Debt Relief and Fiscal Sustainability

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Abstract: In this paper I analyze the relationship between fiscal policy, *aggregate public sector debt* sustainability, and debt relief. I develop a methodology to compute the fiscal policy path that is compatible with aggregate debt sustainability in the post-HIPC era. The model explicitly considers the role of domestic debt and quantifies the extent to which future debt sustainability depends on the availability of concessional loans at subsidized interest rates. The working of the model is illustrated for the case of Nicaragua, a country that in 2002 had one of the highest net present value of public external debt to GDP ratios.
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1 Introduction

In the fall of 1996, and as part of a new approach towards poverty reduction, the World Bank and the International Monetary Fund developed a wide-ranging plan to provide debt relief to many of the poorest nations in the world. This program, which has come to be known as the Highly Indebted Poor Countries (HIPC) debt relief initiative, contemplates the forgiveness of a fraction of these countries' bilateral and multilateral debt. An eligibility requirement for participating in the program is that the country in question develops a well-defined poverty alleviation program. The funds freed up by debt relief should be devoted to effective social programs that, in the eyes of the multilateral institutions, will contribute to the reduction of poverty. In addition, the country is expected to implement broad economic reforms aimed at strengthening the productive sector and increasing the growth potential. By early 2002,

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22 poor countries had made substantial progress in negotiating debt relief within the context of the HIPC initiative (see Table 1 for a list of countries).[1]

Table 1: *HIPC Initiative: 22 HIPCs Having Reached Their Decision Points*

Country	GDP per capita (US$)	Country	GDP per capita (US$)
Benin	380	Mauritania	380
Bolivia	1,010	Mozambique	230
Burkina Faso	240	Nicaragua	430
Cameroon	580	Niger	190
Gambia, The	340	Rwanda	250
Guinea	510	São Tomé & Príncipe	270
Guinea-Bissau	160	Senegal	510
Guyana	760	Tanzania	240
Honduras	760	Uganda	320
Madagascar	250	Zambia	320
Malawi	190		
Mali	240	Simple average	389

Source: World Bank.

The amount of actual debt relief contemplated in the HIPC initiative varies from country to country. A basic principle guiding the program is that in the post-HIPC era the country in question will be able to achieve "*external sector sustainability,*" and thus will not require new rounds of debt forgiveness.[2] In a recent document, the World Bank and the IMF (2001: 4) have stated this principle in the following way: "[B]y bringing the net present value (NPV) of *external debt* down to about 150 percent of a country's exports or 250 percent of a country's revenues at the decision point, it aims to eliminate this critical barrier to longer term debt sustainability for these countries." (emphasis added)

[1] In September 1999, the initiative was revised and the eligibility criteria were standardized. This revised program has come to be known as "The Enhanced HIPC Initiative." Details on the day-to-day progress in the HIPC initiative can be found in the following IMF-maintained web site: http://www.imf.org/external/np/exr/facts/hipc.htm

[2] The World Bank and the IMF (2001) recognize that there is no assurance that these countries will not face debt problems in the future. According to this document, achieving sustainability will require a rapid and stable rate of economic growth.

A particularly important question refers to the type of fiscal policy that will be consistent with maintaining debt sustainability in the post-HIPC era. As the above quote suggests, the multilaterals have focused on policies required to stabilize the ratio of *external debt* to exports. A comprehensive answer to the fiscal sustainability question, however, requires going beyond the country's external debt, and to consider the sustainability of *aggregate* public sector debt, including both foreign as well as domestic debt. While many HIPC nations have little domestic debt, others have accumulated a significant stock of debt that has been purchased by the local banking sector, pension funds, and individuals. Indeed, by ignoring the role of domestic debt, sustainability analyses may underestimate the magnitude of the fiscal effort that poor countries will have to make in the post-HIPC era. Very large required fiscal adjustments could have, in turn, important political economy consequences. First, the adjustment may result in a reduction of funds available to implement the anti-poverty programs. And second, very large reductions in primary expenditures may result in political instability and reform backtracking.

The purpose of this paper is to analyze the relationship between fiscal policy, *aggregate public sector debt* sustainability, and debt relief. In particular, I develop a methodology to compute the fiscal policy path that is compatible with aggregate debt sustainability in the post-HIPC era. This model explicitly considers the role of domestic debt, and quantifies the extent to which future debt sustainability depends on the availability of concessional loans at subsidized interest rates. The working of the model is illustrated for the case of Nicaragua, a country that in 2002 had one of the highest net public external debt to GDP ratios: approximately 280 percent. Nicaragua is the second-poorest country in the Western Hemisphere (after Haiti), and for the last decade has relied very heavily on foreign assistance and aid. The results from this analysis indicate that unless Nicaragua receives substantial concessional aid in the future, its public sector debt is likely to, once again, become unsustainable. The reason for this is that in the absence of large volumes of concessional assistance, Nicaragua would be forced to undertake a fiscal adjustment in the order of 6–8 percent of GDP to achieve sustainability. Adjustments of this magnitude usually crowd out social expenditures, including poverty alleviation programs, and tend to create political economy difficulties. Although this result has been obtained for the specific case of Nicaragua, the methodology used is very general and underlies three general problems that affect most HIPC

countries: First, ignoring the existing domestic debt burden is likely to result in highly misleading analyses. Second, the international community should be aware that sustainability would depend very heavily on the future availability of subsidized concessional loans. And third, sustainability models based on overly optimistic assumptions about future GDP growth are likely to be highly misleading and will underestimate the required fiscal effort and the amount of foreign aid and debt forgiveness.

The rest of the paper is organized as follows: In Section 2, I develop a model of debt relief and fiscal sustainability. In Section 3, the model is calibrated and simulated for the case of Nicaragua. In Section 4, I deal with some extensions and I present results from a sensitivity analysis. In Section 5, I discuss the connection between grants, donations, and fiscal effort. Finally, in Section 6, I present some concluding remarks.

2 Debt Sustainability, Debt Relief, and Fiscal Policy in a Poor Country: An Analytical Framework

An economy is said to have achieved fiscal sustainability when the ratio of public sector debt to GDP is stationary and consistent with the overall demand – both domestic and foreign – for government securities.[3] An important byproduct of public sector sustainability analyses is the computation of the public sector's *primary balance* compatible with a sustainable and stable debt to GDP ratio.[4] This "sustainable primary balance" has become an increasingly important variable in macroeconomic analyses, and is now routinely included as a disbursement condition in IMF programs. The World Bank and the IMF have analyzed the external debt sustainability issue using a "present value constraint" approach (see, for example, World Bank and IMF (2000), Laechler (2001), and World Bank (2002)). This approach consists of analyzing whether, once

[3] Strictly speaking this definition is valid under the so-called "accounting approach." As discussed below, under the "present-value approach" the definition of sustainability is slightly different. However, there are important equivalences between both approaches. Naturally, the debt ratio may be calculated relative to an alternative benchmark, such as exports. On sustainability analyses see, for example, Milesi-Ferretti and Razin (1996, 2000) and Edwards (2002).

