Session 1

ASSESSING PUBLIC LIABILITIES

FISCAL ADJUSTMENT IN EU COUNTRIES: A BALANCE SHEET APPROACH

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Introduction

Several European Union countries have recently implemented or are envisaging fiscal operations which improve budgetary figures but have no structural impact on government finances. Anecdotal evidence suggests that these "non-structural" measures, ranging from securitization of government assets to the transfer of expenditures off budget, have not been used so actively since the run-up to Maastricht of 1997, and according to some commentators have cast doubts on the effectiveness of the fiscal constraints inherent in the Stability and Growth Pact.[1]

This paper provides an evaluation of fiscal operations on public finances using a balance sheet approach, which reconciles budgetary flows with changes in the underlying stocks of government assets and liabilities.[2] This approach is useful for two reasons. First, a number of "non-structural" fiscal operations adopted in EU countries involve asset transactions, whose proper evaluation requires tracking the evolution of government assets in parallel to the evolution of liabilities. Second, this approach allows to investigate the degree to which changes in the size of gross public debt in EU countries over the last decade reflect corresponding changes in holdings of government assets or underlying improvements in net worth. Fiscal operations which entail a simultaneous reduction of both government assets and liabilities, such as, for example, a privatization operation whose proceeds are used to retire government debt, contribute to the objective of reducing the size of the public sector and can be desirable and efficiency-enhancing. However, an improvement in net worth, and not just a symmetric reduction of both sides of the public sector balance sheet, is needed if the objective is to finance a reduction in future taxation or make room for an increase in future spending needs. Distinguishing between these

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[1] Buti, Eijffinger, and Franco (2003) discuss this issue and put forward proposals to increase transparency. Eurostat (1998) contains a detailed country-by-country list of deficit- or debt-reduction measures adopted in 1997 whose classification was doubtful.

[2] The new Government Financial Statistics Manual (GFSM – see IMF, 2001) proposes a balance sheet approach, which uses the terminology of the System of National Accounts 1993 (EC, IMF, OECD, UN and World Bank 1993, henceforth SNA). Despite a few differences (some of them will referred to later), the SNA, GFS and ESA 95 manuals share the same accounting principles.

two types of debt reduction is clearly important in order to assess the sustainability of public finances.

Economists have debated for a long time advantages and shortcomings of various indicators of government accounts, as well as the appropriate definition of the public sector.[3] In particular, the literature has emphasized that "traditional" fiscal indicators, such as the fiscal balance and general government debt, may offer an incomplete picture of government fiscal operations because they do not reflect the evolution of government assets (in addition to government liabilities); fiscal and quasi-fiscal operations taking place outside the domain of the general government; future contractual and non-contractual obligations of the government (such as pension liabilities); and contingent liabilities. A balance sheet approach has been recommended, among others, by Buiter (1983). While it can potentially address issues arising from all of the "critical areas" mentioned above, the approach we adopt in this paper is designed to handle primarily the first issue and some aspects of the second.

The public finance literature has emphasized that the incentive to use "non-structural" fiscal measures – often described as "creative accounting" – may increase in the presence of fiscal rules, but there is surprisingly little theoretical and empirical work on the subject (see Milesi-Ferretti, 2003). Empirical work in this area is clearly hampered by measurement problems and has mostly focused on US states, that have clearly defined budget rules.[4] An exception is Easterly (1999), who argues that fiscal adjustment in a number of developing countries with World Bank and IMF programs relied heavily on running down government assets (primarily by reducing public investment and expenditure on operations and maintenance), implying that the reduction in government liabilities did not necessarily correspond to an improvement in government net worth. This paper provides direct evidence on whether changes in general government debt in EU countries are accompanied by changes in the opposite direction in government assets.

The remainder of the paper is organized as follows. Section 1 presents the framework of analysis. Section 2 classifies "non-structural" fiscal measures in broad categories and discusses several examples taken from European Union countries over the past few years. Section 3 presents a rough attempt at comparing changes in government debt with underlying changes in government net worth and Section 4 concludes.

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[3] See, for example, Buiter (1990), Blejer and Cheasty (1991) and references therein.

[4] Bunch (1991) shows that US states with constitutional debt limits use public authorities to circumvent borrowing restrictions, while von Hagen (1991) and Kiewiet and Szakaly (1996) find that constitutional limitations pertaining only to guaranteed state debt do not affect the total amount of debt issued by state and local public authorities.

1. Framework of analysis

The balance sheet approach we adopt is based on the 2001 Government Financial Statistics Manual (IMF, 2001). It takes the general government as the "unit of analysis" and focuses on changes in government net worth, an approach which is particularly useful for highlighting the budgetary impact of fiscal measures involving asset transactions.

1.1 Government balance sheet

The basic principles of this approach can be briefly summarized as follows:

- The government balance sheet is composed of three elements: on the asset side, the stock of government's non-financial assets K (the public capital stock) and the stock of financial assets FA; on the liability side, the stock of financial liabilities FL. The net worth of government is given by the difference between total assets and liabilities: $W = FA - FL + pK$, where *p* is the value of a unit of public capital. While the valuation of financial assets and liabilities is relatively straightforward, the appropriate valuation of non-financial assets – the public capital stock – is a much more complex issue, which is further discussed below (see also Buiter, 2001).
- Changes in the various items of the balance sheet can arise because of transactions, valuation effects and other changes.[5] Transactions reflect operations resulting in changes to stocks, which are accumulation or decumulation of assets and liabilities caused by mutually agreed interactions between institutional units. In addition to transactions, the stock of assets can change because of valuation effects (for example, fluctuations in prices or exchange rates), or because of other changes in the volume of assets, such as changes in classification.

1.2 Net worth, general government debt and the fiscal balance

General government gross debt, one of the two fiscal measures that the Maastricht criteria and the Stability and Growth Pact refer to, is given by the sum of (a) currency (notes and coins) and deposits, (b) securities other than shares (excluding financial derivatives), and (c) loans. It is closely related to the stock of gross financial liabilities *FL.* Among the differences (which are described in ESA 95) the most important are: the reporting of government debt on a consolidated basis (thus excluding, for example, government debt held by social security funds); and the exclusion of financial derivatives and other accounts payable, which are instead part of gross financial liabilities.

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[5] For example, changes in classification of assets and changes in the quality of existing economic assets.

From a balance sheet perspective, the fiscal balance *B* ("net lending or borrowing") equals the difference between transactions in financial assets and transactions in financial liabilities. Therefore, it can be viewed as an indicator of the financial impact of government activity on the rest of the economy. The relation between net lending or borrowing and the change in the net worth is summarized by the following identity:

$$\Delta W_t \equiv \Delta FA_t - \Delta FL_t + p\Delta K_t + \Delta V_t = B_t + p\Delta K_t + \Delta V_t \quad (1)$$

where ΔV_t represents any change in non-financial and financial assets or liabilities other than government operations: for example, fluctuations in prices or exchange rates and "holding gains or losses" on assets or liabilities. The identity shows that net lending or borrowing is generally different from a change in the government net worth because it includes net capital formation by the government and excludes valuation changes. The latter can be quite important, for example for countries that have a significant share of public debt denominated in foreign currency.[6]

From a flow perspective, the fiscal balance is the difference between government saving S_t^g and investment I_t^g. In turn, government saving equals the difference between revenues and current government expenditures (plus net capital transfers),

$$S_t^g = \tau_t + R_t + r_t^{FA} FA_{t-1} + r_t^K K_{t-1} - G_t^C - r_t^{FL} FL_{t-1} \quad (2)$$

where G_t^C is government current expenditure (inclusive of "net capital transfers"), τ is total tax revenue, R is non-tax, non-interest revenue, r^K the rate of return on government non-financial assets, and $r^{FA}(r^{FL})$ is the rate of return on financial assets (liabilities). In turn, gross government investment is given by:

$$I_t^G = p_t[K_t - K_{t-1}(1-\delta)] \quad (3)$$

Government investment I_t^g equals net fixed capital formation ΔK_t plus capital depreciation δK_{t-1}. If we add capital depreciation (consumption of fixed capital) to current expenditures in equation (2), we can express the fiscal balance as the difference between net saving and net investment.

From the definition of government net worth it is clear that government debt can decrease even when net worth does not change. A decline in debt can be accompanied by a reduction in financial assets (for example, a privatization operation), or by a decline in the stock of non-financial public capital (for example,

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[6] In Greece, for example, currency fluctuations implied increases in gross debt much larger than the underlying flow of new government borrowing, because of the trend nominal depreciation of the drachma *vis-à-vis* partner country currencies.

if depreciation of existing capital exceeds gross capital formation).[7] Also, a switch in the investment pattern of public social security funds from private sector instruments to government sector instruments would imply a decline in general government gross debt, but not in the general government's net financial liabilities or an improvement in the government's net worth.[8] Hence, reductions in gross government debt are not necessarily associated with an improvement in the government's intertemporal budgetary position.

A similar argument can be made for improvements in net lending, particularly if obtained through a reduction in net public investment. Indeed, a number of authors (such as, for example, Blanchard and Giavazzi, 2003) have suggested to amend the fiscal balance the SGP refers to by excluding net investment expenditures. Other authors, such as Buiter (2001) and Buti, Eijffinger and Franco (2003) are more critical of fiscal restraints based on the so-called "golden rule".[9]

1.3 The valuation of public capital

One of the most difficult issues in constructing a government's balance sheet is the valuation of public capital. The value of private capital is equal to the present discounted value (PDV) of the flow of returns that it will generate. However, "government investment is undertaken in anticipation of future social returns, that may or may not take the form of a stream of cash payments" (Buiter, 2001). It is therefore possible for the cost of investment to be higher than the present value of the future stream of financial returns the project generates. In the case in which the future stream of net financial returns is equal to zero government investment is equivalent to government consumption from a budgetary point of view. In this case, an evaluation of the public sector balance sheet at market prices would attribute to public capital a price equal to zero, so that government net worth would coincide with the government's net financial assets.

Even when the public capital is "marketable" (say, a building rented to private individuals, or a state-owned enterprise undertaking market activity) the stream of returns that the government earns on the assets may be below the market rate of return, because of the presence of an implicit subsidy (below-market rents, or wages above market levels in the public enterprise). In this case, evaluating the impact of a sale operation on net worth and on the PDV of future tax revenues may yield opposite results. For example, suppose that the government sells a building or a public enterprise to the private sector for a price which is below the market price

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[7] Easterly (1999) provides several examples of "illusory" fiscal adjustment undertaken by foregoing expenditures on operations and maintenance.

[8] Debt in the Maastricht-based definition is on a consolidated basis, *i.e.*, general government bond holdings by other branches of the general government are netted out. These include, for example, social security funds which are invested in government securities.

[9] The idea of a separate "capital" budget has a long and distinguished history (see, for example, Musgrave, 1939).

(itself given by the capitalized value of market rents). In this case, net worth formally declines, because according to the ESA 95 manual all assets and liabilities must be evaluated at their market price in the government balance sheet.[10] However, the present value of future taxes may still decline, if the 'valuation loss' is smaller than the present discounted value of implicit future subsidies that the sale eliminates. We will discuss the implications of valuation problems for government assets in several of the examples below.

In practice, non-financial public capital is typically evaluated at replacement cost.

1.4 The intertemporal budget constraint and non-structural fiscal measures

Government solvency requires that the sum of government assets and the present discounted value of future taxes equal the sum of outstanding government liabilities and the present discounted value of future spending. In other words, future taxes have to equal the difference between future spending and the government's net worth:

$$\sum_{i+1}^{\infty} T_i (1+r)^{t-i} \geq \sum_{i+1}^{\infty} G_i (1+r)^{t-i} - W_t \qquad (4)$$

where T measures non-interest revenues, G the primary expenditure, and r is the rate of interest, assumed for simplicity to be constant over time and equal across asset categories. Fiscal measures can have an impact on the government's intertemporal position in various ways: for example, they can increase net worth by reducing present spending and/or increasing present taxes; or they can affect future tax receipts or spending (for example, a decline in future tax allowances, or a pension reform that reduces benefits).

A fiscal measure permanently improves public accounts if it reduces the present value of future taxes needed to finance future spending and repay existing debt. In this context, an improvement in the fiscal balance or a reduction in public debt can be defined as non-structural if they do not reduce the need for future taxation.[11] Clearly, a proper classification of *all* fiscal measures along these lines would be hopelessly complex, as it would have to include the impact of any policy decision that may affect public accounts in the future. The paper instead provides a brief sample of non-structural fiscal operations recently adopted by EU countries, and their accounting implications. Some of the operations being described may also reduce the need for future taxation, but only on a one-off basis – for example, they

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[10] "The stock of the assets and liabilities recorded in the balance sheet is valued at the market prices prevailing on the date which the balance sheet relates" (page 197).

[11] In an analogous fashion, one may define permanent fiscal measures (which permanently reduce the level of future spending or the need for future taxation) and one-off measures, which reduce future taxation needs, but only temporarily.

may entail a temporary deficit reduction, and/or can be a combination of a non-structural and a one-off measure.

2. A classification of non-structural fiscal measures

This section presents a classification of frequently adopted non-structural fiscal measures in broad categories; for each category, it discusses the appropriate recording in fiscal accounts, highlighting the effects on the fiscal balance, government debt, as well as on net worth and future taxes. In several cases, a ruling by Eurostat has changed the initial accounting of these measures, with the consequence of 'undoing' the debt or deficit reduction that the fiscal measure initially achieved.

2.1 Capital injections and recapitalization

The ESA 95 manual (page 61) specifies that a capital injection ΔC can be of two types: (a) a capital transfer, when the government, acting for public policy purposes, provides funds to a corporation without receiving financial assets and without expecting property income, (b) a financial transaction, when the government, acting as a shareholder, provides funds and receives in return financial assets of equal value of the payments, on which it expects dividends.

It follows that if a capital injection is made to cover expected future losses, or to cover repetitive losses (perhaps so that the corporation can reduce its borrowing costs), it should be recorded as a capital transfer.[12] In this case, net worth, public debt and the budget balance worsen by the same amount as the transfer.

On the other hand, when a capital injection is a financial transaction, it simply implies a change in asset structure: an increase in financial assets (formally, an acquisition of "share and other equity" of public corporations, recorded in the financial account), and a decline in other assets such as "currency and deposits (financial assets)" if there is a financial transfer or "fixed capital (non-financial assets)" if the transfer involves a non-financial asset. When the counterpart to the capital injection is a financial asset (*i.e.*, acquisition of new shares in the public corporation), neither the government's net worth nor the fiscal balance change. When the counterpart is a non-financial asset (*i.e.*, change in asset structure), the government net worth does not change, but the budget balance improves, because the transfer of the non-financial asset is recorded as negative public investment ("gross fixed capital formation").

In practice, some EU countries have attempted to record capital transfers as financial transactions, so as to avoid an impact on the fiscal balance, leading to discussions with Eurostat. For example, in March 2002 Eurostat did not certify the

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[12] This is the case even if shares (or equivalent) are issued (ESA 95 manual, page 65).

2001 budget deficit initially reported by Portuguese authorities, in part because of questions related to the proper booking of capital transfers to public sector enterprises.[13]

2.2 Special dividends

During the run-up to Maastricht, several governments (including Belgium, Germany and Italy) considered booking revenues arising from the taxation of capital gains on their Central Banks' gold holdings as reducing the budget deficit. In general, special dividends are large and exceptional one-off payments based on accumulated reserves or holding gains , originating, for example, from the Central Bank or public enterprises outside of the general government sector.[14] According to a January 1998 decision by Eurostat, such proceeds "result in a reduction of the State equity which is a financial transaction" and therefore should have no impact on the budget balance. More specifically, such payments should be classified as "withdrawals of equity" – the positive amount of receipts is offset by a decline in the equity held by the general government in these enterprises (or in the Central Bank), leaving net financial liabilities and the budget balance unchanged. However, receipts can be used to reduce government debt even though this reduction is accompanied by an equal reduction in the financial assets of the government.

2.3 Asset sales (privatization and corporatization)

Sales of non-financial assets of the general government are classified as negative "gross fixed capital formation" in the capital account, and their proceeds typically imply an increase in "currency and deposits" in the financial account. In other words, sales of non-financial assets are recorded as negative investment expenditure and therefore improve the budget balance. The impact on the government's net worth depends on the difference between the market price p^m and the actual sale price p of the asset. The impact on the need for future taxation must be evaluated taking into account the present discounted value (PDV) of the stream of (direct and indirect) earnings that the government forgoes with the sale. For example, suppose that the government earns a rate of return r^K on the asset, and that the market rate of return is r^m. If $r^K < r^m$, the government is earning below-market returns on the asset; this is equivalent to earning an implicit market rate of return and paying an implicit subsidy. In this case, the asset sale will lead to a decline in future taxes as long as the PDV of future foregone earnings is below the sale price – that is,

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[13] The deficit (4.3 per cent of GDP) turned out to be much higher than initially reported.

[14] Regular payments of dividends are recorded as such and thus counted in net saving of the general government.

$\frac{r^K}{r^m} p^m < p$. This can occur even when $p < p^m$. *De facto*, the asset sale combines two features: the sale of a non-financial asset and the elimination of a subsidy.

Sales of financial assets (such as privatization operations) do not affect the budget balance, but only the level of gross government debt, in case the privatization proceeds are used to reduce it. The line of reasoning for evaluating their impact on government net worth and on the need for future taxation is analogous to the one for non-financial assets.

2.4 Securitization

The issue here is considerably more complicated and depends on the adopted securitization schemes. In a typical securitization operation, the government sells assets to a Special Purpose Vehicle (SPV), a company set up by a group of investors. The SPV finances itself on the market by issuing bonds (asset-backed securities, or ABS), which are backed by the flow of receipts that the government assets purchased from the government generate. In a recent ruling, Eurostat (2002) has established criteria for the appropriate recording of securitization operations in government accounts. In particular, the requirements for the SPV-issued bonds not to be counted as government debt are: (a) ABSs have no future flows which directly depend on the activity undertaken by government after the securitization operations, (b) the risk is completely transferred to the SPVs, and (c) the difference between the sale price and the market price is below 15 percent. In addition, Eurostat ruled that (d) the value of the initial transaction must be recorded according to the upfront payment made by the SPV to the government, with additional payments having an impact on the fiscal balance only at the time they occur.

As a result of the Eurostat decision, the Italian fiscal deficit for 2001 was increased by an amount of €6.8 billion (0.6 percent of GDP), as €3 billion in revenues from the securitization of lotto receipts and the securitization of real estate assets worth €3.8 billion were excluded from the calculation of the 2001 fiscal balance. The first transaction involved future flows (lotto receipts) that depend on government activity, while for the second the initial price at which the assets were transferred to the SPV was only 60 percent of their value.[15] The Eurostat decision also affected the deficit and debt measures of Austria and Greece.

