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PUBLIC DEBT, EXTERNAL COMPETITIVENESS, AND FISCAL DISCIPLINE IN DEVELOPING COUNTRIES

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1 INTRODUCTION

Macroeconomic-stabilization and structural-adjustment programs for debt-ridden developing countries generally center on two major policies: reduction of the fiscal deficit as the expenditure-reducing policy and devaluation of the domestic currency as the expenditure-switching policy. This study discusses and quantifies the conditions under which those policies are consistent for countries such as Brazil and Mexico, which have large public debts denominated in foreign currency.

Although the fiscal impact of a change in the exchange rate has received little attention in economic analysis, it has fostered a wide array of opinions. Krueger (1978, pp. 130-131) reports ambiguous and weak evidence on the automatic response of the government budget to a devaluation. Ize and Ortiz (1987) argue that the impact is positive when the exchange rate overshoots. Dornbusch (1987) and Sachs (1987) assume that it is negative.

The political and economic implications of this question are too important to leave it unsettled. If there is an important tradeoff between large devaluations and fiscal balance, debtor countries face a difficult policy choice. A real depreciation of the domestic currency would improve the current account in the balance of payments, but it would widen the budget deficit and hence stimulate the government's recourse to domestic borrowing and inflationary finance, eroding the debtor's international creditworthiness. It is thus necessary to know the tradeoff in order to determine the desirable balance between external financing (or debt relief) and current-account adjustment.

The remaining chapters of this study are organized as follows. Chapter 2 examines the role of fiscal rigidities in explaining recurrent problems of heavily indebted developing countries, such as high inflation, financial disintermediation, and depressed investment. The analysis is based on a stylized account of events in debtor countries since the cutoff of foreign lending; it draws heavily on a recent OECD Development Centre Study (Reisen and van Trotsenburg, 1988). Chapter 3 develops a formal framework for tracing the fiscal impact of a change in the real exchange rate, based on the simple budget identity. It shows that the automatic response of the budget to a depreciation of the real exchange rate depends on tax-base and spending

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characteristics, the level and ownership of the public debt, the net flow of foreign exchange to or from the government, and the effective interest rate on foreign debt. It concludes that the net fiscal impact is likely to be adverse in the short to medium term. Chapter 4 computes the amount of fiscal discipline that would have been necessary for Brazil and Mexico from 1982 through 1987 in order to reconcile the large depreciations of their real exchange rates consistent with low inflation and covered interest parity. The same exercise is then conducted with data for the end of 1987 to measure the fiscal discipline required if foreign finance remains rationed and default on domestic and foreign debt is to be avoided. It appears that the recent increase in domestic public debt is likely to impose a heavier financial burden on those countries than the main origin of that increase—the servicing of foreign debt.

2 FISCAL RIGIDITIES AND RECURRENT DEBT PROBLEMS

It is well understood that heavily indebted countries have to generate a trade surplus to service foreign debt as long as their international creditworthiness has not been restored. The debt-export ratio, often used as an indicator of creditworthiness, cannot improve (i.e, fall) unless the noninterest current-account surplus, expressed as a fraction of exports, exceeds the difference between the effective interest rate on foreign debt and the growth rate of export revenues (Dornbusch, 1985). In explaining and projecting the debt-export ratio, the sizable literature on developing-country debt has emphasized external parameters such as the growth rate of OECD countries, world interest rates, and trends in international prices. This approach, however, does not adequately explain the recurrent debt problems of heavily indebted countries, including the persistence of their budget deficits, three-digit inflation rates, depressed domestic savings and investment, abnormally high domestic interest rates, and repeated attacks on their currencies and foreign-exchange reserves. The problem of servicing debt is seriously complicated by the fact that much of the foreign debt is owed by the public sector, whereas most of the countries' export earnings and an important part of their foreign assets are owned by the private sector (Sjaastad, 1983). Hence, governments are forced to raise from the private sector the resources required for debt service by measures that tend to depress private savings, exports, and growth, instead of pursuing policies that promote them.

Consequently, persistent debt problems can often be explained most cogently by applying a fiscal approach rather than a monetary or a foreign-trade approach (see Table 1). This approach focuses the government's budget identity, and it is developed more formally in Chapter 3. The budget identity links the shortfall of foreign financing with the principal forms of domestic financing. The shortfall of foreign financing is the difference between interest payments on net foreign public debt (gross debt *minus* foreign assets) and net new foreign borrowing. The forms of domestic financing are tax revenues, the net increase in domestic nonmonetary public debt, and the increase in real base money *less* the government's noninterest outlays and interest payments on domestic public debt. Usually, the budget identity is grouped to show the link between the public-sector borrowing requirement (fiscal deficit) and sources of external and internal financing. The grouping used here makes immediately apparent the link between the *external transfer* of foreign exchange from the debtor country's government

TABLE 1

THE FISCAL AND FINANCIAL SITUATION OF DIFFERENT DEBTOR GROUPS

	Period	Problem Debtors [a]	Stable Debtors [b]
Change in real public revenue as a percentage of 1980-82 average level	1982-86	−21.9	15.4
Consolidated nominal public-sector borrowing requirement as a percentage of GDP	1982-86	13.8	2.4
Monetary public financing as a percentage of GDP [c]	1982-86	4.2	1.1
Average annual percentage increase of consumer prices	1982-86	99	5
Gross capital formation as a percentage of GDP	1983-86	18	24
Nonbank deposits held abroad as a percentage of private deposits in domestic banking system [d]	1983-86	39	2
Memo: Annual growth rate of real GDP	1982-86	0.9	5.2

SOURCES: Banco de Mexico, *Indicadores Economicos*, various issues; Bank for International Settlements, *International Banking Developments*; Central Bank of Brazil, *BRAZIL Economic Program*; Fundacion de Investigaciones para el Desarollo (Argentina), *Coyuntura y desarrollo*; International Monetary Fund, *International Financial Statistics*.

[a] Argentina, Brazil, Chile, Mexico, Nigeria, Philippines, Venezuela; for consolidated public-sector borrowing requirements, Argentina, Brazil, and Mexico.

