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PART III
Outcome of Phase III Episodes

Chapter 8

Short-Run Response to Phase III

Perhaps the most important statement that can be made about the short-run period following devaluation is that, almost inevitably, it will be difficult if Phase III is anything more than a tidying-up operation. Reducing the rate of growth of the money supply (and raising interest rates) will lead to some dislocations for those denied access to credit. Regardless of whether government spending is held in check or taxes are increased to reduce the government deficit, there will be politically important groups adversely affected by the proposed change. Even the changes in the import regime will lead to outcries; if imports are liberalized, the groups formerly receiving the premiums on import licenses will be disadvantaged, as will domestic import-competing firms which spring up—economic or not—in the insulated domestic market that characterizes the later stages of Phase II; if imports are curtailed sharply, importers and consumers will be disaffected.

To a considerable extent, some adverse reactions are unavoidable, although there have been cases where inappropriate or unnecessarily severe measures resulted in greater disruption than was necessary. Any policies designed to result in resource reallocation are bound to result in some short-run dislocations. The adverse political reactions are bound to be greater, the more delayed the potential benefits resulting from the new regime, but the attempt to shift a QR regime to a liberalized regime, with an attendant change in bias and exportable production, will always entail short-term costs that must be incurred before the longer-term benefits can be realized.

In addition to inevitable dislocations resulting from the policy shift, however, there are two widely held beliefs about the initial effects of devaluation: (1) that it is inflationary; and (2) that it results in domestic recession.[1]

Even here there are two separate issues: (a) the extent to which each of these two beliefs is based upon empirical evidence; and (b) the extent to which such an outcome is inevitable under optimal policy. In this chapter the empirical evidence is under consideration. After all, it is not only a question of whether devaluation is inflationary, but whether the inflationary impact is sizable or not. Likewise, even if devaluation has an adverse impact on the level of economic activity, its magnitude is important. Optimality considerations are covered in Chapter 10.

The first section reviews the evidence from the country studies with regard to the impact of devaluation on the price level. The second section then examines the record with regard to the level of economic activity. A final section traces the balance-of-payments experience of the countries in the short-run period following devaluation.

I. PRICE LEVEL BEHAVIOR

Perhaps the most pervasive belief is that devaluation is inflationary. At an analytical level, several observations are in order: (1) it is far simpler to defend the view that devaluation will result in a once-and-for-all increase in the price level than it is to provide *a priori* reasons why devaluation should affect the *rate* of inflation; (2) devaluation from exchange control is less likely to raise the price level than is a devaluation intended to reduce an open deficit; (3) import liberalization and the absorption of purchasing power through the transfer of premiums are likely to be deflationary, and thus they may offset part or all of the increase in the price level that would otherwise result; and (4) price level changes depend on devaluation and all other determinants of demand. An observation about the rate of change in the price level does not, by itself, constitute sufficient evidence from which to infer the contribution of devaluation.

Each of these four points warrants some elaboration. With respect to the first, one can easily construct models wherein domestic prices of tradables equal their international prices times the price of foreign exchange, while domestic prices of nontradables are rigid downward. In those models an increase in the price of foreign exchange automatically represents an increase in the domestic price of tradables. Since the price of nontradables cannot—by hypothesis—fall, the price level will increase with the exchange rate regardless of the weighting scheme employed to construct the index of the price level.[2]

That model, however, predicts only a once-and-for-all increase in the price level. To be sure, this increase might be stretched out over several years, empirically, as producers adjust to the altered price of inputs and users of their products in turn react to those increases. Such a model would predict a higher

than average "rate of inflation" in the year of devaluation, but this ter-
minology is inappropriate. If the underlying monetary and fiscal determinants
of the rate of inflation were unchanged over a long time period, a slightly
higher rate of inflation would be observed in the period following devaluation,
but the rate of inflation would be altered only in the statistical sense that the
average rate in the postdevaluation period would be higher.

Even the once-and-for-all price increase is difficult to attribute to
devaluation in any ultimate sense. Accepting for the moment the price-
determination model sketched out above, the determinants of the balance of
payments would have to be specified. Usually such determinants include the
behavior of the money supply and related variables. Then, one reason for
needing to devalue the currency would be because of past monetary behavior
that had not been fully reflected in the domestic price level index at a fixed ex-
change rate because of the constancy of the price of traded goods. In this case
devaluation would reflect the past domestic inflation that would have resulted
if—for example—the exchange rate had been permitted to float throughout
the period.

Those considerations, however, lead away from the point at issue here.
What is important is to distinguish between the amount of increase in the price
level following devaluation and sustained changes in the rate of increase in the
price level. The latter sort of effect from devaluation is possible only to the ex-
tent that some type of cost-push mechanism is present within the economy that
transmutes once-and-for-all price increases into an increased rate of inflation.
Debate over the likelihood and empirical relevance of such mechanisms has
continued for years, and the evidence from the country studies will hardly
resolve it. What can be said based on these studies is that the net results of
devaluation, import liberalization, and fiscal and monetary policy were such
that, on balance, the percentage price increase in the several years following
devaluation was no higher than before. In that sense they lend no support to
the hypothesis that cost-push mechanisms exist.

The second point—that devaluation is likely to result in less inflationary
pressure under exchange control than with an open deficit—follows im-
mediately from the fact that a net improvement in the trade balance is not the
sole objective of devaluation. In the traditional, open-deficit case, devaluation
will be successful only if the trade (payments) balance improves, but such an
improvement, by definition, removes supplies from the domestic economy. In
a "pure" liberalizing devaluation undertaken from balanced trade, this effect
would be entirely absent. Moreover, in devaluation with an open deficit,
assuming the absence of peculiar world supply or demand conditions, the
domestic price of both exportables and importables must rise. With devalua-
tion from exchange control, however, that is not necessarily the case. In the
usual situation the domestic price of exportables must increase, but it is not
always true that the domestic price of importables will also rise; insofar as

devaluation absorbs part of the premium on import licenses, the effect will be to leave the domestic price unaltered, thereby reducing the bias of the regime.[3]

The third point is the most obvious, but it is important and has often been overlooked. In addition to the fact that premium absorption is itself deflationary, an increased flow of imports during the period following devaluation is deflationary, and, in fact, imports have sometimes increased markedly as part of the Phase III policy package.

This point leads immediately to the fourth consideration: the behavior of the price level is the combined result of devaluation, of monetary and fiscal policy, of the extent to which imports are liberalized, of random shocks such as weather and terms-of-trade changes, and even of the behavior of real income. If enough deadweight losses associated with QRs and the Phase II regime were eliminated, or if the increased inflow of imports of intermediate goods and spare parts permitted increased utilization of capacity, the consequent increase in real output would absorb some purchasing power and could thus offset some of the price increase that might otherwise occur. Analysis of the behavior of the price level following Phase III must take into account all of the impacts on domestic prices.

Table 8-1 gives the rates of price increase surrounding devaluations. The single- and two-quarter data must be interpreted with care because seasonal factors are important; however, the data provide a useful reference as the experience of each individual country is discussed. In addition to the examination of each country's price level behavior after key Phase III episodes, an attempt was made to pool cross-section and time-series data in order to determine the general impact of devaluation on the price level; the results of this experiment are also discussed in this section.

Price Level Effects in Individual Countries

BRAZIL

The 1957 Phase III appears to have had little if any monetary and fiscal component; the major ingredients were the shift to *ad valorem* tariffs and the change in the exchange rate. There was neither intent to control domestic inflation nor was the inflation rate significantly affected. In contrast, the 1961 devaluation had a significant monetary and fiscal component, which Fishlow refers to as the "first time" orthodox policies had been attempted; however, it was a fairly short-lived attempt. The effects of the 1961 devaluation on the price level are reported by Fishlow and cited in Chapter 7. Relative prices did adjust without a cutback in real output. However, a political crisis brought in a new government, which promptly abandoned monetary and fiscal restraint.

Table 8-1.   Rates of Inflation over Specified Periods before and after Devaluations, Ten Countries (percent increase in the wholesale price index)

Country	Reference Quarter	1 Quarter		2 Quarters		4 Quarters		8 Quarters	
		before	after	before	after	before	after	before	after
Brazil	1957 III	1.2	0.0	−2.2	2.2	12.0	8.0	46.0	67.8
	1961 II	8.4	9.1	14.1	32.0	37.3	52.2	77.4	163.8
	1964 I	26.2	14.3	48.1	30.3	87.8	72.7	201.9	128.5
Chile	1956 III	60.0	25.0	103.0	72.0	189.0	201.0	368.0	349.0
	1959 I	9.3	9.4	13.6	17.9	25.8	16.2	69.5	16.2
	1965 II	8.6	5.4	14.9	7.5	24.0	22.1	88.7	46.5
Colombia	1951 I	.6	13.7	12.0	−0.4	75.0	6.7	−	56.0
	1957 II	7.7	8.4	9.8	10.8	19.2	20.5	28.7	32.5
	1962 IV	1.6	11.8	1.6	25.1	3.2	33.1	9.4	48.0
	1965 II	4.7	2.5	5.3	8.1	5.3	19.7	24.5	26.2
	1967 I	1.4	1.6	2.6	3.2	9.3	6.1	30.2	11.7
Egypt	1962 II	−2.0	1.0	−2.0	1.0	−2.0	0.0	0.0	4.0
Ghana	1967 III	8.1	4.5	6.4	9.0	2.0	20.3	3.1	22.5
India	1966 II	5.8	4.9	7.2	5.1	15.6	15.3	26.3	13.1
Israel	1952 I	25.3	28.0	36.0	31.2	−	72.3	−	143.7
	1962 I	2.6	1.7	7.3	3.4	8.2	7.6	14.5	14.4
South Korea	1961 I	12.2	1.6	10.3	0.7	17.4	5.4	32.0	15.6
	1964 II	12.7	2.6	24.9	3.5	46.2	7.8	65.0	16.4
Philippines	1960 II	−0.5	1.9	0.0	4.8	4.0	5.8	4.0	10.6
	1970 I	5.7	7.5	10.3	7.7	12.8	19.5	8.9	35.2
Turkey	1958 III	9.4	6.7	15.6	11.5	19.5	15.3	38.6	18.2
	1970 III	−1.4	4.4	−2.4	12.4	7.1	21.6	10.5	71.5

Sources: All data are from IMF, *International Financial Statistics*. Line 63 was the source except for Brazil, Chile, and the Philippines, for which line 63a was used, and Israel, for which line 64 was used. Data for Colombia for 1951 are from line 83, and for 1957, from line 62.

