Debt Sustainability for Low-Income Countries: A Review of Standard and Alternative Concepts

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CHAPTER 2

Debt Sustainability for Low-Income Countries

A Review of Standard and Alternative Concepts

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Governments in low-income countries (LICs) have the difficult task of making wide-ranging decisions about public spending, taxation, and borrowing. Although we can analyze at length how both public spending and taxation can be designed and implemented to contribute to growth and poverty reduction, the biggest challenge that most developing countries face is in determining how much they can borrow without jeopardizing their long-term prospects. The objective of this chapter is to introduce the key issues involved in debt sustainability analysis (DSA). We will review the main approaches developed in the literature, starting from the traditional fiscal and external approaches and covering recent alternative frameworks, such as the debt overhang analysis and the human development approach (especially as it relates to the funding requirements for achieving the Millennium Development Goals [MDGs]).

Debt sustainability requires that indebtedness be kept in line with the capacity of the borrower to repay (IMF 2003). At a firm or project level, this means that borrowed funds should be invested productively with a return high enough to cover debt-service costs. This simple definition, however, is not as easily applied to countries as it is to firms or projects.

Government borrowing often is used to cover public deficits rather than to invest in specific projects, and the returns to public investments in the social sectors or infrastructure may materialize only in the distant future. This makes it difficult to take the returns to investment into account. In addition, debt-servicing capacity is determined by government revenues, which depend on tax rates as well as on economic growth. Finally, debt sustainability is affected by variables that often are not under government control, such as the level of world interest rates, the degree of concessionality in the loans received, and the foreign exchange rate.

Given the complex web of factors that affect debt sustainability and are affected by it, the concept cannot be captured in a single indicator or in simple rules of thumb that would apply indiscriminately to all countries. What is needed when working on debt sustainability is a country-specific analysis looking at a set of different indicators and their dynamics, with a particular focus on identifying binding constraints to development as well as key vulnerabilities to which the country may be exposed in the future. At the same time, some guidance and an overview of the main approaches used in the literature on debt sustainability should be useful to anyone studying the relationships between public finance and poverty reduction.

The traditional approaches to debt sustainability cover two basic criteria: *fiscal* and *external*. Consider first fiscal sustainability. Developing countries typically experience a chronic shortfall of domestic savings over the (targeted) level of domestic investment required to generate enough growth to reduce poverty and to meet the MDGs. This savings gap often is mirrored by a fiscal gap—that is, the public sector runs a fiscal deficit to allow for more spending than would be allowed on the basis of government revenue (or more investment than would be allowed on the basis of public saving).[1] To the extent that it is not covered by monetary financing, the deficit feeds into increased debt, either foreign or domestic.

In some countries, it is necessary to consider the possibility of a recurrent-fiscal gap. For instance, if there is limited tax capacity, it is not possible to make some crucial recurrent spending that would provide the minimum quality of public services in such areas as law and order, road maintenance, basic health care, or education services. Such expenditures may have an important bearing on the profitability of public investments as well as on private investment. A second possibility for the occurrence of a recurrent-fiscal gap is when there is some unused capital expenditure

budget that, for some reason, cannot be transferred into the current budget. This may happen in some aid-dependent developing countries where there is not enough country budget ownership and donors funding investment projects face absorption capacity limits on the recipient side but are reluctant to divert some of those resources to the current budget.

Beyond a fiscal gap, many countries are confronted with an external financing gap, which may lead to concerns about the external sustainability of the country's debt. LICs must rely on foreign capital to finance their savings gap. In an open economy, the excess of domestic investment over domestic savings is equal to the trade deficit; or, put in other terms, an excess of domestic investment over national savings translates into a current account deficit. Because LICs' debts are largely denominated in foreign currencies, productive investments should enable countries to convert domestic resources into foreign exchange by generating sufficient export earnings—but this is not always the case.

In addition to the concerns about fiscal and external debt sustainability, the recent literature has identified two additional constraints that feed into debt sustainability concepts and indicators. These relatively recent phenomena, partly linked to the current debt burden itself, have been translated into "alternative" concepts of debt sustainability, two of which are especially important here. First, a high current debt itself may severely hamper future debt-servicing capacity because it might introduce to the economy all kinds of disincentive effects to invest and adjust, resulting in a severe negative effect on future economic growth. This is the so-called *debt overhang hypothesis.* This effect is usually linked to a high stock of debt. Second, a high current debt-service burden also may act as an important constraint that is difficult to deal with from a political or moral point of view. The issue is that the resources allocated to debt service may crowd out social or other poverty-related spending as defined, for instance, through the measures needed to reach the MDGs or other targets specified in a country's Poverty Reduction Strategy Paper (PRSP). As such, a wedge can be inserted between the capacity to pay debt service and what would be considered "affordable" debt service (EURODAD 2001) in order not to crowd out priority sector spending. The so-called *human development approach* to debt sustainability refers specifically to the spending necessary to reach social and poverty reduction goals, and the political pressure to take on more debt to finance needed additional expenditures.

Given the multiple dimensions of the debt sustainability issue, instead of using a one-dimensional measure of debt sustainability, we would argue that it is preferable to rely on a framework that recognizes the multiple constraints faced by LICs. This argument implies that DSA should be carried out using a menu of indicators, including both the present value of the debt stock and debt-service indicators relative to a range of variables, such as exports, revenues, and GDP; and analyzing their dynamic evolution over time using realistic macroeconomic assumptions. It also is important to simulate the effect of country-specific key bottlenecks and vulnerabilities. To apply such a menu of indicators and approaches successfully in a country-specific context, one has to show which aspects are most binding in a particular case and moment in time.

This chapter is structured as follows. In the next section, we provide a brief review of the theoretical concepts used in traditional debt analysis to derive a list of possible constraints and variables that affect debt sustainability. In the third section, we discuss how different indicators have been applied in operational schemes, such as the Enhanced Heavily Indebted Poor Countries (HIPC) Initiative and the new (revised) International Monetary Fund (IMF)/World Bank (2006) framework for long-term debt sustainability for LICs. The fourth section is devoted to an analysis of alternative DSA frameworks (such as the debt overhang hypothesis and the human development approach to debt sustainability). There is also a brief discussion of the new debt relief initiative advocated by the Group of Eight (G-8)—the Multilateral Debt Relief Initiative (MDRI)—that situates debt relief within an MDG perspective. A conclusion completes the chapter.

Traditional Approaches to Debt Sustainability: A Brief Review

LICs are confronted by multiple constraints when making policy decisions that may affect their debt sustainability. First, there is a foreign exchange constraint, reflecting limits on the ability to transform domestic factors of production into the foreign exchange required for external debt service and the financing of imports. There is a fiscal constraint, reflecting the government's limited ability to tax in order to meet its debt-service obligations, next to other expenditure priorities. And one could add a constraint in terms of the fungibility of resources—for example, due to earmarking of revenues for certain sectors, subnational governments, or

public agencies; or due to restrictions on shifting resources from investment to recurrent expenditures. All these constraints may lead to a severe shortage of funds available for recurrent expenditures and thus cause situations where debt service has to compete with other recurrent priority spending. These constraints, and the need to borrow to invest for the country's development and provide much-needed basic services to the population, also may give rise to the so-called twin-deficit situation—a fiscal deficit coupled with a current account balance deficit.

Our objective in this section is to link the different potentially binding constraints faced by LICs with simple concepts and indicators that are developed in the literature and applied in practice to measure debt sustainability. We focus first on fiscal sustainability concepts, and then discuss external sustainability indicators. We also briefly present the solvency approach to debt sustainability. Building on the concept of the present value of debt in the solvency approach, and given that most low-income debt is concessional, we then show how the conventional fiscal and external sustainability concepts can be fine-tuned by using this present value of debt concept rather than nominal stocks or debt-service flows. We start with the traditional approaches to debt sustainability, leaving the other two alternative concepts for later.