[b] Algeria, Indonesia, Malaysia, South Korea, Thailand; for consolidated public-sector borrowing requirements, South Korea.

[c] Real base money at 1980 prices times the annual inflation rate, expressed as a percentage of GDP at 1980 prices.

[d] Defined as gross liabilities of commercial banks in BIS-reporting countries to the nonbank sectors of debtor countries, expressed as a percentage of domestic demand, time, and savings deposits of the private sector (local-currency amounts converted at end-of-year exchange rates).

to foreign creditors and the *internal transfer* of resources from the private to the public sector. It is therefore important to use measures of the fiscal deficit and of the budget identity that include the entire public sector. Ideally, they should incorporate all levels of government (national, provincial, local), public enterprises, extra-budgetary entities, and the central bank, which in most developing countries undertakes many quasi-fiscal

activities, most notably the monetary financing of fiscal deficits (Robinson and Stella, 1987). Unfortunately, the data available on an internationally comparable basis (as in the *Government Finance Statistics Yearbook* of the International Monetary Fund) relate mainly to the central government. Indeed, the poor quality of the published public-finance data has obscured the fiscal underpinnings of debt problems (and the reasons for the poor enforcement of IMF conditionality).

Fiscal rigidities explain why the important shift in net external transfers that occurred with the onset of the debt crisis was immediately translated into exploding fiscal deficits, often larger than 15 percent of GDP. Cuts in public spending figured importantly in efforts to limit those deficits, but they were not up to the task and were not "growth oriented," since they often concentrated on capital expenditure. To the extent that they hit investments in infrastructure rather than "white elephants," they lowered the productivity of complementary private-sector investment, reducing its profitability and future output growth. Cuts in current outlays such as subsidies and public-sector salaries were limited because they were likely to meet opposition from well-organized lobbies or to produce social unrest. Closures and privatizations of unprofitable public enterprises occurred in many cases, some in the context of debt-for-equity swaps, but they do not always solve the budgetary problem. Sales of loss-making enterprises unlikely to become more efficient under private ownership involve subsidies equivalent in present-value terms to the future stream of losses. Sales of profitable enterprises impose losses on the government unless it is able to charge a price equal to the present value of the future earnings stream (Mansoor, 1987).

Fiscal rigidities were even more pronounced on the revenue side. Tax ratios of developing countries tend to be much lower than those of industrial countries, less than half as large on average, but there has been no instance in which a developing country has been able to raise the ratio several percentage points of GDP over the medium term, as has happened in some developed countries (Tanzi and Blejer, 1986). And though tax ratios are low, tax rates themselves are equal to or higher than the international standard (Reynolds, 1985). This suggests that failure to broaden the tax base is crucial in explaining the persistent debt-servicing problems of many developing countries. Administrative and technical defects in tax assessment and collection prevent tax revenues from rising, and powerful interest groups have often prevented tax-legislation reforms aimed at abolishing tax holidays and exemptions.[1] The local elite is also blamed for the Latin American objection

[1] This became particularly apparent in Brazil in late 1987, when the Finance Minister resigned after an unsuccessful attempt to implement a tax reform aimed at enlarging the tax base. The architect of Mexico's tax reform, Francisco Gil Diaz (1987), reports that "considerable political resistance" has prevented the elimination of tax shelters for truckers, farmers,

to tax treaties, which would prevent the tax-free ownership of foreign assets (Lessard and Williamson, 1987).

Tax revenues have been low in debtor countries not only because of the lack of political commitment to tax reform but also because they have been depressed by the debt crisis itself. Reductions in consumption, profits, wages, per capita incomes, and imports, mostly unavoidable if overall demand is to be restrained effectively, have shrunk tax bases. Moreover, the Tanzi effect—the adverse effect of accelerating inflation on real tax revenues—showed up in debtor countries. Tax collections do not keep pace with inflation because progressive income taxes produce only a small share of total tax revenue and many other taxes are levied at specific rates, with long lags in collection (Tanzi, 1977). The lags between accruals and payments reflect the fact that penalties for lateness are low or not enforced. A broad gamut of tax exemptions also hold down revenues.

The budget deficits resulting from these fiscal rigidities had to be covered in large part by domestic borrowing and printing money. A noninterest budget surplus would have been required to constrain inflation; its size can be shown to depend on the demand for real base money, the difference between the real interest rate and the growth rate of GDP, and the level of the public debt (see Chapter 3). Instead, many debtor countries ran budget deficits, even net of interest payments, throughout 1982-88, and though these were financed in part by sales of domestic bonds in the domestic market—a strategy followed extensively by Brazil and Mexico—inflation could not be contained, for reasons ignored by simple monetarist models. Because potential bond buyers attached a high default risk to government bonds, they were reluctant to buy them. The low demand for domestic bonds, coupled with imperfect capital mobility, drove real interest rates far above the world level in many debtor countries. As real interest rates exceeded real growth rates, they compounded the effect of noninterest budget deficits, driving up the ratio of domestic public debt to GDP. Eventually, the deficits had to be monetized, because domestic debt-to-output ratios could not be raised further, confirming the theoretical result obtained by Sargent and Wallace (1981).

Sooner or later, money creation played an important role in virtually every debtor country seeking to make the internal resource transfer needed to service external debt. Base money is an interest-free liability of the public sector which can cover its real spending to the extent that the private sector holds domestic currency and the domestic banking system holds reserves

publishers, and other groups, sectors to which profits are easily shifted for purposes of tax evasion. In Argentina, the cigarette tax alone collects 25 percent more revenue than the profits, capital, and net-asset taxes combined. A mere 4.8 percent of the companies listed on the gains-tax roll paid any tax at all in 1986 (*The Review of the River Plate*, Nov. 27, 1987).

with the central bank against its deposit liabilities. In developing countries, minimum-reserve requirements on demand and savings deposits are important in providing the government with direct access to bank credit (McKinnon and Mathieson, 1981). If this source of seignorage does not give the government enough resources at a stable price level, because the demand for real base money does not grow rapidly enough, inflation develops and interacts with the reserve requirements to impose an inflation tax that gives the government more revenue (Cagan, 1956; Phelps, 1973). The process is called an inflation tax, because the inflation rate can be regarded as a tax rate and the demand for real base money can be regarded as a tax base.

