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Credit Policy and Economic Activity in Developing Countries with IMF Stabilization Programs

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1 INTRODUCTION

Since the days of Keynes and the Great Depression, economists and policymakers have generally accepted the view that, unless prices are perfectly flexible and productive resources are fully employed, money and credit can exert a strong influence on economic activity and growth in the short run. In addition to persuasive evidence from econometric models for industrialized countries, economic developments in the United Kingdom and the United States in the early 1980s were especially revealing in this regard. The imposition of monetary restraint (or merely the threat of restraint, depending on the interpretation of the statistics in the case of the United Kingdom), accompanied by record high real interest rates and exchange rates, contributed significantly to a major downturn in economic activity.

Much less empirical evidence is available on the experience of developing countries. To date, only a few studies have attempted to assess the effects on employment and output growth of the government's control over credit from the domestic banking system, and they suggest that these effects are either weak or statistically nonsignificant. The issue is particularly important for developing countries, where control over bank credit is usually the main direct instrument of monetary policy (see Guitian, 1973) and where bank credit is also the major means of financing public expenditures, so that the effects on output growth of equivalent doses of credit, monetary, or fiscal restraint (or expansion) are essentially the same in the short run.

In one of the earliest studies of stabilization programs supported by the International Monetary Fund, covering experience from 1963 to 1972, Reichmann and Stillson (1978, p. 303) concluded that while the rate of domestic credit expansion was reduced significantly in a large majority of the programs that called for such a reduction, "there is no evidence that programs systematically affected the level of economic activity within the period considered." But this conclusion must be interpreted with caution, for two reasons. It applies not to the effects of credit policy *per se* but to the effects of stabilization programs in which credit restraint was frequently accompanied by other potentially expansionary measures such as devaluation. Furthermore, it refers

This study was prepared while I was in the Standby Programs Division of the Exchange and Trade Relations Department of the IMF, and completed while I was Visiting Professor of Public and International Affairs at Princeton University in 1986. I am indebted to numerous colleagues inside and outside the IMF for helpful comments and suggestions, but I retain full responsibility for any remaining errors or omissions as well as for the views expressed. Peter Sellin assisted with the computations.

to growth of *industrial* production, which, as the authors point out, is not an adequate indicator of aggregate economic activity in most developing countries, whose economies are predominantly agricultural.

A similar lack of evidence of an adverse effect of Fund stabilization programs on growth performance in the short run was reported by Donovan (1982) in an evaluation of stabilization programs undertaken in the 1970s, and by Connors (1979) and Killick (1984). On statistical grounds, however, it is difficult to judge the reliability of the empirical results of these studies. Donovan presents no statistical tests for the significance of his results, while the nonparametric tests of Connors and Killick, like those of Reichmann and Stillson before, are biased by the application of these tests to autocorrelated time series (see below).

According to another study based on an econometric financial-programing model applied to data for twenty-nine developing countries during 1967-75, a once and for all contraction of domestic credit by 10 percent lowered output by only about one-half of 1 percent in the short run (Khan and Knight, 1982, Chart 8, p. 725), but the model is exclusively financial and thus ignores real aspects as well as the supply side of the economies (see also Khan and Knight, 1981). More recent empirical evidence is lucidly summarized by Khan and Knight (1985, Table 1); it indicates that a 10 percent reduction in the growth rate of domestic credit or money supply leads, on average, to a 1 percent reduction in the growth rate of output (GDP or GNP) in developing countries.

This study reviews the relationship between credit policy and growth performance, as well as other relevant aspects of the economic record, under stabilization programs supported by the IMF during 1977, 1978, and 1979 (see Table 1). The analysis is confined to the so called "upper-credit-tranche standby arrangements" concluded during this period and does not cover the longer-term adjustment programs supported under the so called "extended facility" of the Fund.[1] The principal aim is to determine on the basis of available evidence and by a formal statistical test whether economic growth was adversely affected in the short run by the credit policies adopted under the adjustment programs reviewed and, if so, to what extent. The particular group of countries examined here is ideally suited to the study of the relationship between restrictive credit policies and growth because domestic credit restraint played a vital role in virtually all the adjustment programs.

It should be emphasized at the outset that the objective is *not* to investigate the magnitude of the almost surely negative direct effect of domestic credit restraint on growth in the short run, which was scrutinized in Khan and Knight (1985, Table 1). It is rather to examine whether these programs in their entirety have influenced growth directly and indirectly, or whether

[1] For a detailed description of the lending policies of the IMF, see Williamson (1982) and Killick (1984b, pp. 128-144).

TABLE 1
COUNTRIES UNDER STUDY

Standby Program Countries [a]			
1977	1978	1979	Reference Countries [b]
Argentina	Burma	Bangladesh	Bolivia
Burma	Gabon	Congo	Dominican Republic
Egypt	Guyana	Ghana	Greece
Italy	Panama	Kenya	Liberia
Jamaica	Peru	Malawi	Morocco
Pakistan	Portugal	Mauritius	Senegal
Peru	Turkey	Panama	Syrian Arab Republic
Romania	Zambia	Philippines	Tanzania
Sri Lanka		Sierra Leone	Thailand
United Kingdom		Togo	Yugoslavia
Zaire		Turkey	
		Western Samoa	
		Zaire	

[a] Countries that entered into upper-credit-tranche standby arrangements with the Fund during 1977, 1978, and 1979.

[b] Other developing countries that encountered serious balance-of-payments problems during 1977-79 but did not enter into upper-credit-tranche standby arrangements with the Fund during this period (see section 4.C).

other developments have accounted for changes in the growth rate. This is an important distinction, for the reason previously noted—the possibility, and in many cases probability, that the negative direct effects of domestic credit restraint on growth performance were partly or wholly offset by other policies such as devaluation or an increased inflow of foreign capital. Indeed, insofar as domestic credit restraint induced a capital inflow by raising the confidence of potential foreign lenders or donors in the economies of the countries under study, deflationary domestic credit policies may be said to have had a positive effect on output growth indirectly.

Under ideal conditions, empirical analysis of the effectiveness of credit policy in individual countries or groups of countries should be based on fully specified econometric models. However, the limited quantity and poor quality of the data available for a majority of the countries in the present sample make this impossible. In particular, data constraints preclude any attempt to quantify potentially important supply-side considerations. This may explain the narrow financial focus of the econometric model of Khan and Knight (1981, 1982). In the tradition of the monetary approach, they make no attempt to distinguish between the components of the overall balance of payments, so that their analysis disregards not only all issues pertaining to aggregate supply but also the possible substitution of foreign for domestic credit.

The failure to incorporate indirect catalytic effects of domestic credit policy on the capital account may, in turn, explain why the direct effect of domestic credit contraction on output appears so small in their model.

Because it is hard to estimate reliable econometric models for developing countries, Reichmann and Stillson (1978), Connors (1979), Donovan (1982), and Killick (1984) have employed a "before-and-after" approach; they have compared the values of such strategic macroeconomic variables as the balance of payments, output, and inflation before and after the inception of an adjustment program. If not applied with sufficient caution, however, this method is likely to be inconclusive. The main difficulty is the *ceteris paribus* assumption on which the method is implicitly based but which is rarely satisfied in practice. Without guidance from an explicit theoretical model that specifies the relationships between endogenous and exogenous variables, it is difficult to determine through simple before-and-after comparisons whether observed changes in, say, the balance of payments or output growth can be ascribed to the programs under study or to other factors implicitly held fixed (or not included) in the analysis. This study seeks to avoid this difficulty—and thus differs sharply from its predecessors—by using a theoretical model to specify clearly what relevant variables are being held constant in each comparative before-and-after experiment, and by devising experiments to account for variations in such variables (e.g., by distinguishing between devaluation and nondevaluation programs).

Another important weakness of the earlier studies, already noted, is that tests of the statistical significance of the empirical results are either absent (Donovan, 1982) or biased (Reichmann and Stillson, 1978; Connors, 1979; Killick, 1984). In the latter cases, the source of the bias is the application of nonparametric rank tests to autocorrelated time series. If output growth is positively autocorrelated, a high rate of growth before the program is likely to be followed by a high rate of growth during and after the program. In other words, autocorrelation reduces the probability of detecting a significant reduction in output growth resulting from the program. The present study avoids this bias altogether by dealing exclusively with cross-section data that are uncorrelated (except possibly insofar as macroeconomic variables in the countries under study are jointly influenced by world economic developments).

