

Domestic Public Debt of Externally Indebted Countries

by Pablo E. Guidotti and Manmohan S. Kumar



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The following symbols have been used throughout this paper:

- ... to indicate that data are not available;
- to indicate that the figure is zero or less than half the final digit shown, or that the item does not exist;
- between years or months (e.g., 1990-91 or January-June) to indicate the years or months covered, including the beginning and ending years or months;
- / between years (e.g., 1990/91) to indicate a crop or fiscal (financial) year.

“Billion” means a thousand million.

Minor discrepancies between constituent figures and totals are due to rounding.

Prefatory Note

The authors of this study are economists in the Research Department of the International Monetary Fund. The study has benefited from comments and suggestions from numerous colleagues and visiting scholars in the Research Department, as well as from other departments of the Fund. In particular, they wish to thank Bijan Aghevli, Matthew Canzoneri, Michael Dooley, Ernesto Feldman, Morris Goldstein, Mohsin Khan, Saúl Lizondo, Leonardo Leiderman, Claudio Loser, Liliana Rojas-Suárez, Assaf Razin, and, especially, Peter Wickham for their many valuable comments. They are particularly grateful to Guillermo Calvo for his advice and encouragement throughout the course of this study. They also thank Huyen Le and, in particular, Raja Hettiarachchi for efficient research assistance, and Paul Gleason and Catherine Fleck for editorial help. The opinions expressed in the study are those of the authors and do not necessarily reflect the views of the Fund.

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I Introduction

In recent years, there has been an increasing concern about the growth of domestic public debt in developing countries with high levels of external debt and its implications both for stabilization policies and for attempts to deal with the external debt problem. Despite the critical impact the growth of domestic public debt can have in these areas, very few studies have provided a systematic analysis of the domestic public debt situation in these countries.¹

The present study focuses on three main areas: (1) the evolution of domestic public debt and its relationship to external debt and underlying fiscal developments; (2) the development of an analytical framework which integrates different aspects of a country's fiscal situation to facilitate an examination of the links between domestic and external debt, taxes, subsidies, and government spending; and (3) strategies for the management of domestic public debt and their implications for the design of stabilization policies and the control of inflation.

The study is organized as follows: Section II examines the recent growth of domestic and external public sector debt in the 15 developing countries with high levels of external indebtedness, which

hereinafter will be referred to, for simplicity, as the Group of Fifteen (G-15) countries.² It also discusses the fiscal developments underlying the public debt increase in the 1982–88 period. Section III develops an analytical framework for examining the relationship between domestic and external government liabilities and the current and anticipated fiscal stance. This framework is used to obtain a measure of the public sector's ability to service its outstanding liabilities and to provide an estimate of the fiscal surpluses required to service a given level of public debt. Section IV focuses on the implications of the characteristics of the domestic public debt; in particular, it examines the link between nominal debt, credibility of policy, and inflation. The potential role of debt indexation and the management of the maturity structure of debt in determining the sustainability of stabilization programs is discussed. Section V presents the conclusions.

¹See Reisen (1989 a and b).

²The G-15 countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia. These countries constitute the group of 15 heavily indebted countries identified in the 1985 Baker plan for dealing with externally indebted countries. See also International Monetary Fund, *World Economic Outlook: A Survey by the Staff of the International Monetary Fund* (Washington, May 1990).

II Evolution of Public Debt and Fiscal Developments

I. Evolution of Public Debt

Since the onset of the external debt crisis in 1982, domestic public debt has become a matter of increasing concern in a number of developing countries. For the G-15 countries, the average ratio of domestic public debt to gross domestic product (GDP) increased to 16 percent in 1987–88 from 10 percent in 1981–82 (Table 1).³ For the four largest debtors among developing countries in the Western Hemisphere, it rose from 12 percent to 18½ percent over the six-year period.⁴ This remarkable growth contrasts with relative stability in the domestic debt ratio prior to 1981 (Chart 1). For a majority of the G-15 countries, the domestic debt ratio increased by more than 50 percent between 1981–82 and 1987–88. As a result of these developments, domestic public debt in several of these countries currently is either close to or exceeds 25 percent of GDP. The variability of debt ratios across countries is substantial; it has declined over time, however, with the ratio of the standard deviation to the mean falling between 1981–82 and 1987–88. These developments underscore the need to focus more attention on the evolution and the implications of domestic public debt in developing countries with high levels of external debt.⁵

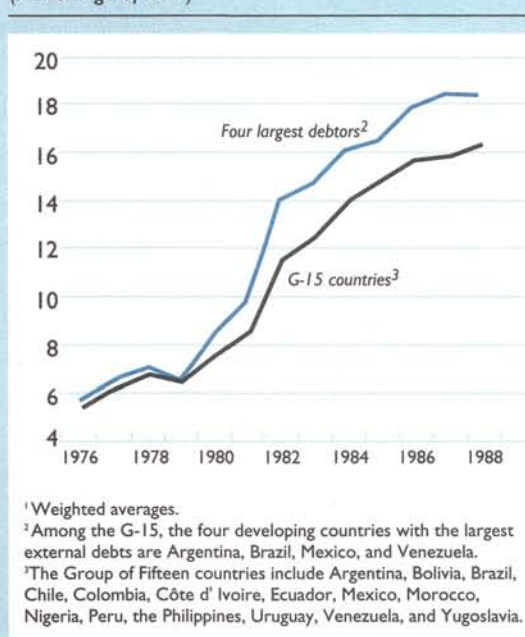
³Domestic public debt figures include gross liabilities of the consolidated public sector, and of the monetary authorities, with the domestic private sector. Since these are consolidated data, government liabilities held by the monetary authorities are excluded.

The average debt ratio for the G-15 countries is a weighted average in which each country's weight is given by the proportion of its GDP (in U.S. dollars) in the group's combined total GDP in 1981–82. The reason for using weighted averages is to make these data comparable with those used in existing studies of external debt. Results are qualitatively unchanged when unweighted averages are used.

⁴Among the G-15, the four largest debtors, all of which are in the Western Hemisphere, are Argentina, Brazil, Mexico, and Venezuela.

⁵It is worth noting that diverse institutional arrangements for domestic debt exist among the G-15 countries. In some countries, much government borrowing is financed directly by the public through the competitive placement of securities in relatively well-developed capital markets, while in other countries, government borrowing involves central bank intermediation.

Chart 1. Fifteen Heavily Indebted Developing Countries: Domestic Public Debt, 1976–88¹
(Percentage of GDP)



The growth in domestic public debt occurred at a time when external public debt was also increasing. The average ratio of external public debt to GDP in the G-15 countries increased by 15 percentage points between 1981–82 and 1987–88, while the ratio for the four largest debtors increased by more than 9 percentage points (Table 1 and Chart 2). The processes underlying the growth of domestic debt and external debt were, however, significantly different. While the increase in domestic public debt essentially reflects continued access of governments to funds from the private sector, the increase in external debt largely reflects the extension of public sector guarantees to a large portion of private external debt, as well as the rescheduling of

Table 1. Fifteen Heavily Indebted Developing Countries: Public Debt, Selected Periods
(Percentage of GDP)

	1976–77	1981–82	1987–88
Domestic public debt ¹			
G-15 countries ²			
Weighted average ³	6.1	10.2	16.1
Median	3.2	3.7	10.1
Standard deviation	6.6	7.1	10.5
Four largest debtors ⁴			
Weighted average ³	6.3	12.0	18.4
Median	5.6	11.9	17.7
Standard deviation	3.0	4.7	6.0
External public debt ⁵			
G-15 countries ²			
Weighted average ³	14.7	22.8	37.7
Median	17.8	27.5	52.0
Standard deviation	8.3	17.5	29.6
Four largest debtors ⁴			
Weighted average ³	14.6	24.2	33.3
Median	12.7	26.2	40.9
Standard deviation	4.2	9.0	14.5
Total public debt ⁶			
G-15 countries ²			
Weighted average ³	20.8	33.0	53.8
Median	24.1	35.5	63.1
Standard deviation	10.5	19.2	29.9
Four largest debtors ⁴			
Weighted average ³	20.9	36.2	51.7
Median	18.4	38.1	60.2
Standard deviation	5.4	4.8	12.1

¹ Domestic public debt includes gross liabilities of the consolidated public sector and of the monetary authorities with the private sector. Ratios are calculated by dividing the average of the stock of debt at the beginning and the end of the year by GDP in national currency. Domestic public debt data were obtained from national sources; various issues of the International Monetary Fund's *International Financial Statistics* and *Government Finance Statistics Yearbook*; and various unpublished Fund documents. Figures for GDP in national currency were obtained from the Fund's *World Economic Outlook* data bank.

² The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

³ Weights are based on the relative shares in U.S. dollar GDP in 1981–82 of the G-15 countries and of the four largest debtors among them (all of which are in the Western Hemisphere), respectively. Figures for GDP in U.S. dollars were obtained from the *World Economic Outlook* data bank.

⁴ Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

⁵ External public debt includes both public and publicly guaranteed debt. Ratios are calculated by dividing the average of the stock of debt at the beginning and the end of the year by GDP in U.S. dollars.

⁶ The total public debt ratio is the ratio of the sum of domestic debt and external debt to GDP.

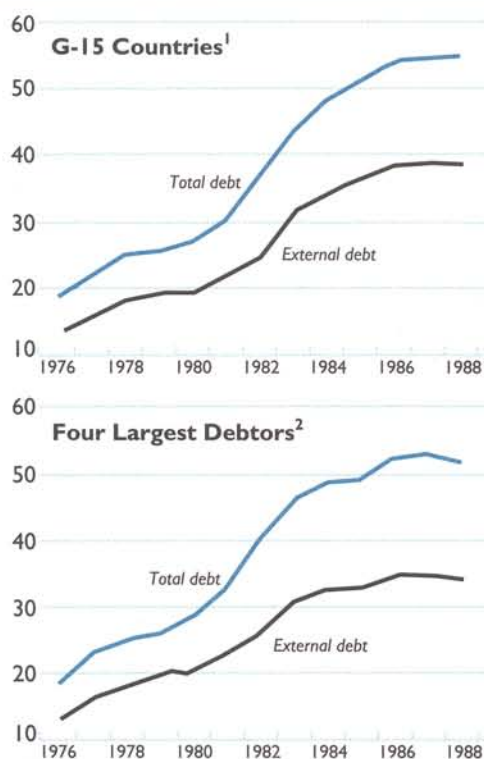
interest and amortization payments, since these countries' access to international capital markets (based on their perceived creditworthiness) had virtually dried up.⁶

⁶ In two cases, Côte d'Ivoire and Peru, the government had run into domestic arrears during the review period. These arrears represent a form of domestic public debt that is not voluntary. For Côte d'Ivoire, the domestic public debt data used in this paper include part of these arrears, which constitute a small portion of the total. For Peru, domestic arrears are not included in the data presented because information was not available.