There is almost no empirical evidence on the ultimate incidence of the inflation tax in debtor countries. The inflation tax on currency, however, can be expected to hit the poor in the informal sectors, because they find it more difficult than do others to switch into foreign currency or assets (for evidence on Mexico, see Gil Diaz, 1987). The burden of the inflation tax on the reserve component of base money is presumably shared by depositors, whose yields are driven down, and nonpreferential borrowers, whose borrowing costs are driven up. The reserve requirement on time deposits drives a wedge between the market-clearing interest rates on deposits and loans, its size being positively associated with the inflation rate. Ceilings on deposit and loan rates then determine how the inflation tax is divided between savers and borrowers (McKinnon and Mathieson, 1981).

When tax burdens rise, the incentives for tax avoidance and evasion are strengthened. This result applies to the inflation tax, too. In some debtor countries, there has been a tripling in the velocity of base money (the inverse of the ratio of base money to GDP) compared with pre-crisis levels. The demand for base money fell, limiting the quantity of resources that governments could acquire from the inflation tax. If they pushed the inflation rate higher, they ended up with smaller real resources. This explains why currency reforms were inevitable in Argentina, Brazil, and Bolivia, and it also explains the timing of those reforms. The timing in each country was closely related to reaching or exceeding the maximum yield from the inflation tax.

Inflation has also been used by some governments, notably in Argentina, to quasi-default on their domestic liabilities and hence to reduce the real cost of domestic debt service. However, this way of inflicting "surprise" capital losses on holders of domestic bonds has become increasingly ineffective (Buiter, 1985). Public debt is now of very short-term maturity in debtor countries (generally, no longer than three months), and it is contracted on a floating-rate basis or is fully indexed to inflation. Hence, there is little scope for governments to lower the *ex post* real return on domestic debt by raising

the inflation rate unexpectedly. Indeed, bondholders have taken high and rising inflation rates into account by requiring correspondingly higher nominal interest rates on domestic government debt. Finally, in many debtor countries a reduction in the real domestic public debt obtained by generating inflation cannot prevent the further growth of interest-bearing debt, because tax revenues and monetary financing will still fall short of the government's noninterest spending (Spaventa, 1987).

Fiscal rigidities and inflationary public finance have undermined growth-oriented (i.e., investment-led) adjustment and the restoration of confidence on the part of foreign and domestic creditors. When the budget deficit exceeds the current-account deficit, the public sector becomes a net user of household and corporate savings, which are then unavailable for private investment. This explains why private investment is depressed in so many debtor countries. High inflation, high minimum-reserve requirements, and forced sales of government bonds have enlarged the wedge between the interest rate paid to domestic savers and the rate that must be paid by domestic borrowers. Rates received by savers are often too low to mobilize savings for capital formation, while credit costs are too high to finance even profitable investments. The concomitant losses of efficiency and opportunities for growth are frequently exacerbated by the provision of rationed credit to favored (big or public) enterprises at preferentially low interest rates.

High inflation and currency depreciation have diverted private savings into domestic inflation hedges, currency substitution, and foreign assets, producing financial disintermediation and capital flight, as the citizens of debtor countries have sought to acquire assets beyond the reach of their governments. These events have inspired a fiscal theory of private portfolio allocation and capital flight (Ize, 1987) arguing that the private sector keeps at home only that part of its financial wealth on which it expects the government to honor its obligations and sequesters the rest abroad. In countries where fiscal rigidities persist, a larger share of private wealth will be kept abroad because of the risks of imminent default and higher taxation. These risks make it impossible to prevent capital flight merely by maintaining covered interest parity.

3 FISCAL EFFECTS OF DEVALUATION

Considering the French situation in the 1920s, when public debt service absorbed almost all tax revenues, Keynes (1923) advocated a discrete devaluation to erode the real value of domestic-currency public debt by inducing a once-for-all increase in the price level. Keynes was concerned with the distributional effects of a growing stock of public debt—the transfer from those who pay taxes to service the debt (workers, entrepreneurs) to those who hold the debt (*rentiers*). There is also an efficiency argument for reducing the real value of the public debt when it crowds out private investment and thus reduces capital formation below the optimal rate (Buiter, 1985). Keynes's recommendation has been revived and modified by several authors (Ize and Ortiz, 1987; Ize, 1987; Trigueros and Fernandez, 1986). They argue that a devaluation or depreciation can reduce real interest rates even when the price level is sticky and the debt is short-term, provided the exchange rate overshoots, creating the expectation of subsequent appreciation. That expectation can drive a wedge between returns on assets in domestic and foreign currencies, and lower returns on domestic assets reduce the costs of servicing domestic debt. On this view, devaluation helps to promote external adjustment and fiscal stability *uno actu*, without an unpleasant tradeoff between them.

The analysis that follows casts serious doubt on the presumption that devaluation reduces the budget deficit. It shows that the automatic fiscal response to devaluation is likely to be negative in the short term for the typical (largely inward-oriented) problem debtor. The rise in tax receipts and new inflow of foreign finance will be too small to make up for the rise in the local-currency costs of servicing foreign-currency debt. To be sure, discretionary policy action (tax reform, debt relief, outright default, etc.) can mitigate or enhance the impact of devaluation. But such policies may not be forthcoming quickly enough or may have too small an impact to compensate for the massive devaluations that have been and often are required by problem debtors.

Consider a country that has lived on capital imports and run up excessive debt. To improve its standing on international capital markets, it must shift resources from the oversized domestic sector to the export and import-competing sectors and thus improve its current account. A sustained devaluation of the real exchange rate is unavoidable. To make it sustainable, we do not adopt the familiar assumption that the price level, P, adjusts sluggishly toward long-run purchasing-power parity (PPP). Instead, we use an adjust-

ment equation that allows for a longer-lasting real devaluation of the domestic currency.[1]

The real exchange rate, e, is defined as the world price level, P^*, converted into local currency by the nominal exchange rate, E, and divided by the home price level, P:

$$e = EP^*/P \,. \tag{1}$$

For convenience, define long-run PPP by $e = 1$.