Fiscal Approach

The conventional accounting approach to fiscal sustainability is based on a simple indicator: the ratio of debt to gross domestic product (GDP). The difficulty lies in estimating this ratio and in analyzing how it changes over time. There are many good descriptions of the mathematics of debt sustainability in the literature. One such description, which is both detailed and short, is provided by Ley (2004). To present the concepts of debt sustainability as simply as possible in our review, we will not derive the key results of the literature; rather, we simply will provide and interpret them. The reader is referred to Ley (2004) or other similar accounts for a formal treatment.[2]

To estimate the ratio of debt to GDP at any point in time, one first must estimate the level of debt. It is easiest to start with nominal debt (as opposed to the present value of debt that we will define later). We first note that, at any point in time, the government budget constraint states that a (primary) fiscal deficit not financed by money creation will feed automatically into higher public debt. Conversely, fiscal surpluses can be

used to reduce the public debt stock. This means that the debt at time t is equal to the debt at time $t - 1$ plus the interest paid on the debt minus the creation of money and a term (the primary budget balance) equal to the difference between the resources available to the government from tax revenues and foreign aid in the form of grants, and the use of those resources in the form of recurrent consumption and investments. Formally, this equation can be written as follows:

$$D_t = D_{t-1} + iD_{t-1} - (T + A_{gb} - I_g - C_g^*) - \Delta M = (1 + i)D_{t-1} - (B + \Delta M), \qquad (2.1)$$

where D is the stock of public debt; i is the average nominal interest rate on public debt; T is the domestic government revenue, consisting mainly of taxes; A_{gb} is foreign aid in the form of grants flowing to the government budget; C_g^* is government recurrent spending (including transfers) but exclusive of interest payment on public debt; ΔM is monetary financing; and B is the primary (that is, noninterest) government balance, including budgetized grant aid (with $B>0$ denoting a surplus).

The concept of sustainability implies that we must look at changes in debt indicators over time, and that we must normalize these indicators by a measure of the government's ability to service debt, such as government revenue or GDP. Let's denote by d_t the ratio of debt to GDP at time t; by r_t the average real interest rate on the debt (after netting out inflation to simplify the notation); by g_t the real growth rate of GDP; and by b_t^* the ratio of the primary balance, including any monetary financing, to GDP at time t. With a few assumptions and relatively simple algebra applied to equation (2.1), we can show that changes to the debt-to-GDP ratio over time will adhere to the following "law of motion":

$$\Delta d_t = \left(\frac{r_t - g_t}{1 + g_t} \right) d_{t-1} - b_t^*. \qquad (2.2)$$

Equation (2.2) makes it clear that two key factors affect the ratio over time. The first factor is the difference between the average real interest rate on the debt (as denoted by r) and the real growth rate of GDP (denoted by g). The term $(r - g)/(1 + g)$ usually is referred to in the literature as the "endogenous dynamics" element of the relationship. The second factor is the primary balance, including seigniorage or the creation or printing of money by the government. Thus, if the average interest rate is structurally higher than the GDP growth rate, the debt-to-GDP ratio will

rise unless the government runs a sufficiently large primary fiscal surplus. Keeping the debt-to-GDP ratio stable also will require a primary surplus. If, on the other hand, the growth rate of GDP exceeds the average rate of interest on public debt, keeping the debt-to-GDP ratio stable or even reducing it is compatible with running a primary fiscal deficit. The intuition for this result is that higher growth will generate higher revenues that will make it easier to pay the government debt in the future. Note also that equation (2.2) can be transformed into a relationship showing the primary balance (with monetary financing) b^* that is required to stabilize the public debt-to-GDP ratio (that is, $\Delta d = 0$). For countries that are able to borrow at concessional interest rates, it is easier, in principle, to realize a positive growth-to-interest rate differential. This in turn makes debt sustainability easier to achieve and maintain even when running fiscal primary deficits. In reality, however, there have been many disappointing cases of LICs with exploding debt ratios, despite favorable borrowing terms, resulting from lower-than-expected growth rates (the implicit "return" on the borrowed funds), large deficits, or a combination of the two.

One could argue that sustainability should not be defined only in terms of maintaining a stable debt-to-GDP ratio. Sustainability ultimately depends on the difference between the current level of the debt ratio and its "desired" level. Given a range of combinations of growth rates, interest rates, and primary surpluses (for a given debt ratio), it is possible in principle to arrive at and sustain a desired level of indebtedness. But the fiscal sustainability framework presented here is intentionally not normative—it only highlights the dynamic behavior of the indicator chosen to analyze the sustainability of debt over time. More normative definitions of what could constitute a desired, optimal, or sustainable level of debt will be introduced in later sections of this chapter. Note also that, in principle, vulnerability to output shocks (which negatively influences the debt-to-GDP ratio) could be dampened by making debt contingent—for example, by creating instruments such as GDP-linked debt. In practice, however, it appears to be extremely difficult to create a market for such instruments.[3]

To this point we have treated the government budget identity and public debt dynamics without considering whether financing was through foreign or domestic debt. For most LICs, borrowing is primarily foreign, which means that debt is contracted not in domestic but in foreign currency and, as such, it creates a structural mismatch problem on the gov-

ernment's balance sheet (that is, revenues in local currency and part of the expenditures in foreign currency). Exchange rate dynamics thus play an important role in determining the domestic cost of debt service and fiscal sustainability.[4]

Define by $\varepsilon_t = \Delta e_t / e_{t-1}$ the change in the exchange rate over two periods (with a depreciation showing a positive sign), by α^f the part of the debt that is denominated in foreign-currency, by r^* the weighted average real interest rate on both foreign and domestic debt, and by r^f the real interest rate on the foreign debt. It can then be shown that

$$\Delta d_t = \left(\frac{r_t^* - g_t + \varepsilon_t \alpha^f (1 + r_t^f)}{(1 + g_t)} \right) d_{t-1} - b_t^*. \tag{2.3}$$

Equation (2.3) introduces a foreign exchange rate effect through the endogenous dynamics term of the debt sustainability relationship, which now is driven by four variables: (1) the interest rate on the debt, (2) the growth rate of GDP, (3) the inflation rate (which does not appear in the equation because we use real interest rates), and (4) the foreign exchange rate. A depreciation of the currency will lead to an increase in the debt ratio over time, and this increase will be larger if the share of the debt denominated in foreign currency is larger and if the real interest rate paid on the debt in foreign currency is higher.

Note also that changes in the exchange rate have a direct effect on the domestic value of the foreign debt stock, and thus on the value of the debt-to-GDP ratio—that is, on the value of d_{t-1} in equation (2.3). Because the foreign exchange rate affects both the numerator and the denominator of the debt-to-GDP ratio, the overall effect depends on the degree of matching in the economy between the composition of debt and the composition of output. The direct effect of exchange rate changes on the debt-to-GDP ratio will be maximal when all public debt is foreign and the economy produces no tradable output (or vice versa). In general, one could argue that it is advisable, when feasible, to try moving the debt composition as close as possible to the composition of output in the economy.

One more extension developed by Ley (2004) is to decompose the economy into the conventional tradable and nontradable sectors to show the additional effect of exchange rate changes on price changes in the tradable sector, which again affect the endogenous dynamics term. Ley showed that the inflation rate in an open economy may be broken into

two components, similar to the interest rate decomposition, to express it as a weighted average of domestic and foreign inflation rates. The valuation gains or losses in tradable sector output induced by the exchange rate then depend on the share of tradable output in total output. Because this introduces an exchange rate effect on the denominator of the endogenous dynamics term in equation (2.3), it dampens the previous foreign exchange rate effect so that the result shown in equation (2.3) is best interpreted as the maximum foreign exchange effect.