A third major difficulty with earlier applications of the before-and-after approach, noted by Khan and Knight (1982, p. 721) and Williamson (1982, pp. 649-650), is that they have inevitably left unanswered an important hypothetical question: Would observed changes in, say, the balance of payments have occurred in any event in the absence of a stabilization program? This question is, of course, unanswerable in principle, because we cannot know what would have happened to policy variables such as domestic credit

without the program. It is possible, however, and potentially valuable to find the answer to another question: Were the stabilization programs under review associated with economic developments that differed significantly from those observed in other countries that had similarly serious current-account or overall balance-of-payments problems but chose *not* to enter into standby programs with the Fund? In contrast to all of the earlier papers mentioned above, an integral part of the empirical analysis reported in this study involves nonparametric statistical tests of the significance of the differences observed between the performances of a "program group" and a "reference group" (listed in the last column of Table 1).[2]

Chapter 2 discusses some major channels through which credit policy influences the balance of payments, inflation, and growth in developing countries, with special emphasis on the potentially important role that the volume of credit can play as a factor of production on the supply side of the economies of these countries. Chapter 3 develops the macroeconomic implications of the supply and cost effects of credit policy within a rigorous but simple analytical framework. This general framework is intended to serve as a guide to thinking about the statistical material in Chapter 4, which presents empirical evidence on the relationships between key magnitudes in the macroeconomic adjustment process during the standby arrangements under review. Using the theoretical background provided in Chapter 3, an attempt is made to answer these questions: Did the rate of domestic credit expansion slow down under these adjustment programs? If so, did the balance of payments improve as intended and did the rate of inflation fall? On the whole, was growth affected during and immediately after the program period? Was the experience of the countries that entered into these arrangements significantly different from the experience of the reference group of countries that elected to adjust on their own or not at all? The fifth and final chapter summarizes the study's principal findings and discusses their implications for economic policy in developing countries.

[2] A review and critique of methodological aspects of the empirical literature on the effects of stabilization programs supported by the Fund is provided in Goldstein and Montiel (1986).

2 SUPPLY AND DEMAND EFFECTS OF CREDIT POLICY

Over the years, the authorities of many member countries of the Fund have hesitated to make the macroeconomic adjustments necessary to correct fundamental balance-of-payments disequilibria and reduce inflation. There is little doubt that their reluctance has frequently reflected concern about the potentially adverse effects of adjustment on the rate of growth of output and employment in the short run, as well as on the distribution of income. These concerns have also been the source of old and new criticism of the widely accepted policy prescription that monetary and fiscal restraint—and sometimes also devaluation—are normally necessary for lasting success in the battle against balance-of-payments deficits and inflation. In the words of Taylor (1981, pp. 500-501):

> It is quite likely that both devaluation and monetary contraction will cause stagflation under semi-industrialized macro-constraints. By leaving the possibility of an output reduction out of their models, financial programmers cannot deal with this natural consequence of the policies they commend. They implicitly tax the poor twice, by real wage reductions and employment declines.

To set the stage, it may be worthwhile to review briefly the major channels through which credit policy can affect output and employment in the short run. There is general consensus about the adjustment mechanism on the demand side of the economy. A reduction in the supply of domestic credit, or in its rate of expansion, reduces expenditure by the private sector, the public sector, or both. By thus reducing aggregate demand for goods and services, credit restraint exerts downward pressure on prices or the rate of inflation and on the demand for imports, improving the current account of the balance of payments.

Less is known with a reasonable degree of certainty about the response of the supply side of the economy to a contraction of domestic credit. The aggregate supply of domestically produced goods and services may be unaffected in the short run. This might be the case, for example, in some primary-producing countries where output is determined principally by production conditions in the primary sector (e.g., mining), producers have limited flexibility in the use of factor inputs, and the production technology is to a large extent fixed in the short run. In most agricultural countries and especially in semi-industrialized countries, however, complete rigidity of supply must be considered unlikely except perhaps in the very short run. In manufacturing, for example, salaried labor and imported intermediate goods and raw materials are important variable factors of production, and so is financial working capital. With nominal wages fixed or at least sticky in the short run by contract

or convention, the real wage of labor varies inversely with the price level. For example, real wage costs fall when the domestic price level rises and producers receive higher prices for their products, and it becomes profitable for firms to hire more labor and expand production. This process is reinforced by increased use of imported inputs that have become relatively less costly. Under a fixed exchange rate, the relative domestic-currency prices of imported inputs fall when the domestic price level rises. These processes stimulate production. Conversely, when domestic product prices fall, labor costs rise in real terms and the relative prices of imported inputs also rise, and these processes discourage production. A similar argument applies to agriculture, where farmers have a clear incentive to expand production when real producer prices rise.[1] But it must be emphasized that the often unpredictable response of nominal wages (and exchange rates) to price changes, as well as uncertainty regarding the magnitude of supply responses and the time lags involved, make it much more difficult to anticipate the extent and speed of supply responses to price incentives than the relationship between aggregate demand and prices. Hence the uncertainty concerning the short-run effects of monetary and fiscal restraint on output—the slope of the aggregate supply curve.

As regards the factors that shift the aggregate supply curve, it has sometimes been argued that financial working capital plays a particularly important part in the production process in developing countries (see McKinnon, 1973, and Keller, 1980). Because domestic financial markets are not well developed, firms are heavily dependent on the domestic banking system for working capital. Frequently, they borrow from banks at the beginning of the production period to pay for labor and other inputs and repay at the end of the period, when output is sold. In these circumstances, bank credit can be viewed as a complementary factor of production. This suggests that the availability and cost of credit should be taken into account not only on the demand side of the economy but on the supply side as well. Reduced access of firms to bank credit may force them to contract and to reorganize remaining production along less efficient lines, driving up production costs and prices, but tight credit could also increase productivity by forcing firms to reduce costs. This applies equally to agricultural and semi-industrialized economies. Furthermore, credit contraction raises the cost of borrowing by increasing interest rates and thus raises costs of production, and this may contribute directly to a contraction of output. Prices may also tend to rise as producers try to pass part of the interest-cost increase on to their customers. If interest rates were initially held below market-clearing levels, however, these cost-raising effects might be offset by an increased supply of credit induced by higher rates of return.

[1] For recent empirical evidence indicating substantial price elasticity of supply of various cash crops in sub-Saharan Africa, see Bond (1983).

Where imported inputs play an important part in manufacturing production, devaluation will inevitably drive up costs of production, and this will cause output to contract and prices to rise for given demand. Again, however, this effect might be offset by the increased availability of foreign exchange for imports of factor inputs as well as for other uses.[2]

It is difficult at present to judge the empirical importance of these supply-side effects; very little direct or indirect evidence pertaining to them is available for developing countries. If these effects are important, restrictive credit policies may have a greater adverse effect on output growth and less of the intended depressing effect on price inflation than is commonly assumed. In the extreme case, the supply-reducing effects of credit restraint on prices may dominate the demand effects, causing stagflation, and the same applies to interest-rate and exchange-rate policy. This is the case contemplated by many critics of orthodox stabilization programs that emphasize monetary and fiscal restraint sometimes combined with devaluation (see the quotation from Taylor, 1981, at the beginning of this chapter, as well as Bruno, 1979, and van Wijnbergen, 1982). At the other end of the spectrum is the assumption frequently made in monetary analyses of inflation and balance-of-payments problems that output is predetermined in the short run independently of credit conditions, because factor markets clear continuously and price expectations adjust rapidly.

Neither of these extreme views is likely to have much applicability to most developing countries. On the one hand, price expectations do not appear to adjust very rapidly to new circumstances, nor do factor markets normally clear instantaneously, as demonstrated, for example, by persistent urban unemployment in many less-developed countries. On the other hand, there is no evidence to support the contention that the supply effects of monetary and fiscal restraint on price developments, with or without devaluation, tend to dominate the demand effects and thus cause stagflation. To be sure, many non–oil-producing developing countries have been afflicted by slower growth, higher rates of inflation, larger payments deficits, and heavier debt burdens than before, despite attempts by some of them to restrain domestic demand. But that observation is irrelevant in this respect: the supply shocks responsible for these developments during the mid-1970s and early 1980s can be traced more directly to events in the industrialized and oil-producing countries than to unintended side effects of domestic monetary, fiscal, and exchange-rate policies.

[2] An empirical assessment of the effects of devaluation on output growth in several developing and industrialized countries, both through the cost of imported inputs on the supply side and through exports, imports, and expenditures on the demand side, is provided in Gylfason and Schmid (1983), Gylfason and Risager (1984), and Gylfason and Radetzki (1985). See also Donovan (1981), Khan and Knight (1985, Table 5), and Edwards (1986).

3 CREDIT POLICY, OUTPUT, AND THE BALANCE OF PAYMENTS: A FORMAL FRAMEWORK

Before proceeding to the empirical analysis of some of the issues just reviewed, it may be useful to present a simple macroeconomic model, which can be viewed as an extension of the monetary balance-of-payments model of Polak (1957) and as a variation on the more general model of Frenkel, Gylfason, and Helliwell (1980). The present model differs from the Polak model primarily by emphasizing the supply side of the economy, which allows simultaneous determination of output and prices, in contrast to the focus of the Polak model on nominal income. The present model also differs from the Frenkel-Gylfason-Helliwell model both by treating the volume of domestic credit as a factor of production, along the lines suggested by McKinnon (1973) and Taylor (1981), and by abstracting from domestic financial assets other than money.