With sluggish price adjustment (inertia), the real exchange rate behaves this way:

$$\dot{e}/e = u\,(1 - \hat{e} - e), \quad u > 0 \,, \tag{2}$$

where dotted variables denote changes and $\hat{e}$ is the sustainable devaluation of the real rate. In other words, equation (2) says that the real exchange rate adjusts gradually toward a level that differs from long-run PPP by $\hat{e}$.

The immediate consequence of a real devaluation is a proportionate rise in real interest payments on foreign-currency debt, but its impact on the noninterest part of the government budget is much more difficult to determine.[2] The budget is likely to be affected by the changes in prices resulting from the devaluation (price effects) and by changes in various tax bases induced by changes in wages, corporate incomes, and export and import volumes (output effects).

A sustained real devaluation raises the prices of tradable goods relative to nontradables. To analyze the price effects, it is therefore useful to break down the noninterest budget deficit, D, into those taxes and expenditures that depend on the prices of nontradables and those that depend on the prices of tradables. In other words, the government has a deficit or surplus in nontradables ($G - T$) and another in tradables ($G^* - T^*$). Both terms are expressed in home currency, so that the nominal deficit is

[1] The impact of swings in exchange rates between the dollar and other key currencies is not considered here. It depends mainly on the currency compositions of foreign debt and of net exports. A depreciation of the dollar against other key currencies reduces the devaluation of the debtor country's dollar exchange rate required to improve external competitiveness to the extent that other currencies have significant trade weights in the definition of the effective exchange rate. But when the share of the depreciating dollar is smaller in the currency composition of foreign debt than in the debtor country's receipts from net exports, the government is likely to be adversely affected by the dollar depreciation. This holds for Indonesia, which is heavily indebted in yen but earns its foreign-exchange receipts mainly from oil in dollar-denominated world markets.

[2] Since the exchange rate is an endogenous variable in a macroeconomic system influencing and being influenced by other variables, an empirical quantification of the automatic budget response to devaluation really requires a general-equilibrium framework. For an informal discussion, see Seade (1988).

$$D = (G - T) + (G^* - T^*) = (g - t)P + (g^* - t^*)EP^* , \quad (3)$$

where the lower-case letters refer to real amounts expressed in physical units. Corrected for domestic inflation, equation (3) becomes

$$D/P = (g - t) + (g^* - t^*)e . \quad (3')$$

Expenditures on nontradables would include public-sector salaries; expenditures on tradables would include imported capital goods. Taxes falling on nontradables would include taxes on labor, and taxes on tradables would include trade taxes. The government of an outward-oriented economy or with an important publicly owned mineral sector is more likely to have a surplus in tradables or be a net seller of foreign exchange to the private sector than the government of an inward-oriented economy or without export-oriented public enterprises. In an inward-oriented country, a devaluation will reduce the dollar value of total tax receipts because they derive largely from taxes on nontradables, while the reduced dollar value of spending on nontradables will not fully offset the cut in tax receipts.

Consider now the budget identity that links the government's noninterest deficit *plus* nominal interest payments on internal and external debt to the sources of financing:

$$D + iB + i^*(B^* - F^*) = \dot{B} + \dot{B}^* - \dot{F}^* + \dot{M} , \quad (4)$$

where i and i^* are the nominal interest rates on local-currency and foreign-currency debts, B is domestic-currency public debt held outside the central bank, B^* is foreign-currency public debt, F^* is the stock of foreign assets held by the public sector (including the central bank), and M is base money.

The conventional cash definition of the fiscal deficit given by this last equation does not correctly reflect the fiscal adjustment that the government must make, nor does it adequately measure the government's claims on real resources. Since inflation acts as a capital levy on outstanding debt, nominal interest payments include an inflation premium that compensates bondholders for inflation (Barro, 1984, pp. 373-384). In addition, the concern here is with the fiscal impact of a sustained real devaluation. These considerations are recognized by substituting real for nominal interest rates in the previous equation and by correcting all other terms of the budget identity for domestic inflation:

$$\begin{aligned}&(g - t) + (g^* - t^*)e + rb + r^*(b^* - f^*)e \\ &= \dot{b} + \dot{b}^*e - \dot{f}^*e + \dot{m} ,\end{aligned} \quad (5)$$

where r and r^* are the real interest rates on local-currency and foreign-currency debts and where $b = B/P$, $b^* = B^*/EP^*$, $f^* = F^*/EP^*$, and $m = M/P$.

The link between the real exchange rate and fiscal balance can now be identified. Consider first a situation without exchange-rate overshooting by collecting all of the variables in equation (5) that depend on e:

$$[r^*(b^* - f^*) + (g^* - t^*)]e \gtrless (\dot{b}^* - \dot{f}^*)e \,. \tag{6}$$

Without exchange-rate overshooting and thus no effect on interest rates, a real devaluation raises the budget deficit when real interest payments on net external debt exceed the noninterest budget surplus relating to tradables. An initial *deficit* on tradables, off course, increases the negative budget response to devaluation. The fact that governments can borrow less from foreigners than they did up to 1982 should also be taken into account. A devaluation enlarges the budget deficit to the extent that it is financed by domestic (local-currency) sources.