One last remark on the accounting approach to DSA refers to the use of specific variables for the denominator and numerator in the debt ratio. We have presented the basic analysis of debt dynamics using the debt-to-GDP ratio as a good indicator to measure debt sustainability. This should be a rather obvious choice for fiscal sustainability, although other indicators relating debt to government revenues can provide useful additional information. Moreover, sustainability indicators where the numerator is a flow variable rather than a stock variable, such as debt service to GDP or to government revenues, also can provide complementary and sometimes more useful information.

External Approach

We now turn to a discussion of the sustainability of the combined public and private debt from a foreign exchange or external point of view. The idea is to measure sustainability in terms of a foreign exchange constraint instead of the fiscal constraint. A sustainable fiscal stance may not be sufficient for external sustainability if private sector investment exceeds private sector savings. Conversely, an unsustainable fiscal deficit may translate into a sustainable external position if the balance of private savings minus private investment is positive and compensates for an unsustainable fiscal deficit. Thus there may be divergence between fiscal and external sustainability (Parker and Kastner 1993).

For external debt analysis, all variables (including output) are now expressed in U.S. dollars rather than domestic currency, given the prominence in U.S. dollar-denominated debt.[5] Let us define D^f as the total foreign debt stock, which is both public and private; i^f as the average nominal interest rate on total foreign debt; $NICA^*$ as the noninterest current account, except for current transfers; Tr as the sum of official grants and other current transfers; FI as the non-debt-creating (that is, equity)

capital flows; and ΔNFA as the change in official reserves and other foreign assets (with a positive figure denoting an increase in foreign assets), which also includes "exceptional finance." The basic debt relationship over time is given by the following equation:

$$D_t^{f'} = (1 + i_t^{f'})D_{t-1}^{f'} - (NICA_t^* + Tr_t) - FI_t + \Delta NFA_t. \tag{2.4}$$

Equation (2.4), which is very similar to equation (2.1), provides the starting point for the analysis. The only difference is that, instead of considering money financing for the fiscal approach, the relationship now is based on the current account financing. The equivalent to equation (2.2) for the fiscal approach is

$$\Delta d_t^{f'} = \left(\frac{r_t^{f'} - g_t'}{1 + g_t'}\right) d_{t-1}^{f'} - nica_t^{**}. \tag{2.5}$$

The key results are similar to those obtained for the fiscal accounting approach to debt sustainability. As before, the first key factor affecting the ratio of debt to GDP is the difference between the real interest rate on the debt and the real growth rate of GDP. These variables are expressed in equation (2.5) with a tilt to highlight the fact that they are now expressed in dollar terms. For example, the growth rate is now the dollar-denominated growth rate. The second factor is now the adjusted noninterest current account balance. A noninterest current account not financed by non-debt-creating equity flows or changes in the foreign reserves position feeds into higher external debt, whereas noninterest current account surpluses can reduce the external debt stock. Thus, if the average interest rate is structurally higher than the GDP growth rate, the debt-to-GDP ratio will rise unless the country runs a sufficiently large noninterest current account surplus. On the other hand, if the growth rate of GDP exceeds the average rate of interest on external debt, keeping the debt-to-GDP ratio stable, or even reducing it, is compatible with running a current account deficit.

As for the fiscal approach, exchange rate effects play a role in the dynamics of the external debt-to-GDP ratio to the extent that output is not exclusively tradable sector output. For example, exchange rate depreciation directly increases the ratio of external debt to GDP as it decreases the dollar value of GDP. Similar to the extensions alluded to in the discussion of the fiscal approach, changes in the exchange rate can be intro-

duced more specifically in the analysis, and the exchange rate effect will depend on the shares of tradable versus nontradable output. The effect will be maximal when tradable output is zero.

Solvency Approach

The accounting approach to DSA enables one to estimate a sustainable fiscal stance at a particular moment in time on the basis of a definition of the fiscal deficit, which refers to the result of a fiscal year and its corresponding annual borrowing requirements. However, governments do not finance their expenses entirely with their annual income. Instead, they shift spending between periods to meet annual fiscal targets. To analyze the medium- and long-run sustainability of the fiscal policy, we must consider the financing constraint facing the public sector in a long-term dynamic context. Looking at the government budget constraint from this intertemporal viewpoint introduces the concept of long-term "solvency." Even if the government faces substantial fiscal deficits and a high (or possibly unsustainable debt-to-GDP ratio) today, the government still can be considered solvent as long as resources generated in the future are sufficiently large to cover all future debt-service obligations. The borrower may experience a "liquidity" problem, but lenders should not worry too much about current debt-servicing problems if they are prepared to roll over current debt-servicing obligations. The same type of argument can be made to some extent for the external approach to debt sustainability.

To take this argument into account, the solvency approach to fiscal debt sustainability is based not on nominal debt, but on the present value (*PV*) of future debt payments. The government can be considered solvent as long as the present value of future resources available for debt servicing (*DS*), as represented by future primary fiscal balances (adjusted for seigniorage, B^*), is larger than the present value of all future public debt-servicing obligations (which equals the current public debt stock for borrowers at market terms)—in other words, if the government has a positive net worth. The case of an equality between debt-service obligations and future primary fiscal balances is referred to as the "no-Ponzi game" condition.[6]

Because solvency is an intertemporal concept, these results imply that there is no unique fiscal stance that ensures solvency. Higher expenses today could be compensated by a cut in spending tomorrow, and governments have the flexibility to adopt different fiscal policy packages and

choose the timing for doing so. This framework can be used to calculate the required primary surplus necessary to stabilize the debt-to-output ratio, which will depend on the difference between the (real) interest rate and the (real) GDP growth rate. Again, inflation rates and exchange rate (changes) can be introduced into the analysis.

Take *PVD* and *PVB*, respectively, to represent the present value (*PV*) of future debt-service payments (*DS*) and of future primary fiscal balances (including seigniorage, B^*) by discounting these values of *DS* and B^* at the appropriate (real) discount rate, δ. As such, public debt can be considered sustainable from a solvency point of view as long as

$$PVB(B^*,\delta,\pi) = \sum_{t=s}^{\infty} \frac{DS_t}{[(1+\pi)(1+\delta)]^{t-s}} \geq \sum_{t=s}^{\infty} \frac{B_t^*}{[(1+\pi)(1+\delta)]^{t-s}} = PVD(DS,\delta,\pi). \tag{2.6}$$

The net worth of a country is simply the difference between the two. The upper bound for the time index of the present value calculation used in determining the solvency constraint is important. Choosing an infinite time horizon enables the country to stay solvent whenever it stabilizes the debt-to-GDP ratio over time, without needing to pay back the debt entirely. The analysis conducted in some of the existing solvency models implies that solvency is ensured only when the rate of growth of the debt-to-output ratio remains below the long-run value of the difference between the real output growth rate and the real interest rate. This implies that the present discounted value of the government debt converges to zero (Cuddington 1997), which is necessary only when working with a solvency concept in a finite time horizon (T instead of ∞).

On a theoretical level, the solvency approach is the appropriate way to look at fiscal sustainability. In practice, however, determining long-term fiscal sustainability using the solvency constraint is difficult in part because estimating the present value of future revenue and expenditure flows is problematic, particularly in LICs. Projecting real rates of growth and real interest rates over the long run also can be very uncertain.[7] For this reason, only a few studies have tried to apply the solvency constraint to developing countries (Buiter and Patel 1992; Haque and Montiel 1994; Cuddington 1997). Most of the available models do not pretend to find a long-run general equilibrium path, nor do they ensure consistency of the

fiscal stance with balance of payments and growth targets. Therefore, from an operational viewpoint, the solvency approach is less useful for debt analysis than other, simpler approaches.