Whereas the 1961 devaluation was accompanied by a short-lived program, Brazil's 1964 Phase III episode was of an entirely different character, lasting from November 1964 until the end of 1967. Fishlow characterizes the 1964-1967 Phase III as being differentiated from that of 1961, not by the instruments used, but by the fact that they were applied over an extended period.[4] Their application was not uniform over this time, however. Monetary restraint was eased during the recession of 1965 as the money supply increased 75 percent during the year, and then in 1966 "the monetary brake was applied harshly and expansion limited to 16 percent provoking another and more serious slowdown in industrial activity. . . ."[5]

A wage formula was introduced under which wage increases lagged

behind the increases in the price level, so that real minimum wages fell about 20 percent over the 1964-1967 period, according to Fishlow's calculations.[6] It was anticipated that this would affect producer expectations with regard to future prices and that inflation would be slowed. Such was dramatically the case: compared with inflation rates of 40 to 90 percent in 1962-1964, inflation slowed to an annual average of 15 percent prior to 1974.[7]

Fishlow does not explicitly comment on the initial effect of the 1964 devaluation on the Brazilian price level. What seems clear is that Brazilian inflation was sufficiently rampant so that sustained efforts were required to contain it. The upward impact of devaluation on the price level cannot be isolated, but it was certainly not positive enough to prevent "orthodox" policies from working.

Chile

By far the most ambitious effort to estimate econometrically the effect of devaluation and liberalization on the price level was made by Behrman, who estimated the determinants of the *rate of increase* of Chilean prices in both a partial and a general equilibrium framework. Behrman notes that simple comparison of inflation rates before and after the Chilean Phase III episodes reveals a lower mean rate following the devaluations, but he attributes that finding to the fact that stabilization programs, with their restrictive monetary and fiscal policies, accompanied the devaluations.

Behrman's partial equilibrium estimate of the determinants of inflation indicated that domestic variables had most of the explanatory power.[8] When allowance is made for the fact that the money supply is partly determined endogenously via the balance of payments and other general equilibrium relations, the impact of the foreign sector is considerably greater. Behrman concluded:

> The widespread reluctance of Chileans to devalue because of an anticipated negative short-run inflationary impact, then, is well-founded. Such price increases, moreover, undo much of the potential positive effects of devaluation on the balance of payments. . . . Unless much more powerful monetary tools are developed, however, Chile cannot avoid the intensification of inflationary pressures from devaluation. . . .[9]

However, when he simulated a devaluation in which quantitative restrictions were also relaxed so that reserves did not increase, the results were different:

> . . . If liberalization accompanies devaluation, the price effects of the former will at best partially offset the inflationary consequences of the latter. This counteracting tendency has been too often ignored in discussions of the short-run consequences of devaluation and liberalization in the Chilean economy.[10]

This finding underlines the consideration noted above: if the flow of imports increases as part of the Phase III policy package, that deflationary impact can offset the once-and-for-all upward pressure on prices that results from devaluation.

COLOMBIA

The allegation that devaluation has an inflationary impact became very important in Colombia following the 1962 Phase III episode. Prices rose at an average annual rate of 10 to 12 percent compared to a rate of 2 percent in the year prior to devaluation.[11] Díaz estimated the determinants of this inflation rate, and he used these estimates both to examine the impact of exchange rate changes and changes in the flow of imports and to compared the predictions resulting from his estimated inflation rates against the actual rates. He found that his results were much more satisfactory with quarterly than with annual data, and he regressed percentage changes in various price indexes as functions of lagged money supply, wages, the exchange rate, and real supplies:

> The regressions also show that changes in the import exchange rate do significantly influence changes in the price level. That influence is also quick (yearly changes for the exchange rate performed much worse than quarterly ones) and quantitatively important. A 10 percent devaluation would be expected to increase prices by about 2 percent, ceteris paribus, according to these equations. It is noteworthy that when the 1956-58 period is included in the regressions, the importance of the exchange rate variable declines. For reasons that are not completely clear, the very large devaluations of those years affected the price level less than devaluations of later years. At any rate, even the 1958-69 results show that the extreme claims often heard in Colombia, which imply a value of 1.0 for the sum of the exchange-rate coefficients, are exaggerated. The combination of short lags for the price effects of devaluations, somewhat longer ones for wage-rate changes, and much longer (and less clear) ones for money, in turn influenced by fiscal and monetary policies, suggests an explanation for the popular but exaggerated identification of devaluations with inflation.[12]

Using his regression results, Díaz simulated the behavior of the price level on the assumption of a 10 percent devaluation and a 10 percent permanent increase in the flow of imports. He found that after all the lagged effects had been worked out, his equations predicted a price increase of about 1 percent nine quarters later. Prices would have increased in the period immediately following devaluation (as the exchange rate response came quickly) and then would have decreased in response to increased supplies of imports.[13]

In examining the behavior of prices in the period following the 1962 devaluation—the period when the inflationary burst offset the increase in the exchange rate—Díaz found that his regression equations accounted for "most,

but not all,'' of the inflation. He notes that the government raised a large number of prices of commodities that had been subject to price controls, including not only electricity and public transportation but also some "basic necessities.''

In contrast with the inflation following the 1962 devaluation, Diaz found that the inflation of 1966 was quite "normal.'' Imports had been liberalized so that real supplies increased. Diaz's results indicated that the price level effect of devaluation should have been positive in the first two quarters following devaluation (by 4 and 3 percent respectively), but that the lagged effect of the real supplies variable should have resulted in small deflationary pressures (less than 1 percent) in each of the next three quarters.

These findings accord well with the notion that the price level impact of devaluation is a once-and-for-all phenomenon that can be offset by increased supplies of imports. Perhaps the most interesting aspect of Diaz's empirical results is the suggestion that there may be a sort of inverse J-curve response of the price level when devaluation is accompanied by increased import flows: prices may initially increase in (quick) response to the devaluation, and fall thereafter as the influence of increased supplies is felt.

Egypt

Egypt's 23 percent gross devaluation represented only a 3 percent net devaluation. Moreover, other policies—including nationalizations—were being pursued during the period surrounding Phase III, and monetary and fiscal policy were expansionary afterward. Under these circumstances the determinants of the behavior of the price level were quite independent of the exchange rate change.

Ghana

The consumer price index of Ghana was "slightly lower'' in the five months following devaluation than in the six months preceding it, and Leith found that relative prices changed. The domestic price of exportables rose relative to the domestic price of importables and home goods; and the domestic price of importables fell relative to.exportables but rose relative to home goods.[14] The Ghanaian government had been engaged in restrictive fiscal policy for a year prior to the devaluation. Leith concluded that

> the combined effect of the devaluation package and the government's fiscal policy does not appear to have been inflationary. On the contrary, the initial conditions surrounding the devaluation suggest that the growth of excess demand for real resources by domestic residents was dampened, and possibly even the absolute level of excess demand was reduced.[15]

INDIA

Bhagwati and Srinivasan explained:

> There was price inflation in India, at any rate since 1962-63, and the pace of price
> rise indeed quickened in 1966-67. This led some uncritical observers to attribute
> this phenomenon to devaluation on a *post hoc ergo propter hoc* basis.[16]

In the Indian context, they demonstrate that the price of food grains is domi-
nant in determining the overall price level. They estimated a simultaneous
equations model of price determination for food grains and then contrasted
the actual behavior of food grains prices with that predicted by their model at
three output levels: (1) with actual food grain output; (2) with 1964/65 levels
of output; and (3) with trend levels of output. Actual food grain prices rose
from 139 to 175 during the two years following the 1964/65 harvest, and the
price increase was somewhat less than that predicted by their model with actual
values of output. Had agricultural output held constant, their results would
have predicted a much smaller increase in prices; had agricultural output in-
creased at its trend rate, the observed price increase would have been less than
9 percent over the two years.[17]

ISRAEL

Israel's two Phase III experiences began from entirely different bases. In
1952 the economy had been governed by quantitative controls of all kinds, and
there was repressed domestic inflation—controlled prices were used in official
price indexes, while black markets abounded. During the 1952-1955 period,
there was a virtually complete shift from QRs to reliance on prices. The of-
ficial price statistics, therefore, are not reliable and overstate the true rate of
inflation during that interval. Michaely made no effort, in view of the poor
quality of the statistics, to estimate the determinants of the price level, but con-
cluded:

> During 1952-54, the domestic price increase, although substantial, was far below
> the increase in the rate of exchange. . . . This lag of movement of local prices
> behind the exchange rate is all the more remarkable in view of the preceding com-
> ment on the strong upward bias involved in the use of official price indexes. . . .[18]

In contrast, domestic prices rose rapidly following the 1962 devaluation, and
the change in the real exchange rate was almost completely eroded within three
years. Michaely attributed this phenomenon to the expansionary demand
policy that accompanied devaluation, rather than to the devaluation itself.
    Overall, the 1952-1955 Israeli experience must be judged to be one of the
cases in which devaluation was part of a policy package that ultimately
resulted in a sharp decrease in the rate of inflation. The 1962 episode,

however, is one in which the inflation rate was apparently essentially unaffected.

SOUTH KOREA

The South Korean experience is somewhat like that of Israel, except the order is reversed. The first liberalization effort in 1961 failed as a consequence of expansionary monetary and fiscal policy and a bad crop following devaluation. The second attempt in 1964 was followed by a marked and sustained reduction in the rate of inflation; during the two years after the 1964 devaluation, prices increased by less than 8 percent annually compared with rates of more than 25 percent in each of the two years preceding devaluation (see Table 8-1).

Frank, Kim, and Westphal summarized the reasons for success in controlling inflation:

> . . . The May 1964 devaluation of about 50 percent (from 130 won to 257 won to the dollar) was not inflationary largely because of the monetary and fiscal stabilization program. Another fact is important here also: the devaluation was more de jure than de facto, at least with respect to exports. . . . Since the devaluation was not really de facto, there was little upward pressure on the prices of export goods.
>
> The sharp rise in the bank deposit rate in 1965 also helped to curb inflationary pressures. The great rise in savings and bank deposits substantially reduced the velocity of circulation of the money supply.[19]

The increase in deposits resulted from monetary and interest rate reforms that had followed the 1964 devaluation.

THE PHILIPPINES

The 1960-1962 Philippine Phase III episode was designed to liberalize the regime. Macroeconomic considerations had not been important in leading to the decision to shift away from quantitative restrictions, and, as the data in Table 8-1 show, inflation was not a problem either before, during, or after the transition period. Indeed, Baldwin reports the deliberate use of easy monetary policy during 1961, presumably to facilitate the adjustment.[20]

In contrast the 1970 devaluation had its roots in the foreign exchange crisis that resulted from a large government budget deficit the preceding year. A policy of monetary restraint was followed in the postdevaluation period, but it is difficult to sort out the effects of the prior increases in the money supply from the impact of devaluation itself; in any event, the rate of inflation did not abate significantly.

