subtle but potentially important difference of emphasis between these writings and the _World Development Report 1990_ (World Bank 1990). The _World Development Report_ clearly sees direct public support as a less important instrument for alleviating poverty in the longer term than achieving the right sort of economic growth. Nonetheless, there appears to be wide agreement that growth is not sufficient for eliminating chronic poverty and hunger in its various dimensions, and that a combination of growth-mediated and support-led security is needed. The real difference lies in the position taken on what should be the proper balance between the two.

On that issue, one question that many readers of this book will ask is: Can support-led security be achieved without sacrificing long-term expansion in those capabilities that do require private consumption goods? Economic growth in some of the economies that have pursued support-led security over long periods, such as Sri Lanka, has been less than impressive. One gets the impression that Drèze and Sen do not see any necessary tradeoff—that support-led security need impinge little on future prospects for growth-mediated security. I believe that quite a credible argument to that effect can be made, but it will not be found in _Hunger and Public Action_. Whether a significant growth cost is incurred in practice will depend on various conditions, notably the structure of the economy (including any existing macroeconomic imbalances) and the resource costs of intervention (which, as Drèze and Sen do point out, but with little hard evidence, may be quite modest in poor countries). The method

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of financing will be crucial on both counts; financing direct support by cutting
other public spending would plausibly damage future growth-mediated security
less than financing by tax increases (particularly on export earnings, as in
Sri Lanka for many years) or borrowing. By at least one assessment, the cost
to growth of direct support is likely to be small provided that (and it is
an important proviso) there are no significant macroeconomic imbalances
(Bourguignon 1991).

The possibilities for combining support-led with growth-mediated strategies,
and their timing, merit further research. Hunger and Public Action throws little
light on the prospects for a development strategy that combines support-led se-
curity at an early stage with growth-mediated security in the longer term. It
would be interesting to know if any of the countries identified by Drèze and
Sen as examples of growth-mediated security would have been examples of
support-led security at some earlier time when they were much poorer.

A number of related questions are left begging about the role of public action
in promoting equitable growth in private incomes—not as an end in itself,
I hasten to add, but as an instrument for higher ends (“increasing utility” or
“expanding capabilities,” as you prefer). Little attention is given to the identi-
fied examples of growth-mediated security (Hong Kong, the Republic of Korea,
and Singapore). I would expect that, with the sustained periods of equitable
growth experienced by these countries, capabilities requiring private consump-
tion goods have expanded greatly for the poor, as have those requiring public
provision. There are numerous questions about how public action can help in
this process. To give just one example, scant regard is given in Hunger and
Public Action to the policy issues that arise in ensuring that the poor share fully
in the potential benefits from technical progress and commercialization in ag-
riculture (Binswanger and von Braun 1991).

The enthusiasm of Hunger and Public Action for public provision of social
services—notably health and education—is shared with other recent writings,
including the Human Development Report 1990 and the World Development
Report 1990. Most of these writings have left me feeling uneasy about the way
the attitude toward the public provision of certain private goods, notably those
used in health care and education, differs from that toward income transfer
and safety net policies. It is not always clear that the same standards are being
applied in evaluating the two types of public spending. For example, the
(difficult) policy choice between targeting and uniformity that Hunger and Public
Action covers quite adequately in the context of famine relief policy also arises
often in the social sectors but is hardly mentioned by the book in that context.
A similar observation can be made about the World Development Report 1990:
the chapter that deals with transfers and safety nets gives far more attention
to cost-effectiveness and targeting than does the chapter on social services,
although the problem would appear to be no less acute in the latter context.

There is a lot we do not know about how to deliver social services to the
poor in developing countries. Analogous to Drèze and Sen’s study of countries
with good social indicators relative to their incomes, it would also be of interest
to look at those with good social indicators relative to their levels of public
expenditure on social services. There can be no presumption that simply throw-
ing more money to the social sectors will much expand the capabilities of the
poor; indeed, in many countries a disproportionate share seems to have gone
to raising the capabilities of those whose capabilities are already relatively
ample (Jimenez 1987, chap. 5; World Bank 1990, chap. 5). The same factors
that act to restrict the extent of income redistribution in favor of the poor pre-
sumably will also constrain the possibilities for targeting social services to the
poor. The nature and cost of an effective system of public support for the poor
will depend crucially on those constraints. The extent to which public action
is constrained by administrative capabilities and political realities, and the de-
tailed issues of policy design and implementation subject to those constraints,
are of the utmost importance to many of the countries that could benefit from
switching to a strategy of support-led security.

Conclusions

Drèze and Sen argue convincingly that there is a positive role for public ac-
tion in both famine relief and the longer-term alleviation of poverty and hunger,
and that it is a role that poor countries with limited domestic resources can go
a long way toward fulfilling. They need not wait to be rich countries.

In arguing the case for such public action, the authors put less emphasis on
raising incomes (except insofar as that mediates public support) than one finds
in other recent writings on this topic. Drèze and Sen are entirely justified in
their criticism of the use of average output as the sole indicator of progress in
development. A high average income can allow great scope for widespread
well-being, but it does not guarantee it.

However, one should be careful not to lose sight of the fact that mean in-
come is one of the relevant parameters of development; the others are the dis-
tribution of income and the provision of crucial nonmarket goods, notably
social services. There are some notoriously difficult problems in finding the
right balance between growth and equity, and between the provision of goods
by private and public means. The position one takes will depend in part on
one's views about human well-being and social welfare at quite an abstract
level. It will also depend on country-specific circumstances, including past rates
of growth, levels of income inequality, and the existing provision of social ser-
dices. Focusing on the expansion of basic human capabilities as the object of
development can help clarify some of these issues, but I am unconvinced that
this perspective calls seriously into question the instrumental importance of at-
taining growth with equity in most developing countries.

It is not enough, then, to know that poor countries need not wait to be rich
countries before providing direct support; the question is also whether they will
have to wait any longer. It cannot be presumed that they will, though there is no way of being sure without knowing quite a lot about economic circumstances and policy details, including methods of financing and their implications for growth. Dréze and Sen concentrate almost exclusively on the success stories of direct support. This teaches the valuable lesson that direct support can work, but there are also lessons to be learned from the cases in which attempts at direct support have failed in the short term or have been costly to the poor in the longer term. This is an important area for future research.

A number of questions also remain unanswered about the implications of identifying capability expansion as the objective of public action. For example, since the approach eschews welfare assessments based on utility, a policy choice that has the greatest impact on capabilities, such as health, might be judged inferior to some other choice by all affected individuals. It is risky to rely solely on information on utility; for example, Sen (1970, chap. 6) has shown how utility-based assessments of policy choices may contradict other valued principles, such as liberty. That is certainly no less true in discussing matters related to health. But these arguments fall well short of convincing me that one should ignore information on utility altogether. It remains unclear what is the best way to incorporate that information in evaluating policies, and what tradeoff against other objectives is to be accepted.

_Hunger and Public Action_ does offer authoritative encouragement on the potential for effective public action against hunger. Famines can be avoided, and we need not wait for an increase in domestic aggregate food availability to do so (although this is not to deny that such an increase will almost certainly help). Chronic hunger and the threat of destitution can be greatly alleviated, and we need not wait for growth to do the job (although this is not to deny that the right sort of growth is a powerful weapon, and that public action has a role in promoting that growth). I believe that a reasonably broad consensus now exists on these propositions, but great challenges remain in both the analysis and the implementation of effective public action against poverty and hunger in specific countries. There is still much we do not know about how to go about making a success of public support. This should be a high priority for future research on development policy.

**Notes**

Martin Ravallion is a principal economist in the Population and Human Resources Department of the World Bank. He is grateful to Jock Anderson, Jere Behrman, James Boyce, Gaurav Datt, Michael Lipton, Amartya Sen, Dominique van de Walle, Michael Walton, and the Observer's referees for their comments on this article.

1. Other volumes so far include Dréze and Sen (1990).

2. Among these statements are the Cairo Declaration of the World Food Council, the Bellagio Declaration from a conference organized by Brown University's World Hunger Program, and the Bangkok Affirmation by the Task Force for Child Survival; these are reprinted in the August 1990 special issue of _Food Policy_. Also see the introduction to that issue by Kasper and Kates.

References

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Martin Ravallion


Voluntary export restraints have been a popular resort of industrial countries faced with increasing competition from exports of developing countries. As a strategy for circumventing the rules of the GATT (whose regulations preclude increases in tariffs), these nontariff barriers have been rather successful; whether they have been as successful in their aim of protecting and stimulating the industry concerned is another matter.

This article looks at what happened when industrial countries imposed—and then removed—voluntary export restraints on the footwear industry during the 1970s and 1980s. Why did protectionism spread so fast and then dissipate almost as rapidly, and what effects did this coming and going have on the exporting countries? We suggest that industrial countries removed the restraints because they found them either superfluous (the expected employment effect failed to materialize) or ineffective (the principal exporters maintained their market share during the height of the restrictions), or else because the industry was able to adjust by importing footwear at a profit.

Predicting the effect of VERs, and determining how best to manage them, are critical questions for developing countries struggling to improve their export performance in the 1990s. The results of detailed study of a representative industry, summarized here, may assist in the prediction and determination.
Protection, despite Disraeli's claim a hundred and fifty years ago that it was "not only dead but damned," appears to be keeping a grip on life in a variety of manifestations. Prominent among these are the nontariff barriers imposed by industrial countries to counter developing country competition: with tariffs bound under the General Agreement on Tariffs and Trade (GATT), devices such as voluntary export restraints (VERs) were mobilized in the 1970s and 1980s to resist the rapid expansion of manufactured exports then taking place in the newly industrialized countries of Asia. A crucial question for the 1990s is the extent to which these obstacles will prevent other developing countries and the reforming Eastern European nations from emulating the successful export strategies of the newly industrialized countries.

This article examines the effects of VERs on exporting countries. Since, as Hamilton (1989) observes, footwear is to the study of trade policy what the fruit fly is to genetics, we draw our examples mostly from that useful and ubiquitous industry. The sector makes an attractive case study for our purposes because, not only has protection come and gone, but footwear is typical of labor-intensive products: comparative advantage has shifted from the industrial countries to the developing countries; footwear technology is not unduly complex or variable; there is no significant government ownership through which covert support could be given (except in Eastern Europe); and the industry is fairly competitive, at least at the production level (see Aw forthcoming), so it is relatively straightforward to study the effects of the VER.

The Rise and Fall of Protectionism in the Footwear Industry

A complete description of nontariff measures must encompass unofficial as well as official barriers. The information in table 1 on nontariff measures on footwear in place from 1970 to 1985 consequently draws on material from exporters, competitors, and trade organizations in the exporting countries as well as official records of nontariff measures from the industrial countries (the data are from Hamilton 1989).

The United States' decision in mid-1977 to impose a four-year VER on imports of nonrubber footwear from the Republic of Korea and Taiwan stands out as the decisive event of the period: within a year Canada, the European Communities (EC), the United Kingdom, and most other countries in Western Europe had followed suit—and with restrictions no longer confined to nonrubber footwear, as the U.S. restriction had been. The new measures—including those of France, Ireland, Italy, Norway, the United Kingdom, and the United States—were typically GATT-illegal and were not reported to the GATT. The international convention for orderly protectionist behavior was rapidly eroded. Indeed, the measures taken by the members of the EC clashed not only with GATT rules but also with the EC's own commercial and, sometimes, com-
petition law. Almost all the new measures discriminated against low-cost exporters only. (The two exceptions were measures in Australia and Canada, but Canada soon effectively excluded footwear originating mainly from industrial countries.)

All these events lend support to the common view that protectionism is spreading and intensifying all the time. But in 1981 the United States lifted its restrictions, and the ensuing rapid reverse domino effect eliminated all important quantitative restrictions against developing countries by 1985. (The significant spillover effects of the U.S. commercial policy on other countries' trade policies suggest strongly that analyses of changes in United States trade policy should not stop at that country's borders.)

So why did the VERs on footwear quietly disappear? The explanatory variables suggested in the literature on political economy (see Baldwin 1984 for a survey) are of little help here. The explanation cannot be tracked down to changes in the comparative cost advantage of any industrial country, to the size of their establishments, to the number of employees per establishment, or to regional concentration. Three observations may, however, afford some illumination.

First, the swings in protectionism may have been influenced by the rate at which employment changed in the sector. In North America the decline in employment halted during the period of restrictions. Perhaps, then, footwear protection was triggered by a relatively fast decline in employment and was not renewed because the problems were considered solved, and future restrictions consequently superfluous. In Western Europe, however, employment declined faster, if anything, during the years of restriction. Here, the decline of protection would have to be attributed to a gradual realization that the restrictions were not so much superfluous as ineffective.

Second, falling employment in a sector does not presuppose unemployment if workers can find other jobs outside the sector. So the demand and supply of protection could well be related to the sector-specificity of labor. Labor is less sector-specific in the footwear industry (according to Hamilton 1989) than in the permanently protected apparel industry.

Third, profits in the footwear industry were respectable compared with average profits in manufacturing, especially in the production of apparel. In the United States, larger footwear producers—who presumably had most influence on political decisions—enjoyed particularly healthy profits. Furthermore, domestic producers in the industrial countries started to import footwear: in Western Europe importing soon became more profitable than production, and by 1983, U.S. producers accounted for almost 50 percent of U.S. footwear imports.

Several hypotheses have been suggested to explain the political economy of protection. In general these models are structural and long term in character, but, even so, they are unable to explain developments over a period as long as fifteen years. Our observations suggest two, more promising, but also more short-term hypotheses. First, the more sector-specific are labor and capital,
Table 1. Protection of Footwear against Market Economies: Nontariff Measures and 1983 Tariff Rates (percent)

<table>
<thead>
<tr>
<th>Country or group</th>
<th>Type of footwear</th>
<th>Exporter</th>
<th>Nontariff measure</th>
<th>Tariff rate</th>
<th>Period of nontariff measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Leather</td>
<td>All, non-MFN(^a)</td>
<td>Value import quota(^b)</td>
<td>12.7</td>
<td>1952–85</td>
</tr>
<tr>
<td></td>
<td>Leather</td>
<td>All, MFN</td>
<td>Tariff quota(^c)</td>
<td>12.7</td>
<td>1986</td>
</tr>
<tr>
<td>Australia</td>
<td>All</td>
<td>MFN</td>
<td>Value import quota</td>
<td>Until 1960</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>MFN</td>
<td>No quota</td>
<td>1960–74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>MFN</td>
<td>Tariff quota(^d)</td>
<td>27.8</td>
<td>1974–</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>MFN</td>
<td>Marking, packing requirement</td>
<td>All years</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>Rubber boots</td>
<td>Korea</td>
<td>Quota and VER</td>
<td>15.4</td>
<td>1970–84</td>
</tr>
<tr>
<td></td>
<td>Rubber boots</td>
<td>Taiwan</td>
<td>VER</td>
<td>15.4</td>
<td>1970–84</td>
</tr>
<tr>
<td></td>
<td>Rubber boots</td>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leather and plastic</td>
<td>All</td>
<td>Non-MFN quota</td>
<td>15.4</td>
<td>1975–77</td>
</tr>
<tr>
<td>United States</td>
<td>Nonrubber</td>
<td>Korea</td>
<td>VER</td>
<td>15.4</td>
<td>1977–81</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>Taiwan</td>
<td>Voluntary VER</td>
<td>15.4</td>
<td>1981–82</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>India</td>
<td></td>
<td>15.4</td>
<td>1979–83</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>Argentina</td>
<td>Countervailing duties and investigations</td>
<td>15.4</td>
<td>1979–83</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>Spain</td>
<td>Countervailing duty</td>
<td>11.4</td>
<td>1974–83</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>Brazil</td>
<td>Voluntary export price restriction</td>
<td>15.4</td>
<td>1983–83</td>
</tr>
<tr>
<td></td>
<td>Nonrubber</td>
<td>Singapore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European Communities</td>
<td>Leather</td>
<td>All</td>
<td>&quot;Retrospective control of imports&quot;</td>
<td>15.4</td>
<td>1975–78</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>All(^e)</td>
<td>&quot;Prior import surveillance&quot;</td>
<td>15.4</td>
<td>1978–81</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>All(^f)</td>
<td>&quot;Posteriori import surveillance&quot;</td>
<td>15.4</td>
<td>1978–81</td>
</tr>
<tr>
<td></td>
<td>Women's</td>
<td>Brazil</td>
<td></td>
<td>15.4</td>
<td>1981–83</td>
</tr>
</tbody>
</table>

\(^a\) Non-MFN: Non-Mostly Favored Nations
\(^b\) Value import quota
\(^c\) Tariff quota
\(^d\) Marking, packing requirement
\(^e\) All:
\(^f\) All:
\(^g\) All:
### Table 1 (continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Industry</th>
<th>Country</th>
<th>Industry</th>
<th>Import Type</th>
<th>Import Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada</strong></td>
<td>Leather</td>
<td>All</td>
<td>MFN quota</td>
<td>1977–81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nonleather</td>
<td>All</td>
<td>MFN quota</td>
<td>1981–82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leather and nonleather</td>
<td>All</td>
<td>MFN quota</td>
<td>1982–85</td>
<td></td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td>Nonleather</td>
<td>Taiwan</td>
<td>Quota</td>
<td>1977–80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Taiwan</td>
<td>Industry-to-industry VER</td>
<td>1981–84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Korea</td>
<td>Industry-to-industry VER</td>
<td>难以或不可能执行</td>
<td>See EC</td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>Leather and rubber</td>
<td>Taiwan</td>
<td>Industry-to-industry VER</td>
<td>1981–82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slippers and espadrilles</td>
<td>Korea</td>
<td>Industry-to-industry VER</td>
<td>1981–84</td>
<td></td>
</tr>
<tr>
<td><strong>Norway</strong></td>
<td>Special and plastic</td>
<td>Korea</td>
<td>VER</td>
<td>8.6</td>
<td>1979–</td>
</tr>
<tr>
<td></td>
<td>footwear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>Leather</td>
<td>Korea</td>
<td>VER</td>
<td>1981–85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Japan</td>
<td>Quota</td>
<td>See EC</td>
<td>1982–83</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Taiwan</td>
<td>“Cooperation agreement”</td>
<td>1981–83</td>
<td></td>
</tr>
<tr>
<td><strong>Benelux</strong></td>
<td>Some rubber and leather</td>
<td>Japan</td>
<td>Quota; import prohibition</td>
<td>See EC</td>
<td>1982–</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>All</td>
<td>All</td>
<td>None</td>
<td>See EC</td>
<td>All years</td>
</tr>
</tbody>
</table>

*MFN*, most favored nation.

a. The United States is excluded from the early 1980s.
b. The quota size was not publicly released. Quotas were distributed to twenty six importers mostly affiliated with Japanese footwear manufacturers.
c. Imports beyond the prespecified quantity were assessed a penalty tariff rate.
d. There was a two-tier quota allocation system to importers: 70 percent on past performance; 30 percent for sale by tender once a year (1986).
e. Informal pressures to restrain were put on Brazil, Hong Kong, Korea, Malaysia, Pakistan, Taiwan, and China.
f. This measure was supplemented from 1982 to 1984 by “bilateral private agreements” between the European Confederation of Footwear Industries and the Korean Footwear Exporters Association.

the more likely is protection. Second, the larger the share of profits from importing in a protected industry's profits, the more likely it is that protection will disappear.

Shifts in the Trade Patterns

Behind the sudden scurry to protection led by the United States in 1977 lay a rapidly expanding world trade in footwear. What effects did intensified protection have on the global trends in the footwear trade, and how, in particular, did the two principal restricted exporters, the Republic of Korea and Taiwan, adapt to the VERs?

World trade in footwear more than doubled between 1973 and 1985; developing countries increased their share from an annual average of 11 percent in 1963–69 to almost 50 percent in 1985 (figure 1). In the early 1980s, footwear accounted for as much as 11 percent of developing countries' total exports of manufactures to industrial countries. The developing countries' share of U.S. consumption of nonrubber footwear (mainly leather) increased from 11 percent by volume in 1971 to 59 percent in 1984. The principal contributors to this expansion were Korea and Taiwan, which together accounted for 8 percent of apparent consumption in 1971 and 42 percent in 1984. In the EC, by contrast, the developing countries' share of apparent consumption has been comparatively small: 12 percent by volume in 1977, rising to 13 percent in 1985. Until 1981 Korea and Taiwan were the largest suppliers among developing economies, but since then China has overtaken them both.

The developing countries' comparatively small and stable share of EC apparent consumption does not imply that producers in individual EC countries have been unaffected by structural change. High-cost EC member countries have experienced fierce competition from lower-cost sources within the EC. Thus domestic producers' share of U.K. apparent consumption by volume fell from 56 percent in 1977 to 43 percent in 1985. The analogous figures for France were 63 and 47 percent and for the Federal Republic of Germany 35 and 19 percent, respectively (Hamilton 1989).

Bark and de Melo (1988) studied the evolving trade in footwear, distinguishing two types of countries—industrial and developing—and three types of footwear—rubber and plastic, leather, and other footwear. Their first observation was that quantitative restrictions did not impede the growth of world trade in footwear. Korea and Taiwan continued to expand their market shares during the period of restrictions, although more slowly than before and after. Other developing economies, which had been losing market shares in the years preceding the restrictions, were able to regain some of their previous market share while the restrictions were in effect.

Bark and de Melo's second observation was that, as might be predicted, the principal restricted exporters—Korea and Taiwan—tended to shift their sales
Figure 1. Shares in industrial countries' imports of footwear, 1965-83 (percent)

Rubber and plastic

Leather

Other

Source: Bark and Melo 1988.
toward unrestricted types of footwear. Indeed, during the period of restrictions the category “other footwear” grew the most (see figure 1). This evidence supports Baldwin’s (1984) arguments about the inefficacy of trade policy: it is clear that the Korean and Taiwanese footwear sectors continued to be competitive during the years of restrictions. We therefore conclude that at most, trade restrictions temporarily slowed down the shift in comparative advantage away from North America and Western Europe toward developing countries.

Effects On Price, Welfare, and Quality

Voluntary export restraints are frequently defined over broad product categories that include many varieties of goods, some with high unit prices, some with low. The explicit or implicit quota premium that a VER gives rise to—that is, the value of the right to export one unit to the restricted market—will be the same regardless of precisely which variety is exported because the scarcity premium induced by the VER acts like a specific tariff (that is, like a flat-rate tax on imports). Hence the premium rate will be proportionately higher on high-priced goods than on low-priced goods, and it might be supposed that producers (and consumers) will have an incentive to upgrade from lower- to higher-quality products within each product category. This quality-upgrading effect of a VER, first adduced by Falvey (1979) and Rodriguez (1979), is shown by Bark and de Melo (1987) to be far from inevitable; de Melo and Winters (1989a) subject it to detailed testing.