The sharp increase in both the domestic and external public debts of the G-15 countries led to a corresponding steep rise in their total public debt, which, as a proportion of GDP, increased from 33 percent to 54 percent between 1981–82 and 1987–88. The total public debt of the four largest debtors rose almost as fast during this period, increasing from 36 percent to 52 percent of GDP. In most of the G-15 countries, total debt exceeded 50 percent of GDP by the end of the period.

It is worth noting that the current ratios of total public debt to GDP for the G-15 countries are not

Chart 2. Fifteen Heavily Indebted Developing Countries: Total Public Debt and External Public Debt, 1976-88
(Percentage of GDP)



¹ The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

² Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

very different from those of a number of industrial countries, which currently either exceed or are close to 100 percent. Several other industrial countries have debt ratios of between 40 percent and 60 percent.⁷ A key question that emerges from this comparison is why these industrial countries are not perceived by international financial markets to be facing the same sort of crisis that besets the developing countries. Section III explores the extent to which this fact can be explained by different current and expected fiscal developments.

⁷ Table 10 in Appendix II reports the public debt ratios of the majority of the Organization for Economic Cooperation and Development (OECD) countries. As it indicates, the average ratio for these countries increased to 59 percent of GDP in 1988 from 48 percent of GDP in 1982.

One facet of the crisis facing developing countries is the rise in secondary-market discounts on their external debts, particularly since 1985. The discounts began to emerge toward the end of 1983, when many of the G-15 countries were beset with external-debt-servicing problems. By the end of 1988, with the exception of Chile, Colombia, and Uruguay, there was a discount of at least 50 percent on the external debt of G-15 countries. The precipitous fall in secondary-market prices between 1985 and 1988 reflected the continuing sharp rise in external debt ratios because of rescheduling, the lack of significant improvement in the perceived capacity to service debt, as well as the competing demands of domestic debt service.

Secondary-market prices of external debt provide an indication of a country's ability—as perceived by the market—to service its external debt. The ratio of market value of external debt to GDP, when secondary-market prices are used, shows a decline that is particularly notable between 1984 and 1988.⁸ (See Chart 3.) From 1981–82 to 1987–88, the average ratio for the G-15 countries declined by nearly 5 percentage points of GDP; while for the four largest debtors, the average decline was even larger. By 1987–88, the market value of the same four countries' external debt was half its contractual value.

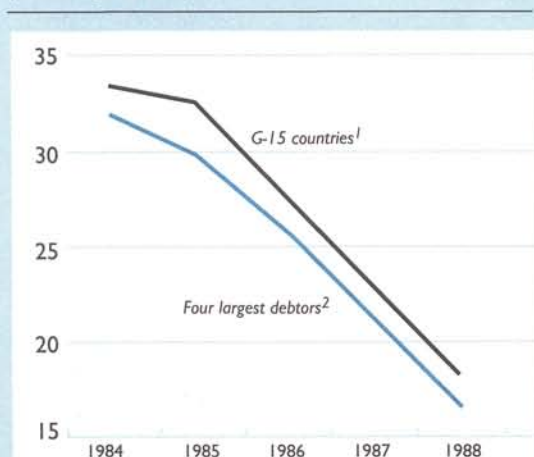
The market value of the combined total of external and domestic debt was almost unchanged between 1981–82 and 1987–88, both for the G-15 countries and the four largest debtors. (See Table 2.)⁹ The relative stability in the market value of total public debt immediately raises a number

⁸ It is worth pointing out that for Chile, Colombia, and the Philippines, there was an increase in the market value of external debt, perhaps reflecting some market optimism about their debt-servicing ability.

Estimates provided in Table 2 are calculated by multiplying the secondary market price of the syndicated bank debt by the total public external debt. This is done for expositional purposes only. It might, in fact, be argued that the claims of the official bilateral creditors and of the international financial institutions should not be discounted at the same rate as syndicated commercial bank debt.

⁹ The market value of external debt is calculated using secondary-market prices. Since, during the review period, domestic debt had been serviced regularly, there were no discounts on domestic debt comparable with those attached to external debt. It may be argued that one reason why domestic debt has been serviced regularly is that governments always have the option of issuing currency to do so. Thus, in nominal terms, a government may never need to resort to outright default on its domestic debt. In real terms, however, if governments issue domestic currency to service their domestic debts, an effective "default" would result through an increase in inflation, to the extent that such an increase was not anticipated and, hence, was not included in nominal interest rates. The interaction between government policy regarding inflation and public expectations will be discussed in detail in Section IV.

Chart 3. Fifteen Heavily Indebted Developing Countries: Market Value of External Public Debt, 1984-88
(Percentage of GDP)



¹The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

²Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

of critical questions concerning the dynamics of debt in the externally indebted developing countries. For instance, is there an implicit maximum market value of total debt that a government can incur? Does an increase in domestic debt induce a decline in the market value of external debt? More generally, what is the relationship between domestic and external debt, and to what extent do other factors, such as domestic fiscal developments, affect the market value of public debt? These and other questions about the characteristics of domestic debt and their implications for debt servicing are discussed in Sections III and IV below.

Before examining these questions, it is natural to inquire why the growth of domestic public debt should be a source of concern. Two main reasons are worth noting. First, the growth of domestic debt has led to a sharp increase in debt-service payments and a further weakening in the public sector's ability to service its external debt. Increased debt-service requirements, for both domestic and external debts, also put more pressure on public sector investment. Even though investment was curtailed in many cases and the infrastructure subsequently deteriorated in a number of the indebted countries, these developments were not accompanied by the further adjustment required in the

public sector's current expenditures or in the revenue base. Thus, increasing fiscal deficits resulted which, in the absence of new external borrowing, led to further domestic debt accumulation.

A second major reason for concern has been the sharp increase in the rate of inflation that accompanied the increased fiscal deficits and the domestic debt burden from 1982 onward. Several of the heavily indebted developing countries experienced annual inflation rates averaging over 200 percent. As shown in Table 3, the rate of inflation for the four largest debtors increased from an average of 3.9 percent a month during 1975-81 to over 9 percent a month during 1982-88—which are equivalent to yearly rates of 65 percent and 235 percent, respectively. For the G-15 countries, the average inflation rate was more than twice as high during the second period as during the first period. Not only did the average inflation rate increase but also its variability. The deteriorating inflation performance has led to growing uncertainty, which has had further, markedly adverse effects on investment and growth.¹⁰ High inflation has also led to increased incentives to economize on holdings of non-interest-bearing assets; this has resulted in rapid demonetization in some economies, with an associated loss in welfare caused by rising transaction costs. In many cases, another major adverse effect of high inflation was a fall in the real value of tax revenues caused by collection lags.

High inflation in several of the sample countries was accompanied by increasingly negative and volatile real interest rates. For several of the G-15 countries, the monthly average ex post real rates were negative and volatile even before the onset of the debt crisis (Table 3).¹¹ After 1982, however, the ex post interest rates became, on average, even more negative, and their variance also increased substantially. The increased volatility was due largely to the fact that a number of countries experienced, on the one hand, episodes of very high positive real interest rates in the midst of stabilization efforts, and, on the other hand, episodes of highly negative real interest rates when adjustment programs were abandoned.

¹⁰See, for instance, the discussion in Owen Evans, "National Savings and Targets for the Federal Budget Balance in the United States," Chapter III of *Staff Studies for the World Economic Outlook* (Washington: International Monetary Fund, September 1990), pp. 35-52. Kormendi and Meguire (1985), De Gregorio (1991 b), and Fischer (1991) provide empirical evidence suggesting a negative relationship between inflation and long-run growth in Latin American countries.

¹¹Interest rates reported in Table 3 are based on countries' short-term deposit rates, with the exceptions of Brazil and Mexico, for which the interest rates on their treasury bills were used.

Table 2. Fifteen Heavily Indebted Developing Countries: External and Total Public Debt at Market Prices, Selected Periods
(Percentage of GDP)

	1976-77	1981-82	1987-88
External debt ¹			
G-15 countries ²			
Weighted average ³	14.7	22.8	18.2
Median	17.8	27.5	24.0
Standard deviation	8.3	17.5	16.1
Four largest debtors ⁴			
Weighted average ³	14.6	24.2	16.7
Median	12.7	26.2	18.1
Standard deviation	4.2	9.0	9.3
Total debt ⁵			
G-15 countries ²			
Weighted average ³	20.8	33.0	34.3
Median	24.1	35.5	40.4
Standard deviation	10.5	19.2	21.2
Four largest debtors ⁴			
Weighted average ³	20.9	36.2	35.0
Median	18.4	38.1	36.4
Standard deviation	5.4	4.8	6.9

¹ The external debt ratio at market prices is obtained by multiplying the external debt ratio at contractual value by the secondary-market price of external debt. Data on secondary-market prices for 1985-88 were obtained from Salomon Brothers (New York).

² The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

³ Weights are the same as those used in Table 1.

⁴ Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

⁵ The total public debt ratio is the sum of the domestic debt ratio provided in Table 1 and the external debt ratio at secondary-market prices provided in this table.

The existence of negative ex post real interest rates in these countries may be considered as something of a puzzle. It is reasonable after all to conjecture that the risks of high and volatile inflation, and of possible default would lead domestic investors to require that significant risk premiums be embodied, ex ante, in domestic interest rates. Given the earlier evidence on the ability of governments to increase their domestic liabilities, it may be thought that the requisite risk premiums would be forthcoming. If this were the case, higher interest rates would be expected to further increase the debt burden. At any given time, investors may underestimate the expected rate of inflation and therefore, ex post, experience negative real returns. But it may be thought that over any length of time, investors' expectations do not consistently underestimate inflation, and, hence, on average, they obtain positive real returns.

One solution to the puzzle may be found by considering the proposition that domestic public debt

may have provided liquidity services to the holder. If that is the case, domestic public debt may be viewed as an interest-bearing component of a broad monetary aggregate. Therefore, real interest rates may be lower, on average, than the international interest rate and may even be negative on account of a liquidity premium. The liquidity premium may be thought of as an important component of the "effective" return on an asset. Thus, the sum of the pecuniary return and the liquidity premium on an asset which provides liquidity services may well be, in equilibrium, no different from the return on an asset which does not provide liquidity services to the holder. This explains why liquid assets—for instance, money—are willingly held even though their pecuniary return, in real terms, is significantly lower than those on other financial assets.

A second solution may be found by considering the proposition that in a period of high and volatile inflation, investors' horizons are considerably

Table 3. Fifteen Heavily Indebted Countries: Monthly Inflation and Real Interest Rates, Selected Periods

(In percent)

	Monthly Inflation Rates ¹		Monthly Real Interest Rates ²	
	1975-81	1982-88	1978-81	1982-88
G-15 countries ³				
Weighted average ⁴	3.2	6.9	-0.6	-1.1
Median	1.5	2.7	-0.4	0.3
Standard deviation	2.0	4.7	1.0	3.1
Four largest debtors ⁵				
Weighted average ⁴	3.9	9.1	-0.8	-1.5
Median	2.8	8.4	-0.3	-1.5
Standard deviation	2.1	5.7	1.2	3.8

¹Data on inflation were computed from the consumer price index data provided in various issues of International Monetary Fund, *International Financial Statistics*.