Can exchange-rate overshooting alter matters? Can an expected real appreciation following an initial discrete devaluation improve the fiscal situation by reducing real interest payments on domestic public debt? With perfect financial openness and rational expectations, interest parity obtains, so that

$$r = r^* + \dot{e}/e \,. \tag{7}$$

Insertion of equation (2) into equation (7) yields

$$r = r^* + u(1 - \hat{e} - e) \,. \tag{8}$$

The domestic interest costs of the government can thus be added to the set of variables in equation (6), which are those that depend on the real exchange rate. Write λ for $(\dot{b}^* - \dot{f}^*)/(b^* - f^*)$ and α for $(g^* - t^*)/(b^* - f^*)$ and use equation (8) to rewrite equation (5) as

$$\begin{aligned} &e(r^* + \alpha - \lambda)(b^* - f^*) + [r^* + u(1 - \hat{e} - e)]b \\ &= \dot{b} + \dot{m} - (g - t) \,. \end{aligned} \tag{9}$$

It is now apparent that even with exchange-rate overshooting devaluation will have an adverse fiscal impact when

$$(b^* - f^*) > u(1 - \hat{e})b/(r^* + \alpha - \lambda) \,, \tag{10}$$

that is, when the foreign-currency portion of the public debt plus the initial deficit on tradables is larger than the savings made by reducing the cost of servicing domestic-currency debt. Note that the extent of exchange-rate overshooting, and hence the fall in the real domestic interest rate, would be overestimated if the real devaluation was omitted from equation (10).

A further price channel through which devaluation may worsen fiscal imbalances is associated with the widespread existence of multiple exchange rates. They have an implicit tax-subsidy structure (Dornbusch, 1986) that

may finance part of the budget. Imports can be taxed by charging a high price for foreign exchange, and exports can be taxed by paying a low price for foreign-exchange earnings that have to be surrendered. A multiple-rate system, however, may also be used by the government to subsidize imports or exports with preferential rates. The net fiscal effect of the multiple-rate structure depends on whether receipts from foreign-exchange sales exceed expenditures for foreign-exchange purchases. Devaluation tends to reduce the differential between the official and black-market rates. It has been shown that the elimination of the black-market differential can lead to a sharp drop in implicit export and import taxes when the affected government has been a net seller of foreign exchange (Pinto, 1987).

A comprehensive analysis of the way in which devaluation affects the budget would allow for short-run output effects on the tax base and on real spending. However, the empirical and theoretical evidence on short-run output responses to devaluation is inconclusive (Balassa, 1987). Traditional models conclude that a devaluation is expansionary in the short run when there is unutilized capacity (Mundell, 1962; Fleming, 1962) and has no effect on aggregate output when there is full employment (Dornbusch, 1973). New theoretical and empirical evidence for developing countries, surveyed by Rojas-Suarez (1987), contradicts these conclusions. Some models show that a devaluation is contractionary because of its effects on demand, which range from negative real-balance effects to income-distributional effects favoring agents having a high marginal propensity to save. Other models embody supply-side effects, such as increases in working-capital requirements, which cause devaluation to reduce output. On the empirical side, a cross-sectional study of twelve developing countries by Edwards (1987) obtained a negative correlation between the real exchange rate and output in the year of the devaluation, but it was fully offset by a positive correlation in the following year. This result, however, may merely reflect the fact that devaluations are frequently undertaken in a year when output is below trend. In view of the inconclusive empirical and theoretical evidence, the present analysis of fiscal effects has been confined to the direct price effects of a real devaluation.

4 MACROECONOMIC CONSISTENCY AND FISCAL DISCIPLINE

How much fiscal discipline would be necessary for Brazil and Mexico to avoid recurrent debt problems of the sort described in Chapter 2? This chapter tries to arrive at a rough assessment of consistency between the fiscal situation and other macroeconomic targets. Those targets are defined by referring to the experience of stable debtor countries, which had low inflation rates (5 percent per year), real interest rates sufficiently high to make capital flight unprofitable, and constant domestic and foreign public-debt ratios (see Reisen, 1988). The assessment shows that fiscal adjustment was inadequate in Mexico and is still inadequate in Brazil to avoid recourse to high inflation and quasi-default on domestic liabilities.

Following Anand and van Wijnbergen (1989), the government budget identity can be used to derive the fiscal deficit or surplus consistent with constant debt ratios and low inflation.[1] Target values for the ratios of domestic and foreign debt to GDP, $\bar{b} = b/y$ and $\bar{b}^* = (\bar{b}^* - f^*)e/y$, imply that domestic debt cannot grow faster than GDP and net foreign debt cannot grow faster than GDP *less* the rate of sustained real devaluation:

$$\dot{b} = n\bar{b}, \quad \dot{b}^* - \dot{f}^* = (n - \hat{e}/e)\bar{b}^* , \tag{11}$$

where n denotes the growth rate of real GDP. The target inflation rate is defined as $\bar{p}$, the ratio of the real money base to GDP as $\bar{m}$, which is assumed to be constant, and the noninterest deficit as a proportion of GDP as d. Substituting into equation (5) to produce the consistency condition,

$$d + r\bar{b} + r^*\bar{b}^* = nb + (n - \hat{e})(b^* - f^*) + (\bar{p} + n)\bar{m} . \tag{12}$$

Solving for the required noninterest deficit,

$$d = (n + \bar{p})\bar{m} - (r - n)\bar{b} - (r^* + \hat{e} - n)\bar{b}^* . \tag{13}$$

It is easily seen that more fiscal discipline is required to avoid inflation and rising debt ratios when the demand for base money is low, when GDP

[1] This constraint on public-debt accumulation is chosen here mainly because stable debtor countries such as Korea kept the ratio of public debt to output constant. International creditworthiness, however, may impose other constraints. When the ratio of foreign public debt to GDP is kept constant, the cash flow to creditors will be negative if the real rate of GDP growth exceeds the real rate of interest, corrected for changes in the real exchange rate. In such a situation, a policy that keeps real foreign debt constant may be more satisfactory to international lenders than a policy that fixes the ratio of debt to output. Lending behavior will also be governed by the lender's GDP (or paid-in capital), although the problem debtor's GDP is likely to be the binding constraint.

growth is low, when public debt is high relative to GDP, and when real depreciation raises the real value of net foreign debt. In fact, when real interest rates exceed real GDP growth and accumulated debt is large, a noninterest surplus is usually necessary. It will be shown that this stricter condition holds for both Brazil and Mexico.

