

# Public Sector Deficits and Macroeconomic Performance

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## *Fiscal Adjustment and Macroeconomic Performance: A Synthesis*

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Fiscal deficits were at the forefront of macroeconomic adjustment in the 1980s, in both developing and industrial countries. They were blamed in large part for the assortment of ills that beset developing countries during the decade: overindebtedness, leading to the debt crisis that began in 1982; high inflation; and poor investment and growth performance. In the 1990s fiscal deficits still occupy the center stage in the massive reform programs initiated in Eastern Europe and the former U.S.S.R. and by many developing countries on all continents.

Many issues are raised by the successes and failures of fiscal adjustment. Not the least of these is how to define and measure fiscal adjustment. What are the most meaningful measures of public sector deficits? How should one assess fiscal stance, public sector solvency, and sustainability of deficits? While the analytical literature tends toward a definitional and methodological agreement on this issue (see Blejer and Cheasty 1991 for a comprehensive survey), empirical applications still differ widely.

Once measurement issues are settled—and before analyzing the consequences of deficits—some frequently posed questions are: How important are the macroeconomic causes of fiscal deficits? What role do domestic and foreign shocks play in relation to changes in fiscal policy in the evolution of deficits? What are the most effective policy instruments for fiscal adjustment?

Regarding the macroeconomic impact of deficits, a recurring question is whether larger public deficits are always associated with higher inflation. Sargent and Wallace's (1985) "monetarist arithmetic" answered this question affirmatively. But the relationship is blurred because governments finance deficits by borrowing, as well as by printing money. The relationship is further muddied by other factors, such as unstable money demand, inflationary exchange rate depreciations, widespread indexation practices, and sticky expectations (see Kiguel and Liviatan 1988; Dornbusch and Fischer 1991).

Interest rates are another ambiguous factor. Do deficits raise domestic real interest rates when governments rely heavily on domestic debt financing, or is this relationship also blurred by such factors as financial repression (Easterly 1989; Giovannini and de Melo 1993) and the high degree of substitutability between public debt and other assets held by the private sector?

Looking beyond domestic financial markets, a central issue of fiscal stabilization involves how private consumption and investment react to deficits. Will consumers reduce their spending when taxes are raised and increase it when taxes are lowered? Or will they offset only changes in government consumption—without reacting to changes in government tax or debt financing—as argued by Barro (1974)? This issue is still not empirically settled for industrial countries (see Hayashi 1985; Bernheim 1987; Leiderman and Blejer 1988; and Seater 1993 for surveys of empirical studies on Barro's Ricardian equivalence proposition of one-to-one crowding-out of private consumption by public consumption). There is, however, growing evidence for developing countries against the Ricardian hypothesis (Haque and Montiel 1989; Corbo and Schmidt-Hebbel 1991).

In regard to government investment, does a higher level of public capital spending crowd in or crowd out private investment? Theory predicts that this will depend on the degree of substitutability or complementarity of private and public capital (see Easterly, Rodríguez, and Schmidt-Hebbel 1989), and the limited available evidence for developing countries confirms this ambiguity (see Blejer and Khan 1984; Khan and Reinhart 1990).

Public deficits could also have indirect effects on private consumption and investment if real interest rates rise in response to higher domestic debt financing. Although theory predicts that real interest rates will have an ambiguous effect on private consumption, private investment should decline unambiguously with higher interest rates. A growing body of evidence for developing countries supports the notion that private consumption is insensitive to real interest rates (Giovannini 1983, 1985; Corbo and Schmidt-Hebbel 1991; Schmidt-Hebbel, Webb, and Corsetti 1992). Surprisingly, many studies also show little response of private investment to interest rates in developing countries (see the surveys by Rama 1993 and Servén and Solimano 1993).

Finally, how do fiscal imbalances feed into external deficits? One should expect a strong link between fiscal and current account deficits in financially open economies when either consumers are not Ricardian or the national versus imported composition of public and private sector spending differs. The role that fiscal imbalances played in the overborrowing by developing countries that led to the 1982 debt crisis is widely recognized (see Dornbusch 1985; Sachs 1989). But

more systematic evidence linking public deficits with external deficits and real exchange rate appreciations is still lacking.

The underlying theoretical framework of this study is simple. The consequences of deficits depend on how they are financed. As a first approximation, each major type of financing, if used excessively, brings about a macroeconomic imbalance. Money creation to finance the deficit often leads to inflation. Domestic borrowing leads to a credit squeeze—through higher interest rates or, when interest rates are fixed, through credit allocation and ever more stringent financial repression—and the crowding-out of private investment and consumption. External borrowing leads to a current account deficit and real exchange rate appreciation and sometimes to a balance of payments crisis (if foreign reserves are run down) or an external debt crisis (if debt is too high).

In its analysis of the effects of deficits, the method applied here focuses first on the monetary and financial market implications of deficits. Next, the direct and indirect effects of public spending, taxation, and deficits on private consumption and investment are addressed. Finally, the impacts of public deficits on external disequilibria and the real exchange rate are identified.

Each step in this study applies a common framework—for deficit measurement, sustainability, macroeconomic sensitivity, monetary and financial markets, private consumption and investment, the trade deficit, and the real exchange rate—to a set of ten case studies. To put the case study results into broader perspective, selected issues are addressed with the use of a fifty-nine-country sample that includes both developing and industrial countries. The fully specified models based on behavioral relationships can be found in Easterly, Rodríguez, and Schmidt-Hebbel (1989); Marshall and Schmidt-Hebbel (1989); Fischer and Easterly (1990); and Rodríguez, chapter 2 in this volume. This chapter summarizes the empirical evidence—based on econometric estimations and policy simulations for each country—and derives the relevant policy implications.<sup>1</sup> Drawing on a representative set of case studies makes possible inferences on the unsettled issues mentioned above that are more reliable than those based on pooled cross-country studies or individual case studies.

The selection criteria for the ten cases—Argentina, Chile, Colombia, Côte d'Ivoire, Ghana, Morocco, Mexico, Pakistan, Thailand and Zimbabwe—stressed both the diversity of fiscal and macroeconomic regimes and experiences and the sample's ability to represent the developing world at large. As will be clear from the discussion below, the ten countries include countries that underwent fiscal adjustment and those that did not; high- and low-deficit countries; large and small economies; low- and high-inflation countries; coun-

tries with and without developed financial markets; and countries with and without access to foreign financing.

This chapter begins with a discussion of alternative measures of fiscal deficits, deficit sustainability, and the interaction between deficits and the macroeconomy. The second section examines the causality from the macroeconomy to the deficits; the contribution of external and domestic shocks in comparison with that of shifts in fiscal policy in changing the deficit; and the most effective policy instruments for fiscal adjustment.

The three subsequent sections address the macroeconomic consequences of deficits. First the focus is on the relationship between the domestic financing of deficits, inflation, and real interest rates; then the relationship of deficits to private consumption and investment is analyzed; and finally the spillover effects of deficits on external imbalances are examined. The chapter closes with the main conclusions and policy implications of the analysis.

### **Measurement of Public Deficits**

How the public deficit is measured has an important bearing on an accurate analysis of the macroeconomic implications of deficits.<sup>2</sup> Appendix 1.1 discusses briefly two dimensions of deficit measurement: public sector composition and economic relevance. To illustrate how misguided a too narrow measure of public sector deficit can be, box 1.1 compares consolidated nonfinancial public sector (CNFPS) and quasi-fiscal deficits in Argentina and Chile. Box 1.2 illustrates the differences between alternative measures of Morocco's central government deficit.

With regard to deficit measurement, the approach taken by this chapter and by the research project at large is to combine the widest possible sector coverage (subject to data availability) and the most meaningful definitional choice, driven by the issues addressed.<sup>3</sup>

### ***Sustainable Public Deficits***

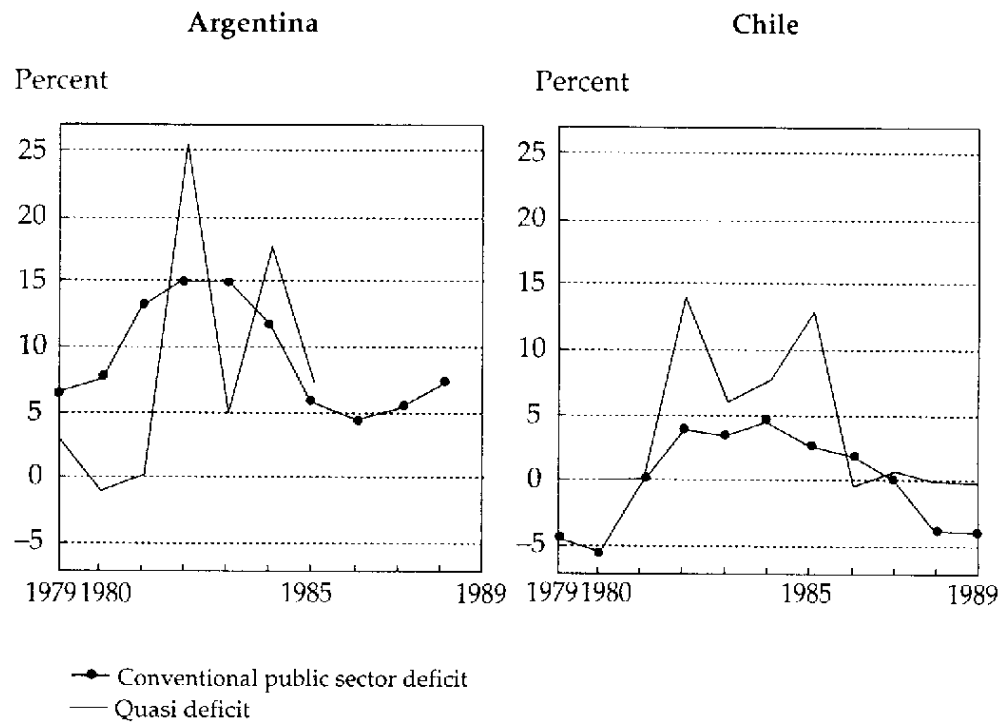
Sustainable public deficit measures are derived by looking at the below-the-line financing constraints of the deficits, following the accounting approach to public sector solvency (see appendix 1.1). Our purpose is to compare actual deficits and sustainable deficit levels. Estimates of sustainable primary deficits are derived by holding constant the ratios of public liabilities to output for feasible values for the macroeconomic variables that determine market demands for public liabilities, as discussed in appendix 1.2.