If the underlying assets being securitized are government financial assets, securitization has no impact on the government's net worth and the budget balance, but may lead to a decline in gross government debt if the proceeds from the securitization are used for that purpose. Specifically, the operation will result in an increase in "currency and deposits" accompanied by a decline in "loans" in the

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[15] In Italy, a second operation involving the securitization of real estate assets was conducted in 2002, and it was designed to meet the new Eurostat criteria. It yielded €6.6 billion (0.5 percent of GDP), and receipts were recorded as negative capital formation.

financial account. This was the case, for example, for part of the securitization of claims on unpaid social security contributions undertaken by the Italian government (the so-called *cartolarizzazione crediti INPS*).

If the underlying government assets are non-financial (such as, for example, real estate holdings), securitization still improves the budget balance because the sale of assets is recorded as negative "gross fixed capital formation" in the capital account. Also in this case, gross government debt declines if the proceeds from the operation are used for that purpose. The impact on government net worth and future taxation depends on two factors: the difference between the market price and the sale price of the asset; and the present value of future subsidies (the difference between "market" returns and the stream of earnings that the government forgoes by selling the asset) that the sale eliminates (see sub-section 2.3 above).

Finally, in the case of collateralizing future receipts (CFR), as was the case for Italy's securitization backed by future lottery receipts, the impact on government net worth is in general negligible – it would depend on the difference in borrowing costs between the government and the SPV. The Eurostat ruling of July 2002 established that proceeds from collateralizing future receipts should always be treated as government borrowing and therefore have no impact on the budget balance and government debt.

2.5 Quasi-fiscal activities[16]

In several European Union countries, public financial institutions (majority-)owned by the general government and possibly benefiting from a guarantee from the general government, play a role in the financing of projects. These operations have no impact on the government's net worth because a guarantee is not counted as a government liability (contingent liabilities are in general recorded off-balance sheet). However, the payoffs of public financial institutions can be reflected in general government accounts through (a) "dividends", (b) withdrawals of equity, (c) "holding gain in shares and other equity" in the revaluation account, and (d) the calling of guarantee. The latter, which would be recorded as "capital transfer, payable", would worsen the budget balance, gross government debt (acquisition of "loans" in the liability side of the financial account) as well as net worth.

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[16] Quasi-fiscal activities are defined as "Activities (under the direction of government) of central banks, public financial institutions, and non-financial public enterprises that are fiscal in character – that is, in principle, they can be duplicated by specific fiscal measures, such as taxes, subsidies or other direct expenditures, even though precise quantification can in some case very difficult. Examples include subsidized bank credit and non-commercial public services provided by an enterprise" (page 76 in "Manual on Fiscal Transparency", IMF). See also MacKenzie and Stella (1996).

2.6 "Off-budget" items and infrastructure spending

The ESA 95 manual regulates the recoding of transactions between the general government and public enterprises (Part II) as well as leases, licenses and concessions (part IV). For example, when the government makes no regular payment to the corporation in cash or in kind, either directly or indirectly, the infrastructure should be recorded in the corporation's balance sheet during the period of exploitation. If the government has shares (or provides guarantees to liabilities) of the public corporations which have infrastructure or off-budgetary items on their balance sheets, profitability of the off-budgetary items and infrastructure should be reflected on 'dividends' or 'holding gains (or losses) in shares and other equity' in the government's accounts. Therefore, the effects of the off-budget operations on the government net worth accrue only indirectly, through this channel.

More generally, a shift from direct public investment to infrastructure projects (co-)financed by the private sector or by a public enterprise outside the general government budget may have no implications for government net worth, but substantial implications for the government budget balance and gross government debt. Suppose, for example, that the project is not entirely self-financing. If it is undertaken by a private firm, which borrows with government guarantees, government outlays would be the flow equivalent of the difference between the 'required' rate of return and the actual rate of return on the project. If the government undertakes the project directly, there would be a large upfront cost (that would show in the budget balance and gross government debt), followed by a stream of future revenues, whose present value would be smaller than the initial outlays by an amount equivalent to the subsidies paid to the private firm in the previous case.

3. Assessing the impact of fiscal adjustment on net worth

The operations discussed in the previous section highlight that the fiscal targets associated with the Maastricht criteria may not always provide reliable information on the underlying degree of fiscal adjustment that a country is undertaking. However, we only provided examples and an aggregate quantification of "non-structural" fiscal adjustment based on a comprehensive list of individual fiscal operations is too demanding and goes beyond the scope of this paper.

In this section we approach the characterization of fiscal adjustment from a different perspective. First, we provide a brief description of fiscal trends since 1992 for the 12 EU countries, tracking not only public debt and the fiscal balance, but also the stocks of financial and non-financial assets, so as to provide a rough estimates of the evolution of government balance sheets. Anecdotal evidence (Eurostat, 1998) suggests that countries with a higher debt level have made more extensive use of non-structural fiscal measures such as asset sales, privatization, securitization and special dividends. We investigate this issue more systematically by studying whether high debt countries rely more heavily on asset sales, and the degree to

which reductions in government debt are reflected in an increase in government net worth, rather than a decumulation of assets. While selling public assets may itself be a desirable objective, consistent with a reduction in the government role in the economy, future expenditure needs due to population ageing, together with commitments to reduce high tax burdens, highlight the importance to achieve a reduction in *net* government liabilities.

Second, we construct a simple indicator of "optimism about the future" and examine whether this degree of optimism is systematically correlated with the underlying fiscal position. Large fiscal imbalances may be associated with a degree of "short-termism" in the conduct of fiscal policy (itself related to political and institutional factors), and more myopic governments are more willing to "gamble" on fiscal adjustment by relying on rosy macroeconomic forecasts.[17]

Both perspectives are grounded in political economy arguments. In political economy models, governments that discount the future more heavily than other economic agents tend to run larger budget deficits and accumulate government debt. In the presence of fiscal rules that limit the size of permissible budget deficits, more myopic governments may rationally choose to implement fiscal measures that shift revenues from the future to the present. As the discussion of section 2 highlights, one of the typical features of non-structural fiscal measures is that the government gets upfront proceeds at the expense of lower revenues in the future – the government moves its future cash flow to the current period. The incentive to engage in this type of operation is stronger the higher the government discount rate.

Also, the incentive to use non-structural measures depends on how severe is the punishment for violating a fiscal rule. We would therefore expect the incentive to be stronger in the run-up to Maastricht, when an excessive deficit could jeopardize participation in the European Monetary Union, than currently.

3.1 Fiscal trends and changes in government balance sheets

Table 1 shows the cyclically adjusted fiscal balance in 1992, 1997 and 2002. During the period 1992-97, the fiscal balance improved in all EU member countries and the average fiscal deficit during the period 1998-2002 was considerably lower than during 1992-97. However, in several countries the process of fiscal deficit reduction during 1992-97 did not achieve a reduction in the ratio of public debt to GDP (Table 2).

As we argued earlier, the fiscal balance and gross government debt capture only part of changes in, and the level of, government net worth. To investigate further how the government balance sheet evolved during the past decade, it is

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[17] Hallerberg, Strauch, and von Hagen (2002) discuss political economy determinants of growth and budgetary forecasts in Stability Programs. A more charitable interpretation is that governments that believe markets are unduly pessimistic about the country's growth prospects run larger fiscal deficits because they expect fast future revenue growth.

Table 1

Fiscal Balances, 1992-2002

	Average Fiscal Balance		Cyclically Adjusted Balance		
	1992-97	1998-2002	1992	1997	2002
Austria	–3.7	–1.4	–2.6	–1.9	–0.3
Belgium	–5.1	–0.1	–8.5	–1.5	0.5
Denmark	–1.7	2.3	–0.6	–0.4	1.6
Finland	–4.4	4.1	1.4	0.7	4.8
France	–4.7	–2.1	–4.2	–1.4	–3.0
Germany	–2.9	–1.7	–3.2	–1.7	–2.6
Greece	–9.4	–1.8	–11.9	–2.8	–1.5
Ireland	–1.4	1.9	–2.2	1.1	–2.4
Italy	–7.9	–2.1	–10.3	–2.2	–2.1
Luxembourg	2.0	4.3	n.a.	n.a.	n.a.
Netherlands	–2.9	0.1	–5.0	–1.9	–1.8
Portugal	–5.7	–3.2	–5.7	–3.7	–2.3
Spain	–5.3	–1.0	–3.8	–1.8	0.2
Sweden	–7.0	2.5	–5.0	0.2	0.8
United Kingdom	–5.5	0.8	–4.4	–1.9	–1.3

Source: OECD, Economic Outlook.

necessary to focus on the evolution of public assets as well. Unfortunately, providing a precise assessment of changes in the government balance sheet is hindered by severe data limitations, in particular the dearth of comparable data on government net worth, and on government financial and non-financial assets (see the Supplement to the 2001 Government Finance Statistics for a discussion). Data on gross financial assets for some EU countries is available from the OECD, although coverage is not homogeneous.[18] In addition, some countries publish sectoral balance sheets which include financial assets and liabilities of the government, and the data are reported by Eurostat. Although coverage from this second source of data should

[18] For example, some countries do not include shares in public enterprises among the general government's financial assets.

Table 2

Debt-to-GDP Ratio, EU Countries

	1992	1997	2002
Austria	57.2	64.7	67.6
Belgium	132.5	124.8	105.3
Denmark	66.3	61.2	45.2
Finland	40.6	54.0	42.7
France	39.6	59.3	59.5
Germany	42.9	61.0	60.8
Greece	87.8	108.2	104.9
Ireland	100.2	65.0	33.3
Italy	107.7	120.2	106.7
Luxembourg	4.7	6.1	5.7
Netherlands	77.8	69.9	52.6
Portugal	54.4	59.1	58.1
Spain	46.8	66.6	54.0
Sweden	63.3	70.5	52.4
United Kingdom	39.2	50.8	38.4

Source: OECD, Economic Outlook.

be more homogeneous and complete, availability is limited to a few countries and years. Comparable data on general government non-financial assets are also difficult to obtain and more generally there are severe conceptual problems in determining market values for a host of government assets. Finally, there are some differences in the recording of gross financial liabilities across countries, although the problems in data comparability across countries are less severe than for government assets.

Given data limitations, we proceed as follows. For countries for which Eurostat or the OECD report data on government financial assets, we combine these data with corresponding data on gross financial liabilities and with estimates of the stock of public capital (constructed using the perpetual inventory method – see Appendix) to estimate the change in the ratio of net worth to GDP.

The change in the ratio of net worth to GDP is given by the change in total assets (financial and non-financial) minus the change in total liabilities:

$$w_t - w_{t-1} = fa_t - fa_{t-1} + pk_t - pk_{t-1} - (fl_t - fl_{t-1}) \quad (5)$$

where lower-case letters indicate ratios to GDP. We examine to what degree changes in the ratio of public debt to GDP $(fl_t - fl_{t-1})$ reflect corresponding changes in the stock of government assets $fa_t - fa_{t-1} + pk_t - pk_{t-1}$ or changes in government net worth. We perform this exercise for both the period 1992-97 and the period 1997-2002.[19]

We also use a second, indirect method to assess changes in the government's balance sheet. The change in net worth ΔW_t is approximately equal to the sum of net saving, capital transfers and valuation effects. We use direct measures of government net saving and capital transfers, and approximate valuation effects with the change in government debt induced by exchange rate fluctuations. These effects are quite substantial for countries that have a significant share of debt denominated in foreign currency (especially prior to EMU). We then use the estimated change in net worth to construct the variable

$$z_t = \frac{\Delta W_t}{Y_t} + (fl_t - fl_{t-1}) - \frac{\gamma}{1+\gamma}(pk_{t-1} - fl_{t-1}) \tag{6}$$

where Y_t is nominal GDP and γ its the rate of growth. Manipulating equations (5) and (6) it can easily be shown that z_t is an upper bound on the gross change in the ratio of government financial assets to GDP:

$$z_t = fa_t - fa_{t-1} + \frac{\gamma}{1+\gamma} fa_{t-1} + pk_t - pk_{t-1} > w_t - w_{t-1} + fl_t - fl_{t-1} \tag{7}$$

We use equation (6) to estimate z_t for the countries for which we don't have data on government financial assets (namely Greece, Ireland, Luxembourg and Portugal). For the other countries, we can calculate z_t directly using equation (7). We then relate z_t to the initial level of government debt, both for the period 1992-97 and for the period 1997-2002. This comparison provides some information on the extent to which fiscal adjustment (as measured by a reduction in gross government debt) has lowered the need for future taxation.[20]

3.2 Changes in the government balance sheet: the evidence

The empirical analysis shows substantial differences between events in the pre- and post-Maastricht period. As shown in Figure 1, the change in public debt

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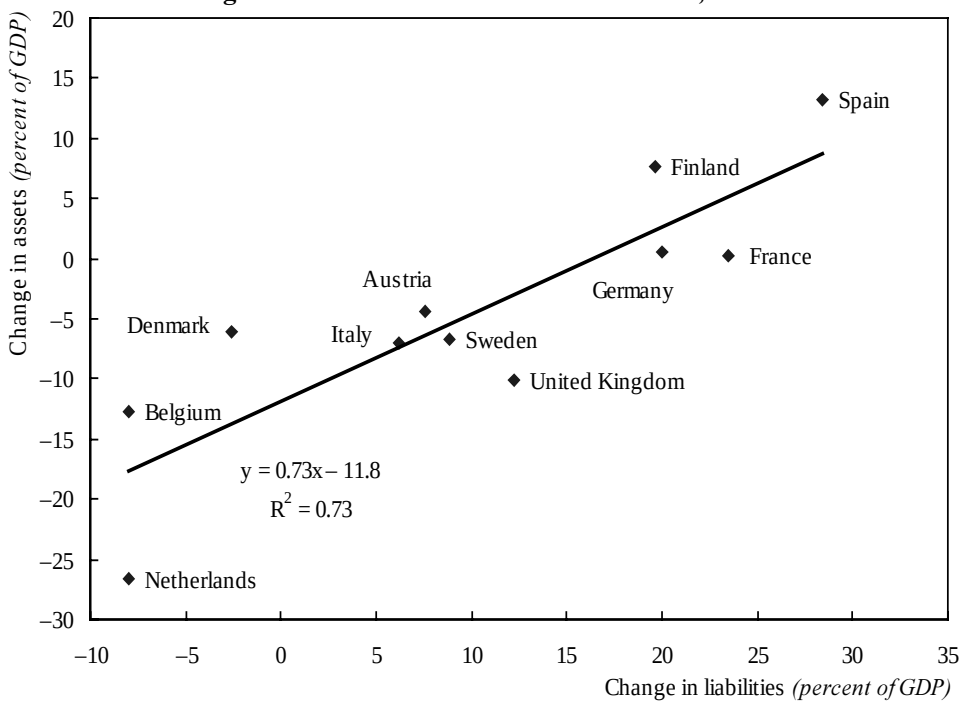
[19] Using the estimates for the public capital stock constructed by Kamps (2004) yields similar results.

[20] This is, of course, not a complete measure of the impact of fiscal policy on future tax outlays. For example, a pension reform has no impact on net worth and government debt but can reduce or increase future spending, and hence future taxes.

Figure 1

Change in Government Assets and Liabilities, 1992-97



Source: authors' calculations based on OECD, Economic Outlook.

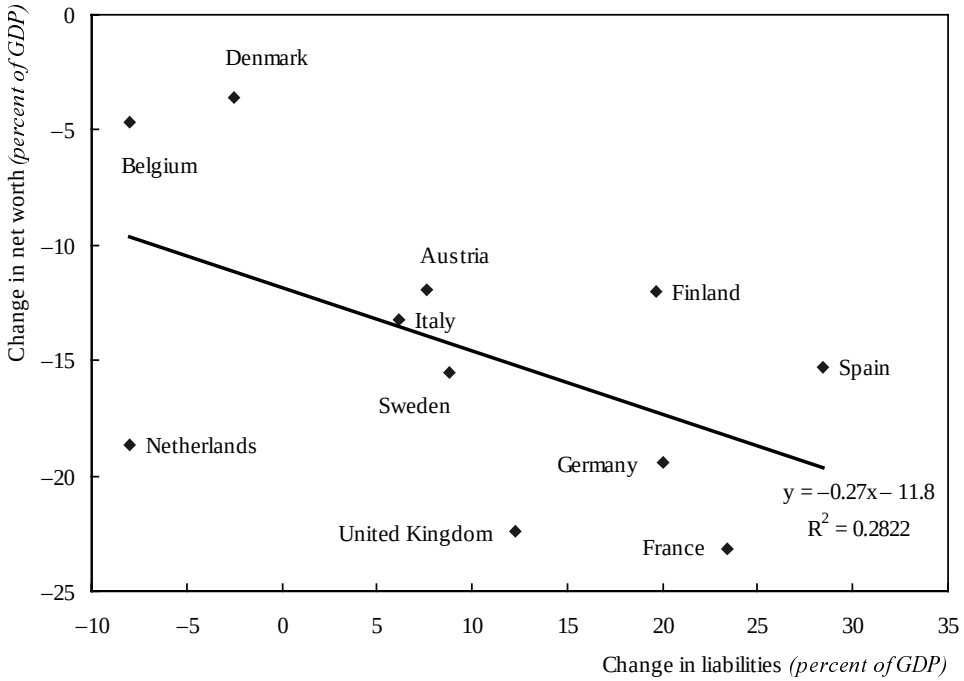
between 1992 and 1997 is strongly positively correlated with changes in government assets during the same period, while it is weakly correlated with changes in net worth (Figure 2). Hence, during this period, the evolution of gross public debt provides only limited information on changes in the government's intertemporal position. Despite a decline in the stock of public assets in the majority of countries, between 1992 and 1997 net worth deteriorated in all EU countries, except for Sweden.

However, for the period 1998-2002 the link between the change in government assets and liabilities virtually disappears (Figure 3), with changes in gross financial liabilities strongly correlated with changes in net worth (Figure 4). In terms of general trends, this period is characterized by an improvement in net worth in most countries, notwithstanding generally declining government assets.

In Figure 5 we relate a proxy for the change in the ratio of public assets to GDP during the period 1992-97, constructed according to equation (6), to public debt at the beginning of that decade. The figure shows that countries with larger government debt in the early Nineties reduced their financial assets more

Figure 2

Changes in Government Liabilities and in Net Worth, 1992-97



Source: authors' calculations based on OECD, Economic Outlook.