Changes in net public debt and other fiscal-deficit measures from end-1981 to end-1987 are given in Table 2 for Brazil and Table 3 for Mexico. The measurement and interpretation of public-sector deficits and fiscal performance are complicated by the high inflation rates in both countries (Tanzi, Blejer, and Teijeiro, 1987). The conventional measure of the deficit, the nominal public-sector borrowing requirement, includes the "monetary correction" on domestic debt that serves to compensate creditors for the falling real value of their claims caused by inflation (Polak, 1989).[2] With very high inflation, the conventional measure loses its economic meaning because nominal interest payments by the government include debt amortization as well as true interest payments. The "operational" deficit corrects for this effect by subtracting the monetary correction on domestic debt. The noninterest deficit, also called the "primary deficit," excludes all interest payments. It measures how the government's current actions influence the public sector's net indebtedness and is used below to evaluate the macroeconomic consistency of the Brazilian and Mexican government budgets. A fourth deficit measure has the advantage of being even more nearly consistent with the system of national accounts; it is the so-called public-sector deficit covering inflation-corrected debt financing and monetary financing as a fraction of GDP.

Tables 2 and 3 reveal large differences among the variously measured deficits. In both Brazil (1983) and Mexico (1982) the operational deficit peaked in the year when voluntary foreign lending ended. The fiscal effort was quite impressive during the first adjustment phase but came to a halt thereafter. Quasi-default through negative real returns on domestic public debt helped the Mexican government to reduce the domestic debt ratio in 1983 and 1984 (Ize and Ortiz, 1987). Apart from its contribution to inflation and thus the erosion of real debt, however, money creation did not help much to transfer real resources to the public sector in either country. In Brazil, the full indexation of the economy and long-standing experience with high inflation had brought the ratio of the money base to GDP down to 3.5 percent by 1981; and it fell further to 2.3 percent by 1985, where it stood again in 1987 after a temporary rise during the implementation of the 1986 program (the

[2] The amount of monetary correction as a fraction of GDP can be defined as $MC/GDP = ib/(1 + i)$, where b is the initial domestic debt ratio and i is the nominal interest rate, which is assumed to equal the inflation rate. Note that when inflation becomes very high, the amount paid for monetary correction approaches the domestic debt ratio.

TABLE 2

BRAZIL: NET PUBLIC-DEBT AND FISCAL-DEFICIT MEASURES AS PERCENTAGES OF GDP, 1981-87

	1981	1982	1983	1984	1985	1986	1987
Foreign public debt	14.0	15.1	28.1	29.1	29.0	26.9	26.1
Domestic nonmonetary public debt	8.3	12.1	15.7	19.5	20.2	19.3	20.5
Total public debt	22.3	27.2	43.8	48.6	49.2	46.2	46.6
Change in total real public debt	4.9	16.6	4.8	0.6	−3.0	0.4	
Change in real money base		1.9	1.3	2.4	2.4	3.6	−3.3
Public-sector deficit [a]		6.8	17.9	7.2	3.0	0.6	−2.9
Nominal public-sector borrowing requirement		16.7	19.9	22.2	27.1	10.8	29.5
Operational public-sector borrowing requirement [b]		6.5	3.0	1.6	3.5	3.5	5.5
Primary deficit [c]		3.7	0.9	−2.1	0	0.4	3.5
Memo: Real GDP growth	−3.4	0.9	−2.5	5.7	8.3	8.2	2.9
Real effective exchange rate (1980-82 average = 100) [d]	103.3	113.0	86.0	85.7	85.0	74.5	73.6

SOURCES: Central Bank of Brazil, *Brazil Economic Program*; Morgan Guaranty, *World Financial Markets*; IMF, *International Financial Statistics*.

[a] Foreign public debt is net of official foreign-exchange reserves. Domestic nonmonetary debt is net of government assets and money base. Debt stocks and money base at year-end have been deflated by the consumer price index (1980 = 100) for the end of the corresponding year. The annual changes in real debt and in the real money base obtained in this way have then been divided by real GDP in 1980 prices.

[b] The operational public-sector borrowing requirement excludes the Monetary Authority, and (pre–Cruzado Plan) it deducts the monetary and exchange corrections paid on the domestic debt.

[c] The primary deficit excludes interest payments on foreign public debt from the operational public-sector borrowing requirement.

[d] A decline in the exchange-rate index denotes real devaluation.

Cruzado Plan). In Mexico, the ratio tumbled from 15.9 percent in 1981 to 4.2 percent in 1987, notwithstanding the high minimum-reserve requirements on commercial-bank deposits.

At the end of 1987, the ratio of total public debt to GDP stood at 46.6 percent in Brazil and 93.8 percent in Mexico. It had doubled in Brazil and tripled in Mexico since the end of 1981. The foreign component of that ratio is very sensitive to shifts in the real exchange rate, so that an important

TABLE 3

MEXICO: NET PUBLIC-DEBT AND FISCAL-DEFICIT MEASURES AS PERCENTAGES OF GDP, 1981-87

	1981	1982	1983	1984	1985	1986	1987
Foreign public debt	22.3	36.6	44.4	38.2	38.3	53.2	53.4
Domestic nonmonetary public debt	11.9	23.3	20.7	16.3	22.8	32.4	40.4
Total public debt	34.2	59.9	65.1	55.5	61.1	85.6	93.8
Change in total real public debt		25.7	5.2	−9.6	4.6	24.5	8.2
Change in real money base		−0.1	−2.3	−0.7	−3.8	−2.5	−2.7
Public-sector deficit [a]		25.6	2.9	8.9	0.8	22.0	6.0
Nominal public-sector borrowing requirement		16.9	8.6	8.5	9.6	16.0	15.8
Operational public-sector borrowing requirement [b]		11.1	−2.1	1.4	2.8	3.5	−1.2
Primary deficit [c]		7.6	−4.4	−4.9	−3.6	−2.2	−4.9
Memo: Real GDP growth	7.9	−0.5	−5.3	3.7	2.8	−3.8	1.4
Real effective exchange rate (1980-82 average = 100) [d]	114.6	87.7	79.0	91.9	90.6	65.1	59.8

SOURCES: Banco de Mexico, *Indicadores Economicos;* Dornbusch (1988); IMF, *International Financial Statistics*; Morgan Guaranty, *World Financial Markets*.