Because the model is concerned with the influence of money and credit on economic activity, the analysis of aggregate demand stresses the monetary side of economic transactions rather than the real side; the market for goods and services need not be considered explicitly. Accordingly, interest rates play no role, nor is an explicit distinction made between monetary and fiscal policy. In view of the emphasis of the analysis on the short run and its application to less-developed countries, the model also suppresses for simplicity many elements of economic behavior that would be relevant in the longer run and in countries with well-developed financial markets: (a) because rigid controls of capital transactions are widespread in developing countries and exchange rates are generally held fixed by the monetary authorities, financial capital movements and exchange rates are assumed to be exogenously determined; (b) money wages are treated as exogenous in the short run; (c) the velocity of circulation of money is assumed to be constant; and (d) the effects of expectations and wealth on both aggregate demand and supply are ignored. Finally, it should be noted that the model does not include all of the supply-side effects discussed in Chapter 2, focusing instead on the demand and supply effects of changes in the stock of domestic credit outstanding.

It should be evident that the model is by no means intended to provide a realistic description of the economies of the developing countries under study. It serves merely to highlight in the simplest possible way the macroeconomic implications of the conflicting views of credit policy reviewed in Chapter 2, and to provide general guidelines for the empirical analysis of Chapter 4.

The model may be expressed by five equations (for notation, see Table 2):

$$M/P = L(Y) \quad \text{(money market)} \quad (1)$$

$$M = D + R \quad \text{(money supply)} \quad (2)$$

$$\Delta R = PX(e/P) - eZ(Y, e/P) + F \quad \text{(balance of payments)} \quad (3)$$

$$Y = Q(N, D/P) \quad \text{(production function)} \quad (4)$$

$$W/P = Q_N(N, D/P)\,. \quad \text{(labor market)} \quad (5)$$

Equation (1) states that real money supply equals the demand for real balances, which varies directly with real income ($L_Y > 0$). Equation (2) defines the money supply as the sum of domestic credit and the net foreign assets of the domestic banking system. Equation (3) states that the overall balance of payments is measured by the change in reserves and equals exports ($X_e > 0$) minus imports ($Z_Y > 0$, $Z_e < 0$) plus net capital inflow, all expressed in nominal terms. Like domestic credit, the exchange rate is treated as an exogenous policy variable. Equation (4) expresses output as a function of employment ($Q_N > 0$, $Q_{NN} < 0$) and of the volume of credit ($Q_D > 0$), which are assumed to be complements in the production process ($Q_{ND} > 0$). The real capital stock is assumed to be fixed during the short period of time under consideration, and it is therefore implicit in the production function. Imported raw materials are ignored. (Real money balances M/P could be treated as a factor of production in lieu of the volume of domestic credit, with the justification that export earnings or foreign credit injected into the economy through the balance of payments can also be viewed as inputs; this change would complicate the analysis slightly without materially altering the qualitative results.) Equation (5) states that labor is employed to the point where its marginal product equals the real wage.

TABLE 2
NOTATION

D	— domestic credit (nominal)
e	— exchange rate (domestic currency price of foreign currency)
F	— net capital inflow (nominal, in domestic currency)
L	— demand for money (real)
M	— money supply (nominal)
N	— employment (in man-hours)
P	— price level (nominal)
Q	— production function
R	— reserves (nominal, in domestic currency)
W	— wage rate (nominal)
X	— exports (real)
Y	— national income (real)
Z	— imports (real)
Δ	— first difference operator ($\Delta R = R - R_{-1}$)

The model can be illustrated in a simple diagram. For this purpose, equations (4) and (5) must first be combined to give the following price equation:

$$P = P(Y, W, D) \qquad P_Y > 0, P_W > 0, P_D < 0, \qquad (6)$$

which represents an upward-sloping aggregate supply schedule with money wages and domestic credit as shift parameters. The signs of the partial derivatives of the supply function reflect the assumption that the link between aggregate supply and the price level via real wages and employment is stronger than the link via financial working capital. Accordingly, an increased supply of credit reduces production costs through its complementarity with labor and thus exerts downward pressure on prices from the supply side (hence $P_D < 0$).

By combining equations (1) and (2) and substituting equation (6) for P in equations (1) and (3), the model can be expressed as two linear relationships between net foreign assets and output:

$$R = m_1 Y + m_2 W - m_3 D \qquad (M \text{ schedule}) \qquad (7)$$

$$R = R_{-1} - k_1 Y - k_2 W + k_3 D + k_4 e + k_5 F . \qquad (K \text{ schedule}) \qquad (8)$$

Here all the coefficients (m_1, k_1, etc.) are positive by definition. Observe also that R_{-1} denotes the predetermined stock of net foreign assets held at the beginning of the period.

The two relationships are shown in the figure on page 12. The slopes of the two schedules (i.e., the signs of m_1 and k_1) reflect the effects of changes in both income and the price level on the demand for money and the current account, respectively; hence the nomenclature—M for "monetary" and K for "Keynesian." The arrows in the diagram indicate how the two schedules shift in response to increases in the exogenous variables. In particular, a reduction in domestic credit is seen to shift both the M schedule and the K schedule to the left, implying that output must contract. But the effect on the balance of payments is ambiguous owing to the potentially inflationary supply-side effect of the contraction of credit. For this reason, the effect on the price level is also ambiguous, as emphasized by Taylor (1981). In the standard case, however, where the supply-side effects of credit policy are minor and are therefore ignored as a first approximation, a contraction of credit causes only the M schedule to shift to the left and improves the balance of payments unambiguously. It should also be noted that balance-of-payments deficits that are not sterilized shift the K schedule to the left over time, thus reducing output and prices; these shifts continue until equilibrium is reached in the balance of payments with $R = R_{-1}$.

The expected effects of increases in the exogenous variables D, W, e, and F on the endogenous variables Y, R, M, and P are summarized in Table 3. The

five question marks reflect the theoretical ambiguities created by treating domestic credit as a factor of production. In the standard case where this role of credit is ignored, credit expansion unambiguously raises the price level, so three of these question marks are replaced by the plus and minus signs shown within parentheses, and only the effects of wage increases on the balance of payments and money supply remain indeterminate (because output and the price level may move in opposite directions).

The "Domestic Credit" column is most relevant here, because it represents the conflicting implications of the orthodox demand-oriented view of credit policy and the new supply-oriented view according to which domestic credit restraint can cause stagflation and weaken the external position. To anticipate, the empirical findings of Chapter 4 provide some support for the traditional view of the effects of credit contraction (or deceleration), at least as far as the balance of payments is concerned. The evidence concerning output

DETERMINATION OF OUTPUT AND THE BALANCE OF PAYMENTS IN THE SHORT RUN

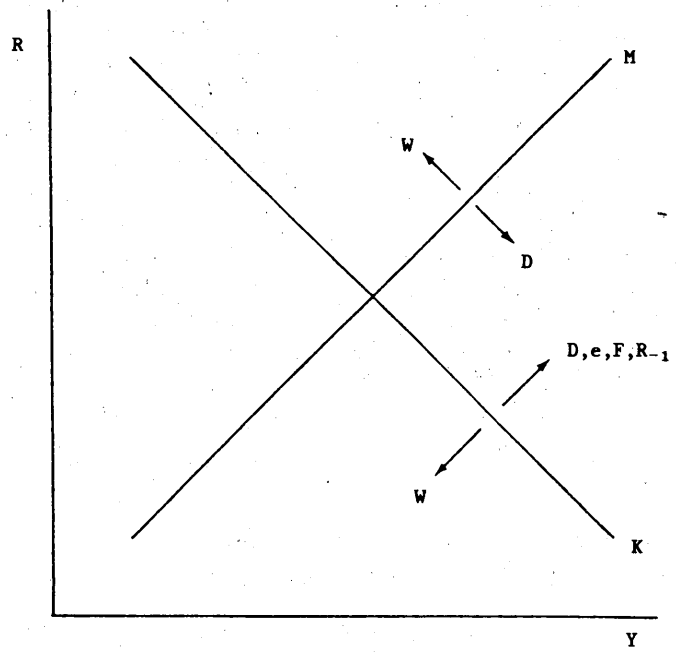

TABLE 3

EXPECTED EFFECTS OF INCREASES IN EXOGENOUS FACTORS ON ENDOGENOUS VARIABLES

Endogenous Variables	Exogenous Factors			
	Domestic Credit	Wage Rate	Exchange Rate	Capital Inflow
Output	+	−	+	+
Reserves	?(−)	?	+	+
Money supply	+	?	+	+
Price level	?(+)	?(+)	+	+

growth, monetary expansion, and inflation is weaker; the changes in these variables following credit contraction are, on average, neither substantial nor statistically significant, even though they generally moved in directions consistent with the demand-oriented view.

Against this analytical background, two main conclusions to be drawn from the findings in the following chapter merit attention and emphasis in advance. First, the result that credit restraint under the stabilization programs was not followed by a significant slowdown in economic growth could imply either of two things: (a) The supply-side effects of credit contraction, which would cause the *K* schedule to shift to the left and add to the negative output effects from the demand side, are not in general sufficiently important from an empirical point of view to dominate the apparently positive output effects of other aspects of the adjustment programs or of other factors that shift the *K* schedule to the right, such as devaluation or increased capital inflow; (b) output is primarily supply-determined and insensitive to variations in domestic credit. In the latter case, however, credit contraction (or deceleration) should have led to a reduction in the price level (or the inflation rate) other things being equal. Yet no significant reduction in the rate of inflation in these countries was observed, which leads to the second conclusion. The direct output and price effects of domestic credit restraint appear to have been partly or wholly offset by simultaneous changes in other "exogenous" variables, including capital flows and exchange rates.