²Data extracted from various issues of *International Financial Statistics*. Nominal interest rates correspond to the deposit rate in all countries, with the exceptions of Brazil and Mexico, for which their treasury bill rates were used. Monthly real interest rates are calculated using the one-month forward inflation rate as given by the consumer price index.

³The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

⁴Weights are the same as those applied in Table 1.

⁵Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

shortened. Therefore what is relevant is not average real rates over a period of several years, but rather average real rates over a period of months. If the real returns are examined on, say, a year-to-year basis over time, then for most of the high-inflation countries, the annual average real return would be expected to be either close to zero or positive. An analysis of the returns in individual countries suggests that when shorter horizons are considered, returns do not significantly differ from zero in a number of cases. In some cases, however, ex post real interest rates are significantly below zero even when shorter horizons are examined.¹²

2. Fiscal Developments

In most of the countries with large external debts, the increase in the domestic public debt ratios largely reflects inadequate fiscal adjustment in the face of a virtual cessation of private external

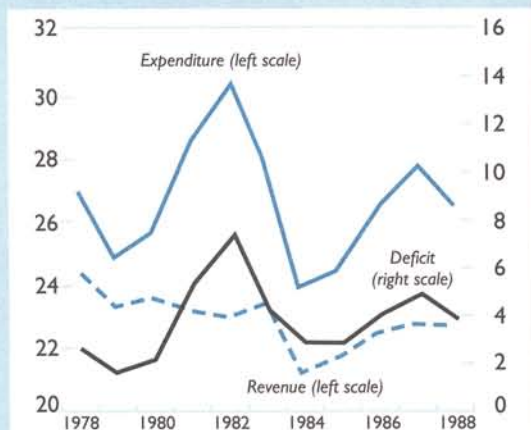
financing and, in several countries, a deterioration in the terms of trade. While fiscal deficits in some countries decreased immediately following the onset of the external debt crisis, after a short time they again increased. On average, for the 15 indebted countries, the fiscal situation remained serious (Table 4 and Chart 4).

One of the important reasons for the heavily indebted developing countries' precarious fiscal situation has been the low and, in some cases, declining, ratio of tax revenues to GDP.¹³ The inadequate revenues are due in part to the consequences of the external debt problem itself. In order to obtain current account surpluses with which to service external debt, domestic demand was frequently restrained. This restraint led, in turn, to lower wages, profits, and per capita incomes, as well as to lower imports, thus eroding the tax base. In part, lower revenues have been due to the increasing administrative and technical problems involved in tax assessment, as well as in the levying and collection of taxes. The decline in the tax base could have been offset to some extent by an increase in tax rates. But increasing tax rates would also have entailed other direct economic and political costs which the

¹²A number of characteristics of the financial markets in some of these countries may also have a bearing on this issue. These include, for example, interest rate controls, restrictions on capital flows, and portfolio requirements imposed on depository institutions.

¹³See also Easterly (1989) and Reisen (1989 a).

Chart 4. Fifteen Heavily Indebted Developing Countries: Summary of Fiscal Accounts, 1978-88¹
(Percentage of GDP)



¹Weighted average of the Group of Fifteen countries which include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

authorities may not have been willing to bear. In several countries, tax rates were, in fact, increased, but the increases often proved to be unproductive or even counterproductive.¹⁴

Seigniorage owing to price inflation contributed to restraining the increase in debt ratios but, at the same time, led to a reduction in normal tax revenues. Unlike the experience in industrial countries, in which the "bracket-creep" from inflation-induced income growth leads to increased tax reve-

nues, the experience in indebted developing countries has been that their collection lags lead to considerable losses in real tax revenues.¹⁵

In the face of a sharp increase in debt-service requirements and declining or unchanging real revenues, the percentage share of public noninterest expenditure in GDP has been reduced in most of the G-15 countries, with some of the sharpest declines occurring in Mexico and Venezuela. For Mexico, the ratio of non-interest expenditure to GDP fell by more than 10 percentage points between 1982 and 1987. The drop was due for the most part to a large reduction in investment, as well as to real wage cuts in the public sector, and to a lesser degree, to cuts in subsidies. For Venezuela, non-interest expenditure was reduced primarily by cutting investment in the oil industry. Wide-ranging expenditure reductions also took place in the Philippines during this period, with public investment again bearing the brunt of the cuts.

In several countries, the non-interest deficits of public sector enterprises declined after 1982, but these deficits remain an important component of the overall deficit and have contributed to the growth of public sector debt. The deficits of public enterprises were due in part to inappropriate pricing policies, which had been adopted out of the authorities' concern about income distribution and price stability; the policies, however, often led to prices being set below long-run marginal costs. In the wake of the fiscal adjustment required to enable a country to service its public debt, it was rarely possible to avoid raising public sector prices. Such price increases, however, have often generated general discontent, and, over time, the public sector prices have barely kept pace with increased costs.

¹⁵The fall in the real value of tax revenue caused by inflation has been analyzed, most notably, by Olivera (1967) and Tanzi (1977).

¹⁴See, for example, Reisen and van Trotsenburg (1988).

Table 4. Fifteen Heavily Indebted Developing Countries: Fiscal Accounts of the Consolidated Public Sector, Selected Periods¹*(Percentage of GDP)*

	1979–82	1983–85	1986–88
Revenue			
G-15 countries ²	23.3	22.1	22.7
Four largest debtors ³	18.5	18.1	17.6
Expenditure			
G-15 countries ²	27.4	25.3	26.9
Four largest debtors ³	23.9	21.6	23.7
Surplus or deficit (–)			
G-15 countries ²	–4.2	–3.3	–4.2
Four largest debtors ³	–5.4	–3.5	–6.1
Interest payments			
G-15 countries ⁴	3.5	6.2	7.1
Four largest debtors	3.1	5.8	7.0
Primary surplus or deficit (–)			
G-15 countries ^{4,5}	–2.3	2.0	0.8
Four largest debtors	–2.3	2.3	0.9

¹ Data were obtained from recent unpublished papers written by various International Monetary Fund staff members. They are drawn from the accounts of the nonfinancial public sector for all G-15 countries, except in the following cases: data for Brazil are for the consolidated general government; data for Colombia and Ecuador are for the consolidated public sector; data for Nigeria are for the federal government; and data for the Philippines are for the national government. Weights are the same as those used in Table 1.

² The Group of Fifteen countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

³ Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

⁴ Estimate was based on nine countries for which data were available: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, the Philippines, and Venezuela.

⁵ Data are not comparable with those provided for the G-15 overall surplus or deficit.

III An Analytical Framework for Fiscal Policy and Public Debt

The preceding discussion suggests that developments related to external and domestic debt have to be viewed within a unified framework that integrates several different aspects of the fiscal situation. The framework should include considerations related not only to *current* government revenues and expenditures but also to expectations regarding their *future* magnitudes. This section develops such a framework in which the basic operations of the public sector are analyzed in terms of a balance sheet listing its assets and liabilities. This balance sheet is used to obtain a measure of public sector solvency and of the fiscal adjustment required to service the outstanding public debt fully. In computing this measure, the links between debt and (current and future) taxes, subsidies, and government spending are examined. The framework itself can be viewed as complementing the use of medium-term scenarios to provide insights into problems of policy sustainability and adjustment.

1. Balance Sheet of Public Sector

Government assets can be thought of as being composed of two parts: the first is the current stock of assets (the conventional definition); the second is the present value of anticipated future revenues from tax and non-tax sources. Current assets include both domestic and foreign assets.¹⁶ The present value of future revenues is the expected stream of revenues discounted back to the present using a given discount rate. Thus, revenues expected in the future can be analyzed in terms of a current asset. The notion of present value is important, because it underscores a fundamental equivalence between the stock and the flow dimensions of fiscal policy: that is, it makes it clear that revenues expected in the future are as relevant in determining a government's ability to meet its liabilities as current revenues.

¹⁶Examples of domestic assets are land and buildings owned by the government, and domestic government loans made to the private sector. Foreign assets include foreign exchange reserves, foreign loans made by the government, and fixed foreign assets, such as embassies.

Similarly, corresponding to government assets, government liabilities can also be thought of as composed of two parts: (1) the current outstanding stock of debt and other current obligations (the conventional definition), and (2) the present value of future expenditures, including subsidies. This way of looking at government assets and liabilities is useful, because the determinants of both short-term and long-term fiscal performance are integrated into a single forward-looking balance sheet.¹⁷

The difference between the government's assets and liabilities is its net worth. On the one hand, if assets exceed liabilities, then net worth is positive and the government is regarded as being solvent—that is, it is able to meet both its current and future obligations. On the other hand, if net worth is negative, then the government is insolvent and, without an increase in its assets, it is not able to meet its current contractual debt obligations. With reference to sovereign governments, however, the above definition of solvency appears to be somewhat simplistic, because not all government assets can be used to service government liabilities. Therefore, in the ensuing discussion, it is assumed that the flow of government revenues from taxes and other sources constitutes the main source of funds available to service public debt.¹⁸ The issue of public sector solvency is of particular importance when one is dealing with highly indebted countries, and it will be examined at length below.

The implications of the above framework can be seen clearly by using the following identity, which schematically presents a government's balance sheet in terms of domestic currency:

$$EA^* + R = G + S + B + EB^* + K \quad (1)$$

where G , S , and R denote the present values of (expected) government expenditures, subsidies,

¹⁷See Buiter (1983) for a similar treatment of public sector accounts.

¹⁸One can think of foreign exchange reserves as a current asset which, under certain circumstances, may be used for servicing debt. This assumption is made in the ensuing discussion.

and (tax and non-tax) revenues; A^* denotes the stock of foreign exchange reserves; and B and B^* denote domestic and external government debt, respectively.¹⁹ E denotes the exchange rate. By assumption, B is denominated in local currency, while A^* and B^* are denominated in foreign currency. K denotes the government's net worth. Consequently, government assets appear on the left-hand side of its balance sheet while government liabilities appear on the right-hand side. Because the balance sheet focuses only on those assets which are considered *most likely* to be used to service the public debt, K provides a measure of the government's net worth which is relevant in assessing the public sector's ability to service its liabilities. Therefore, it is important to stress that for the purposes of the discussion below, solvency is defined only with respect to this notion of government net worth.

2. Implications of Balance-Sheet Approach

The forward-looking balance sheet provides several interesting insights. First, for a given net worth to be maintained, any increase in debt has to be matched by one or both of the following: (1) an increase in government revenues or current assets; and (2) a decrease in expenditures. The changes in revenues and/or expenditures refer to their present values and, hence, comprise not only *current* fiscal adjustments but also any expectations of *future* improvements.