All the evidence that we can find on quality upgrading in response to quantitative restrictions has relied on analyses of data referring to imports in the constrained market. On this basis, comparisons can be drawn between constrained and unconstrained suppliers to the restricted market, but not between a particular exporter’s sales to one market and its sales to another. But it is on the latter comparison that the prediction that exports to a constrained market will be upgraded would need to be based. De Melo and Winters (1989a) measure the effects of VERs on the quality and price of footwear using Korean export data. They rely on the theory of index numbers to construct price indices with desirable properties that allow for comparisons across time and countries and to identify changes in the mix of subproducts within the controlled categories of trade. To compare the price and quality of Korean footwear exports with those of other countries, they first constructed multilateral indices distinguishing exports to each of Korea’s principal trading partners. (For reasons relating to the data, the set had to be limited to fourteen types of footwear.) Then, since changes in quality are more accurately detected the more disaggregated the commodity set, they made similar calculations on more detailed data referring to Korean-U.S. bilateral trade.

De Melo and Winters’ results suggest that, adjusting for changes in the mix of products and countries, there were significant increases in export prices dur-
ing the period of binding VERS. The rate of increase in price of Korean foot-
wear exports to the United States and to the United Kingdom was substantially
higher in the years when the quotas were filled and the VERS were binding. The
annual rate of growth of prices rose from 5 percent in unrestricted years to
13 percent in restricted years for the United States; for the United Kingdom, it
rose from 1 percent to 21 percent.

As to quality, the multilateral results on changes in product mix showed that
the VERS were associated, if anything, with less quality upgrading than during
periods of free trade. This result, confirmed by the bilateral comparisons, is
counter to earlier theoretical predictions. What is the explanation?

First, quality downgrading is plausible if exporters are more interested in
caring foreign exchange than in maximizing profit. If this is so, since foreign
exchange losses will be minimized when marginal revenues are equated for
different product categories, export composition will shift between high- and
low-quality products depending on which category has the higher marginal rev-

Bark and de Melo (1987) show that, given such an objective, the effect
of a VERA product mix cannot be determined unambiguously for most values
of the import demand elasticities. A second possible explanation of the absence
of quality upgrading is that the costs of adjustment were too high for exporters
to attempt to adjust to what was expected to be a temporary distortion.

Winters and Melo's results extended and broadly confirmed the earlier
work by Aw and Roberts (1986) on U.S. footwear imports,1 with the additional
advantage that their disaggregated exporters' data are more pertinent to testing
the effects of VERS on price and quality because they provide a better control
for product differentiation than (equally disaggregated) importers' data.

Another method of detecting the effects of VERS on prices is used by Winters
(1989). Relying on econometric techniques, Winters looks more specifically into
the price increases ("policy price wedges") that arose in the U.K. market from
its restrictions on footwear imports. He identifies and estimates a model gov-
erning the behavior of export prices in the absence of VERS and then examines
the deviations from the model's predictions that can be associated with the im-
position and removal of the restrictions. The method compares the pricing of
exports to the United Kingdom with that of exports to a set of countries whose
import regimes vis à vis Korea and Taiwan were relatively liberal (Austria,
Belgium and Luxembourg, Germany, the Netherlands, and Switzerland). Policy
price wedges were not found for all exporting countries facing U.K. restric-
tions, but were significant for the principal exporters—Korea, Poland, and Taiwan.
For rubber and plastic footwear from Korea, there is evidence of rises of more
than 25 percent during the brief period 1979–80. For the late 1970s and early
1980s, Winters' estimates suggest price increases of almost 20 percent for foot-
wear from Poland and some 16 percent for leather and 12 percent for rubber
and plastic footwear imported from Taiwan. No Eastern European country
apart from Poland shows strong signs of policy price wedges.

Carl B. Hamilton, Jaime de Melo, and L. Alan Winters
Winters also provides a lower-bound estimate of the welfare costs of these policy price wedges. Making the conservative assumption that no other prices change as a result of a restricted exporter introducing a price wedge, he shows that economic welfare is affected in two ways: (i) deadweight losses are incurred as consumers switch away from the footwear whose prices have risen; and (ii) rent is transferred to the exporter concerned as the price of the units that are still imported is driven up. Imports from sources outside the EC pay tariffs of 8 percent on leather and 20 percent on nonleather footwear. The diversion of imports from Korea, Poland, and Taiwan reduces tariff revenue since many of the substitute suppliers are found within the EC and the European Free Trade Area. Still, for the remaining imports from Korea, Poland, and Taiwan, higher prices entail higher tariff receipts.

Winters' estimates confirm that transfers to exporters are by far the largest component of the welfare cost to the United Kingdom of VERs. The deadweight losses are smaller but still significant, while the effects on tariff revenue are actually beneficial in the case of textile footwear. In 1980, the United Kingdom's VERs generated an estimated transfer of at least $29 million, $13 million, and $10 million to Korea, Poland, and Taiwan, respectively (calculated from Winters 1989, and measured in 1980 prices). The economic cost of the policy price wedges overall peaked in 1980 at about $56 million, falling away to some $9 million in 1986 as the restrictions on Korea and Taiwan ceased to bind.

The imposition of a binding quantitative restriction means that someone, somewhere, is rationed. Demanders (importers, dealers, or consumers) are rationed if prices do not rise sufficiently to reduce their demand to the predetermined level; suppliers (exporters) are rationed, for example, if prices rise sufficiently to eliminate any excess demand for imports (because at the new higher price exporters would prefer to provide more than the quota permits). This observation is the starting point of Brenton and Winters' (1990) study. Previous studies of nontariff measures have concentrated on the demand side of the market and have assumed that prices rise to cut demand back to supply. Brenton and Winters allow additionally for the possibility that some demand is rationed, adding a further dimension to the traditional welfare costs of VERs mentioned earlier. The possibility of rationing can be disregarded only on the assumption that exporters are extremely skilled at pricing their products in the distorted market—an unrealistic assumption for unestablished firms in developing countries or exporters in planned economies. Rationing has, in fact, materialized, particularly in the Eastern European countries (see Brenton and Winters 1990).

In identifying the incidence of rationing, Brenton and Winters found evidence of rationing for all types of footwear investigated, although not for all suppliers, and typically not for the full duration of the VERs. They estimated that in the absence of VERs, and provided that supply could be expanded at constant cost, Poland would have increased its share of the U.K. market for men's leather shoes from less than 10 percent to about 40 percent in 1986. For
other types of footwear, they concluded that Czechoslovakia's and Poland's market shares were more than halved by VERs in 1979–80. A similar fate befell Taiwan's shares of textile footwear (8 percent in 1982, instead of 20 percent) and rubber and plastic footwear (6 percent in 1982, instead of 14 percent). The concomitant of the strong effects on some countries' market shares is the implications for prices. Brenton and Winters estimate that the prices reflecting the true scarcity value of footwear (virtual prices) can be up to three times higher than the actual prices, as was the case with Taiwanese textile shoes from 1977 to 1982 and Czechoslovakian women's and children's leather shoes from 1977 to 1980. (Virtual prices are the prices that, at the actual level of utility, would lead to uncoerced choice of the observed quantities; in other words, the degree of rationing can be represented as the difference between the virtual and the actual price [see Neary and Roberts 1980].) For other shoes from Taiwan the virtual prices are some 25 to 100 percent above the actual prices, and for Polish men's leather shoes the premium imposed by the virtual price increased steadily from zero in 1977 to about 200 percent in the mid-1980s. This growth reflects the increasing constraint implied by a fixed quota in the face of steadily increasing import demand.

When both policy price wedges and rationing are taken into account (but not any implications for domestic price), the welfare costs of the United Kingdom's nontariff measures come to about $84 million in 1977 and $85 million in 1986 (both in 1986 prices).

Another study of the effects of VERs on prices concentrates on the costs of U.K. footwear protection in terms of employment and labor adjustment (Takacs and Winters 1990). Using a sophisticated model of footwear production which distinguishes leather and nonleather output, material inputs, and capital and labor inputs, the authors conclude that in 1979, the year of tightest restriction, VERs and quotas increased the prices of U.K. leather and nonleather footwear by 4 percent and 5 percent, respectively, their output by 1.2 percent and zero percent, and employment in this particular industry by just over 1,000 jobs (about 2 percent).

Takacs and Winters also collected data on labor turnover in the U.K. footwear sector. These data suggest average quit rates of about 17 percent a year (a figure much lower than the rate in the United States, which commonly exceeds 40 percent). The implication is that the small labor displacement that would have arisen from the abolition of nontariff measures on footwear in 1979 would rapidly have been met by natural wastage. Even assuming more pessimistic turnover rates than average, Takacs and Winters find that the once-and-for-all social adjustment cost of liberalizing footwear imports—the output forgone while displaced workers in the footwear sector await reemployment—was unlikely to have exceeded £1 million. The annual efficiency costs of protection amount, when all its effects are considered, to about £57 million a year. Similar calculations by de Melo and Tarr (1990) show a benefit-cost ratio of
65 to 1 of removing existing quantitative restrictions (in 1984) in automobiles, steel, and textiles in the United States.

**Effects on Resource Allocation and Income Distribution in Exporting Countries**

The studies of Brenton and Winters (1990), de Melo and Winters (1989a), and Winters (1989) make it clear that VERs bring significant rents to exporters captured from the higher unit profits brought by rising prices as the quantity of imports falls. With this in mind, it is important to look into the implications of VERs for resource allocation and distribution in the exporting countries: the forced reduction of exports to the restricted markets may distort exporters’ economies, while the rent transfers increase their income flows in special ways.

**Managing the VERs**

Exporting countries use the potential rent income from VERs as a carrot to encourage exporters to diversify their sales to unrestricted markets. The demonstrable risk of VERs is an incentive for exporting countries to establish themselves in unrestricted markets before a VER locks them in at low levels of exports. To encourage firms to penetrate unrestricted markets, exporting country governments often allocate licenses to firms for exports under VERs according to their performance in exporting to unrestricted markets; the larger the export volume to unrestricted markets, the larger the allocation of licenses to export to countries under VERs. The principal criterion in most administrative allocations of VER-quota in exporting countries is a firm’s past performance as an exporter to each restricted market (the base quota). Typically some 70 to 80 percent of all available quota is allocated using this criterion. It is in the allocation of the remaining 20 to 30 percent of quota, the open quota, that other criteria—such as exports to nonrestricted markets and unit values of firms’ exports—can come into play (see Hamilton 1986 and Kumar and Khanna 1990).

Bark and de Melo (1989) set up a model to analyze how such two-tier quota allocation might affect economic efficiency. The consequence of tying a firm’s access to more lucrative sales in a VER-restricted market to outstanding sales in the unrestricted market is that, at least at first, firms sell at prices below marginal cost in the unrestricted markets. (The firms push production volume beyond the point where marginal cost equals price.) From the perspective of the firm, at the margin, the cost of selling in the unrestricted market today has to be balanced against the benefit of getting access to (and higher prices in) the VER-restricted market tomorrow. Thus the two-tier quota allocation system forces firms to expand sales in unrestricted markets. And it ensures that, provided the foreign exchange rate correctly reflects the scarcity of foreign ex-
change—that is, that the official exchange rate equals the shadow price of foreign exchange—the welfare gains to the exporting country are larger the larger the share of the overall quota that is not linked to sales in the nonrestricted market (the result is not as clear-cut when, as often, foreign exchange is rationed and the shadow price exceeds the official price of foreign exchange). In those circumstances an efficient allocation between export markets may require some stimulus of exports to the remaining unrestricted markets.

Another criterion often used by governments allocating domestic licenses is the unit value of a firm's exports (in local currency). The higher the unit value, the larger the firm's probability of qualifying for quota. Bark and de Melo (1987) found this criterion to be consistent with the objective of maximizing foreign exchange revenues. It would tend also to encourage quality upgrading and phenomena such as multiple bidding for licenses. These effects have been discussed by Kumar and Khanna (1990) and illustrated with reference to India.

Implications for Efficiency and Income Distribution

The foregoing discussion suggests that most intervention in quota allocation other than a straight auction of export rights leads to loss of efficiency. De Melo and Winters (1989b and 1990) show that VERs induce loss of efficiency in exporting countries even in the absence of government intervention.

Suppose an exporting firm sells in two unrestricted markets; the goods sold in the two markets need not be perfect substitutes. Under standard assumptions, free trade entails the equalization of the marginal revenue from sales in the two markets and the equalization of the marginal return to factors devoted to production for the two markets. Now suppose that a VER is imposed on exports to one of the firm's two markets, reducing exports to that market. The firm's response may be considered in two stages. In the short run, assume that the firm cannot reduce its factor input. The firm will therefore divert some factors to production for the other, unrestricted market. This is the first-round effect. When all firms in the country do this, they may collectively drive down the price in the unrestricted market, inflicting a terms-of-trade loss on the exporting country as a whole.

A second effect may arise in the longer run from the likelihood that the representative firm may now be producing too much for the unrestricted market. Even if the price of exports is unchanged in the unrestricted market, the expansion of production for that market is likely to reduce the marginal products of factors used in that line of production. (The existence of a fixed factor, such as management or physical plant, would account for such increasing costs.) As a result, factors will leave the representative firm, and the sector's activity and output will fall. This contraction may be moderated somewhat if the release of factors is large, reducing wages, returns to capital, and so on, and thus making remaining employment less expensive to the exporting firms—but only at the
expense of shifting the burden of adjustment to labor, in the form of lost real wages and real returns.

The application of this model to the United States' VER on leather footwear from Korea (de Melo and Winters 1989b) establishes that the VER reduced exports of Korean leather footwear to the same extent as would have a 5 to 12 percent reduction in the price of exports to the United States with no compensating price increases in other markets. The VER thus meant first, that exports were redirected from the United States to other world markets, and second, that the marginal product of factors employed in the Korean footwear sector was reduced—possibly by as much as 9 percent. The marginal revenue product of factors producing footwear for the United States is zero once the VER is binding, because no more output can be sold there, while the marginal revenue product of those producing for other markets also falls because the price of other exports is driven down or the marginal product of factors falls as more and more factors are devoted to output not intended for the United States, or both. The consequence of the falling marginal revenue products is falling factor use—in other words, a contraction of the industry. Comparison of time series of output, employment, and wages of the Korean footwear sector with the corresponding series for the entire manufacturing sector corroborates this result. Thus, even though VERs can produce a positive rent transfer to exporting countries, they entail significant losses in efficiency.

From a distributional point of view, it is important to note that footwear jobs in Korea were lost as a result of the United States' VERs—it is difficult to estimate the effect, but certainly between 4,000 and 8,000, or between 12 and 25 percent, of the jobs in the footwear sector were lost. Moreover, Korean footwear workers who lost their jobs are far poorer than U.S. footwear workers; their hourly compensation was only some 14 to 17 percent of that of U.S. workers (United States International Trade Commission 1984, p. A-55, data for 1979–83).

De Melo and Winters (1990) extend the analysis of the allocation and distributional effects on the exporting country methodologically and empirically, focusing on exports from Taiwan to the United States. Their econometric estimates lend strong support to the qualitative prediction that the United States' VERs resulted in both "domino diversion"—increased sales in unrestricted markets—and contraction of the footwear industry, with attendant losses in efficiency. But are these losses not counteracted by the rent transfer resulting from the increase in the price of footwear exported to the United States? No. The estimates indicate that the VER results in a net welfare loss in spite of the rent transfer. For most plausible configurations of the parameters and data, especially when the industry under a VER is of significant size in the exporting country, a VER is more likely than not to reduce national welfare. Moreover, in raising profits and lowering wages in the exporting country, the VERs have a bad effect on income distribution as well as on resource allocation, particularly for labor that is relatively specific to the sector under the VER.
Conclusions

The conclusions from the detailed case study of the footwear sector under VERs almost certainly apply to other competitive, low-cost, and relatively undifferentiated manufacturing activities such as the textile and garment industries. They should also be germane to other labor-intensive, mature, consumer industries. The results show that whatever the method used, the VER imposed significant economic costs on both importing and exporting countries. For industries with greater product differentiation (where the scope for substitution of unrestricted or undetected products would be even larger), the economic costs of similar restrictive trading arrangements would be even higher.

VERs on footwear are shown to have reduced welfare both in importing countries (especially when their rationing effects are included) and in exporting countries—despite the much-discussed rent transfer from importing to exporting countries. Plainly, too, VERs protect few jobs in the importing country (and then only temporarily), whereas their effects on employment and wages in the exporting countries are mainly negative—with highly inequitable consequences for income distribution, since workers in developing countries have considerably lower standards of living than either capital owners in developing countries or workers in industrial countries.

When VERs are brought in, developing country governments must allocate export licenses. The licensing arrangements frequently entail restrictions and criteria that further damage the efficiency of allocation and certainly give scope for rent-seeking and corruption. Quota allocation systems have implications for the quality of goods exported. Contrary to the conventional wisdom, we have found that VERs apparently did not lead Korea to make exceptional improvements in the average quality of its footwear exports. Finally, footwear protection eroded over the 1980s. This suggests that industrial country markets are not inevitably closed to developing country exporters and that resource reallocation according to comparative advantage eventually takes place.

Notes

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1. Aw and Roberts claim to find rather more evidence of upgrading than do de Melo and Winters. However, for reasons spelled out in de Melo and Winters (1989a), the results of Aw and Roberts are not robust.

2. Under assumptions of perfect competition, in equilibrium, sales allocation across markets and factor allocation between activities will be such that no further gains can be obtained from
any reallocation. This implies equalization of revenues and of factor productivities at the margin so that the marginal revenue from applying one more unit of factors—the marginal revenue product—is equalized across markets.

3. This suggests that the government should impose an export tax. It is difficult, however, to estimate the extent of likely terms-of-trade loss. For further discussion, see de Melo and Winters (1990).

References

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WHEN DO HETERODOX STABILIZATION PROGRAMS WORK?
Lessons from Experience

Miguel A. Kiguel
Nissan Liviatan

What advantages and disadvantages does the heterodox strategy offer to stabilization programs in countries with chronic high inflation? Heterodox stabilization programs, in our definition, are those that support orthodox policies—that is, tight fiscal policy and a fixed exchange rate—with the initial, temporary use of incomes policies—that is, price and wage controls. This evaluation, based on several heterodox programs, successful and unsuccessful, from the 1960s and 1980s in Latin American countries and Israel, affords four principal lessons:

• The rapid reduction in inflation at the beginning of heterodox programs (which usually comes about at small cost) is the easy part; the problem is to maintain price stability over time.
• Incomes policies in heterodox stabilization programs are justified only in countries with high chronic inflation, where persistent inflation is more pervasive and problematic.
• There is a case for a bigger fiscal adjustment in heterodox than in orthodox programs because of the risk that a program with price controls may be misperceived as a populist device for achieving price stability without adjusting.
• The failure of a heterodox program is more likely to destabilize inflation than is the failure of an orthodox program.
Orthodox methods of checking inflation in countries with chronic high inflation have encountered formidable obstacles. Disinflation is usually slow, and its costs in terms of unemployment are high. Heterodox tactics were devised to surmount these difficulties.

Heterodox Programs: What Are They?

The epithet “heterodox” has been rather loosely used by economists to describe types of stabilization program. The term means different things to different people. Bruno and others (1988), for example, include in their sample of heterodox programs experiments as diverse as the Austral Plan, the Cruzado Plan, and the Israeli program of 1985; Ocampo (1987) includes the Peruvian populist experiment of 1985 in his study of heterodox programs.

In our view, a heterodox stabilization program is one whose main objective is to achieve rapid and sustained disinflation. The design of the program combines tight fiscal and financial policies and a fixed exchange rate (the orthodox part) with the temporary use of price and wage controls (typically in the form of a freeze). The controls are a temporary device to bring inflation down rapidly and to cushion some of the unemployment costs; once the controls have served their purpose, they are dismantled over time, and the program proceeds along orthodox lines. Typically the exchange rate becomes the main nominal anchor in the second stage.1

Orthodox programs are those that primarily rely on tight fiscal and monetary policies to bring down inflation, and do not include incomes policies. Some of them (exchange-rate-based stabilizations) use a fixed or preannounced exchange rate; others (money-based stabilizations) rely on tight money and a floating exchange rate. Since most orthodox exchange-rate-based programs are preceded by a money-based stabilization stage—in which tight money is relied on for stopping inflation (for instance, in Chile and Argentina in the mid-1970s)—the main difference between orthodox and heterodox programs is the strategy for stopping inflation in the first stage. Inflation comes down slowly under orthodox programs and rapidly under heterodox.

Only two recent programs satisfy our definition of heterodox: the Israeli program of 1985 and the Mexican Pacto de Solidaridad of 1987–88 (figure 1a). Both programs used incomes policies initially to achieve a rapid reduction in inflation; in both cases the exchange rate was the main nominal anchor and was fixed at the beginning; and both maintained the fiscal adjustment throughout. Both programs succeeded in keeping inflation down for an extended period. The extent of the controls differed between the two countries: in Israel, for example, controls were economywide, whereas in Mexico the government allowed a large number of prices to be freely determined. But these differences were of degree and not of substance: the philosophy was the same. The Israeli program is analyzed in detail by Bruno and Pitterman (1988), Bruno and

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Meridor (1991), and Liviatan (1988, 1990), and the Mexican program by Ortiz (1991); see also Kiguel and Liviatan (1989).

Outside this strict definition, we include in the discussion several other programs that embody the heterodox approach to a greater or lesser extent.

Brazil implemented an important and quite successful stabilization program based on incomes policies in the mid-1960s (figure 1b). Unlike the later stabilization of the 1980s—the Cruzado Plan—the program of the 1960s paid due attention to the fiscal accounts. In addition, the earlier program differed from the later because controls were introduced gradually and were mostly voluntary and because the initial reductions in inflation were not as spectacular. (The program is discussed in more detail in Simonsen 1974 and Cardoso and Fishlow 1990, among others.)

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**Figure 1. Inflation, Devaluation, and Attempts to Stabilize**

Ia. Two Heterodox Experiments: Israel (1985) and Mexico (1987)

![Graph showing inflation, devaluation, and stabilization in Israel and Mexico from 1985 to 1990.](image)

*Source: IMF (various years).*

**Source: Data from Banco de Mexico.**
Figure 1. Inflation, Devaluation, and Attempts to Stabilize (continued)

1b. Brazil (1965)

Percent in quarterly terms

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation</th>
<th>Stabilization</th>
<th>Devaluation</th>
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<tbody>
<tr>
<td>1962</td>
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<td>1974</td>
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</table>

Source: IMF (various years).