4 EMPIRICAL EVIDENCE

A quantitative assessment of the thirty-two standby programs under review is inevitably subject to considerable difficulties. First, limited statistics are available and their quality is uncertain. In particular, data on real output (GDP at constant prices) and on consumer prices are notoriously unreliable for many countries in the sample. Second, the countries shown in Table 1 are so diverse that general conclusions drawn from the data must be interpreted with caution. Averages are likely to conceal substantial differences among individual countries. The sample includes five high-inflation countries that were also afflicted by other difficulties (Argentina, Ghana, Peru, Turkey, Zaire), three countries where persistently poor growth performance was attributable mainly to structural deficiencies on the supply side of the economy (Guyana, Jamaica, Zambia), two countries that experienced severe external shocks during the period under review (Gabon, Mauritius), and one country that does not have an independent monetary policy (Panama). To avoid undue distortion of the average measures of performance and the statistical tests, some of these countries were excluded from the empirical analysis.

Against the analytical background provided in Chapter 3 and subject to the above-mentioned caveats, the empirical analysis focuses on five key macroeconomic magnitudes in the year before the program, in the program year, and in the year after the program. These key variables are (1) the rate of domestic credit expansion, (2) the rate of growth of the money supply, broadly defined, (3) the ratio of the overall balance of payments to GDP, with the balance of payments measured broadly by the change in the net foreign assets of the banking system rather than the change in officially held reserves, (4) the rate of growth of real GDP, and (5) the rate of inflation measured by consumer prices. (Precise definitions are given in the Note to Table 4 below.)

Data constraints precluded any attempt to distinguish between alternative uses of credit, although this distinction would have been desirable because it may have important implications for the relationship between credit policy and growth performance. The simple distinction between credit to the public and private sectors could have been drawn but was avoided deliberately because the division of total domestic credit between government and private enterprise is of doubtful relevance for the relationship between credit and growth in the short run. Credit to the public sector will therefore be mentioned only in passing. It should be noted, however, that this sectoral division of credit is an important device by which the IMF seeks to induce member countries to shrink fiscal deficits, and that effect is left out of the present analysis.

Many of the standby programs under review were intended not only to reduce the deficit on current account but also to encourage capital inflow, mainly by restoring foreign confidence in the economic situation of the country concerned. The overall balance of payments was therefore used as the relevant measure of the external position. (Since gross foreign assets and liabilities both increase by amounts drawn under standby arrangements, the net foreign-asset position and hence the overall balance of payments, as measured here, are not affected by the use of Fund resources.) The analysis nevertheless pays some attention to the current account in view of the increasingly heavy interest burden of foreign debt in many of these countries.

There is an additional reason for concern with the composition of the improvement in the balance of payments achieved through a slowdown in domestic credit expansion. The greater the inflow of foreign capital, the smaller will be the ultimate reduction in total credit expansion from domestic and foreign sources combined, and hence the less will be the adverse effect, if any, on the growth rate of output. Accordingly, a distinction is made in the empirical analysis between "catalytic programs," which are those accompanied by an increased inflow of foreign loans or grants, and "noncatalytic programs," which are those where the capital inflow remained unchanged or declined. The model of Chapter 3 featured two other exogenous variables; to capture their effects, a distinction is also made between "devaluation programs" and "nondevaluation programs" and between "structural-adjustment programs" and "demand-management programs," but data constraints did not permit any attempt to take account of wage changes.

The remainder of this chapter is organized as follows. Section A presents an overview of the data and describes the behavior of the major macroeconomic magnitudes under scrutiny before, during, and after the programs reviewed. Section B analyzes the role and impact of devaluations, structural-adjustment measures, and foreign credit under these programs. Section C discusses the reference group and presents the nonparametric statistical tests.

A *Performance under the Stabilization Programs: An Overview*

The basic data from Appendix Tables A.1 through A.3 are summarized in Table 4, which compares the averages of the above-mentioned magnitudes for the calendar years before, during, and after the implementation of the stabilization programs under review. The calendar year was chosen as the period of analysis for two reasons: (1) almost all the nonfinancial data (including the figures on output growth and inflation) were available only on an annual basis; (2) use of the calendar year avoided comparing events that occurred during different periods, at least within each program group. While the quantitative

TABLE 4

AVERAGE MEASURES OF PERFORMANCE UNDER STABILIZATION PROGRAMS, 1977-79

(in percent)

	Credit Expansion (1)	Monetary Expansion (2)	BOP/GDP (3)	Output Growth (4)	Inflation Rate (5)	Memorandum Items: Non–Oil Developing Countries: Output Growth (6)	Memorandum Items: Non–Oil Developing Countries: Inflation Rate (7)	Alternative Measures of Credit Expansion and External Position: Credit to Govt./GDP (8)	Alternative Measures of Credit Expansion and External Position: Current Account/GDP (9)
1977 programs: [a]									
Year before	27	22	−2.0	2.6 [b]	20	5.4	28	5.7 [b]	−6.3 [b,c]
Program year	20	24	0.0	2.8 [b]	18	4.8	27	4.6 [b]	−4.0 [b,c]
Year after	28	27	−1.0 [d]	3.1 [b]	19	5.5	24	5.0 [b,e]	−4.7 [b,c]
1978 programs: [f]									
Year before	30	21	−4.9	1.9	20	4.8	27	7.8	−10.7
Program year	28	29	−1.7	1.8	27	5.5	24	5.7	−5.7
Year after	30	43	0.2	2.6	35	4.9	29	7.5	−7.4
1979 programs: [g]									
Year before	33 [h]	29 [h]	−1.2	4.8 [i]	22	5.5	24	5.2 [j,k]	−12.4 [k]
Program year	26 [h]	19 [h]	−1.2	3.7 [i]	29	4.9	29	3.6 [j,k]	−11.3 [k]
Year after	28 [h]	30 [h]	−1.5	3.2 [i]	31	4.4	38	3.6 [j,k]	−11.3 [k]
All programs combined: [l]									
Year before	30	25	−2.2	3.3	21	5.2	26	5.9	−10.0
Program year	24	23	−0.8	3.0	24	5.1	27	4.4	−7.6
Year after	28	32	−1.0	3.0	27	4.9	30	4.9 [m]	−8.3

Reference group: [l]									
1976	27	28	−0.2	6.4 [n]	8	5.4	28	3.8	−9.0
1977	21	21	0.0	4.2 [n]	11	4.8	27	2.6	−11.1
1978	32	19	−2.7	5.7 [n]	8	5.5	24	4.6	−12.3
1979	25	17	−2.0	4.8 [n]	13	4.9	29	3.6	−11.9
1980	23	28	−1.8	3.2 [n]	22	4.4	38	5.3	−12.0

SOURCES: Author's calculations based on *International Financial Statistics (IFS)* (October 1982 and Yearbooks 1981, 1982, and 1985) and *IMF Annual Report 1981*, Tables 2 and 3. For further detail, see Appendix Tables A.1 to A.4.

NOTE: "Credit Expansion" is the percentage rate of change of domestic credit (line 32 in *IFS*); "Monetary Expansion" is the rate of change of money plus quasi-money (lines 34 plus 35); "BOP/GDP" is the ratio of the change in net foreign assets of the banking system (line 31n) to GDP (line 99b); "Output Growth" is the rate of change of real GDP (line 99b.p); "Inflation Rate" is the percentage rate of change of consumer prices (line 64 in *IFS*); "Credit to Govt./GDP" is the ratio of the change in net claims of the banking system on government and public enterprises (lines 32an, 32b, and 32c) to GDP (line 99b); "Current Account/GDP" is the ratio of the sum of the merchandise trade balance (line 77a.d) and the net services balance (line 77 and), converted to domestic currency by the average U.S. dollar exchange rate (line af), to GDP (line 99b).

[a] Argentina is not included owing to its uniquely high triple-digit inflation rate.

[b] Romania is not included for lack of comparable data.

[c] Zaire is not included for statistical reasons.

[d] Egypt is not included. Average BOP/GDP is −2.4 if Egypt is included.

[e] Egypt is not included. The figure is 7.4 if Egypt is included.

[f] Gabon, Panama, and Zambia are not included for statistical reasons. Gabon experienced a dramatic decline in real GDP in 1977 and 1978 that had repercussions throughout the economy.

[g] Panama and Western Samoa are not included for statistical reasons.

[h] Togo is not included owing to breaks in the data series.

[i] Ghana and Mauritius are not included owing to extreme variations in the data. Mauritius suffered severe cyclones in 1980.

[j] Togo is not included owing to breaks in the data.

[k] The figures for Congo are based on author's estimates.

[l] Simple unweighted averages.

[m] Egypt is not included. The figure is 5.8 if Egypt is included.