[4] The primary balance is defined as the nominal balance, excluding interest payments.

debt forgiveness is granted, the net present value of the public sector's external debt is equal to, or less than, the present discounted value of the public sector's stream of public revenues under certain fiscal policy settings.[5] Three main characteristics of the World Bank–IMF approach should be noted: (1) It assumes implicitly that if the country implements an appropriate set of economic reforms, the debt to GDP ratio achieved immediately after debt relief will be sustainable in the longer run. (2) It assumes (also implicitly) that in the long run the country in question will be able to maintain access to concessional financing. And (3), the "net present value" of external debt used in these calculations is lower than the "face value" of the debt. This follows because the subsidized interest rate used to calculate the future stream of debt service is lower than the market interest rate used to discount this future debt service stream.[6]

The sustainability model developed in this section expands previous work in several directions. First, and as pointed out above, it goes beyond foreign debt, and explicitly considers the role of domestic debt in analyzing fiscal sustainability.[7] Second, I consider the case where the country's access to subsidized debt declines gradually through time. This is an important assumption, and is based on the notion that after reaching a certain GDP per capita, countries tend to rely mostly on debt issued on commercial terms. Third, it assumes that the economy takes some time to reach the steady state. The model, thus, also focuses on the dynamic behavior of the key variables during the transition. And fourth, I explicitly discuss the way in which real exchange rate changes – and more specifically real exchange rate devaluations – affect fiscal sustainability.

2.1 The Basic Framework

I consider two types of public debt: (A) Concessional (or subsidized) debt granted by the multilaterals or other donors, denoted by *DC*, and (B) debt issued on commercial terms, *DD*. In what follows I call this

[5] See Cuddington (1995). As pointed out above, the HIPC initiative target is to achieve a net present value of the debt to exports ratio of 150 percent.

[6] Naturally, using the net present value of debt is equivalent to using the face value and explicitly introducing the subsidized interest payments in the future cash flows.

[7] Laechler (2001) and World Bank and IMF (2001) developed, independently from this study, a methodology for evaluating fiscal sustainability that also incorporates the role of domestic debt.

debt "domestic debt," and I assume that only local residents hold it. The analysis, however, can be easily extended to the case where both domestic and foreign residents hold this type of debt.

In the base case I assume that both types of debt are denominated in foreign currency (US dollars).[8] At any moment in time total public sector debt is the sum of DC and DD; also, at any time t, the net increase in total (dollar-denominated) debt is equal to the sum of the increase in these two types of debt: $\Delta D_t = \Delta DC_t + \Delta DD_t$. From the "uses" side, net debt increases (ΔD_t) are equal to interest payments, plus the primary balance (pb), minus seignorage. More specifically,

$$\Delta D_t = \left(r_t^C DC_{t-1} + r_t^D DD_{t-1}\right) + pb_t - \Delta B_t, \tag{1}$$

where r_t^C and r_t^D are *nominal* interest rates on each type of debt. ΔB_t is the change in the monetary base; this corresponds to seignorage, and its actual magnitude will depend on the rate of domestic inflation, as well as on the monetary base to nominal GDP ratio. In this equation, a positive pb denotes a primary deficit and, thus, a negative number is a primary surplus. In what follows I denote nominal GDP (measured in dollars) as Y.

The main interest of this study is computing the primary balance (deficit) to GDP ratio that is consistent with fiscal "sustainability" in the post-debt forgiveness period. That is, I am interested in the value of $(pb/Y)_t$ that, in the post-HIPC era, is consistent with changes in aggregate public sector debt that are on a sustainable path. A sustainable path of aggregate public sector debt is defined, in turn, as a situation where increases in each type of debt are in line with the pace at which national and international creditors desire to accumulate government-issued securities. Without loss of generality I assume that in the post-HIPC period the donor community is willing to increase its accumulation of this country's concessional debt at an annual rate of θ.[9] Likewise, I assume that holders of domestic debt are willing to accumulate it at a rate equal to β.

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[8] This assumption corresponds quite closely to the case of many of the poorer nations; extending the analysis to the case where part of DD is denominated in domestic currency is rather simple.

Moreover, in order to simplify the presentation in the basic analysis, I work with GDP in dollars. In Section 4, however, I introduce valuation problems and consider explicitly the evolution of the real exchange rate and its effect on the dollar value of GDP.

[9] It is easy to generalize the analysis – as we do later – to the case were θ changes through time.

In the long run, an important constraint is that neither the concessional nor the domestic debt to GDP ratios grow without limit. In other words, in the long run these ratios should be bounded. Denoting the real rate of GDP growth by g, and the rate of dollar inflation by π^*, these constraints may be written as[10]

$$\theta \leq (g + \pi^*); \quad \beta \leq (g + \pi^*). \tag{2}$$

These conditions are required to assure convergence of the primary balance ratio (pb/Y) through time (see (3), for details). With regard to seignorage, in the base case I assume that the domestic rate of inflation is π, and that the income elasticity of demand for money is unity. Alternative assumptions regarding the income elasticity of the demand for money can be easily incorporated into the analysis (see Section 4).

From (1), and using the sustainable rates of growth of both types of debt (θ and β), a very general expression for the dynamic behavior of the sustainable primary balance to GDP ratio may be obtained. This is the maximum primary deficit to GDP ratio that, at any period of time t, is consistent with the aggregate debt to GDP ratio being on a sustainable path.[11]

$$\begin{aligned}(pb_t/Y_t) \leq \big[\{\theta - r_t^C\}(DC_0/Y_0)e^{(\theta-g-\pi^*)(t-1)} \\ + \{\beta - r_t^D\}(DD_0/Y_0)e^{(\beta-g-\pi^*)(t-1)}\big] \\ \times [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0).\end{aligned} \tag{3}$$

Here (DC_0/Y_0) is the initial ratio of the face value of concessional debt to GDP.[12] Likewise, (DD_0/Y_0) is the initial domestic debt to GDP ratio, π is the (target) rate of domestic inflation, and (B_0/Y_0) is the initial ratio

[10] Since we are assuming that all debt is dollar-denominated, we can write the rate of growth of dollar-denominated GDP as the sum of the rate of real GDP growth, plus the rate of US inflation. If domestic currency-denominated debt is allowed, we would have to make a correction related to debt valuation issues. This "correction term," however, would only be relevant if there are changes in the real exchange rate. See the discussion below for greater details.

[11] Notice that in order to make this equation more operational, we have expressed most of the relevant variables as a percentage of nominal GDP.