Second, domestic and external debt appear to enter the statement of public sector liabilities on an equal footing—that is, domestic and external debt have equal claims on government resources. Therefore, if an *external* debt-servicing problem exists, then it is likely that a *domestic* debt-servicing problem also exists. This simple observation suggests that departures from the equivalence of claims should be based on a recognition that the charac-

teristics of the two types of debt may be quite different and that, as a result, government policies for managing the two types of debt may also differ significantly.

From the above observation, it follows that a domestic debt problem may occur where the ratio of domestic debt to GDP is low by international standards if, at the same time, *either* the ratio of external debt to GDP is high *or* the current or expected future fiscal position is weak. As noted in Section II, both of these conditions prevail in a number of the G-15 countries.

Third, the present value of the anticipated future stream of government expenditure and subsidies is, to the extent that the stream is perceived as a "permanent" obligation, also a form of government debt. This equivalence appears to be particularly relevant for subsidies and transfers, because they may be thought of as representing promises to provide flows of payments in much the same way governments agree to make contractual interest payments.²⁰ By the same token, the stream of future taxes can be regarded as a form of government asset. For this reason, "solving the debt problem" may involve, for example, a cut in subsidies or an increase in taxes. In this sense, a reduction in subsidies represents a reduction of government liabilities just as a reduction in debt would.

An illustration of the equivalence between debt and the discounted present value of government expenditures and subsidies is provided by remuneration paid on bank reserves—a government transfer quite often employed in developing countries. Paying interest on reserves held against bank deposits is an interesting example, because whether such payments are included in government expenditure or are considered to be interest on part of the domestic debt depends on the government's accounting practices. For example, on the one hand, a straight transfer would take place if the central bank just paid remuneration on commercial banks' reserves without acknowledging the latter as part of its domestic debt. On the other hand, some countries (for example, Argentina until recently) consider part of these reserves to be government obligations. In this situation, the central bank's transfer would become an interest payment.

Finally, it follows from the forward-looking balance sheet that whether a government is solvent or not depends on the amount of its expenditures (including subsidies), its total revenues, and its debt.

¹⁹Seigniorage owing to inflation can be thought of as a tax and is therefore included in government revenues, R . The operational surplus or deficit of public sector enterprises is included in government revenues, R . It is worth noting that the privatization of public sector enterprises has two effects on the government's balance sheet. On the one hand, it will affect the discounted present value of revenues. On the other hand, it affects current assets. If assets are valued at market prices, these two items will tend to cancel each other out. However, the decision to privatize may represent a change in government policy—say, with respect to pricing—and could have an effect on net worth. Similarly, it may be argued that, over time, the government could levy taxes on the newly created private enterprises, and to the extent that this possibility is not reflected in the sale price, the present value of revenues could increase.

²⁰It may be argued that the government has significantly more discretion in cutting subsidies than in defaulting on debt, because subsidies are generally not contractual. However, it should be emphasized that, in practice, subsidies are often difficult to remove because of the influence of vested interests.

On the one hand, a government is *solvent* if its net worth is non-negative, or, to put it differently, a solvent government does not have a debt problem.²¹ On the other hand, if a government's net worth is negative, it will not be able to service fully its debt obligations.

What happens when a government is insolvent or nearly insolvent? Consider first the case where total contractual debt has reached the maximum level that can be serviced and, therefore, the government's net worth is zero. If *solvency is to be maintained*, there cannot be any further increase in liabilities without a corresponding increase in assets. Thus, any increase in domestic debt not matched by an equivalent increase in assets should be met either by a decrease in the contractual value of external debt (for instance, by debt relief) or by a decrease in the present discounted value of expenditures and subsidies. Otherwise, the government will become insolvent.

A government's insolvency has two main implications. First, if the government has no other assets to draw on in order to cover a negative net worth, the market value of its contractual obligations will have to fall; the market value, then, reflects the government's perceived debt-servicing capacity. The market value can only fall if domestic and external debt trade at less than their contractual values—that is, if they trade at a discount. In fact, those discounts will be set by the market at levels where a government's net worth will not be negative. Recalling the forward-looking balance sheet, this implies that

$$EA^* + R = G + S + qB + Eq^*B^* \quad (2)$$

where the prices of domestic debt and foreign debt, which are denoted by q and q^* , respectively, are less than unity, so that the discounts are $1-q$ and $1-q^*$, respectively.

While the market value of total debt (i.e., $qB + Eq^*B^*$) has to decline when there is the perception of insolvency, the shares of the burden that fall on domestic and foreign debt can differ markedly if the characteristics of the two debts are different. For example, if domestic debt were perceived as having, in some sense, seniority over external debt, q might not fall; hence, the brunt of the adjustment would be borne by the market price of external debt, q^* .

The second implication of government insolvency concerns the issuance of new debt. If an *insolvent* government is able to issue new domestic

debt without a corresponding improvement in its debt-servicing ability (e.g., by increasing assets or by strengthening its primary fiscal stance), then any *new debt issues are likely to induce capital losses on previous creditors* by depressing even more the market value of outstanding debt. The question then becomes, how can this debt be issued?

One possible explanation is that the domestic debt provides liquidity services to its holders. Such would be the case, for example, if banks were allowed to hold new debt as part of their legal reserves against bank deposits.²² New debt could then be taken up even if its market value were less than its contractual value. This is similar to the case in which the banking system is forced to hold debt at interest rates lower than market rates. The issuance of debt is feasible because it is likely to result in lower rates being paid on bank deposits, which continue to be held voluntarily by the public because of their superior liquidity relative to other financial assets.

Even if new debt did not provide liquidity services to the holder, it might still be issued if its yield were high enough to compensate bondholders for the anticipated capital loss owing to government insolvency. A third possibility is that the new domestic debt might be issued if it were perceived by the public as being "senior" relative to external debt—in other words, if holders of domestic debt believed that whatever government resources were available would be used to service their debt first.²³ Such a perception could reflect a belief that the costs associated with default are substantially higher when the holders of government paper are domestic residents.²⁴ The public perception of the

²²Banks would voluntarily hold government bonds in these circumstances whenever the spread between the interest rate earned on their reserves and the lending rate was lower than the equivalent rate associated with the discount on government bonds.

²³Two observations may provide some support for the notion that the new domestic debt issued in the G-15 countries after 1982 may have been perceived as having an implicitly senior status. First, domestic public debt, unlike external debt, continued, in general, to be serviced. At the same time, while almost no new private external loans were made to G-15 country governments, they continued to have access to fresh domestic funds. Second, domestic debt was issued at interest rates that, at least on an ex post basis, were not higher (and were often considerably lower) in real terms than the interest on external debt. The possibility that domestic debt may have been perceived as being senior suggests that the increased reliance on domestic debt financing by most of these countries could have contributed in a substantial way to the capital losses experienced by foreign creditors.

²⁴It could be argued, on a legal basis, that the reverse could actually be the case. While the government can always plead sovereign immunity in its own courts, it cannot do so in foreign courts. Furthermore, foreign creditors can penalize the debtor government in a number of ways—for example, suspending

²¹In this discussion, no distinction is made between ability and willingness to pay. The willingness to pay, in the context of fiscal adjustment, is clearly an important factor, which may vary across countries. Thus, even if a government is technically solvent, its public debt could still sell at a discount.

Table 5. Illustrative Examples of Government Net Worth Calculation¹*(Percentage of GDP)*

Case	Primary Surplus or Deficit (-)	Present Discounted Value of Primary Balance ($r = 0.05$) ²	Foreign Exchange Reserves	Total Public Debt	Net Worth
A	1.5	30	10	40	0
B	1.0	20	5	80	-55
C	-1.5	-30	5	80	-105
D	-2.5	-50	5	30	-75

¹ Computations are based on equation (1).² r = discount rate.

seniority of domestic debt compared with external debt, however, is likely to vanish rapidly if the government faces problems in servicing its domestic debt.

3. Illustrative Examples of Government Net Worth Calculation

The above framework for analyzing government assets and liabilities provides us with a convenient method for obtaining estimates of a government's net worth, as defined earlier. These estimates can provide an indication of the ability of a government to service its debt in full. In those cases where net worth is negative, the estimates can also be used to obtain a measure of the fiscal stance required to re-establish solvency.

To illustrate the relative contribution of the individual components of the government's balance sheet to its net worth, four hypothetical cases are presented in Table 5. It should be noted that these four cases, although they are hypothetical, reflect orders of magnitude which are not atypical of several of the G-15 countries and have been designed to show the interaction of alternative fiscal stances with different levels of public debt.

The starting point for the calculations is an estimate of the primary fiscal balance expected to prevail in the future. For instance, it could be assumed that the primary balance in the recent past provides

trade credits or seizing the debtor's assets located abroad. Nonetheless, it could also be argued that it is easier to repair damage to a country's international reputation than damage to its domestic reputation, which could have immediate political repercussions.

a reasonable indication of the balance likely to prevail in the future. In the first two cases, expected primary surpluses of 1.5 percent and 1.0 percent of GDP, respectively, are assumed. In the two remaining cases, expected primary deficits of 1.5 percent and 2.5 percent of GDP, respectively, are assumed. The present discounted value of these primary balances, computed using an illustrative discount rate of 5 percent per annum, can thereby be obtained.²⁵ For instance, the present value of a primary surplus of 1.5 percent of GDP is equivalent to that of a current asset amounting to 30 percent of GDP, which clearly would increase the government's net worth. Similarly, the present value of a primary deficit of 2.5 percent of GDP is equivalent to that of a debt amounting to 50 percent of GDP, which clearly would decrease the government's net worth.

The two other variables that enter the net worth calculations are the ratios of foreign exchange

²⁵ The discount rate equals the long-run real rate of interest minus the long-run rate of growth of GDP. The 5 percent discount rate is consistent with a real rate of interest of 8 percent and a GDP growth rate of 3 percent. Considerable empirical evidence indicates that the long-run real rate of return on capital, which may be equated with the long-run real rate of interest, is in the range of 7–10 percent per annum. (See, for example, Boskin (1978).) Thus, a 5 percent discount rate could be consistent with output growth rates ranging between 2 percent and 5 percent per annum. It is worth noting that, in principle, for the purpose of evaluating government solvency, the discount rate used to obtain net worth should be based on an interest rate which excludes a default-risk premium, since the presence of a default-risk premium already embodies an expectation of insolvency. Similarly, it should be noted that for the purpose of evaluating solvency, it is natural to assume that the public sector has access to capital markets. The observation that many G-15 countries face steep risk premiums as well as credit constraints is, itself, a reflection of their perceived insolvency, not the cause of it.

reserves to GDP and of total (domestic *plus* external) public debt to GDP. Foreign exchange reserves are assumed to range between 5 percent and 10 percent of GDP, in line with the observation that foreign exchange reserves tend to be small relative to the other magnitudes involved in the calculation of government net worth. Total public debt levels range from 30 percent to 80 percent of GDP. Government net worth is obtained by adding together the present value of the primary balance, the foreign exchange reserves, and the total public debt. Government net worth is negative in three of the four cases, reflecting the impact of a high level of public debt and/or a large primary fiscal deficit. The values of net worth vary significantly across the different cases, with the government in Case A being solvent—a situation in which the expected primary surplus is adequate to meet outstanding government liabilities—with the governments in the remaining cases having substantial negative net worths. It is interesting to note that the government in Case D, while having the lowest ratio of public debt to GDP—similar to that of its counterpart in Case A—shows a significantly negative net worth—similar to that of its counterpart in Case C—because of its inadequate fiscal adjustment. This example illustrates the fundamental equivalence between the consequences of, on the one hand, inadequate fiscal discipline and, on the other hand, an excessive debt burden.