TURKEY

Turkey's two experiences are distinctly different. The 1958 devaluation was followed by a once-and-for-all increase in the prices of a large number of commodities whose prices had been subject to controls. Thereafter the earlier inflation—at least 20 to 25 percent per year according to the official statistics (based on controlled, not black market, prices)—abated, and the price level was constant over the next several years. The major factors accounting for the control of inflation were the adoption of realistic pricing policies by the State Economic Enterprises and the increased flow of imports that followed devaluation. The State Economic Enterprises had been incurring large deficits, which were financed by central bank credits in the 1955-1958 period; those credits had resulted in large increases in the money supply and the inflation. Elimination of the source of money supply increases would, in itself, have done much to reduce inflationary pressures. In the year following devaluation, however, a sizable increase in imports further dampened the inflation, and Turkey experienced rates of inflation of less than 5 percent throughout the first half of the 1960s. It is also noteworthy that real GNP increased, which reflected the better utilization of resources made possible by imports of spare parts and intermediate goods.

The 1970 devaluation had an entirely different aftermath. The inflow of workers' remittances had a substantial impact on the money supply. Consequently the rate of inflation increased sharply after the 1970 devaluation. The exchange rate change itself was used as the occasion to raise prices of products sold by several State Economic Enterprises. It is difficult to estimate what would have happened to the rate of inflation had the central bank somehow been able to sterilize the inflow of workers' remittances. What seems clear is that the greater part of inflationary pressure resulted from the accumulation of foreign exchange reserves and the consequent increase in the money supply, rather than from the devaluation itself.

Price Level Behavior and Devaluation

In an effort to summarize statistically the impact of devaluation on the price level, a simple price level determination model was fitted for each country, and coefficients for dummy variables were estimated for each of the four quarters following devaluation. The procedures used, and the results, are reported in the appendix to this chapter. For present purposes, what is significant is that the sign of the coefficients of the dummies reflects the net direction of the change in the price level resulting from all influences other than the money supply in the postdevaluation period. As such, they can be taken as being a descriptive statistic of the average change in the rate of inflation experienced

following the start of Phase III episodes after allowance is made for a simple money-supply/price-level relationship. For the twenty-two Phase III episodes, all signs were negative, although none was significant at a 95 percent confidence level. This reinforces the impression from the country studies that, on balance after taking account of monetary behavior, the average effect of other influences was to dampen the rate of price increase.

Such a result does not imply that devaluation from a position of exchange control is deflationary. It does, however, confirm the evidence from the individual studies that: (1) the popular interpretation of the extent of inflationary pressure resulting from devaluation is greatly exaggerated; (2) while the effect of devaluation itself may be to raise some prices, there are significant offsets; and (3) the magnitude of the inflationary impact is not likely to be so great that it cannot be offset by appropriate policies, including monetary and fiscal restraint and liberalization of the flow of imports.

To be sure, circumstances vary from country to country and time to time, and an element of luck is involved in the behavior of the price level. Bad harvests, in particular, seem to have played havoc with some attempts to maintain the price level—as in India in 1966 and in South Korea in 1962—and good harvests have contributed to a reduction in inflationary pressures in other cases—most notably in Ghana.

What does seem clear is that rejecting devaluation because it might lead to inflation could be rational only in very special circumstances or in a situation where there were constraints on the adoption of other supporting policies.[21] At least in principle, to the extent that liberalization of the regime is a policy objective, restrictive monetary and fiscal policies could be adopted and imports liberalized enough to offset the pressures on the price level that might otherwise emerge. The contribution of exchange rate changes was very small compared to other types of inflationary pressures faced by the countries covered by this project.

II. THE LEVEL OF ECONOMIC ACTIVITY

Another frequent allegation made about devaluation is that it is likely to be followed by recession, or at least a slowdown in the growth rate. This belief accounts for part of the skepticism toward "IMF advice"—the recommendation to "devalue, cut back government expenditures, and control the money supply." It is widely believed that such policies have not led to an improved balance-of-payments situation and a higher rate of growth, but rather to recession, without visible and sustained balance-of-payments relief, and to the eventual abandonment of the program with a resumption in the rate of inflation.

Background Considerations

There are very important questions about whether a slowdown in the rate of growth necessarily accompanies successful transition from QRs to a liberalized trade and payments regime, and—if so—what the magnitude of any such slowdown might be. Answers to these questions hinge critically upon the timing and magnitude of the longer-term response of exports to the altered regime (and therefore on the maintenance of liberalization beyond the short run). These issues are addressed in Chapter 10.

In this section the level of economic activity during the Phase III experience is reviewed. In some instances exogenous events following devaluation resulted in a recession; in other cases inappropriate and overly restrictive policy probably contributed to intensifying and prolonging retardation in the rate of growth. Nonetheless, in the cases where there was some success in altering real exchange rates—that is, where inflation did not immediately wipe out any effects devaluation might have had (as in Colombia following the devaluation of November 1962)—there was a tendency toward slower growth, if not a reduction in the level of economic activity. It was, however, much less pronounced than is often alleged.

In reviewing the evidence from the country studies, it should be recalled that lower income results in a downward shift in demand for imports at any given import EER, thereby contributing to reduced premiums on import licenses, less bias, and greater liberalization. It also permits shifting resources toward the sectors whose profitability increases with reduction of variance and bias. Later on it will be argued that import license premiums can be reduced at lower cost through financing an immediate increase in the flow of imports by foreign borrowing than by reducing domestic incomes, while the reallocation of resources requires some slowdown in the pace of economic activity.

One other consideration deserves mention before proceeding. Although attention here is focused on the relationship between a slowdown in the rate of economic growth and the outcome of a Phase III episode, some of the devaluation/liberalization episodes were accompaniments to the domestic goal of halting inflation. It is quite possible that recession beyond a certain magnitude might not be a necessary part of the effort to shift to a liberalized regime, but might be essential for the control of inflation. The issues involved in that debate are well beyond the scope of the present study.

The evidence from the country studies, therefore, must be sifted with regard to: (1) the magnitude of any recession; (2) the reasons for it; and (3) the contribution, if any, that changes in the level of economic activity made to liberalization of the trade and payments regime and to resource reallocation. It may prove useful to start by providing data on real growth rates of GNP and industrial production for periods during or surrounding each Phase III episode. These data are given in Table 8-2 for reference when the experience of

Table 8-2. Rates of Growth of Real GNP and Industrial Output for Years Surrounding Devaluations, Ten Countries

Country	De-valuation Year	Real GNP Growth Rate				Growth Rate of Industrial Output			
		Trend[a]	before	during	after	Trend[a]	before	during	after
Brazil	1957	5.8	5.0	8.2	6.6	9.0	13.2	11.3	16.3
	1961	4.3	6.6	7.2	5.3	5.1	10.0	10.8	7.7
	1964	4.3	1.6	3.1	2.7	5.1	.6	5.0	−4.7
Chile	1956	2.7	−1.2	−1.9	9.2	3.9	−3.1	1.4	−.4
	1959	2.7	.6	2.5	−1.5	3.9	2.3	8.6	−1.3
	1965	4.9	4.1	5.0	7.0	6.8	11.2	4.7	8.5
Colombia	1957	4.5	2.7	3.5	2.5	6.4	6.8	2.9	3.1
	1962	4.4	4.9	5.0	3.3	5.4	4.7	6.5	4.6
	1965	4.4	6.1	3.6	5.3	5.4	5.4	5.0	6.2
	1967	5.1	5.3	4.2	6.1	5.5	6.2	5.6	5.5
Egypt	1962	5.6	3.0	8.0	6.4	8.5	8.5	6.2	12.3
Ghana	1967	.9	.1	1.8	1.4	10.1	n.a.	−.6	11.7
India	1966	2.9	−4.7	2.0	9.5	6.7	1.3	2.4	4.3
Israel	1952	12.0	30.0	7.4	1.2	n.a.	n.a.	n.a.	n.a.
	1962	8.4	10.6	12.9	11.6	11.1	15.5	13.4	14.2
South Korea	1961	7.5	2.2	4.8	2.8	13.3	3.9	4.4	15.6
	1964	7.5	9.1	8.9	7.0	12.8	15.9	6.0	21.8
Philippines	1960	5.5	7.7	.8	6.2	9.2	7.0	1.9	8.9
	1970	4.8	6.6	5.0	7.8	6.8	6.9	2.4	7.3
Turkey	1958	4.0	7.8	4.5	4.0	9.2	10.7	5.5	3.7
	1970	6.8	5.4	5.6	10.6	9.6	12.0	2.0	10.4

n.a. = not available.

Sources: *U.N. Yearbook of National Accounts Statistics*, various issues, except that: (1) Ghanaian industrial rates were derived from Leith, Table III-3; (2) Egyptian data were provided by Hansen; (3) Israeli data are from Michaely, Tables A-2 and A-9; and (4) Turkish national income statistics, which were revised in 1973, were taken from the State Institute of Statistics and used in computing trend rates.

[a]Trend rates are for the periods indicated: Brazil−1957: 1950-1960; 1961 and 1964: 1960-1966. Chile−1956 and 1959: 1950-1960; 1965: 1960-1965. Colombia−1951 and 1957: 1950-1960; 1962 and 1965: 1960-1965; 1967: 1960-1970. Egypt−1950-1960. Ghana−1963-1966 for GNP and 1962-1966 for industrial activity. India−1960-1966. Israel−1952: 1950-1960; 1962: 1960-1966. South Korea−1960-1966. Philippines−1960: 1950-1960; 1970: 1965-1970. Turkey−1958: 1953-1958; 1970: 1965-1970.

each country is discussed. As a basis for comparison, the first column on each side of Table 8-2 gives the trend rate—that is, the average annual rate of growth of real GNP and industrial activity, respectively. The exact periods used for the trend are indicated in the notes to the table. The next three columns on

each side of the table give the rate of growth for the year before, the year of, and the year after devaluation. Thus, for example, in Chile the annual average rate of growth of real GNP was 2.7 percent for the period 1950-1960. GNP in 1959—the year of devaluation—exceeded 1958 GNP by 2.5 percent, and 1960 GNP fell 1.5 percent from its 1959 level.

Recession in Individual Countries

Any single statistic, particularly an annual one, cannot adequately indicate the level of economic activity. It is more appropriate, therefore, to interpret the data in Table 8-2 in the light of the analyses in the individual country studies.

BRAZIL

The 1957 Brazilian Phase III episode does not appear to have affected the rapid pace of economic growth in that country. Although the 1961 Phase III was accompanied by restrictive monetary policy for about half a year, Fishlow noted that the policy did not have any adverse effects on the level of real output. Table 8-2 reflects the absence of any significant change in the level of economic activity during either Phase III period.