[a] Foreign public debt is from Dornbusch (1988); official foreign-exchange reserves have been netted out. Domestic nonmonetary debt is the sum of net claims of the financial sector on the central government and on nonfinancial public enterprises *plus* government bonds sold directly to the private sector *minus* the money base. Debt stocks and money base at year-end have been deflated by the consumer price index (1980 = 100) for the end of the corresponding year. The annual changes in real debt and in the real money base obtained in this way have then been divided by real GDP in 1980 prices.

[b] The operational public-sector borrowing requirement is defined as the financial deficit *minus* the monetary correction on domestic debt.

[c] The primary deficit is defined as the financial deficit *minus* interest payments on domestic and foreign public debt.

[d] A decline in the exchange-rate index denotes real devaluation.

part of the increase is attributable to the maxi-devaluation of the Brazilian cruzeiro in 1983 and the devaluations of the Mexican peso in 1982 and 1986. The increase in the domestic component in Brazil has been strongly influenced by the gap between high real interest rates on government debt and the rate of growth of real GDP. The same observation applies to the Mexican experience since 1984.

Tables 4 and 5 demonstrate that the fiscal efforts of both Brazil and Mexico were not enough to preclude inflation and a rise in public debt, given the high interest cost of servicing domestic debt and devaluation-induced increases in real foreign debt. Equation (13) states the condition for constancy of the debt ratio in terms of the link between the noninterest government budget and the real interest costs of domestic and foreign debt *minus* monetary finance and new borrowing. This equation has been applied to two adjustment periods in 1981-87 and to projections of future performance. The exercise is based on a number of assumptions and actual obser-

TABLE 4

BRAZIL: REQUIRED PUBLIC-SECTOR NONINTEREST SURPLUS

	Actual		Projection from 1988
	1983	1984-87	
Real interest bill as % of GDP:			
On domestic debt	1.8	2.3	3.0
On foreign debt	1.5	2.4	1.8
Less financing available as % of GDP:			
Monetary finance	0.1	0.5	0.4
New domestic borrowing consistent with a constant domestic debt ratio	−0.3	1.0	1.0
New foreign borrowing consistent with constant foreign debt ratio	−4.0	1.2	1.3
Equals required noninterest surplus as % of GDP	7.5	2.0	2.1
Actual noninterest surplus as % of GDP (− denotes deficit)	−0.9	−0.4	−1.0 [a]
Memoranda:			
Assumptions:			
Money base as % of GDP	4.4	4.4	4.4
Annual inflation rate (%)	5.0	5.0	5.0
Real interest rate on domestic debt net of taxes (%)	14.5	14.5	14.5
Experience: [b]			
Real annual growth of GDP (%)	−2.5	6.3	5.0
Real annual devaluation (%)	24.0	2.0	0
Real interest rate on foreign debt (%)	10.1	8.6	7.0

SOURCES: See Table 2 and text.

[a] January-March 1988.

[b] Projections are based on assumptions. Real interest rate on foreign debt refers to the effective rate net of world inflation measured by the U.S. consumer price index.

vations. The values for the monetary base, the annual inflation rate, and the real interest rate on domestic debt are imposed on equation (13) by adopting assumptions explained below. Actual observations are used for real GDP growth, movements in the real effective exchange rate, and the effective interest rate on foreign debt.

Ideally, assumptions about the demand for base money and real interest rates on domestic debt should be derived by estimating a full model of the financial sector. However, data limitations and recent shifts in functional relationships would distort ordinary regression results, so an alternative

TABLE 5

MEXICO: REQUIRED PUBLIC-SECTOR NONINTEREST SURPLUS

	Actual		Projection
	1983	1984-87	from 1988
Real interest bill as % of GDP:			
On domestic debt	1.8	3.2	6.2
On foreign debt	1.9	3.7	3.7
Less financing available as % of GDP:			
Monetary finance	0.3	0.5	1.1
New domestic borrowing consistent with a constant domestic debt ratio	−0.3	−0.2	1.6
New foreign borrowing consistent with constant foreign debt ratio	−6.9	−3.4	2.1
Equals required noninterest surplus as % of GDP	10.6	10.1	5.1
Actual noninterest surplus as % of GDP (− denotes deficit)	−0.9	4.1	6.9 [a]
Memoranda:			
Assumptions:			
Money base as % of GDP	12.0	12.0	12.0
Annual inflation rate (%)	5.0	5.0	5.0
Real interest rate on domestic debt net of taxes (%)	15.4	15.4	15.4
Experience: [b]			
Real annual growth of GDP (%)	−2.9	−1.2	4.0
Real annual devaluation (%)	31.4	6.6	0
Real interest rate on foreign debt (%)	9.7	8.5	7.0

SOURCES: See Table 3 and text.

[a] April-June 1988.

[b] Projections are based on assumptions. Real interest rate on foreign debt refers to the effective rate net of world inflation measured by the U.S. consumer price index.

route is chosen here. It is assumed that the inflation rate would have been 5 percent per year and that the government budget would have been consistent with that inflation rate. Next, it is necessary to choose real interest rates on domestic debt that are consistent with the assumptions made above concerning fiscal deficits and inflation, as well as high enough to make currency arbitrage unattractive under conditions of imperfect capital mobility and with domestic default risks. In the case of Brazil, these requirements would appear to be met for early 1986, when real after-tax returns on treasury bills stood at 14.5 percent and net errors and omissions in the balance of payments were near zero (Cardoso and Fishlow, 1989). In Mexico, the same conditions seem to have applied in late 1986, when the tax-free real return on treasury bills was 15.4 percent (Dornbusch, 1988). In the longer term, under conditions of sustained fiscal discipline, real domestic interest rates would probably find a lower equilibrium level; there would be less need to crowd out the private demand for loanable funds, and new government debt could be sold at a lower risk premium. Finally, we must make an assumption about the ratio of base money to GDP. The remonetization of the Brazilian economy after the Cruzado Plan (when inflation was zero) brought that ratio up to 4.4 percent (from 2.3 percent in 1985). For Brazil, then, the 1986 ratio of base money to GDP is assumed to be consistent with inflation at 5 percent and a real interest rate at 14.5 percent. In Mexico, the ratio of base money to GDP was very high in 1981, at 15.9 percent, but it has declined continuously, falling to 4.2 percent in 1987. In the absence of other evidence, it is assumed that with inflation at 5 percent and the real interest rate at 15.4 percent, the ratio of base money to GDP would have been 12 percent in Mexico. All of these assumptions are debatable and could be improved by more sophisticated estimation procedures based on general-equilibrium models.