[12] Notice that this model focuses on the "face value of debt." Naturally, a perfectly equivalent expression can be derived on the basis of the present value of debt. The approach followed here is, however, more transparent as it provides a clear description of the flows involved.

of base money to GDP.[13] In (3) the initial debt to GDP ratios (DC_0/Y_0) and (DD_0/Y_0) should be interpreted as the ratios prevailing immediately after the HIPC-sponsored debt reduction has been granted.

Equation (3) shows that the dynamic path for the sustainable primary balance depends on a number of key variables, including nominal interest rates on both types of debt, the rates of domestic and foreign inflation, the rate of growth of real GDP, and the sustainable rates of growth of both types of debt (θ and β). In the rest of this section, I investigate the way in which the availability of concessional financing and the rate of growth of GDP affect the sustainable primary balance.[14] Moreover, in what follows – and unless stated otherwise – I will assume that (3) holds with strict equality.

2.2 Concessional Debt and Sustainable Fiscal Policy

In order to organize the discussion, I consider four possible cases for the evolution of concessional loans through time. These cases go from a rather conservative scenario, where concessional loans are rolled over every year with no additional funds being available, to an optimistic one where concessional loans are assumed to grow at the same rate as nominal GDP. More specifically:

- **Case A:** It is assumed that maturing consessional loans are fully rolled over. That is, the *nominal value* of concessional debt is maintained constant through time, and no net funds (in nominal dollars) are provided. In terms of the model, this means that $\theta = 0$.
- **Case B:** Under this scenario I assume that the donor community is willing to maintain *the real dollar value* of the concessional debt at the level it had immediately after debt reduction has been granted. In this case, $\theta = \pi^*$ and concessional debt grows at the international rate of inflation. To the extent that the rate of growth of real GDP (g) is positive, the concessional debt to GDP ratio will gradually converge towards zero.

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[13] It should be noted that the results obtained from this model refer to the fiscal effort under the assumption that the country achieves a certain target rate of growth and a certain target rate of domestic inflation. In that sense these are conditional results and not the outcome of a general equilibrium exercise.

[14] See the discussion in IMF and IDA, "Nicaragua: Decision Point Document for the HIPC Initiative," December 7, 2000, on possible donors' behavior in the post-HIPC period. We return to this issue in the next subsection where we present our computations for Nicaragua.

- **Case C**: It is assumed that the international community is willing to increase concessional funds in real terms. More specifically, in this case I assume that $\theta = \phi g + \pi^*$, where $0 \leq \phi < 1$. (Notice that I have ruled out the case where $\phi = 1$. That case corresponds to scenario D.)
- **Case D**: This is the most optimistic of all four scenarios, and assumes that the donor community is willing to provide sufficient concessional funds as to maintain the concessional debt to GDP ratio at the immediate post-HIPC level. In this case, $\theta = g + \pi^*$.

Existing studies on the HIPC initiative have mostly concentrated on Case D, and have assumed that after the HIPC initiative the country will continue to have access to substantial amounts of concessional financing. As pointed out above, however, this appears to be an optimistic assumption that will tend to underestimate the type of fiscal effort required to maintain fiscal sustainability. In that sense, the approach followed in this paper is more general and provides insights on the relationship between donors' behavior and the type of fiscal policy effort required to achieve sustainability.

In order to concentrate on the effects of concessional funds availability, in the rest of this section I assume that domestic debt (DD) grows at a rate equal to that of nominal GDP. This means that $\beta = g + \pi^*$, and that the ratio of DD to GDP will remain constant and equal to its period 0 level. In Section 4, however, I explore the way in which the results change if this assumption is altered.

Table 2 summarizes the basic results for the primary balance and debt ratios under the four alternative scenarios defined above. While the rows refer to the four scenarios, the columns provide the key results from this analysis. In column (a), I present the equations for the dynamic behavior of the sustainable primary balance. Column (b) contains the equations for the steady-state sustainable primary balance. In column (c), I present the stationary concessional debt to GDP ratio (DC/Y). Finally, in column (d), I present the stationary domestic debt to GDP ratio (DD/Y). The equations in columns (b)–(d) correspond, then, to the case when $t \to \infty$. A number of insights emerge from this table:

- In the first three cases (A–C) the steady-state ratio of concessional debt to GDP – which is reported in column (c) – is equal to zero. The three cases differ, however, on the speed at which this steady state is achieved (see the simulations in Section 3).

Table 2: *Sustainable and Steady-State Primary Balances and Debt to GDP Ratios under Alternative Scenarios*

(a) Dynamic path of "sustainable" primary balance to GDP ratio	(b) Steady-state "sustainable" primary balance to GDP ratio	(c) Stationary concessional debt to GDP ratio	(d) Stationary domestic debt to GDP ratio
	Case A: $\theta = 0$		
$(pb_t/Y_t) = \big[- r_t^C(DC_0/Y_0)e^{-(g+\pi^*)(t-1)} + \{g + \pi^* - r_t^D\}(DD_0/Y_0)\big] [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(pb/Y) = \{g + \pi^* - r^D\} (DD_0/Y_0)[1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(DC/Y) = 0$	$(DD/Y) = (DD_0/Y_0)$
	Case B: $\theta = \pi^*$		
$(pb_t/Y_t) = \big[\{\pi^* - r_t^C\}(DC_0/Y_0)e^{-g(t-1)} + \{g + \pi^* - r_t^D\}(DD_0/Y_0)\big] [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(pb/Y) = \{g + \pi^* - r^D\} (DD_0/Y_0)[1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(DC/Y) = 0$	$(DD/Y) = (DD_0/Y_0)$
	Case C: $\theta = (\phi g + \pi^*)$		
$(pb_t/Y_t) = \big[\{\phi g + \pi^* - r_t^C\}(DC_0/Y_0) e^{-\phi g(t-1)} + \{g + \pi^* - r_t^D\}(DD_0/Y_0)\big] [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(pb/Y) = \{g + \pi^* - r^D\} (DD_0/Y_0)[1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(DC/Y) = 0$	$(DD/Y) = (DD_0/Y_0)$
	Case D: $\theta = (g + \pi^*)$		
$(pb_t/Y_t) = (D_0/Y_0)\big[(g+\pi^*) - r^C(DC_0/D_0) - r^D(DD_0/D_0)\big] [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(pb/Y) = (D_0/Y_0)\big[(g+\pi^*) - r^C(DC_0/D_0) - r^D(DD_0/D_0)\big] [1/(1+g+\pi^*)] + (g+\pi)(B_0/Y_0)$	$(DC/Y) = (DC_0/Y_0)$	$(DD/Y) = (DD_0/Y_0)$

Note: For explanations, see the text.