In a similar way to what has just been outlined for fiscal analysis, we could try to evaluate solvency, including the external constraint, by analyzing the relationship between the future external debt-service paths and some indicator of future capacity to generate foreign exchange, such as current account balances or expected growth of exports. Again, however, it has proved difficult to translate this into operational indicators. One interesting example is provided by Cohen (1985), who defined a solvency index that measures the fraction of exports that should be devoted to repaying the debt in order to satisfy the solvency constraint. In follow-up work, Cohen (1996) estimated that, for African countries, a debt-to-export ratio of about 210 percent should be the threshold at which a country's debt should be rescheduled. Because this index is based on trade flows only, leaving aside capital movements, it needs to be used with caution. In a situation of massive capital flight, it should be used together with an evaluation of the capital outflows and their possibility of being repatriated while causing liquidity problems.

Concessionality and the Present Value of Debt

The concept of the present value of debt introduced in the solvency approach is especially important for LICs. To the extent that debt is highly concessional, nominal debt may not be a good indicator of debt burden because nominal debt stock will not reflect adequately the present value of the future debt-servicing burden. For countries with highly concessional debt, therefore, it is particularly appropriate to use the present value of debt—that is, the discounted value of all future debt-service payments—as a measure of the future debt burden. What would change in our analysis of the fiscal and external approaches to debt sustainability if we were to use the present value of debt instead of its nominal value? One way to move from a nominal to a present value approach is to use the grant element (GE) concept, as shown in equation (2.7), which is defined as the difference between the nominal stock of debt and its present value, expressed as a percentage of the nominal debt stock. Note also that the value of the GE depends on the discount rate used (that is, a reduction of the discount rate reduces the GE of debt by increasing the present value of the debt).

$$GE_t = \frac{(D_t - PV_t)}{D_t} \Leftrightarrow D_t = \frac{PV_t}{(1 - GE_t)}. \tag{2.7}$$

To look at the dynamics of the GE, define μ_t as the change in GE over time, with $(1 - GE_t)/(1 - GE_t - 1) = 1 - \mu_t$. The parameter μ is thus equal to zero if the GE of the overall debt stock remains unchanged between two periods, and the parameter is positive (negative) if the GE increases (falls). Using this definition, it can be shown that the change in the ratio of the present value of debt to GDP over time, which is denoted as Δpv, is equal to

$$\Delta pv = \frac{r_t^{f'} - g_t' - \mu_t(1 + r_t^{f'})}{(1 + gt')} pv_{t-1}^{f'} - (1\ GE_t)(nica_t^{**}). \tag{2.8}$$

There are two main differences between equations (2.5) and (2.8). The first difference is that a higher degree of concessionality (a larger value for GE) relaxes the constraint imposed by the adjusted noninterest current account balance. The second difference is that, if the degree of concessionality increases over time, the required growth rate, necessary to ensure that the debt ratio does not increase, is reduced. Simply stated, a higher degree of concessionality over time reduces the required ability to finance future interest payments through growth. Conversely, for countries whose borrowing becomes less concessional over time (for example, because a country reaches middle-income status and graduates from the International Development Association [IDA]), the required growth rate to ensure sustainability will increase with the drop in concessionality of the loans received.

Equation (2.9) provides the law of motion of the present value debt-to-GDP ratio under the fiscal accounting approach, starting from equation (2.3), which already factored changes in the exchange rate. There is one variable in equation (2.9) that needs to be defined: a_{gb} is the net budgetized grant aid as a ratio of GDP (and b^{**} is the primary balance without grants) to single out the effect of (budgetized) grant aid on the dynamics.

$$\Delta pv = \left(\frac{r_t^* - g_t + \varepsilon_t \alpha^f (1 + r_t^f)(1 - \mu_t) - (1 + r_t^*)\mu_t}{(1 + g_t)} \right) \tag{2.9}$$
$$pv_{t-1} - (1 - GE_t)(b_t^{**} + a_g b,t).$$

As before, a large depreciation that raises the domestic currency value of foreign currency debt can lead to a sharp rise in the debt ratio, even if revenue growth exceeds the interest rate, and the primary balance after grants is in surplus. Thus, substantial changes in the present value debt-to-exports ratio can occur in only a few years, even with a prudent and highly concessional borrowing policy and low fiscal deficits.[8] In addition, as was the case with external sustainability, equation (2.9) shows that, in the fiscal approach, changes toward higher concessionality over time will decrease the burden placed on growth to be able to repay loans, and reduce the impact of variations in the exchange rate because grants do not have to be repaid. In addition, a higher level of grant aid will reduce the financing gap.

It is also worth noting that the external or fiscal financing gap—that is, the second term on the right-hand side of equations (2.8) and (2.9)—is the factor that most directly captures the tension between debt sustainability and the need for financing. A fiscal gap is equivalent to the adjusted primary deficit after grants, whereas an external gap is defined as the adjusted noninterest current account deficit. When a country or government boosts its investment to achieve higher growth and eventually greater poverty reduction, the financing gap rises, as reflected in a larger current account and/or fiscal deficit, unless there is an offsetting fall in domestic public or private consumption. In the absence of higher grants or other nondebt financing, such as debt rescheduling or the buildup of arrears, debt ratios would increase.

In the applied chapters on Paraguay, Guinea, Rwanda, and Senegal in this volume, case studies that rely on the above-mentioned concepts or adaptations of them are provided to reveal the sustainability of various growth and taxation-spending scenarios over time. The debt module of SimSIP (which stands for Simulations for Social Indicators and Poverty) is a simple tool used to perform complex simulations easily. Analysts can use such tools to help governments and other actors identify some simple trade-offs between debt sustainability and key macroeconomic variables involved in the debt dynamics, such as growth, interest rates, inflation rates, and exchange rate changes, as well as fiscal and current account deficits and their impact on antipoverty spending.

In the rest of this chapter, we consider the operational aspects of debt sustainability analysis, including alternative frameworks that have been proposed to look at the issue and the latest initiatives (such as the HIPC

Initiative and the MDRI) taken by donors to reduce the burden of debt service for poor countries.

Operationalizing Debt Sustainability Concepts: The HIPC Initiative

How can the different concepts and indicators of debt sustainability be put together in an operational framework to guide monitoring and decision making on real-world country cases?

Four Steps Necessary to Conduct a DSA

This section sketches four basic steps required to conduct a DSA, and then briefly discusses the HIPC framework adopted by the IMF and the World Bank. The four steps actually draw on what already is operational at the IMF and the World Bank (IMF 2002; IMF and IDA 2005). The steps are as follows:

1. Deciding on the appropriate debt sustainability concepts and indicators.
2. Conducting consistent analysis of the debt dynamics based on the chosen menu of indicators, under a most-likely benchmark scenario, over a medium-to-long-term period.
3. Running stress tests using a number of detailed alternative scenarios, taking into account the most relevant structural vulnerabilities of the economy.
4. Translating debt sustainability into borrowing policies.