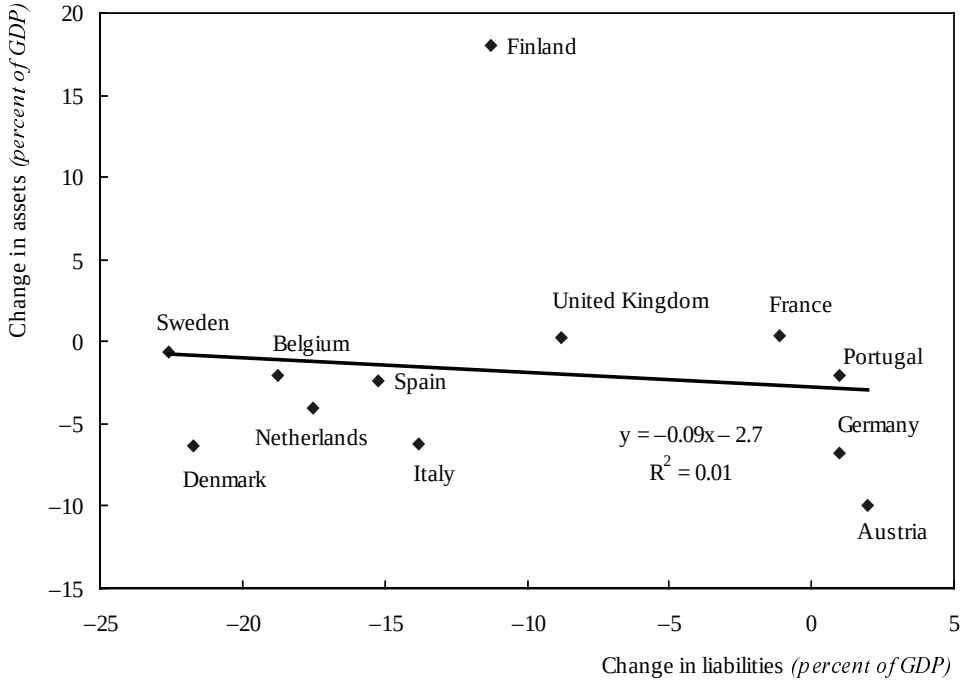
substantially in the period 1992-97 than countries with lower initial public debt.[21] Once again, the link is much weaker in the period 1998-2002 (Figure 6).

Overall, these results are consistent with the notion that during the period leading up to 1997 governments contained the rise in the public debt ratio (or reduced it) by decumulating government assets, and that this decumulation was stronger in countries with large public debts. During the period 1997-2002 instead government debt declined and net worth improved in virtually every country. A possible interpretation of the weaker incentive to use non-structural measures is that fiscal rules are less "punishing" in the post-1997 era (once countries are inside the euro area). A comparison with the evolution of balance sheets in other OECD countries can provide some perspective on whether we are capturing phenomena associated with the establishment of budget rules in the euro area and the EU, or common fiscal trends in advanced economies. Preliminary evidence shows that the correlation between changes in financial assets and financial liabilities for the 1992-97 period is much stronger in the euro area than in non-euro area OECD

[21] The correlation is stronger for the countries that joined the euro area.

Figure 3

Changes in Government Assets and Liabilities, 1997-2002



Source: Authors' calculations based on OECD Economic Outlook.

countries (0.8 versus 0.3).[22] In the subsequent period, the correlation for euro-area countries drops to zero, while the one for other OECD countries remains broadly unchanged.

3.3 Fiscal imbalances and output projections

The last piece of evidence we focus on relates to the link between the growth forecasts of countries' medium-term fiscal plans and their initial fiscal conditions. Intuitively speaking, given other conditions, a government that expects more favorable economic conditions in the future and faces constraints on its budget balance and/or debt level has a stronger incentive to use "non-structural" fiscal measures, "betting" on the possibility of favorable future conditions to avoid the cost of improving the underlying fiscal accounts.

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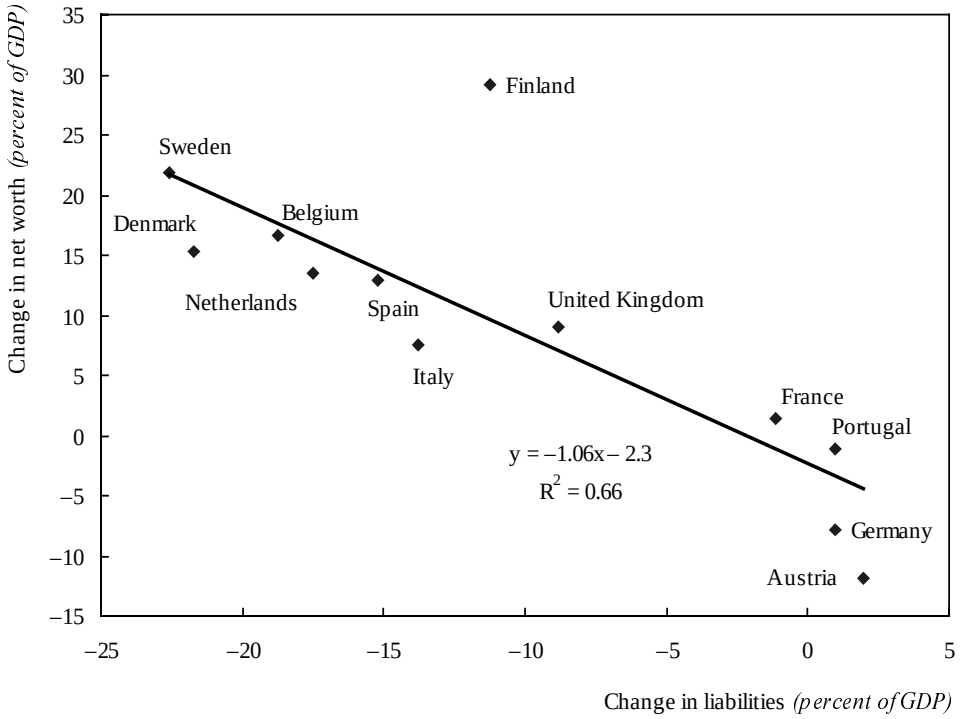
[22] In addition to the Denmark, Sweden, and the United Kingdom, the non-euro area sample includes Australia, Canada, Iceland, Japan, New Zealand, and the United States.

Figure 4

Change in Government Liabilities and Net Worth, 1997-2002



Source: Authors' calculations based on OECD Economic Outlook.

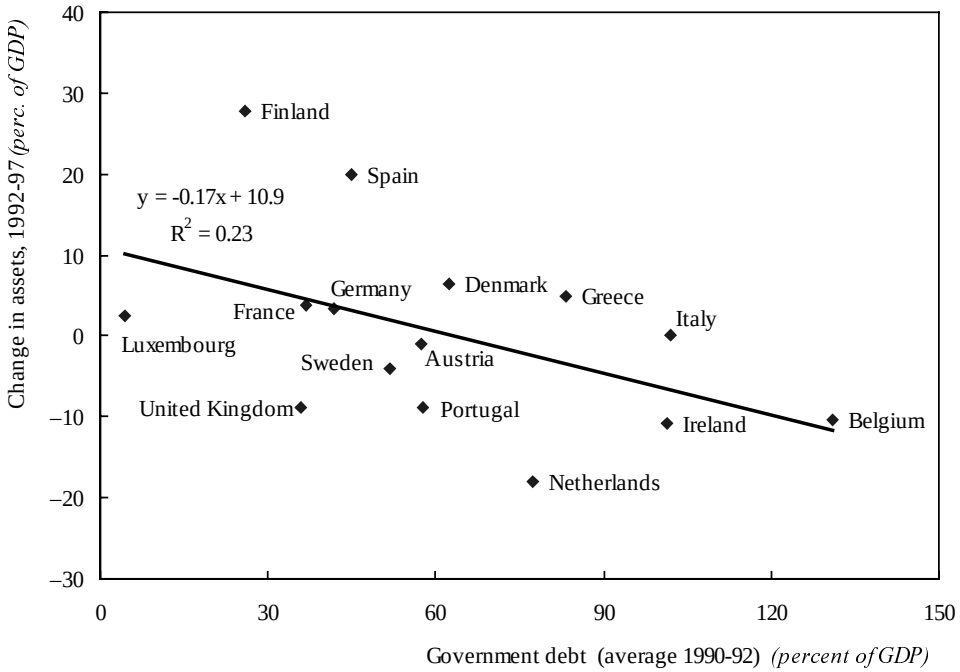
Our indicator of government optimism with regard to output is constructed from the period 1998-onwards using the Stability Programs, which are annually submitted to the European Commission by 12 EU member countries. These programs report the forecast of output growth on which budgetary projections are based. We define the "degree of optimism about future" (DOF) as follows:

$$DOF_t = \sum_{s=1}^{2} (G_{y_t}^{t+s} - CF_{y_t}^{t+s})$$

where G_{yt}^{t+s} is the expected GDP growth rate (annual base) of year $t+s$ in the Stability Program submitted at year t and CF_{yt}^{t+s} is the expected GDP growth rate

Figure 5

Adjusted Change in Public Assets and Initial Debt, 1992-97



Source: Authors' calculations based on OECD, Economic Outlook, and Eurostat, New Cronos database.

in year $t+s$ in the Consensus Forecast in the same month as the Program was submitted.[23]

The larger *DOF* is, the more optimistic the government is about economic conditions in the future compared to the Consensus Forecast, which is the simple average of expected growth rates provided by private research institutes. For the purpose of cross-country comparisons, we normalize *DOF* using the average GDP growth rate from 1993 to 1997 because countries with high growth rate tend to have larger absolute values of *DOF*.[24]

Figure 7 plots the relation between the average of the "degree of optimism about the future" from 1998 to 2001 and the average budget deficit per GDP from 1995 to 1997 (results are identical if we use the average budget deficit from 1993 to 1995). The negative correlation between the initial budget deficit per GDP and the

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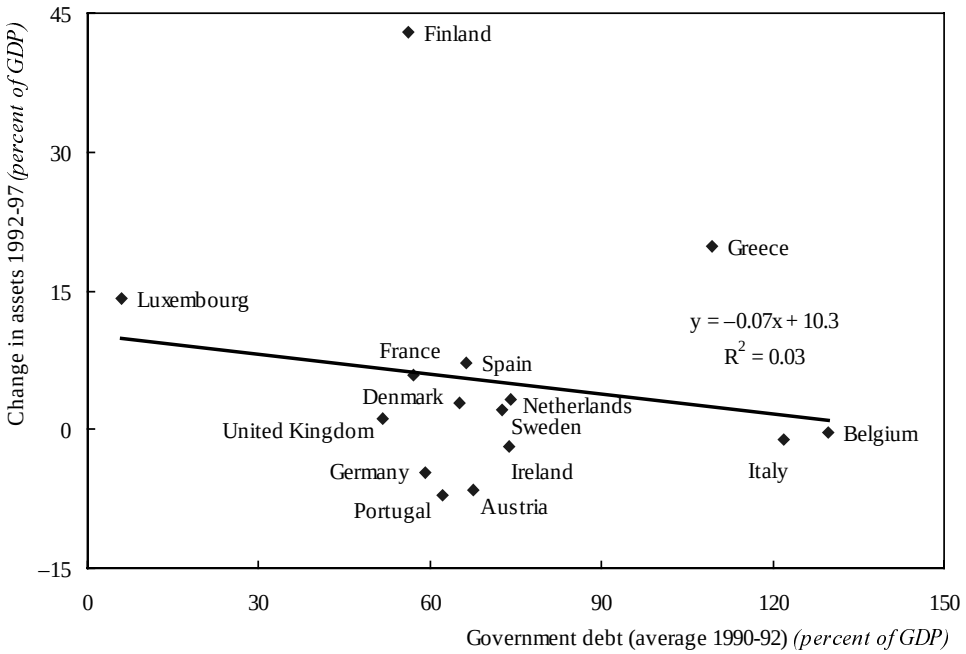
[23] The Consensus Forecast monthly reports the average of the expected GDP growth rates (annual base) computed by private research institutions in each country (there is no report for Luxembourg).

[24] Our results are robust to different normalization methods.

Figure 6

Adjusted Change in Public Assets and Initial Public Debt, 1997-2002



Source: Authors' calculations based on OECD, Economic Outlook, and Eurostat, New Cronos database.

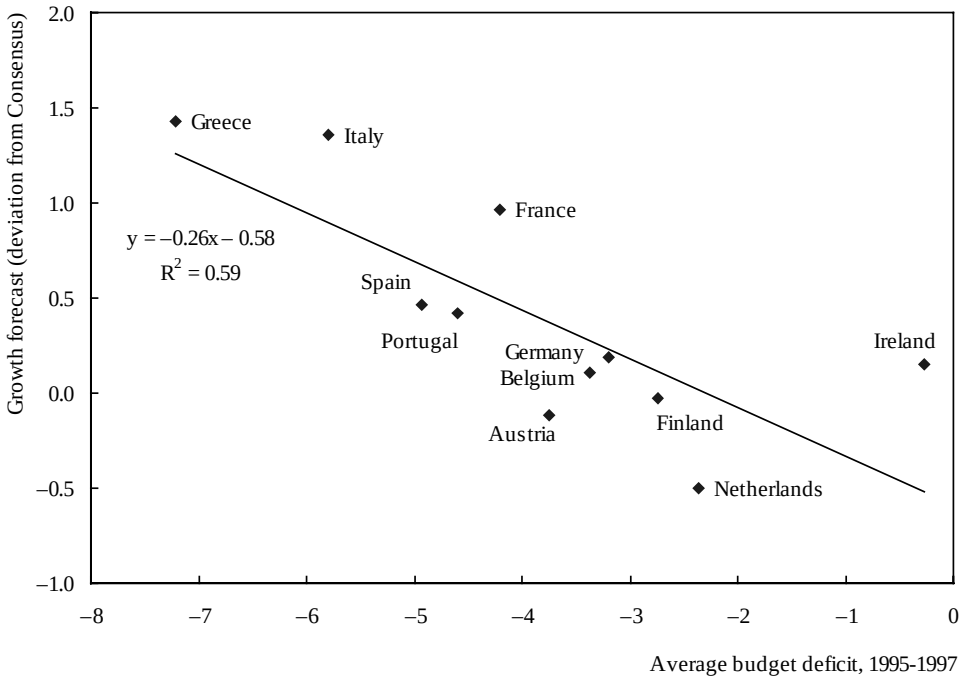
degree of optimism about the future is striking – among EU countries, governments with larger budget deficits have systematically more optimistic output forecasts.

4. Concluding remarks

In the presence of fiscal rules constraining the size of the fiscal balance of the path of government debt, governments may adopt measures which affect these targets but have no impact on the government's net worth. Anecdotal evidence suggests that these measures have been widely used in EU countries, in the run-up to the adoption of the common currency and also during the current slowdown. The paper has re-examined fiscal adjustment in EU countries over the past decade by focusing on the evolution of the general government balance sheet. It has described a number of fiscal measures that improve the fiscal accounts subject to the Maastricht criteria but have no durable impact on public finances as a whole. Empirical evidence for EU countries suggests a positive correlation between changes in government liabilities and changes in government assets for the period 1992-97, but a much weaker correlation for the period 1997-2002. Also, countries

Figure 7

Degree of Optimism and Budget Balance



Note: the deviation of the growth forecast from consensus is constructed as follows. First, for each year t=1998-2001, we calculate deviations of the growth forecast incorporated in the country's Stability Program from the Consensus growth forecast at the time the Stability Program was issued, and sum these deviations for the years t+1 and t+2. The resulting deviations are then averaged over the period 1998-2001, and normalized by the country's average growth rate during the period 1993-97.

Source: Individual countries' Stability Programs and Consensus Forecasts.

with a more difficult fiscal situation have used systematically more optimistic output projections in their Stability Programs.

APPENDIX
THE ESTIMATION OF PUBLIC CAPITAL

The paper makes use of the perpetual inventory method (PIM) to compute the nominal value of public capital. This Appendix derives the formula used in the PIM.

The law of motion of "real" public capital stock is given by:

$$K_t = (1-\delta)K_{t-1} + I_t \tag{8}$$

where δ represents the real depreciation rate, which is set to 4 per cent. Let the deflator of the government gross fixed capital formation be p. Multiplying p_t to both sides of the above equation and rearranging gives the following law of motion of nominal public capital:

$$p_t K_t = (1-\delta)\hat{p}_t p_{t-1} K_{t-1} + p_t I_t \text{, and } \hat{p}_t = \frac{p_t}{p_{t-1}}$$

Let the nominal value of capital be $\tilde{K}_t$. The new law of motion is finally reduced to:

$$\tilde{K}_t = (1-\delta)\hat{p}_t \tilde{K}_{t-1} + \tilde{I}_t$$

This is the law of motion of nominal public capital used to estimate the data of public capital in our paper.

One problem in the PIM is the computation of the initial capital stock, which is usually estimated based on strong assumptions. In this paper, we implicitly assume that each economy's stock of public capital was in steady state in the Eighties. Under this assumption, the initial level of public capital can be obtained as follows. First, both sides of the nominal law of motion have to be divided by the nominal GDP $\tilde{Y}_t$:

$$\frac{\tilde{K}_t}{\tilde{Y}_t} = \frac{(1-\delta)(1+\pi_t^K)}{1+g_t}\frac{\tilde{K}_{t-1}}{\tilde{Y}_{t-1}} + \frac{\tilde{I}_t}{\tilde{Y}_t},$$

where $1+\pi_t^K = \hat{p}_t = \frac{p_t}{p_{t-1}}$ and $1+g_t^K = \frac{\tilde{Y}_t}{\tilde{Y}_{t-1}}$.

Hence, in the steady state:

$$\tilde{K} = \frac{(1+g)\tilde{I}}{g-\pi^K+\delta(1+\pi^K)}$$

where all variables are the average of the Eighties.

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PUBLIC DEBT, CONTINGENT LIABILITIES AND DEBT "TOLERANCE": THE CASE OF COLOMBIA

Sergio Clavijo Vergara[*]

Introduction

In this document we will address the issue of public and external debt sustainability, with references being made to Latin America and Colombia over the period 1997-2003. We will distinguish between the effect of "explicit" public debt and "contingent" public obligations, including the effect of pension liabilities and public guarantees.

During the Nineties, Brazil made a great effort in assessing the budgetary cash-effect of "hidden" liabilities. When the so-called "skeletons" (hidden in the public closets) came out, they realized that the Net Present Value (NPV) of public debt should be increased by about 6-8 per cent of GDP, due to unavoidable future payments regarding pensions, public guarantees, and judicial settlements (Rozenwurcel, 2002). The Fiscal Responsibility Law, approved in Brazil in May 2000, improved the "budgetary arithmetic" aimed at anticipating the cash impact of such contingencies, which have fluctuated in the range of 0.3-1.0 per cent of GDP per year (including additional pension payments).