- In Case D, the steady-state concessional debt to GDP ratio is equal to its value in the initial period, i.e., ratio prevailing immediately after the debt is forgiven.
- In all four cases the steady-state ratio of domestic debt to GDP is equal to the period 0 level. This is the result of assuming that $\beta = g + \pi^*$. In Section 4, however, this assumption is relaxed and the case where (DD/Y) changes through time is investigated.
- Cases A, B, and C have the same steady-state sustainable primary balance. The equation for this steady-state sustainable primary balance is equivalent to the one obtained in debt-dynamic models for middle-income countries, or countries that have no access to subsidized debt. Notice that the steady-state primary balance can correspond either to a deficit or to a surplus.
- Under Case D, the country's fiscal effort is lower than under any of the other three cases. The reason for this is that under Case D, the country has continuous access to subsidized financing.
- The long-run sustainable primary balance under Case D may be either a deficit or a surplus. If the weighted average of interest rates is higher than the nominal rate of GDP growth, the country is indeed likely to be required to run a primary surplus in the long run.
- The equations in column (b) show that the existence of domestic debt has an important effect on the long-run primary balance. Indeed, from these equations it is clear that ignoring domestic debt may result in a substantial underestimation of the fiscal effort required to maintain fiscal sustainability.

3 Debt Sustainability under Alternative Donor Behavior: A Case Study

In this section, I illustrate the working of the model using data for Nicaragua, one of the poorest countries in the Western Hemisphere, and one that for decades has been burdened by an extremely high external debt. In 2000, Nicaragua's total external debt had reached a face value of $6.8 billion, representing 280 percent of the country's official GDP.[15] The

[15] There is general agreement that Nicaragua's official GDP underestimates "real" GDP. There is less agreement, however, on the magnitude of this underestimation.

World Bank and IMF (2000) have calculated that in terms of net present value this debt represented $4.5 billion, or approximately 180 percent of GDP.[16] The enhanced HIPC initiative contemplates reducing Nicaragua's external debt burden to a net present value of approximately $1.32 billion or 150 percent of exports. This, in turn, amounts to 55 percent of official GDP.[17]

In addition to its very high external debt, Nicaragua has other characteristics that make it an ideal candidate for a case study. First, it also has a very high domestic debt burden – in excess of 50 percent of GDP in 2002. This ratio is several times higher than that of other HIPC nations. As Table A.1 in the Appendix shows, the average domestic debt to GDP ratio in a group of HIPC countries is only 16.5 percent. Second, as shown in Table 3, during the last few years Nicaragua has run very large fiscal deficits, with the primary deficit to GDP ratio averaging almost 5 percent during 1999–2001. This deficit level is much larger than those of other Latin American nations. In fact, most countries in the region run a primary surplus. Third, Nicaragua relies very heavily on grants and donations by NGOs to finance its public sector expenditures (see Section 5 for a discussion). And fourth, remittances from migrants represent a very important source of current account financing.[18] A useful exercise is to compare the sustainable primary balance that emerges from the model's simulation with the actual balances during the last few years. This comparison will provide some guidelines on the type of fiscal adjustment – if any – that Nicaragua will have to undertake after the HIPC-sponsored debt relief is granted.

While according to the World Bank (2002) "adjusted" GDP is approximately 1.7 times the official figure, other experts have argued that the adjustment should be closer to 1.3 times. For the sake of consistency, in the rest of the paper I use official GDP data. The results, however, would not be affected significantly if adjusted data are used. I briefly deal with this issue in the concluding remarks section.

[16] This figure assumes that Nicaragua has used all "traditional" debt relief mechanisms available to it under the so-called "Naples terms" (see World Bank and IMF 2000: Tables 3 and 4).

[17] See World Bank and IMF (2000) for details. It is expected that debt relief under this initiative will be granted in mid-2003.

[18] On the behavior of the current account in Nicaragua see, for example, World Bank and IMF (2001), Edwards and Vergara (2001), and Edwards (2002).

Table 3: *Consolidated Public Sector Balance in Nicaragua: 1995–2001 (percentage of GDP)*[a]

	1995	1996	1997	1998	1999	2000	2001
Total current revenues	29.2	31.3	34.2	36.9	35.4	32.9	32.9
Total current expenditures	40.3	47.4	44.3	44.3	51.1	48.6	53.6
Overall balance before grants	−11.1	−16.1	−10.0	− 7.4	−15.7	−15.7	−20.7
Overall balance after grants	− 5.0	− 7.3	− 4.6	− 3.6	− 7.0	− 8.3	−12.0
Primary surplus	− 1.0	− 4.0	0.4	1.5	− 2.1	− 3.7	− 9.0

[a] In 1999, Hurricane Mitch resulted in a major emergency and generated an increase in foreign assistance. The figures for 2001 refer to the 2001 budget.

Source: World Bank (2002).

3.1 Parameterization of the Model

In this sub-section, I briefly present the parameter values used in the sustainability exercise for Nicaragua (see Table 4 for a summary).

Post-HIPC Concessional Debt to GDP Ratio, (DC_0/Y_0): The HIPC contemplates reducing the net present value of Nicaragua's external debt, relative to exports, to 150 percent. In terms of the face value of the external debt, this would imply reducing the stock of external debt to approximately $4.2 billion, or 167 percent of GDP. Thus, the value of (DC_0/Y_0) used in the baseline computations reported in this section is equal to 1.67.[19]

Post-HIPC Domestic Debt to GDP Ratio, (DD_0/Y_0): Both the Treasury and the Central Bank of Nicaragua have issued large volumes of domestic debt. This stock of domestic debt – which in late 2001 reached 52.5 percent of GDP – has different origins, including bonds issued by

[19] Notice that the correspondence of NPV and face value of debt will depend on the interest rate used to discount the future flows of debt payments, as well as on the interest rate on concessional debt. The figures used in this exercise correspond to those considered by the multilaterals. See World Bank and IMF (2001) and Laechler (2001) for details.