The first step involves measuring the selected indicators. One requirement for this step is an up-to-date and complete database of the country's debt. This might demand that a lot of technical assistance be given to a debtor country's debt management offices by the Commonwealth units, the IMF, the United Nations Institute for Training and Research, the World Bank, and the bilateral donor-funded HIPC Capacity Building Program.[9] This step also requires country-specific analysis. First, the analysis should lead to a decision on the coverage of debt—that is, whether it is useful to include domestic debt in the coverage of public debt and private debt in the coverage of external debt. Furthermore, it should be decided whether to prioritize the use of nominal debt stocks in the analysis or to

focus more on the present value of debt. Next, one should consider whether to put the focus on debt stock ratios or on debt-service analysis: is it debt overhang or the crowding-out of current resources that is the key constraint? Finally, one should decide whether to focus more on external or on fiscal sustainability—that is, whether a country basically is constrained more by foreign exchange issues or by recurrent fiscal gaps, and thereby choose the most appropriate debt indicator denominators (exports, GDP, or government revenues).[10]

In the second step, when the key constraints are identified and appropriate indicators are chosen, DSA applies the basic dynamics formulas, such as those derived before, to the current values of the indicators to derive their medium-to-long-term evolution. Again, this should be done on the foundation of most-likely base values for the key macroeconomic variables involved in the dynamics. For this, the IMF and the World Bank have designed templates—one for fiscal and one for external debt analysis—that can be adjusted to fit a specific country situation. The templates look at the role of endogenous dynamics, as well as the role of primary fiscal and noninterest current account balances. For LICs, it is important that the dynamics explicitly take into account the importance of budgetized grants and other non-debt-creating flows, as well as the use of "exceptional financing."[11]

Next to highlighting the evolution under a baseline scenario, it is crucial to perform the stress tests described in step three to determine the impact of possible shocks and alternative outputs of key macroeconomic variables. Scenarios can be based on historic volatilities or can take into account changed structures and likely new near-future threats (such as the impact of HIV/AIDS) or opportunities as well as needs (such as those related to the MDGs and the increased focus on poverty reduction). Following the discussion of the human development approach to debt sustainability, a case could be made routinely to include in those stress tests one scenario involving the projected amount of spending needed to meet the MDGs or other similar objectives put forward in the country's poverty reduction strategy.

The final step produces borrowing policies. The overall picture of the medium-term evolution of key debt indicators should feed into policy prescriptions regarding future borrowing. For LICs, this typically refers to a minimal grant element required in future borrowing. Here again a latent conflict often is detected between requirements to meet debt sus-

tainability in a conventional way and borrowing policies linked to meeting poverty reduction and MDG needs. It also is important to note that DSA often has been performed jointly by the IMF and the World Bank on the basis of country input. Now, however, it is growing more common for countries (especially within the HIPC Initiative context) to conduct their own DSAs using the same tools and formulas as the IMF and World Bank use, largely thanks to capacity-building assistance provided.

Debt Sustainability Concepts Used in the HIPC Initiative and the Impact of the Initiative

The best-known operational debt sustainability framework has been the one devised to guide debt relief decisions for the HIPC Initiative. Started in 1996, the initiative explicitly aimed to use the debt relief instruments to reduce to a sustainable level the participating countries' debt burden. The purpose of this section is not to evaluate the initiative in detail for there is a large body of literature on the topic.[12] We give only a brief overview of the framework used.

The HIPC Initiative sustainability framework focuses on the stock concept for deriving threshold indicators. The present value definition, rather than nominal stocks, is used to reflect the relative degree of concessionality of the country's debt. The particular thresholds use elements of both the fiscal and external sustainability frameworks. More precisely, there are two key ratios: (1) a ratio of the net present value of debt to exports that should remain below 150 percent (external window), and (2) a ratio of the net present value of debt to government revenue that should remain below 250 percent. HIPCs can qualify for this fiscal window if their economies are sufficiently open, as indicated by an exports-to-GDP ratio of at least 30 percent and a government revenue-to-GDP ratio of at least 15 percent (to reduce moral hazard). These thresholds resulted from a 1999 modification of the original HIPC Initiative into the Enhanced HIPC Initiative in an attempt to provide broader, deeper, and faster debt relief (the original HIPC targets were set at 200–250 percent for the ratio of the net present value of debt to exports, and at 280 percent for the ratio of the net present value of debt to government revenue). The Enhanced HIPC Initiative also set targets for indicators related to a debt-service concept, fixed at 15–20 percent of exports (down from 20–25 percent in the original framework), but these are merely indicative targets.

It is important to note that the HIPC Initiative framework relies on data concerning external public and publicly guaranteed debt (outstanding and disbursed), including arrears. This means that domestic debt is not included in the fiscal window.[13] Similarly, private external debt is not included in the external window.[14] A three-year average is used for calculating exports (of goods and services). Government revenue is central government revenue, excluding grants. Currency-specific commercial interest reference rates are used as discount rates for calculating the present value of the debt. The amount of relief is determined on the basis of a DSA. Note that the debt thresholds used in the Enhanced HIPC Initiative are not to be considered as an elaborated framework of debt sustainability (IMF 2003). The level of the thresholds was set to provide a cushion against external shocks and some safety margin to avoid debt crises.

Recently, the World Bank and the IMF have revised the framework of the Enhanced HIPC Initiative to better tailor DSA and thresholds to country circumstances, and they have broadened this into a forward-looking debt sustainability framework for all LICs. Originally, under the Enhanced HIPC Initiative, the thresholds were set at a uniform level for all countries. To provide future-oriented guidance on new borrowing and lending decisions, the new framework adapts the thresholds according to the performance of the countries as measured through the Country Policy and Institutional Assessment (CPIA).[15] Table 2.1 provides the new indicative thresholds for different levels of policy quality. Furthermore, the new debt sustainability framework adopted by the Bretton Woods insti-

Table 2.1. Debt Sustainability Thresholds and Policy Performance for IDA14
percent

	CPIA score		
Debt sustainability indicator	*Strong (CPIA ≥ 3.75)*	*Medium (CPIA 3.25–3.75)*	*Poor (CPIA ≤ 3.25)*
Present value of debt/GDP	50	40	30
Present value of debt/exports	200	150	100
Present value of debt/revenue	300	250	200
Debt service/exports	25	20	15
Debt service/revenue	35	30	25

Source: IMF and IDA 2005.
Note: CPIA = Country Policy and Institutional Assessment; IDA14 = the 14th replenishment of the IDA's resources, agreed in 2005.

tutions takes into account debt sustainability indicators for determining country allocations within the IDA. Previously, debt sustainability did not enter directly into determining IDA allocation because all IDA credits were in the form of highly concessional loans. Under IDA13 (the 13th replenishment), however, donors decided that up to a fixed percentage of IDA allocations could be in the form of grants to reduce future debt burdens. More important, IDA14 country allocations include debt sustainability issues in a direct way by distributing country allocations between loans and grants, with a higher proportion of grants when debt sustainability is more of a concern (IDA 2005a).

Alternative Approaches to Analyzing Debt Sustainability

The policy-making implications of the debt sustainability concepts discussed so far are quite straightforward: debt-service sustainability often requires government action and adjustment at the direct government public budget level (revenue and spending behavior), influencing fiscal balances and/or actions to enhance a country's capacity to generate foreign exchange and influencing trade balances and current accounts. At the same time, governments should aim at stimulating economic growth (important also for endogenous debt dynamics), as well as reducing poverty. This very well may lead to situations of inherent conflict, whereby debt service is prioritized and debt sustainability is achieved or maintained at the expense of growth and/or poverty reduction. Moreover, it may lead to situations in which debt itself acts as an obstacle to growth and poverty alleviation. This difficult trade-off or dilemma has given rise to a number of alternative definitions of or approaches to debt sustainability—notably the debt overhang approach and the human development approach. These alternative approaches are more normative in nature than the preceding ones because they more explicitly hint at some optimal debt levels that could be targeted.

Debt Overhang

One alternative way to define debt sustainability refers to the presence of *debt overhang*, defined as the negative effect of a large debt burden on economic growth (Krugman 1988). As such, the threshold for debt sus-

tainability could be defined as the level just before debt starts to have a negative impact on economic growth. This level might differ from the debt sustainability thresholds used in traditional fiscal and external approaches because the absence of debt-servicing problems does not necessarily mean that there is no negative effect of debt on growth.