Likewise, Colombia approved the Fiscal Responsibility Law 819 in July 2003 and for the first time the Annual Budget Proposal (for 2004) had to include an assessment of contingent liabilities, a pluriannual macroeconomic program, and public debt/GDP ratio sustainability exercises (Uribe, 2003). This Fiscal Responsibility Law came to complement the efforts of Law 448 of 1998 in addressing the complex issue of long-term fiscal status. The official programming revealed that average primary surpluses of 2.8 per cent of GDP are required in order to stabilize the "net" public debt/GDP ratio, currently at 52 per cent. Under favorable macroeconomic conditions the debt/GDP ratio is expected to decline below 47 per cent by 2010.

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[*] Member of the Board of Directors, Central Bank of Colombia (Banco de la República). These views are not necessarily shared by the Board of Directors. This paper was prepared for the "VI Workshop on Public Debt" organized by Banca d'Italia, held in Perugia, April 1-3, 2004. The author thanks Luis I. Lozano and Santiago Muñoz, staff member of Banco de la República, for able assistance, and J.A. Daniel (IMF) and J. Gokhale (CATO Institute) for insightful comments.

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However, traditional debt sustainability exercises present at least two weaknesses (Clavijo, 2002; IMF, 2003a):

- they neglect the need to service intra-governmental debt by focusing on a "public net liability" concept;[1] by contrast, our concern has to do with proper accounting of "public gross liabilities" which are sometimes underestimated by way of ignoring the effect of having to serve this intra-governmental debt as well (usually represented by pensions assets of the PAYG system or public enterprises' portfolio held as central government treasuries). Furthermore, if such intra-governmental debt happens to be stipulated at under-market interest rates and artificially long-maturity conditions, certainly the modified duration of public debt would not be properly accounted for,
- they only account for "explicit" liabilities. This procedure underestimates the effective primary surplus that is required to stabilize public debt ratios once "hidden" liabilities are factored in. Put differently, proper accounting of future obligations under current "contingent liabilities" is tantamount to having an effective public debt/GDP ratio higher than expected and hence debt dynamics would be more stringent.[2]

In spite of the efforts of the IMF and Wall Street in addressing this issue, computations keep neglecting the effect of having to serve intra-governmental debt and contingent obligations. This is particularly worrisome in the light of recent evidence which shows that recognition of contingent liabilities in emerging markets, along with interest rates and exchange rate developments, account for the bulk of public debt indicators' deterioration. By contrast, economic growth and primary balances have contributed to reduce public debt/GDP ratios, easing the final net deterioration (IMF, 2003a, p.118).

In fact, our results indicate that, in order to stabilize the 52 per cent *net* public debt/GDP ratio, Colombia would be required to deliver a primary surplus of 2.6 per cent of GDP during the following 5 years. However, when considering "gross liabilities" (reaching 62 per cent of GDP), this figure needs to be increased to 3.1 per cent of GDP, where an additional 0.5 per cent of GDP *per annum* is required to honor intra-governmental debt. If the "hidden" liabilities are to be included, the total primary surplus should be around 4 per cent of GDP per year, where contingent payments would call for an extra effort of at least 1 per cent of GDP.

Our analysis of external debt/GDP ratios leads us to conclude that, in the period 1997-2003, a significant deterioration in most Latin American countries occurred, except for the oil-based economies of Mexico and Venezuela. Argentina

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1 IMF's (2003, p. 114) concern has to do with the concept of "net public debt", where the netting refers to proper accounting of public financial and non-financial assets. For further discussions regarding the perils of guiding fiscal policy by this concept of "governmental net-worth" see Balassone *et al.* (2004), pp. 15-16.

2 As mentioned by Köhler-Töglhofer and Zagler (2004), p. 11, determining the initial public debt/GDP ratio is the key for finding the debt convergence path.

and even Chile have surpassed their external debt range of "tolerance" and Brazil and Colombia have reached such limit.

Section 1 is devoted to explain the size of "gross" and "contingent" public liabilities in the case of Colombia. In section 2 we focus on "gross" public debt and total external debt and compare these magnitudes across the main Latin American economies. Section 3 is devoted to sensitivity analysis of real interest rates, economic growth, and tax efficiency with respect to the primary surpluses required for stabilizing debt ratios. Section 4 provides concluding remarks.

1. "Explicit" public debt and "contingent" liabilities

"Explicit" public debt corresponds to the disbursed debt which is accrued on a public entity (central government, local government, public bank or public enterprise). By contrast, "contingent" public liabilities are conditioned by the occurrence of a future event and as such do not constitute a current liability. Usually the bulk of contingent liabilities corresponds to pension obligations that are to be paid once contributors reach the required retirement age and minimum years of contributions; other contingent liabilities trigger their payments according to pre-established rules dealing with a minimum of traffic, energy, or communication flows.

From a conceptual point of view, the main difference between "explicit" and "contingent" public debt is that the fiscal burden of the former can easily be quantified and its dynamics modeled through the behavior of the interest rate and the timespan of the debt (IMF, 2003a). The "modified-duration" of the debt stock is a useful concept that summarizes the combined effect of these variables. Furthermore, the dynamics of public debt denominated in foreign currency can be "anchored" to long-term values of local interest rates by way of assuming "covered" or "uncovered" interest rate parity condition. Put differently, the parameters of the "explicit" debt are known beforehand and the challenge in forecasting its fiscal burden rests in anticipating key macrovariables (e.g. growth, tax revenues, and interest rates).

By contrast, the cost of "contingent" liabilities depends not only on those key macrovariables but also on microeconomic events dealing with a variety of demographic, geographical, and socioeconomic events (Clavijo, 2002). Although the rules are also set beforehand, the trigger prices of the guarantees are difficult to forecast and require a detailed knowledge of each sector (e.g. pensions, energy and telecommunications markets, road traffic).

The complexity of judging long-term fiscal gaps is not restricted to emerging markets and, in fact, has become one of the most hotly debated topics in recent years in the United States. The so-called "generational imbalances" intent to account for the 75-year actuarial deficits of the Social Security, Medicare, Medicaid, and

(of course) for the effect of the national debt. One of the latest analysis shows that, under current policies, a structural adjustment of 2.3 per cent of GDP is required to stabilize the debt/GDP ratio in the four following decades (Auerbach *et al.*, 2003, p. 4; see also Steindel, 2004).

In the case of Colombia, we have to take into account the difficulties in forecasting the "cash" effects of contingent pension payments, which depend on the approval (by Congress) of a new generation of pension reforms. In the case of Colombia, such new generation of pension reforms needs to tackle the following issues (Alarcon, 2002; Ayala, 2002):

- The concessions granted to special groups of public servants, including the public security forces, oil workers, and teachers; here the solution is to include these sectors in the general framework adopted under Law 797 of 2002, keeping exemptions to a minimum;
- The delay in making effective the new retirement conditions, which should be phased in immediately, instead of waiting until 2007 or 2014, where new conditions will come into effect;
- The level and conditions under which public guarantees are provided; an effective way to proceed here is to lower the percentage of real wage being guaranteed, say from the current 100 per cent to 75 per cent;
- The retirement age, which should be further increased to 60/65 (female/male), in line with the observed progress of life expectancy;
- The high payroll taxes, which hamper goals in terms of pension coverage and affect the fiscal burden; hence, earmarked taxes (different from pensions and health) need to be substituted for regular taxes, in the case of child care (ICBF), and reduced, in the cases of labor training (SENA) and labor assistance (COFAMILIARES), in order to avoid damaging effects on employment and international competitiveness (Clavijo, 1998). There exists ample evidence of significant changes in structural unemployment due to changes in payroll taxes, especially in OECD countries (Van Den Noord and Heady, 2002).

A referendum took place in October 2003, which addressed some of these issues, but unfortunately it was not approved. An alternative plan is to program an accumulation of pension reserves exogenously, for instance, by allocating to the PAYG some of the expected new oil windfall gains. However, the expected amount of unfunded pension liabilities stemming from the public system alone (15 per cent of GDP) represents about a quarter of the net present value of the known oil exploitation. In fact, the accelerated exhaustion of oil reserves poses a threat to maintaining the current level of oil net exports beyond 2010. Hence, depending on "windfall oil gains" to close the expected pension gap in the next three decades does not appear to be a prudent and solid fiscal solution to the pension problem.

Table 1 illustrates total public liabilities estimated at end-2003, distinguishing "gross" from "net" debt and "explicit" from "contingent" debt. "Gross"

Non-financial Public Sector Debt (NFPS) is estimated at 61 per cent of GDP and debt with the Financial Public Sector (FPS) represents another 1.3 per cent of GDP, for a total of "gross-explicit" public debt of 62.3 per cent of GDP. The issue of servicing public debt on timely basis should be related to this total "gross" figure, since interest payments are calculated on this total stock and the ability to reduce or roll-on the principal has to do with this outstanding debt.

However, IMF programs and debt sustainability exercises usually reduce this "gross" figure of the amount of intra-governmental debt arguing that interest payments within the public sector can be netted out. We challenge this procedure on the basis of being inadequate for gauging the effective public debt burden, given the fact that "treasuries" held by public enterprises and public institutes have to be paid interests. Furthermore, the ability to roll "treasuries" held by public entities should not be taken for granted. Aging PAYG systems tend to deteriorate the modified duration of total public debt as their reserves are depleted and substituted by treasuries contracted at full-market conditions (most likely, at higher interest rates and shorter maturities).

Table 1

Public Sector Liabilities in Colombia: Current and Contingent Liabilities
(percent of GDP, estimated at end-2003)

	Explicit Liabilities			Contingent Liabilities		
	Non-Financial Public Sector (NFPS)	Financial Public Sector (FS)	Total	Pensions	Financial (FOGAFIN)	Other (Guarantees)
(1) Gross Debt	61.0	1.3	62.3	180.0	4.7	5.5
(2) Intra-sectorial* (or Liquid Assets)**	10.0*	-	10.0*	10.0**	1.0**	-
(3) = (1) – (2) Net Debt	51.0	1.3	52.3	170.0	3.7	5.5

Source: Our computations based on data by the Ministry of Finance, DNP, and Banco de la República.

In the case of Colombia, this procedure would artificially slash the equivalent of 10 per cent of GDP obligations, leaving "net" debt at the level of 52 per cent of GDP (see Table 1). As we shall illustrate, the required primary surplus can be underestimated in about 0.5 per cent of GDP per year by recurring to this obscure procedure.

We understand that this procedure was the result of negotiations between the IMF and Brazil, but in that case there was a good reason for such netting. The bulk of intra-governmental treasuries was held by territorial entities and the central government had "earmarked" some revenues coming from those entities to service such debt. Put differently, the central government did not require additional primary surpluses to service those treasuries, since there were income sources (other than central government taxes) to honor that intra-governmental debt. Clearly, this is not the case of Colombia and I reckon that this particular arrangement is hard to replicate in other LDCs.[3]

Table 1 also shows the NPV of contingent liabilities. The key difference with respect to "gross" debt is that its burden does no hinge on interest rates paths, but on microeconomic events dealing with demographics, traffic flows, etc. Being of different nature and computed at different time horizons, these "contingent" debts can not be added. For instance, the NPV of pension liabilities (computed in a 50-year horizon) has been estimated at 180 per cent of GDP, after the approval of Law 797 of 2002, in which contributions were increased and benefits reduced (Echeverry *et al.*, 2001). The stock of such pension obligations can be netted out of the liquid asset held by the fully-funded private funds (AFPs), which currently hold about 6 per cent of GDP, the PAYG system, with 2 per cent of GDP, and those of public entities (Ecopetrol and FONPET), with 2 per cent of GDP. This leaves the net pension liability around 170 per cent of GDP.

Another important component of contingent liabilities has to do with the financial public sector and the entity in charge (FOGAFIN), especially after the 1987-89 and 1998-2001 crises. It has been estimated that the NPV of such obligations could represent around 4.7 per cent of GDP in an 8-year horizon. Realization of some of FOGAFIN's assets could provide liquidity for as much as 1 per cent of GDP, leaving a financial public net contingent liability of 3.7 per cent of GDP (see Table 1). We shall assume, for simplicity, that net cash requirements on behalf of FOGAFIN during the years to come will be attended through the quasi-fiscal profits of the central bank, which have fluctuated around 0.3-0.7 per cent of GDP per year.

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[3] This "income earmarking" devoted to honor intra-governmental debt in Brazil is quite different from the "expenditure earmarking" intended to be approved in the Colombian referendum of October 2003, where the part of the "freeze" of operational expenditures of territorial entities would go to support their educational expenditures. In fact, if additional educational expenditures occur, there will not be net-savings but a redirection of expenditures.

Finally, we have estimated that non-pension liabilities (other than FOGAFIN's) represent a NPV of around 5.5 per cent of GDP at a 10-year horizon (see Table 1). However, the best way to gauge the fiscal burden of contingent liabilities is by computing the most probable outcome of those contingencies and to translate them into annual cash flows.

Table 2 presents the cash impact of such contingencies for the period 2004-2008, as stated partially in the 2004 Colombian budget, where we have added the effect of the telecommunications sector and the judicial settlements (based on historical trends). Note that non-pension obligations fluctuate between 0.7-0.8 per cent of GDP per year and pension obligations are as high as 0.3-1.0 per cent of GDP per year.

In short, a correct "budgetary arithmetic" that includes the effect of contingent liabilities leaves us with an average of 1.3 per cent of GDP of additional payments not included in the "explicit" debt scheduled for the period 2004-2008. Note that we are excluding FOGAFIN's requirements based on the idea that the quasi-fiscal profits of the central bank would take care of them. Hence, additional "social expenditure" should not be programmed based on such profits. Put

Table 2

Cash Impact of Contingent Liabilities in Colombia 2004-2008
(percent of GDP)

Concept	2004	2005	2006	2007	2008
Road Traffic (Concessions)	0.06	0.06	0.06	0.06	0.06
Energy Generation (PPAs)	0.08	0.08	0.07	0.06	0.06
Telecommunication (Joint Ventures)	0.31	0.32	0.31	0.31	0.30
Territorial Loan Guarantees	0.01	0.01	0.02	0.03	0.04
Enterprises Loan Guarantees	0.25	0.21	0.19	0.17	0.16
Judicial Settlements	0.09	0.09	0.08	0.08	0.08
Additional Pension Payments	0.80	1.04	0.30	0.30	0.30
Total	**1.60**	**1.80**	**1.04**	**1.01**	**0.99**

Source: Our computations based on the 2004 Budget (Uribe, 2003), Ministry of Finance and Banco de la República.

differently, these figures mean that the required primary surplus to stabilize "gross"public debt should be increased by about 1.3 per cent of GDP per year to account for obligations not included in the traditional concept of "explicit" public debt. As mentioned by the IMF (2003a, p.118), ignoring the effects of contingent liabilities would lead to further deterioration of the "explicit" public debt/GDP ratio, as has been observed in most emerging markets during 1997-2003.

2. "Gross" public debt, total external debt, and "tolerance" in Latin America

Due to difficulties in getting to know "contingent" liabilities at the international level, we shall focus in the rest of the paper on "gross" public debt and its sustainability problems in Latin America. In fact, most statistics concentrate on NFPS, leaving out indebtedness with the financial system, internal or external, which in some countries could represent important amounts.

Table 3 provides the evolution of the NFPS for the main economies of Latin America. Note, for instance, the case of Argentina, which showed a consolidated public debt of only 34.5 per cent of GDP in 1997. Even in late 2001, right before the debt crises, the reading was moderate at 53.6 per cent of GDP. Once depreciation of the local currency occurred, jumping from $1 to $3 per dollar in early 2002, the debt readings escalated to 135.6 per cent of GDP for public debt and to 132.1 per cent of GDP for private and public external debt by end-2002.

The artificial "parity" system collapsed, revealing the unsustainability of the fiscal stance (Calvo and Mishkin, 2003). In the meantime, the liquidity buffer indicator compressed from 1.7 to 0.3 (see Table 3) and the biggest sovereign open-default debt took place. The historical threshold of external debt "tolerance" for Argentina is close to 37 per cent of GDP, if measured by the average of the 1970-2000 period, or 53 per cent of GDP, when considering the rate of indebtedness at which a "credit event" took place (Reinhart *et al.*, 2003).[4]

What is interesting to note is that either benchmark has been practically violated since 1997 or even since 1995 if computations were made at purchasing power parity (PPP). During the years 1997-2003, the external debt/GDP ratio increased by 49 percentage points of GDP, standing at 92 per cent of GDP, and the consolidated "gross" public debt/GDP ratio increased by 119 percentage points of GDP, standing at 154 per cent of GDP.

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[4] Our definition of external debt "intolerance" is different from the one proposed by Reinhart *et al.* (2003, p. 34), since they forecast the debt/GDP ratio at which a country would slip into the Club of bad debt compliance. In the case of Argentina such ratio is as low as 15 per cent of GDP, given the circumstances of the late Nineties.

Table 3

EXTERNAL AND PUBLIC DEBT IN LATIN AMERICA

(percent of GDP)

Country	Years	External Debt		Consolidated Public Debt	"Liquidity Buffer" NIR/ Amortizations Due
		Observed	Range of "Tolerance"*		
Argentina	1997	42.6		34.5	1.70
	2000	51.6		45.3	0.70
	2001	52.2		53.6	0.40
	2002	132.1		135.6	0.30
	2003	92.0	37-53	153.9	0.40
	Var.03/97	49.4		119.4	–1.30
Brazil	1997	24.8		60.0	0.79
	2000	41.3		65.0	0.55
	2001	45.2		72.0	0.58
	2002	49.4		80.0	0.71
	2003	50.6	31-50	73.0	0.85
	Var.03/97	25.8		13.0	0.06
Chile	1997	35.2		38.3	3.20
	2000	53.8		32.9	2.00
	2001	56.4		31.4	3.70
	2002	61.8		32.0	3.90
	2003	62.9	31-58	33.2	3.00
	Var.03/97	27.7		–5.1	–0.20
Colombia	1997	32.3		31.3	1.08
	2000	43.1		48.1	1.02
	2001	47.8		54.0	1.10
	2002	46.3		61.5	1.10
	2003	50.7	34-50	62.0	1.20
	Var.03/97	18.4		30.7	0.12
Mexico	1997	38.8		24.0	0.40
	2000	28.4		40.6	0.60
	2001	26.6		40.4	0.90
	2002	26.5		39.9	1.00
	2003	28.7	38-46	38.1	1.20
	Var.03/97	–10.1		14.1	0.80
Venezuela	1997	39.6		40.3	2.21
	2000	28.0		34.2	3.80
	2001	33.1		26.2	6.30
	2002	31.0		31.2	6.50
	2003	29.6	41 - 44	34.5	5.00
	Var.03/97	–10.0		–5.8	4.29

* Given by the 1970-2000 average indebtness and the rate at which a "credit event" occurred.
Source: Our computations based on IMF (2003), oldman & Sachs (2003), Reinhart *et al.* (2003).