It is the Brazilian experience after 1964 that warrants attention. In 1965 not only were GNP growth and industrial production well below trend levels, but slow growth continued throughout the next several years. Indeed, Phase III is judged to have continued until 1968. By any standard there was a significant recession, in the sense that output over the period as a whole was substantially below trend. The recession was not accompanied by high and rising unemployment for, as Fishlow demonstrates, real wages fell during the period. The authorities consistently underestimated the rate of price increase in computing the permitted wage rate, which fell 20 percent in real terms over the four years.[22]

Several factors are important in understanding the Brazilian recession. Perhaps most important is that the primary policy objective was to control inflation through restrictive monetary and fiscal policies. Liberalization of imports resulted from success in attaining the primary goal, not the other way around, as Fishlow describes:

> This internal stabilization strategy was not the counterpart of a more realistic commercial policy designed to restore external equilibrium by curbing domestic consumption. Rather, the sequence was the opposite. Slower growth directed to stem inflation had as a secondary consequence substantially reduced import demand, and thus made liberalizing measures possible.[23]

There is no doubt that the government was successful in achieving its primary objective. Inflation was substantially curbed. The annual rate of increase in

the GDP deflator was 78 percent in 1963 and 88 percent in 1964; thereafter the annual percentage increases were 55, 39, 27, 28, and 22 for 1965 through 1969, respectively, with rates slightly lower than that in the subsequent four years.[24]

What is open to question is whether the period of stagnation had to last as long as it did. Fishlow clearly believes that it did not. Until 1967, emphasis was on liberalization of imports. The bias toward import substitution had actually increased somewhat since 1961. Although exports rose, they did so because of excess industrial capacity induced by the recession and also because of larger agricultural output.[25] Only in 1967 did policy shift toward encouraging exports. At that time Antonio Delfim Netto assumed office as finance minister. His policy stance differed from the earlier one in that he believed that a more expansionary policy would lead to more growth and less inflation; Fishlow considers that this policy would have been more appropriate during the previous period, as well. This was the start of the emphasis on exporting and the adoption of the policies that led to Brazil's rapid growth and export boom of the late 1960s and early 1970s.

CHILE

Chile's Phase III experiences all were motivated by domestic considerations. The aftermath of the first Phase III episode, in 1957/58, was the highest rate of growth of real GDP of any postwar phase.[26] This rapid growth, however, appears to have been prompted by reasons other than the devaluation and liberalization. The second and third Phase III episodes, which were accompanied by restrictive monetary and fiscal policies, both saw a reduction in output. Behrman's conclusions are indicative of some of the problems involved with selecting appropriate monetary and fiscal policy:

> The short-run impact of both devaluation and liberalization on output was negative. Increased competition from imports more than offset the greater availability of imported inputs. This effect could have been lessened by lowering trade barriers immediately on noncompetitive imports and only more slowly on competitive imports. To do so, however, would have left many inefficient industries with even greater protection. It also might have made the whole liberalization attempt seem less credible.
>
> Another possibility would have been to use fiscal and monetary policy to offset the contractionary impetus of liberalization. This was done in 1965 and 1966. The obvious problem is that such a strategy increases inflationary pressures. In the Frei program [following the 1965 Phase III] the government tried to increase capacity utilization and growth by expansionary fiscal and monetary policy limited by a programmed decline in the rate of inflation. The latter, it was hoped, would reduce inflationary expectations despite the booming economy. There was initial success, but momentum could not be maintained for more than a year or two.[27]

As in the Brazilian case the recession in Chile was more a result of the restraint necessary to break inflationary pressures than of liberalization; had inflation not been a problem, expansionary monetary and fiscal policy could have been used to offset the deflationary effect of increased imports. Unlike Brazil's prolonged Phase II period following her 1964 devaluation, however, the magnitude and duration of the Chilean recessions were relatively small.

Colombia

The 1951 Phase III episode in Colombia was not analyzed in detail by Díaz, and it is omitted from Table 8-3 for that reason. Of Colombia's other four Phase III experiences, the 1962 experience was followed by inflation and is not relevant to issues under consideration here.[28]

The 1957 devaluation was accompanied by restrictive monetary and fiscal policy, and the result was a pronounced slowdown in the rate of growth; per capita real GDP fell in the year following devaluation. Given the restrictive policies accompanying devaluation, Díaz expressed surprise that the impact on the growth rate was not greater.[29]

The 1965 and 1967 Phase IIIs do not appear to have had any negative impact on the level of economic activity. Growth rates of investment, manufacturing, and GNP rose somewhat in 1966 and 1968,[30] and recession simply does not appear to have been a factor in those cases.

Egypt

Egypt's net devaluation was only 3 percent and it was followed by expansionary monetary and fiscal policy. The Egyptian experience does not provide any evidence on the macroeconomic impact of devaluation.[31]

Ghana

The fiscal and monetary policy of Ghana had been restrictive for a year prior to devaluation. The motive for further restrictiveness was that "apparently the authorities expected the impact of the devaluation to be inflationary. This expectation arose in part from a failure to recognize the potentially deflationary effect of the devaluation. . . ."[32]

It appears that the ability of producers to expand output as they obtained imports of intermediate goods and spare parts resulted in a net expansion of industrial production. Real income rose in Ghana in the two years following devaluation, as the figures in Table 8-3 indicate, although the trend growth rate for that country is painfully low.

India

India suffered a prolonged and severe recession in the two years following the devaluation. The principal reason for it was the drought, with the conse-

quent decline in agricultural production. Monetary and fiscal policy were also restrictive, primarily because the government feared that expenditures or other expansionary actions would only accelerate the increase in food prices.[33]

Bhagwati and Srinivasan do not believe that monetary and fiscal policies were restrictionist because of the devaluation, although they noted that it was apparent that some individuals expected devaluation to be inflationary: In their opinion,

> This view ignores one critical element in LDC devaluations—namely, that the inflow of aid implies that the immediate effect of the devaluation is likely to be significantly deflationary because imports often exceed exports by a factor of even two. Also, the fact that the net, as distinct from the gross, devaluation was not quite as great as was commonly believed . . . implied that any need for such a compensatory deflationary policy was correspondingly less, ceteris paribus.[34]

When Bhagwati and Srinivasan examined the impact of the devaluation itself on the level of economic activity, they concluded that it was mildly positive. Among the import-intensive industries (chemicals, metal-based industries, and art silk manufactures), chemicals production was able to increase significantly. Devaluation stimulated production in the capital goods industries, but that effect was more than offset by the decline in demand resulting from the government's cutback in its purchases of capital goods and the drought-induced decline in the level of income. While the monetary and fiscal policy of the Indian government can be criticized on grounds that a more expansionary policy might have permitted an increase in the level of industrial activity and investment, the recession that followed the 1966 devaluation must be judged to have resulted from factors exogenous to the devaluation and liberalization.[35]

ISRAEL

Israel's average annual rate of growth of real GNP over the period 1950 to 1970 was 10.5 percent, and the economy operated at a full employment level virtually throughout the period. Michaely's discussion focuses on the monetary and fiscal policies accompanying devaluation and their ability to contain excess demand. The only recessions experienced in Israel during the two decades were in 1953, after the shift in policies, and in 1965. There was no recession after the 1962 devaluation. Michaely attributes the 1953 recession to the restrictive monetary and fiscal policies designed to control domestic inflation.[36]

SOUTH KOREA

South Korea also experienced very rapid growth, and no deflationary pressures are reported for either Phase IH, although the rate of inflation was reduced after 1964. The relatively low growth rate for 1962, reported in Table

8-2, reflects the influence of a bad harvest rather than a recession. The expansionary monetary and fiscal policy followed during 1961/62 resulted in excess demand pressures. Certainly there is no evidence that recessionary tendencies accompanied either of the South Korean devaluations.[37]

THE PHILIPPINES

The two Philippine Phase III episodes were distinctly different in their origins. The first was designed to shift from QRs to pricing measures to protect domestic industry and was not intended to reduce the bias of the regime. Demand management policies do not seem to have been at issue. As Baldwin reported:

> Many import-competing manufacturing activities were, of course, adversely affected by the liberalization because manufacturers who had directly imported raw materials and capital goods at the exchange rate of P2 to the dollar and thus had reaped the windfall gain themselves now were faced with higher input costs. . . . The average annual rate of growth in the manufacturing sector declined from 7.7 per cent between 1957 and 1959 . . . to 3.8 per cent from 1960 to 1962. . . .[38]

According to Baldwin, while there was some shift in incentives following the 1960 devaluation, it was not sufficient to induce resources to move into export industries. The result was a "stagnation" of industrial activity as import-competing activities were cut back and there was nothing to replace them. The immediate downward pressure on the level of economic activity appears to have been less important, however, than the fact that industrial activity continued to grow at relatively low rates over the next several years.

The 1970 devaluation was entirely different, starting as it did from a situation in which there was sizable excess aggregate demand. Government policies were restrictionist in the period immediately following devaluation. However, the government was apparently concerned over price increases, and there is no report of a slowdown in economic activity. The overall conclusion must be that short-run recession has not been a part of the Philippines' experience with devaluation and its aftermath.[39]

TURKEY

Although reports on the level of economic activity following the 1958 devaluation indicated that there was a recession in Turkey, real GNP increased 5 percent in 1959 over its 1958 level. This was mostly due to an expansion of industrial output in response to the increased availability of imports. To be sure, tight money conditions led to outcries, and some of the import-competing industries that had sprung up during the exchange control period were closed down. But in light of the combined deflationary impact of the monetary and

fiscal policy, however, along with augmented flow of imports, the increase in real output is remarkable. Even such adjustments as did occur appear to have been over in a relatively short period of time—within a year following the devaluation. At about that time, however, monetary and fiscal policy signals were reversed and highly expansionist policies were pursued until 1960. Following a reversion to tight money after May 1960, there was a significant slowdown in the pace of economic activity,but it is difficult to attribute that to the devaluation. The 1970 experience, likewise, was almost completely devoid of any recession. The major problem was inflation in the period following the devaluation.[40]

Evaluation of the Evidence

Overall, only three of the twenty-two Phase III episodes—Brazil after 1964, Colombia after 1957, and India after 1966—can be said to have been followed by a severe recession of prolonged duration. The Indian recession appears to have resulted from factors almost entirely independent of the devaluation, and the Colombian from the stabilization program adopted. While other countries—most notably Chile—also experienced slowdowns in their growth rates, it is difficult to label them recessions. Moreover, much of the deflationary impact that did result apparently stemmed more from domestic stabilization policies designed to reduce the rate of inflation.