Some programs started out heterodox and addressed the budget deficit at the beginning, but later changed course and relaxed the fiscal stance. These programs are included in our study because they illustrate the similarities between macroeconomic developments during the early stage in those programs that persist and those that do not. Within the latter category (which we call non-persistent heterodox programs) we include two programs of the 1960s (the Argentine 1967 program under Finance Minister Adalbert Krieger Vasena and the Uruguayan program of 1968) and the 1985 Austral Plan in Argentina (see figure 1c).

Finally, we look at two populist programs: the Cruzado Plan in Brazil in the 1980s and the Peruvian program of 1985 (figure 1d) (see Dornbusch and Edwards 1989 for a more extensive discussion). These so-called stabilization programs used price and wage controls and a fixed exchange rate to stop inflation but ignored the fiscal side completely. Indeed, many populist programs combined controls with expansionary fiscal and monetary policies and with increases in real wages, with disastrous macroeconomic consequences. These programs are included to compare their evolution with the very different outcomes of the nonpersistent heterodox programs.

Problems with Orthodox Strategies

The heterodox approach has generally been adopted to confront the inflationary rigidities that are characteristic of countries with chronic high inflation. Kiguel and Liviatan document the difficulties in their discussion (1988) of
Figure 1. *Inflation, Devaluation, and Attempts to Stabilize (continued)*

lc. Nonpersistent Heterodox Programs: The Krieger Vasena Program (Argentina, 1967), the Uruguayan Program (1968), and the Austral Plan (Argentina, 1985)

Krieger Vasena Program

![Chart for Krieger Vasena Program](chart1)

Source: IMF (various years).

Uruguayan Program

![Chart for Uruguayan Program](chart2)

Source: IMF (various years).

Austral Plan

![Chart for Austral Plan](chart3)

Source: Indicadores de Conjuntura (Fundación de Investigaciones Económicas Latinoamericanos).
various orthodox stabilization programs. The slow and often small reductions in inflation are common both to programs that used money and to those that used the exchange rate as the main nominal anchor. Paradoxically, in some cases, a reduction in the budget deficit was accompanied by a permanent increase in inflation.
The Mexican Experience

The Mexican experience before the Pacto (1987) is a good example of the frustration with orthodox programs characteristic of countries that eventually opt for the heterodox strategy. Table 1 summarizes the main macroeconomic developments in Mexico in the 1980s. The fiscal accounts were corrected early and impressively; the deficit in the operational balance (11 percent of gross domestic product [GDP] in 1981) was virtually eliminated by 1983. But the drastic reduction in the deficit was accompanied by large devaluations that pushed inflation up from 28 percent in 1981 to 100 percent in 1983. In an attempt to reduce inflation, the policy shifted in 1984 to using the exchange rate as the nominal anchor. This strategy had only moderate and temporary effects in reducing inflation (although the fiscal accounts remained sound). In fact, inflation rose again in 1986 when the exchange rate rule was abandoned and replaced by a policy of aggressive devaluations to deal with the plunge in oil prices. The acceleration of inflation continued in 1987, a year in which the government ran a surplus in its operational balance.

The Mexican experience makes it clear that a correction in the budget deficit—although necessary—is not sufficient to bring down inflation. A budget surplus might not be enough for the purpose. A well-designed stabilization program needs to balance the correction in the fundamentals with a policy to manage the nominal anchors. In Mexico, however, the success was meager even when the exchange rate was used as nominal anchor, especially because the nominal anchor proved weak when the economy faced an adverse external shock.

The failure of various orthodox strategies to control inflation in the aftermath of the debt crisis is perhaps the main reason Mexico finally decided to follow the heterodox approach. The Mexicans adopted this course reluctantly, sharing many of the concerns about the use of controls raised by critics of these programs. Nevertheless, encouraged by the success of the Israeli program, they finally decided to try the heterodox alternative.

The Nature and Causes of Inflationary Rigidities

The difficulties experienced by Mexico are characteristic of countries with chronic inflation. In these countries inflation tends to display rigidities (or inertia), as has been widely discussed (see, for example, Dornbusch and Simonsen 1987; Tobin 1987, chap. 29). For our purposes it is useful to distinguish two types of rigidities. A first type, which we will call institutional, is a consequence of backward indexation, staggered contracts, and the like (see, for example, Fischer 1977, 1983; Taylor 1979; Lopez and Bacha 1983).

A second “expectational” rigidity arises from lack of conviction on the part of the populace that the government can bring down inflation in the long term. Past failures to adjust and maintain the fiscal balance as required to support
|-----------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| 1. Inflation, devaluation, and interest  
   (percent in annual terms) |       |       |      |       |       |       |       |       |       |       |
|   a. CPI inflation | 26.3  | 28.0  | 58.9 | 101.9 | 65.5  | 57.7  | 86.2  | 131.8 | 114.2 | 20.0  |
|   b. Official devaluation | 0.9   | 6.5   | 130.2| 112.9 | 39.7  | 53.2  | 137.9 | 123.5 | 64.7  | 8.2   |
|   c. Interest rate on loans* | 20.7  | 28.6  | 40.4 | 56.6  | 51.1  | 56.1  | 80.9  | 86.7  | 67.6  | 20.5  |
|   d. CPI inflation (Dec. to Dec.) | 29.8  | 28.7  | 98.9 | 80.8  | 59.2  | 63.7  | 105.7 | 159.2 | 51.7  | 19.7  |
|   e. Official devaluation (Dec. to Dec.) | 2.2   | 12.6  | 268.3| 49.1  | 33.8  | 93.0  | 148.5 | 139.3 | 11.5  | 16.3  |
| 2. Monetary statistics (percent) |       |       |      |       |       |       |       |       |       |       |
|   a. M1 as share of GDP | 11.2  | 10.8  | 10.9 | 8.4   | 8.1   | 7.6   | 7.3   | 6.5   | 5.6   | 6.2   |
|   b. M3 as share of GDP | 30.1  | 33.6  | 37.4 | 33.2  | 33.7  | 31.2  | 35.9  | 37.8  | 31.4  | 34.5  |
|   c. Seigniorage - M1 | 2.7   | 2.7   | 2.4  | 3.0   | 3.6   | 2.9   | 3.5   | 2.1   | 1.0   |       |
|   d. Change in M1 | 33.4  | 33.3  | 54.1 | 41.4  | 62.3  | 53.8  | 72.1  | 129.7 | 58.1  | 40.1  |
|   e. Change in M3 | 45.6  | 53.7  | 78.6 | 61.4  | 70.4  | 46.7  | 100.2 | 159.4 | 69.0  | 49.3  |
|   f. Monetary base | 41.1  | 45.1  | 90.4 | 58.1  | 54.1  | 17.5  | 47.7  | 70.3  | 42.3  | 10.6  |
|   g. Consolidated monetary system  
      domestic credit‡ | 39.0  | 48.8  | 100.9| 56.4  | 51.2  | 69.2  | 101.0 | 104.2 |      |      |
|   h. Central bank domestic credit§ | 37.0  | 43.5  | 157.6| 41.7  | 31.1  | 49.0  | 61.3  | 13.7  |      |      |
| 3. Aggregate demand (percentage of GDP  
   at current prices) |       |       |      |       |       |       |       |       |       |       |
|   a. Private consumption | 65.1  | 64.4  | 61.6 | 60.9  | 63.1  | 64.5  | 68.5  | 69.7  | 70.0  | 70.0  |
|   b. Public consumption | 10.0  | 10.7  | 10.5 | 8.8   | 9.2   | 9.2   | 9.0   | 8.7   | 8.5   | 9.0   |
|   c. Investment | 24.8  | 26.4  | 22.9 | 17.5  | 18.0  | 21.2  | 18.7  | 18.6  | 19.2  | 20.0  |
|   d. Exports | 10.7  | 10.4  | 15.3 | 19.0  | 17.4  | 15.4  | 17.2  | 19.7  | 16.0  | 16.2  |
| 4. Economic activity (percentage change  
   in real terms) |       |       |      |       |       |       |       |       |       |       |
|   a. GDP growth | 8.3   | 7.9   | -0.6 | -5.3  | 3.7   | 2.8   | 2.0   | 1.4   | 1.1   | 2.9   |
|   b. Unemployment | 4.5   | 4.2   | 4.1  | 6.7   | 6.0   | 4.8   | 4.3   | 3.9   | 3.6   |       |
|   c. Private consumption | 7.5   | 7.4   | -2.5 | -3.4  | 3.3   | 4.2   | -1.4  | -0.9  | 1.9   | 5.1   |
|   d. Public consumption | 9.3   | 10.3  | 2.0  | 2.7   | 6.6   | -2.3  | 0.1   | -0.5  | -0.9  | -1.0  |
|   e. Investment | 14.9  | 16.2  | -16.8| -28.3 | 6.4   | 8.2   | -12.0 | -0.7  |       |       |
|   f. Exports | 6.1   | 11.6  | 21.8 | 13.6  | 5.7   | -4.0  | 1.5   | 12.2  |       |       |
### Table 1. Continued

#### 5. Relative price indices (1980=100)

|                  | a. Real wage || b. Real exchange rate | c. Terms of trade |
|------------------|-------------|-----------------------------|-------------------|
| 1980             | 100.0       | 109.5                       | 105.7             |
| 1985             | 72.7        | 115.2                       | 132.7             |
| 1990             | 67.2        | 102.5                       | 96.5              |
| 1995             | 70.0        | 98.5                        | 97.2              |
| 2000             | 64.7        | 145.1                       | 96.3              |
| 2005             | 63.0        | 157.5                       | 63.8              |
| 2010             | 62.0        | 130.3                       | —                 |
| 2015             | 63.3        | 118.4                       | —                 |

#### 6. External sector (millions of U.S. dollars)

<table>
<thead>
<tr>
<th></th>
<th>a. Trade balance</th>
<th>b. Current account balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>-2,830.0</td>
<td>-8,162.0</td>
</tr>
<tr>
<td>1985</td>
<td>-4,099.0</td>
<td>-13,899.0</td>
</tr>
<tr>
<td>1990</td>
<td>6,795.0</td>
<td>-6,218.0</td>
</tr>
<tr>
<td>1995</td>
<td>13,762.0</td>
<td>5,419.0</td>
</tr>
<tr>
<td>2000</td>
<td>12,941.0</td>
<td>4,238.5</td>
</tr>
<tr>
<td>2005</td>
<td>21,663.0</td>
<td>1,236.7</td>
</tr>
<tr>
<td>2010</td>
<td>20,631.0</td>
<td>-1,672.7</td>
</tr>
<tr>
<td>2015</td>
<td>19,893.0</td>
<td>3,466.5</td>
</tr>
</tbody>
</table>

#### 7. Public sector (percentage of GDP)

<table>
<thead>
<tr>
<th></th>
<th>a. Total expenditure</th>
<th>b. Expenditure excluding interest payments</th>
<th>c. Total revenue</th>
<th>d. Total deficit</th>
<th>e. Operational deficit</th>
<th>f. Primary deficit</th>
<th>g. Domestic public debt</th>
<th>h. Foreign public debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>33.5</td>
<td>30.0</td>
<td>26.9</td>
<td>6.6</td>
<td>5.6</td>
<td>3.1</td>
<td>8.6</td>
<td>18.8</td>
</tr>
<tr>
<td>1985</td>
<td>39.7</td>
<td>34.7</td>
<td>26.7</td>
<td>13.0</td>
<td>11.7</td>
<td>8.0</td>
<td>10.7</td>
<td>20.0</td>
</tr>
<tr>
<td>1990</td>
<td>44.5</td>
<td>36.3</td>
<td>28.9</td>
<td>15.6</td>
<td>8.3</td>
<td>8.0</td>
<td>12.6</td>
<td>38.9</td>
</tr>
<tr>
<td>1995</td>
<td>41.0</td>
<td>28.6</td>
<td>32.9</td>
<td>8.1</td>
<td>1.3</td>
<td>1.3</td>
<td>16.5</td>
<td>43.0</td>
</tr>
<tr>
<td>2000</td>
<td>39.3</td>
<td>27.4</td>
<td>32.2</td>
<td>7.1</td>
<td>0.6</td>
<td>1.0</td>
<td>18.0</td>
<td>40.0</td>
</tr>
<tr>
<td>2005</td>
<td>39.9</td>
<td>28.4</td>
<td>31.2</td>
<td>8.7</td>
<td>0.6</td>
<td>1.0</td>
<td>16.6</td>
<td>38.0</td>
</tr>
<tr>
<td>2010</td>
<td>45.3</td>
<td>28.7</td>
<td>30.3</td>
<td>15.0</td>
<td>1.0</td>
<td>1.0</td>
<td>14.9</td>
<td>32.0</td>
</tr>
<tr>
<td>2015</td>
<td>45.5</td>
<td>25.8</td>
<td>30.6</td>
<td>14.9</td>
<td>1.0</td>
<td>1.0</td>
<td>11.5</td>
<td>26.0</td>
</tr>
</tbody>
</table>

CPI, consumer price index.

* Not available.

* Interest rate on loans is the average cost of funds compounded annually.

+ Seigniorage = \(M1(t) - M1(t-1)/GDP(t)\).

\(\dagger\) Consolidated monetary system domestic credit is line 32 in IMF (various years).

\$ Central bank domestic credit is total claims on the government and private sector less government deposits.

|| Real wage is the purchasing power in relation to the overall consumer price index.

# Primary deficit = 7(b)-7(c).

Source: Banco de Mexico except:

2(c,d), 6(a,d) IMF (various years)
4(b) CEPAL (Comisión Económica para América Latina y el Caribe)
4(c,d,e,f) World Bank, National Accounts Data Base
5(a) Mexico National Minimum Salary Commission
5(c), 7(c) World Bank
7(f,g) Banco de Mexico 1987
1985–89 REC 1990

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low inflation are one obvious reason for this credibility problem; a second, less understood source of mistrust is the suspicion that the government might deviate from the announced targets for the nominal anchor—the exchange rate or monetary rules—if wages and prices increase beyond the target level. The government’s nonfiscal objectives (such as maintaining full employment or external balance) could, in a discretionary regime, lead it to accept increases in inflation to avoid higher real wages, or to step up the rate of devaluation to avoid overvaluation of the domestic currency. (The use of inflation to achieve nonfiscal objectives is analyzed in detail in the literature on policy games; see Barro and Gordon 1983a and 1983b, among others.)

How Does the Heterodox Strategy Address These Problems?

What, in theory, are the virtues of the heterodox approach? The prevailing view in the literature (see, for example, Bruno and others 1988; Ocampo 1987; Alberro and Ibarra 1987; Blejer and Cheasty 1988; Heymann 1987; Cardoso and Dornbusch 1987; Fischer 1987; Solimano 1990) is that (1) price and wage controls can be useful to support disinflation initially when the inflation process displays inertia, (2) the initial costs of bringing down inflation in this way are usually small compared with those in orthodox programs, and (3) the success of a heterodox program in the longer term primarily depends on maintaining the fiscal adjustment (the orthodox part) throughout. But these studies provide only a partial evaluation of heterodox programs because they concentrate on the initial stage of the programs—the first or at best the second year. With this relatively short-term horizon, the evaluations have overlooked some of the longer-term consequences.

From the medium- or long-term perspective, the first question to be answered is: how, if at all, does the early and rapid reduction of inflation through controls on wages and prices enhance the prospects for stabilization? We argue that the controls in the first phase can improve the fiscal accounts by reversing the fall in government revenue that usually accompanies an increase in inflation (the Olivera-Tanzi effect), and that the initial period of low inflation gives the government a grace period in which to prove its commitment to eliminating the budget deficit in a sustainable way.

Second, what costs are entailed for later developments? A significant potential cost, in our view, is the damage that the use of controls to avoid recession in the first stage of disinflation may do to the credibility of the government in the longer term. Will a government unwilling to accept the costs of bringing down inflation through orthodox methods be willing to accept these costs, and any difficulties associated with their deferment, later on?

Incomes policies are controversial. Economists are skeptical about their use in stabilization partly because of their frequent misuse in populist programs to
bring down inflation while avoiding any adjustment in the fundamentals (see Dornbusch and Edwards 1989), and partly because they may distort the allocation of resources. In fact, many economists would argue that sustained elimination of the budget deficit is sufficient to bring down inflation; whether or not controls are used is irrelevant. The empirical evidence, however, shows that reducing the budget deficit is necessary but not sufficient for bringing down inflation in the short or even in the medium run. Price and wage controls are not necessarily the solution, but in some circumstances heterodox programs may be the right way to go.

Dealing with Institutional Rigidities

Incomes policies are included in heterodox programs to overcome the rigidities in inflation. Their usefulness largely depends on the causes of the rigidities. And they are not necessarily the most effective instrument to deal with this problem, because the long-term costs of their inclusion in programs could well exceed the short-term benefits reaped from overcoming the rigidities early on.

When rigidity is ascribed principally to backward indexation—as in Brazil—an initial realignment of prices (to get the “right” set of relative prices) and wages accompanied by the elimination of indexation is all that is needed. A three- or four-month freeze of prices and wages is certainly not required to break this cycle. Once the right relative prices are in place and indexation is eliminated, any persistence of inflation must be attributable to other sources.

But it is very hard to determine the right set of relative prices—even harder in low-inflation economies, where nominal contracts are long and staggered, than in high-inflation economies, where contracts are short and highly synchronized. There are examples of programs in low-inflation economies (such as the Krieger Vasena program in the 1960s in Argentina) that used fairly sophisticated rules to avoid disparities in real wages across sectors, but the ensuing complications and misjudgments may outweigh the gains. The case for using incomes policies in low-inflation economies is weak.

A stronger case can be made for using incomes policies in high-inflation economies, where decisions on prices and wages are synchronized and the risk that a freeze would create large disparities in relative prices and wages is correspondingly lower. A legitimate question is why an orthodox shock would not be equally or more effective, particularly given its proven efficacy in stopping hyperinflation. The answer is that there are other factors generating persistence of inflation, mainly lack of credibility in the program, that are more acute when tackling chronic high inflation than when hyperinflation is the target (see Kiguel and Liviatan 1988).

The problem of lack of credibility cannot be solved by a short wage-price freeze and a simple formula that gets relative prices right. Expectations wield a strong influence over inflation. Setting prices and wages involves making predictions about future inflation that cannot simply be based on past inflation:
in forming their expectations about inflation, agents look at the whole history of inflation in the country—particularly such aspects as the outcome of previous stabilization attempts (generally dismal) and the way in which inflation was affected by external shocks. Governments need time to prove their commitment to sustaining a stabilization program. In heterodox programs the initial freeze lasts about six months. This indicates that the main motivation for the use of incomes policies is to deal with credibility problems rather than institutional factors (such as backward indexation).

**Dealing with Expectational Rigidities**

**FISCAL ASPECTS.** When private agents have little faith in an announced fiscal adjustment, they will set prices accordingly. Their pessimistic expectations are thus likely to maintain the momentum of inflation, leading to overvaluation, current account deficits, and other difficulties. Incomes policies may then usefully be introduced to counter the costs of these repercussions (see Persson and van Wijnbergen 1989). Since it takes time to demonstrate the commitment to fiscal adjustment, the controls will need to be in place longer than would be needed for dealing with institutional rigidities. Ideally, by the time controls are removed, the durability and extent of fiscal adjustment should be clearer.

In the more successful programs the fiscal situation improved during the period of price controls. In the Israeli program the fiscal deficit turned into a surplus. A crucial move was the abandonment of a large, sacred aviation project—the Lavy—a measure that few thought politically feasible. The experience in Mexico is somewhat different because the fiscal adjustment was largely complete before the program was launched. Nevertheless, the government introduced additional tax measures and continued its efforts to restructure the public sector through privatization. In the successful Brazilian program of the 1960s the fiscal accounts likewise improved during the period of controls.

In the nonpersistent programs, the period of controls was not used to advantage. In the Austral Plan, for example, the initial improvement in the fiscal and quasi-fiscal accounts (that is, the operational balance of the central bank) was not sustained. To the contrary, initially the total budget deficit as a share of GDP was reduced from about 10 percent in the first half of 1985 to 2.5 percent in the second. This trend began to be reversed in the first half of 1986 (in the first quarter, the deficit exceeded 4 percent of GDP), and by 1987 the deficit already exceeded 6 percent. Although the fiscal deficit remained much smaller than before the Austral Plan, the reluctance to deal with the budget deficit once and for all perhaps reflected a corresponding reluctance to fight inflation persistently. The same deterioration of the fiscal accounts during the period of controls occurred in the Argentine and Uruguayan programs of the 1960s.

NOMINAL ASPECTS. Sound fiscal policies in the initial stage are essential to building credibility on the fiscal side, but they are of little help in establishing credibility on the nominal side. Because the nominal anchor (the exchange rate) can easily be maintained for a short time, especially when prices and wages are frozen, the private sector has no guarantee that the government will continue to defend it in the face of adverse expectations once price controls are lifted. In other words, the controls postpone the establishment of credibility on the nominal side: the government can demonstrate its commitment to the nominal anchor only once prices are freely determined.

The key to the credibility of the nominal anchor is whether the government will maintain its rules for it if confronted by persistent inflation arising from adverse expectations. Increases in prices and wages do not necessarily take place because private agents expect the initial improvement in the fiscal accounts to be reversed. Such increases could equally occur because producers, who set nominal prices in advance for fixed periods, fear that these prices might be eroded through an unannounced devaluation in order to increase employment or improve the balance of payments—a justifiable anxiety, because this was precisely the strategy used in the past to deal with adverse external shocks (for example, in Brazil and Mexico in 1982-84). The problem is generally exacerbated because it is difficult to know in advance when and how much the government is willing to compromise in order to reduce the costs of disinflation.

The perception that the government might deviate from the announced target for the nominal exchange rate was perhaps most clear during the Pacto in Mexico. The policy adopted there was to announce the values of future exchange rates for a period of about six months. When the period was about to expire, a new rule was announced for the next half year. Nominal interest rates have nevertheless remained very high—certainly above international levels—reflecting the perceived risk that the government would deviate from the announced exchange rate policy. This expectation was probably not directly related to a fiscal problem (since the operational budget deficit remained small, and the surplus in the primary fiscal balance was sustained), but rather reflected skepticism that the exchange rate rule could be maintained in the face of persistent deterioration in the current account of the balance of payments (see table 1). (This deterioration in the current account is characteristic of exchange rate stabilizations; see Kiguel and Liviatan forthcoming) 3

Far from solving the credibility problem with regard to nominal anchors, incomes policies could exacerbate it. The early use of controls could be read by the private sector as a signal that the government is not willing to stick to the rules for the nominal anchors (for instance, to the exchange rate rule) if confronted with adverse expectations. This type of credibility problem requires that the government demonstrate its willingness to absorb the costs—overvaluation and recession—associated with defending the nominal anchors.