During the September 2003 Annual Meetings of the IMF-WB in Dubai, Argentina proposed bond holders to accept a haircut of 75 per cent, on nearly US$90 billion of non-performing debt (internal and external), and to service the "restructured" debt at an interest rate of only 4 per cent per year. It is worth to highlight that the implicit "gross" debt/GDP ratio that Argentina intends to serve is around 60 per cent of GDP, in line with the Maastricht criteria. In our view, this monumental "credit event" represents a landmark in terms of setting the debt "tolerance" limit that both debtors and creditors are willing to work on towards the future.

The story of Brazil over the period 1997-2003 also spells dramatic deteriorations of external and public debt/GDP ratios, but has not yet constituted a "credit event". The external debt/GDP ratio has increased by 26 percentage points and stands at 51 per cent of GDP by end-2003. The range of external debt "tolerance" for Brazil is 31-50 per cent of GDP, which means that Brazil is currently at the limit.

Regarding consolidated public debt, Brazil experienced less deterioration (13 percentage points) than in the external debt during 1997-2003, but the current level of 73 per cent of GDP surpasses even the moderate criteria of Maastricht. Fortunately, the Lula Administration has moved in the direction of adopting structural reforms that should help diminish such level, if primary surpluses are kept in the 3.5-4.5 per cent of GPD range. International liquidity continues to be a problem for Brazil, although it has improved from a liquidity buffer of 0.79 up to 0.85 by end-2003.

Chile is an investment-grade country with a public debt/GDP ratio as low as 33 per cent by end-2003, about 5 percentage points less than in 1997. However, the external debt/GDP ratio is rather high for a non-speculative grade country (63 per cent of GDP) and actually surpasses the range of "tolerance", which stands at 31-58 per cent of GDP. Note, for example, that the increase of external indebtedness in Chile, 28 percentage points of GDP during 1997-2003, is challenged only by Argentina (49 percentage points). There have been constructive proposals to deal, at the level of the multilaterals, with capital flows volatility which has hurt well-managed economies, like Chile (Caballero, 2003; Fischer, 2003). While these proposals are implemented, it is a very good idea for Chile to have a "liquidity buffer" close to three, which actually triples the market benchmark.

Colombia shows moderate deterioration in external debt/GDP ratios, increasing by 18 percentage points of GDP during 1997-2003, standing at a level of 51 per cent of GDP at end-2003. At this level, Colombia has reached the upper limit of the range of "tolerance". This is one of the main reasons why Moody's rating agency has not yet removed the "negative outlook". However, Standard & Poor's did so in mid-2003, after taking into account the set of approved structural reforms and growth recovery. Following the precautionary actions taken by Chile and Peru,

among others, Colombia has managed to maintain a "liquidity buffer" indicator above one.

Nevertheless, the deterioration of about 31 percentage points of GDP in the consolidated "gross" public debt during the period 1997-2003 is a matter of concern. This degradation is only surpassed by Argentina and the current level of debt (61 per cent of GDP) explicitly requires structural actions. We shall come back to discuss the primary surpluses needed to stabilize this public debt indicator.

Economies dominated by rich oil sectors have performed well during the 1997-2003. This is the case of Mexico and Venezuela, whose external debt/GDP ratios have declined by 10 percentage points and currently stand at around 28-30 per cent of GDP. These indicators are well below their ranges of external indebtedness "tolerance" (38-46 and 41-44, respectively). The "liquidity buffer" indicator is just appropriate in the case of Mexico and generous in the case of Venezuela.

Although the public debt/GDP ratio has increased by 14 percentage points in the case of Mexico during this period, the attained level (38 per cent) is not yet a matter of concern. However, there are great expectations regarding the approval of new tax laws aimed at revamping tax collections. In the case of Venezuela, the public debt ratio has actually declined by 6 percentage points and stands at a moderate level of 34 per cent of GDP. Macroeconomic perspectives hinge on the performance of oil prices as the tax system remains weak and public expenditure remains under big pressure.

In short, we have seen that, in the period 1997-2003, the external debt/GDP ratios have deteriorated in a significant manner in most Latin American countries, except for oil-based economies such as Mexico and Venezuela. Furthermore, Argentina and Chile have surpassed the so-called external debt range of "tolerance" and, at a level of 92 per cent, Argentina stands in an open-default situation while, at 63 per cent, Chile remains vulnerable (in spite of being an investment grade country). Brazil and Colombia have reached the limit of "tolerance" at 50 per cent and require actions to further expand their international trading. However, these two countries remain fragile due to the marked deterioration of their "gross" public debt/GDP ratio, which currently stands above 60 per cent. Additional structural reforms need to be implemented in order to deliver the primary surplus that could stabilize debt indicators in the medium term.

A simple comparison between public debt indicators of emerging markets (standing on average at 70 per cent of GDP) and those of developed economies (on average at 65 per cent of GDP) should leave us with crucial lessons for the near future. Required primary surpluses in emerging markets should be programmed above the prospective target of "gross" public debt/GDP ratios due to the following risks (IMF, 2003a):

- Revenues/GDP ratios are low in emerging markets (27 vs. 44 per cent), hard to increase, and subject to huge volatility according to the economic cycle.

- Interest rate payments/GDP ratios are high in emerging markets (5 vs. 2 per cent) and subject to high volatility, contagion, and compounded effects stemming from changing international debt spreads and foreign exchange fluctuations.
- Contingent liabilities represent mounting pressures and only recent "fiscal responsibility laws" are forcing economic authorities to make them explicit at budget level.

3. Public debt dynamics and sensitivity analysis

The economic literature on debt dynamics has proposed a simple formula for assessing the primary surpluses that are required to stabilize a given "gross" public debt/GDP ratio. Following Blanchard (1990) and Meijdam *et al.* (1996), it is possible to show that public debt increases can be expressed by the following equation:

$$\Delta\,[\text{Public Debt/GDP}] = [(\text{Real Interest Rate} - \text{Real Economic Growth Rate}) * (\text{Public Debt/GDP})] - (\text{Primary Surplus/GDP})$$

As argued in section 1, public debt should be referred to a "gross" concept (including intra-governmental debt). What this expression tells us is that: 1) the public debt/GDP ratio will deteriorate as long as the real interest rate is greater than the rate of economic growth and; 2) the larger the stock/GDP ratio, the larger the impact of such burden. It also tells us that a way to counterbalance the real interest rate-real economic growth gap is by saving enough before interest payments are accounted for (the so-called primary surplus). If such gap is positive, its effect on the debt ratio can be compensated by saving big amounts and could actually lead to a reduction in the public debt/GDP ratio for the following period.

Note, however, that applying the equation to "gross" public debt will leave out the future burden of contingent payments that do not depend on interest payments, but on the performance of microeconomic sectors dealing with energy and traffic flows, as discussed in section 1. This means that whatever result we get on the required "primary surplus", it should be increased by the annual "cash" effect of the contingent payments. In the case of Colombia, we have already quantified that amount in as much as 1.3 per cent of GDP during at least the following five years.

Table 4 illustrates the required Primary Surplus/GDP ratio to stabilize the "gross" public debt/GDP ratio, given different scenarios of indebtedness and real interest rates. Let us assume, for the moment, that this is the case of an economy that is able to growth at an annual pace of 2 per cent in real terms and that tax collections present unity elasticity to economic growth.

Table 4

Required Primary Surplus to Stabilize "Gross" Public Debts
(percent of GDP)

Ratio of Public Debt/GDP	**Assumption: Real Economic Growth fixed at 2% per year** **Real Interest Rate** *(percent)*			
	7	**8**	**9**	**10**
30	1.5	1.8	2.1	2.4
40	2.0	2.4	2.8	3.2
50	2.5	3.0	3.5	4.0
60	**3.0**	3.6	4.2	4.8
70	3.5	4.2	4.9	5.6

Ratio of Public Debt/GDP	**Assumption: Real Interest Rate fixed at 7% per year** **Real Economic Growth** *(percent)*			
	2	**3**	**4**	**5**
30	1.5	1.2	0.9	0.6
40	2.0	1.6	1.2	0.8
50	2.5	2.0	1.5	1.0
60	**3.0**	2.4	1.8	1.2
70	3.5	2.8	2.1	1.4

Ratio of Public Debt/GDP	**Assumptions: Real Interest Rate 7% and Real Growth fixed at 2% per year** **Tax Revenue Elasticity** *(percent)*			
	0.4	**0.6**	**0.8**	**1.0**
30	1.9	1.7	1.6	1.5
40	2.5	2.3	2.2	2.0
50	3.1	2.9	2.7	2.5
60	3.7	3.5	3.2	**3.0**
70	4.3	4.1	3.8	3.5

Sources: Our computations based on Meijdam *et al.* (1996).

It can readily be observed that at an average real interest rate of 7 per cent per year, similar to the one currently faced by the Colombian debt, a primary surplus equivalent to 3 per cent of GDP per year is required in order to stabilize "gross" debt at the level of 60 per cent of GDP. This is the primary surplus being targeted by Colombian authorities under the current Stand-by Agreement with the IMF (2003b).

However, such target does not take into account that about half of the public debt (representing 30 per cent of GDP) corresponds to external debt. As a consequence, one should assess the risk of a faster than expected rate of depreciation of the peso against the dollar, under international turbulence. In this case, the "equivalent" real interest rate would be pressed upwards and it could easily escalate to 8 per cent in real terms, leading to a requirement of a primary surplus of 3.6 per cent of GDP.

Brazil has taken the lead in this respect by targeting a primary surplus of 4.0-4.5 per cent of GDP in 2003, since its "gross" ratio is around 70 per cent of GDP and its average net cost should be hovering around 9 per cent in real terms, after successful restructuring of their dollar-denominated local debts. Note, for instance, that economic growth in Brazil was expected at only 1 per cent during 2003 (although actually contracted by –0.2 per cent), so part of this extra primary surplus is definitely being used as a cushion for facing these negative surprises.[5] If Brazil and Colombia were to recover, on a sustainable basis, the average growth rate of the previous 30 years, which is close to 4 per cent per year, then the primary surplus efforts could be reduced to as little as 2 per cent of GDP (see the intermediate panel of Table 4).

Finally, it is worth highlighting the effect of the tax cycle on the primary surplus requirements. It is well known that, during the first year of a tax reform, the tax revenue elasticity with respect to economic growth could be close to one. However, as time passes by, loopholes appear and elusion strategies begin to dampen tax collections. The last section of Table 4 illustrates the effect of losing tax revenue elasticity. At the 60 per cent debt/GDP ratio, in order to deal with a fall in the revenue collection elasticity from one to 0.80, Colombia would require an additional primary surplus of 0.2 per cent of GDP per year. In the case of Brazil, standing at the 70 per cent level, the additional primary surplus would be 0.3 per cent of GDP.

In short, considering these combined effects (contingent liabilities and market turbulence), it becomes clear that Colombia's public "gross" debt is more likely to stabilize at around 60 per cent of GDP if a primary surplus of 4 per cent of GDP is targeted, instead of the current 3 per cent of GDP. The expected faster economic

[5] The literature on inflation targeting is clear in recommending independent central banks "… to make explicit the conditional nature of the commitment to an inflation target. […] Fiscal policy ought to be treated as a potential source of 'shocks'. *Ideally, where fiscal policy that undermines central bank control of inflation is a real possibility, this be should be accounted for, discussed in inflation reports, and reflected in central bank projections"* (Sims, 2003, p.13, italics ours). See also Fraga *et al.* (2003).

growth of 3.5-4 per cent in the following years should be used as a cushion for confronting the volatility of the real interest rate and of the exchange rate, especially since Colombia has adopted, starting September 1999, a floating exchange rate system.

4. Conclusions

We have analyzed the dynamics of Colombia's public and external debt, with reference to the Latin American experience during 1997-2003. We argued, first, that such computations should be made on "gross" basis (*i.e.* including the required interest payment on intra-governmental debt). Our concern has to do with proper accounting of "public gross liabilities" which are sometimes underestimated by way of ignoring the effect of having to serve as well this intra-governmental debt. Secondly, we argued that public debt should have a "forward looking" view by way of including the effect of contingent liabilities, like pension obligations and public guarantees. In spite of the efforts of the IMF and Wall Street to address this issue, computations keep neglecting the effect of having to serve intra-governmental debt and contingent obligations.

The complexity of judging long-term fiscal gaps is not restricted to emerging markets and, in fact, has become one of the most hotly debated topics in recent years in the United States. The so-called "generational imbalances" intent to account for the 75-year actuarial deficits of the Social Security, Medicare, Medicaid, and (of course) the effect of the national debt. One of the latest analyses shows that in Colombia, under current policies, a structural adjustment of 2.3 per cent of GDP is required to stabilize the debt/GDP ratio in the four following decades.

In the case of Colombia, our results indicate that, in order to stabilize the 62 per cent gross public debt/GDP ratio, there is a need to deliver primary surpluses close to 3 per cent of GDP during the next years. Furthermore, when considering the effect of contingent debts, an additional primary surplus of 1 per cent of GDP is required annually.

Regarding external debt/GDP ratios, we found that most non-oil-based economies (including Argentina, Brazil, Chile and Colombia) have actually exceeded the range of external debt "tolerance". At a level of 92 per cent, Argentina stands in an open-default situation, while at 63 per cent Chile remains vulnerable (in spite of being an investment grade country). Brazil and Colombia have reached the limit of "tolerance" at 50 per cent and require actions to further expand their international trading. Additionally, these two countries remain fragile due to the marked deterioration of their "gross" public debt/GDP ratios, which currently stand above 60 per cent. Additional structural reforms need to be implemented in order to deliver the required primary surplus that could stabilize debt indicators in the medium term.

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A DIFFERENT VIEW ON PUBLIC DEBT: THE GOVERNMENT AS FINANCIAL INVESTOR

Carl Gjersem[*]

Introduction

Starting in the late Sixties and early Seventies, immense oil and natural gas reserves have been discovered along Norway's long coastline and far out into the North Sea. The development of these resources was kept under rather strict governmental control, and a large part of the profits have ended up in the public coffers. Now revenues from the petroleum sector have reached their peak and will slowly dwindle for the coming decades. Coupled with rising pension and health care costs caused by ageing as in most other OECD countries, there is an obvious case for pre-funding and saving in the public sector.

This public saving is taking place in the Petroleum Fund, which by now is one of the world's biggest financial investors.

Against this backdrop, this paper sets out some of the issues that concern a government that is also a financial investor. After a brief description of the Norwegian economy, the second section below describes the budgetary mechanism that has managed to establish actual public saving. The third section depicts the structure of the Fund, the fourth its investments and the next evaluates the financial results attained. The sixth section sets out some of the political economy lessons that can be drawn. The last section concludes.

1. Setting the scene

While a small country, Norwegian GDP per capita and productivity growth are among the highest in the world (OECD, 2003). Public spending is very high in Norway, partly reflecting an extensive coverage of the welfare system and ambitious regional development objectives (Joumard and Suyker, 2002). The current population is just below 5 million, and with birth rates around 1.8 combined with positive net immigration total population is set to grow further, albeit slowly. However, population ageing will take place, driven not so much by falling fertility as by falling mortality. While strong, this pattern of ageing is thus not as severe as in many other countries.

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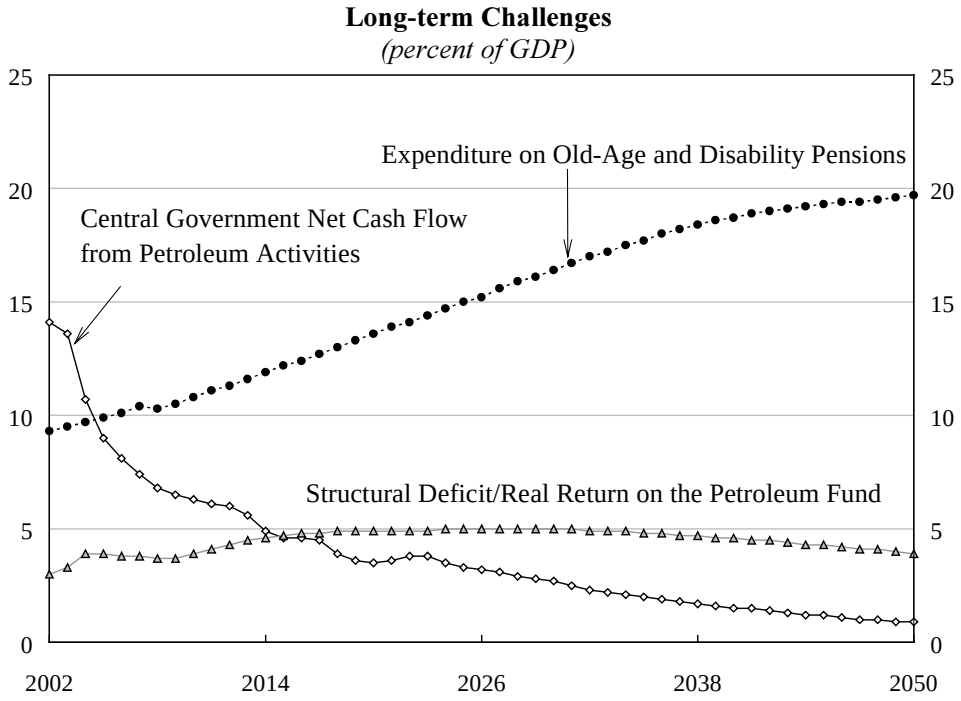
The views expressed in this paper are those of the author and do not necessarily reflect those of the Ministry or of the government of Norway.

Figure 1



Source: Ministry of Finance.

However, compared to most OECD countries, the expected growth in pension and health spending is very high (Dang *et al.*, 2001 and Pension Commission, 2004). While the average old age pension expenditure for OECD countries 7.4 per cent of GDP today, Norway is below at 4.9 per cent. However, compared to an expected average increase of 3.4 percentage points in the other OECD countries, Norway expects an increase of almost 10 percentage points (Figure 1).[1] The extensive public health and care system will raise similar challenges.

Contrary to many other resource-rich nations, the Norwegian government took steps long ago towards safeguarding this revenue stream for the future (Sachs and Warner, 2001). The Government Petroleum Fund was established in 1990. Its construction aims as helping the management of fiscal policy by making the spending of petroleum revenues more visible.