Several conclusions seem warranted. First, and perhaps most important, is that recession need not accompany successful liberalization (as evidenced by South Korea's experience). It has not been universal, and where it did occur it was less pronounced than seems popularly supposed. Second, it would appear that application of monetary and fiscal restraint is likely to lead to a retardation of growth; this may be an inevitable cost of attempting to break inflationary expectations. Third, while there are some elements of a liberalization effort—including any increase in the flow of imports—that are likely to be deflationary, those elements may have offsetting effects that permit increases in real output. To a certain extent the stimulus of increased real output associated with higher imports of intermediate goods may counteract the absorption of domestic purchasing power by increased imports of finished goods. Finally, there is evidence that changing the bias of the regime must result in some dislocation in economic activity; when bias toward import-substitution industries is reduced, their profitability will diminish. If the profitability of other activities is not sufficiently increased, longer-term stagnation may result. Parts of the Brazilian, Chilean, and Philippine experiences suggest this interpretation, and it is an issue to which attention will return after longer-term responses to Phase III episodes have been examined.

III. SHORT-TERM BALANCE-OF-PAYMENTS RESPONSE

If a devaluation is to result in permanent reduction in restriction and bias, other than in the trivial sense that failure to devalue would have meant greater restrictiveness and bias, foreign exchange receipts must at some point start growing at a rate not signficantly different from the rate of growth of demand for imports of goods and services.[41] Should foreign exchange receipts not grow at about that rate, QRs must become increasingly restrictive in order to contain foreign exchange expenditures at levels permitted by receipts.[42]

Generally, such growth of foreign exchange earnings depends on the rate of growth of exports. While private foreign capital flows, aid receipts, and tourist income can offset a deficit in the trade balance, their *rate of growth* is closely related to how well export earnings are performing: foreign investors are generally unwilling to lend if exports are relatively stagnant; aid receipts usually do not grow rapidly; and other sources of foreign exchange are usually determined by much the same set of variables as exports themselves.

A major purpose of devaluation with its accompanying reduction in bias and variance is to reallocate resources so as to increase production of exportables. But that sort of resource reallocation may not take place instantaneously for various reasons: (1) investors are very likely to wait to see if the new incentives created by the devaluation will continue; (2) it takes time to decide to create new capacity; (3) there are further lags as plant and equipment are ordered and installed; and (4) additional time may be needed for developing foreign markets.[43]

The short run, therefore, can be taken as the period during which resources might begin to shift, but it does not extend to the period when export earnings start growing out of the capacity created in response to the altered bias of the regime. Such a period is clearly perilous; if export earnings are not increasing, it is difficult to sustain the liberalization, and it is also likely that skepticism about prospects for its success will develop. This is the period during which many of the costs—including whatever price level increases and reductions in the rate of growth that result from devaluation—are incurred, but the longer-term benefits that could result are not yet realized.

There are a number of factors that could provide foreign exchange to support the liberalization during this period: counterspeculative flows following devaluation; the use of excess capacity, resulting from the depressed domestic market, to produce more exports; reduced imports because of domestic recession; relatively quick responses in markets without long gestation lags, such as tourism; and even fortuitous improvements in the prices of major export commodities or good weather.

The magnitude of these favorable factors and also the length of time required for longer-run adjustments to take place are important considerations when a devaluation-and-liberalization effort is debated by policymakers. The

availability of foreign exchange is the major determinant of the ability to sustain whatever liberalization accompanies devaluation until such time as foreign exchange earnings start growing. Estimates of the probable magnitude of financing needed for any particular liberalization, or of the amount of liberalization that could be permitted with a given level of available financing, would also depend on these factors.

Before reviewing the experience following the Phase III episodes covered by the country studies, there is one general topic, relevant for analysis of the response to devaluation from exchange controls, that should be explored: the reliability of information about the short-term response to devaluation. For reasons that are inherent in the nature of exchange control regimes, official statistics about shifts in the country's foreign exchange expenditures and receipts are likely to be unreliable. Because of that, interpretation of the results of Phase III episodes requires extreme care, and the difficulties involved in interpreting the data are sufficiently significant that they warrant special attention before proceeding.

The Validity of Official Statistics

One of the key features of Phase II regimes is that QRs, high tariffs, and the detailed regulations surrounding foreign currency transactions all provide strong incentives for false invoicing and evasion. In all probability, part of the recorded change in official statistics following devaluation reflects the response to altered incentives to misrecord transactions; not all recorded changes represent altered real flows. In the nature of the case there are no "true figures" against which the official statistics can be gauged to estimate the extent of such misreading, so the probable direction and magnitude of misrecording can only be inferred.

There are all sorts of ways in which incentives for misrecording are created, and they all have their impact on balance-of-payments statistics. First, there are incentives for completely avoiding transactions through official channels, as with black market operations and smuggling; the effect is to remove those transactions from the official payments statistics. Second, there are numerous incentives to misclassify transactions. For example, in countries where there has been a tax on nationals' purchases of foreign exchange for travel abroad for pleasure, there have been incentives to misstate the nature of the requirement for foreign currency and also to purchase foreign exchange in the black market. When there are controls on the amount of funds that can be repatriated legally, foreign firms have an incentive to transfer their profits through overinvoicing the imports from their parent firms and underinvoicing exports. In such instances the "profit and dividend remittances" item in balance-of-payments accounts should be higher than is in fact recorded, and

"exports" should be higher and "imports" lower. There are also incentives to misclassify commodity trade among various categories; this might result in recorded changes in the commodity composition of trade but is less likely to result in apparent changes in the trade or current account balance.

Finally, the recorded value of various transactions may be false. Consider, for example, an exportable eligible for a cash subsidy. The existence of the cash subsidy provides an incentive for *overstating* the value of the export. When there is also a black market, however, the black market premium provides an incentive for underrecording because underinvoicing the export will enable the exporter to keep part of his foreign currency proceeds. Symmetric arguments apply to the valuation of imports; high duties provide an incentive for underinvoicing, and black markets provide an inducement to overinvoice. In the cases of misclassifying or failing to record transactions, theory provides reasonable *a priori* predictions as to the likely direction of misrecording. Therefore, some inferences may be drawn about the probable change following devaluation. The picture is somewhat more obscure where values are misrepresented, because there is no *a priori* basis for estimating the bias in the official estimates of changes in transactions.

With devaluation and the accompanying simplification and unification of rates, it is likely that the volume of such misrecording will decline, sometimes sharply. As already seen in Table 6-4, black market premiums tend to decline, often drastically, after devaluation. The replacement of export subsidies reduces the incentive for overstating the value of exports. In India, for example, there had apparently been considerable overinvoicing of exports ("paper exports") for purposes of obtaining cash subsidies, import entitlements, and other privileges accruing to exporters in proportion to their declared value of exports. With the devaluation and the removal of export subsidies in June 1966, the incentive for overinvoicing was removed. Simultaneously, expectations formed that export subsidies would quickly be reintroduced into the system. Indian data show a decline in the rupee value of exports immediately following the 1966 devaluation. In view of the nature of the incentives it is impossible to estimate the extent to which exports actually dropped in anticipation of the resumption of export subsidies, and how much of the apparent decline was really a decline in overinvoicing.

An interesting question arises over the real impact of a change in the prevalence of misrecorded transactions. Assume, for the moment, that after devaluation there was no change in trade flows, but that the magnitude of false invoicing and of evasion did change. A number of real effects could result, including increased tariff revenues, reduced subsidy payments for "paper" exports, and an increased flow of foreign exchange through official channels.

Whether, in any of these circumstances, the devaluation improved welfare would depend on two things: (1) the marginal social product of foreign exchange or savings (resulting from increased government revenues) in the

private sector relative to the public sector; and (2) the saving, if any, in resources that had earlier been employed to evade regulations. Evaluation of the relative productivity of resources in the hands of the private or the public sector is subjective, and there is no empirical evidence about possible orders of magnitude of resources employed in evading the regime. On balance there is probably a presumption that there is a net welfare improvement—there is clearly some resource saving—and it is not evident that government behavior is so finely constrained that a net increase in foreign exchange held by the central bank or in revenue received by the finance ministry will, in fact, result in increased expenditures by the public sector.

Short-Term Responses in Individual Countries

BRAZIL

Brazil's 1957 devaluation reduced balance-of-payments pressures in the short run primarily by increasing domestic protection against imports (which declined in dollar value from $1,285 million in 1957 to $1,179 million in 1958) and by the receipt of $375 million from the IMF.[44] It will be recalled that this was the era during which Brazil received sizable long-term private capital inflows, reaching $250 million in 1957.

Fishlow believes that the short-term response to the 1957 devaluation was an improvement in the balance-of-payments situation, but that the failure to alter the bias of the regime, combined with falling prices of Brazil's exports on world markets, led to stagnant export earnings, which were $1,558 million in 1954, $1,392 million in 1957, and below $1,300 million in each subsequent year until 1961. Brazil's 1957 devaluation would appear to have temporarily removed some payments pressures, and thus it was satisfactory in the short run but a failure in the longer run.

The 1961 Phase II was aimed at increasing real EERs, especially for exports. Fishlow analyzed the short-term response as follows:

> . . . There was a gratifying immediate improvement in the balance of payments. Non-coffee exports increased in volume and value. Even more important quantitatively, there was a renewed inflow of capital; official long-term inflows generated a positive net balance for the first time since the early 1950s. Reserves were augmented in 1961 by $178 million.[45]

The new Brazilian government shifted toward inflationary policies in the last part of 1961, and the real exchange rate rapidly eroded. As in 1957, the short-term response was satisfactory but short-lived because of domestic policies.

The 1964 experience was entirely different. In that case there had been pressing debt repayment obligations, with a third of the total debt of $3.9

billion coming due in 1964. The devaluation was accompanied by debt rescheduling which was "a more significant factor in restoring balance-of-payments equilibrium" than were current account changes.[46] The domestic slowdown, however, resulted in a sharp decrease in the demand for imports. The trade balance changed from an average annual deficit of $133 million in 1961-1963 to an average surplus of $304 million in 1964-1966. Reduced imports accounted for $189 million of this change, and increased exports, $248 million. Fishlow attributes both of these shifts primarily to domestic recession.

Although the increase in exports after the devaluation was larger in absolute magnitude than the reduction in imports (compared to 1961-1963), it is important to recognize that imports would have grown, rather than declined, had the Brazilian economy maintained its momentum during those years. Fishlow, therefore, computed the average import savings resulting from reduced income by estimating an import demand equation and calculating what imports might have been if GDP had grown at an average annual rate of 6 percent. Using those relations, his estimate is that because of the domestic recession, imports were lower by an annual average of $290 million, compared to what they would have been with 6 percent growth and the same EERs.[47]

According to Fishlow it was the large reduction in import demand, combined with the inflow of external assistance, that paved the way for reform of the import regime. Brazil was able to use much of the external assistance to reschedule and pay off foreign indebtedness; the foreign aid had a substantial grant component, so the effect was similar to partial cancellation of the debt. The fact that debt repayment obligations were no longer pressing meant that

> . . . the government could proceed with the dismantling of the elaborate protective structure that had been laboriously constructed to discourage import demand. Because of the improved payments situation, the price of imports was lowered as part of the liberalization strategy, rather than increased; the wedge between import and export exchange rates was reduced on the import side. . . .[48]

It was not until 1967 that policies to stimulate export growth were initiated. In the Brazilian case the "short term" was three years, and liberalization was sustained during most of this period by depressed levels of domestic income.