[n] Senegal is not included for statistical reasons.

analysis of the relationships among credit policy, the balance of payments, and growth is clearly independent of this choice, the calendar year after the program may be more relevant for judging the degree of implementation and success of programs that were approved late in the year. It should be borne in mind, however, that the formal approval of virtually all the programs under review was preceded by several months of preparatory work. During this period, the authorities may have begun to respond to their balance-of-payments problems, for example by restraining credit expansion. In any event, the potential bias created by the focus on calendar years does not seem to be significant; the use of quarterly financial data and spliced annual nonfinancial data timed to conform to different program periods gives results similar to those presented below.

Subject to these qualifications, the cross-section evidence of Table 4 provides some useful insights. Column 1 shows that, on average, the rate of credit expansion was reduced substantially during the program years. If the 1977, 1978, and 1979 programs are taken together, the average rate of credit expansion was reduced from 30 percent in the year before the program to 24 percent in the program year but rose to 28 percent in the following year. (Computations based on quarterly data produce the same average rates.) Net domestic credit to the public sector, shown in column 8, behaved in a similar way. The faster growth of domestic credit in the year after the program may indicate a reduced commitment by the authorities to the adjustment effort once the standby arrangement with the Fund had expired.

The immediate purpose of controlling credit expansion is to contain the growth rate of the money supply and to restrain imports. But the strength of the link between credit expansion and the behavior of the money supply depends on the extent to which credit policy influences the balance of payments, as well as on exogenous factors that affect the external position. In general, the larger the improvement in the balance of payments, the larger is the ensuing rate of monetary expansion. Columns 2 and 3 bear witness. Under the 1977 and 1978 arrangements, the rate of monetary expansion actually rose during the program year as the balance of payments improved, and it increased further in the following year when credit creation accelerated. Taking the 1977, 1978, and 1979 arrangements together, the rate of monetary expansion slowed much less than the rate of credit expansion in the program year, while the balance-of-payments deficit was reduced from 2.2 percent of GDP on average in the year before the program to 0.8 percent on average in the program year. Column 9 shows that the current account followed a very similar pattern. These results indicate that, on the whole, domestic credit expansion slowed down considerably under the standby programs reviewed, while the balance-of-payments position improved substantially, as intended. Of course, other factors such as exchange-rate or price developments may have contributed to this outcome.

The interaction of credit expansion, output growth, and inflation under these stabilization programs cannot be examined in isolation. We saw in Chapters 2 and 3 that a tightening of credit can generally be expected to lead to a reduction in both inflation and real growth, *ceteris paribus*, but this is not necessarily the case. We also saw that a reduction in the rate of domestic credit expansion may be accompanied by an increase in export volume or an influx of foreign capital, by an improvement in the terms of trade, or by a devaluation, so that output growth is unaffected by the slowdown in domestic credit expansion. Furthermore, domestic developments are highly dependent on economic events abroad in small open economies like most of those under review here. Domestic credit contraction may have only a limited impact on inflation and growth at home if the rest of the world economy is in an upswing or if foreign financing is available to replace domestic credit. Finally, the growth performance of developing countries tends to be particularly sensitive to noneconomic factors such as rainfall and political stability.

Under these circumstances, it is not surprising that the evidence on output growth presented in column 4 is mixed. If the sample is viewed as a whole, the average growth rate of GDP declined under the standby programs, going from 3.3 percent in the pre-program year to 3.0 percent in the program year and remaining there in the following year. By comparison, column 6 shows that the average growth rate of GDP in all non–oil-producing developing countries (excluding China) declined from 5.2 percent to 4.9 percent during the same period. These figures suggest that during and immediately after the program period the reduction in credit expansion under the standby arrangements depressed output growth somewhat, but not substantially. If this inference is confirmed by closer scrutiny, the potentially negative effects of tight credit on aggregate supply emphasized in Chapter 2 may have been relatively unimportant, if present at all, in the stabilization programs under review.

A mixed picture also emerges when the three groups of standby arrangements are viewed separately and the time horizon is extended to three years before and after the programs. During the three-year period immediately following the 1977 programs (1978-80), the average annual growth rate of output was 3.3 percent, compared with 2.7 percent during 1974-76, confirming the results of the one-year comparison. For the 1978 programs, by contrast, the slight increase in growth that occurred immediately after the program year was subsequently reversed; the average annual growth rate fell from 3.9 percent during 1975-77 to 3.5 percent during 1979-81. (These averages, it must be added, refer to only five of the eight countries in the 1978 program group; Gabon, Panama, and Zambia were excluded as before.) The three-year comparisons for the countries in the 1979 program group also confirm the results of the one-year comparison; the average annual growth rate decreased from 4.2 percent during 1976-78 to 2.5 percent during 1980-82. Keep in mind,

however, that growth performance during a three-year period following a one-year adjustment program is likely to be influenced by many factors unrelated to the program. In particular, any short-run adverse effects of these programs on growth performance are likely to be reversed in many cases, especially in the wake of programs that emphasized export promotion or import liberalization or that stimulated capital inflow.

The results are also mixed with respect to inflation. On the one hand, the inflation rate was kept below the average rate prevailing in non–oil-producing developing countries before, during, and immediately after the program period (compare columns 5 and 7). On the other hand, the inflation rate rose in both the program year and the following year in many of the countries in the sample. The average inflation rate for the sample as a whole rose from 21 percent in the pre-program year to 24 percent in the program year and to 27 percent in the following year (the figures are 16, 17, and 22 percent, respectively, if Turkey and Zaire are excluded). But the acceleration of prices under the standby arrangements reviewed does not appear to be much out of line with the trend of consumer prices in all non–oil-producing developing countries during 1976-80.

To recapitulate, performance under the stabilization programs supported by the IMF in 1977, 1978, and 1979 was generally characterized by a substantial slowdown in the rate of domestic credit expansion, some reduction in the rate of growth of the money supply, a strong improvement in the balance of payments, a relatively modest reduction in the rate of growth of output, and inflation rates that were below the average for other non–oil-producing developing countries. While these observations do not necessarily imply a statistically significant pattern (see section C below), let alone a causative link between credit policy and the other macroeconomic magnitudes at issue, it seems natural nonetheless to interpret the evidence as indicating that domestic credit policy played an important role in securing the outcome.

B Devaluation, Structural Adjustment, and Foreign Credit

Averages of macroeconomic aggregates may conceal important differences among individual countries, so the results presented thus far must be interpreted with caution. While monetary and fiscal policies were intended to play an important role in virtually all the standby programs under review, most of the programs involved other measures as well. Several were accompanied by significant exchange-rate actions. Several emphasized microeconomic or supply-side policies to deal with structural problems such as severe distortions in costs and prices, inadequate saving and investment, or inefficient nonfinancial public enterprises. And several were accompanied by significant increases in capital inflow from abroad. Before performing statistical-significance tests, it is therefore advisable to take a more disaggregative approach to

the data in order to gain further insight into the interplay of credit policy with exchange-rate policy, supply-side measures, and foreign credit.

To this end, the sample was divided into six categories. First, "devaluation programs" (those in which exchange-rate distortions were present at the inception and the exchange-rate policies adopted were deemed appropriate by the Fund staff) were distinguished from "nondevaluation programs" (all others). Second, "structural-adjustment programs" (those that appear to have placed relatively heavy emphasis on dealing with structural problems) were distinguished from "demand-management programs" (all others). Third, "catalytic programs" (those that were accompanied by increased foreign loans and grants, measured by an increased difference between the overall balance of payments and the current account in the program year or the year after) were distinguished from "noncatalytic programs" (all others). The countries so distinguished in the 1977, 1978, and 1979 programs are listed in Table 5. Table 6 shows the averages of the major macroeconomic aggregates recorded separately for each subgroup.

Three features of the results are particularly worth noting. First, the overall balance-of-payments deficit was considerably larger in the devaluation-program countries than in the nondevaluation-program countries in the year before the program, but the two groups registered a similar strengthening of the external position in the program year. This improvement continued in the devaluation group, however, and overall balance-of-payments equilibrium was reached on average in the year after the program, but the initial improvement for the nondevaluation group was reversed immediately after the program period. It is interesting that during the program year the average infla-

TABLE 5
CLASSIFICATION OF PROGRAMS

Programs	1977	1978	1979
Devaluation	Burma Peru Sri Lanka	Portugal Turkey Zambia	Mauritius Western Samoa Zaire
Structural-adjustment	Burma Egypt Jamaica Peru Sri Lanka	Panama Peru Portugal Zambia	Bangladesh Ghana Turkey Western Samoa
Catalytic	Burma Pakistan Sri Lanka	Burma Peru Portugal	Bangladesh Kenya Philippines Sierra Leone Turkey

TABLE 6

AVERAGE MEASURES OF PERFORMANCE UNDER STABILIZATION PROGRAMS BY SUBGROUP, 1977-79

(in percent)

Programs	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth [a]	Inflation Rate
Devaluation:					
Year before	33	28	−3.4	3.0	24
Program year	27	20	−1.8	2.1	33
Year after	32	41	−0.4	2.9	33
Nondevaluation:					
Year before	30	24	−1.8	3.0	22
Program year	24	25	−0.3	3.1	23
Year after	28	29	−1.1 [b]	3.2	27 [c]
Structural-adjustment:					
Year before	32	28	−3.2	3.1	27
Program year	29	30	−0.8	2.3	27
Year after	37	40	−1.1 [b]	3.7	37 [d]
Demand-Management:					
Year before	29	23	−1.6	2.9	19
Program year	22	18	−0.7	3.1	25
Year after	23	27	−0.7	2.7	22
Catalytic:					
Year before	28	23	−2.7	4.6	17
Program year	29	26	−0.6	4.0	19
Year after	28	31	−0.6	4.4	25 [e]
Noncatalytic:					
Year before	32	27	−1.9	1.4	27
Program year	22	21	−0.9	1.6	32
Year after	30	34	−1.2 [b]	1.8	31

SOURCES: Same as for Table 4.