The Fund has two main purposes. First, it acts as a buffer to smooth short-term fluctuations in the oil revenues. This will make the Norwegian economy

[1] However, a politically broad-based Committee has recently proposed a set of changes to the old age pension system that may reduce total pension expenditure by as much as 20 per cent, or 3-4 per cent of GDP, in the long run.

more robust and allow greater room to manoeuvre in economic policy. Second, it will serve as a tool for coping with the financial challenges from the ageing population and the expected decline in oil revenues, by transferring wealth to future generations. The process of transforming physical petroleum reserves with financial assets in the Petroleum Fund will reduce future dependence of the oil revenues.

2. The fiscal mechanism

Formally, the Petroleum Fund is a NOK-denominated account with the central bank (Norges Bank). The corollary to this account is the investment by Norges Bank of a corresponding amount in financial instruments abroad in the Bank's own name. The return on these securities determines the return on the Petroleum Fund. By the end of September 2003, the Government Petroleum Fund amounted to NOK 845 billion (EUR 100 billion).[2] Projections indicate that the Fund will have grown from the current 54 per cent of GDP today to more than 90 per cent by the end of 2010.

The income of the Fund consists of the net cash flow from petroleum activities plus the return on the Fund's assets. The expenditures of the Fund are the transfers to the Fiscal budget to finance the non-oil budget deficit. Thus, the Fund's construction creates a direct link from the use of the Fund's capital and the non-oil budget deficit. Increased government expenditure or lower tax incomes from mainland activities result in smaller allocations to the Fund. Accordingly, the Petroleum Fund is an integrated part of the government finances, and can be seen as an accounting device (Figure 2).

In early spring 2001, the government introduced a fiscal rule for accelerated use of the State Petroleum Fund. This rule states that each year, 4 per cent of the initial balance in the State Petroleum Fund for that year should be "used"[3] The actual implementation of fiscal policy should also take into account business cycle fluctuations. As the annual inflow into the State Petroleum Fund currently is markedly higher, the fund will grow in the medium term and the annual "use" will increase accordingly. This fiscal policy rule thus implies a modest increase in the use of petroleum revenues, at the same time as it contributes to limiting expenditure growth. The rule has not stood up perfectly even in its short life; a relaxed reading taking into account the downturn in economic activity that hit Norway alongside most of the OECD area these last years is needed to be very positive on its workings.

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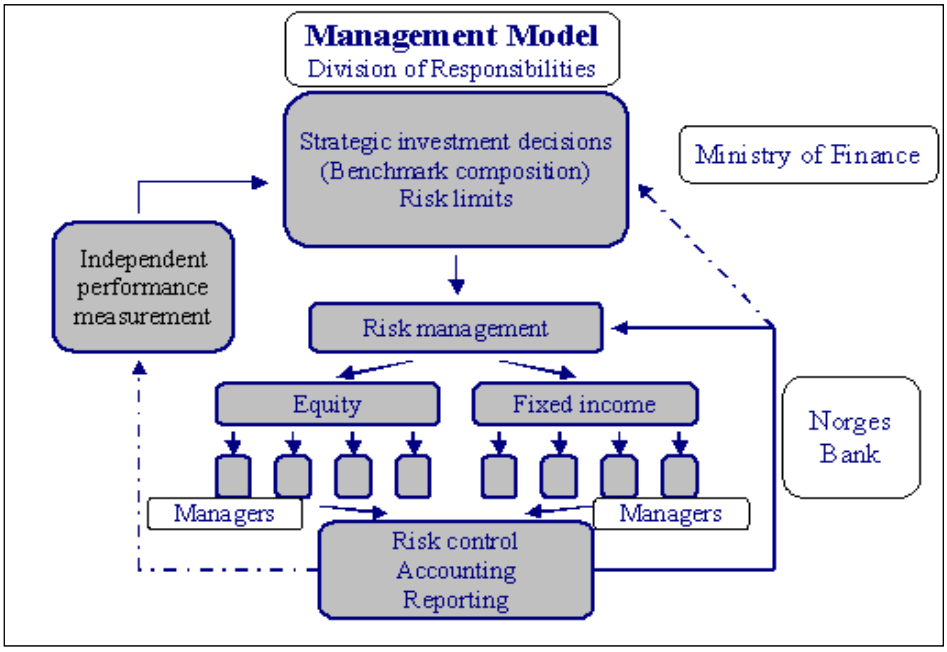
[2] The conversions presented here are based on an exchange rate between NOK and EUR of 8.43, as of December 31, 2003. In June 2004 the exchange rate also was close to this level.

[3] Formally, the rule states that the budget should balance after transfers from the State Petroleum Fund when corrected for activity (that is, the business cycle influence) and for transfers from Norges Bank and financial income in excess of "normal levels". There is no specific constraint on how the additional funds should be used; the use can consist of reduced taxes, or increased transfers or consumption.

Figure 2

How the Fund Works



Source: Ministry of Finance.

3. The organisational framework

An Act of Parliament established the Fund in 1990.[4] According to this law, the Ministry of Finance is the manager of the Fund. In the Regulation on the Management of the Government Petroleum Fund, the Ministry of Finance has delegated the responsibility for the operational management of the Government Petroleum Fund to Norges Bank. The task is further defined in a Management Agreement between the Ministry of Finance and Norges Bank and in letters from the Ministry to the Bank.

The Government and the Ministry of Finance decide the guidelines and regulations. However, the Government always consults the Parliament (Storting) before making substantial changes to the guidelines. The Government regularly informs Parliament about developments in the Fund (notably in the National Budget in October, The National Accounts in March and the Revised National Budget in May).

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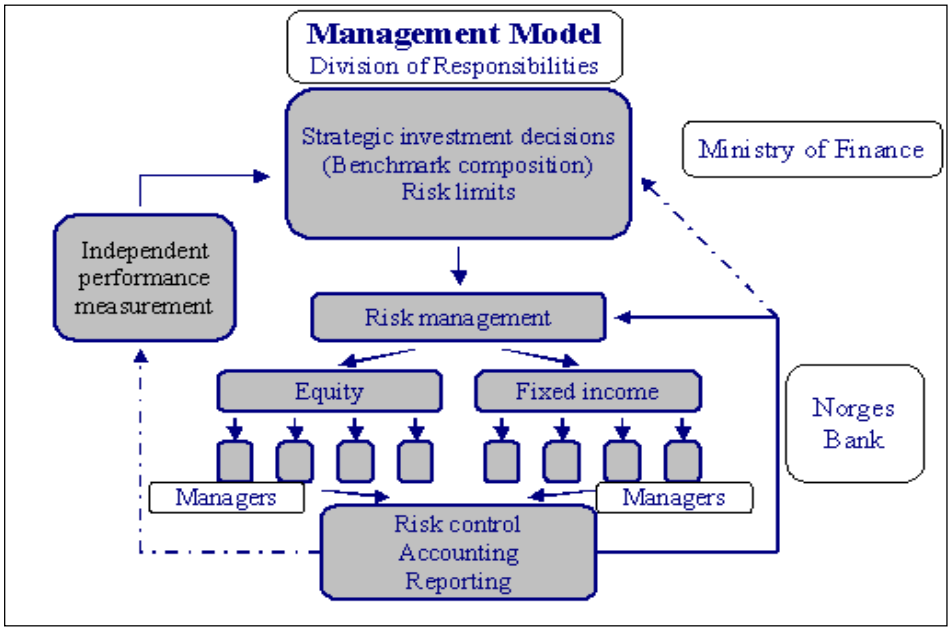
[4] This is Act No. 36 of 22 June 1990 relating to the Government Petroleum Fund, supported by Regulations from October 1997.

The division of responsibilities between the Ministry of Finance and Norges Bank follows a fixed demarcation (Figure 3). The Ministry of Finance decides the strategic investment decisions (known as the benchmark portfolio), and the risk limits. Norges Banks tasks are to carry out the investment strategy, risk management, accounting and reporting. Further, the Bank is to offer advice on strategic investment decisions to the Ministry. The office of the Auditor General has overriding responsibility for auditing the Petroleum Fund and reports to the Storting on the management of the Fund.

An important issue for the Ministry is the evaluation of Norges Bank's operational management of the Fund. The Ministry of Finance has hired external expertise to carry out independent performance reviews of the Fund's performance. In order to evaluate the performance of the Petroleum Fund, the Ministry of Finance has defined a benchmark portfolio. The benchmark is a theoretical portfolio consisting of market indices for the countries in which investments are allowed. In this way, the performance of the Petroleum Fund is compared to the benchmark. Furthermore, the Ministry has set a limit as to how much the Petroleum Fund's investments may be expected to deviate from the benchmark, illustrating that the benchmark also serves as a risk management tool.

Figure 3

Management Model



Source: Ministry of Finance.

4. The investments

All investment funds have a purpose. To what degree that purpose is uniquely defined varies across different types of funds. A fund with a clear purpose as defined by its liabilities is an autonomous pension fund. On the other hand, the Petroleum fund is an endowment fund with the full government budget as liability and profit maximation for a given risk profile as purpose. The Fund made its highest ever return in 2003, 12.6 per cent, beating its benchmark by 0.6 basis points.

The Fund is currently invested in nearly 30 different countries. It follows from the Regulation that the Fund is only to be invested abroad. Petroleum revenues are seen as too large and volatile to be absorbed by the mainland economy without creating high inflation and structural problems in the short run. An internationally invested fund alleviates this problem, as the central government contributes to the capital outflow needed to match current account surpluses. Further main considerations behind this are the following:

- The need to maintain and protect the Fiscal Budget as the central political management tool: Financing domestic investments through the Petroleum Fund, including infrastructure, know-how and businesses, the Fund would become a supplementary source of financing government expenditures. This would undermine the position of the Fiscal Budget as a management tool and weaken the budget process.
- The need for a diversified industry structure: Channelling financial investments abroad helps to ensure that the amount of oil revenues used in the economy does not result in an industry structure that cannot be sustained when oil revenues start to decline (*i.e.,* avoiding so-called "Dutch Disease"). The optimal level of domestic fixed investments should not be affected by the size of petroleum revenues in a given year. Increased domestic investment carries the risk of a lower return on investment.

The typical textbook approach to investing will suggest that the return on a portfolio essentially is determined by the strategy and framework laid down for its management. The most important strategic decisions concern the distribution of investments among various asset classes, such as bonds and equities, and the distribution by country. These decisions can determine as much as 90-95 per cent of the return. The remaining 5-10 per cent of the differences in return is a result of the manager's choice of equities and bonds.

Initially, the Fund's capital was invested more or less in line with Norges Bank's foreign exchange reserves, *i.e.* primarily in low-risk interest-bearing securities. Later, prospects of a substantial Fund and a longer investment horizon led the government to conclude that a longer-term investment horizon was warranted and that equity instruments should be included in the portfolio. Credit bonds were included in the benchmark and the portfolio from 2002, and further expansion to other and less liquid asset classes may lie ahead. The equity portfolio is now invested in some emerging markets. Private equity and real estate are examples of

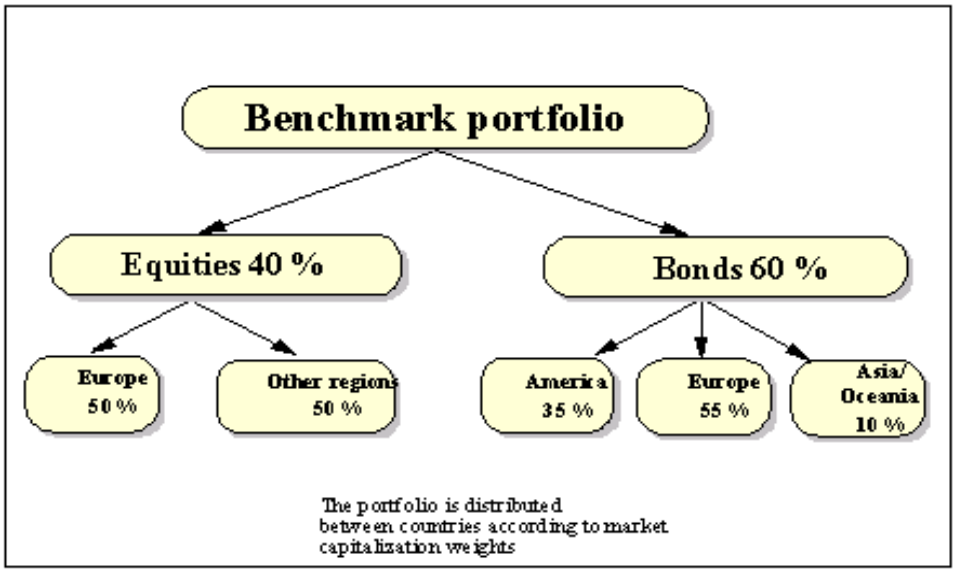
classes that have been discussed but where decisions have been put off. Such alternative investment classes raise question both for the management organisation in terms of competence and need of manpower in the day-to-day management of the fund, and in terms of control and reporting for the Ministry, as the return is hard to establish for assets that are infrequently traded.

From 1 January 1998 the diversification strategy of the Fund has been based on an asset allocation in the benchmark portfolio set to 60 per cent bonds and 40 per cent equities (Figure 4). The equity portfolio has a geographical split of 50 per cent in Europe and 50 per cent in other regions according to market capitalisation weights. For the fixed income portfolio, 55 per cent is invested in Europe, 35 per cent in America and 10 per cent in Asia/Oceania. Within each region, the portfolios are invested according to the market capitalisation weights for each country and market shares are not rebalanced. The Fund is invested in all developed markets. The rules further stipulate that the investments in any one company may not exceed 3 per cent of the voting shares or share capital. Similar rules are in place for individual bond issues.

The active management of the equity portfolio is increasingly centred on sector mandates, where bets are taken within a specific sector but across countries. Portfolio manager overlap increases the risk of breaches of the ownership restrictions. The active management of the fixed income portfolio involves both bets

Figure 4

Investment of the Fund



Source: Ministry of Finance.

on interest rates in different currencies and on exchange rates, in addition to sovereign issuers with different standings in the market.

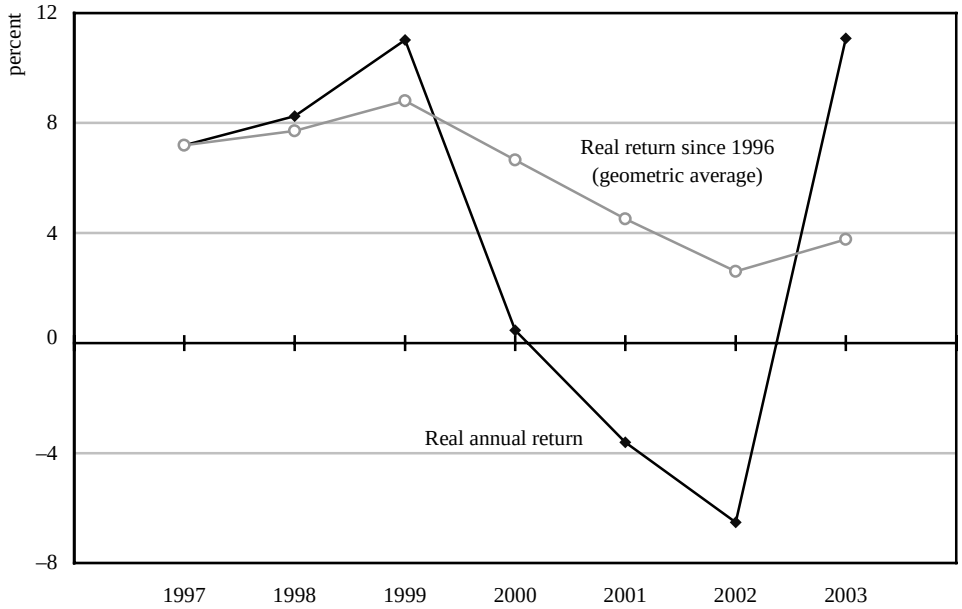
5. The return on the fund

Since the beginning of 1998 nominal return on the Fund's assets, measured in the funds currency basket, has averaged 5.3 per cent per annum (Figure 5). It is the return in foreign currency that is relevant for measuring the development in the funds international purchasing power. The average annual real return, *i.e.* after deductions for management costs and inflation, has been 3.7 per cent from the beginning of 1998 until the end of 2003. Remarkably, the running cost of the Fund has been kept at or below 0.1 per cent of total assets.

The long-term real return represents the marginal funding cost for the Norwegian government. It has been rather close to the 4 per cent that often has been used in international economic exercises (see projections in the OECD or the EU, e.g. EU, 2003). It is close to the after-tax real return that has prevailed in the United

Figure 5

Return on the Fund's Investments



Note: Annual real return in the Fund's currency basket and geometric average of annual returns over the whole period. Equities have been included in the benchmark portfolio since March 1997.
Source: Norges Bank and Ministry of Finance.

States in the 1880-2002 period according to McGrattan and Prescott (2003) and also for a somewhat shorter period according to Kotlikoff and Summers (1981). However, the treatment of risk in such exercises raises further issues.

The Regulation on the Fund defines limits for duration and credit risk connected with the investments in fixed income instruments. The modified duration of the total portfolio of fixed income instruments and associated derivatives should be between 3 and 7. The credit risk is regulated by a minimum rating for fixed income instruments, bank deposits and for counterparties in derivatives transactions. The risk limit relative to the funds benchmark, defined as tracking error, has been set to maximum 1.5 percentage points. A 1.5 per cent tracking error implies that the actual return is expected to deviate by less than 1.5 percentage points from the benchmark return in two out of three years. That the actual deviations have been far smaller indicates that the manager has not made full use of the risk limits.

In 2003, the manager achieved a return that was 0.59 percentage points higher than that on the benchmark portfolio. This is the sixth consecutive year since equities were introduced into the portfolio in 1998 that Norges Bank has outperformed the benchmark as defined by the Ministry of Finance. The annual excess return has averaged 0.43 per cent. The total excess return over this period has been just over NOK 9 billion (EUR 1.1 billion).

6. The political economy of the Fund

First, there is political risk to the Fund construction consisting of a pure spending spree. Even with a fiscal rule that is not followed in any strict sense, it is hard to argue that this has happened. However, there is more subtle risk in the sense that non-economic issues may enter the purpose of the fund. Such issues have certainly appeared, through the introduction of environmental concern, ethically motivated investing and a broadening of the investment universe.