CHILE

Of prime importance in understanding the outcomes of all three of Chile's Phase III episodes is the fact that they were intended, at least partially, to result in a reduction in inflation. Imports were liberalized as part of each anti-inflation program. As described by Behrman,

> In all three cases, then, net inflows of official foreign credits played important short-run roles. In the first two programs they allowed the liberalization efforts to

be prolonged. In the third they helped it to get started. In no case, however, did they lead to long-run success. In the long run, in fact, they may have been dysfunctional by obscuring the fact that the exchange rate remained well below equilibrium.[49]

All three Phase III episodes had some other features in common. In each, inventories were reduced following devaluation and there was less capital flight; both nontraditional exports and net direct investment increased. Even so, the increased flow of imports predominated, so that deficits on current account increased following the first two Phase III episodes. After the third, the increased price of copper enabled Chile to maintain import liberalization, despite the failure of exports to respond in as great a measure as imports. The first two liberalization efforts ended when further foreign credits were unavailable to sustain them.

So while selected components of Chile's balance of payments improved in the postdevaluation period, the changes were not sufficient to offset the increased flows of imports that liberalized the regime. When foreign credits were no longer forthcoming, and exports had not increased sufficiently, Chile reverted to Phase II exchange controls for lack of an alternative.[50]

COLUMBIA

Columbia's 1951 devaluation was followed by immediate and sustained improvement in the balance of payments, which resulted primarily from the high price of coffee exports. Increased foreign exchange earnings were used to continue relaxation of import controls, and this situation continued into 1954.[51] Like the 1965 Chilean episode, the primary factor involved in maintaining the liberalization was the fortunate circumstance of a favorable world market; there was no sustained growth of exports.

The 1957 devaluation was of a completely different character—the primary motive was to cut imports. Imports in 1957/58 were one-third below their 1955/56 level as the rate of gross domestic capital formation in machinery and equipment fell in half. Despite declining coffee earnings a current account surplus emerged. According to Díaz, that surplus was used to pay off arrears in indebtedness. The short-run result of the 1957 devaluation was therefore a sharp improvement in the balance of payments, which is partly hidden in the official record because the improvement was primarily used for debt repayment.

The 1962 devaluation was followed by an inflation so severe that the real exchange rate at the end of 1963 was only 4 percent above its predevaluation level.[52] Díaz does not even consider the short-run impact on the balance of payments, except to note that intended liberalization of imports was quickly aborted and that reliance upon QRs increased thereafter.[53] Inspection of Col-

ombian statistics shows reduced imports in 1963, but those figures are presumably a response to tightened exchange control. It seems doubtful that there was time enough for any response to the 1962 effort.

In contrast the 1965 devaluation was accompanied by significant import liberalization. Prior licensing was removed on more than half of all imports, advance import deposit requirements were relaxed, imports for the first three quarters of 1966 were 49 percent above their 1965 level, while export earnings declined about 1 percent.[54] The liberalization of imports was financed primarily from loans received at the time of the 1965 devaluation. Under these circumstances, as the credits were used up and inflation eroded the effect of the earlier alteration of the nominal exchange rate, the Colombian authorities had either to borrow again from international agencies or to resort to renewed exchange controls; they opted for the latter course in November 1966. As Díaz reported:

> Most observers now agree that by October 1966 stocks of imported goods were bulging, and a downturn in imports (even at the existing exchange rate) was imminent. A good share of the increase in imports during 1966 had been motivated by a speculative desire to take advantage of a liberalization not expected to last long. . . .[55]

Imports fell sharply between 1966 and 1967 but were once again liberalized with the 1967 devaluation. Unlike the earlier efforts, however, export earnings began growing in the following year, and the liberalization could be sustained.

In the Colombian case it would appear that all Phase III episodes, except that of 1957, were intended to liberalize imports; liberalization was initially financed by foreign credits received at the time of devaluation and, except for 1967, the episodes ended when these credits were exhausted.

EGYPT

Once again the very small magnitude of Egypt's net devaluation precluded any substantial effects, except in the sense that devaluation was the price paid for a loan from the IMF. The Egyptian government had approached the IMF because it was faced with payments difficulties and with the prospect that they would intensify. Receipt of the loan of £E 20 million prevented increased restrictiveness as the Egyptian balance of payments continued to deteriorate—as anticipated—in the following year.[56]

GHANA

Leith examined separately the impact of Ghana's devaluation on non-cocoa exports, cocoa exports, imports, private capital flows, and official capital flows.

For noncocoa exports the response was somewhat slow. Leith estimated an export supply function for these commodities; in the first year following devaluation, actual exports fell short by 8.8 percent of those predicted and, for the second year, by 3 percent. Leith interprets this result to mean that entrepreneurs were waiting to see if the new price signals would in fact be maintained—a finding tending to support the view that the export response may be slow. Inflationary pressures had reemerged by 1969, so that the new real rate was greatly eroded. According to Leith's estimate, noncocoa exports were about 14 percent greater than they would otherwise have been by 1969/70. If however, comparison is simply made between noncocoa exports before and after devaluation, the conclusion is much less sharp: in 1969/70, noncocoa exports had merely reattained their level of 1965/66.[57]

For cocoa exports the impact of devaluation depended on the extent to which the alteration in the exchange rate affected the producer price, which was, after all, separately administered. In fact, the nominal cocoa price did increase 30 percent, but within the following three years that increase was erased by domestic inflation. Moreover, the producer price, even after devaluation, was below the level at which it would pay to make new plantings; it was estimated that NC9.00 was the minimum price at which capacity would be expanded, and the producer price increased only from NC5.00 to NC6.50.[58]

On the import side the QR mechanism continued to prevail after devaluation, so that the level of imports was a function of the value of licenses issued and not of the exchange rate. Imports dropped from $320 million to $265 million from 1966 to 1967. Leith's import demand function contains only GDP and a dummy variable for the years in which licensing predominated; he considers that price was not the determining factor either before or after the devaluation, so the behavior of imports cannot be attributed to the devaluation.[59]

Private capital flows fluctuated widely from year to year in Ghana but do not appear to have had any direct relationship to devaluation. Leith identified official capital flows as the major component influenced by the devaluation:

Official capital flows, paradoxically, are more sensitive to the exchange rate. Determined in part by the development "needs" of the recipient but also in part by the donor's sense of the appropriateness of the recipient's policies, they are affected to a substantial degree by the visible measurable policy changes in the "correct" direction. . . . This was in part the view taken by major OECD donor countries in response to the Ghanaian 1967 devaluation. A moderate inflow for 1966 to support the new NLC government was doubled in 1967 and more than redoubled in 1968. . . .[60]

On balance the improvement in Ghana's current account was rather mild: the deficit fell from $125 million in 1966, to $84 million in 1967, and to $56 million in 1968. The chief short-term impact, therefore, was in capital flows, with a tightening of imports also playing a role.

INDIA

India's current account deficit was over $1 billion in 1966 and 1967 as export earnings were relatively stagnant and below their 1965 level, while imports were liberalized. The liberalization was more a function of licensing decisions than of the devaluation, although import premiums fell sharply. The Indian recession resulted in a downward shift in the demand for imports and released domestic supplies for exports, so that exports began increasing in 1968 while imports were declining, with a consequent improvement in the current account balance.

The large current account deficits of 1966 and 1967 were financed by substantial aid inflows, which amounted to about $1.5 billion in each year.[61] It was those flows which, together with the exchange rate change and domestic recession, permitted import liberalization. But as soon as domestic income began increasing again, premiums on import licenses again began rising sharply.[62] It would thus appear that the short-run response to devaluation was import liberalization and offsetting aid inflows.

ISRAEL

Israel's experience differs from most of the others in a number of regards, most notably in that there was no reliance on foreign credits. The first Israeli Phase III episode was designed to liberalize the trade and payments regime, replacing QRs with price measures. The episode is the more remarkable because the increased import EER was sufficient not only to absorb premiums on import licenses but also to reduce the quantity of imports despite growing real income. Michaely reports that

> [for] . . . the first half of the 1950s . . . the quantities of exports and imports seem clearly to respond to the price movements, which in this period were both large and consistent. During the three years 1952-54, the PPP-adjusted exchange rate increased at an average annual rate of 25.3 percent. . . . The average annual increase of exports . . . was 22.8 percent in the years 1952-54, versus 5.3 percent for all other years. In 1952-55, the average annual change in the exchange rate for imports rose 22.8 percent; the quantity index fell 9.8 percent. . . .[63]

In both Israeli devaluations the response of exports to altered real EERs has lagged more than the response of imports.[64] For the first devaluation, success was sufficient for Michaely to report that "the balance-of-payments position . . . ceased to be the major basis for trade and payments restriction."[65] This shift appears to have been largely the result of changes in current flows; the import surplus fell from $359 million in 1951 to $238 million in 1954 despite an increase in autonomous capital flows.

The 1962 devaluation was very different, both because the measure was

adopted in anticipation of future payments difficulties and because expansionist monetary and fiscal policies offset much of its effects.[66]. Foreign exchange reserves were high and rising when the devaluation was undertaken. Total autonomous capital imports appear to have remained relatively constant over the 1962-1965 period, and it is apparent that, for Israel, those imports are largely independent of the exchange rate. Exports of goods and services rose rapidly in the year or two following devaluation, but no more so than they had in the two years prior to devaluation. Import growth was reduced to 5 percent in 1963, probably reflecting in part the impact of devaluation.

SOUTH KOREA

South Korea's two devaluations were designed to liberalize imports primarily by raising the real import EER; in the 1961 devaluation the real export EER actually fell from the preceding year. The rapid export growth that marked South Korea's development in the 1960s started after 1959, and the government's policy of subsidizing exports resulted in the devaluation having relatively little effect on exports (which rose from $33 million in 1960 to $55 million in 1962, and from $87 million in 1963 to $175 million in 1965). A realistic exchange rate policy was clearly a necessary condition for the rapid growth of exports, but that policy was carried out over the entire decade, not just at moments of devaluation.

The 1961 devaluation resulted in a 30 percent increase in the real import EER and a consequent cutback in imports from $395 million in 1960 to $283 million in 1961. Liberalization was carried out via the transfer of commodities to the automatic approval list. But monetary and fiscal policies were expansionary, and multiple exchange rates and quantitative restrictions were again imposed in 1963 in order to contain imports. The 1964 devaluation was not dissimilar. A 25 percent increase in the real import EER left a still lower real rate than had been achieved in 1961. Imports were again cut back from $497 million in 1963 to $365 million in 1964, and again licensing was relaxed. In both devaluations the net goods and services account deficit was smaller than it had been in preceding years.