NOTE: For definitions of variables, and countries excluded, see notes to Table 4. Romania and Togo are also excluded owing to lack of data.

[a] Ghana and Mauritius are not included.

[b] Egypt is not included.

[c] 21 if Turkey is not included.

[d] 29 if Turkey is not included.

[e] 17 if Turkey is not included.

tion rate increased substantially in the devaluation group, as expected, but remained virtually unchanged in the nondevaluation group. In the program year, moreover, the average growth rate of output for the devaluation group declined relative to the growth rate for the nondevaluation group in the program year but recovered subsequently, so that the outcomes were similar in

the year after the program. (But the relative reduction in the average growth rate for the devaluation group in the program year is not statistically significant, based on the nonparametric test introduced in section C.)

Second, the rate of domestic credit expansion fell less in the program year in the structural-adjustment group than in the demand-management group, presumably a reflection of the relatively greater emphasis of the structural-adjustment programs on nonfinancial policies. Yet the balance-of-payments adjustment patterns were qualitatively similar. During the program year, there was a considerable reduction in the average growth rate of output in the structural-adjustment group, but it should be viewed in the light of the predominantly structural problems that prompted most of these programs and in the light of the resumption of rapid growth in the following year. (The decline in the average growth rate in the demand-management group in the year after the program is not statistically significant in comparison with either the structural-adjustment group or the reference group.)

Third, a comparison of the catalytic and noncatalytic programs shows that, with practically no change in domestic credit expansion and an injection of foreign capital, the catalytic group experienced a fairly small and short-lived reduction in output growth. In the noncatalytic group, by contrast, the average rate of domestic credit expansion declined substantially (though only temporarily) in the program year without visibly affecting growth. At the same time, the catalytic program group achieved a considerable reduction in its average balance-of-payments deficit, equivalent to about 2 percent of GDP, which was both larger and more durable than the achievement of the noncatalytic group.

Subject to the obvious qualification that no attempt has been made to vary more than one exogenous variable (other than domestic credit expansion) in each comparison, the results reported here are by and large consistent with the analytical framework of Chapter 3. The rate of domestic credit expansion was reduced as intended, at least temporarily, in all the subgroups except the catalytic, and the balance of payments showed substantial improvement in every category, apparently without inflicting serious or lasting damage on growth performance.

C Comparisons with a Reference Group: Significance Tests

The data have revealed a fairly clear and consistent pattern, but it remains to be determined whether or not the results are statistically significant. Obviously, it is not possible to test the significance of the results for individual countries, nor to say how these countries would have fared had they decided not to enter into standby arrangements with the Fund. It *is* possible, however, and of interest, to compare and test the significance of differences between the behavior of the major macroeconomic aggregates in countries that

entered into IMF standby arrangements and the behavior of the same aggregates in another group of countries that had persistent current-account or balance-of-payments problems during 1975-77 but did not enter into standby arrangements. Accordingly, I will compare the performance of a group of countries with a given "disease" (external deficits) during and immediately after "treatment" (the Fund program) with the performance of a reference group drawn from the same population of "patients" (deficit countries) that did not receive treatment. An attempt is then made to use significance tests to draw inferences about the results of the treatment.

Certain limitations of the statistical methods should be pointed out before proceeding. First, because the "patients" are countries, it is impossible to select a reference group identical to the program group in all respects except the treatment. A comparison of the program group with itself in earlier years, when it suffered from the same disease without receiving the same treatment, is subject to the difficulty that the world economic environment may have changed substantially in the meantime.

With comparisons between matched pairs thus ruled out, an independent reference group must be selected.[1] One possibility would be to use all non–oil-producing developing countries (as was done by Donovan, 1982, and, casually, in section B above), but such comparisons can be misleading, because many of those countries did not have the disease defined here. Furthermore, the patient population is small, so that random selection of samples is impractical, nor can treatment be randomly assigned to patients. To bypass this problem, the entire population of program countries is compared instead with a reference group consisting of virtually all nonindustrial non–oil-producing countries that experienced a cumulative decline in nominal net foreign assets or substantial and persistent current-account deficits during 1975-77 and for which the requisite data are available. (These countries are listed in the last column of Table 1; basic data for each one are presented in Appendix Table A.4.) The year 1978 was chosen as the hypothetical program year for the reference group, even for comparisons with the 1977 and 1979 program groups. In fact, some of the countries in the reference group actively considered entering into standby or extended arrangements with the Fund in 1978. (Some of them actually did so after 1979.)

The data for the reference group are summarized at the bottom of Table 4. It can be seen that the reference-group countries had lower payments deficits and lower rates of domestic credit expansion and price inflation in 1977 than the program-group countries had on average in the pre-program years. For that reason, the need for adjustment, with or without support from the Fund, was less urgent for the reference-group countries. It should be emphasized,

[1] For a thorough discussion of the use of related vs. independent samples, see Siegel (1956, Chaps. 5 and 6).

however, that the apparent equilibrium in the overall balance of payments of the reference-group countries in 1977 understates the weakness of their external positions; the average ratio of the current-account deficit to GDP was about the same for the reference group in 1977 as for the program group in the pre-program year. Thus, the stronger overall payments position of the reference group presumably reflects a relatively easier access to foreign capital. Also, the average ratio of reserves to imports was virtually the same in the two groups (2.5 months' worth of imports in the program group as a whole compared with 2.6 months' worth of imports in the reference group).[2] It is also worth noting that the average inflation rate in the reference group was much lower during 1976-79 than in the program group or in all non–oil-producing developing countries, and the average growth rate of output was considerably higher than in the program group and about the same as in all non–oil-producing developing countries. Nevertheless, the essential similarity between the program and reference groups is underlined by the fact that there is no statistically significant difference (in the sense defined below) between the movements of the five main macroeconomic variables in the pre-program year for the program group and in 1977 for the reference group.[3]

Despite the deficits on current account mentioned above, the average rate of domestic credit expansion in the reference group increased markedly in 1978, and the overall balance of payments moved from approximate equilibrium to sizable deficit (equivalent to almost 3 percent of GDP on average). The current account also deteriorated (column 9). These developments were accompanied by a substantial increase in the average annual growth rate of output. The changes were partially reversed during 1979, when domestic credit expansion and output growth slowed down and the balance-of-payments deficit decreased. Thus, the slowdown in domestic credit expansion and the ensuing improvement in the external position that were achieved under the standby programs did not occur in the reference group in 1978. By implication, the slowdown in domestic credit expansion in the reference group in 1979 was less effective on average than the adjustment effort undertaken by the program countries. The balance-of-payments deficits were reduced to 2 percent of GDP, compared with less than 1 percent of GDP for the program group, and the ratio of the current-account deficit to GDP remained unchanged. In spite of the slowdown in 1979, moreover, the rate of domestic credit expansion remained far above the domestic inflation rate.

[2] Here gross international reserves are measured in U.S. dollars and are defined as total reserves including gold valued according to national practice (that is, the sum of lines "1*l*.d" and "1 and" in *IFS*). Imports (cif, line 71 in *IFS*) were converted to U.S. dollars by the average U.S. dollar exchange rate (line rf in *IFS*).

[3] Two minor exceptions should be noted. Compared with the reference group, the rates of monetary expansion and output growth rose significantly in the 1977 program group in the pre-program year.

The nonparametric U test proposed by Mann and Whitney (1947) was used to measure the statistical significance of the differences between the change in the performance of the program group from the year before the program to the program year and the change in the performance of the reference group from 1977 to 1978. This test is particularly suitable for present purposes because, unlike the more popular t test, which is only slightly more powerful, the U test does not require the samples under study to be normally distributed, or to have equal variances. The two samples must be independent of each other for the Mann-Whitney test to be valid, but this requirement is approximately satisfied by the cross-section data used here (but not by the autocorrelated time-series data used in earlier studies).

The Mann-Whitney test is performed by pooling the reference and program groups and arranging the observations from the two samples in ascending order, then replacing the smallest by 1, the next by 2, etc., and the last by an integer equal to the sum of the number of observations. The sum of the integers (or ranks) corresponding to the observations from, say, the reference group is the test statistic. If this sum is high or low enough to indicate that the observations from the reference group are systematically higher or lower than those from the program group, one can reject the null hypothesis that there is no difference between the two groups. To make significance tests of this hypothesis possible, Mann and Whitney calculated the distribution of the test statistic for small samples and showed that it is approximately normal when the number of observations in each sample exceeds 7 (see Mood and Graybill, 1963, Chap. 16).