Miguel A. Kiguel and Nissan Liviatan
How Effective Is the Heterodox Strategy?

A feature common to all the programs considered above is that, regardless of whether they effect any fiscal adjustment, inflation comes to a halt almost immediately. Figure 1 illustrates that this phenomenon is observed in serious programs (such as those in Israel and Mexico), nonpersistent programs (the Austral Plan, the Krieger Vasena program, and the Uruguayan program of 1968), and populist programs (the Cruzado Plan and the Peruvian program of 1985).

The initial effect on inflation therefore has nothing to say about the sustainability of the stabilization; the indications must be sought in other macroeconomic variables. Populist programs are easy to recognize because of the expansionary monetary and fiscal policy and unusually large increases in real wages (detailed in Dornbusch and Edwards 1989). Persistent and nonpersistent programs are harder to distinguish, as Blejer and Liviatan (1987) illustrate in their comparison of the outcomes during the first year of the stabilization programs in Argentina and Israel of 1985. Within that time frame they conclude that "the programs were similar in their designs and their effects" (p. 409). The similarities, which were especially strong during the first three quarters of the two programs, include policy variables such as the budget deficit and the nominal exchange rate and endogenous variables such as real money balances, interest rates, real wages, the real exchange rate, the premium for the black market exchange rate, unemployment, industrial production, and the trade balance. Likewise, both the Krieger Vasena program in Argentina and the Uruguayan program of 1968, which were eventually abandoned, started in a very promising way and remained sound for a relatively long time (about two years). Both seemed to have a reasonable chance of success initially, and the outcomes were very similar to the more successful Brazilian program of the 1960s. Although the differences between persistent and nonpersistent programs become clearer over time, it is not always easy to distinguish them in the early stages.

That governments abandon programs despite the quite substantial costs of failure is puzzling. It may be that policymakers underestimate the costs of disinflation and abandon the programs once they recognize their mistake. Or political support for stabilization may be substantial when inflation is high but evaporate once specific groups are hurt by policies—such as budget cuts—introduced to maintain price stability.

The uncertainty about whether a program will be sustained exacts a cost. Agents will always consider failure possible to some extent—a credibility problem that will be reflected in high interest rates or overvaluation of the domestic currency. Both Israel and Mexico have faced a real appreciation during the stabilization process. They have also faced high real interest rates for a protracted period.
Advantages of the Heterodox Controls

One potential advantage of the heterodox strategy over the money-based orthodox strategy is that the initial costs of reducing inflation are low. Other benefits are the gains from reversing the Olivera-Tanzi effect, the improvement of fiscal credibility, and the possibility of adding momentum to the program as a whole.

LOW INITIAL COSTS. The relatively small initial costs of bringing down inflation in heterodox programs contrast with those of money-based orthodox stabilization programs such as the Chilean program of the mid-1970s. The costs in that program came early on in the form of a deep recession and massive unemployment. (See Edwards and Edwards 1987 and Corbo and Solimano 1991 for a description of this program.)

In heterodox programs the costs of stopping inflation usually appear later. The first stage, when tight controls are in place and inflation falls at little or no cost in terms of unemployment, is the easy part. The problems start when controls are relaxed, and the appreciation of the domestic currency leads to a deep recession, to a loss of competitiveness that hurts the export sector, and to the high interest rates necessary to maintain attractive rates of return on domestic assets to avoid capital flight.

The difficulties for disinflation arise because the overvaluation that took place during the expansionary period needs to be corrected without losing control of the main nominal anchor: the exchange rate. A large devaluation could restore competitiveness but might erode confidence in the government’s determination to sustain the stabilization program. Such a devaluation could be held to indicate that the government is not prepared to pay the price of overvaluation and would rather accept rekindled inflation.

Both of the successful heterodox programs of the 1980s experienced overvaluation. Both have continued to use the exchange rate as the nominal anchor, but neither the Israeli device of unannounced step devaluations to avoid further appreciation nor Mexico’s preannounced crawling peg has successfully solved the problem of overvaluation.

REVERSING THE OLIVERA-TANZI EFFECT. With regard to fiscal matters, heterodox programs can derive advantages from the Olivera-Tanzi effect working in reverse—a consideration particularly important in countries where inflation is high. These gains are hard to quantify: in Israel they were estimated to be about 1.5 percent of GDP; under the Austral Plan at about 2 percent of GDP. There were additional gains, especially in the Austral Plan, from raising prices for public enterprises at the outset to levels that greatly improved the finances of these firms.

Though potentially important, the benefit from a reversed Olivera-Tanzi effect should be treated with caution because it is not a true signal of the fiscal
effort. A program that relies solely on this effect for fiscal improvement is likely to fail, since the deficit will remain low only if the government succeeds in keeping inflation down. Any shock that destabilizes inflation will increase the deficit, making the inflation process self-sustained. Furthermore, to the extent that public sector enterprise prices are not adjusted during the period of controls, their finances will deteriorate. The gains from the reversed Olivera-Tanzi effect should therefore play a relatively small part in the fiscal adjustment. In Israel, for example, the effect was responsible for approximately a quarter of the improvement in the fiscal accounts; in Mexico its impact was negligible. In the Austral Plan, by contrast, much of the improvement in the fiscal accounts came from the reversed Olivera-Tanzi effect, in conjunction with the increased prices in public sector enterprises.

IMPROVED FISCAL CREDIBILITY. The initial fall in inflation can help establish fiscal credibility in two ways. First, as mentioned earlier, the government can use the freeze to prevent a persistence in domestic inflation (due to lack of credibility) that would lead to distortions in relative prices, while it performs the fiscal adjustment. Second, low inflation makes it easier in practice to calculate the size of the budget deficit and in this sense it can make this process more transparent (see Tanzi 1989). It is hard to know the size of the budget deficit when inflation is high—for one thing, there is more room for using accounting tricks to mask the true state of the fiscal accounts. Sharon (1990) argues that in Israel the reduction in inflation was instrumental in keeping track of what was happening in the fiscal accounts. High inflation also complicates calculation of real interest rates, since these depend on the choice of the deflator (which could be the actual or the expected rate of inflation).

ADDING MOMENTUM TO THE PROGRAM. A fourth possible advantage of the heterodox approach is that the initial fall in inflation might spur the introduction of additional measures to strengthen the program. Spending cuts or tax increases may be harder to accept while inflation remains high than when they are seen to support a reduction in inflation that has already taken place. Support for the Alfonsin government during the first months of the Austral Plan, for example, was widespread enough to sustain intensified fiscal reform. The government failed to seize this opportunity however, perhaps because it thought that the initial fall in inflation could be maintained without further action.

The experience of the Austral Plan indicates that the quick reduction in inflation could work in one of two ways: it could help advance the adjustment if the government is determined to undertake it, but it could equally postpone adjustment if the early, transitory success is taken as evidence that stabilization is there to stay.
Disadvantages of the Heterodox Controls

The criticisms most commonly advanced of the heterodox strategy are that (1) the controls could become a substitute for fiscal adjustment; (2) the controls could lead to misallocation of resources; (3) once in place, the controls are difficult to remove; and (4) it is particularly difficult to assess progress.

SUBSTITUTING FOR FISCAL ADJUSTMENT. The initial improvement in inflation and the small unemployment costs can create complacency about fiscal conditions, and this complacency may undermine the success of the program. Populist programs are a glaring example of the attempt to gain price stability without fiscal adjustment. In the Cruzado Plan and the Peruvian program the combination of controls with expansionary policies that created generalized excess demand for goods and services rapidly led to repressed inflation, widespread shortages, and the emergence of black markets. In the end, of course, prices exploded. In Peru this led to hyperinflation; in Brazil to an outburst in inflation that was checked by a new round of controls.

Fiscal overadjustment is helpful in underscoring the intentions of the government. The case for overadjustment is developed more fully in Rodrik (1989) in relation to trade liberalization programs. Because populist programs abuse controls, heterodox programs need to take a tighter fiscal stance to show that they mean business. In addition, the fiscal overadjustment supports a situation in which supplies must be excessive overall in order to avoid shortages during the period of controls. In practice, the differences between heterodox and populist programs became apparent shortly after the programs were launched. Key differences were the attitude toward real wages and toward the importance of fiscal (and sometimes monetary) policy, and the fact that generalized shortages were averted in heterodox programs. Persistent and nonpersistent programs were not distinguished in this way, because shortages did not arise in either of them, and real wages in both followed a similar course.

MISALLOCATION OF RESOURCES. In our view, this disadvantage of the heterodox strategy is less important than the others. The criticism that wage and price controls lead to misallocation of resources is valid for countries that use controls in the long term, but weaker for countries that adopt heterodox programs, which use controls only temporarily. In addition, in most heterodox programs (even the nonpersistent ones) controls were not rigorously imposed: although firms were not free to increase prices without prior government authorization, they were authorized to raise prices whenever it was clear that their prices were out of line with costs.

TENACITY OF CONTROLS. The criticism that controls are hard to remove once they are in place is valid for heterodox programs. It applies also more generally to programs that announce rules for nominal variables (especially the exchange
Exchange-rate-based stabilizations typically fix the exchange rate for longer than was originally intended. The problem arises because a departure from the original rule could be interpreted as a signal that the government is abandoning its nominal policies. The outcome is a period of overvaluation, with its well-known costs. In programs that start with price controls the two problems go together. The Uruguayan program of 1968 provides useful insights in this respect (see Finch 1979; Viana 1988). The program, like other heterodox programs, started with a reduction in the budget deficit, a fixed exchange rate, and a price and wage freeze. The fiscal and external situations deteriorated over the years, and after some time it was clear that adjustments were needed in the program. These adjustments were postponed mainly because, with elections imminent, the authorities were reluctant to free prices and wages and devalue the exchange rate. Eventually and inevitably, the program collapsed with maxi-devaluations and record levels of inflation. The lesson is that even programs that appear to be heterodox early on may deviate from their original intent.

DIFFICULTIES IN ASSESSING PROGRESS. It is always hard to predict at the outset whether a stabilization program—orthodox or heterodox—will succeed. In Bolivia, for example, the orthodox stabilization of August 1985 that brought hyperinflation to a halt followed unsuccessful stabilization efforts that had not differed greatly. And even this successful program confronted a serious reversal toward the end of the year, when hyperinflation briefly reemerged.

The difficulty is compounded in heterodox programs by the fact that low inflation is maintained through controls. In the absence of prices determined in the markets, it is harder to discern whether the program is working because the fundamentals are in order and low inflation is there to stay, or because controls are in place. The answer has to wait until controls are removed and inflation finds its new equilibrium. In the meantime, the credibility problem is bigger in a heterodox program.

The Role of Controls: A Reassessment

The role of controls in heterodox stabilization programs poses something of a puzzle. The fact that controls do not lead to shortages or marked distortions in relative prices could be taken as evidence that they are not binding—and if they are not binding, why are they needed? Before answering this question, it is useful to point out that programs in countries with chronic inflation that did not use controls have always failed to reduce inflation sharply in the short run. In contrast, the quick and drastic reduction in inflation observed in heterodox programs shows that controls played an important role.

In our view, controls in the initial stage in heterodox programs are a coordinating device in the movement to low inflation (see Dornbusch and Simonsen...
The literature on the inflation tax (for instance, Bruno 1989 and Bruno and Fischer 1990) provides a useful framework in which to analyze this issue. Consider an economy that initially is in a high-inflation equilibrium and at full employment, where expectations are being fulfilled and the government is using the revenue from money creation to finance its budget deficit. The Bruno and Fischer studies show that two equilibria can be consistent with the same budget deficit. If the economy is initially at the high-inflation equilibrium, controls could be used to move the economy to the low-inflation equilibrium—a move that does not require in principle any change in the budget deficit. Controls thus act as a coordinating mechanism: the announcement that controls are in place could be enough to reverse inflationary expectations, thus allowing the economy to remain in the low-inflation equilibrium. In this exercise shortages do not occur because there are no pressures that would create excess demand and the economy remains at full employment. The idea that controls worked in heterodox programs because they repressed inflation (as in populist programs) is largely misleading. Controls acted as a shock treatment, as a guideline for a prompt downward revision of inflationary expectations, and this was at least credible in the short run.

The analytical framework discussed above tells only part of the story because it assumes that once the initial difficulty—moving to the low-inflation equilibrium—is surmounted the economy will tend to stay at equilibrium. Bruno argues that the low-inflation equilibrium can be made stable in this way if it is supported by an appropriate fiscal adjustment. We know, however, that there is an additional difficulty in sustaining low inflation: the issue of the credibility of nominal anchors. The initial reduction in inflation is only the beginning; persistence is needed to sustain stabilization.

**When Are Heterodox Programs Appropriate?**

Heterodox programs are appropriate in a limited number of cases. On the "not recommended" list are, first, countries with low inflation that suddenly experience an outburst of high inflation. Examples are Costa Rica and the Philippines in the early 1980s. Both countries traditionally had low inflation but experienced a short inflationary spiral following devaluations undertaken in response to the debt crisis. Generalized price and wage controls are not a good idea in such instances because inflation is correctly perceived to be temporary. The expectational component in the inflation process does not become important, and the episode can therefore be treated with orthodox remedies. The speed with which inflation was brought down in Costa Rica and the Philippines illustrates that this was indeed the right approach.

Hyperinflation is a second case in which the orthodox strategy is preferred. Because in these episodes inflation is explosive and does not display inertia, incomes policies are not necessary to restore price stability (see Kiguel and

*Miguel A. Kiguel and Nissan Liviatan*
Liviatan 1988). Finally, the orthodox approach is also preferable in economies in which inflation rates are low or moderate—somewhere between 20 percent and 40 percent. In these economies, generalized controls are unlikely to generate a large reduction in inflation principally because contracts are typically long and staggered, whereas in high-inflation economies they are short and highly synchronized. A freeze would leave great disparities in relative wages and prices, penalizing those with the oldest contracts. The problem is difficult to handle in practice, because so much information is required.4

The single situation in which the heterodox strategy may be useful, then, is in economies suffering from chronic high inflation, such as those that opted for this policy in the 1980s. There is a caveat, however: launching a heterodox program that is later abandoned can be dangerous—more costly, even, than simply postponing stabilization.

The failure of the Austral Plan and of other programs that relied on incomes policies, such as the Cruzado Plan, illustrates these risks (see figures 1c and 1d). In both, the failures were followed by a period of unstable inflation that ended up in hyperinflation (see Kiguel and Liviatan 1990b). These similarities were not accidental. In our view, the cycles of inflation and stabilization were the result of the repeated use of incomes policies as a stabilization instrument following the failure of the plans. The programs, in demonstrating that controls can effectively stop inflation in the short run, set the stage for the recurrent use of incomes policies. But once the private sector began to anticipate this policy, it started to inflate prices to forestall the damage a price freeze might do to profits. These reactions further destabilized inflation, leading ultimately to hyperinflation in both countries.

The traditional hyperinflations, such as those of Europe in the 1920s and more recently in Bolivia, were primarily a fiscal phenomenon; the hyperinflations in Argentina and Brazil in 1989 and 1990 are more directly attributable to the failure of the heterodox experiments. The outcomes differed as well: neither Argentina nor Brazil succeeded in stopping hyperinflation in its tracks, despite using the same kind of orthodox program (based on very tight monetary policy and a significant fiscal adjustment) that had succeeded in the traditional episodes.

Thus the heterodox era added a new chapter to the history of failed attempts to check inflation in Argentina and Brazil. The lesson is that the heterodox strategy offers a one-time opportunity which, if handled properly and perseveringly, could lead to lasting stability—though not without costs. Misused, the controls will impede rather than facilitate the task of stabilization.

Notes

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1. In disinflation programs, the path of a nominal variable, typically money or the exchange rate, is announced to influence the evolution of prices. This variable is the nominal anchor.
2. The primary balance is defined as the difference between total revenue and noninterest expenditure. The operational balance is the primary balance minus the real cost of servicing the public debt.

3. In Mexico the deterioration was perhaps larger because the stabilization program was accompanied by liberalization of international trade.

4. It is surprising that Tobin (1987) does not recognize these difficulties, and many of the other difficulties analyzed in this article, when he makes the case for incomes policies for the United States. The idea that there are costless ways of bringing down inflation is naive. Incomes policies hurt the reputation of the government and might indicate that it is not sufficiently determined to fight inflation.

References

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Throughout the twentieth century governments have been spending ever larger proportions of national income. Three issues arise in discussions about the growth of such spending as it pertains to developing countries: How does it compare with expenditure in industrial nations? What explains the growth in spending by developing country governments? And what are the effects on economic growth? Government expenditure as a share of GDP in low- and middle-income countries, on average, is lower than comparable shares in industrial market economies and, with few exceptions, is growing. Many factors, including ideology, demographics, a positive income elasticity for public goods, the rising cost of public goods relative to private goods, and perhaps development theory and practice, explain this growth. As for the relationship between government expenditure and economic growth, the empirical evidence does not reveal any strong correlation. The size of government may engender strong ideological debate, but the position that the aggregate level of government expenditure is a significant determinant of growth rates receives little support.

Government expenditure has accounted for a rising proportion of national income in the twentieth century. This result appears to apply to most countries regardless of their level of economic development. In this article we review previous research to compare trends in the growth of government spending in developing countries with those in industrial nations and attempt to explain the reasons for this growth and its effect on economic development.
The first section surveys empirical evidence on the growth of government expenditure, with some caveats about measurement. The survey primarily considers the size rather than the composition of government spending, although we address composition briefly in the concluding section. We then look at the determinants of the growth of government. Because most of the literature has pertained to trends in industrial nations, we speculate here on the relevance of the research for developing nations. The following section reviews the evidence relating the size and growth of government expenditure to national economic performance. It examines theoretical explanations and then considers the empirical results as reviewed in the literature. In the final section, we speculate on the future path of government expenditure and outline a research agenda to evaluate the effects of government spending on economic development.

Measuring the Growth in Government Expenditure

Any nominal valuation of government, whether revenue or expenditure, assumes that what we are measuring is the government's role as a direct economic agent. The consequences of a fiscal expansion of government would appear to call for a measure of the budget deficit or surplus. Although the effects of fiscal or monetary policy will not be captured by a nominal index that defines a government's size and influence exclusively in budgetary terms, measurement of total government spending is required in order to examine such issues as how the division of output between public and private goods affects economic growth.

Evaluating the growth in public expenditure over time requires comparisons that raise the problem of whether and how to convert nominal units to real terms (that is, with the rate of inflation deducted). One way to avoid the problem of deflating to constant dollars is to chart the trend in the ratio of government expenditure to gross domestic product (GDP). This is the method used by Pluta (1981), Ram (1987), and Beck (1979, 1982). Baumol (1967) argues against this procedure on the grounds that the price of public goods may rise more quickly than the prices of other goods, particularly if technological change is faster in the relatively less service-intensive private sector. (See Mueller 1987, pp. 120–21, for a critique of this position.) Under such assumptions about relative price changes for public and private goods, government expenditure ratios based on current prices—as in Musgrave (1981)—yield upwardly biased figures on government output because the ratios do not take into account relative price effects (changes in the relative values of spending on two goods that arise from changes in their prices rather than from changes in the quantities consumed). An opposing position argues that the nominal share of government expenditure can be used as long as the relative prices of public and private goods reflect consumer valuations. If this is the case, the share of output in value terms is the appropriate index of the total amount of goods the government extracts from the economy.
Whether nominal or real shares of government expenditure are used depends on the question. Calculating the income elasticity of the demand for public goods would seem to require a real measure of government output, whereas a nominal index would be more useful in assessing the extent to which the government preempts economic resources. Ultimately our understanding of the cost of government would benefit from a comparison of both measures, because there are considerable differences between the two sets of figures.

A few dimensions of the available data are worth noting. The two major sources of information on government expenditure are government budgets and national income accounts. The latter, which are more widely available in developing countries, tend to report only government consumption (government expenditure minus transfer payments and gross capital formation). In contrast, government budget data tend to cover all components of central government expenditure, but they exclude state and local governments as well. Off-budget activities, including subsidies, tax expenditure, concessional government lending, and public loan guarantees, also are often omitted. Still, estimates of government expenditure seem more appropriate for assessing the total resource cost of government activity; government consumption is a more limited index of resource cost but may be a more precise measure of spending for public goods.

**Experience in OECD Countries**

Based on the narrow definition of government spending used in national income accounts, Kuznets (1966) shows that government consumption as a share of GDP did not reach double digits in Europe and North America until the 1940s and, in many countries, the 1950s (see table 1). The broader definition of government expenditure in table 2, however, suggests a more prolonged period of growth. Although the U.S. government's share of national income expanded slowly in the earlier years shown in the table, Japan and some European countries devoted 20 to 30 percent of gross national product (GNP) to public expenditure as early as 1929 (see Mueller 1987 for U.S. data; Peacock and Wiseman 1961 and Peltzman 1980 for U.K. statistics).