Table 4: *Parameter Values Used in Nicaragua's Sustainability Exercises*

Parameter	Symbol	Assumed value	Comments and sources
Initial concessional debt to GDP ratio	(DC_0/Y_0)	167 percent	Taken from HIPC documents, including the "Decision Point Document."
Initial domestic debt to GDP ratio	(DD_0/Y_0)	52.5 percent	Taken from different official documents (see text).
Rate of accumulation of concessional debt going forward	θ	Different assumptions, depending on the scenario being considered.	Some scenarios assume that even in the steady state Nicaragua has a considerable debt to GDP ratio; others assume that in the very long run Nicaragua graduates from concessional assistance.
Rate of accumulation of domestic debt	β	$(g + \pi^*)$	Assumes that initial ratio is maintained.
Rate of growth of nominal GDP in US dollars	$(g + \pi^*)$	We assume several alternative values for real growth (g), ranging from 2 percent to 7 percent; we assume a rate of US inflation of 2.5 percent per year.	The sustainable path of the primary balance will critically depend on the growth assumptions.
Interest rate on concessional funds	r^C	3.0 percent	Taken from projections made by IDA and IMF.
Interest rate on commercial funds	r^D	15 percent	Taken from projections based on comparable countries.
Monetary base to GDP ratio	(B_0/Y_0)	0.09	Actual ratio in 2001; number is changed in various simulations.
Domestic rate of inflation	π	8.5 percent	The baseline case considers 8.5 percent, alternative numbers in sensitivity analysis.

the treasury to compensate individuals whose property was expropriated during the Sandinista rule, and bonds issued by the Central Bank to support commercial banks that failed during the late 1990s and early 2000s (see Edwards and Vergara (2001), World Bank (2002), and Laechler (2001) for details). In the baseline computations I use a value of (DD_0/Y_0) equal to 0.525. It is important to notice that this domestic debt ratio (at 52.5 percent of GDP) is high from a comparative perspective. This is so, quite independently of the fact that Nicaragua has already a very large concessional debt burden and that Nicaragua's official GDP is likely to be significantly underestimated. Even if, as was argued earlier, "true" GDP is 1.3–1.7 times the "official" GDP, the domestic debt burden is still high.

Rate of Future Accumulation of Debt, θ and β: I use the values corresponding to scenarios A–D discussed above. For Scenario C, I assume that $\phi = 1/2$ and, thus, that $\theta = ((g/2) + \pi^*)$. See Table 4 for details.

Rate of Growth of Nominal GDP (in US$): The World Bank and the IMF (2000) have assumed that Nicaragua's real GDP will grow at 5.5 percent in real terms in the period 2002–2008 and at 5 percent into the longer run. In this study, however, and in order to investigate the role of growth on sustainability, I consider alternative values of real GDP growth, ranging from 2 to 7 percent per year. With respect to US inflation I assume 2.5 percent per year during the period under study.

Interest Rates: I assume a baseline value of the concessional rate of interest of 3 percent in nominal terms. This is the result of considering an interest rate of 0.75 percent on multilateral debt, and an interest rate on bilateral debt of 4.75 percent in nominal terms (see Edwards and Vergara (2001) and World Bank and IMF (2000)). With respect to the commercial rate of domestic debt, I assume in the base line scenario that the government can borrow, on average, at 15 percent in nominal US dollar terms. Although this number may appear to be on the high side, it is not. In fact, this interest rate is in line, in terms of the implicit country risk premium, with rates in some Latin American nations such as Brazil and Venezuela that have access to international financial markets. Also, it is slightly lower than the average interest rate paid by the Central Bank of Nicaragua during the recent past.[20] In Section 4, I consider, however, alternative values for the cost of domestic debt.

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[20] See Banco Central de Nicaragua, *Informe Sobre la Deuda Interna* (various issues).

Domestic rate of inflation: In the baseline sustainability exercise I assume that Nicaragua maintains an inflationary target of 8.5 percent per annum. This rate of inflation, in turn, is assumed to be the result of a combined international inflation of 2.5 percent and a rate of devaluation of the cordoba (crawling peg) of 6 percent per year. I do consider, however, alternative inflationary targets in the sensitivity analysis reported in Section 4.

3.2 Nicaragua's Sustainable Fiscal Policy Path: Basic Results

Table 5 contains the results from computing the minimally sustainable path for the primary balance, under the four scenarios described above. In this table a positive number refers to a *primary deficit*, and year 1 should be interpreted as the first year after debt forgiveness has been granted.[21] That is, the smaller the number in this table (i.e. the more negative it is), the larger the fiscal effort required to achieve sustainability. The importance of these results is that they provide some guidance on the "minimal primary fiscal effort" that Nicaragua has to make, every year, in order for its debt to GDP ratios to remain on a path compatible with both the availability of concessional resources and the amount of domestic debt that investors are willing to hold.[22]

The most salient results from Table 5 are the following:

- Depending on the scenario and on the assumed rate of GDP growth, the sustainable balance may be either a *deficit* (a positive number in Table 5), or a *surplus* (a negative number).
- The sustainable primary balance is highly sensitive to the rate of real GDP growth. The higher the rate of growth, the smaller the fiscal effort that the country has to make. Consider, for instance, Scenario C: For a rate of real GDP growth of 4 percent per year, the country has to run a sustainable primary surplus of 0.7 percent of GDP during the first year. Then, this surplus has to increase gradually, reaching

[21] Thus, if debt relief is granted – as expected, in mid-2003 – year 1 in Table 5 should be interpreted as referring to year 2004.

[22] It should be noticed that, from an NPV perspective, the results presented in this table provide only one of the possible primary balance paths compatible with satisfying the NPV constraint. The paths in this table have a particular significance, however, since they assure that in every year the debt to GDP ratios are (exactly) on their sustainable paths.

1.1 percent of GDP in year 10, and stabilizing at 3.1 percent of GDP in the steady state. If the rate of growth were 5 percent, then the country would be able to run a primary *deficit* of 0.66 percent of GDP during the first year. On the other hand, a lower rate of GDP growth will result in a lower sustainable deficit. At a 3 percent annual real GDP growth, a surplus of 2.1 percent of GDP is needed in year one.

- Only under two scenarios (C and D), and for rates of real GDP growth in excess of 5 and 3 percent, respectively, is the sustainable primary balance path characterized, every year, by a *primary deficit.*

Table 5: *Nicaragua's Sustainable Primary Balance Path under Alternative Scenarios*

Year	Rate of real GDP growth (%) 2.00	3.00	4.00	5.00	6.00	7.00
			Scenario A			
1	−9.17	−8.49	−7.81	−7.15	−6.50	−5.86
2	−8.96	−8.23	−7.52	−6.82	−6.13	−5.45
3	−8.76	−7.99	−7.24	−6.50	−5.78	−5.07
4	−8.56	−7.76	−6.98	−6.21	−5.46	−4.73
5	−8.38	−7.55	−6.74	−5.95	−5.17	−4.42
6	−8.20	−7.34	−6.51	−5.70	−4.90	−4.13
7	−8.03	−7.15	−6.30	−5.46	−4.66	−3.87
8	−7.87	−6.97	−6.09	−5.25	−4.43	−3.64
9	−7.72	−6.80	−5.91	−5.05	−4.22	−3.43
10	−7.69	−6.71	−5.74	−4.64	−3.90	−3.31
Steady state	−4.38	−3.74	−3.11	−2.49	−1.89	−1.29
			Scenario B			
1	−5.17	−4.53	−3.89	−3.27	−2.65	−2.05
2	−5.16	−4.51	−3.86	−3.23	−2.61	−2.00
3	−5.14	−4.48	−3.83	−3.20	−2.57	−1.95
4	−5.13	−4.46	−3.81	−3.16	−2.53	−1.91
5	−5.11	−4.44	−3.78	−3.13	−2.49	−1.86
6	−5.10	−4.42	−3.75	−3.10	−2.46	−1.82
7	−5.08	−4.40	−3.73	−3.07	−2.42	−1.79
8	−5.07	−4.38	−3.70	−3.04	−2.39	−1.75
9	−5.06	−4.36	−3.68	−3.01	−2.36	−1.72
10	−4.92	−4.21	−3.42	−2.84	−2.19	−1.65
Steady state	−4.38	−3.74	−3.11	−2.49	−1.89	−1.29