Figure 1.1 compares sustainable and actual primary surplus levels for six relevant fiscal experiences during the 1980s.<sup>4</sup> Sustainable pri-

**Box 1.1. Quasi-Fiscal Deficits in Argentina and Chile**

Quasi-fiscal deficits of the central bank amounted to a cumulative 55 percent of GDP during 1982–85 in Argentina and to a cumulative 41 percent of GDP during the same period in Chile. In Argentina quasi-fiscal deficits were roughly as large as conventional deficits during the period (box figure 1.1); the sum of both exceeded, on average, 25 percent of GDP per year! In Chile quasi-fiscal deficits exceeded, on average, 10 percent of GDP per year, more than double the conventional deficits. Both cases illustrate how misleading nonfinancial public sector deficits can be. For example, while conventional deficits were falling during 1984 in Argentina, the fiscal stance of the overall public sector, including the central bank, deteriorated greatly. In Chile conventional deficits underestimate both the 1981–85 fiscal crisis and the subsequent fiscal adjustment.

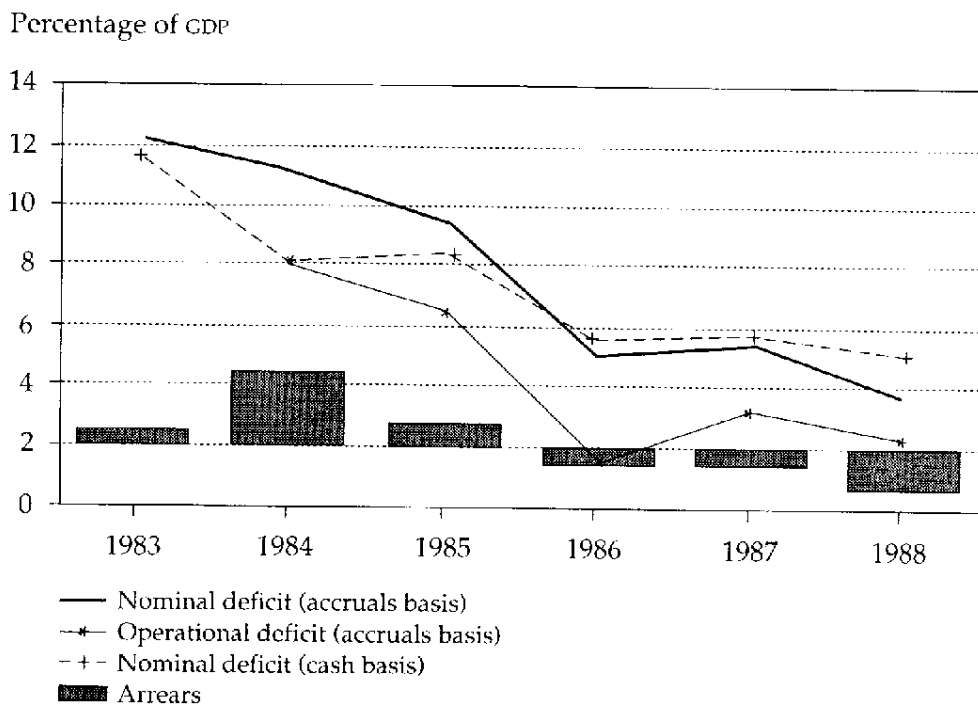
Box figure 1.1. Conventional and Quasi-Fiscal Deficits, Argentina and Chile, 1979–89



many surplus levels diverge widely, not only because of the different levels of public liability stocks and macroeconomic variables in each country but also because the calculations were made for different public sector coverages. The levels range from 1.4 percent of GDP for the total (financial and nonfinancial) public sector in Chile to -2.8

**Box 1.2. Alternative Deficit Measures for Morocco**

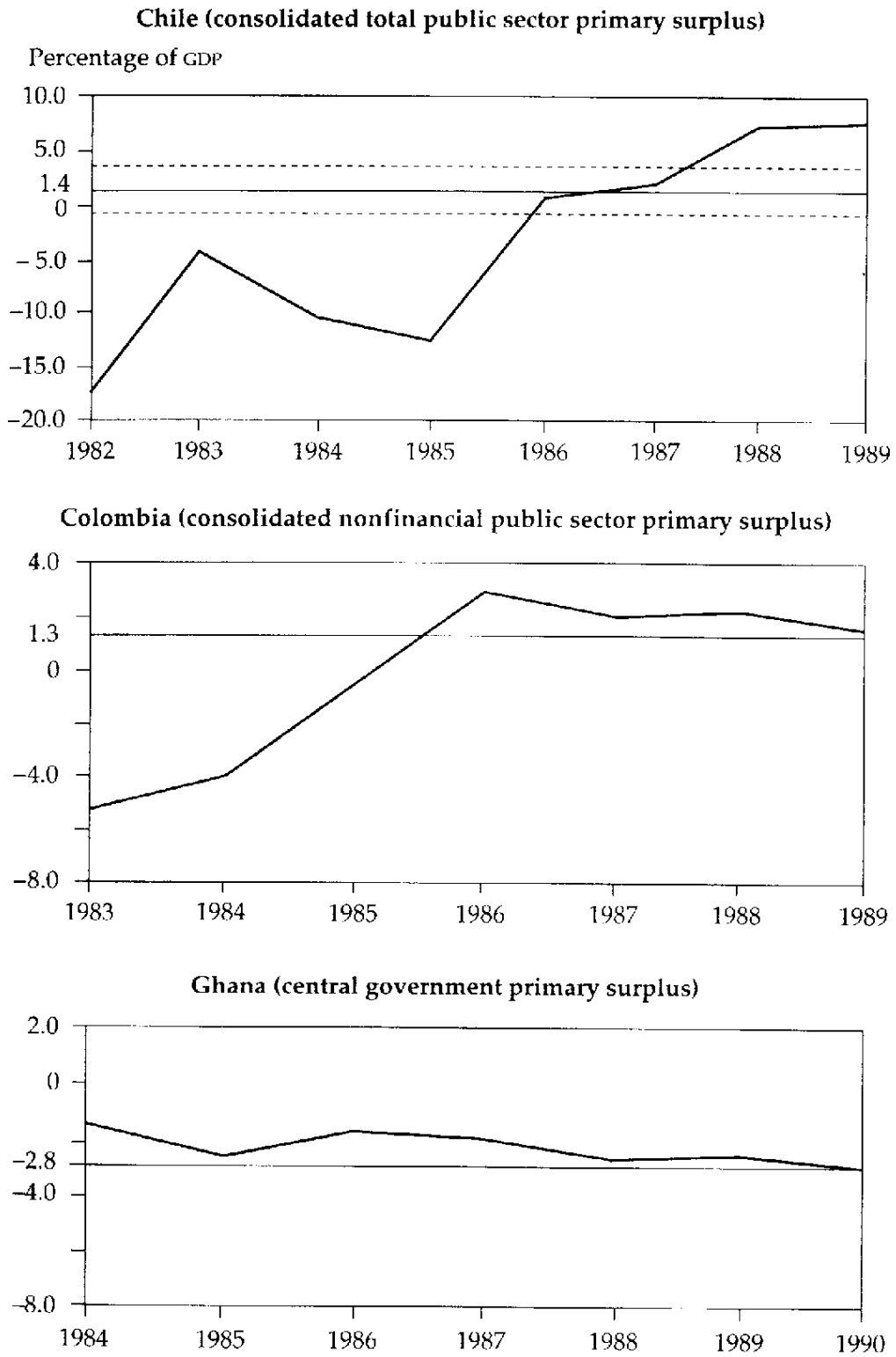
The decline in Morocco's cash-basis deficit gives only a partial picture of the significant fiscal improvement achieved during 1983–88 (see box figure 1.2). The country was able to lower its accruals-basis deficit at an even more rapid pace by reducing accumulation of arrears and starting to repay them in 1986. At the same time, the nominal deficit fell faster than the economically more meaningful operational deficit as a consequence of the decline of the inflation component of domestic interest payments resulting from lower inflation.

**Box figure 1.2. Deficit Measures, Morocco, 1983–88**

percent of GDP (a sustainable primary deficit) for the central government in Ghana.