Recent comprehensive data on government expenditure show a rise from 26 percent of GNP to 47 percent of GNP from 1960 to 1982 (Saunders and Klau 1985, table 2; Tanzi 1986, table 2). But there is a wide range among countries. Government expenditure in Iceland was 28 percent of GDP in 1960 and by 1982 was only 34 percent. In contrast, the government share of GDP in Sweden in 1962 was 31 percent and rose to 67 percent over the following two decades. Collectively, the ratios of government spending to GDP in the countries of the Organisation for Economic Co-operation and Development (OECD) ranged from 30 to 67 percent by 1982.¹

Musgrave (1981, table 1) analyzes the sources of growth in government spending in the United States by disaggregating total government expenditure and highlighting variations both over time (high in the fifties and low in the

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Table 1. Government Consumption as a Share of GNP (percent)

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Share of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1950–60</td>
<td>9.9</td>
</tr>
<tr>
<td>Canada</td>
<td>1870, 1890</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>1890, 1900, 1910</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>1920, 1929</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>1926–30</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>1950–59</td>
<td>14.1</td>
</tr>
<tr>
<td>Denmark</td>
<td>1950–59</td>
<td>12.5</td>
</tr>
<tr>
<td>Germany</td>
<td>1851–70</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>1871–90</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>1891–1913</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>1928</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>1950–59</td>
<td>14.4</td>
</tr>
<tr>
<td>Italy</td>
<td>1861–80</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>1881–1900</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>1901–10</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>1921–30</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>1950–59</td>
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</tr>
<tr>
<td>Japan</td>
<td>1950–59</td>
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</tr>
<tr>
<td>Norway</td>
<td>1865–74</td>
<td>3.8</td>
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<tr>
<td></td>
<td>1875–94</td>
<td>4.8</td>
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<td>1895–1914</td>
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</tr>
<tr>
<td></td>
<td>1950–59</td>
<td>12.5</td>
</tr>
<tr>
<td>Sweden</td>
<td>1861–80</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>1881–1900</td>
<td>5.4</td>
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<tr>
<td></td>
<td>1901–20</td>
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</tr>
<tr>
<td></td>
<td>1921–40</td>
<td>8.6</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>1950–59</td>
<td>16.8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1860–79</td>
<td>4.8</td>
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<tr>
<td></td>
<td>1880–99</td>
<td>5.8</td>
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<td>1900–14</td>
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<td></td>
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<td>1950–58</td>
<td>16.9</td>
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<td>United States</td>
<td>1869–88</td>
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<td>1889–1908</td>
<td>4.4</td>
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<td></td>
<td>1909–28</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>1929–38</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>1946–55</td>
<td>15.4</td>
</tr>
<tr>
<td></td>
<td>1950–59</td>
<td>17.9</td>
</tr>
</tbody>
</table>

Source: Kuznets 1966, table 5.3.
Table 2. Government Expenditure as a Share of National Income for Selected OECD Countries (percent)

<table>
<thead>
<tr>
<th>Year</th>
<th>France</th>
<th>Germanya</th>
<th>Japan</th>
<th>Sweden</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880</td>
<td>15</td>
<td>10b</td>
<td>11c</td>
<td>6d</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>1929</td>
<td>19</td>
<td>31</td>
<td>19</td>
<td>8d</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>1960</td>
<td>35</td>
<td>32</td>
<td>18</td>
<td>31</td>
<td>32</td>
<td>28</td>
</tr>
<tr>
<td>1985</td>
<td>52</td>
<td>47</td>
<td>33</td>
<td>65</td>
<td>48</td>
<td>37</td>
</tr>
</tbody>
</table>

Note: Data include central, state, and local expenditure except where noted. Data for 1880 and 1929 are as a share of GNP; for 1960 and 1985 as a share of GDP.


b. 1881.
c. 1885.
d. Central government only.


seventies) and by source (defense versus civilian; federal versus state and local). He concludes "that the growth of Leviathan, especially in the recent past, is in the eyes of the beholder." If we consider only the endpoints, 1940 and 1986, U.S. government expenditure as a share of GNP rose 16.9 percentage points, from 18.4 to 35.3 percent of GNP. Transfers accounted for 10.5 percentage points of this increase and defense added 4.4 percentage points. Contrary to popular belief, most of the increase came from federal spending (14.5 percentage points) rather than from state and local government outlays (2.4 percentage points) (Lindauer 1988, table 6).

Nominal government purchases, including defense, increased by 6.4 percentage points of GNP during this period, but if we use the implicit price deflator, real purchases grew by less than 1 percentage point and civilian purchases actually fell 3 percentage points. By implication, the increase in the price of public goods relative to private goods accounts for much of the rise in nontransfer payments (Beck 1979).

Experience in Developing Countries

Information on the size and growth of government expenditure in developing countries is difficult to piece together. World Development Report 1988 (World Bank 1988) gives both central government expenditure as a percentage of GNP and government consumption as a share of GDP. The former series, drawn from the International Monetary Fund’s Government Finance Statistics Yearbook (various years), excludes state, provincial, and local government outlays. Both sources note that readers should exercise caution in interpreting the data, particularly when making comparisons across countries.
Government expenditure (consumption) data in 1986 are available for most of the ninety-seven low- and middle-income economies listed in World Bank (1988). As a group, the developing economies devote a smaller share of national income to government spending than do the industrial market economies. The median value of government expenditure (or government consumption) in 1986 in developing economies was 27 percent (14 percent) compared with 40 percent (19 percent) in industrial market economies. The range in the shares spent by governments, however, is considerably greater in the developing economies (see table 3).

By 1986, government consumption as a share of GDP had reached the double-digit level in 82 percent of developing countries. By the time most industrial countries reached this level, in the 1940s and 1950s, per capita income was much higher than it is in today's low- and middle-income nations. According to Maddison's (1982) estimates, per capita income in 1880 in France, Germany, the United Kingdom, and the United States was $1,600 to $2,900 (in 1986 U.S. dollars). In other words, before the turn of the century, these countries had achieved upper-middle-income status by today's standards. In 1880, Japan and Sweden would have qualified as lower-middle-income countries. In all six countries government expenditure as a share of GDP ranged from 6 to 15 percent,

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Country group a</td>
<td>Government expenditure as a share of GNP</td>
</tr>
<tr>
<td>Media</td>
<td>1972</td>
</tr>
<tr>
<td>Low income</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>19</td>
</tr>
<tr>
<td>Range</td>
<td>8–34</td>
</tr>
<tr>
<td>Number of observations</td>
<td>23</td>
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<tr>
<td>Lower middle income</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>15</td>
</tr>
<tr>
<td>Range</td>
<td>10–43</td>
</tr>
<tr>
<td>Number of observations</td>
<td>22</td>
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<tr>
<td>Upper middle income</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>25</td>
</tr>
<tr>
<td>Range</td>
<td>12–62</td>
</tr>
<tr>
<td>Number of observations</td>
<td>16</td>
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<tr>
<td>Industrial market</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>28</td>
</tr>
<tr>
<td>Range</td>
<td>13–41</td>
</tr>
<tr>
<td>Number of observations</td>
<td>18</td>
</tr>
</tbody>
</table>

a. Based on 1986 per capita income.
significantly lower than the median 27 percent reported for today's middle-income nations. These findings are especially robust considering that the definition for government expenditure used in table 2 includes all government expenditure, whereas government spending is defined in World Bank (1988) as only central government spending. By either definition, historical comparisons suggest that if there is a "pattern of development" for government consumption, it is not particularly robust (see Chenery and Syrquin 1975).

In recent decades government spending in developing countries has increased significantly. From 1972 to 1986, lower-middle-income economies recorded a median rise of twelve percentage points in government spending as a share of GNP; for low-income and upper-middle-income nations the increases have been considerably smaller. According to the narrower government consumption measure, spending by developing country governments also grew from 1965 to 1986, but not as much as that by industrial market economies (see table 3).

Both Pluta (1981) and Ram (1987) have estimated the relation between government spending and GDP in developing countries. Pluta's estimates can be compared with those by Saunders and Klau (1985) for OECD nations, although there are variations in the time periods in the two studies, and the definitions of government expenditure are not uniform. At first glance, the median elasticity in both groups is remarkably similar. But in fact, the range in individual elasticities in developing economies is much larger than the values for OECD countries. Therefore, there may be less in common about the recent growth in government spending across these two groups of countries than there might have at first appeared to be.

One dimension of the growth of government spending in developing nations that stands in marked contrast to the experience of industrial market economies is that in some cases government expenditure has declined as a share of national income. Longer-run trends are reported in World Bank (1988). Unfortunately, only 46 percent of the low- and middle-income economies report shares of government expenditure for the years covered (74 percent report shares of government consumption), and it cannot be determined if the missing observations are distributed randomly. Nevertheless, for the available sample, government expenditure as a share of GNP declines in 29 percent of the cases, and government consumption as a share of GDP falls in 25 percent of the cases. The extent of the decline is substantial: the median drop in the former category was 4.7 percentage points; in the latter 3.5 percentage points.

Previous research permits some evaluation of whether the rise in government spending reflects an expansion in government output or changes in the cost of government production. These sources of growth in government expenditure are captured by comparing the elasticity of government spending with respect to GDP expressed in current, as opposed to appropriately deflated, dollars. If the costs of government production increase faster than other prices, price elasticities of government consumption adjusted by a government purchases deflator will be lower than elasticities based on current prices. This outcome is

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apparent in a comparison of Pluta's (1981) current price elasticities compared with those estimated by Ram (1987). Establishing this result, however, is subject to measurement problems because it is generally recognized that deflators for government spending are unreliable because they disregard changes in factor productivity, and the international price data of Summers and Heston (1984) used by Ram appear to systematically underestimate the elasticity in question. But the results suggest that increases in government consumption as a share of GDP in developing economies as well as in industrial economies are due to the increasing cost of producing government services as well as to actual increases in the volume of such services.

Thus, although the data base has serious limitations, the evidence suggests that:

- Developing countries, on average, devote a smaller percentage of GDP to government spending than do OECD countries. This seems especially true for low-income nations.
- Government spending varies considerably across low- and middle-income nations. In 1986, the range of central government expenditure as a share of GNP was 7 to 72 percent; government consumption as a share of GDP was 7 to 45 percent. These variations exceed those observed in industrial countries.
- Compared with the historical experience of industrial nations, governments in low- and middle-income countries are consuming much higher fractions of GDP at their relative stage of development.
- Although the rate of growth of government spending in low- and middle-income economies varies, and has even declined in a few cases, continued expansion appears to be the norm.
- The available data make it difficult to draw firm conclusions about relative price changes for public goods, but increasing unit costs may contribute to the growth in public expenditure.

Explaining the Growth in Government Expenditure

Explanations of why governments grow have a long tradition, extending at least as far back as Adolph Wagner (1890). More recently the evolution of positive theories of government, often under the banner of the "public choice school," has made the subject a rich area for intellectual and political debate (see Mueller 1987). This view holds that public officials set economic policies in their own self-interest just as firms do. A survey of this literature shows that the focus is almost exclusively on industrial economies. The challenge, therefore, is how to apply the concepts to developing nations. We have organized four alternative approaches to understanding government growth: cost accounting, demand-side arguments, supply-side factors, and development theory.
Saunders and Klau (1985) use a "cost accounting" approach to analyze the growth in government spending in OECD countries. The authors acknowledge that although this method does not directly contribute to the debate over a positive theory of government, they find it useful in decomposing expenditure in a meaningful way. They look at government programs, including health, education, and social security, and separate the effects of demographic influences, changes in coverage, and increases in real benefits. The authors attribute the growth in pension expenditure, for example, to an expanding system of entitlement resulting from both demographics and the broadened coverage. In the areas of health and education, they find the level of benefits has grown more than the number of beneficiaries.

With the notable exceptions of Tait and Heller (1982) and Heller and Diamond (1990), comparable analyses of trends in government budgets over a broad range of expenditure categories have not been widely undertaken for the developing world. Their findings support the view that demographic changes, at least from 1975 to 1986, are positively associated with growing government spending on health, education, and social security. Rapid population growth and subsequent demographic transitions may account for a significant amount of the increase in government spending, especially for health and education.

**Demand-Side Arguments**

The cost-accounting method admittedly begs the basic question: why does society want, permit, or accept a growing share of output to be controlled by the public sector? The literature on this subject proposes a positive theory of government. On the demand side, the arguments include Wagner's Law, preference-based explanations, and the models referred to as public choice theories.

The first argument in most demand equations is a price term, but it is unlikely that price effects will account for the observed growth in government spending. After all, it is widely believed that productivity growth in the service-intensive government sector lags productivity growth elsewhere in an economy. Therefore, the unit cost of government output is likely to rise over time, suggesting a decline in the quantity of government output demanded, all else equal. If the observed growth in government reflects other demand-side arguments, the increase in the demand for government goods and services will have to be large enough to offset the negative substitution effects generated by the increasing relative price of government production.

Income effects are an obvious candidate to fulfill this role, which is why Wagner's Law fits neatly into a traditional analysis of demand. Wagner's Law suggests that as incomes rise, the demand for government increases more than in proportion, primarily because of the technological requirements of...
industrialization and the urbanization that accompanies it. This argument is more appealing for merit goods than for transfers, and it is interpreted in terms of the value of the income elasticity for public goods. Specifically, increases in expenditure on social overhead capital (physical infrastructure such as bridges, roads, and ports) and on public services required to meet the personnel needs of industry may exceed the growth of income. Empirical evidence on developing economies, however, contradicts Wagner’s hypothesis, suggesting that other arguments are needed to account for government’s rising share of national income (Ram 1987).

Another demand-side argument concerns tastes. Does society increasingly prefer public over private spending? This notion goes beyond the relatively narrow distinction between the demand for public (nonrival) goods and that for private (rival) goods. The larger issue is whether some societies prefer public production, including public production of rival goods. A case in point is a comparison of Sweden and Switzerland. Both are mixed economies with comparable levels of per capita income, but the share of government expenditure in GDP in Sweden is roughly twice that in Switzerland. Prevailing ideologies that reflect different attitudes about the role of government, and, hence, differing “tastes” must account for some of the variance in government spending. (Malaysia and the Republic of Korea may be similarly compared.)

Ideology explains some of the variance in levels of government spending and changes in the share of government expenditure following shifts in political regimes (as in Chile or Nicaragua). But ideology itself may offer less insight for the trend increases in government spending in the majority of cases, in which consistent ideological positions are maintained over time. Political economy explanations other than ideology have been proposed to deal with this situation.

The public choice school embraces a number of demand-oriented models of government growth, including theories of bureaucracy and median voter and public employee voting models. Common to these arguments is a consideration of who is demanding more government and how this demand results in excessive government expenditure.

Application of the public choice framework in the context of developing countries raises a number of problems. First, many of the basic arguments cannot be empirically verified in industrial economies. Second, voting models based on public choice would seem to require reasonably fair and democratic elections, circumstances not common in authoritarian states. Although all nations, regardless of political structure, must resolve conflicts among vested interests, the explanatory powers of public choice voting models are weakened if democratic institutions are absent.

Models of bureaucracy in which the wishes of the state are placed above those of the citizens are more promising. In such models, “citizens and political institutions constitute at most (loose) constraints against which political leaders and bureaucrats pursue their own personal interests” (Ram 1987, p. 142). For
the developing world as well as the industrial market economies, this idea has a familiar ring.

Supply-Side Factors

On the supply side there are at least two distinct arguments. As noted earlier, one is the imbalance in productivity growth identified by Baumol (1967), who concludes that productivity growth is slower in services than in nonservices because of different rates of technological change. Wage payments, however, are equalized across sectors. Since government production tends to be service-intensive, the model predicts increasing costs of government output if real levels of publicly provided goods and services are maintained. (Obviously this argument need not apply to government transfers.)

Even if the unit cost of government relative to private production does increase over time, there may well be factors other than differential technological progress at work. For example, public production may be more inefficient than private production because of softer budget constraints. Overall, increases in the unit cost of public production may be an important determinant of the growth in government consumption.

The other set of supply-side arguments reflects "Say's law of government spending": public expenditure is driven by the availability of revenue. Peacock and Wiseman (1961) make this point in their study of long-term government expenditure growth in the United Kingdom. They find that the taxpayers' acceptance of tolerable levels of taxation changes over time in discrete steps, usually in the wake of such events as wars or significant economic downturns. In developing countries, the "Please effect" (Please 1967) is analogous; public expenditure, especially for consumption, is driven by available resources rather than the other way around. For instance, if the government wishes to increase the rate of domestic saving through higher levels of public saving, the increase in tax revenue may encourage more spending, perhaps on public investment but equally likely on government consumption. This effect is evident in the experiences of Côte d'Ivoire and Senegal. As Devarajan and de Melo (1987) confirm, export taxation programs put most of the rents from commodity price increases into the government coffers, where it was used to finance substantial increases in government spending, for both consumption and investment. What these explanations share is a focus on the willingness to pay for government, and as such they require an explanation of this willingness.

Development Theorizing

Any explanation for the growth of government in developing countries must come to terms with two empirical facts. First, government spending accounts for a higher share of national income than it did when the now industrial
economies were at comparable levels of per capita income. And second, there is a trend toward an increase in these shares.

The first observation is easier to account for than the second. The technology of statehood is different today from what it was in the eighteenth and nineteenth centuries. Membership in the world of nations requires, for example, far more ambassadors. The same could be said about public health specialists, flight controllers, customs agents, and so forth.

On the second point, since we do not have a generally accepted positive theory of the growth of government for industrial economies, we should not have high expectations for finding one for developing nations. But one factor in the growth of government may be the role of development theory over the past twenty-five to thirty years. Since the late 1940s and early 1950s, models of development have emphasized the extent of market failure in developing countries. The language of some old theories that are currently the subject of renewed attention evokes an image of the need for more government. Programs such as the critical minimum effort, the big push, balanced growth, redistribution with growth, and basic needs all suggest more, not less, government (Arndt 1987). Similarly, Denison (1962) and Schultz (1961), writing on the sources of economic growth and the importance of human capital, implicitly advocate more spending on education and health care, traditionally government domains. Although development theory over the past decade has reversed orientation and replaced the government with the market as the engine of growth, the legacy of earlier theories may have influenced the expansion of the public sector in many developing countries.

If we add to this kettle of abstract thinking the roles of both multilateral and bilateral aid, with their requirements for public sector rather than private sector counterparts, and the demonstration effect of successful capitalist and socialist countries with large and growing state sectors, it should come as no surprise that the growth of government in developing nations was supported, if not inspired, by industrial countries. Practice and advice may both have encouraged an expansion of the public sector's share of national output in developing countries.

In sum, there is not likely to be one explanation. Just as in industrial economies, ideology, bureaucratic controls, demographic changes, the income elasticity of public goods, and the increasing cost of government production have probably been important factors. Certainly aid and foreign advice may have been influential as well.

**Government Spending and Economic Growth**

What are the consequences of the expansion of government spending for aggregate economic growth? Although there is no shortage of opinion, theory and evidence are notably sparse.
Theoretical Work

As Olson (1984) points out, the ideological debate over the relationship between increased government spending and economic growth provides little evidence to resolve the issue; there does not seem to be a strong relationship between government ideology and economic performance due, perhaps, to the absence of a clear relationship between ideology and government size. Moreover, economic theory does not provide a fully developed methodology that incorporates government spending in standard growth models. We can, however, identify two principal channels through which government activity may influence economic performance and discuss alternative hypotheses about its effects.

First, government spending, particularly investment, may provide goods that enter directly into private sector production, such as education and infrastructure. Government spending also may indirectly influence the efficiency of private sector allocation of inputs. For example, to the extent that government spending corrects market failures, guarantees property rights and the enforcement of contracts, and provides essential public goods, this effect will be positive. By the same token, government regulation may impose excessive burdens on the private sector. High taxes or borrowing to finance government spending may distort private incentives. In addition, if the financing of government investment projects bids up interest rates, private investment may be crowded out, slowing growth. Conversely, if public capital formation and private capital formation are truly complementary, government projects may stimulate entrepreneurs and enhance private investment and growth (Taylor 1988). Since all these effects are likely to operate, the direction of the net effect, which Ram (1986) calls an “externality” effect, is an empirical issue.

The second channel is the efficiency of government as a producer, as distinct from a provider, of goods and services. At issue is the relative efficiency of government, as opposed to private, production. Musgrave (1982) clarifies this distinction, noting that although certain goods and services should be provided by the market, others should be provided publicly and made available free of direct charge to the users. This tells us nothing about whether the government itself should undertake the production of such goods or whether it should purchase them from private firms. If productivity in the government sector is lower than in the private sector, a larger government presence in the economy will be associated with weaker aggregate performance. Conversely, efficient government sectors, where relative factor productivities are high, will enhance aggregate output. These differences in productivity may arise both from differences in the nature of goods produced in the two sectors (as in Baumol’s argument about the concentration of government in the less productive service sector) and from the inefficient management of government relative to private operations.
Empirical Evidence

Most empirical work does not consider the theoretical relationship between government spending and economic growth just discussed. This literature can be divided into two groups based on the way the relationship is formulated in the empirical presentation. The first group relates economic growth to the level of government spending, that is, the share of government spending in GDP; the second group examines the relation between the growth in government spending and the growth of GDP. The results of these studies often appear contradictory.

Three studies—Gould (1983), Saunders (1985), and Smith (1985)—explore the first correlation using somewhat different countries and time periods. Smith and Saunders find that higher levels of government spending are associated with slower growth; Gould finds a mildly positive correlation. None of the studies is especially rigorous or comprehensive, and all the results are statistically weak or highly sensitive to outliers. For example, Smith no longer finds a strong correlation in the OECD countries if Japan, with its high growth rate and low government expenditure, is excluded.

Landau (1986) provides a more comprehensive example of the first type of study based on sixty-five countries, with annual, four-year, or seven-year averages of growth in per capita GDP as the variable he seeks to explain. He relates growth in per capita income to several sets of independent variables but does not provide a theoretical framework explaining the nature of these influences. The variables include measures of international economic conditions, human and physical capital, structure of production, historical and political factors, resources, population, and geoclimatic factors, as well as three-year lagged averages of the share of government spending in GDP, disaggregated into education, defense and transfer payments, other government consumption, and government investment. He also includes measures of government revenue and proxies for the level of regulation, also measured as lagged three-year averages. The data come from a wide variety of sources, and Landau gives no indication of any problems of consistency.

Landau disaggregates government spending while holding other determinants of economic growth constant. In so doing, he observes that general government consumption has a negative and significant influence on growth, whereas the influence of spending on education is positive but insignificant. He also finds that the influence of military expenditure, net of the effect of taxation to finance it, is essentially zero, as is the effect of transfers.

Although Landau argues that all of these variables plausibly influence growth and contends that the work is based on a simple production function framework, the regression equations are essentially ad hoc. He does not discuss the mechanism through which government spending influences aggregate production. In addition, his use of such familiar variables as investment does not seem consistent with a growth model based on a production function. These
models would posit that annual growth in GDP is a function of investment over
the same period, yet Landau uses the average of three lagged values. The chan-
nels of government influence on growth imply that current, not lagged, govern-
ment spending is influential, and in the absence of a clear discussion of how
and why lagged levels influence growth, his estimates are not easy to interpret.
Although it is plausible that levels of government spending influence levels of
output, it is not clear how levels of spending influence growth rates, and the
model provides little insight into this process. In other studies Barro (1989) also
finds a negative correlation between government consumption (excluding edu-
cation and defense) and average annual growth of GDP. Dervis and Petri (1987)
find that the developing economies that grew the fastest between 1966 and 1984
had low shares of government spending in GDP, although this correlation dis-
appears in regressions that include policy, structural, and external variables.

The second type of study relates growth in per capita income to growth in
government spending. Ram (1986) examines this correlation in a more rigorous
manner. Ram begins with a pair of production functions, one each for the pri-
ivate and public sectors, and allows public sector output to be an input in
private sector production. From these, he derives a growth equation in which
growth in per capita income is a function of investment, population growth,
and growth in government spending over the same period. He identifies the two
channels of influence of government spending on aggregate growth discussed
earlier in this section, an “externality” effect and a “differential productivity
effect” related to the relative productivity of factors employed in the public as
opposed to the private sector. He attempts to distinguish between these effects
in the estimation of a growth equation using cross-sectional data for 1960–70
and 1970–80 from the Summers and Heston data set, as well as separate time
series estimates for individual countries. Real government consumption is his
measure of government size. The model finds a positive relation between
growth in government and overall economic growth. Ram concludes that both
the externality and differential productivity effects are positive, so productivity
in the government sector appears to be higher than in the private sector, at least
in the 1960s subsample.