Following this procedure, standardized Mann-Whitney U statistics were computed to compare the performances of the reference countries and the program countries, both for individual years and subgroups and as a whole. The results are summarized in Table 7. In each cell, the top entry indicates whether the hypothesis stated in the column head above it must be rejected ("No") or not ("Yes"). (Since all but one of the samples under study are large enough for the U statistics shown in the middle of each cell to be normally distributed, those statistics can be interpreted as t statistics. The one exception is the 1978 program group, which is too small.) The first column shows the results of tests of the hypothesis that domestic credit expansion fell significantly during the program period for the program group compared with the reference group. For example, the entry "Yes" followed by 2.6** (and accompanied by 0.004 in parentheses) in the top left corner shows that the average reduction in the rate of domestic credit expansion achieved under the 1977 programs was statistically significant (at the 0.004 level for a one-tailed test) compared with the change in credit expansion in the reference group from 1977 to 1978.[4]

[4] The U statistics were corrected for tie scores where appropriate.

TABLE 7

COMPARISON OF PERFORMANCE UNDER STABILIZATION PROGRAMS AND IN REFERENCE GROUP: TEST RESULTS USING STANDARDIZED MANN-WHITNEY *U* STATISTICS

(significance levels in parentheses)

Programs	Hypotheses				
	1. Credit Expansion Fell	2. Monetary Expansion Fell	3. BOP/ GDP Rose	4. Output Growth Fell	5. Inflation Rate Fell
1977 [a]	Yes	Uncertain	Yes	Uncertain	Uncertain
	2.6**	−0.9	−3.0**	−.04	−0.9
	(0.004)	(0.19)	(0.001)	(0.48)	(0.19)
1978 [b]	Uncertain	Uncertain	Yes	Uncertain	Uncertain
	1.3	−1.3	−2.6**	−0.06	−1.3
	(0.10)	(0.10)	(0.004)	(0.48)	(0.10)
1979 [c]	Uncertain	Uncertain	Yes	Uncertain	Uncertain
	1.3	0.8	−2.2*	1.0	−1.6
	(0.09)	(0.21)	(0.02)	(0.15)	(0.06)
All combined	Yes	Uncertain	Yes	Uncertain	No
	2.3**	−0.4	−3.3**	0.5	−1.6*
	(0.01)	(0.35)	(0.001)	(0.32)	(0.05)
Devaluation	Yes	Uncertain	Yes	Uncertain	Uncertain
	2.2**	0.2	−2.9**	0.3	−1.4
	(0.01)	(0.42)	(0.002)	(0.37)	(0.09)
Nondevaluation	Yes	Uncertain	Yes	Uncertain	Uncertain
	1.9*	−0.7	−2.9**	0.4	−1.4
	(0.03)	(0.26)	(0.002)	(0.33)	(0.08)
Structural-adjustment	Uncertain	Uncertain	Yes	Uncertain	Uncertain
	1.2	−1.1	−3.1**	0.6	−1.0
	(0.11)	(0.14)	(0.001)	(0.26)	(0.15)
Demand-management	Yes	Uncertain	Yes	Uncertain	No
	2.6**	0.2	−2.7**	0.2	−1.7*
	(0.005)	(0.43)	(0.004)	(0.42)	(0.05)
Catalytic	Uncertain	Uncertain	Yes	Uncertain	Uncertain
	1.1	−0.5	−3.4**	0.3	−1.0
	(0.14)	(0.31)	(0.001)	(0.38)	(0.15)
Noncatalytic	Yes	Uncertain	Yes	Uncertain	No
	2.8**	−0.2	−2.4**	0.5	−1.7*
	(0.003)	(0.43)	(0.01)	(0.32)	(0.04)

SOURCE: Author's calculations.

* Statistically significant difference at the 0.05 level (in a one-tailed test) between results achieved by program group in the program year and the reference group in 1978.

** Statistically significant difference at the 0.01 level.

[a] Argentina and Romania are not included.

[b] Gabon, Panama, and Zambia are not included.

[c] Panama, Togo, and Western Samoa are not included.

The results show that both the average reduction in the rate of credit expansion and the ensuing average improvement in the balance of payments registered under the standby programs were generally statistically significant at the 0.05 level, even at the more stringent 0.01 level, compared with the movements of these variables in the reference group. The slowdown in credit expansion was significant in all subgroups except the structural-adjustment group (where credit policy was generally assigned a less important role than in the demand-management programs) and the catalytic group.[5] Even more striking, the improvement in the balance of payments was significant in every subgroup, classified either by year or by program content. Other changes under these programs, including the average reduction in the growth rate of output and in the inflation rate, were not significant by the same criterion.

These results support the conclusion that the improvement in the external position achieved under the stabilization programs was not on average coincidental and apparently did not entail a significant cost in terms of lost output and employment. The direct negative effects of credit restraint on output growth were apparently offset by other factors such as devaluation or structural adjustment. (It is impossible to test this interpretation explicitly, however, as all except five of the programs under study were accompanied by devaluation, structural-adjustment measures, or increased foreign borrowing, and these five include two industrial countries, so that the number of programs involving "pure" credit contraction is too small and heterogeneous to form a comparison group.)

The tests presented here are designed to determine only whether the differences between the program and reference groups are statistically significant evidence of differences in their economic environment. They are therefore subject to important qualifications. First, the tests do *not* exclude the possibility that statistically significant differences between the groups are due to differences other than those caused by the Fund programs in particular. Second, a serious adjustment effort might have been undertaken by the program countries in any case, even without Fund support. Finally, the choice of 1978 as the hypothetical program year for the reference group is inevitably somewhat arbitrary and creates potential difficulties for comparisons of the 1977 and 1979 program groups with the reference group. When 1977 and 1979 are treated as the hypothetical program years for the reference group in comparisons with the 1977 and 1979 program groups, respectively, the changes in the rate of domestic credit expansion and the ratio of the balance of payments to GDP are not significant for these groups individually. Nevertheless, the average improvement in the balance of payments for the program

[5] The average reduction in the ratio of government credit to GDP was also highly significant ($U = 2.7^{**}$ for all the programs combined).

group as a whole remains statistically significant at the 0.01 level, although the reduction in the average rate of domestic credit expansion becomes nonsignificant. The changes in the average growth rate of output remain nonsignificant throughout.

5 CONCLUSION

Critics of orthodox demand-oriented stabilization programs have frequently contended that the supply side is crucial to the macroeconomic adjustment problems of developing countries. Aggregate supply is elastic with respect to price, and credit policy, they say, like interest-rate and exchange-rate policy, has direct effects on the structure and cost of production and hence on aggregate supply. In consequence, they claim, a reduction in the rate of credit expansion tends to depress output growth substantially in the short run and may even be inflationary as well. This study has tried to throw new light on the relationship between credit policy and the performance of output and other key macroeconomic aggregates in developing countries. A simple macroeconomic framework reflecting these supply-side considerations was developed, and empirical evidence was presented to evaluate performance under stabilization programs supported by the IMF in 1977, 1978, and 1979.

By and large, the standby arrangements under review were successful with respect to the balance of payments. The evidence shows that credit expansion was reduced markedly and the overall balance of payments improved substantially. Subject to the qualifications noted, both these outcomes were statistically significant compared with events in a reference group of countries. At the same time, the inflation rate, although increasing on average, was generally kept below the rates prevailing in other non–oil-producing developing countries. These results, it appears, were achieved at the cost of a relatively modest reduction in the average growth rate of output during and immediately after the program period. For the program group as a whole, as well as for individual subgroups, the decline in the average growth rate was not statistically significant when compared with growth in the reference group, nor was a significant difference found between growth in individual program subgroups during or immediately after the program period. It should be kept in mind, however, that all but five of the programs under review were accompanied by devaluation, microeconomic supply-side measures, or increased foreign borrowing, all of which would tend to counteract the direct negative effect of contractionary credit policy. Furthermore, world economic activity slowed down during this period, so that the average growth rate of all non–oil-producing developing countries also fell modestly, and this effect may have dominated differences between the program and reference groups.

It thus appears that the experience with these standby arrangements does not give occasion for grave concern about the short-term contractionary or even stagflationary consequences of adjustment programs supported by the Fund.