How do the calculated sustainable deficits compare with actual levels during the 1980s? In Chile the massive public sector adjustment during the 1980s (comprising both the nonfinancial deficit and the central bank's quasi-fiscal losses) pushed primary surpluses in 1988 and 1989 well beyond the upper bound of sustainable levels. Colombia reached sustainable primary surplus levels in 1987–89 after significantly strengthening its fiscal stance. Morocco also pursued strong fiscal adjustment policies, achieving a primary surplus level in 1988 even higher than that required to reduce public debt as a share of

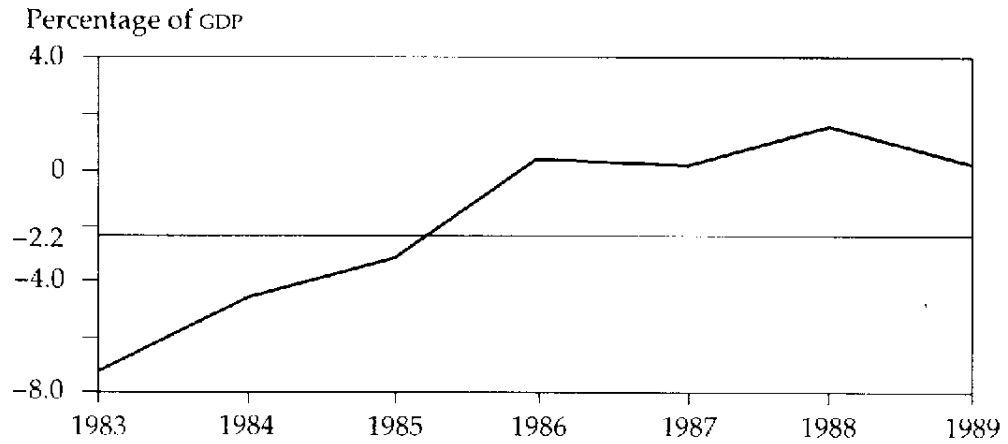
**Figure 1.1. Actual and Sustainable Public Sector Primary Surplus in Six Countries, 1980s**



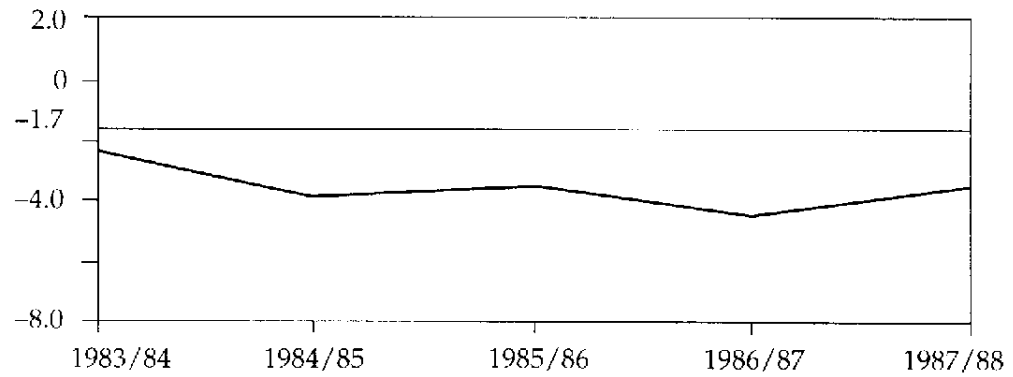
*(Figure continues on the following page.)*

**Figure 1.1 (continued)**

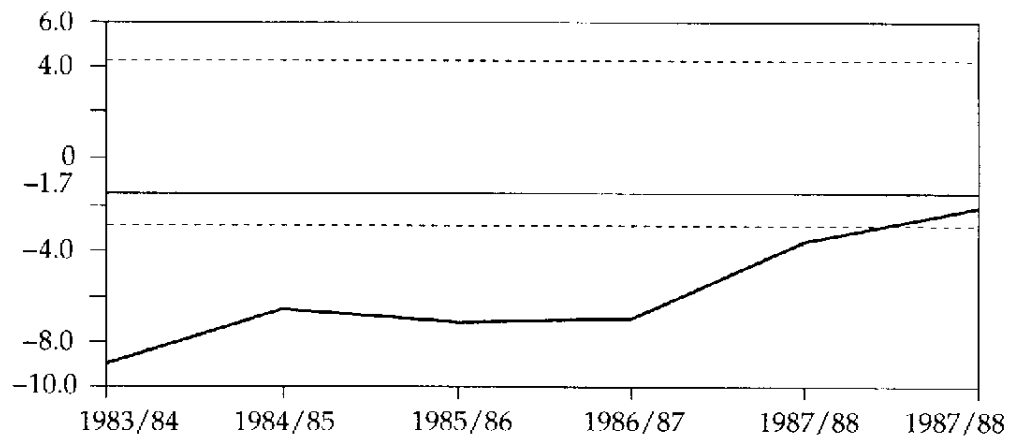
**Morocco (central government primary surplus)**



**Pakistan (general government primary surplus)**



**Zimbabwe (general government primary surplus)**



— Actual primary surplus  
— Sustainable primary surplus (midpoint)  
- - - Upper and lower bounds of primary surplus

Source: Chapters 4, 5, 7, 8, 9, and 10 in this volume.

output, although subsequently its fiscal stance deteriorated somewhat. Pakistan's fiscal deterioration raised its primary deficits beyond the 1.7 percent of GDP level consistent with stable debt-to-output ratios. Finally, Zimbabwe's modest fiscal adjustment in 1987-89 reduced its primary deficit to within the broad range of values consistent with sustainable levels, but still distant from an upper-bound level of sustainable primary surplus consistent with an adverse macroeconomic scenario.

Although these calculations are based on simple assumptions, they provide useful benchmarks for evaluating fiscal stance from a longer-run perspective. The next section generalizes these results by focusing on the fiscal performance of the ten country cases and distinguishing between the consolidated nonfinancial and quasi-fiscal deficits.

### *Correlations of Deficits with Other Macroeconomic Variables*

To obtain an overview of the relationship between fiscal deficits and relevant macroeconomic variables, we collected data on a large sample of countries, including members of the Organization for Economic Cooperation and Development (OECD). (For data and sources for the sample, see the Statistical Appendix in this volume.) The usefulness of fiscal deficits as an indicator of overall economic performance is reflected by our calculation of simple correlations between public sector balances (as a percentage of GDP) and other major macroeconomic variables, as shown in table 1.1.

There are good reasons not to expect very strong correlations. Fiscal deficits are measured in different ways across countries, introducing some measurement error into the sample. In addition, the theoretical relationship between deficits and other macroeconomic variables depends crucially on the means of financing them. (More generally, simple correlations may fail to be significant because of the omission of other variables.) Despite these caveats, we find a significant statistical relationship between the public sector balance and many, although not all, macroeconomic performance variables. Per capita growth is significantly and positively related to fiscal surpluses.<sup>5</sup> There is also an interesting negative and significant correlation between per capita growth and the *variance* of fiscal balances. Low and stable fiscal deficits are associated with high growth.

Fiscal balances are positively related to real interest rates, contrary to the usual prediction that deficits lead to high interest rates and surpluses to low rates. Since there are a large number of negative real interest rates in the sample, this finding is probably explained by an association between financial repression and fiscal deficits. Fiscal balances are negatively related to money creation (seigniorage), confirm-

**Table 1.1. Cross-Section Correlations of Consolidated Public Sector Balance as a Percentage of GDP with Other Variables**

<i>Variable</i>	<i>Correlation</i>	<i>t-statistic</i>
GDP growth	0.19	1.46
GDP per capita growth	0.37	3.02**
Real interest rate	0.31	2.34*
Money creation (percentage of GDP)	-0.33	-2.40**
Inflation	-0.16	-1.21
Investment (percentage of GDP)	0.24	1.70*
Total consumption (percentage of GDP)	-0.48	-3.97**
Private consumption (percentage of GDP)	-0.38	-3.00**
Real exchange rate	-0.15	-1.10
Current account (percentage of GDP)	0.54	4.76**
Black-market premium	-0.35	-2.65**
Variance of deficits with per capita GDP growth	-0.36	-2.88**

\* Significant at 5 percent level (one-tailed).

\*\* Significant at 1 percent level (one-tailed).

*Note:* Public surplus is positive; deficit is negative. Public balances of OECD countries are general government. Sample size varies between fifty and fifty-nine. Period of averages is longest period for which data are available for each pair of concepts for each country. For the real exchange rate, an appreciation is an increase.

*Source:* OECD, *OECD Economic Outlook*; World Bank data. For real exchange rate, Dollar 1990, using purchasing power parity (PPP) comparisons from Summers and Heston 1988.

ing that countries which run high deficits do so in part through greater reliance on seigniorage. (But de Haan and Zelhorst 1990 find that the correlation holds only for high-inflation countries.) However, inflation rates show little correlation with fiscal balances, perhaps reflecting in part the nonlinear relationship between money creation and inflation discussed later in this chapter.

Fiscal balances are positively, although weakly, related to total gross domestic investment, offering at least superficial support to the notion that deficits crowd out investment. The fiscal balance is negatively related to both total and private consumption. This finding is superficially consistent with the hypotheses that taxes crowd out private consumption and that public and private consumption are complementary. It is inconsistent with the Ricardian notion that government spending lowers consumption.

Fiscal balances are correlated with external current account balances across countries. This lends support to the "fiscal approach to the balance of payments," which says that fiscal imbalances are the main sources of external imbalances.<sup>6</sup> A suggestive association is found between fiscal balances and black-market premiums, indicating that countries with high deficits are more likely to control the foreign exchange market tightly and that deficits drive up the premium created by such controls. Real exchange rates, however, show

little association with fiscal deficits. This may reflect the extent to which trade intervention differs across countries.

There are two messages to be carried away from this set of generally strong (but occasionally weak) associations between fiscal balances and macroeconomic performance. The first is that despite problems of comparability across countries, the fiscal balance is a useful indicator of macroeconomic health. The second is that in order to trace the relationships between deficits and specific macroeconomic variables, such as inflation and real interest rates, deeper analysis is needed, with careful attention to the bidirectional causality among the variables and the underlying behavioral relationships. The following sections address these issues.