The Environmental Fund that was established with NOK 1 billion of assets on 31 January 2001, and was increased by another billion in 2002. The Environmental Fund's assets are only to be invested in shares in companies that satisfy certain environmental criteria, including environmental reporting and environmental certification. This implies that *all* companies that fulfil these requirements will be included. In addition, companies that are considered to have inherently little negative influence on the environment are included, even if they do not fulfil the requirements to reporting and certification. The environmental and financial aspects of the Environmental Fund were evaluated in the Revised National Budget in May 2004, without much evidence found in support of this approach.

A further development recently came from a public commission appointed to propose ethical guidelines for the Petroleum Fund. After a public consultation process, the Government proposed a set of ethical guidelines for the Petroleum Fund based on the commission's report and the submissions received in the Revised National Budget for 2004. These guidelines comprise three elements:

exercise of ownership rights, negative screening and exclusion. Norges Bank is to be responsible for the implementation of the corporate governance policy, while the Ministry of Finance will be responsible for decisions about the ethical constraints on the Fund's investment universe. The Ministry will also establish an external council to advice on negative screening and exclusion. The Parliament supported introducing these guidelines in June 2004. As a corollary to the increased focus on ethical issues, Parliament supported discontinuing the Environment Fund.

The benchmark portfolio, as set by the Ministry of Finance, governs the diversification across countries. Beside the industrialised countries, it also includes quite a number of emerging markets. Being small, these hardly affect the overall risk profile of the fund. However, such recent inclusions as that of South Africa appear to be more of a political issue than motivated from a professional diversification or active management viewpoints.

Although uncertain in their future developments, these issues do probably have a rather small effect on the Petroleum Fund's return. The ones described above have not grown after having been introduced. Rather they have been calmly evaluated for goal attainment and been scaled accordingly. It is not obvious that further such proposals are eliminated in the current strategy, though. These could be for a specific geographical distribution or for specific projects, perhaps including infrastructure projects that had failed the ordinary process for setting priorities in the National Budget negotiations. Indeed, proposals on "using the public financial strength to assist national industries abroad" have recently been demanded from Parliament.[5]

The operation of the Fund and the management of its capital are governed by law, regulations and detailed guidelines. The Fund was established when the Parliament adopted the Act relating to the Petroleum Fund in 1990. The Act formally gave the King authority to issue further guidelines for the Fund, and this authority was delegated to the Ministry of Finance as is regular practice. The Ministry has issued two regulations, and a number of guidelines have been communicated to Norges Bank in the form of letters from the Ministry. The Parliament is always informed and expresses its opinions when amendments to the formal framework for the operation of the Fund are made. Comprehensive discussion in Parliament has been a part of the strategy since the Fund's infancy. This approach to decision-making supports responsible participation.

As is well known, recent years have constituted a very volatile period in the world's financial markets. The Fund's asset allocation mix is partly motivated by the need to avoid political unrest from large swings in its value. However, as Figure 5 above illustrated, these swings have been very strong. Focussing on the equity part

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[5] A recent discussion on such issues can be found in the recent report from an Expert group headed by economics professor Agnar Sandmo from the Norwegian School of Economics and Business Administration (Expert group, 2004).

of the portfolio, the return has been negative for successive years. Actually, overall the fixed-income part of the portfolio has been the money earner since the Fund's inception. Viewed in a political economy perspective, it is rather surprising to note that the political basis for the Fund have been left unscathed by these financial waves.

There is political risk in the sense that non-economic issues may enter the purpose of the fund. There is at the same time risks to the political system. For the parties in power, there is a clear risk of being associated with volatile results. Recent experience suggests that this issue may have been exaggerated, though. Through the falling stock markets that appeared in the new century, the level of acceptable risk well judged. One could also argue that the experience suggests that the political system will weather even higher volatility, consistent with a higher exposure to equity and hopefully, rewarded by higher risk premiums.

7. Final remarks

There is no single policy measure that can eliminate the long-term pressures on the welfare system caused by the demographic outlook, a still maturing pension system and decreasing petroleum revenues. The Norwegian government has chosen a broad strategy to meet these challenges. The main message in this strategy is to strengthen the economic basis for the future welfare by measures to promote a well-functioning economy, high employment and solid public finances. Especially, to meet the demographic development with a declining share of the population in the working ages and a related increase in the share of pensioners, it becomes even more important to keep the labour force as large and well qualified as possible. Steps to reduce future pension expenditures were taken as early as in the beginning of the Nineties and a new reform of the pension system is now in the process of being presented to Parliament.

The current budget policy approach consists of a coherent and simultaneous treatment of all budgets items. Taxes should not be earmarked for expenditures considered to be integrated parts of the public tasks, as the social security system is. By earmarking, it is difficult to give all budget items the consistent, stable and visible budgetary treatment over time that is central to ensure sustainability. A coherent discussion in the Government and the Parliament of public income, expenditure and policy priorities during the annual budget process are important. It has been seen as essential to avoid building a pension fund while at the same time running deficits in other public sectors.

This may be called general funding in contrast to earmarked funding. The Petroleum Fund was established as a fiscal mechanism in 1990, to enhance the transparency of the spending of petroleum revenues. All oil revenues are accumulated in the Fund, and transfers from the Fund will finance any non-oil deficit on the government budget. Such transfers require explicit voting in Parliament. Thus a general fund, not isolated from the budget process, is established

through the Petroleum Fund. Accumulation of assets in the Petroleum Fund through budget surpluses will among other things be used to meet long term challenges related to the demographic development and increased pension expenditures. Thus, public net saving will automatically create financial assets in the public sector.

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PUBLIC DEBT IN EMERGING MARKETS: IS IT TOO HIGH?

James Alexander Daniel, Tim Callen, Macro Terrones, Xavier Debrun and Celine Allard [*]

The potential risks associated with high levels of public debt have long been a concern of economic policymakers around the globe. In the industrial countries, the need to strengthen fiscal positions and reduce public debt levels to accommodate the pressures that population aging will put on government budgets in the future has received considerable attention in recent years (see, for example, the May 2001 *World Economic Outlook*, European Policy Committee, 2001; and Turner and others, 1998). For emerging market economies, high public debt has often had more immediate consequences for economic performance, with debt crises – and the resulting painful periods of economic adjustment – having been a recurring feature of the histories of many of these countries.

Following a period of relative calm in the first half of the Nineties, during which public debt levels in many countries declined, recent developments have once again brought to the fore the issue of public debt in emerging market economies. Public debt has increased quite sharply in recent years across a broad range of emerging market economies, there have been high profile and costly debt defaults or distressed debt restructurings in Argentina, Ecuador, Pakistan, Russia, Ukraine and Uruguay, and other countries – Turkey, for example – have experienced severe fiscal difficulties. These developments have led to the suggestion that – despite the currently benign environment in global financial markets – emerging market economies may once again be on the verge of serious public debt problems.

Discussions of the economic impact of public debt go back at least as far as the eighteenth century when debt problems in France and Great Britain began to mount. More recently, the political economy aspects of public debt have also received increasing attention.[1] There are of course valid reasons why a government may choose to borrow and accumulate debt. The debt may be used to fund spending that contributes to broader economic and social objectives. Financing public investment – for example, by improving physical infrastructure – might raise the rate of return on private capital or provide something that the private sector would not provide because of externalities, while higher spending on education or health care may enhance a nation's human capital. Further, if government spending has to be

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[*] International Monetary Fund.

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[1] In this literature, debt is seen in a strategic context where the government can use it to finance expenditures or tax cuts to boost its reelection prospects, or to try to constrain the actions of successor regimes (see Rogoff, 1990, and Persson and Svenson, 1989).

temporarily high today because of, say, a war or a natural disaster, debt could be used as a buffer to limit the need to immediately raise taxes (see Barro, 1979). Financing countercyclical fiscal policy also has an important role in helping stabilize economies and smooth business cycles.

Large public debt burdens can, however, have a significant negative effect on economic activity. They require high taxes to finance and put upward pressure on real interest rates, "crowding out" private investment. When a government is no longer able to finance its deficits, it is forced to contract spending or raise revenues, often at a time when fiscal policy is needed to help stabilize the economy (fiscal policy becomes procyclical rather than countercyclical). When it cannot take these actions, a debt crisis ensues and the government is forced to default or inflate the debt away (an implicit default), both of which entail large economic and welfare costs.

Given the recent rise in public debt in emerging market economies, two increasingly important questions are at what point does public debt become too high?[2] and what policy actions does a government need to take to ensure that its debt is sustainable? A recent paper by Reinhart, Rogoff and Savastano (2003) has investigated the "intolerance" of some emerging market economies to external debt, and has examined episodes of large external debt reductions in these economies. To date, however, few studies have empirically examined public debt sustainability or large *public* debt reductions in emerging market *economies*, partly because of the difficulties in constructing a dataset on public debt in these countries. This paper seeks to address this gap and build on the work of Reinhart, Rogoff and Savastano. In particular, it compiles a comprehensive cross-country database on public debt in emerging market economies, and then applies a number of different approaches to assess sustainability and analyze past instances in which countries have undertaken significant public debt reductions. Innovative aspects of the analysis include an investigation of how fiscal policy in emerging market economies responds to increases in public debt and the implications of the greater inherent volatility of emerging market economies for the sustainability of their public debt.

As already discussed, compiling a data set is a major challenge for any study of public debt in emerging market economies. The availability and coverage of public debt data vary considerably between countries and there is no single source from which the data can be obtained. For the purposes of this chapter, two new data sets were constructed. They both focus on gross public sector debt, rather than net debt (*i.e.*, where public sector assets are netted out) or the net present value of the debt, because of data limitations. The first dataset contains a broad measure of public debt for the period 1990-2002 and the second a narrower definition of public debt, but over a longer time period (1970-2002). The reasons for creating two separate datasets, and the strengths and weaknesses of each, are discussed in Box 1.

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[2] Economic theory provides little practical guidance on the optimum level of public debt as it is dependent on the specification of the model (see Aiyagari and McGrathan, 1998).

1. Public debt and fiscal policy in emerging market economies

Public sector debt in emerging market economies has risen quite sharply since the mid-Nineties, and currently averages about 70 per cent of GDP (Figure 3.1).[3] This increase in debt has more than reversed the decline that took place in the first half of the Nineties, so that despite the Brady debt restructuring initiative and large-scale privatization programs in many countries, public debt in emerging markets is higher than it was at the beginning of the Nineties. This is not to say there have not been success stories – Bulgaria, for example, has reduced its public debt ratio from close to 160 per cent of GDP in the early Nineties to less than 60 per cent of GDP in 2002 – but many other countries have experienced very large increases in their debt ratios. In Argentina, public debt has risen from 30 per cent of GDP in the early Nineties to 150 per cent of GDP at end-2002, while in Lebanon it has increased from 50 per cent of GDP to close to 180 per cent of GDP over the same period.

The increase in public debt in emerging market economies in recent years has been concentrated in Latin America and Asia, with the latter seeing the most notable rise owing to the impact of the financial crisis in the region in the late Nineties. In contrast, debt ratios in the transition countries in Europe have fallen sharply as a number of these economies have implemented significant economic and fiscal reforms as they move toward accession to the European Union. In the Middle East and Africa, debt has remained broadly unchanged, but at uncomfortably high levels. The rise in public debt has been accounted for by increased issuance of domestic debt, spurred by domestic financial liberalization, the decline in inflation (particularly in Latin America), and bank restructuring debt.[4] In contrast, the share of external public debt has declined, and now accounts for about one-half of the total, compared to about two-thirds at the beginning of the Nineties.

The increase in public debt in emerging market economies stands in contrast to developments among the industrial countries where debt ratios have generally declined in recent years (with the notable exception of Japan) (Figure 2). Strikingly, after being well below industrial country levels during the Nineties, the average public debt ratio in emerging market economies is now higher than the average ratio in industrial countries (and much higher as a percent of government revenues). It is also noticeable that despite the decline in the share of external debt in total public debt to about 50 per cent in emerging market economies, it still remains well above the 25 per cent share in industrial countries. The difference in debt denominated in, or indexed to, foreign currency is even larger. Based on a limited sample of

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[3] Emerging market economies are here defined as those that were in the EMBI global index at the beginning of 2002 plus Costa Rica, Indonesia, India, Israel, and Jordan. Data are for nonfinancial public sector debt (external and domestic) where available, or the broadest definition of public sector that is otherwise available. Average figures are unweighted.

[4] Reinhart, Rogoff and Savastano (2003) similarly note these trends, but across a much smaller subset of countries.

emerging market economies, the foreign currency component is about 60 per cent of total debt because some domestic government debt is linked to foreign currencies.

What have been the main factors behind the increase in public debt in emerging markets since the mid-Nineties? The rise appears to be largely accounted for by interest and exchange rate movements and the recognition of off-balance-sheet and contingent liabilities. In a number of countries, the costs of recapitalizing banking systems have been particularly high.[5] Growth, on the other hand, has acted to reduce the public debt ratio. The primary fiscal balance (revenues less noninterest expenditures) has not itself added to the debt stock during this period, but it has not acted in any significant way to offset the increase in debt that has been caused by other factors. Indeed, primary fiscal balances have weakened somewhat since the mid-Nineties in all regions except the Middle East and Africa at a time when a strong fiscal effort was needed.

The increase in public debt to high levels in many emerging market economies in recent years has once again raised concerns about debt sustainability and whether there could be a repeat of the Eighties debt crisis. The long history of debt crises in many emerging market economies suggests that such concerns are not unfounded. Indeed, the fact that some emerging market economies have a long history of defaulting on their sovereign debt raises the question of why international investors continue to lend to these countries. Evidence, however, suggests that investors may not have lost by investing in these economies, although the *ex post* risk premia earned on their investment has been small. For example, Klingen, Weder and Zettelmeyer (2003) find that during 1970-2002 the rate of return on lending to emerging markets was the same as the return on U.S. government bonds. Over a more recent sample, the *ex post* risk premium was found to be small, but positive. Casual observation of sovereign debt default episodes in emerging markets over the past 30 years indicates that while the level of public debt at the time of a default has varied substantially, in many cases it has been quite low. In 55 per cent of the defaults recorded, public debt was below 60 per cent of GDP – the benchmark established for European Union members in the Maastricht treaty – in the year before the default and in 35 per cent of the case, the default actually occurred at a debt ratio of less than 40 per cent of GDP.[6] Indeed, the median public debt-to-GDP ratio in the year before a default was about 50 per cent of GDP. Governments in emerging markets have also defaulted on their domestic debt through high inflation,

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[5] Burnside, Eichenbaum, and Rebelo (2001) model the impact of contingent financial sector liabilities in the context of the Asian financial crisis.

[6] Looking at external debt at the time of sovereign debt default over the same period, Reinhart, Rogoff, and Savastano (2003) find that external debt was less than 60 per cent of GDP in 53 per cent of cases, but less than 40 per cent of GDP in only 13 per cent of cases. For the calculations reported here, the default data are taken from Standard & Poor's (2002b) and refer to default events on both external and domestic government debt. Default episodes were matched with available data on total public debt to generate the 38 defaults that underlie the chart. Periods of severe fiscal stress that do not result in default are not captured.

particularly in the Eighties and early Nineties when several of these economies had triple-digit annual inflation rates (and a few experienced hyperinflation).[7]

Not all emerging market economies, however, have experienced debt crises or very high inflation rates, indicating that it is difficult to make generalizations about these economies as a group. Indeed, a number of emerging market economies – such as India and Malaysia – have managed to maintain relatively high public debt for a long period without a default. A comparison between emerging market country defaulters (since 1998) and nondefaulters points to a number of noticeable differences between the two groups.[8] The countries that have defaulted have, on average, a higher ratio of public debt to GDP, a higher debt-to-revenue ratio, a higher proportion of external debt in total public debt and a lower ratio of broad money to GDP than those that did not default.[9] Indeed, in a number of cases it bears noting that debt ratios prior to the crisis were held down by overvalued exchange rates, given the importance of foreign currency-denominated debt in such cases.

The default experience of many emerging market economies stands in stark contrast to that of industrial countries, where there has been no explicit public debt default since World War II (although inflation in many industrial countries has eroded the real value of debt, particularly during the Seventies).

These differences in default history has led to the view that because of the characteristics of emerging market economies – including their inherent volatility, weaker institutions and poor credit history – the level of public debt that they can sustain is much lower than for industrial countries (see Reinhart, Rogoff and Savastano, 2003, and IMF, 2002).

Certainly, there are a number of features of the fiscal structure in emerging market economies that have an important bearing on the level of public debt that they can sustain. These include the following.

- *Revenue ratios in emerging market economies are low*. On average, the revenue-to-GDP ratio is 27 per cent of GDP, compared with 44 per cent of GDP in industrial countries. There are, however, considerable differences among emerging market economies, with, for example, many of the transition economies and Israel having ratios on par with industrial countries. Effective tax rates in emerging market economies are generally much lower than in industrial countries.[10] The difference is particularly striking for direct tax rates, where

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7 See the May 2001 *World Economic Outlook*.

8 Hemming, Kell, and Schimmelpfennig (2003) provide a detailed analysis of the role of fiscal policy in 11 recent crisis episodes in emerging market economies.

9 There may of course be other differences between the defaulters and non-defaulters. In particular, differences in the maturity structure of the debt may also have played a role. Data limitations, however, precluded examining this issue in this chapter.

10 Estimates of effective direct and indirect tax rates were computed for a subset of industrial and emerging market economies for which data were available. Data were taken from the United Nations *National Accounts Statistics* and the IMF's *Government Finance Statistics*, and the calculations use a simplified

(continues)

industrial countries generally have effective direct tax rates of 30 per cent or more and emerging markets outside eastern Europe, often only about 10 per cent. This low effective tax rate is the result of inefficient tax systems, significant tax exemptions and a large informal sector. The difference in effective indirect tax rates between industrial and emerging market economies is also noticeable.

- *Revenues are volatile in emerging market economies*. The volatility of revenues – measured by the coefficient of variation – in emerging market economies is generally much higher than in industrial countries, although there are exceptions. This is partly due to the greater underlying volatility of the economy; income, consumption and the terms of trade (which are often driven by the prices of a few commodities) are more volatile in emerging markets (see Kose, Prasad and Terrones, 2003). There is also a considerable difference in the volatility of effective tax rates (measured by the coefficient of variation).[11]
- *Interest costs account for a high proportion of government expenditure in emerging market economies and are volatile*. At 5 per cent of GDP, interest expenditures are almost twice as high in emerging market economies as in industrial countries and account for an average of about 17 per cent of expenditures (compared with 10 per cent in industrial countries). Interest expenditures are also more volatile in emerging markets because of the structure of public debt. With a large proportion of debt either external or denominated in foreign currency and revenues in domestic currency, high exchange rate volatility can result in large spikes in interest (and principal) payments relative to government income. Further, domestic debt is often of a short maturity, so interest costs are more sensitive to changes in the domestic interest rate environment.