An important implication of the balance-sheet approach is that government net worth—by summarizing the broad fiscal situation—provides an indication of the government's ability to service its current debt. It was also noted earlier that secondary-market discounts on external debt reflect uncertainty about a government's ability to meet its current liabilities. Therefore, one should expect to observe a relationship between an estimate of government net worth and the secondary-market discount on the external debt. In particular, the higher government net worth is, the greater should be its perceived ability to service its external debt and, hence, the lower the secondary market discount on that debt.

It is interesting to explore the extent to which the above relationship is borne out in the G-15 countries. To this effect, the previous methodology was used to obtain a measure of the public sector's ability to service its outstanding debt for nine of the G-15 countries.²⁶ This measure was then corre-

lated, across the nine countries, with the corresponding secondary-market discounts for 1987–88. The findings suggest that there is, indeed, a close statistical association between secondary-market prices and the public sector's perceived ability to service its outstanding liabilities, with the correlation coefficient between these two variables being 0.85—statistically a highly significant result.

4. Required Fiscal Adjustment

Once a negative estimate of government net worth (as shown in three of the four cases in Table 5) is obtained, this immediately poses the question of what would be the primary fiscal adjustment required to re-establish solvency—that is, how large a *permanent* primary surplus would be required to enable the government to service its current public debt? The surplus must be large enough to prevent government net worth from being negative. The required primary surpluses (as a percentage of GDP), computed using discount rates of 3 percent and 5 percent per annum for the four hypothetical cases discussed above, are reported in Table 6. When a 5 percent discount rate is used, the primary surplus needed is quite sizable, especially in Cases B and C, for which it exceeds 3 percent of GDP. More importantly, with the exception of Case A, the calculations imply a substantial *permanent* fiscal adjustment compared with current expected performance. It is important to stress that while some of these numbers may appear to be manageable for governments, they represent a significant adjustment, given that the improvement has to be maintained into the future.

These required surpluses could fall markedly if the countries concerned experienced higher long-run rates of growth. For instance, if the rate of growth were 2 percentage points higher than we assumed previously, so that the corresponding discount rate were 3 percent rather than 5 percent per annum, then the required primary surplus would fall in all four cases. A substantial permanent fiscal adjustment, compared with the government's expected primary fiscal stance, would still be required in the last three cases, however.

The balance-sheet framework discussed above could be of considerable use in the design and evaluation of adjustment programs. This is so because the public sector's net worth and the calculations pertaining to the required fiscal adjustment may be regarded as central to the issue of policy sustainability. In this respect, the use of the balance-sheet framework could be viewed as a complement to the use of medium-term scenarios to evaluate the impact of changes in economic policy and exogenous variables on the major macroeconomic

²⁶The nine countries include Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, the Philippines, and Venezuela. These are the countries for which the required data were obtainable from recent unpublished Fund documents. Owing to their confidential nature, the data for individual member countries cannot be included here.

Table 6. Fiscal Surplus Required to Service Outstanding Public Debt
(Percentage of GDP)

Case	Required Fiscal Surplus ($r = 0.05$) ¹	Required Fiscal Surplus ($r = 0.03$) ¹	Expected Fiscal Balance
A	1.5	0.9	1.5
B	3.8	2.3	1.0
C	3.8	2.3	-1.5
D	1.3	0.8	-2.5

¹ r = discount rate.

targets. Unlike medium-term scenarios, calculations of net worth and the required fiscal surplus do not require one to project the specific path of policy and macroeconomic variables. Since this framework relies only on discounted present values, it provides a measure of the sustainable fiscal stance that could be consistent with alternative assumptions about the time path of exogenous and policy variables.²⁷

The above framework could also be used to shed light on one of the questions raised in Section II, where it was noted that the ratio of total public debt to GDP in many of the G-15 countries is similar to those in a number of industrial countries. The question was raised concerning the extent to which the fiscal stance of the two groups of countries would explain why only the developing countries

have faced a debt crisis. If one considers the *recent* primary fiscal performance of a number of the industrial countries with the highest levels of public debt, the difference in fiscal performance does not appear to justify the presence of a debt crisis only in the case of developing countries.²⁸

One possible explanation for the crisis occurring only in developing countries is that *future expected* primary surpluses are larger in industrial countries. In fact, it has been argued that industrial countries' ability to raise additional revenues may be substantially greater than that of developing countries, because of the former's more efficient tax collection as well as structural factors which imply differences between the tax bases in the two groups of countries.²⁹ If this is so, it would suggest that in a developing country, structural reforms in the public sector, as well as policy measures which made the market more optimistic about the country's *future* fiscal performance, could have a significant impact on the public sector's creditworthiness, even if the effects of those reforms might be felt only after a lag.³⁰

²⁸If one were to perform the calculations applied in Table 5—taking the recent fiscal performance as an indication of the future primary fiscal stance—for both the G-15 countries and a number of industrial countries with high public debt levels, the public sector's balance sheet (as described by equation (1)) would not look substantially different for countries in the two groups. For both groups of countries, one would conclude that the recent primary fiscal stance was not consistent, over the long run, with the servicing of current public debt.

²⁹See Reisen (1989 a); for an alternative view, see Tanzi (1989). In addition, it might be argued that the process of economic integration might contribute, in some cases (e.g., European countries), to a more optimistic view about future fiscal performance.

³⁰Another possible explanation could be that the GDP growth of industrial countries may be expected to be higher. However, neither a comparison of growth rates of the two sets of countries over the last two decades nor the growth projections reported in the recent *World Economic Outlook: A Survey by the Staff of the International Monetary Fund* (Washington: International Monetary Fund, May 1990) suggest that such a growth differential is likely to play a significant role.

²⁷It is worth noting that, operationally, the net worth and required fiscal stance calculations require considerably fewer assumptions as well as less data—over the time horizon covered by the medium-term scenarios—because they do not focus on year-to-year projections.

IV Issues in Domestic Public Debt Management

The above analysis has emphasized the key role of fiscal adjustment in dealing with the crisis facing the G-15 countries. This section examines a number of specific debt-management strategies which could complement fiscal adjustment. These strategies should be viewed in the context of developments noted in Section II, where it was shown that the growth of domestic public debt in highly indebted developing countries was associated with a sharp increase in inflation. Since 1982, price stabilization programs have been undertaken in a number of these countries. In some cases, programs have been successful in temporarily reducing inflation but, soon thereafter, new and sometimes virulent outbursts of inflation have occurred. In part, the lack of success has resulted from difficulties faced by the countries' authorities in making stabilization efforts credible. This lack of credibility has meant that real interest rates often remained extremely high in the early stages of the adjustment programs, casting further doubt on their sustainability. The uncertainty associated with repeated failures to stabilize inflation rates has further increased the likelihood of runs on domestic assets. It is not growth in domestic debt per se that is responsible for this vicious circle, but rather the underlying fiscal situation that is reflected, in part, in the evolution of domestic debt. This section examines how the characteristics of domestic debt contribute to the developments mentioned above and how domestic debt management—in particular, debt indexation and changes in the maturity structure of debt—can contribute to achieving a better outcome.

I. Nominal Versus Indexed Debt

In most countries, domestic public debt is issued in nominal terms. Put simply, this means that government liabilities are denominated in domestic currency and the amortization schedule is not explicitly indexed to reflect changes in the purchasing power of money. Because its real value is affected by changes in the price level, the presence of nomi-

nal debt has important implications for the effects of inflation on the fiscal situation. This subsection examines the connection between nominal debt and inflation and reaches three main conclusions: (1) inflation affects the real value of nominal debt only if it is unanticipated; therefore, persistent inflation should not be expected, in principle, to reduce the debt burden; (2) the existence of nominal debt may exacerbate inflation, because the public recognizes that policymakers may have an incentive to tolerate inflation and consequently demands a corresponding inflation premium; and (3) debt indexation may contribute to reducing inflationary expectations and, thus, enhance the credibility of stabilization efforts by reducing the danger of high real interest rates.

a. Nominal Public Debt and Inflation

Since, superficially at least, the real value of nominal government debt could be reduced by an increase in the price level, it is worth examining the extent to which inflation might be regarded as “effective” in reducing the debt burden. Undertaking an analysis of this issue requires one to recognize that public expectations about inflation play a crucial role in determining this “effectiveness.” Furthermore, it should be emphasized that even if it appears that the debt burden might be reduced through inflation, inflation has other significant adverse allocative and distributional consequences which have to be taken into account. For instance, because of the uncertainties it engenders, inflation may have considerable adverse effects on investment and growth. Also, because of fiscal lags, government revenues may be significantly reduced in real terms by inflation.

Inflation reduces the real debt burden only if it takes the public by surprise, for if inflation is anticipated, bondholders will require a nominal return to compensate them for the expected capital loss associated with the fall in the real value of nominal debt. In fact, to the extent that inflation is anticipated, the nominal interest rate will rise to compensate bondholders *point for point* so that, in the

end, the real return actually paid on the public debt will be the same as it would have been if no inflation had occurred. In such a case, inflation has no direct effect on the debt burden. Thus, inflation has an effect only if it results in a negative *ex post* real rate of interest or, at least, in a real rate of return lower than that available in international financial markets.³¹

If policymakers expect that inflation will not be anticipated by the public, they may be tempted to put aside their misgivings concerning its adverse effects in an effort to lower the real value of public debt. Given the serious costs of inflation, such a policy is very much a second-best approach, but it may nevertheless be considered attractive because it enables policymakers, in the short run, to avoid raising taxes or reducing expenditures.

The extent to which high levels of nominal public debt may encourage policymakers to tolerate inflation, rather than undertaking fiscal adjustment, can be illustrated by the following example. Consider the primary fiscal improvement that would be required to match a given reduction in the real value of the stock of nominal debt achieved by a *once-for-all and unanticipated* increase in the price level. Consider, for instance, a once-for-all and unanticipated increase in the price level of 10 percent, with a stock of nominal debt of 25 percent of GDP. This increase generates a fall in the real value of domestic debt of 2.3 percent of GDP (i.e., $25 \times (0.1 \div 1.1)$). This is equivalent to the fall in real domestic debt which would be obtained by a primary fiscal improvement of 0.6 percent of GDP per year over a period of five years.³² Similarly, the same increase in the price level, when the debt-to-GDP ratio is 100 percent, has an effect equivalent to a fiscal improvement of 1.2 percent of GDP per year sustained for ten years.