### **Causes of and Remedies for Deficits**

This section focuses on the determinants of deficits and the components of successful programs for fiscal stabilization. We start by assessing the contribution of foreign and domestic macroeconomic shocks in relation to that of shifts in fiscal policy in the evolution of public deficits. We then identify the main policies used in successful adjustment efforts.

#### *Sensitivity of Deficits to Foreign Variables*

Foreign shocks are a source of fiscal instability in many developing countries. Fluctuating export prices and foreign interest rates mean that commodity exporters and highly indebted countries face an inherent instability which often hinders fiscal adjustment efforts.<sup>7</sup>

Changes in export prices affect the public sector directly, via the profits of the exporting state-owned company or marketing board, or indirectly, through taxes on profits or on exports. (See Gelb and associates 1988 for a detailed study of the macroeconomic and fiscal consequences of commodity price booms in oil-exporting countries.) The quantitative impact of the export price shock on government accounts depends on the tax and property structure, the amount exported, and the magnitude of the price shock. In countries that face high export price volatility and that export through a large state-owned enterprise (as in Chile and Mexico) or a marketing board (as in Côte d'Ivoire and Ghana), fiscal accounts are sensitive to terms of trade shocks. If the foreign trade structure is diversified, the private sector is the main exporter, and export taxes are low or absent (as in Pakistan and Zimbabwe), public sector accounts do not suffer significantly from export price volatility. Import prices affect public expenditure in some countries. In Morocco, for instance, the decline in imported food prices was the main cause of the substantial decline in

subsidies to the private sector in the mid-1980s. Changes in foreign interest rates affect highly indebted countries with a high share of variable-interest debt, such as Argentina and Colombia.

In addition to measuring the impact of foreign shocks on public accounts, it is illuminating to assess the contribution of shocks to overall public sector deficits. Both dimensions are presented for six countries in table 1.2. The first column shows the average absolute change in public deficits as a result of different foreign shocks over the relevant sample periods. For instance, foreign shocks contributed, on average, to a variation in the public sector deficit amounting to 2.3 percent of GDP in Chile and 0.3 percent in Zimbabwe. Chile and Thailand are highly sensitive to changes in export prices or terms of trade, while in Colombia and Morocco the average contribution of export price shocks to deficits is only about 1 percent of GDP. In Zimbabwe the influence of terms of trade shocks on government revenue is negligible. In comparison with terms of trade shocks, fluctuations in interest rates have much lower effects on public deficits; they contribute, at most, 0.4 percent of GDP to the variation of public sector deficits in our sample.

The average relative contribution of foreign shocks in the second column measures the degree of correlation between foreign-shock-induced deficits and the overall public deficit. In Chile, Colombia, and Thailand adverse foreign shocks increase deficits, with shares varying between 12 and 50 percent of the total fluctuation of deficits. In Ghana the tiny foreign interest shocks are uncorrelated with deficits. In Morocco and Zimbabwe, however, foreign shocks have the opposite sign from the changes in overall deficits, indicating that domestic macroeconomic shocks and fiscal policy changes more than compensate for the influence of adverse foreign shocks.

Even moderate shocks could explain much variation in deficits. In Colombia, for example, moderate shocks have a huge influence—as much as 50 percent—on the variability of deficits. Because Colombia did not require such substantial fiscal adjustment during the relevant sample period (1984–89), foreign shocks had a more significant role in the evolution of its deficit. In Chile, which experienced the greatest foreign shocks, the relative contribution of these shocks to deficit variability has been a low 12 percent. During 1973–88 Chile embarked on massive fiscal adjustment programs that overshadowed the influence of foreign shocks.

Optimal responses to shocks depend on whether the shocks are temporary or permanent. Purely transitory shocks should be (dis)saved and hence reflected by public deficits, whereas permanent shocks should induce corresponding changes in expenditure or revenue without affecting deficits. In the case of public sectors that own large commodity-exporting companies (as in Chile, Mexico, and

**Table 1.2. Contribution of Foreign Shocks to Public Deficits**

<i>Country and shock</i>	<i>Average absolute variation of public deficits attributable to foreign shocks (percentage of GDP)</i>	<i>Average relative contribution of foreign shocks to variation of public deficits (percentage of variation of deficits)</i>
<i>Chile, 1973–88</i>		
Foreign shocks	2.3	12
Changes in copper price	2.7	15
Changes in foreign interest rates	0.4	–3
<i>Colombia, 1984–89</i>		
Foreign shocks	1.0	50
Changes in coffee fund	1.2	59
Changes in surplus of oil company	0.9	–9
<i>Ghana, 1972/73 to 1988</i>		
Changes in foreign interest rates	0.1	0
<i>Morocco, 1971–88</i>		
Changes in contributions of phosphate company	0.8	–17
<i>Thailand, 1970–88</i>		
Changes in terms of trade	2.2	41
<i>Zimbabwe, 1980/81 to 1988/89</i>		
Changes in foreign interest rates	0.3	–3

*Note:* The first column computes the annual average absolute variation of the deficit caused by the corresponding changes in foreign variables. (The exception is Chile; figures are based on period averages for 1973–75, 1975–81, 1981–86, and 1986–88.) If more than one foreign variable is considered, the sum of the average absolute variations for the individual variables differs from the average absolute variation of the combined shocks because of the opposite signs of individual variations. The second column reflects the average relative contribution of foreign shocks to the variation of public deficits, defined as:

$$\left[ \sum_{i=t}^{t+n} dv_i(\text{sign } d_i) \right] \left/ \sum_{i=t}^{t+n} |d_i| \right.$$

where  $d_i$  is the change in the deficit in period  $i$ ,  $dv_i$  is the change in the deficit caused by variable  $v$  in period  $i$ ,  $t$  is the initial period, and  $n + 1$  is the total number of periods.

*Source:* Authors' calculations and information from country case studies listed in the references to this chapter.

Morocco) or that collect large revenues from private exporters (Côte d'Ivoire and Ghana), price-stabilization or revenue-stabilization funds, such as those implemented in Chile and Venezuela, or hedging through risk-sharing contracts, are efficient mechanisms for isolating the budget from temporary export price shocks.

***Sensitivity of Deficits to Domestic Macroeconomic Variables***

A second group of variables that affect deficits and are also outside the direct control of fiscal policymakers consists of domestic macroeconomic variables. In the following discussion, we concentrate on four variables that often have strong effects on public budgets: inflation, the real interest rate, the real exchange rate, and output.

**INFLATION.** Inflation affects budget deficits through various channels.<sup>8</sup> Anticipated inflation raises nominal interest payments to domestic debt holders. Inflation also affects the primary deficit (the Olivera-Tanzi effect).<sup>9</sup> Collection lags for taxes that are not fully indexed (for example, nominally fixed excise taxes) lead to declining real revenue when inflation increases. Inflation also tends to lead to public demoralization and hence to lower tax compliance. If, however, income brackets are nonindexed, higher inflation leads to bracket creep and hence to higher direct taxation. Real public current expenditure declines with inflation when public wages or transfers are not indexed. Whereas in many countries the net effect of inflation is to increase primary deficits, the budget structure could conceivably reverse this effect.

Table 1.3 summarizes the effects of inflation on public deficits in seven countries and identifies the channels through which they operate. Results from estimated tax revenue functions allow us to classify countries according to the net influence of inflation on tax revenue. Inflation lowers aggregate tax revenue in Colombia and both direct and indirect taxes in Ghana. The only positive effect of inflation on taxes is found for direct tax revenue in Zimbabwe, where nonindexation of income brackets leads to bracket creep. Short collection lags, indexation of tax revenue, and indexation of income brackets could be behind the nonsignificant effects of inflation on tax revenue in Chile (direct and indirect taxes), Morocco (total taxes), Pakistan (direct, indirect, and trade taxes), and Zimbabwe (indirect and total taxes).

Table 1.3 provides some partial evidence concerning the effects of inflation on expenditure categories. Transfers to the private sector in Chile decline with inflation, presumably as a result of incomplete indexation. No evidence of a significant effect of inflation on aggregate public expenditure could be found in Morocco.

In most countries the net influence of inflation is to raise nominal public sector deficits, as a result of the dominating effect of rising prices on interest payments and tax revenues. A good example is Thailand where, according to econometric results, an increase in inflation of 10 percentage points raises the CNFPS deficit by 0.9 percentage points of GDP.<sup>10</sup>

**Table 1.3. Effect of Inflation on Public Deficits**

<i>Negative</i>	<i>Zero</i>	<i>Positive<sup>a</sup></i>
<i>Effect on tax revenue</i>		
Colombia: total taxes (1972-87)	Chile: direct taxes, indirect taxes (1973-89)	Zimbabwe: direct taxes (1970/71 to 1988/89)
Ghana: direct taxes, indirect taxes (1970/71 to 1988)	Morocco: total taxes Pakistan: direct taxes, indirect taxes, trade taxes (1972/73 to 1987/88)	
	Zimbabwe: indirect taxes, total taxes (1970/71 to 1988/89)	
<i>Effect on public expenditure</i>		
Chile: transfers (1973-89)	Morocco: public expenditure	
<i>Effect on the public deficit</i>		
		Thailand (1971-88)

*Note:* The effect of inflation on deficits via nominal interest payments on the debt is excluded as a separate channel of transmission.

a. Because of nonindexation of income brackets.

*Source:* Country case studies listed in the references to this chapter.