The next step in applying the consistency condition in equation (13) is to add observed values for real GDP growth, real devaluation, and the real effective interest rate on foreign public debt. To use actual rather than assumed values for these variables is to make the implicit assumption that GDP, the exchange rate, and the foreign interest rate are not significantly affected by fiscal performance. Real devaluation is represented by the yearly percentage change in the annual average value of the trade-weighted effective exchange rate.[3] Real GDP growth and the real effective foreign interest cost are also calculated as annual averages. Finally, the domestic and foreign debt ratios at the start of each period are applied to the consistency condition in equation (13).

[3] The trade-weighted rate is used for lack of data on the precise currency composition of public foreign debt. The results are not distorted seriously because the U.S. dollar figures prominently in the denomination of Brazilian and Mexican foreign debt as well as in the domination of their foreign trade.

Most of the adjustment in the real exchange rate that was needed to switch the current account from deficit to surplus occurred in 1983 in the case of Brazil and in 1982 and 1983 in the case of Mexico. These devaluations immediately raised the levels of net foreign debt as proportions of GDP and tax revenue. The increase in the public debt ratio could have been offset only if the government had run a noninterest budget surplus on the order of about 7 percent of GDP in the Brazilian case and 10 percent of GDP in the Mexican case. This did not happen, and public debt ratios doubled in both countries from the end of 1981 to the end of 1983, largely as a result of the devaluations but also because of depressed GDP growth and high interest rates on foreign debt.

During 1984-1987, the fiscal adjustments required by real-exchange-rate movements and GDP growth diverged in the two countries. High GDP growth and low real devaluation helped Brazil to keep its debt ratios from rising. Moreover, the real effective interest rate on foreign debt was significantly lower (by 1.5 percent) than in 1982-83. These events reduced the amount of fiscal discipline that would have been required to limit inflation, capital flight, and rising indebtedness. The required noninterest surplus for Brazil was only 2.0 percent of GDP, which would have involved new public borrowing amounting to about 2.2 percent of GDP. Because the actual noninterest deficit averaged 0.4 percent of GDP in 1984-87, the fiscal disequilibrium amounted to 2.6 percent of GDP.

The Mexican government managed to switch the noninterest budget into surplus. It averaged 4.1 percent of GDP during 1984-87. But more adjustment was required. Mexico experienced a large real appreciation of its currency in 1984 and 1985, but it was more than reversed by a sharp real depreciation in 1986 and 1987 in the wake of falling oil prices. The resulting average annual devaluation of 6.6 percent, coupled with negative real GDP growth, raised the amount of fiscal adjustment needed to stabilize the public debt ratio. The noninterest budget surplus required for this purpose remained at the very high level of 10.1 percent of GDP for 1984-87, so that there was a shortfall of 6.0 percent.

One more calculation is presented in Tables 4 and 5 in connection with the prospective consistency between the budget and other macroeconomic targets in Brazil and Mexico. It assumes that their external positions require no further real devaluations of their currencies, that the real effective foreign interest rate stays at 7 percent, and that real GDP grows at 5 percent in Brazil and 4 percent in Mexico. The other assumptions, regarding inflation, the demand for real base money, and the domestic real interest rate, are as before. Note, however, that these calculations are based on the public debt ratios that prevailed at the end of 1987 and these may be too high to inspire confidence, in which case the calculations understate the required fiscal discipline. Several results deserve to be stressed:

First, more fiscal discipline will be required in Mexico than in Brazil if domestic debt is to be serviced at 1986 interest rates, a further increase of indebtedness is to be avoided, and inflation is to be stabilized at 5 percent annually. This difference is due largely but not exclusively to the difference between the countries' debt ratios. The public debt is approximately equal to GDP in Mexico, but it is only half that large in Brazil. Nevertheless, the Mexican authorities seem to have achieved the necessary fiscal adjustments in 1988,[4] but in Brazil the fiscal disequilibrium is estimated at about 3 percent of GDP.

Second, the burden of the domestic public debt will matter more than the burden of foreign debt, provided that the countries can avoid further devaluation-induced increases in the real cost of servicing foreign debt and that the interest cost of domestic debt continues to exceed the interest cost of foreign debt.

Third, bringing down inflation from current levels to those observed in stable debtor countries would yield an important once-for-all gain in seignorage, especially in Mexico. If this gain were used to amortize high-cost domestic debt, the noninterest budget surplus required would be reduced.

Fourth, the fiscal effort required in debtor countries is heavily influenced by economic variables responsive to the policies of OECD countries. Movements in the real exchange rates of debtor countries result in part from changes in the availability of new foreign finance and shifts in exchange rates among OECD currencies. More obvious (but perhaps less important) is the link between the interest cost of servicing foreign debt and interest rates in the OECD area. Finally, GDP growth in debtor countries is linked to OECD growth through international trade.

The framework presented here helps to quantify the gap between actual fiscal performance in debtor countries and the fiscal discipline that would be consistent with achieving other macroeconomic targets. How that gap can best be closed—by fiscal adjustment, by debt relief, or by new foreign lending—is a function of its size. The bigger the gap, the less likely it is that fiscal adjustment alone can do the job.

[4] Buffie and Sangines Krause (1989) argue, however, that the official data on Mexico's public finances overstate the noninterest surplus because they do not net out interest payments among branches of the public sector.

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