Table 5: *continued*

			Scenario C			
1	−3.53	−2.11	−0.71	0.66	2.01	3.33
2	−3.54	−2.13	−0.76	0.58	1.89	3.18
3	−3.55	−2.16	−0.81	0.51	1.78	3.02
4	−3.55	−2.18	−0.85	0.43	1.68	2.88
5	−3.56	−2.20	−0.89	0.36	1.57	2.74
6	−3.57	−2.22	−0.94	0.29	1.47	2.60
7	−3.58	−2.25	−0.98	0.23	1.37	2.47
8	−3.59	−2.27	−1.02	0.16	1.28	2.34
9	−3.59	−2.29	−1.06	0.10	1.19	2.22
10	−3.69	−2.42	−1.11	0.00	1.01	2.02
Steady state	−4.33	−3.69	−3.07	−2.45	−1.84	−1.24
			Scenario D			
1	−1.93	0.26	2.42	4.54	6.63	8.67
2	−1.93	0.26	2.42	4.54	6.63	8.67
3	−1.93	0.26	2.42	4.54	6.63	8.67
4	−1.93	0.26	2.42	4.54	6.63	8.67
5	−1.93	0.26	2.42	4.54	6.63	8.67
6	−1.93	0.26	2.42	4.54	6.63	8.67
7	−1.93	0.26	2.42	4.54	6.63	8.67
8	−1.93	0.26	2.42	4.54	6.63	8.67
9	−1.93	0.26	2.42	4.54	6.63	8.67
10	−1.93	0.26	2.42	4.54	6.63	8.67
Steady state	−1.93	0.26	2.42	4.54	6.63	8.67

Note: A positive number means that the country is able to run a primary deficit. For details on the computations, see the discussion in the text and the equations in Table 2.

- Under Scenarios A and B, which are the more conservative ones in terms of the future availability of subsidized loans, a *primary surplus* is required for all rates of growth considered in this analysis. This would imply a major adjustment relative to the current fiscal situation in Nicaragua. This result is particularly important, since it illustrates the extent to which Nicaragua's future fiscal efforts are sensitive to future evolutions of concessional assistance.
- Even under Scenario C – which is characterized by real increases in concessional aid through time – a primary surplus is required every year if the rate of growth of real GDP is lower than 5 percent of GDP.

- It is possible, for instance, that by overestimating the future availability of "soft loans," analysts will underestimate the extent of fiscal adjustment required in the years to come. I return to this issue below.

Table 6 contains the evolution of the concessional debt to GDP ratio under the four basic scenarios. As before, the computations have been made for a number of alternative future rates of growth of real GDP. The rate at which this ratio declines in Scenarios A–C depends on the assumed rate of growth of GDP. In every one of these three scenarios, the rate of decline of the concessional debt to GDP ratio is gradual. For instance, under Scenario C, if GDP grows at an annual rate of 5 percent per year, after ten years the ratio of concessional debt to GDP is still over 100 percent of GDP.[23] In scenario D, which assumes the greatest availability of subsidized loans in the future, this ratio remains constant at 167 percent.

Which of these four scenarios is more "realistic"? The World Bank and IMF (2000) have projected that Nicaragua will receive an average disbursement of net concessional loans in the neighborhood of US$200 million per year during the first five years of the post-HIPC era. This projection is similar to the figures obtained from Scenario C, which assumes that in the post-HIPC period concessional loans grow at a rate of $\theta = ((g/2) + \pi^*)$. In that sense, then, Scenario C may be considered as the most "realistic" of the four. For this reason, in Sections 4 and 5, on extensions and the role of grants and donations, I center on this scenario (results for the other scenarios are available on request). Notice that the actual average primary deficit for 1999–2001 (Table 3) exceeds every single entry in Panel C of Table 5.

4 Extensions

In this section, I extend the model in several directions, and I investigate the way in which changing some of the key assumptions affects the basic results presented in Tables 5 and 6. In particular, I deal with the following extensions: (1) The case where the real exchange rate is initially overvalued by 10 percent, relative to its long-run equilibrium value. (2) A different (higher) rate of domestic inflation. (3) The case

[23] By construction, in all three scenarios the domestic debt to GDP ratio remains constant at 0.525. We consider alternative cases in our sensitivity analysis below.

where the initial ratio of domestic debt to GDP is not the same as the steady-state equilibrium ratio. And (4) I investigate how a lower cost of domestic debt is likely to affect fiscal sustainability. In order to maintain the discussion focused as above, I report the results from these four extensions for the case where $\theta = ((g/2) + \pi^*)$, or Scenario C.

4.1 Real Exchange Rate Changes

The sustainability exercises presented above assume that the real exchange rate (RER) remains stable at its initial level in the indefinite

Table 6: *Evolution of Nicaragua's Concessional Debt to GDP Ratio under Alternative Scenarios*

Year	Rate of real GDP growth (%) 2.00	3.00	4.00	5.00	6.00	7.00
			Scenario A			
1	167.00	167.00	167.00	167.00	167.00	167.00
2	159.65	158.06	156.49	154.93	153.39	151.87
3	152.63	149.60	146.64	143.74	140.89	138.10
4	145.91	141.60	137.41	133.35	129.41	125.59
5	139.49	134.02	128.77	123.72	118.87	114.20
6	133.35	126.85	120.66	114.78	109.18	103.85
7	127.48	120.06	113.07	106.48	100.28	94.44
8	121.87	113.64	105.95	98.79	92.11	85.88
9	116.51	107.55	99.28	91.65	84.61	78.10
10	111.39	101.80	93.04	85.03	77.71	71.02
Steady state	0.00	0.00	0.00	0.00	0.00	0.00
			Scenario B			
1	167.00	167.00	167.00	167.00	167.00	167.00
2	163.69	162.06	160.45	158.86	157.27	155.71
3	160.45	157.27	154.16	151.11	148.12	145.18
4	157.27	152.63	148.12	143.74	139.49	135.37
5	154.16	148.12	142.31	136.73	131.37	126.22
6	151.11	143.74	136.73	130.06	123.72	117.68
7	148.12	139.49	131.37	123.72	116.51	109.73
8	145.18	135.37	126.22	117.68	109.73	102.31
9	142.31	131.37	121.27	111.94	103.34	95.39
10	139.49	127.48	116.51	106.48	97.32	88.94
Steady state	0.00	0.00	0.00	0.00	0.00	0.00