**REAL INTEREST RATE.** Real interest payments (and hence both the nominal and the operational deficit) obviously increase one-to-one with the real interest rate. Inflation shocks that are unexpected (or, even if expected, are not reflected in higher nominal interest rates because of controls on interest) reduce real interest rates and hence the operational deficit. For instance, in Ghana the one-period rise in inflation from 30 percent in 1982 to 115 percent in 1983 increased the nominal CNEPS deficit only slightly but reduced the operational deficit significantly as a result of the drop in real interest rates to negative levels.

Since the mid-1970s financial liberalization with partial or complete deregulation of interest rates has increased the sensitivity of deficits to the real interest rate. After early and radical financial liberalizations in Chile (1974-75) and Argentina (1977), the 1980s saw partial or complete liberalizations in Mexico, Morocco, and Zimbabwe. Whereas the massive rise in real interest rates in Chile during the 1970s did not impinge on the deficit because of the virtual absence of domestic interest-bearing debt, the increasing domestic debt stocks of the 1980s, in conjunction with moderately high interest rates, added

to the burden of the central bank, which holds most of the domestic debt in the public sector. In Morocco partial liberalization of interest rates since 1984 has significantly increased the cost of domestic debt to the treasury. It is estimated that a future increase of rates on government debt to competitive market levels could add 2 percentage points of GDP to the deficit.

Less access to foreign financing after 1982 forced countries to combine deficit reduction with increased reliance on domestic financing. A case in point is Pakistan. Its domestic nonbank borrowing increased from 4.8 percent of GDP in fiscal 1980/81 to 7.4 percent in 1987/88, and its domestic interest payments rose by 1.5 percentage points of GDP as a result of both higher domestic debt stocks and higher interest rates.

**REAL EXCHANGE RATE.** A real exchange rate (RER) depreciation raises public expenditure (measured in local currency units) by increasing foreign interest payments and the cost of tradable capital and intermediate goods acquired by the public sector. Public sector revenue is boosted by a real depreciation that raises surpluses of firms producing tradable goods, as well as direct and indirect taxation on production or sales of tradable goods. The net effect of the RER on the deficit (in real terms or as a share of GDP) hence depends on the relative weights of traded and nontraded items in public expenditure and revenue.

Table 1.4 summarizes the effects of the RER on tax revenue, profits of state-owned enterprises (SOEs), transfers, and consolidated deficits. In Colombia total tax revenue was reduced by real devaluation—presumably because a more devalued RER reduces quantitative import restrictions or because of a highly elastic import demand. The opposite is true for Ghana and Zimbabwe, where various revenue categories (direct and total taxes in Ghana, direct and indirect taxes in Zimbabwe) are increased by devaluation, presumably because tradable-goods activities (sales and production) are taxed more heavily than nontradable-goods activities. Because the remaining tax categories are shown to be insensitive to the RER, aggregate tax revenue rises with an RER devaluation in Ghana and Zimbabwe.

Real devaluations have positive effects on public budgets in countries in which a significant share of SOEs consists of companies that produce tradable goods. This is especially true when the big commodity exporters are public enterprises, as in Chile, Colombia, Mexico, and Morocco. Devaluations also boost net revenues from profits of agricultural marketing boards; this is clearly the case in Côte d'Ivoire.

A computation of the net effect of the RER on the CNFPS deficit combines the previously mentioned effects on public revenue with

**Table 1.4. Effect of a Real Exchange Rate (RER) Devaluation on Public Deficits**

<i>Negative</i>	<i>Positive</i>	
<i>Effect on tax revenue</i>		
Colombia: total taxes (1972–87)	Ghana: direct taxes, total taxes (1970/71 to 1988)	Zimbabwe: direct taxes, indirect taxes (1970/71 to 1988/89)
<i>Effect on profits or transfers from state-owned enterprises (SOEs)</i>		
Chile: surplus of SOEs and copper taxes		
Colombia: surplus of coffee fund and state oil company		
Côte d'Ivoire: revenue from cocoa and coffee marketing boards		
Mexico: surplus of SOE		
Morocco: contributions of state phosphate company		
<i>Net effect on the CNFPS deficit</i>		
<i>Increases deficit</i>	<i>Close to zero</i>	<i>Lowers deficit</i>
Chile	Colombia	Mexico
Ghana	Thailand	
	Zimbabwe	

*Source:* Country case studies listed in the references to this chapter.

the large and positive effect of the RER on foreign interest payments and with any effects on public expenditure. In some countries the interest effect dominates whatever positive effect the RER has on the primary deficit. The opposite is true in Mexico, where the share of oil-related federal revenue in GDP (7.9 percent in 1989) is more than twice as large as interest payments on dollar-denominated debt (3.4 percent in 1989). In Colombia, Thailand, and Zimbabwe a real devaluation has little or no influence on the overall deficit.

OUTPUT. Transitory output shocks affect nonfinancial public deficits because of changing tax bases and transfer payments to the private sector. This anticyclical behavior of public deficits motivated traditional Keynesian prescriptions of using the budget as an automatic stabilizer to counteract "autonomous" demand shocks. In countries with nonindependent central banks or countries under extreme financial crises, the anticyclical behavior of the nonfinancial deficit is reinforced by the anticyclical quasi-fiscal operations of the financial public sector. Cases in point are Argentina and Chile during the financial crisis and recession of the early 1980s (see box 1.1).

Trend growth is sometimes seen as a cure for public deficits; if growth is high enough, it is argued, tax bases expand and countries

**Box 1.3. How Sensitive Are Deficits to Macroeconomic Shocks in Zimbabwe?**

Box table 1.3 shows to what extent Zimbabwe's CNFPS deficit is affected by domestic and foreign macroeconomic shocks. (The estimates are based on 1987/88 and 1988/89 CNFPS budgets.) The domestic real interest rate has a significant effect on the deficit as a result of Zimbabwe's high domestic public debt: a 1 percentage point increase in the real interest rate raises the deficit by 0.4 percentage point of GDP, as the ratio of domestic debt to GDP stands at 40 percent. It is interesting that inflation has a lower positive effect on the deficit than does the real interest rate. The reason is that the effect on the deficit via higher nominal interest payments is in part compensated by the positive effect of bracket creep on revenue from income taxes. A devaluation contributes to a slightly lower deficit in Zimbabwe: the higher foreign interest bill is more than compensated by increased tax revenues from import taxes and direct taxes on tradables-producing sectors. Growth seems to have a strong effect on deficits, but its magnitude is overestimated because the calculation considers the influence of GDP only on tax revenue, not on public expenditure.

**Box table 1.3. Macroeconomic Shocks and the CNFPS Deficit**

<i>Change in macroeconomic determinants</i>	<i>Change in CNFPS deficit (percentage points of GDP)</i>
Increase in domestic inflation (1 percentage point)	0.31
Increase in domestic real interest rate (1 percentage point)	0.40
Devaluation of real exchange rate (1 percent)	-0.06
Growth of real GDP (1 percent)	-0.37
Increase in foreign interest rate (1 percentage point)	0.25

*Source:* Chapter 10 in this volume, table 10.5.

can grow out of deficits. This view is flawed for two reasons. First, it neglects the fact that not only tax bases but also successful pressures for higher public expenditure rise with output levels. Second, growth will not materialize if public deficits are high, inflation and real interest rates are high, and private investment is therefore depressed.

Box 1.3 illustrates the preceding analysis by showing how sensitive Zimbabwe's CNFPS deficit is to changes in the four domestic macroeconomic variables and the foreign interest rate.

### *Fiscal Policies*

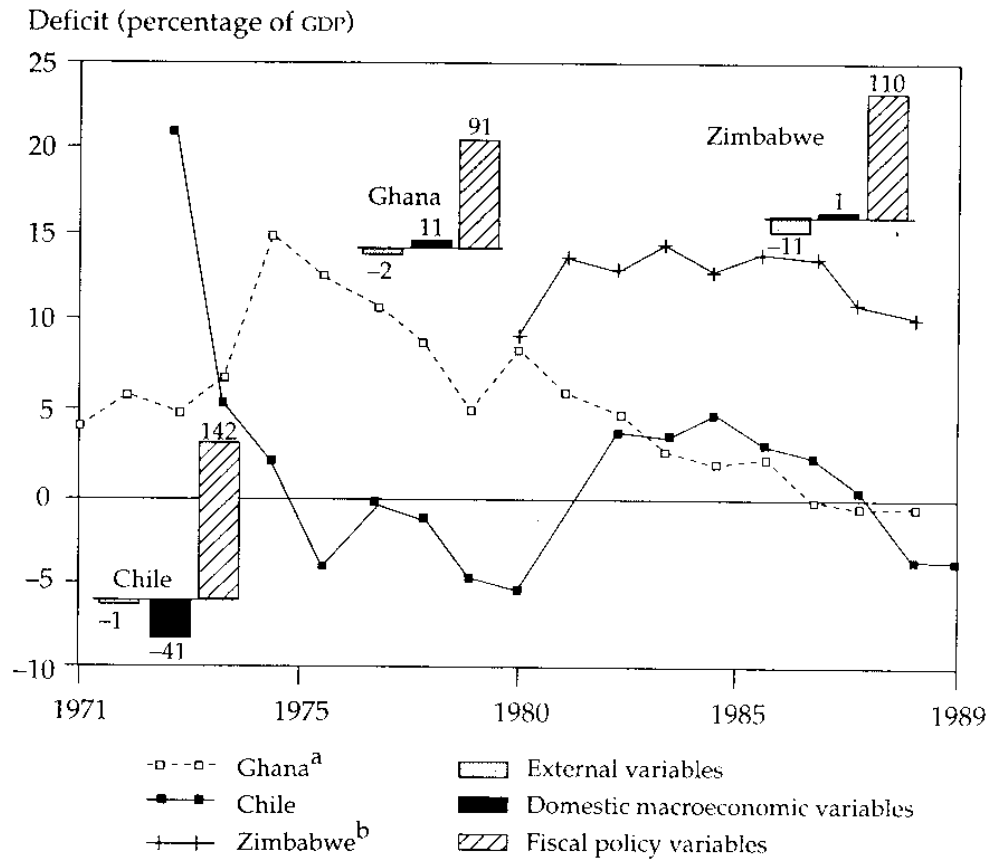
In this section we compare the influence of fiscal policy variables and that of foreign and domestic macroeconomic variables in the evolution of public deficits. Using time-series results for the decomposition of public sector deficits according to the three groups of deficit determinants (based on the deficit decomposition methodology of Marshall and Schmidt-Hebbel 1989), we compute the contribution of each group to changes in public deficits. Figure 1.2 presents the average relative contribution of the three groups of variables to changes in CNFPS deficits and the pattern of deficits in Chile, Ghana, and Zimbabwe.<sup>11</sup> The evolution of the public deficit in these three countries reflects the influence both of temporary (or cyclical) shocks and, particularly in the cases of Chile and Ghana, of structural policy shifts that brought about lower trend deficits.