Debt overhang occurs when an excessive debt stock introduces negative externalities in the economy beyond the transfer of resources, first on investment and adjustment and then on economic growth. This is because high (current and future) debt transfers lead to anticipation by domestic and foreign investors of future higher taxes and increased uncertainty, both of which create a disincentive effect on the present investment or adjustment decisions of an indebted country. The concept of "investment" has to be viewed broadly here. It refers to accumulation in human capital—through spending on education and health care—as well as in physical capital, such as machinery and infrastructure. It also captures many types of policy reforms, including structural reforms and macroeconomic stabilization, whose long-term benefits may come at the expense of short-term costs.

There are many potential incentive effects at work in the debt overhang approach. First, debt overhang may reduce the willingness of debtor governments to execute adjustment programs because a possibly large part of the benefits will go to foreign creditors as increased debt-service transfers and will not stay in the country as increased consumption or additional investment capacity. Second, debt overhang may depress private investment (by both domestic and foreign investors). Indeed, because the public sector has to service the debt, public spending will have to be reduced, internal transfers will have to be operated from the private sector, or, most likely, both actions will occur. As a consequence, not only public investment but also private (domestic and foreign) investment will be depressed as expected external transfers are transmitted throughout the economy in the form of higher uncertainty and large expected taxes of different kinds. These effects reduce perceived future net after-tax returns on investment and increase the risk premium on investment. Additionally, the public sector may be tempted to use taxes on financial intermediation, such as the inflation tax. This negative incentive effect can be particularly pronounced in the sectors most likely to be tapped for public financing, be it the monetary and financial systems, the manufacturing sector, or trade activities.

Apart from the investment disincentive effect, debt overhang also will scare off potential new foreign lenders. In the absence of seniority, new loans enter the same pool as old loans and instantly metamorphose into as poor a financial claim as the old loans. Furthermore, as long as the old claims stand undiminished, the new lenders will have to share the fruits of any improved creditworthiness with the old lenders. This depresses the return to the potential new lenders, and keeps them from doing business with the debtor countries. As a consequence, these countries are shunned in international credit markets and cannot borrow as they otherwise could. Some high-yielding investments, which investors would undertake notwithstanding the disincentive effect described earlier, may thus go unexploited because of a lack of financing (Diwan and Rodrik 1992).

Through those various channels, debt overhang therefore acts as a brake on economic growth, beyond siphoning off public resources for debt service. This line of reasoning then generally is turned into an argument in favor of debt relief because it can be claimed that debt reduction has a more beneficial effect than an equivalent amount of aid injected in a debt-ridden economy. The difference resides in the stimulating effect on the private sector stemming from debt relief, made possible by the reduced foreign claim on future gains. By selecting debt relief, the donor ensures that the proceeds of economic growth remain within the economy. Political features also are important: debt relief increases domestic acceptance of austerity because the burden of reforms is perceived to be shared with creditors.

The debt overhang hypothesis also gives rise to the concept of a debt Laffer curve (Krugman 1988), suggesting that expected payments to creditors might even start to decrease with higher debt at high debt ratios because of this debt overhang effect. Again this can be turned into an argument in favor of debt relief. For countries with high levels of debt, it might be in creditors' self-interest to grant some debt relief because it would lead to higher expected payments. Empirical studies, predominantly using information from the secondary market of value-impaired debt (such as Claessens 1990; Cohen 1991) do seem to validate the existence of the debt Laffer curve and the position of some countries at the "wrong side" of the curve, where creditors collectively benefit from granting debt relief. Yet the available evidence in this area must be treated with caution. The apparent disincentive effect of a large debt on investment, and hence on growth, may reflect instead the fact that low investment re-

sults from the general dismal state of the economy in some countries where a large debt overhang is just another reflection of the conditions. Results from most early studies using a linear relationship between debt and growth show that the strength of the association between debt and growth varies substantially according to the selection of the debt indicator and the model specification. Upon suggestion that this relationship between debt and growth might follow a nonlinear inverted U—that is, following the Laffer curve argument—nonlinear specifications are better.

The more recent studies do seem to point to a higher effect of debt on growth. But the magnitude of the effect varies substantially across specifications, and it presents large cross-country variation. Patillo, Poirson, and Ricci (2002) showed that the average effect of external debt on growth is negative when the debt stock exceeds 160–170 percent of exports or 35–40 percent of GDP; they also found that the marginal effect of external debt on growth is negative in a very wide range of 30–115 percent of exports for nominal debt (or 30–295 percent of exports with debt expressed in present value), or between 5 percent and 90 percent for the nominal stock-to-GDP ratio (and between 5 percent and 50 percent for present value of the debt-to-GDP ratio). Patillo, Poirson, and Ricci (2004) showed that this debt overhang effect is stronger in countries with policies and institutions of weak quality, and with lower aid flows. In a way that is similar to the World Bank and IMF framework that will be discussed below, this would call for a country-specific determination of debt sustainability thresholds. Finally, Clements, Bhattacharya, and Nguyen (2004) showed that a substantial reduction in the debt stock for HIPCs is associated with an annual increase of approximately 1.0 percent in per capita income, and that it could accelerate growth indirectly by about 0.5 percent a year in some HIPCs if a substantial percentage of the debt relief were directly channeled into public investment. The study also hinted that this effect will be largely realized when envisaged HIPC debt relief is executed.

Debt Sustainability from a Human Development Perspective

A more radical alternative approach is often referred to as the *human development approach* to debt sustainability and debt relief. This approach prioritizes the MDGs instead of conventional debt sustainability, and it states that even if a country has the resources to pay its contractual debt

service, current debt service might crowd out public spending of resources needed to reach substantial poverty reduction or the achievement of the other MDGs. As such, debt sustainability is defined as that level where debt service no longer crowds out MDG-priority public spending. This introduces a concept of "affordable" debt service linked to the MDGs, and the notion is translated into an argument in favor of debt relief—preferably in terms of debt-service relief. Clearly, reducing debt service can benefit the recurrent expenditure budget directly. In most LICs, if we postulate the existence of a recurrent-fiscal gap, applying this alternative debt sustainability concept might be very effective in relaxing this gap.

In practice, the approach can be operationalized in many different ways. The crowding-out effect on priority spending by debt service could be minimized by establishing upper limits on debt-service ratios (debt service related to government revenue or GDP). One prominent proposal along these lines was suggested by Birdsall and Williamson (2002). Another was pioneered in a Catholic Agency for Overseas Development (CAFOD) article by Northover, Joyner, and Woodward (1998), and extended by Berlage et al. (2003). We describe below the basic algebra of this approach.

The CAFOD proposal works in the following way. Define for each country the tax-revenue base as $Y - A$, where Y is GDP and A is nontaxable income. The proposal suggests taking as A all incomes below the poverty line of $1 a day per person, and then defining the standard revenue as equal to $a\ (Y - A)$. This is obtained by applying to Y a standard-tax rate a. The "net feasible revenue" is then the standard revenue minus B, where B is an allowance for basic human needs. Net feasible revenue measures the government resources available to meet other public expenditures, including debt service. When the net feasible revenue is negative, any amount of debt is "unsustainable" and should be cancelled outright. When the net feasible revenue is positive, sustainable debt service is defined as an acceptable proportion b of net feasible revenue to be devoted to debt service. Therefore, the sustainable debt service is equal to $(b.a)\ (Y - A) - bB$. This can be rewritten as $c(Y - C)$, with $c = b.a$, $C^* = b.a.A + b.B$, and $C = C^*/c$. This estimation may result in a negative figure if the allowance for basic needs exceeds standard revenue. Hence, the final formula is a definition of sustainable debt service (*SDS*) as a suitable fraction c of an adjusted national income $Y - C$ whenever the latter is positive. That is,

$$SDS = c.max\,[0, Y - C]. \tag{2.10}$$

Instead of computing this on an annual basis, Berlage et al. (2003) turned this into a 15-year scheme (until 2015) to make sure that debt is fully extinguished after 2015 and that it stays sustainable throughout the period by including an insurance scheme. For this, the authors first computed net feasible revenue. If negative, the country's debt is cancelled outright. If positive, one must calculate *SDS* according to equation (2.7) and go to the next step. That next step consists of multiplying the calculated *SDS* by 15 to obtain the net present value of debt that will be amortized in 15 years by that *SDS* (using a real discount rate equal to the rate of growth of real GDP). One then compares the result with the country's net present value of outstanding debt (call it *NPV*), and retains the lower of the two figures, which can be denoted by *NPV**. The corresponding debt service, *SDS**, is equal to *NPV** divided by 15.