Although other studies using Ram’s theoretical framework and data set sup-
port his general conclusion, they point out weaknesses in the analysis. Ram es-
estimates four different forms of the growth equation, each derived by varying
assumptions about the basic relationships. All four are based on two assump-
tions fundamental to his ability to distinguish between the externality effect and
the factor productivity effect: (1) the difference in factor productivity between
the two sectors is the same for both factors, so that if government workers are
twice as productive as private workers, government capital is twice as produc-
tive as well; and (2) the influence of the size of government on private sector
output is the same in all countries and time periods. As Rao (1989) points out,
these are very strong assumptions, and Ram’s failure to justify them suggests
that the empirical separation of the two effects has no basis. Although these
two effects are certainly separable in the theoretical sense, theory does not give us a clear prediction of the sign of either effect, and the specific functional form that Ram imposes may generate the results he gets. To the extent that this is the case, his conclusion that the net effect of the two must be positive is dubious. In addition, Ram uses government spending rather than government output to measure factor productivity, so his conclusion really speaks to how much the government spends per unit of input, not how much it produces.

Assessing the Studies

A comparison of these two groups of studies reveals one basic pattern. In the studies using the level of government spending as an independent variable, the correlation between government size and growth usually is negative; studies using the rate of growth of government spending find generally positive correlations.

In general, the studies using level of government spending include a broader range of variables than do the other studies, but they rely on ad hoc functional forms. The specification of a linear function of levels when the “true” functional form is something else could itself generate estimates of the wrong sign and biased magnitude. This bias implies that the conclusion that larger government results in diminished growth in per capita income cannot be maintained on the basis of this evidence.

Nor do the conclusions of studies using growth in government as the independent variable stand up to close scrutiny. Some of the assumptions are dubious, and several variables that could be important are omitted, which may bias the results.

The qualifications surrounding the empirical study of the relationship between government spending and economic growth suggest that all results should be interpreted with caution. The causal relation between government spending and economic growth is not obvious, and although most studies are predicated on the idea that government size has a causal influence on economic growth, the converse is certainly possible. In addition, taxation creates distortions that may offset the benefits of government spending, and studies that ignore these effects miss an important aspect of the relationship. Furthermore, the way in which governments spend money is as important as the aggregate level of spending, and studies of aggregate government spending cannot speak to these issues. In sum, we are still a long way from drawing definitive conclusions. In part because of the lack of consensus in the scholarly community, the debate has remained largely ideological.

Conclusion: A Look Ahead

What will happen to government expenditure for the remainder of this century? If empirical trends are extrapolated, the share of GDP spent by govern-

ments in low- and middle-income economies should continue to rise. This has been the experience of industrial economies, and there is no evidence to suggest that the outcome will be different for developing countries. At a minimum, the tendencies for transfer payments to grow and for the relative cost of government services to increase should fuel the rise.

At a behavioral level, the anticipated growth in government spending will be driven in part by demographic transitions. Increasing life expectancy coupled with high birth rates and the ensuing demand for education and other social services will contribute to the expected increase. On the public choice frontier, any movement toward an increased reliance on democratic institutions also may be associated with a growth of government expenditure shares. Korea, for example, historically a nation with low government spending relative to GDP, appears headed in this direction as a result of democratic reforms.

But there are also forces operating to check the trend. First, there is the legacy of the austerity programs of the 1980s that called for reductions in public spending under structural adjustment. The pain associated with these reductions may make some governments more wary of expanding public sector commitments. Second, the demise of many socialist and centrally planned economies will in all likelihood reduce average spending shares for the middle-income group. Third, if development advice and theory has an effect, the market-oriented thinking of the 1980s will eventually result in a lower GDP elasticity of government spending in the 1990s. Taken together, these forces suggest that the variance in country experience will remain large.

These issues call for new directions in research. First, a wider perspective must be adopted in assessing the effect of government spending on the economy. Growth is just one component of economic development, and a complete analysis must include the relationships between government spending on the one hand and inflation, employment, poverty, and distribution on the other. Second, aggregate studies relating government expenditure and growth seem to ignore the central issue of what governments spend their money on. Even when, as in Landau's work, spending is decomposed by sector, the basic relationships are not well specified. For example, an assessment of the effect of education outlays on growth should consider per capita spending and the level of service provided rather than the share of education in GDP. Further work, therefore, should not only examine disaggregated government spending but also carefully consider the ways in which these relationships are formulated.

Successful economies include not only those with low government expenditure-to-GDP ratios (Korea, Taiwan) but some with relatively high ratios (Botswana, Malaysia). These cases complement the overall lack of evidence relating the size of government spending and economic growth, and suggest that more attention be devoted not to how much governments spend but to what governments actually do with their resources.

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Notes

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1. Saunders and Klau (1985, table 3) explain the growth in government expenditure in OECD countries by relating increases in \( G_e \) (government expenditure) to the growth in nominal GDP (that is, by computing the elasticity of government spending with respect to GDP). They also consider the sources of growth in expenditure by calculating the elasticities of the components of \( G_e \): \( G_c \) (government consumption), \( G_t \) (transfer payments), and \( G_i \) (gross capital formation). Median values of these elasticities for OECD economies from 1960 to 1982 are \( G_c \) (1.20), \( G_t \) (1.16), \( G_i \) (1.31), and \( G_e \) (1.00).

In all cases the elasticity of \( G_e \) with respect to GDP is greater than one, consistent with Wagner’s Law, which states that in a growing economy the scale of government activity expands relative to national income. (For a review of the controversy surrounding this relationship, see Ram 1987.) At a more disaggregated level, although the elasticities of \( G_c \) and \( G_t \) are always greater than one, transfers have been the fastest-growing element in most OECD countries. In contrast, in well over half the nations, the elasticity of public investment has been less than or equal to one, reflecting a slowdown in the rate of government capital formation.

2. We have extrapolated from estimates for 1870 based on Maddison’s GDP growth index. GDP was converted to a per capita figure using Maddison’s mid-year population estimates for 1880 and converted 1986 dollars using the U.S. consumer price index.

References

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This article provides a framework for appraising new financial instruments and evaluating the extent to which they can help alleviate problems of incomplete credit markets and contingent claims markets in developing countries. Although the issues involved apply to any new financial instrument, we give particular attention to commodity-linked securities because many developing countries specialize in producing a handful of primary commodities and are therefore exposed to substantial commodity price risks. The article looks at the supply of, demand for, and pricing of commodity-linked securities and discusses some issues that affect their use by developing countries: their special legal status as sovereign debt; their feasibility (since to become truly effective they will require liquid secondary markets); and the construction of an optimal portfolio of external debt obligations. It also discusses the potential for new financial instruments—particularly commodity-linked securities—as a tool for risk management in developing countries.

Over the years economists and policymakers have suggested a number of ways to reduce and manage the commodity price risks facing developing countries. Schemes to stabilize commodity prices—buffer stocks, buffer funds, quotas, and variable export taxes—have been the most common remedy because when credit and contingent claims markets are incomplete, stabilization schemes can reduce and redistribute risks and thereby increase economic efficiency (Newbery and Stiglitz 1981). But economists have become disillusioned with price stabilization schemes. For one thing, they force everyone to accept the same degree of stability. There is no way for farmers
and traders to choose a level of participation that is consistent with their individual circumstances and preferences. For another, buffer stock schemes are open to speculative attack (Salant 1983) and tend to become instruments of income redistribution rather than of stabilization. Newbery and Stiglitz, in fact, suggest that the main effects of price stabilization schemes come from income redistribution, and that gains in economic efficiency, if any, tend to be very small.

One of the alternatives that has been suggested is to expand the use of market mechanisms for risk management, such as crop insurance and futures markets. These instruments allow individuals to participate at whatever level they choose and, it is argued, are more effective and efficient forms of risk management. But market mechanisms are not without problems either. Kenneth Arrow (1974) argues that a variety of factors, including poor economic infrastructure, informational asymmetries, and high transaction costs, make insurance and other intertemporal markets (for instance, futures markets and credit and capital markets) notoriously incomplete and imperfect in developing countries. Thus efforts to introduce new markets must be capable of overcoming these frictions.

One possibility would be to design a single market-based instrument that combines financing and hedging functions. Examples of such instruments include swaps; indexed variable-rate loans; caps, floors, and collars; and commodity-linked bonds. Because these instruments can improve risk management without relying directly on specialized futures and crop insurance markets, they can help overcome the problems inherent in incomplete markets by reallocating risk among individuals and easing access to credit. Despite the potential advantages of these financial instruments, however, relatively little use has been made of them by developing countries.

This article provides a framework for appraising new financial instruments and evaluating the extent to which they can help alleviate problems of incomplete credit and contingent claims markets in developing countries. While the issues involved apply to any new financial instrument, we give particular attention to commodity-linked securities because many developing countries specialize in producing a handful of primary commodities and are therefore exposed to substantial commodity price risks.

The appeal of commodity-linked securities is that their return is linked to the value of a commodity (or basket of commodities). Thus a bond linked to the price of copper, for example, might pay as principal the value of a specific quantity of copper priced in a designated copper market on the date that the bond matures. Coupon payments may also be linked to the price of copper at intermediate dates between issue and maturity. This means that the issuer of a commodity-linked security has debt service obligations that rise and fall with the prices of commodities; debt service payments are highest when commodity prices are high and commodity producers can best afford to pay. Conversely, when commodity prices are low and producers are strapped for funds, debt ser-
vice falls. These securities therefore allow developing countries to raise funds and hedge commodity price risks using a single financial instrument.

This article looks at the supply of, demand for, and pricing of new financial instruments and discusses some issues that affect their use by developing countries: their special legal status as sovereign debt; their feasibility (since to become truly effective they will require liquid secondary markets); and the construction of an optimal portfolio of external debt obligations. It also discusses the potential for new financial instruments—particularly commodity-linked securities—as a tool for risk management in developing countries.

Supply

Innovative financial instruments come in a variety of forms. A simple example is a swap, whereby two parties agree to exchange cash flows calculated to reflect fluctuations in a designated price or interest rate index. Consider a developing country that borrows from a bank at a fixed interest rate to expand coffee production. The country then negotiates a swap with a coffee-roasting firm. Under the swap, the firm agrees to make the fixed interest payments to the bank in exchange for payments based on the price of coffee. The country has gained downside price protection because its payment obligations now decline with coffee prices; the coffee roaster has hedged against price increases in coffee because it will receive higher payments when coffee prices rise. Thus both parties are better off. These transactions (including currency swaps to hedge exchange rate risks and interest rate swaps to hedge interest rate fluctuations) are still relatively new, but their use is growing rapidly (Smith, Smithson, and Wakeman 1986).

Commodity-Linked Bonds

An early example of commodity-linked finance was the decision by the Confederate States of America in 1863 to issue cotton bonds. The economy of the Confederacy relied heavily on cotton. To finance the war effort, the government issued a bond with payoffs linked to cotton prices. Commodity-linked finance in industrial countries expanded rapidly throughout the 1980s, and commodity bond issues now total between $3 billion and $4 billion (Priovolos and Duncan 1991). To date, however, most of the action has been heavily concentrated in gold, silver, and oil-linked securities issued by industrial countries (including the French government's 1973 issue of gold bonds, Sunshine Mining's issues of silver bonds in 1980 and 1985, and the oil-linked notes issued in 1981 by Denver-based Petro-Lewis Corporation); Mexico's "petro" bonds are an exception to this trend.

There are two principal types of commodity-linked bonds: indexed bonds and option (or warrant) bonds. Principal and interest payments on an indexed
bond are linked (indexed) to the price of the underlying commodity; payments rise and fall according to a predetermined schedule as the price of the commodity fluctuates. Option bonds, in contrast, have conventional principal and interest payments but, at maturity, the holder has an option to buy (a call option) or sell (a put option) a predetermined quantity of a specified commodity at a predetermined price (the strike price). Because this option is valuable, option bonds either sell at a premium to conventional bonds or have lower coupon rates.

Why would a developing country issue a commodity-linked bond? The primary motivation is to hedge price risks and raise investment capital with a single financial instrument. If a commodity producer wants to expand production capacity (a risky investment because future commodity prices are unknown), it can, of course, take out a conventional loan at flexible interest rates. But interest payments on the loan are unrelated to the profitability of the enterprise, and the producer is exposed to considerable risk because debt service obligations can remain stagnant or even rise when commodity prices and profits are falling.

INDEXED BONDS. In the case of commodity-linked indexed bonds, however, both coupon and principal payments are linked to future commodity prices. Coupon payments rise and fall in tandem with commodity prices. Similarly, when the bond matures and new production comes on line, principal payments will also parallel commodity prices. Thus debt service obligations are positively correlated with commodity prices, reducing the overall risk to the producer. Note that producer cash flows are a function of commodity prices under both conventional loans and commodity-linked indexed bonds. But with the indexed bond, net cash flows become less sensitive to commodity prices, so overall risk has been reduced.

OPTION BONDS. Commodity-linked bonds can also help alleviate cash flow problems by lowering interest payments below the level required by a conventional loan. Consider the same commodity producer who now finances new production capacity with an option bond. The option bond has conventional coupon and principal payments as well as an option to buy a certain amount of the commodity at maturity at a specified strike price. Because the option is valuable, even if the bond carries a lower coupon, the issue can raise the same amount of capital as a conventional bond with a higher coupon—much the same as convertible bonds used by corporations. The producer has lowered the cost of servicing debt until the bond matures. At maturity, the option may or may not be valuable; if the price of the commodity is below the strike price, the call option will expire worthless and the producer will have benefited from the lower coupon payments without having to service the option. If commodity prices are above the strike price, the call option will be exercised and the producer will have to pay the difference between the commodity price and the strike price. This payment occurs, however, at a time when commodity prices
are high and the producer can best afford to pay. The producer has forgone
the opportunity to reap the gains above the strike price in exchange for lower
interest payments.

The payment schedule from issuing commodity-linked bonds could, in prin-
ciple, be replicated by issuing conventional bonds and taking out a portfolio of
forward positions and options in the particular commodity. For zero coupon
bonds this procedure is straightforward: an indexed bond is replicated by issu-
ing a conventional bond and taking a short position in a forward contract to
deliver the commodity at maturity; an option bond is replicated by issuing a
conventional bond and selling an option to buy or sell the commodity at the
strike price. Replicating the payment schedule for coupon-bearing commodity
bonds is more difficult but can be accomplished using conventional bonds plus
a portfolio of forward contracts and options with different maturities (Richard

This raises the question of why developing countries need to issue commodity-
linked bonds. For one thing, because forward, futures, and options markets are
incomplete in developing countries, replication is theoretically possible but not
feasible in practice. For another, even when these markets do exist, maturities
are short—usually no more than a year. Commodity-linked bonds could provide
finance and hedging opportunities over much longer periods. And finally, there
may also be advantages (lower transaction costs, for one) to combining financial
and hedging activities into a single financial instrument rather than separating
them into several instruments.

Findings from Economic Models

O'Hara (1987) and Ball and Myers (1991) have examined economic models
of the decision to issue commodity-linked bonds to finance production activi-
ties. They find that risk-averse producers prefer to issue commodity-linked
bonds rather than take out conventional loans, provided that the commodity-
linked bonds have no risk premium (that is, they do not carry a higher rate
than conventional bonds to compensate for the increase in risk). (Default risk
is ignored for the moment but is explored below.) If there is no risk premium,
the commodity issues will be priced at the same level as conventional bonds
with the same expected return. In this case, the reduction in risk (stemming
from the hedging feature of the commodity issue) makes commodity-linked se-
curities more desirable than conventional loans. If there is a risk premium,
commodity issues will be priced at a discount to conventional bonds that yield
the same expected return. As the risk premium increases, so does the price dis-
count, and producers become less willing to issue commodity-linked bonds and
instead revert to conventional forms of finance. If the risk premium gets too
high, no commodity-linked bonds will be issued.

These results are exactly what we would expect. The risk premium can be
considered a cost paid by producers to entice investors to accept part of the
price risk. If the cost is too high, producers will choose to bear the risk rather than pay the cost. The high cost of the risk premium resulting from the inherent commodity price risk, as well as the risk of default, could explain why developing countries have made little use of commodity-linked finance to date.

So far we have described securities that are linked to commodity prices. But hedging performance might be improved by linking debt service to commodity revenue instead. For example, suppose the price of a commodity is high because of a crop failure and the developing country actually is experiencing a shortfall in production and revenue. (This could easily occur if there were a single large exporter, but the situation might also arise if many countries share production shocks, perhaps because of common weather patterns.) If securities are linked to commodity prices, debt service would be high at precisely the time when commodity revenue, and hence the ability to service debt, is low. In theory, this difficulty could be avoided by indexing the securities to revenues rather than to prices. The problem, of course, is one of moral hazard: the country has a disincentive to increase (and an incentive to underreport) production levels. In practice, the only viable commodity-linked finance involves links to widely observed prices on liquid world markets (Lessard and Williamson 1985). It is important to recognize, though, that a negative correlation between the price of a commodity and the output of an individual country might discourage issues of securities linked to that commodity price.

Demand

The modern theory of finance suggests three reasons individuals invest in financial assets: to store wealth so that consumption can be smoothed over a lifetime; to accumulate wealth so that it can be passed on to heirs; and to reduce risks to the investor’s portfolio of assets. Assets are chosen for a portfolio because of their individual risk and return characteristics, and because of the way they interact to determine the aggregate risk and reward of the whole portfolio. From this perspective, the demand for new financial instruments depends on the distribution of returns from investing in the securities and on the extent to which the intrinsic risk from holding the instrument can be diversified by positioning it in the portfolio.

Risk Management

O’Hara (1984) and Fall (1991) use standard models of portfolio selection to investigate the potential demand for commodity-linked bonds. Because such investments are risky (the investor is subject to low returns when commodity prices drop), risk-averse investors might be expected to drop these issues from their portfolios unless there is a risk premium pushing the expected return on commodity issues above that of conventional bonds. But commodity-linked bonds
can provide a form of insurance to some investors. Suppose the commodity prices to which the bonds are linked are positively correlated with the prices of goods consumed by the investor. By investing in commodity issues, the investor will get high returns precisely when they are needed most to pay for high-priced consumption goods. In this sense commodity-linked securities act as an inflation hedge (O'Hara 1984). In some instances the return may be negatively correlated with returns on other assets in the investor's portfolio, providing a form of insurance through portfolio diversification. Although these insurance attributes serve as an incentive to hold commodity-linked securities, a risk premium still may be necessary to induce serious demand for these instruments.

The extent to which risks from holding commodity-linked securities can be diversified depends on the set of asset markets and investment opportunities available to investors. The opportunity for diversification is greatest when investors have access to futures and options markets for the same (or a closely related) commodity. When futures and options are available, investors can use them to manage overall risk exposure. For this reason, we might expect investors to be more willing to hold commodity-linked securities where well-developed futures and options markets operate.

The strength of the demand for new financial instruments will also depend on how risk averse investors are. Investors who are highly risk averse will not hold commodity issues unless they can either hedge the risk or obtain a return at a substantial premium over the return on risk-free securities. The decisions of less risk-averse investors will be dominated by the expected return on different securities, and only a small premium may be required to induce their participation. As Fall (1991) points out, however, the aggregate demand will depend on the market's risk aversion, which is a function of the degree of risk aversion of all investors.

In the real world, these securities will be purchased—at least initially—by businesses and financial intermediaries, not by individual investors. This may increase the demand beyond what might be expected from individual investors and reduce the premium required to induce participation. For example, the commodity to which the security is linked could be an important production input for a firm considering investment. Thus the returns to this firm from investing in commodity-linked securities would have a strong negative correlation with firm profits, and the hedging potential therefore would be much higher than for an individual investor. Furthermore, firms may be less risk averse than individuals because there is a separation between ownership and control.

The question of who invests in commodity-linked securities—and why—is crucial to developing countries. Demand has a hedging component, driven by the risk of inflation and the desire for diversifying the portfolio, and a speculative component, driven by any risk premium that places a wedge between the expected return on commodity issues and the risk-free rate. Total demand depends on the existing market structure, the insurance provided, the risk aversion of investors, and the equilibrium risk premium in the market. Another
important factor influencing the demand for commodity-linked securities is whether a liquid secondary market exists for these assets.

Pricing

The most direct way of pricing securities is to build a model of supply and demand for all securities and define the equilibrium price based on the principle that markets clear. This is a daunting task, however, because a general equilibrium asset pricing model depends on interactions among many markets and is sensitive to the individual preferences of investors and issuers (about which we know little).

An alternative is to value securities based on an arbitrage principle. Arbitrage involves a transaction that results in a sure profit without an initial cash outlay. If an arbitrage opportunity exists, profit-seeking individuals would be expected to exploit it as soon as it arises and to continue exploiting it until it is eliminated. Thus equilibrium in well-developed, efficient markets should be devoid of arbitrage opportunities. This fact can be used to characterize the properties of equilibrium asset prices, and the resulting models are called arbitrage pricing models. Such models have become very popular since Black and Scholes (1973) applied them to option pricing. One advantage is that these models lead to a valuation formula that generally does not depend on individual preferences, in contrast to a general equilibrium approach.

A commodity-linked security is a derivative asset in the sense that its payoff is determined by the price of other assets (the underlying commodities). The key to valuing a derivative asset with the arbitrage pricing model is to find a trading strategy in the underlying assets that exactly replicates the payoff from a trading strategy in the derivative asset. To eliminate arbitrage opportunities, the current cost of establishing the positions in the underlying assets must then equal the current value of the derivative asset (Rubinstein 1987).

For example, consider the strategy of buying and holding a zero coupon bond that entitles the investor to receive the value of one barrel of oil at maturity, valued at the market price for oil on that date. Assuming no storage costs for the oil and no transaction costs on the bond, this trading strategy has exactly the same payoff as buying a barrel of oil and holding it until the maturity date. Thus to eliminate arbitrage opportunities, the current price of the bond must equal the current price of a barrel of oil. This establishes the price of the derivative asset (the commodity-linked bond) in terms of the probability distribution of prices for the underlying assets, without the need to resort to models of supply and demand that depend on the preferences of individual investors (Varian 1987).