Table 6: *continued*

			Scenario C			
1	167.00	167.00	167.00	167.00	167.00	167.00
2	165.34	164.51	163.69	162.88	162.06	161.26
3	163.69	162.06	160.45	158.86	157.27	155.71
4	162.06	159.65	157.27	154.93	152.63	150.35
5	160.45	157.27	154.16	151.11	148.12	145.18
6	158.86	154.93	151.11	147.38	143.74	140.19
7	157.27	152.63	148.12	143.74	139.49	135.37
8	155.71	150.35	145.18	140.19	135.37	130.71
9	154.16	148.12	142.31	136.73	131.37	126.22
10	152.63	145.91	139.49	133.35	127.48	121.87
Steady state	0.00	0.00	0.00	0.00	0.00	0.00
			Scenario D			
1	167.00	167.00	167.00	167.00	167.00	167.00
2	167.00	167.00	167.00	167.00	167.00	167.00
3	167.00	167.00	167.00	167.00	167.00	167.00
4	167.00	167.00	167.00	167.00	167.00	167.00
5	167.00	167.00	167.00	167.00	167.00	167.00
6	167.00	167.00	167.00	167.00	167.00	167.00
7	167.00	167.00	167.00	167.00	167.00	167.00
8	167.00	167.00	167.00	167.00	167.00	167.00
9	167.00	167.00	167.00	167.00	167.00	167.00
10	167.00	167.00	167.00	167.00	167.00	167.00
Steady state	167.00	167.00	167.00	167.00	167.00	167.00

Note: In these computations, I have used Nicaragua's official GDP figures. For details on the computations, see the text and the equations in Table 2.

future. Naturally, this need not be the case. Indeed, it is possible that initially the RER is overvalued with respect to its equilibrium value. This situation would affect the calculations of the primary balance sustainable path. More specifically, in this case the equation for the sustainable primary balance in period t becomes

$$(pb_t/Y_t) = \left[\left\{g/2 + \pi^* - r_t^C\right\}(DC_0/Y_0)e^{\{(dRER/RER)-(g/2)\}(t-1)} + \left\{g + \pi^* - r_t^D\right\}(DD_0/Y_0))e^{(dRER/RER)(t-1)}\right] \times [1/(1+g+\pi^*)] - (g+\pi)(B_0/Y_0), \quad (4)$$

where $(dRER/RER)_t$ is the change in the real exchange rate in period t. The *RER*, in turn, is assumed to evolve through time according to the

following equation:

$$RER_t = RER^* + (RER^* - RER_0)e^{-\gamma t}. \quad (5)$$

Here, RER^* is the equilibrium real exchange rate, and γ is the rate at which RER disequilibria are eliminated through time.

Panel A in Table 7 contains the results for the sustainable path of the primary balance in Nicaragua under the assumption that the real exchange rate is originally 10 percent overvalued. All other assumptions used to make the computations in this table correspond to those of Scenario C.[24] As may be seen from these figures, the sustainable path is characterized by a somewhat tighter fiscal policy.

4.2 Domestic Inflation

The results presented in the preceding section assume that the rate of domestic inflation is equal to 8.5 percent per year. From a policy point of view, an important question is whether the country's fiscal effort would have to be different under alternative rates of domestic inflation. In fact, politicians are usually tempted to argue that at higher rates of inflation, the country will have to make a smaller fiscal effort. This, however, is not the case. Indeed, there is ample evidence suggesting that under most conditions the seignorage-maximizing rate of inflation is rather low – of the order of 5 percent per annum. This means that increases in the rate of inflation above what is considered in this paper are likely to reduce revenues from seignorage. This means that higher inflation would imply a greater fiscal effort for Nicaragua.[25] Panel B in Table 7 contains the simulation results under the assumption that the domestic rate of inflation increases to 12 percent per year. As may be seen, the results indicate that the required fiscal effort increases somewhat.

4.3 Changes in the Long-Run Domestic Debt Ratio

The simulation exercises reported in Section 3 assumed that (1) the ratio of concessional debt to GDP declines through time, and (2), the

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[24] In the computations, the partial adjustment coefficient γ was assumed to be 0.5.

[25] I performed a number of exercises assuming alternative rates of inflation. They did confirm the point made above. Notice, however, that an unexpected increase in the rate of inflation may result in short-run increases in seignorage. This situation would be short-lived, however, and in the medium to longer run, the country will be worse off.

domestic (commercial) debt to GDP ratio remains constant at its initial level (in the actual simulations, this ratio is assumed to remain at 0.525). There is no reason for the latter to be the case, however. Indeed, it is perfectly possible for the domestic debt to GDP ratio to change through time. Generally speaking, it is possible to argue that as the concessional debt to GDP ratio declines, domestic debt will increase until it reaches a new equilibrium.[26] In the case of Nicaragua, however, at 52.5 percent

Table 7: *Extensions and Sensitivity Analysis: Sustainable Primary Balance to GDP Ratio* (Scenario C)

	Rate of real GDP growth (%)					
Year	2.00	3.00	4.00	5.00	6.00	7.00
	A: Real exchange rate 10 percent overvalued					
1	−3.69	−2.20	−0.76	0.64	2.03	3.39
2	−3.69	−2.24	−0.82	0.56	1.91	3.24
3	−3.69	−2.26	−0.86	0.49	1.80	3.07
4	−3.67	−2.26	−0.90	0.42	1.69	2.91
5	−3.65	−2.26	−0.93	0.35	1.58	2.76
6	−3.63	−2.27	−0.96	0.28	1.47	2.62
7	−3.62	−2.28	−1.00	0.22	1.37	2.48
8	−3.62	−2.29	−1.03	0.15	1.28	2.35
9	−3.61	−2.30	−1.07	0.09	1.19	2.22
Steady state	−4.33	−3.69	−3.07	−2.45	−1.84	−1.24
	B: 12 percent inflation rate					
1	−3.64	−2.24	−0.88	0.46	1.78	3.08
2	−3.64	−2.27	−0.92	0.39	1.67	2.92
3	−3.65	−2.29	−0.97	0.31	1.56	2.77
4	−3.66	−2.31	−1.02	0.24	1.45	2.62
5	−3.67	−2.34	−1.06	0.17	1.35	2.48
6	−3.68	−2.36	−1.10	0.10	1.25	2.34
7	−3.68	−2.38	−1.14	0.03	1.15	2.21
8	−3.69	−2.40	−1.19	−0.03	1.05	2.08
9	−3.70	−2.42	−1.23	−0.10	0.96	1.96
Steady state	−4.44	−3.83	−3.23	−2.64	−2.07	−1.50

[26] In general, one would expect that an increase in the domestic debt ratio would require changes in the interest rate at which that debt is contracted. In this exercise, however, I assume that the domestic interest rate does not change. Results obtained under changing domestic interest rates are available on request.