The final step consists of comparing *SDS** with *SDS*. If *SDS** = *SDS* as given by equation (2.6), then by construction it is equal to $c(Y - C)$. The country benefits from a debt reduction equal to the difference between *NPV* and *NPV**. For each of the next 15 years (each year being t), the country will transfer into a trust fund (called PAIR) an amount equal to $SDS_t^* = c.max\,[0, Y_t - C_t]$. At the end of the 15 years, no further service will be required on the initially outstanding debt. That debt will be extinct. If *SDS** < *SDS*, the country does not benefit from a debt reduction because its outstanding debt is sustainable. However, it is still desirable to let the country benefit from the embedded insurance mechanism. If we define $d = NPV^*/NPV$ (=*SDS*/SDS*), with $d<1$, the country's annual service then will be $SDS_t^* = d.c.max\,[0, Y_t - C_t]$. Again, no further service will be required after the year 2015.

Thus, the basic conceptual setup by Northover, Joyner, and Woodward (1998) is to determine the resources needed for the country to attain the MDGs first, and then attempt to achieve them with the resources generated by the public sector in the government budget (on the basis of an objective minimal "tax rate" on GDP, to avoid moral hazard). The affordable debt service is determined on the basis of the resources left after spending everything needed to achieve the MDGs and other priority spending (rather than de facto prioritizing debt service).

It is clear that applying this kind of approach in practice would be fraught with difficulties, including problems of moral hazard. Putting for-

ward such an alternative approach, however, has influenced actual debt relief practices in a more indirect way. Applying this approach has shown that, for a number of countries (although not for all of them), no resources would be left for debt service. Related to these proposals are calls for a more "independent" determination of debt sustainability or "insolvency."[16] Finally, the more ethical approach to debt sustainability uses the concept of odious debt, again to advocate for full debt repudiation (Birdsall and Williamson 2002, appendix C; Kremer and Jayachandran 2002). Several of these approaches and concepts have been used by advocates, especially within the nongovernmental organization community, to call for full debt cancellation across the board. It can be argued that these approaches have contributed to the international community recently having granted additional debt relief through the MDRI.

An Explicit MDG Perspective in the MDRI

One requirement of the HIPC Initiative is for participating countries to increase their poverty-reducing expenditure after receiving the debt relief. This means that some countries may struggle to meet poverty reduction and MDG goals while maintaining debt sustainability (Fedelino and Kudina 2003). This has been documented by country-case research. Edwards provided an interesting example by introducing a model that explicitly considers the role of domestic debt and computes the fiscal policy path that is compatible with aggregate fiscal sustainability (2002b) and with external sustainability (2002a) in the post-HIPC era. Applying the model to the case of Nicaragua illustrates the challenges in the post-HIPC period. Under a reasonable set of assumptions regarding future GDP growth, concessional loans, and donations, the required fiscal adjustment appears to be severe and threatens to jeopardize implementation of the country's poverty reduction strategy. Such case studies and, more generally, some countries' continued difficulty in remaining on a sustainable debt path even after implementing the HIPC Initiative have reinforced the call for a broadened framework. It was this call that became the basis for the additional debt relief granted in the MDRI.

At its Gleneagles Summit in July 2005, the G-8 called on the African Development Bank, the IMF, and the World Bank to provide additional debt relief by cancelling all the remaining debt owed to those three institutions by a sample of LICs—more precisely, owed by those countries that have or will soon have achieved the completion point under the

HIPC Initiative. Later, this proposal became officially referred to as the Multilateral Debt Relief Initiative. Since then, the governing boards of these institutions have responded positively to the proposal, and implementation has started.[17]

This additional debt relief is limited to post–completion point HIPC Initiative countries,[18] and its purpose was not to allow countries to regain debt sustainability in a conventional sense because, in principle, HIPC debt relief already had achieved this. As such, at least in theory, MDRI debt cancellation refers explicitly to a human development type of debt sustainability concept, linking the debt relief explicitly to the need to provide additional resources to selected LICs to meet the MDGs. The entry conditions for the recipient countries refer to (1) broad macroeconomic stability, (2) overall commitment by the recipient government to implement a poverty alleviation strategy in the framework of the PRSP initiative, and (3) a minimal quality of public expenditure management in the recipient country. These requirements should facilitate the use of the resources freed by this additional debt cancellation for expenditures that actually further the MDGs or similar objectives put forward in the country's PRSP.

As of the date of writing, all completion point HIPC countries have been benefiting from the MDRI (as have two non-HIPCs, Cambodia and Tajikistan, which receive only additional IMF debt relief). This has resulted not only in close to $19 billion[19] in additional debt relief in present value terms, but also in a considerable reduction in the recipient country's debt sustainability indicators. One concern among donors is that this reduction in debt ratios might trigger a new buildup of debt in the future, posing additional challenges to the forward-looking debt sustainability framework for LICs in place (see IMF and World Bank 2006).

Conclusion

The analysis of debt sustainability in LICs cannot be based simply on models that have been developed for industrial countries because a number of characteristics that are rather specific to LICs must be taken into account. LICs receive little external private capital flows, whether in debt or equity form. The relative absence of foreign investment in equity form limits the use of non-debt-creating external flows (other than grants) to finance foreign exchange gaps. By contrast, LICs sometimes receive sub-

stantial amounts of official grants that reduce the foreign exchange gap and supplement domestically generated government revenues, and thereby relax the fiscal gap and, potentially, the recurrent-fiscal gap. This is more the case when grants are in the form of budget support and when fungibility of spending is not hampered by earmarked aid flows. On the other hand, given its relative importance in the government budget, aid uncertainty and volatility may complicate debt sustainability analysis.

LICs also receive sometimes highly concessional official financing apart from grants. This makes it more likely that the return on investment does exceed its cost, and the debt dynamic is sustainable. It also introduces a potentially large difference between the nominal debt stock (book value) and the present value of future debt service, and it increases the appeal of looking at debt sustainability indicators based on present value concepts of debt. Some LICs often rely on substantial amounts of exceptional financing to cover both fiscal and foreign exchange gaps. Exceptional financing refers here particularly to the use of arrears on (external) debt, debt rescheduling, and/or debt forgiveness (possibly including nonconcessional IMF lending).[20] Also, government's use of domestic debt to finance fiscal gaps generally is limited in LICs, even if domestic debt markets are developing rapidly in some countries. Moreover, private sector external debt generally is limited. Given all these factors, LICs typically experience a large vulnerability to external shocks of all kinds. Therefore, it is important to look for mechanisms that may link debt service more explicitly to the capacity to pay.