Chile's fiscal experience in 1973–89 reveals four distinct periods: massive fiscal stabilization (1973–76); consolidation of public sector retrenchment (1977–80); crisis and deficit explosion (1981–84); and again, significant fiscal stabilization (1985–89). Fiscal policymakers are the main actors behind this experience, which achieved CNFPS surpluses close to 5 percent of GDP. On average, the relative contribution of fiscal policy variables to changes (and therefore to trend reduction) in the deficit was 142 percent. Changes in fiscal policy variables thus compensated for the strongly negative contribution of domestic macroeconomic variables and the slightly negative contribution of external variables.

Ghana is a case of gradual, but also highly successful, fiscal adjustment. There, too, the contribution of fiscal policy variables to the turnaround was massive, explaining 91 percent of the change in the deficit. Improvements in domestic macroeconomic variables helped to a small extent, contributing 11 percent to the fluctuations and structural correction of the central government deficit in Ghana.

The substantial deterioration in Zimbabwe's CNFPS budget after 1980 was partly reversed when a limited fiscal stabilization began in fiscal 1987/88. Zimbabwean policymakers compensated for the influence of variables beyond their control: fiscal policy variables explain 110 percent of the variation of public deficits, neutralizing the negative contribution of foreign interest shocks to the deficit.

A central conclusion emerges from the cases of Chile, Ghana, and Zimbabwe: fiscal policy variables dominate absolutely these countries' experiences of fiscal adjustment or deterioration. External and domestic macroeconomic shocks play a minor, and often even negative, role in the cyclical variation and the structural changes in public sector budgets. Active fiscal policies are both the main culprits in fiscal crises and effective instruments in bringing about fiscal stabilization and adjustment.

**Figure 1.2. Nominal CNFPS Deficit and Deficit Decomposition by Main Determinants, Chile, Ghana, and Zimbabwe, 1971–89**

a. Central government deficit; fiscal year data for 1971/72 to 1981/82.

b. Fiscal year.

Source: Authors' calculations based on country data in chapters 4, 7, and 10 in this volume.

Table 1.5 identifies the contribution of specific policies in ten relevant country experiences, one for each country in the sample. Three countries (Chile, Mexico, and Thailand) achieved strong and rapid fiscal adjustment. Four (Colombia, Ghana, Morocco, and Zimbabwe) followed a more gradualist approach of fiscal retrenchment. Pakistan experienced moderate deterioration, and Argentina and Côte d'Ivoire experienced massive fiscal deterioration.

Loss of control over public consumption (particularly wage levels and employment levels) is a major cause of a looser fiscal stance. One dramatic example is Argentina, where as a result of the large increase in current expenditure, investment fell by almost 5 percentage points of GDP during the period of extreme fiscal deterioration, 1977–82. The other is Zimbabwe, which, during a period of fiscal retrenchment

(1986/87 to 1988/89), was not able to avoid further increases in its public wage bill by 4.0 percentage points of GDP. Côte d'Ivoire's fiscal deterioration, too, was partly attributable to rising current expenditure. Conversely, the examples of strong austerity policies in Chile (1973-75), Ghana (1975/76 to 1988), Mexico (1986-89), and Thailand (1985-88) illustrate the important role played by reductions in current expenditure and, in particular, by cuts in wages and public employment.

Cutting transfers and subsidies is often an effective way to contribute to both fiscal stabilization and market deregulation. In Ghana and Zimbabwe lower transfers and subsidies contributed greatly to deficit reduction, by 5.4 and 5.0 percentage points of GDP, respectively. On the revenue side, tax reforms are at the heart of efforts to address structural deficits. In Chile reforms of direct taxes and the introduction of the value added tax (VAT) raised revenues by a staggering 10.5 percentage points of GDP, while Zimbabwe's 1988 tax reforms yielded a significant 4.2 percentage points of GDP. Higher tax revenue also helped Colombia, Mexico, and Thailand to reduce their deficits.

Rationalization of public enterprises and reforms of agricultural marketing boards constitute the fourth element of successful stabilization in our ten-country sample. Higher operating surpluses of SOEs contributed significantly to improving structural deficits—in Chile by a dramatic 8.4 percentage points of GDP and in Colombia and Ghana by smaller amounts. Conversely, the drastic deterioration in Côte d'Ivoire was caused by the decline in revenue from the cocoa and coffee revenue stabilization funds as a result of continuing producer price supports during a period of declining world prices.

An encouraging finding from our sample is that successful fiscal retrenchment does not have to rely on lower public investment. In the most dramatic fiscal turnaround (Chile, 1973-75) public capital formation was not reduced. In the three countries in which public investment fell during fiscal adjustment—Colombia, Ghana, and Mexico—the reduction was moderate. Only one case of fiscal retrenchment (Thailand) relied heavily on cutting public investment. Conversely, the two largest declines in public investment occurred in Côte d'Ivoire and Argentina during periods in which public deficits exploded. In the case of Argentina public capital expenditure continued its systematic decline beyond 1982, reaching a thirty-year low of 6.1 percent of GDP in 1987.

We conclude that successful (that is, sustainable) nonfinancial public sector adjustment typically requires simultaneous action on four fronts: reducing an overblown government bureaucracy; cutting transfers and subsidies to the private sector (except for efficient and targeted social programs); enacting tax legislation for increased,

**Table 1.5. Contribution of Policies to Fiscal Adjustment or Deterioration in Ten Countries**  
(percentage points of GDP)

<i>Country experience</i>	<i>Deficit level at start and end of period</i>	<i>Change in deficit and contribution of fiscal policy changes</i>
Argentina: 1977-82 deterioration	4.7; 15.1	+10.4 +15.1 -4.7
Chile: 1973-75 adjustment	20.6; 2.1	-18.5 -4.3 -10.5 -8.4
Colombia: 1984-89 adjustment	6.3; 2.2	-4.1 -1.2 -2.1 -2.1 -1.9
Côte d'Ivoire: 1984-89 deterioration	1.7; 14.4	+12.7 +3.6 -5.1 +2.9 +12.7
Ghana: 1975/76-88 adjustment	15.1; -0.4	-15.5 -1.3 -1.6 -5.4 -1.8

Mexico: 1986-89 adjustment	14.9; 5.1	Change in deficit Lower current expenditure Lower other expenditure Lower public investment Higher direct tax revenue Higher VAT revenue	-9.8 -2.5 -4.6 -0.7 -3.0 -0.9
Morocco: 1983-88 adjustment	12.1; 4.1	Change in deficit Lower expenditure on goods/services Lower transfers/subsidies Lower capital expenditure New petroleum levy	-8.0 -2.9 -1.7 -3.3 -3.4
Pakistan: 1980/81 to 1986/87 deterioration	4.8; 8.3	Change in deficit Higher noninterest current expenditure Lower direct tax revenue Lower indirect tax revenue	+3.5 +2.9 +0.8 +1.9
Thailand: 1986-88 adjustment	8.6; -0.2	Change in deficit Lower public wages/salaries Lower public investment Higher revenue	-8.8 -1.4 -3.5 -2.2
Zimbabwe: 1986/87 to 1988/89 adjustment	14.4; 10.0	Change in deficit Higher public wages/salaries Lower transfers/subsidies 1988 direct tax reform 1988 custom duty reform	-4.4 +4.0 -5.0 -2.4 -1.8

*Note:* SOE, state-owned enterprise; VAT, value added tax. Data refer to the central government for Ghana and Morocco and to general government for Pakistan. In all other cases the data refer to the consolidated nonfinancial public sector deficit.

*Source:* Country case studies listed in the references to this chapter.

broadly based direct and indirect taxation; and reforming or privatizing public enterprises and commodity marketing boards. Efficient public investment, particularly in social or physical infrastructure, should not only be exempted from fiscal cuts but should be expanded to encourage economic growth.

### **Deficits, Inflation, Real Interest Rates, and Financial Repression**

As shown by the cross-country evidence in figure 1.3, the relationships between deficits and inflation and between deficits and interest rates are far from simple. At low to medium rates of inflation, there is no relationship across countries between long-term inflation rates (1980–88) and public deficits. However, the countries with the highest inflation rates—Argentina and Mexico during the 1980s—had significantly higher deficits than countries with lower rates. Similarly, domestic real interest rates show no correlation with public deficits across countries except in the case of high-deficit, high-interest-rate Argentina.