Table 7: *continued*

	C: Decline of domestic debt from 52.5 percent to 45 percent					
1	−3.91	−2.48	−1.08	0.29	1.64	2.97
2	−3.86	−2.45	−1.08	0.26	1.57	2.85
3	−3.81	−2.42	−1.08	0.23	1.50	2.74
4	−3.76	−2.40	−1.08	0.20	1.43	2.62
5	−3.72	−2.38	−1.08	0.16	1.36	2.51
6	−3.68	−2.35	−1.08	0.13	1.29	2.41
7	−3.65	−2.34	−1.09	0.10	1.23	2.30
8	−3.61	−2.32	−1.10	0.06	1.16	2.20
9	−3.58	−2.30	−1.10	0.03	1.10	2.10
Steady state	−3.88	−3.02	−2.47	−1.92	−1.39	−0.87
	D: Cost of domestic debt at 12 percent					
1	−2.07	−0.66	0.72	2.08	3.41	4.73
2	−2.08	−0.69	0.67	2.00	3.30	4.57
3	−2.08	−0.71	0.63	1.93	3.19	4.42
4	−2.09	−0.73	0.58	1.85	3.08	4.27
5	−2.10	−0.75	0.54	1.78	2.98	4.13
6	−2.11	−0.78	0.50	1.71	2.88	3.99
7	−2.12	−0.80	0.45	1.65	2.78	3.86
8	−2.12	−0.82	0.41	1.58	2.69	3.73
9	−2.13	−0.84	0.37	1.52	2.59	3.61
10	−2.18	−0.93	0.32	1.48	2.47	3.34
Steady state	−2.87	−2.24	−1.63	−1.03	−0.43	0.15

Note: For details on the computations, see the discussion in the text.

of GDP, domestic public sector debt is already high by international standards.[27] This suggests that, if anything, it is possible that in the future Nicaragua's sustainable domestic debt to GDP will be lower. For this reason, and in order to consider a more conservative perspective, I calculated the sustainable primary balance path under the assumption that the domestic debt to GDP ratio declines gradually from its current 0.525 level to 0.45, a level that is still quite high from a Latin American comparative perspective. The results for the dynamic sustainable path are reported in Panel C of Table 7.[28] As may be seen, the magnitude of the

[27] See, for example, the data on domestic debt to GDP ratios for the Latin American nations in Table 8 of Goldman Sachs (2002).

[28] The actual equations used in these simulations are available on request.

fiscal effort experiences some important changes relative to the results reported in Table 5. For instance, if growth is assumed to be 5 percent of GDP, the sustainable fiscal deficit in year 2 declines to 0.26 percent of GDP; in the steady-state the country would have to run a primary surplus of little under 2 percent of GDP.[29]

4.4 The Cost of Domestic Debt

In Panel D of Table 7, I present the sustainable path for the primary balance under the assumption that the (nominal) cost of domestic debt is 12 percent. The results obtained indicate that, as expected, the fiscal effort in the post-HIPC era is quite sensitive to the cost of capital. The lower the cost of domestic debt, the lower the fiscal effort required in the post-HIPC period.

5 Grants, Donations, and Fiscal Adjustment after HIPC

The exercises presented above provide estimations for alternative sustainable paths for the primary balance, after the government has received grants, transfers, and "*donations.*" However, in most HIPC countries, including Nicaragua, future fiscal efforts will also be affected by the evolution of transfers and grants provided by the advanced nations and the NGOs. If these grants and transfers decline as a percentage of GDP, the magnitude of the fiscal adjustment has to be larger than otherwise. At any moment in time the public sector budget constraint is given by

$$pe + rD - t - G - \Delta B = \Delta D, \tag{6}$$

where pe is primary expenditure, rD refers to interest payments on all the public sector debt, t are taxes, G are grants and donations, ΔB is seignorage, and ΔD refers to net increases of aggregate public sector debt. Using the definition of primary balance (pb), this expression may be rewritten as follows:

$$pe - t = pb + G. \tag{7}$$

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[29] We also computed the path under the assumption that the domestic debt to GDP ratio increases to 0.60. Naturally, in this case the fiscal effort is somewhat – and only somewhat – reduced.

The left-hand side of (7) includes two policy variables – primary expenditure and taxes. The variables in the right-hand side, on the other hand, are pre-determined: *pb* is given by the analysis presented in the preceding sections, and *G* are grants and donations from the international donor community.

The World Bank and IMF (2000) have estimated that grants and transfers to the HIPC countries will decline in the post-debt forgiveness era. In the case of Nicaragua they are expected to decline from approximately 10 percent of GDP in 2000 to approximately 4 percent of GDP in the year 2007. According to these estimates, this decline will be significant beginning in the year 2004, and by 2005 grants and transfers will be 5 percent of GDP lower than in the year 2001. These projections further suggest that for most poor countries, life after HIPC will not be easy.

6 Concluding Remarks

A fundamental goal of the HIPC debt relief initiative is to help poor countries move towards macroeconomic sustainability. The World Bank and the IMF have argued that this will not be automatic, and will require implementing reforms that will help accelerate growth. The model developed in this paper shows that whether a country indeed achieves sustainability is likely to depend on three additional sets of variables: (1) the initial stock of domestic debt, (2) the availability of concessional loans going forward, and (3) the future path of grants and donations.

The application of the model to the case of Nicaragua illustrates the challenges of the post-HIPC period. In addition, the simulation results presented here show that the required fiscal effort depends very heavily on the rate of real GDP growth. This indicates that projections based on overoptimistic growth assumptions – a recurrent problem with the multilateral programs – will underestimate the required fiscal effort. Under a reasonable set of assumptions regarding future GDP growth, concessional loans and donations, the required fiscal adjustment appears to be severe. Whether this adjustment will affect the country's ability to implement an effective poverty reduction program is still an open question.

Appendix

Table A.1: *Overall Debt, Domestic Debt, and External Debt in Selected HIPC Countries: End of 2001*

	Overall debt	Domestic debt	External debt
Burkina Faso	76.8	13.0	63.8
Cameroon	93.2	15.6	77.6
Gambia, The	161.8	33.6	128.2
Guyana	261.2	84.3	176.9
Honduras	67.3	3.2	64.1
Madagascar	111.4	5.0	106.4
Niger	97.6	10.4	87.2
Rwanda	176.9	1.0	175.9
São Tomé & Príncipe	618.4	0.4	618.0
Senegal	9.9	9.9	n.a.
Uganda	68.8	5.2	63.6
Average	158.5	16.5	156.2

n.a.: not available.

Source: IMF staff estimates.

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