This example shows why a large stock of nominal debt may provide a temptation to tolerate infla-

tion.³³ Precisely because of this temptation, a large stock of nominal government debt may be destabilizing. This may be particularly true when the government's ability to enforce a credible stabilization program is questionable. When the public doubts that stabilization will be successful, a vicious circle may result from the interrelationship between nominal debt, interest rates, and inflation. Given a large stock of nominal public debt, and to the extent that the public anticipates future inflation, nominal interest rates will rise. But this increase in interest rates will increase the debt burden even further, making inflation appear even more "attractive" to the policymaker although, in the final analysis, it will be much more costly to the economy, and to society generally, than alternative policies such as tax increases or fiscal tightening.

Furthermore, unless there is an active interest rate policy, the economy could end up not having a nominal anchor.³⁴ This is so because depending on whether interest rates are freely determined by the market, an economy can be consistent with entirely different inflation rates. On the one hand, suppose that the public expects a *high* rate of inflation, leading to high nominal interest rates. If the government attempts to achieve low inflation, then the cost of debt servicing may be too high (because of the associated high *real* interest rate). Consequently, policymakers may be forced to take the high-inflation route, thereby validating expectations. On the other hand, if inflationary expectations are *low*, the nominal interest rate will be correspondingly low, making a strategy of low inflation feasible, validating expectations in this case as well.

It is important to note that the possibility of an economy's not having a nominal anchor suggests that real interest rates may vary substantially over very short periods during stabilization programs and that these fluctuations may be triggered largely by changes in public expectations about inflation. Therefore, in designing adjustment programs for a country with a large nominal public debt, it appears that special attention should be devoted to the effects of alternative *real* interest rates on the fiscal position. In particular, an adjustment program should be designed so that the effects of possible large fluctuations in real interest rates can be

³¹The evidence on interest rates presented in Section II (Table 3) suggests that during 1982–88, the governments of several of the G-15 countries may have been able, on average, to reduce the real value of nominal public debt through negative *ex post* real interest rates. However, since inflationary expectations increased dramatically and, hence, nominal interest rates increased to compensate bondholders for the expected capital loss, when the reduction was economically significant, the cost has been heavy in terms of higher inflation and, in some instances, hyperinflation.

³²The primary fiscal improvement of 0.6 percent of GDP per year over a period of five years is obtained as follows. The once-for-all increase in the price level induces a reduction in the real value of the stock debt of 2.3 percent of GDP. This reduction equals the present discounted value of the primary surplus of 0.6 percent of GDP per annum—calculated over a five-year period and using a discount rate of 5 percent per year.

³³It is important to stress that for purposes of the above discussion, a country with a large stock of nominal public debt need not have a large *net* stock of public debt. For example, the stock of nominal liabilities might be offset by real or indexed assets, in which case the same issues would arise for a country with a small *net* total public debt.

³⁴This issue is discussed in more detail in Calvo (1988 and 1989).

accommodated within the program, thereby increasing public confidence that the policy will not be reversed.

b. Implications for Interest Rate Policy and Sterilization

The interaction between non-indexed debt and inflationary expectations has important implications for interest rate policy in the context of stabilization. This is especially so when a country faces insolvency or near-insolvency and has a large stock of nominal debt. In this context, a policy of keeping real interest rates high to reduce inflation, while possibly effective in the short run, may, in the end, turn out to cause a stronger inflationary outburst when the domestic debt burden becomes intolerable because of the high real interest rates. Depending on the starting inflation rate, the initial increase in interest rates may generate a substantial increase in the stock of nominal public debt as the higher interest is capitalized. For reasons discussed earlier, the growth of debt may induce the public to expect higher inflation as the deteriorating fiscal situation begins to undermine the credibility of the stabilization effort. As inflationary expectations worsen, nominal interest rates rise *pari passu*, and, if inflation remains unchanged, real interest rates increase, weakening the government's credibility even more. Thus, a policy of high real interest rates, which was initially implemented with the objective of reducing inflation, may end up forcing abandonment of the stabilization program.³⁵

Similarly, the presence of a large stock of nominal debt may also have important implications for the role of sterilization in the context of a price-stabilization program under a fixed exchange rate regime. Policymakers must react to the capital inflow that typically occurs during the first stages of the program. On the one hand, if the new funds are not sterilized, the domestic money supply will take a sizable upward jump, which may be interpreted as a signal that the government's anti-inflationary stance is weakening. On the other hand, if the capital inflow is sterilized by issuing nominal bonds, then, for reasons discussed above, the increase in domestic (non-indexed) debt may weaken the credibility of the government's price-stabilization program and result in unduly high interest rates. This, in turn, may end up forcing the government to abandon the stabilization effort and to devalue the country's currency as the capitalization of interest rapidly increases the debt burden.³⁶

³⁵For a related discussion, see Calvo (1990 b).

³⁶A more detailed discussion can be found in Calvo (1990 a).

c. Debt Indexation and Credibility

Debt indexation occurs when the domestic-currency value of the *principal* in a debt contract is indexed so as to maintain its purchasing power. The choice of the appropriate index, in itself, poses serious technical problems. The two most prevalent methods of indexation are (1) linking it to the consumer price index, or the exchange rate, or a combination of the two; and (2) linking the *interest rate* on long-term bonds to some short-term interest rate. The latter method is conceptually different from the type of price indexation discussed in this section. Interest rate indexation will be discussed later on in the context of debt maturity.³⁷

It has been suggested that a possible solution to the problem of losing the nominal anchor is to index the public debt. (See Calvo (1988).) The reason why debt indexation may be thought of as a useful tool for controlling inflation is precisely because it breaks the link, noted earlier, between inflation and government debt.³⁸ This occurs because the principal is indexed to maintain its *real* value, and, consequently, changes in the price level have *no* effect on the debt burden. This implies that for indexed debt, the above-mentioned reasons for tolerating inflation have no validity. Thus, by eliminating the potential link between inflation and debt, indexation can contribute to lowering the public's expectations of inflation. Furthermore, indexed debt could be attractive because it can be thought of as introducing an element of policy pre-commitment (namely, the indexation formula itself). Hence, debt indexation can lead to a reduction in nominal interest rates and thereby help the economy reach a better (low-inflation) equilibrium.

The policy of debt indexation should, however, be used with considerable caution owing to factors relating both to the efficacy of debt indexation and to the impact that such indexation may have on other variables in the economy. It should be emphasized that debt indexation alone is by no means enough to prevent inflationary outbursts and that the effects of debt indexation will depend crucially on the soundness of underlying macroeconomic

³⁷In connection with price indexation, it has to be noted that foreign debt is, from a formal point of view, similar to domestic debt indexed to the market exchange rate. Thus, most of the observations which are valid for indexed debt are basically applicable to international debt. Later on in this paper, when the possibility of open default is discussed, reasons why external and domestic indexed debt may be different are mentioned.

³⁸See Calvo (1988) and Fischer (1983 b). Arguments in favor of government issuance of indexed bonds are also found in early work by Bach and Musgrave (1941), Friedman (1974), and Tobin (1971).

policies. Here, one can distinguish two outcomes. On the one hand, there may be instances in which a stabilization program is, in principle, sustainable, assuming there is adequate fiscal adjustment, if the private sector believes in it and in the ensuing reduction of inflation. But the program may become unsustainable if the private sector does not believe in it—that is, if there is a credibility gap which results in very high *ex ante* real interest rates leading to the loss of nominal anchor discussed earlier. It is precisely in such instances that a device—such as debt indexation—which enhances policy credibility may provide a bridge to sustainability by reducing interest rates.

On the other hand, debt indexation may be ineffective, and possibly even counterproductive, if fiscal adjustment is inadequate. Inflation clearly may accelerate, notwithstanding debt indexation, because of high fiscal deficits and the associated monetary policy stance. An illustration of a situation in which the presence of debt indexation is actually counterproductive is provided by the case in which there is an increase in the public sector's deficit—for instance, because of an unanticipated increase in expenditure or a terms of trade shock—and the government is temporarily unable to raise the required revenue through conventional means. In such a case, where monetary financing is the *only* alternative, inflation will accelerate despite the presence of debt indexation.³⁹ In fact, it is likely that, in this instance, debt indexation will exacerbate inflation, since it reduces the base of the inflation tax.⁴⁰

Furthermore, debt indexation is effective only as long as open default is not a viable option. If default were a possibility, indexation would be ineffective in reducing *ex ante* real interest rates, because the inflation premium would be replaced by a default premium. If the probability of default were to be sufficiently high in the eyes of the public, then the default premium would be correspondingly high. In such a situation, the government could face

a serious shortage of funds or, possibly, a run (that is, a stampede to cash in government securities).⁴¹

Two additional concerns are often raised in connection with debt indexation. First, there is a common concern that any device—such as indexation—which promises to moderate the adverse consequences of inflation is likely to weaken the resolve of governments to address the problem of inflation.⁴² While this argument may have some validity, especially for other forms of indexation, it may be less applicable to debt indexation. The reason for this lies in the incentive aspects discussed in this section, which suggest that it is precisely the lack of debt indexation which may weaken the resolve of policymakers to address the problem of inflation.⁴³

Second, it is sometimes argued that debt indexation may end up leading to other forms of indexation, such as that of wages. This could occur because debt indexation imposes pressure on policymakers to protect both wage earners and asset holders from the detrimental effects of inflation. While there may be some substance to this argument, it is worth noting that, in certain circumstances, debt indexation may actually lead to less wage indexation. This would occur, for example, if, for reasons noted earlier, debt indexation enhanced the stability of monetary policy and, hence, reduced the uncertainty concerning shocks having a monetary origin. If monetary shocks were to become less prevalent, wage indexation might be reduced, since the less is the uncertainty regarding the future course of monetary or real variables, the less will be the perceived need for wage indexation.⁴⁴

⁴¹The size of the default premium depends importantly on the perceived costs associated with open default. These costs may vary across various types of debt instruments, depending on who is the holder.

⁴²It should be pointed out that implicit in the argument that indexation weakens the resolve of governments to fight inflation is the notion that indexation reduces the costs associated with inflation. Hence, the argument does not necessarily lead to the conclusion that higher indexation reduces social welfare. (See Fischer and Summers (1989) and De Gregorio (1991 a).)

⁴³In an early work, Bach and Musgrave (1941, p. 823) argued that “by imposing upon the government a contingent liability dependent on its failure to check price inflation, the flotation of stable purchasing power bonds may exert a wholesome pressure upon Congress to adopt aggressive anti-inflationary policies.”