It is noteworthy that official grant aid was declining throughout the period, and by 1964 it stood at less than half its average level of the late 1950s.[67] Net capital inflows do not appear to have been very responsive to devaluations, either, although private capital became important in the late 1960s. Like so many other aspects of the South Korean experience, it was not devaluation itself but the maintenance of policy stances and gradual adjustments in key variables that explain performance.

THE PHILIPPINES

The 1960 Philippine devaluation was intended to alter the regime by replacing QRs with a higher effective exchange rate, especially with respect to

imports. During the 1960-1963 period, when these shifts were occurring, the value of imports remained virtually constant. The commodity composition of imports changed, however, with a shift toward commodities that had previously been subject to tight restrictions. Baldwin estimates that quantities of "essential" producer and consumer goods fell 3 and 13 percent, respectively, between 1959 and 1962, while semi-essential producer goods imports fell 18 percent. Imports classified as nonessential consumer goods—the category previously subject to most severe restriction—rose 19 percent.[68] Examination of Philippine balance-of-payments statistics does not indicate any systematic change in capital flows, private or official, and Baldwin does not discuss the short-term behavior of the balance of payments. Perhaps the important point is that the 1960 devaluation was not intended to affect the payments position and, in the short run, it did not do so.

The 1970 devaluation was entirely different. Debt repayment obligations coming due started the payments crisis, and the IMF insisted on an exchange rate change or floating the peso as a preconditon for debt restructuring. The government floated the peso and received almost $200 million in credits from private and official sources.[69]

That shift must of course be counted as the single most significant payments response to devaluation because it encompassed not only the creation of new debt but the restructuring of payments on existing debt. Private capital flows do not appear to have altered significantly. Baldwin reported, however, that exports also responded:

> Exports quickly increased after the currency depreciation. Their value had remained at around $850 million from 1966 through 1969 but rose 24 percent to $1,062 million in 1970. In volume terms, exports, which had actually fallen about 5 percent between 1966 and 1969, rose 14 percent between 1969 and 1970. These favorable performances in value and volume terms continued in 1971. . . ."[70]

Meanwhile, tight monetary and fiscal policy, combined with continued controls over payments in foreign exchange, resulted in a decline of $40 million in the dollar value of imports following devaluation. The net result was a decrease in the trade deficit from $276 million in 1969 and $28 million and $64 million in 1970 and 1971, respectively.[71]

Thus the initial short-term response of the balance of payments was favorable because of the receipt of additional credits. Beyond that immediate impact, however, the Phillippines experience appears to be somewhat unusual in the rapidity with which the trade balance, and especially exports, responded to the alteration in exchange rates.

TURKEY

The 1958 Turkish devaluation was prompted by arreas in foreign indebtedness, and—as in so many other countries—the devaluation was accom-

panied by debt rescheduling and the receipt of fresh credits of $359 million. Those credits were used, primarily, to liberalize imports, and the flow of imports into Turkey increased dramatically. Despite an increase in exports of $116 million between 1958 and 1959 (part of which resulted from the reversal of inventory speculation prior to the devaluation), the trade balance deficit increased from $37 million to $70 million. Turkey had long since exhausted available credit facilities, so reduction of the trade deficit was not the object of the devaluation.[72]

After the 1970 devaluation, by contrast, some official credits were extended, but the biggest short-term change was in remittances from Turkish workers in Europe. Workers' remittances had been $141 million in 1969, and they rose to $273 million in 1970 (mostly in the last five months of the year) and then to $471 million in 1971. In addition, export earnings increased sharply, partly because of a good harvest but also as a consequence of exchange rate changes. Imports were liberalized, also, and they rose from $801 million in 1969 to $1,171 million in 1971; the result was a virtual elimination of premiums on import licenses. The remarkable increase in current account receipts following devaluation was large enough to finance the increased flow of imports.

Empirical Regularities across Devaluations

The most striking characteristic of the country studies is the variety of initial conditions and motives for initiating Phase III episodes. These circumstances uniquely influenced the outcome of each devaluation. The philosophy underlying the entire NBER project—that sound economic analysis can be performed only in light of knowledge about the economic structure of the country—is once again confirmed by the evidence. It is apparent that the sorts of standards one might use to judge the short-run outcome of devaluations must differ substantially with circumstances. In many cases the relevant criterion is probably the degree to which quantitative controls were removed from imports or the fraction of commodities that were free to enter with automatic approval or without any licensing. Closely related to that measure, of course, is the extent to which premiums on import licenses were absorbed due to the combination of policies adopted following devaluation. Judged by these criteria, most devaluations had some short-run success; the devaluations in Colombia and Egypt, both in 1962, come to mind as examples of two that did not. The degree of initial success differed markedly, ranging all the way from Ghana and India, where premiums were partially absorbed and import flows were maintained, to cases where premiums virtually vanished—Israel in 1952, the Philippines after 1960, and Turkey in 1958 and 1970.

When it comes to analyzing the behavior of various components of the balance of payments, there is again a great deal of variance. In a few countries,

including Israel, the Philippines, and Turkey in 1958, there was a sizable short-term increase in current account receipts. In most other countries, authors found some increase in exports (or at least a failure to decrease as much as they otherwise would have), but in the short run the order of magnitude was not sufficient to provide a dependable basis on which to liberalize imports. In general the evidence is consistent with the notion of a lag in export response.

Other potential short-run sources of foreign exchange receipts appear to have been the exception rather than the rule. There do not appear to have been large counterspeculative flows. While some private capital outflows were reversed, other factors usually dominated the determination of private capital flows, and devaluation by itself did not offset them.

Surprisingly enough, official flows seem to be the most uniformly responsive to changes in the exchange rate. The reasons are largely those given by Leith (see page 171), although the fact that debt often brings about devaluation also contributes. Perhaps the most common single pattern observed among the twenty-two Phase III episodes was that of accumulated indebtedness bringing about both the devaluation decision and foreign creditors' involvement in it. The issues involved with debt accumulation and foreign creditors, and their involvement in Phase III, must be postponed until Chapter 10, but because of these features, examination of balance-of-payments statements cannot tell the full story of the response to devaluation; part of it is reflected in asset, and not in flow, changes.

What is significant here is the frequency with which foreign indebtedness was the overriding consideration in deciding to devalue. Perhaps equally important was the number of times the additional foreign credits that were extended as part of the devaluation package were employed to liberalize imports. In many of those instances, import liberalization could not have begun without new lines of credit. Of those liberalizations that were made possible because of credits, many were terminated when the credits were exhausted. In fact, IMF stabilization programs have come to connote an association with this sequence of stabilization program, use of new credits to finance import liberalization, exhaustion of credit, and return to QRs. It will be seen below that those experiences are almost uniformly accompanied by failure to alter the exchange rate by enough to expect any sustained response.

A final point to be noted is that nothing can be inferred based only on the behavior or imports following Phase III; whether they increase or decrease, and by how much, is largely a function of policy decisions. Since imports are controlled by quantitative restrictions in Phase II, it is hardly surprising that their behavior in Phase III is part of the policy package and not part of the economy's response to it.

NOTES

1. There is the third view: that devaluation does not increase foreign exchange earnings. That is considered in Chapter 9.

2. Appropriate specification of the money market is then important; an increased price level would presumably result in reduced spending as individuals strive to restore their real balances.

3. A cost-push mechanism might again change this result. If the price paid by producers for intermediate goods increased, they might, with monopoly power in the domestic economy, raise the price of their output even if the total quantity produced were unaltered (as the quantity of import licenses received for necessary inputs was unchanged).

4. Fishlow, p. 36.

5. Ibid., p. 37.

6. Ibid., p. 38.

7. Ibid., p. 35.

8. Behrman, p. 225.

9. Ibid., p. 230.

10. Ibid., p. 230.

11. Díaz, p. 191.

12. Ibid., p. 187.

13. Ibid., p. 187.

14. Ghana was fortunate in that weather was favorable in 1967, and crops were good. Leith apparently does not believe this was a crucial factor, although it clearly contributed to the favorable outcome.

15. Leith, pp. 125-26.

16. Bhagwati and Srinivasan, p. 111.

17. Ibid., p. 116.

18. Michaely, p. 134.

19. Frank, Kim, and Westphal, p. 54.

20. Baldwin, p. 53.

21. Considerations pertaining to the probable behavior of aggregate demand could, of course, influence the timing of a decision to devalue; a period of slack aggregate demand would offer better prospects than one in which strong expansionary pressures were being felt.

22. Fishlow summary, p. 38.

23. Ibid.

24. Ibid., Table A-III.

25. Ibid., p.70.

26. Behrman, p. 14.

27. Ibid., p. 186.

28. It was followed by a bad crop year, which explains the low growth rate indicated in Table 8-3.

29. Díaz, p. 13.

30. Ibid., p. 133.

31. The changes in GNP growth rates shown in Table 8-3 reflect primarily the influences of a bad crop in 1961 followed by a bumper crop in 1962 and a good one again in 1963.

32. Leith, p. 125.

33. Bhagwati and Srinivasan, p. 118.

34. Ibid.

35. Ibid., p. 127.

36. Michaely, pp. 123-27.

37. Frank, Kim, and Westphal, p. 54.

38. Baldwin, p. 59.

39. Ibid., pp. 76-77.

40. For a fuller discussion, see Krueger, pp. 103 ff. and Appendix C.

41. The demand for imports is the demand for importables less the domestic supply of importables. If the supply of importables grows at the same rate as income, the demand for imports will grow faster or slower than income as the income elasticity of demand for importables is greater or less than unity. Usually the supply of importables (that is, domestic production) grows faster than income, but the income elasticity of demand for imports is also greater than unity.

42. Depressing the level of economic activity is yet a third alternative, but it is generally unacceptable except as a short-run strategy.

43. Some of these factors are the same as those responsible for the J-curve responses often noted in developed countries. Others, however, are much more closely related to the nature of the prior exchange control regime.

44. Fishlow, p. 27.

45. Ibid., p. 31.

46. Ibid., p. 36.

47. Ibid., p. 38 and Table IX, p. 38a.

48. Ibid., p. 39.

49. Behrman, pp. 304-5.

50. Ibid., p. 306.

51. Díaz, p. 18.

52. Ibid., p. 26.

53. Ibid., p. 195.

54. Ibid., p. 203.

55. Ibid., p. 207.

56. Hansen and Nashashibi, p. 90.

57. Leith, pp. 131-32. Noncocoa exports had, however, declined sharply in the interim.

58. Ibid., p. 133.

59. Ibid., p. 135.

60. Ibid., pp. 137-38.

61. Bhagwati and Srinivasan, p. 112.

62. Ibid., p. 162.

63. Michaely, pp. 139-40.

64. Ibid., p. 143.

65. Ibid., p. 23.

66. Ibid., p. 127.

67. Frank, Kim, and Westphal, p. 14.

68. Baldwin, p. 59.

69. See Baldwin, p. 79, for a fuller description of Philippine indebtedness and its change in 1970.

70. Ibid., p. 81.

71. Ibid.

72. There is also reason to believe that a sizable shift in the errors and omissions figure in the Turkish balance of payments may reflect repatriation of funds previously smuggled out of the country.