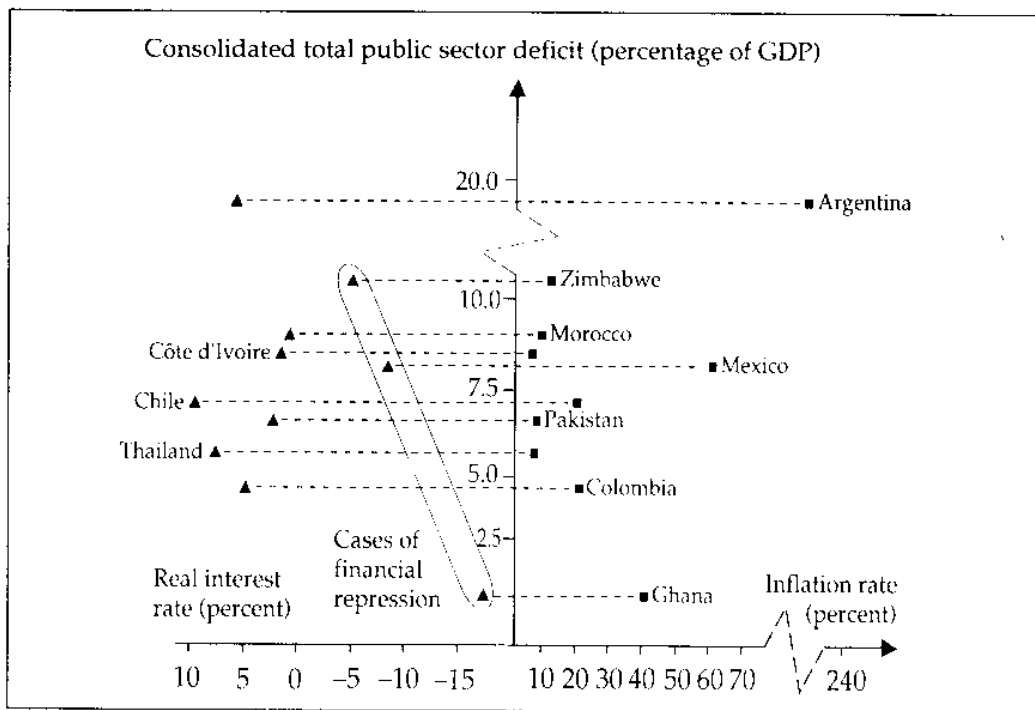
The lack of correlation across countries between deficits and inflation and between deficits and interest rates is primarily attributable to the different ways in which countries finance their public deficits. To account for the effects of these differences, a more detailed understanding is needed of the links between domestic deficit financing and inflation and interest rates (or financial repression).

This section first considers the relationship between seigniorage, inflation, and money demand and compares steady-state seigniorage levels with one-shot seigniorage episodes. It then reviews the empirical evidence on the relationships between specific sources of deficit financing and inflation, real interest rates, and financial repression.

#### *Seigniorage Laffer Curve and Misspecified Money Demand*

Any notion that fiscal deficits and inflation display a simple relationship fails for two reasons. The first is that countries make different choices about seigniorage to finance their deficits, partly because they differ in the extent to which other means of finance are available. The second reason is that money creation and inflation are nonlinearly related. The scattergram shown in figure 1.4 suggests a conventional “Laffer-curve” relationship between the inflation rate and revenue from seigniorage, with revenue falling off at some point because of the elastic response of money demand. The exact maximum of the curve is sensitive to the inclusion of the extreme points: with Argentina the maximum is at 160 percent inflation, while without Argentina it is only at 68 percent. (A similar point is made by Fischer and

**Figure 1.3. Fiscal Deficits, Real Interest Rates, and Inflation Rates in Case Study Countries, 1980–88 Averages**



Note: The consolidated total public sector deficits are for the CNFPS in all ten countries, but quasi-fiscal deficits are also included for Argentina, Chile, and Mexico. Source: For the deficit series, the country studies (see References); for the inflation rates and nominal interest rates (used to compute real interest rates), IMF, *International Financial Statistics*, various years.

Easterly 1990, who also note that the growth rate affects whether deficits are inflationary.)

Econometric estimation of a quadratic equation statistically confirms the Laffer curve, as shown by the following cross-country relationship:

$$T/Y = 0.01 + 0.043\pi - 0.13\pi^2$$

(4.9)    (4.1)    (-2.31)

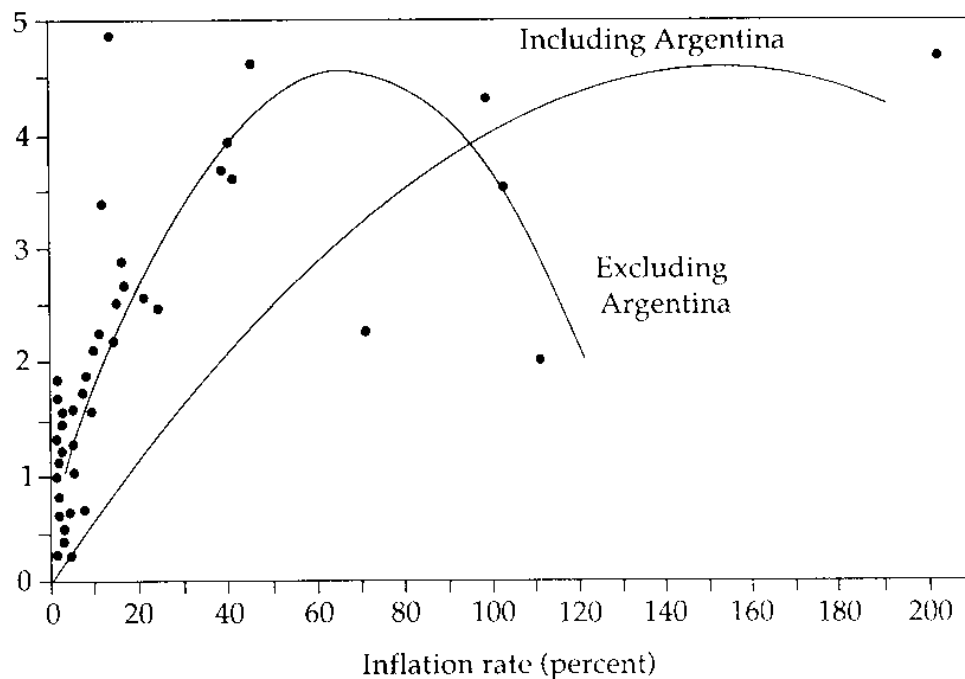
$$R^2 = 0.44$$

where  $T/Y$  is average seigniorage revenue as a ratio to GDP in 1970–89 and  $\pi$  is average inflation in 1970–89;  $t$ -statistics are in parentheses.<sup>12</sup>

These cross-section results differ significantly from calculations of revenue-maximizing inflation from individual time-series results for the case studies.<sup>13</sup> A regularity is that countries with high-inflation have very high seigniorage-maximizing inflation rates (in Argentina the rate is 966 percent, in Chile, 792 percent, and in Ghana, 125 percent); countries with moderate inflation have more moderate maximizing rates (Colombia's is 80 percent); and countries with low infla-

**Figure 1.4. Inflation and Seigniorage**

Seigniorage (percentage of GDP)



Source: Authors' regression and Statistical Appendix, tables A.3 and A.4.

tion have low maximizing inflation rates—Thailand's is only 4 percent!

One hypothesis to explain these huge differences across countries is misspecification of money demand. Conventional estimates of the seigniorage-maximizing inflation rate typically make use of a Cagan money demand, which implies a constant semielasticity of money demand with respect to inflation or interest rates (Cagan 1956). Easterly, Mauro, and Schmidt-Hebbel (forthcoming) show that the elasticity of substitution in transactions between money and bonds determines how the inflation semielasticity of money demand changes as inflation rises. Allowing for a variable semielasticity, the authors report estimates of seigniorage-maximizing inflation—varying between 266 and 303 percent per year—for a panel sample of eleven high-inflation countries. Their results are consistent with a semielasticity that increases with inflation (that is, higher inflation hastens the flight away from money and toward financial assets that provide protection from inflation).<sup>14</sup>

#### *Steady-State Seigniorage versus One-Shot Seigniorage Episodes*

Given the attention devoted to seigniorage in the literature, it is easy to forget how small it is as a source of revenue. Table 1.6 shows the

**Table 1.6. Average Seigniorage in OECD and Developing Countries**

Country	Average seigniorage, 1970-88 (percentage of GDP)	Highest excise tax, 1985	Product subject to highest excise tax
<i>OECD countries</i>			
Austria	0.9	1.0	Wine
Belgium	0.5	1.1	Mineral oil
Canada	0.4	0.7	Gasoline
Denmark	0.4	1.1	Cigarettes
Finland	0.6	1.3	Fuel
France	0.6	0.4	Insurance
Germany, Fed. Rep.	0.7	1.3	Mineral oil
Greece	2.8	2.2	Fuel
Italy	2.2	1.7	Mineral oil
Japan	1.0	0.6	Liquor
Netherlands	0.6	0.8	Petroleum
Norway	0.6	1.5	Vehicle transfer
Spain	2.3	1.3	Petroleum
Sweden	0.6	1.0	Petroleum
United States	0.4	0.3	Motor vehicle fuels
Average	1.0	1.1	n.a.
<i>Developing countries</i>			
Argentina	4.2	2.5	Fuel
Bangladesh	1.0	—	—
Bolivia	2.9	—	—
Brazil	2.3	0.2	Electricity
Burkina Faso	1.1	0.7	Beverages
Chile	3.7	—	—
Colombia	2.1	0.6	Gasoline
Côte d'Ivoire	1.3	1.1	Petroleum
Dominican Republic	1.6	1.8	Petroleum
Ecuador	1.8	0.3	Beer
Ghana	3.1	—	—
Honduras	0.8	0.5	Beer
India	1.5	0.7	Textiles and Jute
Indonesia	1.4	0.9	Tobacco
Jamaica	1.9	—	—
Jordan	5.0	—	—
Kenya	1.1	—	—
Korea	1.6	0.8	Liquor
Malawi	2.0	—	—
Malaysia	1.3	0.7	Petrol
Mexico	3.1	1.4	Gasoline
Morocco	1.7	1.2	Tobacco
Nigeria	1.1	—	—
Pakistan	2.0	—	—
Paraguay	1.9	0.9	Fuel

(Table continues on the following page.)