⁴⁴It has also been suggested that real shocks—for instance, shocks to productivity—need to be accommodated by changing the real wage; thus, when shocks are mostly real, wage indexation is undesirable to the extent that, by increasing real wage rigidity, they induce excessive fluctuations in output and employment. The inverse relationship between debt indexation and wage indexation may be of particular relevance when policy lacks credibility, for it is in precisely such a situation that policymakers may find debt indexation most useful for controlling inflation and, hence, for reducing shocks having a monetary origin. These implications follow from Gray's (1976) analysis of wage indexation and Calvo and Guidotti's (1990 a) analysis of debt indexation.

³⁹See Levhari and Liviatan (1976).

⁴⁰Calvo and Guidotti (1989 and 1990 a) have also suggested that because the presence of some amount of nominal debt can provide a degree of flexibility to the policymaker, the public debt should not be fully indexed. The optimal degree of debt indexation derives from the trade-off implied by the fact that while nominal debt provides flexibility, it also increases the risk of higher inflation. The nature of this trade-off depends heavily on the ability of the authorities to commit themselves to a policy of *low average* inflation. If policymakers can credibly maintain a low inflation rate, on average, then even small fluctuations around this average level may reduce the need to adjust other taxes to finance expenditure shocks. In fact, this argument suggests that the more policymakers are able to credibly pre-commit policy, the smaller will be the proportion of debt that should be indexed.

Given the diversity of factors noted above, it is not surprising that the empirical evidence on the relationship between debt indexation and inflation is not clear cut. In a detailed analysis focusing on the inflationary consequences of the 1973–74 oil shock, Fischer (1983 a) concluded that there was no systematic empirical relationship between inflation and various forms of indexation—in particular, debt indexation. There are no systematic data on debt indexation for the G-15 countries for the review period, but it appears that in three of the countries (Brazil, Chile, and Uruguay) most of the domestic public debt was indexed—that is, on average, more than 75 percent of the domestic public debt was indexed to the exchange rate or to the consumer price index during 1982–88. The group of G-15 countries with low indexation (with less than 25 percent of the domestic public debt indexed) includes four countries: Argentina, Colombia, Mexico, and Morocco.

As far as inflation is concerned (both in terms of its average rate and its variability), the experience across these countries has been mixed, reflecting differing fiscal stances during the review period. As noted, given the large number of factors determining inflation, it is not possible to ascertain unequivocally the extent to which debt indexation may have contributed to dampening inflationary expectations. Among the countries with high debt indexation, on the one hand, Brazil experienced extremely high rates of inflation during the review period, owing largely to inadequate fiscal adjustment. On the other hand, Uruguay and, especially, Chile experienced substantially lower average rates of inflation, with no hyperinflation experienced during 1982–88. Also among the countries with low debt indexation, the experience with inflation was not uniform: Mexico and Argentina experienced episodes of high inflation, while a number of other countries showed substantially lower average inflation rates.

To sum up, two main issues have been highlighted in this section: (1) there is a potentially destabilizing interrelationship between nominal public debt and inflation; and (2) in certain circumstances, debt indexation may complement fiscal adjustment in stabilizing inflation.

2. Debt Maturity

Maturity structure refers to the amortization schedule associated with an outstanding stock of debt. This structure is determined by the average maturities of the different types of paper issued by the government. Maturities can vary considerably, from those of overnight paper to those of long-term bonds. Among longer-term bonds, the matu-

rities on individual instruments may vary widely. For example, a ten-year bond with a three-year grace period, and amortization in equal installments from then on, has quite a different maturity structure than a ten-year bond with no grace period, or a bond that is fully amortized at the end of the tenth year. For the purposes of the present discussion, a bond with an n -year maturity is defined as a promise to amortize the bond entirely at the end of the n th year. This definition assumes that the interest payment on a bond with an n -year maturity is determined when the bond is issued.⁴⁵

The discussion below shows that debt maturity is a key characteristic in the management of public debt for two reasons.⁴⁶ First, because debt maturity can play a crucial role in preventing “confidence crises” and, second, because it has important implications for the relationship between nominal debt and inflation. Before we address these issues, it is worth reviewing the recent evolution of debt maturities in highly indebted countries.

a. Evidence on Maturity Structure

Table 7 presents information on the debt maturity structure for countries in the sample for which data were available. It reports the proportion of short-term debt (maturing in less than one year) to total debt for 1983–88 and for 1987–88. As can be observed, countries with high external debt, with the exceptions of Chile and Uruguay, tend to have domestic public debt with very short maturities. Moreover, in a number of countries, notably Nigeria and the Philippines, debt maturity has shortened even more in recent years.

There are two possible reasons for the observed shortening of maturities. First, the fiscal situation in these countries may have raised fears of an open default. In such circumstances, the public may have preferred debt instruments that allowed them to be repaid first. However, in the event of a “run” or “confidence crisis,” when everybody wants to be repaid, none can be sure of obtaining full repay-

⁴⁵The definition of debt maturity is more complex where the interest rate on a long-term bond is indexed to a short-term interest rate. For the purpose of analyzing the interaction between nominal bonds, inflation, and maturity structure, floating-rate bonds are considered short-term liabilities. This is so because while the real value of debt may still be reduced by an unanticipated increase in inflation, the indexation mechanism incorporates any anticipated increase in inflation into nominal interest rates, in much the same way as debt may be refinanced through the issue of short-term bonds.

⁴⁶The role of debt maturity is analyzed by Calvo and Guidotti (1990 a, b, c, and d); Calvo, Guidotti, and Leiderman (1991); Alesina, Prati, and Tabellini (1990); and Giavazzi and Pagano (1990).

Table 7. Eight G-15 Countries: Debt Maturities, 1982–88 and 1987–88
(In percent)

	Short-Term Debt/Total Debt	
	1982–88	1987–88
Argentina ¹	63.3	73.7
Brazil	100.0	100.0
Chile	48.3	31.8
Mexico	73.8	71.8
Morocco	n.a.	56.2
Nigeria	64.2	72.0
Philippines	54.8 ²	70.6 ³
Uruguay	40.7	38.1

Source: Fund staff estimates based on national sources.

Note: n.a. = not available.

¹ Central bank debt at floating rates is included as short-term debt.

² 1983–87.

³ 1987.

ment. The possibility of a run may prevent the government from borrowing at all. Even if the government can undertake some borrowing, few people will find it attractive to acquire long-term government bonds, since they are less senior, in an intertemporal sense, than short-term debt. But short-term maturities are risky for the government, because a “confidence crisis” could trigger a run on government assets and the latter could, in turn, force the government to declare a debt moratorium even when sound economic policies were being followed.

A second possible reason for the shortening of maturities is the increase in inflation and inflationary expectations. The relationship between nominal debt and inflation was discussed earlier. How does the maturity structure of nominal debt affect this relationship? If non-indexed debt has a long maturity, then a given reduction in the real debt burden will require relatively small increases in inflation, albeit over a longer period. Conversely, if the debt has a very short maturity—say, only one month—the same real debt reduction would have to be achieved in the course of a month, requiring a sudden burst of inflation.

b. Maturity Structure and Inflation

The effect of different maturities on the potential relationship between nominal debt and inflation can be illustrated by means of a simple

numerical exercise. This is done in Table 8, which shows the impact, for different maturities, of *unanticipated* inflation (lasting until the bond's maturity) that is equivalent to a given amount of fiscal adjustment.⁴⁷ Recalling the earlier definition of maturity, the interest rate on a bond which matures in n years is determined at the time of issue for the length of the contract. This implies that on a ten-year bond, unanticipated inflation acts for ten years. Thus, each of the numbers in the table represents the annual inflation rate which has the same effect on reducing the debt as an annual improvement equivalent to 1 percent of GDP in the primary fiscal balance for each of five years and ten years, respectively, for debt having different maturities.⁴⁸ The exercise is undertaken for debt-to-GDP ratios of 25 percent and 100 percent. For example, if nominal debt is equivalent to 25 percent of GDP and matures in one year, then the unanticipated inflation rate that would have the same effect in one year as a fiscal improvement of 1 percent of GDP for each of the next five years is 20.8 percent. If that same debt matured in three years, then the inflation rate producing an effect equivalent to that of the specified fiscal improvement would be 7.9 percent per year for each of the next three years. When nominal debt is equivalent to 100 percent of GDP, the same example yields unanticipated annual inflation rates of 4.5 percent and 1.7 percent, respectively.⁴⁹ Thus, a lengthening of debt's maturity reduces dramatically the yearly rate of inflation associated with a given amount of seigniorage.

The above calculations illustrate the basic relationship that exists between debt's maturity structure and inflation. It is worth noting that there is a close similarity between indexation and debt's maturity.⁵⁰ This similarity arises because changes in either of these change the nominal base on which inflation acts. Indexation affects the nominal base *at a given point in time* by simply changing the amount of liabilities which are nominal. Thus, reducing the extent of indexation increases the nominal base. Changing debt's maturity affects the nominal base in a more subtle way. Making a debt issue's maturity longer enlarges the nominal base

⁴⁷ Appendix I discusses in greater detail the methodology used in Table 8.

⁴⁸ Calculations in Table 8 are made based upon the assumption that interest is paid at maturity. For low interest rates, the numbers reported in the table would not change significantly if alternative assumptions were made.

⁴⁹ It should be pointed out that the 4.5 percent inflation rate lasts for one year, while the 1.7 percent inflation rate lasts for three years.

⁵⁰ The link between optimal indexation and the maturity structure of public debt is discussed in greater detail by Calvo and Guidotti (1990 a).

Table 8. Debt Maturity and Inflation
(In percent per year)

		Unanticipated Inflation Rate Corresponding to Maturity (in Years) of:			
		1	3	10	30
A.	25 percent debt-to-GDP ratio				
	Fiscal improvement equivalent to				
	1 percent of GDP for each of:				
	5 years	20.8	7.9	2.6	1.3
	10 years	44.5	18.6	5.5	2.8
B.	100 percent debt-to-GDP ratio				
	Fiscal improvement equivalent to				
	1 percent of GDP for each of:				
	5 years	4.5	1.7	0.6	0.3
	10 years	8.3	3.1	1.1	0.5

on an intertemporal dimension, in that inflation can act on it for a longer period.

Because of this similarity, the policy regarding the management of the maturity structure of debt is not independent of the policy adopted regarding debt indexation. On the one hand, as was noted earlier, indexation, in some circumstances, could play a role in controlling inflation, particularly when policy announcements lacked credibility. The advantage of having long-term maturities in such instances may, therefore, depend on the indexation policy. If debt indexation is used to reduce inflationary expectations, then a long maturity could help to control inflation by providing the government with an incentive to smooth it out over time, as is illustrated numerically in Table 8.

On the other hand, if no debt indexation is used, the existence of nominal bonds with long maturities may exacerbate expectations of high inflation. These expectations are fueled by the fact that a longer maturity structure, by allowing inflation to reduce the debt burden over a longer period, could make the inflation route less costly. Therefore,

when indexation is not used, it may actually be desirable to have a *shorter* maturity structure. This would enhance the credibility of a government's low-inflation policy objective by reducing the temptation for it to tolerate inflation. This temptation is reduced because, as was indicated above, in order for a country to achieve a given debt reduction, inflation needs to be higher and concentrated over a shorter period, thus increasing the cost associated with that debt reduction.