Schwartz (1982) was one of the first to apply this approach to pricing commodity-linked bonds using the now standard assumptions of the Black-Scholes model:
1. Markets are frictionless (no penalties for short sales, no transaction costs, no taxes, infinitely divisible assets).
2. Markets for all assets are continuously traded.
3. Returns on the underlying asset are normally distributed with constant mean and instantaneous variance.
4. The risk-free rate of interest is known and constant.¹

Using these assumptions, Schwartz was able to replicate the return from investing in a risk-free bond by continuously adjusting a portfolio consisting of commodity-linked bonds, the underlying commodity, and the risk-free bond. Using the “no arbitrage” condition, Schwartz obtained an expression for the price of the commodity-linked bond in terms of the underlying commodity price, its instantaneous variance, and certain characteristics of the commodity-linked bond (time to maturity, strike price, and so on).

Solving the Black-Scholes model requires analyzing a complicated set of partial differential equations. A simplified arbitrage pricing model has been developed by Cox, Ross, and Rubinstein (1979) and applied to the pricing of commodity-linked bonds by Rajan (1991). Using this model,² Rajan estimates prices for hypothetical commodity-linked bonds and finds that results are very similar to those from the Black-Scholes model. Both rely on arbitrage arguments and are not sensitive to individual investor preferences. This means that securities are essentially priced as if they were risk free, with a current price equal to the expected value of the income stream generated by the security, discounted at the risk-free rate (Smith 1976). This is a strength in that the models are easy to understand and implement, but it is also a weakness because it implies that the security being priced has no risk premium (continuous trading allows the replicating portfolio to be continuously adjusted so that it remains risk free). Because the commodity-linked bonds can be made part of a risk-free portfolio, they have no risk premium in equilibrium.

All of this would be fine if the securities involved actually could be traded continuously; in fact, this is not the case. It is also worth noting that because of the customized nature of these securities, and because transactions would be international, transaction costs and tax considerations may also be important. These problems are compounded when valuing commodity-linked bonds with coupon payments, since most of the results so far have been derived for zero coupon bonds. For these reasons, many economists are skeptical of the assumptions of the Black-Scholes model when applied to the problem of pricing commodity-linked securities issued by developing countries.

Without continuous trading, any simplified approach to pricing based on risk neutrality may be quite misleading; actual prices may well have a risk premium in equilibrium. Indeed, it might be argued that the risk premium is currently so high that it precludes trade, which is why we see so few commodity-linked issues from developing countries. In this sense, markets for commodity linked securities are incomplete, and any innovation that could reduce risk premia (and other trade barriers), might encourage an expansion of trade.
Sovereign Risk

So far, we have ignored default risk and assumed that all the risk from investing in securities involved the uncertainty of the income stream. In fact, however, securities issued by sovereign governments carry a different risk from those issued by private corporations. The additional risk faced by investors in this situation is usually called sovereign risk (Eaton and Gersovitz 1981). Not only is collateral generally unavailable, but, in the event of default, there is no distribution of assets to investors. The most creditors can do is seize assets held outside the country and cut off future financial dealings. In this sense, debt service by sovereign governments is voluntary, and investors are continuously exposed to the risk of default—or the threat of default (the investor can hope that the government will try to reschedule the debt at more favorable terms).

A developing country presumably would threaten to default whenever the benefits from doing so (termination or rescheduling of principal and interest payments) exceed the costs (restricted access to international capital markets). Knowing this, investors will limit their loans to foreign governments to reduce their exposure to sovereign risk. The higher the perceived risk that a country will default, the more restricted its access to international capital markets, and the more limited its ability to finance domestic investment and smooth out fluctuations in aggregate consumption.

For example, Wright and Newbery (1989) analyze attempts to smooth domestic consumption using conventional external loans. They find that if sovereign risk induces investors to put any upper bound at all on the amount they are willing to lend, complete consumption smoothing cannot occur. The other problem with conventional debt (at least this was the case in the 1980s) is that the ability to pay is negatively correlated with debt service obligations. Thus the probability of default is high, and access to funds is restricted.

Would commodity-linked securities help developing countries overcome the restrictions on lending arising from sovereign risk? Investors still would be vulnerable in case of default, after all. What does change, however, is the probability of default. Because commodity-linked securities provide a hedge against movements of commodity prices, debt service is positively correlated with the ability to pay, in contrast to the zero or negative correlation that has characterized conventional loans.

For these reasons, a given amount of capital from commodity-linked securities provides a degree of consumption smoothing superior to the same amount raised via conventional loans, provided risk premia and transaction costs on the commodity-linked securities are not too high. Perhaps more important, investors will support more commodity-linked issues than conventional loans, other things being equal, because there is less risk of default. The degree to which the probability of default declines with commodity-linked issues depends on the magnitude of commodity price risk, the importance of the commodity...
to the country's export earnings and aggregate consumption levels, and the extent to which the country views stable consumption levels as desirable (Wright and Newbery 1989).

A number of developing countries today seem on the brink of default. Indeed, one might argue that some countries are in default already, protected only by the unwillingness of investors to make a formal declaration (and thereby reduce the prospects of recovering their funds). Sovereign risk is a barrier to participation in international capital markets, particularly at present, when lofty debt levels and low commodity prices mean that the probability of default is high. Investors demand a premium to compensate them for the risk of default, but if the premium is too high, countries may simply choose not to participate. By reducing the risk of default and lowering the premium a country must pay to get access to international capital markets, commodity-linked securities have the potential to generate improved access to funds.

Securitization

Securitization—the creation of liquid secondary markets for trading debt instruments—is one of the most important issues in the use of financial instruments by developing countries. Active secondary markets provide a number of advantages to issuers and investors. First, there are benefits from liquidity. Investors are much more willing to supply funds when they can trade into and out of the security any time they need to react to new information and circumstances. The flexibility can be valuable, enabling debt to be more widely distributed and inducing additional investment on better terms. Second, prices quoted in an active secondary market will aggregate and reflect information about the value of securities in a changing economic environment. The market's valuation of the securities provides useful information to all participants, in much the same way an active futures exchange aggregates information about future commodity prices. Third, any actions taken by a developing country to reduce (or increase) the value of its debt would immediately be reflected in the price of its securities on secondary markets. This would allow an immediate adjustment in investors' portfolios, and at the same time provide a strong incentive for officials to use funds wisely.

There are several barriers to securitization of such debt, but sovereign risk is the most important. Because of sovereign risk, the probability of default on external debt varies significantly from country to country. Debt issued by Brazil is a very different investment from debt issued by Indonesia, even when the terms are identical. This diversity presents a natural barrier to securitization. If debt from different countries cannot be packaged into securities with standard features, including standard default risks, then transaction costs from trade in secondary markets will be high and the development of liquid secondary markets will be problematic. The fact that most developing country debt
has been issued in the form of general obligation bank loans is testimony to these obstacles.

Anderson, Gilbert, and Powell (1989) suggest a two-pronged attack for dealing with sovereign risk. First, the risk of default would be split off from remaining risks via a third-party guarantee on the performance of the developing country. This guarantee would create securities that essentially have no default risk and are therefore more suitable for standardization and securitization. The third party providing the guarantee could be a new or existing international agency that pools default risks from many different countries and types of securities and insures the default risk. (Each developing country would pay a premium tied to the size of its debt and assessed probability of default.) In the case of nonperformance by the debtor, the agency would make scheduled payments to the investor and assume the nonperforming security into its portfolio. The agency might then reschedule or negotiate partial payment—or both. If the default insurance is provided at actuarially fair rates, the operation could be self-financing.

The same approach has been used by the U.S. Government National Mortgage Association, which performs similar activities by bundling standardized securities and insuring default risks in order to facilitate liquid secondary markets for mortgage loans. Although an international agency operating in many different countries would face considerable problems, there appear to be significant benefits to securitizing developing country debt, and national precedents for this approach have been successful.

The main problem with the third-party guarantee, of course, is that it does not eliminate default risk but merely transfers it from those investing in securities to the agency providing the guarantee. The agency, in turn, transfers the cost of this risk back to the developing countries in the form of an insurance premium. In many cases the insurance premium is likely to be so high that developing countries will have little incentive to participate. The second component of Anderson, Gilbert, and Powell's plan therefore is to find a way to reduce the probability of default. They would introduce commodity price contingency into the debt obligations. They show that commodity-linked financial instruments have many of the attributes desirable for a security design that minimizes default risk.

The interesting practical question is whether commodity-linked financial instruments can lower the default risk enough to make debt service guarantees a viable approach to securitization of developing country debt. This is a difficult empirical issue about which little is known. There is no doubt, however, that the introduction of liquid secondary markets would expand trade and improve risk management opportunities for investors and issuers alike, expanding the set of credit and contingent claims markets available and helping to overcome the effects of incomplete markets. One of the most important policy issues for developing countries is whether it is possible to develop liquid secondary markets for commodity-contingent debt.
Optimal Portfolios of External Debt

Assuming that markets for new financial instruments will evolve, there are two key questions about their use by developing countries. First, how does a country determine the optimal currency composition of external debt (that is, in what currencies should the debt be denominated?), and second, how does the government choose an optimal portfolio of debt instruments to issue? Questions such as these must be answered on a case-by-case basis.

The optimal currency composition of external debt has been investigated by Claessens (1991). He assumes that no commodity-linked securities are available to the country but that it can issue conventional debt in several alternative currencies. At the same time the country faces risk from currency exchange rate movements and trades in commodities whose prices are subject to shocks over time. In this situation, unanticipated fluctuations in commodity prices cause fluctuations in domestic consumption that can be smoothed via external borrowing. Thus by issuing debt in currencies whose exchange rates are highly correlated with particular commodity price movements, an optimal currency composition of external debt provides a hedge against unanticipated fluctuations in domestic consumption. As an example, Claessens estimates the optimal currency composition of external debt for Indonesia and Turkey and finds a substantial reduction in risk as a result of a move from actual to optimal currency compositions during the sample period.

Optimal portfolios of commodity-linked bonds have been studied by Myers and Thompson (1989). They assume that all external debt is denominated in a single currency but that the country can issue bonds linked to its major export commodities. If there is no risk premium on the commodity-linked issues, a risk-minimizing portfolio of external debt depends on the relative strength of the correlations between unanticipated shocks to export revenues and unanticipated shocks to particular commodity prices. If export revenues are strongly positively correlated with the price of a commodity, bonds linked to this commodity price play a major role in the optimal debt portfolio. On the other hand, if this correlation is weak or negative, few—or no—bonds linked to that commodity price should be issued. (In the case of negative correlation, the country may want to invest in commodity-linked bonds rather than issue them.) This is exactly as expected because a strong positive correlation (where debt service obligations increase and decrease with commodity prices) reduces the risk that the country will be able to import to maintain consumption levels. The authors offer a method for estimating optimal portfolios of commodity-linked bonds showing that in the case of Costa Rica, bonds linked to the price of coffee could play an important role in reducing the country's commodity risks.

Several unanswered questions concern the risk management dimension of new instruments, and existing studies have assumed the objective is to minimize—or eliminate—risk. Under more general preference assumptions and the
existence of risk premia, the demand and supply of securities would have a speculative as well as a hedging component that could influence the composition of optimal external debt. Moreover, if risk premia do exist and are large enough, they would act as disincentives to developing countries, in spite of the risk reduction that could be achieved. There is also the question of whether commodity-linked securities issued in different currencies can be used to hedge exchange rate risk as well as commodity price risks. This could be particularly important for developing countries because they typically lack forward or futures markets for their currencies.

Concluding Comments

Incomplete credit markets and contingent claims markets are a persistent feature of the economies of many developing countries, and this persistence is testimony to the many barriers to the successful introduction of new markets. But markets are dynamic and flexible; new financial instruments are continually being developed, and new markets constantly emerge to take advantage of gaps in present markets and lower the costs of international finance.

Despite the potential advantages of commodity-linked securities, developing countries have made little use of these instruments to date. The reason could be a lack of familiarity with the characteristics of these new instruments and a lack of experience in using them. In this case we might expect use to expand over time as their benefits become known and countries acquire more experience with them. However, the reason could also be that transaction costs are too high. Or perhaps the risk premia required by investors are higher than developing countries are willing to pay. These problems may prevent the emergence of viable market institutions for commodity-linked securities. It therefore remains to be seen whether commodity-linked securities have a significant role to play in developing countries.

Notes

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1. Schwartz also generalizes the framework by allowing for default risk or interest rate risk (but not both) in some of his models. Carr (1987) provides a valuation formula when commodity price risk, interest rate risk, and default risk are all present.

2. The binomial option pricing model features trading at discrete time intervals, but price changes from period to period are limited to be one of only two possible values. This seems like a fairly severe restriction on the stochastic process governing commodity prices. However, it can be shown that as the time interval between trades approaches zero, the binomial option pricing model converges to the Black-Scholes option pricing model.
3. Wright and Newbery find that optimal consumption smoothing generates an accumulated debt path that follows a random walk. But because of the properties of a random walk, any upper limit on the amount of debt a country could accumulate would eventually be reached in finite time, and at that point the optimal consumption-smoothing plan would fall apart.

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PRIVATE INVESTMENT AND MACROECONOMIC ADJUSTMENT
A Survey

Luis Serven
Andrés Solimano

This article reviews theories of investment behavior and examines empirical studies of investment in developing countries. The emphasis is on understanding the interactions among macroeconomic policies, structural adjustment, and private investment. The article deals with the effect of exchange rate policy on investment, the relationship between public and private investment, the importance of market imperfections and financial constraints on capital formation, and the effect of economic instability on irreversible investment decisions.

The correction of external imbalances in many developing countries during the 1980s took the form of large cuts in investment rather than increases in domestic savings. This decline in investment, which mirrored the decline in the transfer of external resources after 1982, was especially sharp in the highly indebted countries and was accompanied by slowed growth in these and other developing countries. In addition, both public and private rates of investment fell, although the decline in private investment was more drastic. If this trend continues, it will slow potential growth in these economies and will reduce long-run levels of per capita consumption and income, endangering the sustainability of the adjustment effort.

This reduction in investment seems to reflect several factors. First, the decline in the availability of foreign savings has not been matched by a
corresponding increase in domestic savings. Second, the deterioration of fiscal conditions due to cuts in foreign lending, higher domestic interest rates, and the acceleration of inflation in several countries forced a fiscal adjustment that in many cases took the form of a contraction in public investment. Third, the macroeconomic instability associated with external shocks has hampered private investment. And fourth, the debt overhang has discouraged investors through its implied tax on future output and the ensuing credit constraints in international capital markets.

In many countries, macroeconomic adjustment has not improved the response of private investment. Even when substantial progress has been made in correcting imbalances and restoring profitability—often through drastic cuts in real wages—the effect on private investment has been weak and slow to appear. Many of these issues are difficult to explain in the context of conventional investment theories. We review here recent developments in investment theory and empirical studies on investment in developing countries to explain some features of investment behavior that were important in the 1980s:

• The relation between public and private investment that results from the traditional financial crowding-out effect and the physical complementarity between public and private capital.
• The importance of imperfections in financial markets and financial constraints in a world of imperfect and asymmetric information.
• The effects of changes in the real exchange rate on the volume, timing, and composition of investment. These effects are especially important in developing countries because of the typically high import content of investment.
• The irreversible nature of most investments, which makes private investors particularly sensitive to risk and dampens their response to changes in economic incentives.
• The complex relationship between the foreign debt overhang and the volume of private investment.
• The dependence between the returns to individual investors and the level of aggregate investment, which makes possible a failure in coordination. Such a failure can leave the economy trapped in a low-investment, low-growth equilibrium after adjustment.

In this article we first review theories of investment. Then we examine the effect of monetary, fiscal, and exchange rate policies on private investment, emphasizing economic or institutional features that are specific to developing countries (for instance, pervasive rationing in financial markets, complementarities between public and private investment, considerable reliance on imported capital goods, and shifts in income distribution). Such features may determine how macroeconomic policies influence private investment. Finally we examine recent literature on credibility, uncertainty, and irreversibility in investment decisions, and look at how such factors influence the investment response.
Investment Theory

Keynes (1936), who first called attention to the existence of an independent investment function in the economy, observed that investment depends on the prospective marginal efficiency of capital relative to some interest rate reflecting the opportunity cost of the invested funds. He pointed out that private investment was intrinsically volatile since any rational assessment of the return on investment was bound to be highly uncertain. The “animal spirits” of private investors would be the main driving force in investment decisions.

After Keynes, the evolution of investment theory was linked to simple growth models. These models gave rise to the accelerator theory, popular in the 1950s and early 1960s and widely used even today in practical growth exercises. The accelerator theory makes investment a linear proportion of changes in output. Its extreme simplicity explains its popularity: given an incremental capital-output ratio, it is easy to compute the investment requirements associated with a given target for output growth. In this model, expectations, profitability, and capital costs play no role.

The restrictive assumptions behind the accelerator theory led Jorgenson (1967) and Hall and Jorgenson (1971) to formulate the neoclassical approach. In this approach the desired (or optimal) capital stock depends on the level of output and on the user cost of capital (which in turn depends on the price of capital goods, the real interest rate, and the depreciation rate). Lags in decisionmaking and delivery create a gap between the current and desired capital stocks, giving rise to an investment equation, that is, an equation for the change in the capital stock.

The foundations of this approach have been criticized on the grounds that the assumptions of perfect competition and exogenously given output are inconsistent; that the assumption of static expectations about future prices, output, and interest rates is inappropriate, since investment is essentially a forward-looking process; and that the lags in delivery are introduced in an ad hoc manner.

An alternative view, associated with Tobin (1969), is that what matters is the relation between the increase in the value of the firm due to the installation of an additional unit of capital and its replacement cost. When the increase in the market value of the additional unit exceeds (or is less than) the replacement cost, firms will want to increase (or decrease) their existing capital stock. This ratio, known in the literature as marginal Q, may differ from unity because of delivery lags and adjustment or installation costs. However, marginal Q is not easily measured, so what is used instead is the ratio of the market value of the entire existing capital stock to its replacement cost (the average Q ratio).

Abel (1980), Hayashi (1982), and Precious (1985), however, pointed to problems in using average Q. If firms enjoy economies of scale or market power, or if they cannot sell all they want, marginal and average Q will systematically differ. Moreover, the assumption of increasing installation costs is dubious. The
cost of additions to an individual firm's capital stock is likely to be proportional—or even less than proportional—to the volume of investment, because of the lumpy nature of many investment projects. More important, disinvestment, if feasible, is more costly than positive investment: capital goods often are firm-specific and have a low resale value. An extreme but useful view of this asymmetry is to consider investment completely irreversible.

This notion, introduced by Arrow (1968), suggests that under conditions of certainty, irreversibility creates a wedge between the cost of capital and its marginal contribution to profits. However, it is under conditions of uncertainty that irreversibility can have important implications for investment decisions. Recent literature (Bernanke 1983; McDonald and Siegel 1986; Pindyck 1991; Bertola 1989; Bertola and Caballero 1990) has emphasized that irreversible investment can be very negatively affected by risk factors. The intuitive reason is that if the future is uncertain, any addition to productive capacity today risks the chance that the firm may find itself stuck tomorrow with excess capital that cannot be (costlessly) eliminated. This implies that uncertainty may be as relevant for investment decisions as are such conventional variables as interest rates or taxes.

In the Keynesian tradition, the disequilibrium approach (Malinvaud 1980, 1982; Sneessens 1987) views investment as a function of both profitability and demand for output. In Malinvaud (1982), investment decisions have two stages: first, the decision to expand the level of productive capacity, and second, the decision about the capital intensity of the additional capacity. The former decision depends on the expected degree of capacity utilization in the economy, which provides an indicator of demand conditions; the latter decision depends on relative prices such as the cost of capital and labor. The distinction between the decisions is meaningful because factor proportions are assumed variable before the investment but fixed after it. The investment decision, in turn, takes place in a setting in which firms may be facing current and expected future sales constraints, an important departure from the continuous market-clearing assumed by both neoclassical (Jorgenson's) and Tobin's Q models. Therefore, investment depends both on profitability and on the prevailing sales constraints, which determine the rate of capacity utilization (see Sneesens 1987).

Disequilibrium models have often been criticized on the grounds that their assumptions regarding expectations are too simple and that they do not explain why prices are rigid. However, market disequilibrium and rational expectations are not necessarily inconsistent hypotheses. Neary and Stiglitz (1983) have developed rational expectations models in which the markets for goods and labor do not clear, in a context of forward-looking agents that anticipate future sales constraints and wage and price rigidities (see also Precious 1985). This is particularly relevant since investors are concerned with whether investment decisions made today will be justified by events in the future. From the policy viewpoint, important problems of macroeconomic adjustment, such as a persistent decline in output, are associated with (transitory) disequilibrium in the
goods and labor markets. In such conditions, investment behavior may involve a combination of expectations and market disequilibrium.

Another view is provided by macroeconomic models of coordination failure, which emphasize the inability of individual agents to successfully coordinate their decisions in a decentralized economic system. Although there are many potential sources for such failure (see Cooper and John 1988), the most common one is the existence of monopolistic competition and increasing returns to scale. In this context, the returns on investment depend on the overall level of economic activity, which in turn is positively affected by the volume of aggregate investment. Since each individual firm is likely to view its own contribution to aggregate investment as negligible, the social and private returns to investment diverge, with the former exceeding the latter. Under certain conditions, the economy may get stuck in an "insufficient investment" equilibrium, in which individual firms invest too little—lowering aggregate investment—precisely because each firm expects aggregate investment to be low (Kiyotaki 1988, Shleifer and Vishny 1989). As we emphasize later, this mechanism may play an important role in adjustment programs.

There is a growing literature on the effects of financial constraints on investment. At the micro level, firms may face binding financial constraints in domestic capital markets because interest rates are controlled or because of endogenous credit rationing (Stiglitz and Weiss 1981). Asymmetric information, adverse selection, and incentive effects may make interest rate changes an inefficient device to sort out good borrowers from bad borrowers. Under those conditions, credit rationing and quantitative constraints may be preferred by creditors.

The recent literature on the financial determinants of investment (see Fazzari, Hubbard, and Petersen 1988a, 1988b; Calomiris and Hubbard 1989; Mayer 1989; MacKie-Mason 1989; and Hubbard 1990) has emphasized that internal finance (retained profits) and external finance (bonds, equity, or bank credit) are not perfect substitutes. The discrepancy in the cost of financing is due to asymmetric information: lenders in capital markets cannot evaluate the quality of investment opportunities. This raises the cost of new debt and equity above the opportunity cost of internal funds. In this view, investment is sensitive to such financial factors—a departure from the idea of the perfect capital market.