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APPENDIX TABLES

TABLE A.1
1977 STANDBY PROGRAMS: BASIC DATA
(in percent)

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Argentina:					
Year before	269	361	0.7	−3.2	443
Program year	234	231	5.6	5.0	176
Year after	176	172	7.0	−3.8	175
Burma:					
Year before	9	11	−0.9	5.6	22
Program year	8	4	−0.1	6.0	−1
Year after	19	15	−0.4	6.5	−6
Egypt:					
Year before	15	26	0.8	7.8	10
Program year	17	34	3.3	7.9	13
Year after	57	27	−14.9	10.1	11
Italy:					
Year before	21	21	2.8	5.9	17
Program year	16	22	2.2	1.9	17
Year after	17	23	4.1	2.7	12
Jamaica:					
Year before	25	7	−7.6	−6.1	10
Program year	12	16	−1.0	−1.9	11
Year after	27	17	−10.1	−0.3	35
Pakistan:					
Year before	31	32	−0.9	4.1	7
Program year	23	18	−0.5	5.8	10
Year after	22	20	1.0	5.5	7
Peru:					
Year before	54	24	−7.1	3.1	34
Program year	37	25	−6.8	−1.2	38
Year after	54	61	−4.4	−1.8	58
Romania:					
Year before	17	16	−5.7	N.A.	0
Program year	6	14	−3.7	N.A.	1
Year after	15	17	−2.0	N.A.	2

Continued on next page

Table A.1—Continued

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Sri Lanka:					
Year before	31	33	0.3	4.7	1
Program year	38	38	6.5	4.8	1
Year after	25	25	1.5	6.2	12
United Kingdom:					
Year before	14	12	−1.5	3.6	17
Program year	6	10	1.0	1.3	16
Year after	10	15	1.1	3.3	8
Zaire:					
Year before	56	41	0.0	−5.3	81
Program year	42	59	−0.6	0.8	69
Year after	38	54	0.1	−4.7	48
Unweighted average: [a]					
Year before	27	22	−2.0	2.6 [b]	20
Program year	20	24	0.0	2.8 [b]	18
Year after	28	27	−1.0 [c]	3.1 [b]	19

SOURCE: *International Financial Statistics (IFS)* (October 1982).

NOTE: "Credit Expansion" is the percentage rate of change of domestic credit (line 32 in *IFS*); "Monetary Expansion" is the rate of change of money plus quasi-money (lines 34 plus 35); "BOP/GDP" is the ratio of the change in net foreign assets of the banking system (line 31n) to GDP (line 99b): "Output Growth" is the rate of change of real GDP (line 99b.p); "Inflation Rate" is the percentage rate of change of consumer prices (line 64).

[a] Argentina is not included.

[b] Romania is not included.

[c] Egypt is not included. Average BOP/GDP is −2.4 if Egypt is included.

TABLE A.2
1978 STANDBY PROGRAMS: BASIC DATA
(in percent)

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Burma:					
Year before	8	4	−0.1	6.0	−1
Program year	19	15	−0.4	6.5	−6
Year after	20	17	1.9	5.7	6
Gabon:					
Year before	34	−2	−6.1	N.A.	14
Program year	−14	−13	0.0	N.A.	11
Year after	9	8	0.5	7.9 [a]	8
Guyana:					
Year before	30	23	−5.1	−4.8 [a]	8
Program year	11	10	2.4	−1.7 [a]	15
Year after	27	7	−9.5	−0.7 [a]	18
Panama:					
Year before	2	11	0.8	4.6	5
Program year	2	27	11.2	6.5	4
Year after	23	23	−15.9	7.1	8
Peru:					
Year before	37	25	−6.8	−1.2	38
Program year	54	61	−4.4	−1.8	58
Year after	16	92	10.4	3.8	67
Portugal:					
Year before	32	17	−10.5	5.6	27
Program year	21	21	−4.0	3.2	22
Year after	27	38	0.8	4.5	24
Turkey:					
Year before	41	34	−2.2	3.9	27
Program year	34	37	−2.2	2.9	45
Year after	60	62	−2.4	−0.4	59
Zambia:					
Year before	29	12	−2.6	−5.1	20
Program year	18	−8	−27.6 [b]	2.4	16
Year after	9	30	5.3	−8.0	10
Unweighted average: [c]					
Year before	30	21	−4.9	1.9	20
Program year	28	29	−1.7	1.8	27
Year after	30	43	0.2	2.6	35

SOURCE: *IFS* (October 1982).
NOTE: See Note to Appendix Table A.1.
[a] From *IFS Yearbook* (1985).
[b] Break in the series.
[c] Gabon, Panama, and Zambia are not included.

TABLE A.3
1979 STANDBY PROGRAMS: BASIC DATA
(in percent)

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Bangladesh:					
Year before	19	26	0.7	5.9	13
Program year	23	22	0.4	4.0	13
Year after	34	21	−1.6	5.5	13
Congo:					
Year before	6	7	−0.4 [a]	7.0 [a]	10
Program year	9	22	3.3 [a]	6.0 [a]	8
Year after	17	37	5.1 [a]	9.0 [a]	7
Ghana:					
Year before	68	69	1.1 [b]	8.5 [b]	73
Program year	15	16	0.1 [b]	−3.2 [b]	54
Year after	28	34	−0.3 [b]	0.0 [b]	50
Kenya:					
Year before	36	14	−4.0	7.4	17
Program year	14	16	2.9	4.0	8
Year after	13	−1	−2.8	2.9	14
Malawi:					
Year before	30	5	−2.4	5.4	9
Program year	32	1	−7.1	4.4	11
Year after	11	13	0.0	0.6	18
Mauritius:					
Year before	24	22	−3.3	5.0 [b]	9
Program year	25	9	−6.0	5.7 [b]	14
Year after	14	23	2.3 [b]	−10.6 [b]	43
Panama:					
Year before	2	27	11.2	6.5	4
Program year	23	23	−15.9	7.1	8
Year after	19	27	9.1	4.9	14
Philippines:					
Year before	24	24	−3.7	6.2	8
Program year	25	13	−3.4	7.5	19
Year after	22	22	−2.5	4.4	18
Sierra Leone:					
Year before	49	32	−1.8	3.0	8
Program year	29	20	−1.2	4.6	21
Year after	31	22	−8.5 [b]	4.6 [b,c]	11

Continued on next page

Table A.3—Continued

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Togo:					
Year before	24	35	2.9	10.1 [b]	0
Program year	8 [c]	2 [c]	−0.2	6.8 [b]	8
Year after	12	9	−2.0 [b]	0.8 [b]	12
Turkey:					
Year before	34	37	−2.2	2.9	45
Program year	60	62	−2.4	−0.4	59
Year after	84	67	−6.2	−1.1	110
Western Samoa:					
Year before	95	19	N.A.	N.A.	2
Program year	53	43	N.A.	N.A.	11
Year after	27 [b,c]	22	N.A.	N.A.	33
Zaire:					
Year before	38	54	0.1	−4.7	48
Program year	29	7	0.2	−3.3	109
Year after	24	65	−0.1	2.5	42
Unweighted average: [d]					
Year before	33 [e]	29 [e]	−1.2	4.8 [f]	22
Program year	26 [e]	19 [e]	−1.2	3.7 [f]	29
Year after	28 [e]	30 [e]	−1.5	3.2 [f]	31

SOURCE: *IFS* (October 1982).

NOTE: See Note to Appendix Table A.1.

[a] Author's estimates.

[b] Obtained from *IFS Yearbook* (1985).

[c] Break in the series.

[d] Panama and Western Samoa are not included.

[e] Togo is not included.

[f] Ghana and Mauritius are not included. With Ghana included, the output growth averages are 5.2, 3.0, and 2.9, respectively.

TABLE A.4
REFERENCE GROUP: BASIC DATA
(in percent)

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Bolivia:					
1977	36	29	0.0	4.2	8
1978	35	13	−3.2	3.4	10
1979	41	15	−3.3	1.8	20
Dominican Republic:					
1977	12	15	1.3	5.0	13
1978	9	1	−1.8	2.1	4
1979	16	17	−0.1	4.7	9
Greece:					
1977	26	23	−1.4	3.4	12
1978	23	24	−1.7	6.7	13
1979	22	17	−1.0	3.7	19
Liberia:					
1977	27	13	−1.0	−0.8	6
1978	62	23	−4.5	3.9	7
1979	35	5	−6.8	4.4	12
Morocco:					
1977	22	20	0.0	6.5	13
1978	23	18	0.0	3.4	10
1979	13	14	−0.1	4.5	8
Senegal:					
1977	19	15	−0.5	0.8	12
1978	31	21	−4.6	−13.3	3
1979	18	6	−4.9	10.3	10
Syrian Arab Republic:					
1977	19	28	2.4	−2.5	13
1978	28	27	−1.2	8.7	5
1979	14	17	2.3	5.3	5
Tanzania:					
1977	6	20	3.2	6.6	12
1978	48	13	−6.2	5.8	11
1979	39	47	0.5	5.5	14
Thailand:					
1977	28	20	−1.5	7.2	8
1978	28	19	−2.1	10.1	8
1979	23	14	0.1	6.1	10

Continued on next page

Table A.4—Continued

	Credit Expansion	Monetary Expansion	BOP/GDP	Output Growth	Inflation Rate
Yugoslavia:					
1977	17 [a]	24 [a]	−2.0 [a]	8.0	15
1978	30	29	−2.0	7.1	14
1979	27	21	−6.9	6.9	21
Unweighted average:					
1977	21	21	0.0	4.2 [b]	11
1978	32	19	−2.7	5.7 [b]	8
1979	25	17	−2.0	4.8 [b]	13

SOURCE: *IFS* (October 1982).

NOTE: See Note to Appendix Table A.1.

[a] Break in the series.

[b] Senegal is not included.

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