**Table 1.6** (continued)

Country	Average seigniorage, 1970-88 (percentage of GDP)	Highest excise tax, 1985	Product subject to highest excise tax
Peru	3.6	4.1	Gasoline
Philippines	1.0	—	—
Sri Lanka	1.3	—	—
Thailand	1.0	1.5	Petroleum products
Trinidad and Tobago	0.9	—	—
Turkey	3.4	—	—
Venezuela	1.5	0.5	Liquor
Zaire	4.4	0.3	Tobacco
Zambia	2.0	1.9	Petroleum
Zimbabwe	1.1	—	—
Average	2.1	1.1	n.a.

— Not available.

n.a. Not applicable.

Source: For excise taxes, IMF 1986; for seigniorage, Statistical Appendix, table A.2.

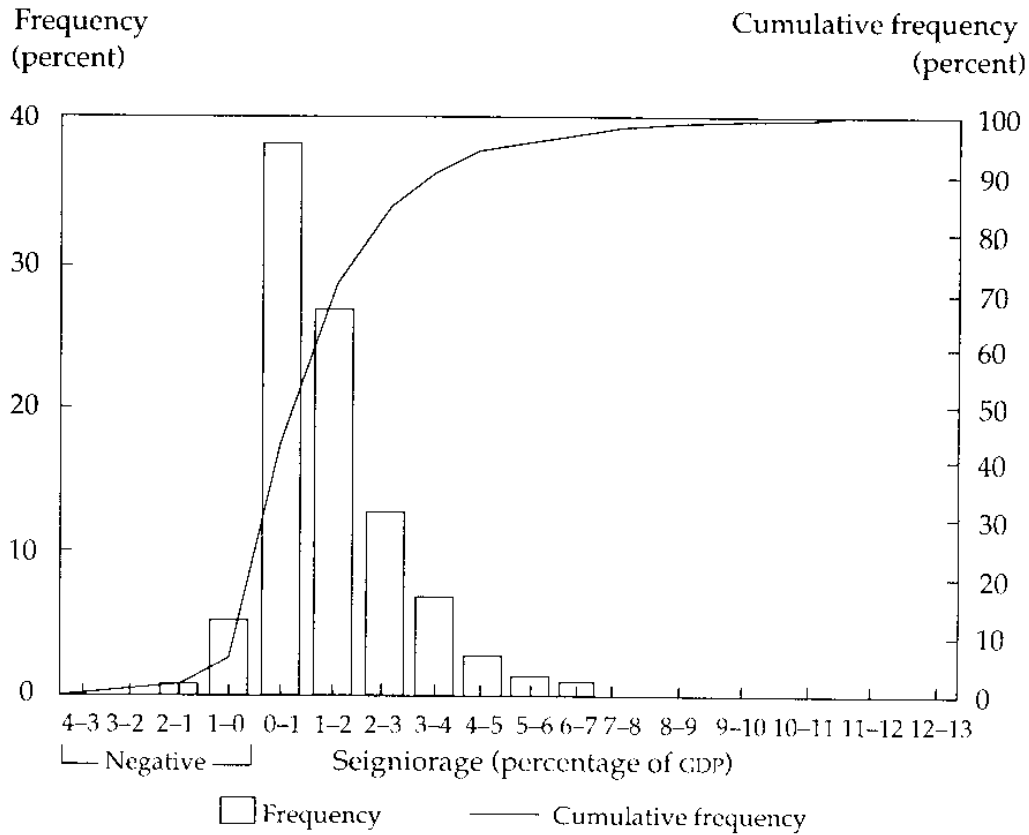
average seigniorage for a sample of industrial and developing countries for which data are available. Seigniorage is calculated as the ratio to real GDP of the yearly sum of deflated monthly changes in the money base. The generally small amount of seigniorage for the ten case studies is typical of the overall pattern of seigniorage among all countries. The maximum amount of average seigniorage revenue over an extended time is less than 5 percent of GDP. Seigniorage is mainly a phenomenon of developing countries—among industrial countries, only Greece, Italy, and Spain had seigniorage above 1 percent of GDP. Average seigniorage is more than twice that level in developing countries.<sup>15</sup>

Seigniorage revenue is of the same order of magnitude as revenue from individual excise taxes (see table 1.6). Why, then, are macroeconomists so preoccupied with taxes on money, as against taxes on beer, jute, or cigarettes?

Perhaps one reason is that seigniorage can be a large source of temporary revenue during times of crisis. The time-series averages for seigniorage conceal tremendous year-to-year fluctuations. Figure 1.5 shows a frequency distribution of the individual yearly observations for the same sample of countries as in table 1.6. Although nearly half the sample is concentrated in observations of less than 1 percent of GDP, there is a significant number of observations of high-seigniorage revenue, reaching as high as 13 percent of GDP. The average time-series coefficient of variation in the sample is 90 percent.<sup>16</sup>

This suggests that a fruitful approach to seigniorage would be to study the episodes of high seigniorage to see how they happened and

**Figure 1.5. Frequency Distribution of Annual Seigniorage Observations, Fifty-one Countries, 1970–88**



Source: Statistical Appendix, tables A.3 and A.4.

what their consequences were. A number of the case studies in this project include such episodes; bursts of seigniorage appear in Argentina in 1975 and 1983, in Chile in 1971, in Ghana in 1978 and 1983, and in Mexico in 1982. A different type of one-shot seigniorage took place in Ghana in 1979, when the government captured 2.5 percent of GDP through a currency conversion and partial expropriation of deposits, and in 1982, when the government again expropriated private wealth through the demonetization of the largest-denomination note. These episodes brought a short-term gain to public finances at considerable long-run cost—the Ghana case study estimates that seigniorage was permanently lowered by 1 to 2 percent of GDP because of the fall in money demand after the 1979 currency expropriation.

Table 1.7 looks at episodes of high (conventional) seigniorage in the broader sample. Of a total of 1,143 observations of forty-nine countries for various years, we identified eighteen instances in which seigniorage was more than 4 percentage points above the average seigniorage-to-GDP ratio in the particular country.<sup>17</sup> We see that

**Table 1.7. Episodes of High Seigniorage Spikes**

Country	Year of spike	Seigniorage (percentage of GDP)		Components of spike (percentage of GDP)		Growth (percent)			Inflation (percent, December to December)	
		Seigniorage spike (deviation from average)	Average seigniorage	Change in real money base + average money base	Above-average inflation tax	Growth in year of spike	Average growth rate	Inflation in year of spike	Change in inflation over previous year	Average inflation rate
Argentina	1975	9.0	4.2	-4.0	6.5	-0.5	2.2	336.1	296.2	105.4
Bolivia	1982	7.5	2.9	-0.8	7.9	-4.4	2.7	296.6	271.4	54.5
	1983	5.3	—	-3.3	8.6	-6.5	—	327.8	31.3	—
	1984	7.0	—	-3.9	20.8	1.0	—	2,176.2	1,848.4	—
	1971	6.7	3.8	10.9	-3.0	9.1	1.5	19.4	-15.6	91.3
Denmark	1985	4.2	0.4	4.3	-0.2	4.3	2.4	3.6	-2.0	7.7
Dominican Rep.	1986	4.9	1.6	5.3	-0.6	3.0	5.7	6.5	-21.8	13.1
	1988	5.7	—	2.2	3.0	1.3	—	57.5	32.5	—
Ghana	1978	4.7	3.1	-0.6	3.8	9.8	1.7	108.5	-2.4	38.6
Jamaica	1984	5.4	1.9	4.7	1.0	-1.4	-0.2	31.2	14.5	17.0

Mexico	1982	7.9	3.1	1.4	3.7	-0.6	5.0	98.9	70.2	29.8
Peru	1985	6.7	3.6	2.7	2.5	2.2	2.2	158.3	46.8	82.1
	1988	6.0	—	-7.3	14.8	-8.0	—	1,722.1	1,607.5	—
Trinidad/Tobago	1982	4.2	0.9	4.3	0.0	-4.7	1.6	10.8	-0.8	10.5
Zaire	1976	4.1	4.4	0.5	2.2	-5.5	3.1	78.8	42.1	47.1
	1982	4.9	—	4.4	-0.6	-0.4	—	41.0	-12.0	—
	1987	5.7	—	-0.1	4.1	0.6	—	106.5	68.2	—
Zambia	1986	6.0	2.0	5.4	1.1	0.2	1.8	34.6	-23.7	18.9
Average for "spike" episodes or countries		8.8	2.7	1.5	4.2	0.0	2.5	311.9	236.2	43.0
Average for thirty-nine "nonspike" countries in sample		—	1.4	—	—	—	4.5	—	—	11.2

— Not available.

Note: Spikes are defined as seigniorage more than 4 percentage points of GDP above the average seigniorage-to-GDP ratio for the country. Components do not sum to the "spike" because of the covariance term.

Source: Authors' calculations based on data in the Statistical Appendix and in IMF, *International Financial Statistics*, various issues.