Fazzari, Hubbard, and Petersen (1988a) and Hubbard (1990) report empirical research along these lines for industrial countries. They test the role of the financial structure of the firm in the Q, neoclassical, and accelerator models of investment by firm size. They find that financial effects are important for investment but also that there are differences in the sensitivity of investment to liquidity, depending on firms' policies regarding retained earnings. An important macroeconomic dimension of these findings is that, provided fluctuations in cash flow and liquidity are correlated with movements in aggregate economic activity and the business cycle, macroeconomic instability may affect investment mainly for firms that rely heavily on internal finance.
Chenery and Bruno (1962) raise an important point: in developing economies where domestic and foreign capital goods are highly complementary, the lack of foreign exchange to import machinery and equipment can constrain growth, although in the medium run, substitution between domestic and foreign capital goods, as well as export promotion, could ease the foreign exchange constraint (see Bacha 1984, 1990). Finally, income distribution may affect private investment through (a) the rate of profit, (b) the level of aggregate demand, and (c) the degree of social and political stability.

Macroeconomic Policy and Private Investment

Monetary, fiscal, and exchange rate policies aimed at correcting unsustainable macroeconomic imbalances are bound to affect private investment. The standard macroeconomic package oriented toward improving the balance of payments and reducing inflation includes restrictive fiscal and monetary policies supplemented by a real devaluation. Here we review the relevant empirical literature on the macroeconomic determinants of investment in developing countries, and highlight the transmission mechanisms through which such policies affect capital formation.

Monetary Policy

The restrictive monetary and credit policies included in stabilization packages affect investment in two ways: they raise the real cost of bank credit; and, by raising interest rates, they increase the opportunity cost of retained earnings. Both mechanisms raise the user cost of capital and lead to a reduction in investment. This effect has been confirmed in studies by de Melo and Tybout (1986), Greene and Villanueva (1991), and Solimano (1989). Other economists disagree, however. Van Wijnbergen (1982), Blejer and Khan (1984), Lim (1987), and Dailami (1990), for example, find that in the repressed financial markets typical of many developing countries, credit policy affects investment directly, because credit is allocated to firms with access to preferential interest rates rather than through the indirect interest rate channel—although interest rates also affect firms that borrow in the unofficial money market (van Wijnbergen 1983a, 1983b). Thus the institutional structure of financial markets in developing countries is important in determining the effect of monetary and credit policy on investment, and how such policy is transmitted.

Fiscal Policy

High fiscal deficits push up interest rates or reduce the availability of credit to the private sector, or both, thus crowding out private investment. Hence the reduction of the public deficit during macroeconomic adjustment should allow
private investment to expand (as confirmed by van Wijnbergen 1982 in the case of the Republic of Korea). However, the way a fiscal deficit is corrected also matters. The mix of tax increases and spending reductions will affect aggregate private investment. Efforts to reduce the public deficit often involve cutting back on public investment. Some of these expenditures (especially on such components of infrastructure as roads, ports, and communication networks) may be complementary with private investment and will cause private investment to fall. This underscores the need to protect public expenditure on infrastructure during the adjustment process to encourage the recovery of investment and growth.

Several empirical studies have attempted to shed light on this issue. A study by Blejer and Khan (1984) based on cross-country data found that government investment in infrastructure is complementary with private investment (and other types of government investment are not). More recently, Greene and Villanueva (1991) and Serven and Solimano (1991) arrived at similar conclusions based on multicountry panel data. Musalem (1989) reported that private and public investment were complementary in a time-series study of investment in Mexico. Balassa (1988), however, reported cross-section estimates showing that an increase in public investment led to a decline in private investment. Furthermore, he found a negative correlation between the share of public investment in total investment and the size of incremental capital-output ratios, which indicates that public investment is less efficient than private investment. Khan and Reinhart (1990) reexamined the differences in productivity between private and public investment for a sample of twenty-four developing countries and found that the marginal productivity of public sector capital is negative (although not significantly so), whereas that of private investment is significantly positive.

Changes in Output

Empirical studies of investment in developing countries show that changes in output are the most important determinant of private investment (see Blejer and Khan 1984; Faini and de Melo 1990; Greene and Villanueva 1991; Serven and Solimano 1991). To a certain extent this is puzzling, since a substantial amount of fluctuation in output appears to be transitory and therefore should not affect investment. And it is costly to install capital, so adjusting to transitory shocks is sub-optimal. Thus the puzzle remains largely unexplained (see Shapiro 1986), although it might be due to investors' myopic expectations or short planning horizons.

Whatever the cause, the implication is that the contraction in demand induced by adjustment measures is likely to have an adverse short-run effect on investment because of its negative effect on output growth. This is apparent in the context of the Q theory of investment. Solimano (1989) shows that in Chile, aggregate investment profitability is procyclical—Tobin's Q increases in
upturns and falls in downturns—so we should expect the market value of capital, and hence investment, to fall in the short run in response to a slowdown in economic activity.

The downturn may also affect investment through its effect on expectations. A recession, for instance, could lead investors to postpone investing until the economy recovers. This response may, in turn, delay the recovery. To avoid such an outcome, it is important that governments design demand adjustment policies that minimize the potentially adverse effects on investment and growth.

**Exchange Rate Policy**

To reduce the external imbalance, adjustment programs rely on a combination of policies that cut back on expenditures and switch spending toward domestic goods. Such expenditure-switching policies generally include a real devaluation, with significant consequences for investment.

**Profitability.** Devaluation has important effects on profitability through its impact on the relative price of capital goods. Because investment goods combine domestic components (that is, construction or infrastructure) and foreign components (machinery and equipment), a real depreciation raises the real cost of imported components and acts like an adverse supply shock in the “production” of investment goods. Buffie (1986) and Branson (1986) note that a real deprecation increases the real cost of new capital goods relative to domestic goods, depressing investment in nontradable activities. In the tradable goods sector, however, the cost of new capital goods—relative to the price of output—falls, and investment rises. The result for aggregate investment is therefore uncertain.

The empirical studies reflect this theoretical ambiguity. In the short run real depreciation adversely affects investment (although its long-run effect may be positive). For example, Musalem (1989) finds that devaluation had an adverse effect on investment in Mexico. Faini and de Melo (1990) arrive at similar results using data for twenty-four developing countries. Branson (1986) explicitly calculates the impact of a devaluation on Tobin's Q in the home goods sector, concluding that profits fall (along with the market value of capital), while the real cost of new capital goods rises. Solimano (1989), using an empirical simultaneous equation model for Chile, also concludes that a real depreciation reduces investment in the short run, although it recovers in the medium term. Moreover, this study finds that a real appreciation produces an unsustainable expansion in investment. Empirical analysis of panel data on private investment for a number of developing countries (Serven and Solimano 1991; Cardoso 1991; and Larrain and Vergara 1991) shows that the real exchange rate has an insignificant effect, in the statistical
sense, on aggregate investment; its coefficient of variation does have a significantly adverse effect.

In general, a high dependence on imported capital and intermediate goods, along with a relatively low share of traded goods in total investment, would result in a contraction of investment after a real devaluation. Lizondo and Montiel (1989) distinguish between investment in traded and nontraded goods in a model in which capital is sector-specific. They decompose the effect of devaluation on the cost of capital, the product wage in both sectors (also examined by van Wijnbergen 1985 and Risager 1988), and the cost of imported intermediate inputs. The results show that the net effect of a real depreciation is ambiguous; investment in tradable goods increases while investment in domestic goods declines.

Anticipated and unanticipated devaluation may affect the profitability of investment through the real interest rate. In the case of an unanticipated devaluation, we assume that interest rates are market-determined. Devaluation will raise the price of imported intermediate inputs, and wages under indexation will rise. If monetary policy does not fully accommodate the increase in prices, real money balances will fall, pushing up the real interest rate for a given rate of (expected) inflation. In this way, devaluation depresses the market value of existing capital and exerts an adverse effect on investment. By contrast, if devaluation were anticipated and if it eliminates expectations that the currency will be devalued, investment may expand, since the required return on capital would tend to fall, mirroring the reduction in the anticipated rate of depreciation. This result depends on the degree of capital mobility and on the import content of investment.

FINANCIAL EFFECTS OF DEVALUATION. The debt crisis of the 1980s has attracted attention to the effect of devaluation on the real value of foreign currency liabilities. In the case of firms with foreign debts, devaluation automatically raises the burden of debt, reducing the net worth of firms producing home goods. If domestic credit markets are imperfect (as is often the case in developing countries), these firms may face credit constraints or higher financing costs as creditors raise interest rates to compensate for the increased risk of default. These financial pressures will lead directly to reduced investment for indebted firms at risk of bankruptcy. The increase in the real value of the firms' foreign debt also affects investment indirectly. As the net worth of these firms falls, so does the quality of the portfolios of their domestic creditors. Banks and financial intermediaries may be forced to reduce their exposure by cutting their loans—or they may simply go bankrupt. The ensuing tightening of credit markets may reduce the supply of credit (or raise interest rates), even for firms that had no foreign currency liabilities. The implications for investment are obvious as financing becomes scarce and expensive.

The financial effects of an unanticipated devaluation may require the government to bail out firms or financial intermediaries to avoid an epidemic of
bankruptcies that could jeopardize the adjustment effort. Financing the bailout, however, may lead either to inflation or to a domestic debt overhang, if the government or the central bank issues bonds to cover the foreign exchange losses of commercial banks or firms. The ensuing rise in the public debt puts upward pressure on interest rates, crowding out private investment. It is important to note the implicit tradeoff between supporting investment today (by subsidizing indebted firms) and supporting investment tomorrow, when previously issued public debt may crowd out investment.

Empirical studies of the financial effects of devaluation and its impact on investment are scarce; the exceptions are Easterly (1990) and Rosensweig and Taylor (1990). In Easterly's model, devaluation results in a drop in gross domestic product (GDP) and in private investment, but the decline in investment is greater than the reduction in GDP. The main cut in investment comes from corporations and is due to a sharp increase in real foreign indebtedness. Easterly reports that the cash flow of corporations declines substantially as a result of capital losses on dollar debt, while the replacement cost of capital rises sharply. Rosensweig and Taylor also underscore the importance of foreign currency liabilities. In their model for Thailand, GDP increases following a real depreciation, under the assumption of a strong export response to relative price incentives (ignoring capital losses on foreign debt). Higher net worth results in more deposits to banks, credit supply rises, and interest rates fall. The result is an increase in investment. But when the capital losses on foreign liabilities associated with a devaluation are taken into consideration, the expansionary net effect on exports may be offset, and domestic capital formation may fall.

DEVALUATION, OUTPUT, AND INVESTMENT. Devaluation may also reduce investment by depressing aggregate demand. Moreover, if investment has a significant import content, the expansion of output is likely to be a necessary (but not sufficient) condition to expand investment (Serven 1990).

The literature on contractionary devaluation (Krugman and Taylor 1978; van Wijnbergen 1982; Edwards 1988; Solimano 1986; Lizondo and Montiel 1989) emphasizes the slow working of substitution effects arising from devaluation. In the short run its adverse effects on income are dominant. These effects operate through two channels on the demand side: one is the likely trade imbalance, which results in a real income transfer to the rest of the world (even at given terms of trade); the other is the negative effect on consumption as real income is redistributed from wages to profits. On the supply side, three mechanisms of transmission may contribute to the contraction of output: the increased real price of imported inputs for domestic goods, the rise in the price of working capital (due to increased interest rates), and real wage resistance. If the currency devaluation leads to a drop in GDP, the slump in economic activity will prompt a cut in investment (unless the slump is perceived to be transitory). Given strong substitution effects, however, such as a large rise in net exports, GDP will expand, raising real income and stimulating
investment spending as the degree of capacity utilization increases. This outcome is more likely as time passes and substitution effects gradually come into play.

**THE TIMING OF INVESTMENT.** An anticipated devaluation can have a substantial effect on the timing of investment through its effect on interest rates and the future price of imported capital goods (for a detailed exposition, see Serven 1990). Its effect on interest rates depends on the degree of capital mobility, that is, the costs of portfolio adjustment. In the case of imperfect capital mobility, the domestic real interest rate is an increasing function of the foreign real interest rate plus the expected rate of depreciation of the real exchange rate (it may also depend on the relative or absolute stocks of financial assets). The perception that a real depreciation is imminent will be reflected in higher real interest rates—according to the degree of capital mobility. In this way expectations of a devaluation represent a transitory disincentive to invest; pending the depreciation, the real interest rate is high and investment is low. Once devaluation has taken place, the disincentive is eliminated and investment rises.

The import content of capital goods operates in the opposite direction. When a real depreciation is anticipated, the real price of imported capital goods is expected to rise. Before the depreciation, imports of capital goods are cheap and investment high (the mechanism is similar to an anticipated increase in tariffs on investment goods). Dornbusch (1985) notes that this represents a transitory investment incentive that disappears once the depreciation is implemented. The net effect on investment depends on the degree of capital mobility relative to the import content of investment. When capital is highly mobile, the effect on the interest rate dominates, and expectations of a devaluation lead to an investment slump that will persist until the depreciation is actually undertaken. When capital is relatively immobile and investment requires a high proportion of imported capital goods, an anticipated depreciation may result in a transitory investment boom that subsides when the depreciation occurs.

**The Incentive Structure**

A key ingredient of most adjustment packages is a change in economic incentives that switches spending to domestic goods and raises profitability in the tradable sector. This change in incentives is expected to lead to a burst of investment in tradables, increasing production and economic growth, and thus ensuring the sustainability of the adjustment effort.

In practice, however, the investment response often is unexpectedly slow and weak. In the meantime, the short-run deflationary consequences of expenditure cuts may be magnified, leading to a reduction in growth. In the face of high
costs of adjustment in terms of employment and growth, the stabilization effort may fail.

Conventional investment theories do not explain this slow response except by resorting to the (unconvincing) argument that firms face rapidly increasing costs of adjustment (which does not seem to be the case), or that investors adapt very slowly to economic changes. A more satisfactory explanation takes into account the importance of uncertainty.

**Irreversibility, Uncertainty, and Investment**

Uncertainty plays a key role in investment decisions because they are irreversible (see Pindyck 1991). These investments represent sunk costs, because capital, once installed, cannot be used in a different activity (without incurring a substantial cost). The decision to invest in an uncertain environment involves exercising an option—the option to wait for new information. The loss of this option, which must be considered part of the opportunity cost of investment, is overlooked in conventional calculations of net present value. As recent studies have shown, this opportunity cost can be substantial and is also sensitive to the prevailing degree of uncertainty about returns to the investment. Thus changes in uncertainty can have a strong effect on aggregate investment. From a policy perspective, a stable incentive structure and macroeconomic policy environment may be as important for investment as the level of the tax incentives or the interest rate. In other words, if uncertainty is high, incentives may have to be prohibitively large to have any significant effect on investment.

The effect of uncertainty is independent of investors' risk preferences or the extent to which risks may be diversifiable. Investors may be risk-neutral (as assumed by most of the literature on irreversibility) and their risks diversifiable, but investment would still be hostage to the perceived degree of uncertainty.

From a macroeconomic perspective, different forms of uncertainty may be relevant for investment decisions. For example, in the face of uncertain demand (see Pindyck 1988 and Bertola 1989), firms will opt for lower capacity if investment is irreversible than they would under conditions of reversibility. However, the ex-post capacity level may actually be higher under irreversibility, because if demand is unexpectedly low, an irreversible investment cannot be undone. Pindyck and Bertola also show that increased volatility in demand will generally lead to reduced investment.

Dixit (1987), Krugman (1988), and Krugman and Baldwin (1987) found that when sunk costs of entry are combined with uncertain future real exchange rates, firms are discouraged from entering the export market even though favorable current exchange rates would seem to make entry profitable. Similarly, Caballero and Corbo (1988) show that uncertainty over future real exchange rates can depress exports. Dornbusch (1988) examines the related issue of reversing capital flight following a real depreciation. He argues that if a country
wants to attract capital to irreversible fixed investment, an overdepreciation of the exchange rate may be needed to compensate for the uncertainty faced by investors.

Ingersoll and Ross (1988) and Tornell (1989) examine interest rate uncertainty in the context of irreversible investment where future returns are known with certainty. They conclude that the effect of changes in interest rate uncertainty on the optimal timing of investment may be sizable. Moreover, an expected decline in future interest rates may not lead to increased investment because the change lowers the cost of waiting, and thus the effect on investment is ambiguous. In other words, the volatility of interest rates may have a more important effect on investment than do the actual levels of interest rates.

The relevance of these results for macroeconomic policy in developing countries cannot be overemphasized. Many developing countries suffer from high, unpredictable inflation and price variability. The findings on irreversible investment suggest that changes in prices that affect sectoral incentives may be ineffective in stimulating investment. It may take some time before investors are convinced that the changes are permanent. The decision to implement an adjustment program may well increase uncertainty in the short run, as private agents get mixed signals about which incentives apply to previous policies, which to stabilization, and which to structural reforms. Van Wijnbergen (1985) shows that a trade reform that is suspected to be only temporary can reduce investment in both tradable and nontradable sectors as economic agents postpone decisions in order to receive additional information.

The foreign debt burden faced by highly indebted countries and the associated income transfers to foreign creditors represent another source of instability (Sachs 1988). In a context of uncertainty, the real exchange rate and the demand management policies consistent with the required income transfer are also uncertain. Even the amount of the income transfer is unknown, since it depends on future interest rates and terms of trade. The transfer may require changes in the real exchange rate or fiscal contraction, or both. Thus investors face the risk of large swings in relative prices, taxes, or aggregate demand, each of which leads to reduced investment.

This effect may be hard to identify because foreign debt may affect investment adversely through two additional channels (Borensztein 1990): the debt overhang, which acts as an anticipated foreign tax on current and future income (as part of the returns on investment accrue to foreign creditors in the form of debt service payments); and credit rationing, because a highly indebted country is likely to face credit constraints in international capital markets. Empirical studies (see Faini and de Melo 1990; Greene and Villanueva 1991; and Serven and Solimano 1991) have confirmed that the debt burden has an adverse effect on investment.

Luis Serven and Andrés Solimano
The Role of Credibility

From a policy perspective, the incomplete credibility of policy reforms is an important source of uncertainty. Unless investors view the adjustment program as internally consistent and are convinced that the government will carry it out despite the implied social costs, the possibility of reversal will become a key determinant of the investment response. Governments can reverse adjustment policies, but investors cannot undo decisions about fixed capital. In such conditions, the value of waiting arises from the losses that investors would incur if policies were reversed in the future.

Any given set of policies will affect investment depending on the prevailing degree of confidence of the public. Stabilization may entail marked social and economic costs if the government’s credibility is low, because the investment response will be too low to offset the deflationary bias of demand restraint. Thus a deep recession may develop before investors are persuaded that adjustment measures will be maintained. This skepticism is particularly relevant in economies with a history of frequent policy swings or failed stabilization attempts—two features shared by many developing countries.

The right economic incentives are a precondition for investment and growth but not a guarantee. Obviously, credibility would help speed the investment response and reduce the costs of adjustment, but how can governments improve their credibility? In this context, the choice between gradual and abrupt stabilization is an important one. Gradual adjustment involves modest objectives that can be achieved and that are intended to strengthen the government’s reputation. In contrast, an abrupt adjustment involves drastic measures—an overdepreciation of the exchange rate, for instance—to stimulate the prompt reallocation of resources (although it could also increase the social costs). The choice will largely depend on the social distribution of adjustment costs.

It is important to emphasize that a reversal of policy is an endogenous outcome, since the private sector ultimately determines whether the adjustment program can be sustained. For example, when a large real depreciation does not attract investment to the tradable sector because confidence is low, its only visible effects will be a decline in real income and a redistribution of income from labor to capital, especially in the tradable sector. However, because the depreciation does not compensate for the lack of credibility, the increased profits will be reflected in increased capital flight. Social pressure and balance of payments problems may eventually force a reversal of policy, thus confirming the initial skepticism of investors.

But the same policy, in a situation of high confidence, can lead to an investment boom that validates the adjustment program. This indeterminacy is due to the difference between the social and private returns to investment: higher aggregate investment helps sustain the adjustment effort and therefore results in higher returns to investment—a mechanism ignored by individual investors.
If left to its own resources, the economy may get stuck in the "low confidence–low investment–adjustment failure" cycle.

How can such a cycle be avoided? The answer is not simple. While transitory investment incentives would appear to be the most appropriate tool to spur investment, in practice they run the risk of destabilizing public finances. By contrast, sufficient external support may raise investors' confidence in the sustainability of the adjustment (Dornbusch 1991).

**Uncertainty and Investment: Empirical Applications**

The empirical literature on uncertainty and irreversibility is sparse. Pindyck (1986) tests for the effects of uncertainty by introducing the volatility of stock returns as an explanatory variable in an investment equation; his results (with U.S. data) show a negative relation between the volatility of stock returns and investment growth. Solimano (1989) also investigates the effects of economic instability in an empirical model applied to Chile. He finds that the volatility of the real exchange rate and output have a significant negative effect on private investment, and he argues that the large swings in both variables in the 1980s may have reduced private investment as compared to a scenario of lower relative price and output variability. Dailami (1987) reports similar results for Brazil. Dailami and Walton (1989) argue that macroeconomic instability may be a major cause of low investment in Zimbabwe. Recent multicountry panel data studies of investment (Serven and Solimano 1991; Cardoso 1991; Larraín and Vergara 1991) also found that measures of macroeconomic instability, such as the variability of the real exchange rate or of the inflation rate, have an adverse effect on investment.

Empirical applications of structural models of irreversible investment have so far been very limited. Bizer and Sichel (1988) have developed a model of capital accumulation with asymmetric costs of adjustment. In this framework, irreversibility implies higher costs to downward than to upward adjustment. Their preliminary results using industrial sector data for the manufacturing sector are somewhat mixed, perhaps because of problems with aggregation. The role of irreversibility may be masked in aggregate data; as Bertola (1989) points out, irreversibility is probably more relevant at the level of the individual firm. Bertola and Caballero (1990) present a formal model based on the aggregation of individual firms' irreversible investments. The resulting aggregate investment rule gives satisfactory results when applied to U.S. data, although more work is still needed. Caballero (1991) has applied a similar approach to data on some developing countries (Brazil, Korea, Mexico, and Turkey), with highly promising results.

Simulation models provide another way of assessing the practical importance of uncertainty and irreversibility. The development of a structural simulation model suitable for studying the effects of uncertainty on irreversible investment should be a research priority.

_Luis Serven and Andrés Solimano_
Issues for Further Research

This paper has reviewed the theoretical and empirical literature on macroeconomic adjustment and private capital formation. Further research should be a priority in the following areas:

- The specific mechanisms through which the level and composition of public investment affect private investment
- The relationships between different types of investment, for instance between investment in human capital and investment in physical capital, or between foreign and domestic investment
- The effects of macroeconomic adjustment policies on the composition and quality of investment
- The consequences of income distribution and redistributive policies for private investment
- The relationship between social and political stability and private capital accumulation.

Note

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