In sum, long-maturity bonds are desirable for two main reasons: first, they help prevent "runs" or "credibility crises," and, second, they help stabilize inflation if used in conjunction with debt indexation.⁵¹ However, when policy lacks credibility and the government is unable to use debt indexation effectively to dampen inflationary expectations, shorter maturities may be called for.

⁵¹When there are expectations of high inflation, however, it may often be difficult, or at least excessively costly, to issue long-term bonds. If open default is a viable option, it may not even be possible to issue long-term bonds.

V Concluding Remarks

This study has highlighted a number of issues related to domestic public debt in developing countries with high levels of external debt. It has emphasized the crucial role played by developments in the fiscal sector, the implications of high indebtedness for stabilization programs, and strategies for managing the domestic public debt.

An analytical framework has been proposed to facilitate an examination of developments concerning domestic public debt. The framework has integrated analysis of domestic public debt with that of external public debt and the underlying current and prospective fiscal stances, and, hence, it could be useful for analyzing the interrelationship between government liabilities and other aspects of the fiscal picture. In particular, this approach suggests that the external debt situation cannot be analyzed effectively in isolation from the domestic debt situation.

Analysis carried out using the balance-sheet approach to the government fiscal operations has shown that short-term improvements in a country's primary surplus may be far from adequate to enable it to regain solvency. Therefore, a public sector's ability to service its liabilities may not be substantially affected by stabilization programs that are not credible in the medium term and long term. These considerations suggest that in the de-

sign of programs, more emphasis should be given to their long-term sustainability and to the required structural policies. In this context, the balance-sheet approach appears to be a useful complement to the medium-term scenarios often employed to analyze policy sustainability.

The study has also shown that there are potentially important links between nominal debt, the credibility of economic policy, and inflation. Clearly, these links should be taken into account in the design of stabilization programs in countries with high nominal public debts. Furthermore, the existence of these links underscores the need to conduct a sensitivity analysis of the effects of different real interest rates on the fiscal accounts when designing an adjustment program.

Finally, the study has shown that a large stock of nominal debt can be destabilizing because of its potential effect on inflationary expectations. It has been shown that in such circumstances, debt-management policies—such as those concerned with the management of debt maturities and debt indexation—may have a role in preventing such problems as the loss of a nominal anchor and the occurrence of “confidence crises.” This suggests that even though these aspects of domestic debt management are not a substitute for fiscal adjustment, they should be taken into consideration in policy design.

Appendix I Debt Maturity and Inflation

It was noted in Section IV that changes in the maturity structure of nominal government debt may affect the intertemporal path of inflation. The effect of different maturities on inflation was illustrated by means of a numerical exercise presented in Table 8. The numbers presented in Table 8 correspond to the yearly rates of inflation which solve the following equation:

$$\sum_{t=1}^n s \left(\frac{1}{1+r} \right)^{t-1} = \sum_{t=1}^m \frac{b\pi}{1+\pi} \left[\frac{1}{(1+r)(1+\pi)} \right]^{t-1} \quad (3)$$

where b , s , π , and r denote the ratio of public debt to GDP, the primary surplus, the yearly rate of

inflation, and the yearly discount rate, respectively; n is the number of years over which the fiscal surplus is sustained; and m is the maturity of the public debt. Thus, the left-hand side of equation (3) is the present value of a primary fiscal surplus, s , sustained over n years, while the right-hand side of the equation is the present value of the reduction in the real stock of debt, b , generated by a constant rate of inflation, π , over m years. In Table 8, b takes values of 25 and 100; s equals 1 percent of GDP; r equals 0.05; n takes values of 5 and 10; and m takes values of 1, 3, 10, and 30.

Appendix II Statistical Tables

This appendix provides additional information on domestic and external public debt, and fiscal accounts.

I. Public Debt (Tables 9 and 10)

The public debt data were obtained from national sources; recent unpublished Fund papers; the International Monetary Fund's *Government Finance Statistics Yearbook* and *International Finan-*

cial Statistics; the Fund's World Economic Outlook data bank; and the *Economic Outlook* (December 1988 issue) published by the Organization for Economic Cooperation and Development (OECD). Table 9 provides domestic and external public debt data, on an annual basis, for the average of the G-15 countries and for the group consisting of the four largest debtors among the G-15, all of which are in the Western Hemisphere. Table 10 provides data for the majority of the OECD countries.

Table 9. Fifteen Heavily Indebted Developing Countries: Public Debt, 1976–88¹
(Percentage of GDP)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Domestic public debt													
G-15 countries ²	5.7	6.5	7.0	6.6	7.8	8.7	11.7	12.6	14.2	14.9	15.8	15.9	16.4
Four largest debtors ³	5.9	6.7	7.1	6.6	8.5	9.9	14.1	14.8	16.1	16.5	17.9	18.4	18.4
External public debt													
G-15 countries ²	13.6	15.8	18.1	18.9	19.1	21.3	24.4	30.4	33.5	35.6	37.4	37.7	37.7
Four largest debtors ²	12.9	16.4	17.9	19.4	19.9	22.5	25.8	30.7	32.0	32.1	33.8	33.8	32.9
Total debt													
G-15 countries ²	19.3	22.3	25.1	25.6	26.9	30.0	36.1	43.0	47.6	50.5	53.2	53.6	54.0
Four largest debtors ³	18.8	23.1	25.0	26.0	28.5	32.4	39.9	45.5	48.1	48.7	51.7	52.2	51.2

Source: Domestic public debt data were obtained from national sources; the International Monetary Fund's *International Financial Statistics* and *Government Finance Statistics Yearbook*; and recent unpublished Fund papers. Figures for GDP in national currencies and in U.S. dollars were obtained from the Fund's World Economic Outlook data bank. External debt data were provided by Fund staff members. The total public debt ratio is the sum of the domestic debt ratio and the external debt ratio.

¹Weighted averages. Weights are based on the relative shares in GDP (measured in U.S. dollars) in 1981–82 of the G-15 countries and of the four largest debtors among them (all of which are in the Western Hemisphere), respectively.

²The G-15 countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

³Among the G-15, the four developing countries with the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

Table 10. Industrial Countries: Gross Public Debt, 1981–88
(Percentage of nominal GNP/GDP)

	1981	1982	1983	1984	1985	1986	1987 ¹	1988 ¹
United States	37.2	41.1	44.2	45.2	48.3	51.1	51.6	51.5
Japan	57.0	61.1	66.9	68.4	69.0	72.8	75.5	73.0
Germany, Fed. Rep. of	36.3	39.5	40.9	41.5	42.2	42.4	43.7	44.5
France ²	36.4	40.1	41.4	43.8	45.4	45.4	47.5	47.2
Italy	61.0	66.3	71.9	77.1	84.0	88.5	92.7	95.0
United Kingdom	54.5	53.2	53.4	54.8	53.3	52.0	49.6	44.9
Canada	45.1	50.1	56.1	58.8	64.6	68.6	68.8	68.2
Total of above countries ³	44.5	48.3	51.6	53.2	55.4	57.9	59.2	58.5
Australia ²	22.3	22.1	24.1	25.2	26.4	26.6	23.5	20.5
Austria	39.3	41.6	46.0	47.9	49.6	54.0	57.5	57.2
Belgium	93.3	102.4	113.3	118.6	122.7	127.2	132.5	134.4
Denmark ²	43.6	53.0	62.6	67.0	65.7	59.5	57.2	55.3
Finland ²	14.6	17.1	18.7	19.1	19.0	18.8	20.0	18.8
Greece ²	32.8	36.1	41.2	49.5	57.9	59.0	64.7	68.7
Ireland	83.5	92.2	104.7	113.2	117.7	133.2	135.6	132.8
Netherlands	50.3	55.5	61.9	66.1	69.6	71.3	75.0	77.7
Norway ²	47.4	42.1	38.8	38.7	40.7	51.0	42.8	41.1
Spain ²	23.3	29.0	35.0	41.8	47.2	48.1	48.4	48.4
Sweden	52.3	62.0	65.7	67.2	67.7	67.3	62.0	58.1
Total of smaller countries ^{3,4}	42.0	46.7	51.8	55.5	58.2	59.9	59.9	59.4
Total of European countries ^{3,4}	45.2	48.8	51.8	54.5	56.7	57.7	58.9	58.7
Total of all countries above ³	44.2	48.1	51.6	53.5	55.8	58.1	59.2	58.6

Source: Organization for Economic Cooperation and Development, *Economic Outlook* (December 1988).

Note: GNP denotes gross national product.

¹Partly estimated.

²Does not exclude public sector mutual indebtedness.

³1987 GNP/GDP weights and exchange rates.

⁴For the countries shown in the table.

2. Fiscal Accounts (Table II)

Data were obtained from recent unpublished Fund papers and include other estimates prepared

by Fund staff members. Weighted averages were obtained using 1981–82 GDP weights.

Table II. Fifteen Heavily Indebted Developing Countries: Fiscal Accounts of the Consolidated Public Sector, 1978–88

(Percentage of GDP)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Revenue											
G-15 countries ¹	24.4	23.3	23.6	23.2	23.0	23.4	21.2	21.7	22.5	22.8	22.7
Four largest debtors ²	19.9	18.1	19.1	18.3	18.3	18.5	17.7	18.2	17.9	17.7	17.2
Expenditure											
G-15 countries ¹	27.0	24.9	25.7	28.6	30.4	27.6	23.9	24.5	26.5	27.8	26.5
Four largest debtors ²	21.9	21.3	22.4	25.2	26.5	23.4	20.3	21.1	23.6	24.6	22.8
Surplus or deficit (–)											
G-15 countries ¹	–2.6	–1.6	–2.1	–5.4	–7.4	–4.2	–2.7	–2.8	–4.0	–5.0	–3.8
Four largest debtors ²	–2.0	–3.2	–3.3	–6.9	–8.2	–4.9	–2.7	–3.0	–5.7	–6.9	–5.6
Interest payments											
G-15 countries ¹	2.2	2.0	2.2	3.2	6.5	6.8	5.8	6.0	6.6	7.3	7.3
Four largest debtors ²	1.8	1.7	1.9	3.0	5.8	6.1	5.5	5.8	6.6	7.4	7.1
Primary surplus or deficit (–)											
G-15 countries ¹	–1.7	–0.9	–1.3	–4.4	–2.7	1.0	2.4	2.5	1.0	0.1	1.4
Four largest debtors ²	–0.2	–1.5	–1.4	–3.9	–2.4	1.2	2.8	2.8	0.9	0.5	1.5

Source: Various recent unpublished Fund papers.

¹The G-15 countries include Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay, Venezuela, and Yugoslavia.

²The four developing countries among the G-15 that have the largest external debts are Argentina, Brazil, Mexico, and Venezuela.

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