Appendix to Chapter 8

Statistical Investigation of the Impact of Devaluation on the Price Level

by Anne O. Krueger and Salih Neftci

The results of a statistical investigation of the effect of devaluation on the price level are reported in this appendix. More precisely, we test the hypothesis that, on the average, devaluation leads to an increase in the price level in developing countries. This test is based on the assumption that the impact of devaluation on the price level in these countries is roughly similar, even though the structure of price determination is different. A simple regression model is used to determine this average effect, after account is taken of the role of past price changes and money supply behavior.

It is evident that the underlying structure of each country differs from that of every other. No simple model can be a satisfactory structural representation because it cannot adequately provide estimates of enough of the various influences on the price level. Nevertheless, generalizations will be made on the basis of the experience of the project countries, and it seems worthwhile to attempt some form of pooling of time-series and cross-section data; however, the results, at best, yield something of a description of average behavior.

The time series in question are of the price level and the money supply in each of the project countries. The cross-section consists of observations of periods following devaluation in several countries. For example, observations of the quarter following devaluation may be regarded as constituting a cross-section from which the average initial impact of devaluation (and whatever other variables were systematically operating) on the price level could be inferred.

The basic model is very simple—obtaining comparable data and a comparable structure across ten countries does not appear likely to withstand the challenge of a highly complex price-determination model. It is assumed that each country's price level at time t is a function of its money supply, lagged

money supply, and lagged price level and that the coefficients of the function differ for each country. Devaluation, however, is presumed to have the same impact—if any—on price formation in each country once account is taken of the effects of past price level and money supply behavior. Several variants of this basic model were estimated. The basic structure of the system is linear, so that for the jth country:

$$P_j(t) = \beta_0 + \beta_{1_j}P_j(t - 1) + \beta_{2_j}M(t)_j + \beta_{3_j}M(t - 1)_j + \sum_{i=1}^{5} \alpha_i D_i + \epsilon_j(t)$$

where j is the country subscript (with ten countries, $j = 1, \ldots, 10$); $M_j(t) =$ the money supply of the jth country at time t; $P_j(t)$ denotes the price level of the jth country at time t; D_i, $i = 1, \ldots, 5$ are dummy variables common to all countries; α_i, $i = 1, \ldots, 5$ are the coefficients of these dummy variables; and β_0, β_{1j}, β_{2j}, β_{3j} are parameters to be estimated (β_0 is the same for all countries since it has no country-specific subscript); $\epsilon_j(t)$ denotes a random disturbance affecting the price level of the jth country; it is assumed to have the following properties:

$$E(\epsilon_j[t]) = 0 \text{ for all } j, t$$

$$E(\epsilon_j[t]\epsilon_k[s]) = \sigma^2, \text{ if } t = s, j = k$$
$$0, \text{ if } t \neq s, \text{ or } j \neq k$$

Thus, if P_j is the observation vector on the jth country's price level, and X_j is the matrix of observations on $P_j(t - 1)$, $M_j(t)$, $M_j(t - 1)$, we can write the pooled regression as follows:

$$
\begin{bmatrix} P_1 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ P_{10} \end{bmatrix}
=
\begin{bmatrix} 1 & X_1 & & 0 & \cdot & & & \cdot \\ \cdot & & \cdot & & \cdot & & & \cdot \\ \cdot & & & \cdot & \cdot & & & \cdot \\ \cdot & & & & D_1 & \ldots\ldots & D_5 & \cdot \\ \cdot & & & \cdot & \cdot & & & \cdot \\ \cdot & & \cdot & & \cdot & & & \cdot \\ \cdot & & & \cdot & \cdot & & & \cdot \\ 1 & 0 & & X_{10} & \cdot & & & \cdot \end{bmatrix}
\begin{bmatrix} \beta_0 \\ \\ \beta_1 \\ \cdot \\ \cdot \\ \cdot \\ \beta_{10} \\ \alpha_1 \\ \cdot \\ \cdot \\ \cdot \\ \alpha_5 \end{bmatrix}
+
\begin{bmatrix} \epsilon_1 \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \\ \epsilon_{10} \end{bmatrix}
$$

where $N_j =$ the number of observations of the jth country, and P_j is $(N_j \times 1)$, X_j is $(N_j \times 3)$, ϵ_j is $(N_j \times 1)$. In addition, β_j, $j = 1, \ldots, 10$ are (3×1) vectors, and β_0 and α_i are scalars. The D_is are, as before, the dummy variables,

and are included to measure the impact of devaluation on the price level. In order to accomplish this, dummy variables are set to assume the following values: $D_1 = 1$ for the period during which devaluation takes place and zero for all other observations; $D_2 = 1$ for the first period after devaluation and zero for all other observations; $D_3 = 1$ for the second period after devaluation, and so on. Two equations were estimated, one with dummy variables and the other without them. The F test was then applied to test for the significance of the dummies. Three alternative versions of the model were estimated in this manner. In one version, the values of the variables were used; in the second, first differences in the values of the variables were used; and in the third, logarithms of the variables were used.

The model was estimated using both quarterly and annual data, and the results of the two most satisfactory versions are summarized in Table 8-1A. The version on the left-hand side of the table omits the current money supply variable, and the version on the right includes it. To reduce the variables for each country to the same mean (which is important when money supply is given in different units), all price and money supply data were indexed on the same base.

There are, of course, problems with the estimation procedure itself. Ideally, a considerably more complex lag structure should be used, and also the influence of other variables, such as import liberalization, should be taken into account. It proved impossible, however, to attempt this within the confines of the time and computer resources available. As the model stands, serial correlation is not entirely eliminated, as indicated by the Durbin-Watson statistics reported in the table.

Since the major purpose of the estimates is to test for the significance of dummy variables, inspection of possible sources of bias in the estimates is of considerable importance. The major possible source is omission of nominal income as a separate independent variable, since justification for use of the money supply must, in fact, rest on the quantity theory of money. Because income and prices move together and because it is expected that there is positive correlation—if any—between devaluation and income, it is likely that this omission biases the coefficients of the dummies upward.

Turning to the regression estimates, the coefficients for each country for each version are given in Table 8-1A. The lagged value of the price variable is highly significant, as indicated by the relatively large t values for each country. The "best" estimate is Version I, but it is marred by the presence of serial correlation. The lagged money supply is significant in Version I for Chile, Colombia, India, Israel, South Korea, the Philippines, and Turkey. Introduction of

Table 8-1A. Regression Estimates of the Price Level Impact of Devaluation (dependent variable: quarterly observations on $P(t)$)

Country	Period	Version I: Coefficients of		Version II: Coefficients of		
		$P(t-1)$	$M(t-1)$	$P(t-1)$	$M(t-1)$	$M(t)$
Brazil	1953-1972	0.98	0.001	0.98	0.08	−0.04
		(25.4)	(.9)	(20.5)	(.7)	(−.4)
Chile	1954-1972	.88	.06	.88	.11	−.04
		(32.5)	(4.6)	(31.7)	(1.6)	(−.7)
Colombia	1951-1972	.49	.35	.49	.35	.00
		(3.5)	(2.7)	(3.5)	(.5)	(.00)
Egypt	1955-1972	.68	.15	.68	.12	.03
		(4.3)	(.9)	(4.3)	(.2)	(.1)
Ghana	1957-1972	.67	.21	.62	.12	.15
		(4.1)	(1.1)	(3.4)	(.5)	(.71)
India	1954-1972	.50	.36	.50	.63	−.26
		(2.6)	(1.9)	(2.6)	(.8)	(−.4)
Israel	1951-1972	.64	.16	.64	−.04	.19
		(7.0)	(2.0)	(6.8)	(−.1)	(.3)
South Korea	1954-1972	.82	.04	.81	.01	.03
		(16.2)	(1.9)	(16.0)	(.1)	(.2)
Philippines	1954-1972	.49	.33	.49	.24	.08
		(3.3)	(2.4)	(3.3)	(.6)	(.2)
Turkey	1957-1972	.58	.20	.58	.16	.03
		(4.8)	(2.4)	(4.8)	(.7)	(.2)
Constant:		20.7	(11.0)	20.6	(10.8)	

Coefficients of Dummies:

Quarter of devaluation		−3.6	(−.8)	−3.9	(−.8)	
One quarter after		−2.8	(−.6)	−3.2	(−.7)	
Two quarters after		−2.7	(−.5)	−2.7	(−.6)	
Three quarters after		−2.1	(−.4)	−2.1	(−.4)	
Four quarters after		−2.9	(−.6)	−2.8	(−.6)	

F-test: all dummies insignificant:	0.33		0.35	
F-test: all coefficients are zero:	1280.0		903.8	
R^2		.98		.98
Durbin-Watson Statistic:		1.56		1.57

Numbers in parentheses are *t*-statistics.

Sources: All data are from IMF, *International Financial Statistics,* supplements for 1967/68, 1973. Price data are wholesale prices from line 63, except for Chile, where line A63 was used, and Turkey, where line 63a was used. Money supply data are from line 34.

the current money supply variable in Version 2 seems to lead to some negative coefficients. However, what is important is that the sign of the "sum" of both money supply coefficients is positive, not that they individually are less than zero.

The results of both versions are roughly similar. The coefficients on the lagged price level and lagged money supply do not seem to be seriously affected by introduction of the current money supply variable. Note, however, that because of multicollinearity, introduction of $M(t)$ lowers all t for the lagged money supply coefficients; almost all were significant in Version I.

The bottom of Table 8-1A gives the coefficients of the dummy variables and their t statistics for each of the five quarters. None of the dummies, except for the third quarter after devaluation taken alone in Version II, is significant; indeed, all signs are negative, implying that price increases are, if anything, smaller than expected after devaluations. Using the F-test to test the hypothesis that all dummy variables are zero confirms the hypothesis at the 1 percent level. The results of all other regression estimates gave the same results with respect to the quarterly dummies; in logarithmic form and in first difference form, the hypothesis that the dummies were not significant was accepted at the 5 percent level.

Tests on annual data generally provided poorer fits (with negative sign on the money supply in many cases) than those on quarterly data. But again the dummies had negative coefficients and were insignificant.

These results confirm the impression gleaned from the individual country studies. Whatever inflationary impact devaluation might have had was insufficiently strong to offset other influences on the price level, even after account is taken (crudely) of the effects of the money supply; on average, the rate of inflation was not any higher in the period following devaluation than before.