Taking into account the context of LICs, the objectives of this chapter have been to present a number of basic concepts related to debt sustainability, to highlight their dynamic nature, and to explain how the concepts and related indicators can inform public policy in LICs. To judge whether a given debt evolution hampers debt sustainability, we must determine indicative threshold values for the relevant variables. It must be emphasized, however, that many factors influencing debt sustainability are not easily brought together in a few thresholds. Over time, a large body of literature has emerged that tries to look at what indicators are most relevant and what indicators are likely threshold values. Studies have tried to identify the probability of debt unsustainability on the basis of (ex post) analysis that discriminates between problem and no-problem countries, distinguishing those countries that have experienced debt serv-

icing problems from those that have not, regardless of the measures that were used.

The empirical studies using these frameworks rely on limited dependent variable models, such as discriminant analysis or logit and probit analysis; or on more sophisticated methods, such as binary recursive trees (as in Manasse and Roubini 2005). When judged against the target of providing unified, absolute thresholds, the success of these models to date has been fairly modest. Results typically are being used as guiding values rather than as absolute threshold values, especially when determining debt sustainability on the basis of one or a few indicators only. This conclusion was reaffirmed by recent analysis (Kraay and Nehru 2006). The authors started from a novel way of defining a problem situation of debt sustainability, labeled "debt distress," and configured it as a situation in which a country resorts to exceptional finance in any of three forms: (1) building significant arrears on external debt; (2) rescheduling the debt, notably in the Paris Club; and (3) using nonconcessional IMF lending. Using probit analysis, they showed that cross-country and time variations in the incidence of debt distress are explained not only by debt burden indicators but also by differences in the quality of institutions and policy (for example, as measured by the World Bank's CPIA Index), and by vulnerability to external shocks. IMF analysis basically has confirmed those results, which have directly fed into the new forward-looking debt sustainability framework of the IMF and the World Bank (IMF and IDA 2005; IMF and World Bank 2006). Indicative threshold values, however, have been and will continue to be used in operational work.

In the future, the probability of debt problems likely will remain high in many LICs, and is likely to increase sharply if large-scale finance required to meet the MDGs is provided, even at historic levels of concessionality (Kraay and Nehru 2006). Therefore, a richer framework of debt sustainability is called for, one in which the use of simple debt burden indicators is extended by adding indicators for quality of policies and shocks and by taking into account the needs of poor countries. The existence of difficult trade-offs also suggests that the targeted level of sustainable debt should vary (positively) with the quality of its policies and institutions, and (negatively) with the vulnerability to shocks that the country experiences: country-specific debt thresholds reflecting both policies and shocks are simply more appropriate.

Beyond the issue of the choice of indicators for DSA, what ultimately matters for policy is trying to assess how much "fiscal space" a country has to pay for public spending and what its sources of financing could be without compromising the country's solvency in the long run. The concept of fiscal space, which is broader than that of debt sustainability, refers to a government's ability to undertake spending without impairing its solvency—that is, without compromising its present and future ability to service its debt (Heller 2005). In recent years, this concept has emerged as an important subject for debate in the international community. It was used initially to advocate for traditional fiscal deficit targets not limiting the ability of a government to finance growth-enhancing projects. More broadly, it refers to any constraints to particular public expenditures that could lead to higher growth and better achievements of poverty reduction and social goals, such as the MDGs. Fiscal space can be created by improving the effectiveness of public expenditure, increasing fiscal revenues, mobilizing grant aid, and/or issuing new internal or external debt. A country thus can create fiscal space within or outside its existing borrowing parameters.

Several policy packages that would not jeopardize solvency can be pictured, but the choice of specific policies cannot be determined without considering country circumstances. Improving the effectiveness of public expenditures can liberate public resources for allocation to priority sectors, but also should enhance growth and contribute to improving the country's solvency. Similarly, increasing fiscal revenues can create fiscal space and have a positive impact on growth and solvency when additional revenues result mainly from enlarging the tax base, applying new nondistortionary taxes, harmonizing tax rates and tax systems, and improving tax compliance. Grants also can contribute to creating fiscal space in a productive manner, but the funds should be used to finance pro-growth expenditures that are consistent with the rest of the budget and that take into account multisectoral synergies. Finally, some countries may choose to generate fiscal space by increasing the use of their internal or external borrowing capacity. The ultimate result will depend on how the additional resources affect the solvency equation through the exchange rate, interest rates, and growth channels.

Notes

1. A fiscal gap is a special subcategory of the savings gap. Its existence assumes that it is impossible to transfer the private savings slack into budgetary resources either by increased taxation or by the inflation tax. Otherwise, there can be only one overall savings gap.
2. As the abstract of Ley's article nicely states, there is "nothing new here—just a concise yet detailed presentation of the simple but inexorable algebra of sustainability."
3. See Borensztein and Mauro (2004) for an extensive analysis in favor of issuing GDP-linked debt, and the comment to their proposal by Claessens (Borensztein and Mauro 2004, pp. 208–10) that focuses mainly on practical difficulties. Other recent proposals focus on the establishment of a new IMF facility to provide insurance or contingency financing to protect against these shocks.
4. There is actually a small body of related literature on the concept of "original sin"—that is, a situation in which the domestic currency cannot be used to borrow abroad and sometimes even domestically (see Eichengreen and Hausmann 1999). Proposals to allow countries to borrow abroad in domestic currency are discussed in Hausmann and Rigobon (2003).
5. For some Francophone African countries, one might use the euro instead.
6. For detailed solvency constraint models, see Agénor and Montiel (1996).
7. Although many economists view "net worth" as the right fiscal concept to focus on, most of them agree that it is difficult to measure. Easterly (1999) has tested empirically the implications of a fiscal model introducing the net worth concept, but has not provided an operational estimate of this variable, given existing difficulties.
8. A notable example is the situation that exists in Uganda. For more information, see IMF (2003, p. 26).
9. For an early review of the program, see IDA and IMF (2002).
10. Simple indicators, such as the exports-to-GDP ratio (χ) or the government revenues-to-GDP ratio (ρ), can help a lot in determining the key constraints: low values (relative to group averages) on these simple indicators already detect a key vulnerability. For an application in Bolivia, see IMF (2003, p. 23).
11. The templates together with country applications can be found at the World Bank's Web site (http://www.worldbank.org). For a manual describing how to perform a DSA for LICs, see World Bank (2006b). For a detailed analysis of fiscal debt sustainability using this framework for a stylized typical LIC with a high debt, see Baldacci and Fletcher (2004).

12. For detailed reviews, see Birdsall and Williamson (2002), Gunter (2002), World Bank (2003, 2006a), Sun (2004), UNCTAD (2004), Chauvin and Kraay (2005, 2006), and IDA and IMF (2006).
13. Exclusion of domestic debt is consistent with the treatment by the Paris Club, and it is explained by the difficulties involved in including in the analysis the HIPCs' rather narrow internal financial markets.
14. Hjertholm (2003) has shown that the thresholds used for the two windows are not analytically comparable.
15. Beginning in 2005, the CPIA is fully disclosed, and it has been renamed the IDA Resource Allocation Index.
16. These proposals generally are known as referring to a "fair and transparent arbitration procedure." For an early proposal along these lines, based on the internationalization of the U.S. Bankruptcy Code, see Raffer (1990); for a more recent proposal, see Sachs (2002).
17. For details, see African Development Bank Group (2006), IMF (2006), and IDA (2005b), respectively. See especially IDA and IMF (2006) for an overview of the current status of implementation. Recently, the Inter-American Development Bank also decided to join the MDRI and grant additional debt relief to its post-HIPCs.
18. An exception to this limitation is IMF debt relief for which LICs with a per capita annual income of less than $380 also qualify (IMF 2006).
19. A billion is 1,000 millions.
20. The extensive use of exceptional financing itself can be used as an indicator to identify unsustainable debt. Kraay and Nehru (2006) denoted this as "debt distress" and used the concept to derive sustainable debt thresholds.

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