These differences in the budget and public debt structures between emerging and industrial countries are striking and, as will be discussed in the next section, they have important implications for debt sustainability.

2. Assessing the sustainability of public debt in emerging market economies

Before proceeding, it is first necessary to define the related concepts of government solvency and public debt sustainability. A government is said to be

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version of the methodology proposed by Mendoza, Razin, and Tesar (1994). The length of the sample varied across countries depending on data availability. The effective direct tax rate was calculated as the ratio of total tax and nontax revenue net of domestic taxes on goods and services divided by the sum of compensation to employees and total operating surplus. The effective indirect tax rate was calculated as the ratio of all domestic taxes on goods and services divided by private consumption.

[11] The impact of commodity prices and commodity exports on government revenues is important even for those emerging market economies that have diversified their exports away from primary commodities. In Mexico, for example, oil exports are less than 15 per cent of total exports, but oil-related revenues still account for about one-third of public sector revenue. Regression results reported in Appendix 3.1 confirm the importance of commodity price developments for the primary budget balance in emerging market economies.

solvent if it is expected to be able to generate sufficient future primary budget surpluses to be able to repay its outstanding debt (in more technical terms, the present discounted value of future primary fiscal surpluses must be at least equal to the value of the existing stock of public debt).[12] This criterion, however, is not very practical or demanding because, for example, it would permit a government to run large primary deficits for a period of time if it could commit to run primary surpluses of a sufficient size thereafter and so satisfy the solvency condition. In reality, a government cannot commit to such action – running large primary surpluses for a long period of time would be costly and politically very difficult.

So solvency needs to be viewed in relation to a fiscal adjustment path that is both economically and politically feasible, and a given debt level is usually thought of as being sustainable if it implies that the government's budget constraint (in present value terms) is satisfied without an unrealistically large future correction in the primary balance (see IMF, 2002). Liquidity conditions are also important. Even if a government satisfies its present value budget constraint, it may not have sufficient assets and financing available to meet or roll over its maturing liabilities. Unfortunately, there is no simple rule for determining whether, in practice, a government's debt is sustainable or not.[13] This section therefore applies a number of different approaches that have been developed in the economics literature to look at the issue of public debt sustainability in emerging market economies and how the situation compares with industrial countries. The aim of the analysis is to look at trends across a broad range of countries, rather than to focus on the situation in any one country.

It should be noted up front that the following analysis does not take account of the risks that governments face from contingent and other off-balance-sheet liabilities. This is because of the difficulties in compiling cross-country data on such liabilities. The recent experience in many countries, however, has shown that the recognition of contingent or implicit liabilities – particularly those associated with the recapitalization of financial sectors – can add significantly to public debt, and in some cases push a situation that had previously appeared to be sustainable into one that is clearly not.

3. A simple approach to public debt sustainability

Methods for assessing public debt sustainability usually start from the basic accounting identity that links public sector revenues and expenditures to the change in the debt stock. One commonly used approach is to view fiscal policy as sustainable if it delivers a ratio of public debt to GDP that is stable, and then to calculate the primary budget balance that would achieve that (known as the

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[12] Appendix 3.1 demonstrates why the government's primary fiscal balance, rather than the overall fiscal balance, is the key for the analysis of public debt sustainability.

[13] See Chalk and Hemming (2000) for a survey of methods for assessing fiscal sustainability.

"debt-stabilizing primary balance").[14] If the actual primary balance is less than the debt-stabilizing balance, current fiscal policy implies an increasing ratio of public debt to GDP, and is therefore viewed as unsustainable. The difference between the actual and debt-stabilizing primary balance indicates the degree of fiscal adjustment that is needed to achieve a constant debt-to-GDP ratio. A judgment can then be made as to whether such an adjustment is attainable in the political and economic environment of the country concerned.

Over the past few years, only a small number of emerging market economies (mainly in Asia) appear to have been running primary budget surpluses consistent with what is required to stabilize or reduce the ratio of public debt to GDP.[15] For others – particularly countries in Latin America – there has been a significant difference between the actual and debt-stabilizing primary balance. Of course, a number of emerging market economies have recently made considerable efforts to increase their primary fiscal surpluses and such actions, if sustained, could address such sustainability concerns. Further, were growth to be stronger or real interest rates lower than in the past, a smaller primary surplus would be needed to stabilize the debt ratio. Among the industrial countries, only Japan has had a large gap between its actual and debt-stabilizing primary balance in recent years.

While these types of indicators of debt sustainability are useful because they are quite simple to construct and have a straightforward interpretation, their drawback is that they are based on an arbitrary definition of sustainability (*i.e.*, stabilize the debt-to-GDP ratio). Incurring temporarily high deficits and debt levels, however, may be appropriate in some circumstances, and it is certainly unlikely that a country should try and maintain a stable debt-to-GDP ratio at all times. Further, it may be of little practical policy use to know what is needed to stabilize the debt ratio when it is already at a high level and leaves a country vulnerable to shocks, such as a sudden stop in capital flows.

4. How does fiscal policy respond to public debt accumulation?

A more flexible approach to assessing debt sustainability is to look at it within the context of the broader objectives and constraints of the fiscal policy decision-making process. One way to do this is to look at the relationship between

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[14] See Buiter (1985), Blanchard (1990), and Blanchard and others (1990). This method is based on long-run, perfect foresight considerations that transform the government's budget constraint into an equation that maps the long-run primary fiscal balance as a share of GDP into a "sustainable" debt-to-GDP ratio that remains constant over time. The debt stabilizing primary balance depends on the debt-to-GDP ratio, the real growth rate, and the real interest rate on government debt. The real interest rate on debt is in practice difficult to measure accurately, and requires, among other factors, a breakdown of debt and interest payments into local and foreign currency that is not always available. Here, an emerging market country's real interest rate is taken as the U.S. long-term real interest rate plus its average EMBI spread. For industrial countries, the real 10-year bond yield is used.

[15] Based on the average primary balance and ratio of public debt to GDP for 2000-2002, the average real interest rate for 1998-2002, and the average real growth rate for 1990-2002 (1997-2002 for transition economies).

fiscal policy instruments (the variables deemed to reflect the actions of policymakers) and the objectives of fiscal policy (such as stabilizing output fluctuations and maintaining debt sustainability). Such "reaction functions" or "policy rules" are well established in the analysis of monetary policy, but they are much less developed in studies of fiscal policy, and to date have not been applied to emerging market economies.[16]

Fiscal policy reaction functions were separately estimated for industrial and emerging market economies, with the primary fiscal balance being considered the key operating target of the fiscal authorities. The primary fiscal balance is assumed to respond to changes in public debt, but it is also affected by temporary factors such as the level of economic activity.[17] Within this framework, the connection between current policy actions and long-run debt sustainability – the key issue of interest here – lies in the fact that a positive response of the primary balance to an increase in public debt generally implies the consistency of current fiscal policy with long-run solvency (see Bohn, 1998, for a formal demonstration, and Appendix 3.1). As discussed earlier, however, long-run solvency (satisfying the present-value budget constraint) is a relatively undemanding criterion as it only requires a commitment to adjust policy in the (possibly distant) future.

Two conclusions follow from examining the link between the adjusted primary balance (*i.e.*, after the impact of temporary factors has been accounted for) and public debt.[18] First, emerging market economies as a group exhibit a lower average adjusted primary balance than industrial countries at any level of public debt. Second, the response of the primary surplus weakens as the debt ratio rises in emerging market economies, and this response stops altogether when debt exceeds 50 per cent of GDP. This suggests that – on average – the conduct of fiscal policy in emerging market economies is not consistent with ensuring sustainability once public debt exceeds a threshold of 50 per cent of GDP. In contrast, industrial countries respond strongly to rising debt when debt is at a high level. Indeed, when debt is above 80 per cent of GDP, the estimated adjustment in the primary surplus is almost three times as large as that at lower debt levels. These estimates of course are for a large sample of emerging and industrial countries and the reported results are an average for the sample. Therefore, this behavior is not true for every country in either the emerging market or industrial country group; some emerging market economies have acted quite strongly to maintain a sustainable debt position.

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[16] Such fiscal policy studies for industrial countries include Bohn (1998) for the United States; Mélitz (1997) for OECD countries; Debrun and Wyplosz (1999) for euro area countries; and Gali and Perotti (2003) for European countries. Favero (2002) makes joint estimates of monetary and fiscal policy rules.

[17] For emerging market economies, four temporary factors that affect the primary balance were considered (all of which were found to significantly affect the primary surplus in the estimated fiscal policy reaction function): the business cycle, inflation, commodity prices, and debt restructuring or default. For industrial economies, the temporary factors considered were limited to the business cycle and inflation. Appendix 3.1 contains details of the sample selection and econometric methodology used in this section.

[18] The figures and econometric results discussed in this section refer to the association between the primary surplus adjusted for the influence of temporary factors (as a percent of GDP) and the ratio of public debt to GDP observed at the end of the preceding year.

The analysis also indicates clear differences between emerging market and industrial countries in terms of the cyclicality of fiscal policy. While a 1 per centage point improvement in the output gap is estimated to result in an average improvement in the primary balance of only 0.04 per centage points of GDP in Latin America and 0.23 per centage points of GDP in non-Latin American emerging markets, it leads to a 0.87 per centage points of GDP improvement in industrial countries.[19] These differences are primarily driven by expenditures, which, as a per cent of GDP, are unreactive to cyclical fluctuations in emerging markets (in Latin American countries, expenditures actually appear to be slightly procyclical). In cyclical upswings, outlays expand at the same pace as economic activity (or faster in Latin America), but when economic growth weakens, revenues decline and lending conditions tighten, and the government has to contract its outlays.[20] This behavior contrasts to that in industrial countries, where expenditures increase by less than economic growth in an upturn and fall by less than activity in a downturn, thus exerting a stabilizing influence on the economy. This behavior likely reflects the significant automatic stabilizers at work through the extensive social security systems in industrial countries, giving to government expenditure an insurance role against macroeconomic volatility (see Rodrik, 1998, and Fatàs and Mihov, 2003). Interestingly, better institutional quality is found to be associated with a more countercyclical policy in emerging market economies, suggesting that the ability to control expenditures (and raise revenues) is less of a problem in countries with better institutions (see Appendix 3.1).

These results are suggestive of a link between debt sustainability and the short-term conduct of fiscal policy. Because their behavior indicates a strong commitment to debt sustainability, industrial countries can run countercyclical fiscal policies without lenders becoming concerned about sustainability issues. In many emerging market economies, however, the ability to adjust fiscal policy to maintain debt sustainability is often in doubt. Lenders therefore quickly become concerned when deficits widen and the tight resource constraint forces governments to cut expenditures during a downturn, further adding to the economic weakness.

5. Do governments in emerging market economies overborrow?

A third approach to assessing public debt sustainability is to see if a government is "overborrowing" in the sense of whether its debt stock exceeds the present discounted value of its expected future primary surpluses. To operationalize such a calculation, expected future primary balances are here approximated by the

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[19] A number of other studies have found evidence of procyclical fiscal policies. For example, Talvi and Végh (2000) argue that fiscal policy is procyclical in most countries outside the G7, while the April 2002 *World Economic Outlook* found that fiscal policy was procyclical in a number of Latin American countries.

[20] Procyclical fiscal policy in Latin America has implications for social spending and the poor. Braun and Di Grescia (2003) find that social spending in the region is procylical (although less so than total government spending), and that in crisis situations governments often reduce social spending, which adversely affects the poor.

average primary balance achieved during the sample period, on the assumption that a government's fiscal policy track record is the best guide to what it can be expected to achieve in the future. A benchmark level of public debt (as a percent of GDP) is then calculated and compared with actual debt. The extent of over- or underborrowing is measured by the ratio of actual public debt to the benchmark level of debt, with a ratio greater than 1 suggesting that a government is overborrowing relative to what is justified by its fiscal policy track record.[21] The discount rate – the difference between the real interest rate and real output growth – is proxied by the difference between the real LIBOR interest rate plus a country-specific spread and the average real GDP growth.[22]

The benchmark debt-to-GDP ratio was calculated for 50 countries (14 industrial, 21 emerging market, and 15 developing) using data for the 1985-2002 period.[23] The median value of the ratio for industrial countries is estimated at 75 per cent of GDP, almost three times higher than that for emerging markets. Comparing the actual and benchmark public debt levels suggests that many emerging market economies have indeed been overborrowing as the typical (median) emerging market economy has a ratio of public debt to GDP that is 2½ times larger than its fiscal policy track record would suggest is warranted.[24] While this is lower than for the "other developing countries" group, it compares unfavorably with the typical industrial country, where the ratio is less than 1. There are differences, however, among emerging market regions. Asian countries have a similar ratio to industrial countries, while countries in Latin America and other regions have a ratio of 2½ and 6, respectively, suggesting significant overborrowing. Further, the typical emerging market economy with a default history has an overborrowing ratio of 3½, compared with a ratio of less than 1 for a nondefaulter. These results convey the same message as before: many emerging market economies need to generate larger primary surpluses than they have done in the past to be able to sustain their public debt levels.

The fact that many countries overborrow raises the question of whether there are any common features that help to explain this behavior. An econometric analysis

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[21] This overborrowing ratio is closely related to the public debt sustainability measure discussed earlier, but it does not provide a quantitative estimate of the primary balance adjustment needed to stabilize the debt-to-GDP ratio. For a country that has undertaken significant fiscal reforms in recent years and is now achieving a higher sustained primary surplus than it has historically, the assumption that its past track record provides a good guide to future primary surpluses may of course not be valid.

[22] If future growth rates are expected to be higher, or real interest rates lower, than their historic average, this will affect the estimated overborrowing ratio. Because data on spreads are not available for the whole sample period or for all countries, the Institutional Investor rating – which is highly correlated with spreads – is used to derive a proxy (see Appendix 3.1).

[23] Some countries were excluded because either the average primary balance was negative or the discount factor was negative over the sample period – in both cases, the debt-to-GDP ratio is nonstationary (although in different directions).

[24] Because of a number of outliers, the mean overborrowing ratio for emerging market economies at 16 is much higher than the median.

suggests that the following policy variables are important determinants of overborrowing.[25]

- *Government revenues*. Governments with low revenues will often have difficulty meeting their desired expenditures from revenues, increasing the pressure on them to borrow. The econometric results suggest that an increase in emerging market economies' revenue ratio to the industrial country average would, other things remaining unchanged, reduce the overborrowing ratio by about 35 per cent.
- *Trade openness*. Openness has a positive effect on economic growth, which helps mitigate the existing debt burden, while more open economies are able to generate the trade surpluses needed to service foreign debt and are less likely to experience difficulties with external public debt.[26] The estimates suggest that reducing foreign exchange rate restrictions for current transactions – the proxy used here for trade openness – to industrial country levels would, others thing remaining unchanged, reduce the overborrowing ratio in emerging markets by 60 per cent.[27]
- *The quality of domestic institutions and the nature of the political system*. A number of studies have found a relationship between the quality of fiscal institutions – the rules and regulations by which budgets are constructed and implemented – and fiscal outcomes.[28] Further, good institutions are associated with stronger growth, which boosts revenues and eases the debt-servicing burden.[29] On the other hand, political systems that deliver weak (minority or coalition) governments often delay fiscal adjustment and accumulate public debt based on short-term needs.[30] Simple correlations suggest that good institutions are associated with less overborrowing. In the econometric analysis, however, only the protection of property rights was found to be a significant explanatory variable, with the estimated coefficient suggesting that were the protection of property rights in emerging market economies to be raised to the level of industrial countries, the overborrowing ratio would be reduced by about 50 per cent.

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[25] Other factors not directly under the control of policymakers – macroeconomic volatility and relative income – were also included in the regressions, as was an industrial country dummy variable (see Appendix 3.1 for details).

[26] On openness and economic growth, see the survey by Berg and Krueger (2003), and on openness and external debt difficulties, see Sachs (1985).

[27] The index of exchange rate restrictions for current transactions is used here because it is available for the countries during the full sample period of the analysis. The reported results, however, remain broadly unchanged when alternative measures of trade openness – such as that developed by Sachs and Warner (1995) – are used.

[28] See, for example, von Hagen (1992) and von Hagen and Harden (1995). Alesina and others (1998) find the nature of the budget process strongly influences fiscal outcomes in Latin America.

[29] See the April 2003 *World Economic Outlook* for an analysis of the relationship between growth and institutions.

[30] Alesina, Perotti, and Tavares (1998) find that coalition governments often have a harder time consolidating fiscal policy than do single party governments.

6. Uncertainty and public debt sustainability

One of the problems with the three approaches to debt sustainability that have been discussed so far in this chapter is that they do not take account of the uncertainties that face governments in emerging market economies.[31] As outlined earlier, government revenues in emerging market economies are more variable than in industrial economies, and a government could find itself in a situation where it is faced with low revenues for an extended period of time because of, say, a collapse in the price of the country's primary commodity export. Further, emerging market governments also face considerable uncertainty from interest and exchange rate movements. There have recently been a number of attempts to incorporate such uncertainties into the analysis of public debt sustainability. One approach has been to apply the Value-at-Risk (VaR) methodology that is commonly used in the assessment of financial institution risk to look at the risks faced by the government. A different approach has been to use economic models that incorporate uncertainty to derive estimates of sustainable debt ratios (see Mendoza and Oviedo, 2003).

One way to look at the impact of uncertainty on public debt sustainability is to consider the case of a government that is credibly committed to servicing its debts in all circumstances. Such a government would need to take into account the fact that its future revenues – and consequently primary balance outcomes – are uncertain, and that it could be faced with the possibility of a long period of low revenues in the future. To be credibly committed to servicing its debt in all circumstances, the government cannot borrow more than the debt that it would be able to sustain with the primary balances that would occur with these low revenue outcomes. This is not to say that the government could not borrow at all: if actual debt were below the maximum sustainable debt level, the government would be able to borrow until the threshold was reached, at which point it would need to reduce expenditures to maintain the credibility of its commitment.

The requirement that a government should only borrow up to the debt level that it could sustain in the face of a long period of low revenues may seem a stringent one. Emerging markets, however, have faced long periods of low revenue realizations in the past when the price of their main commodity export has fallen. For example, governments in oil-exporting countries faced this situation after the collapse of oil prices in the Eighties.[32] In such circumstances, the government is suddenly confronted with a debt stock that it had believed was sustainable when revenues related to commodity exports were high, but is not sustainable with the new reality of lower revenues from commodity exports.

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[31] See Gavin and others (1996) for an extensive discussion of the effects of volatility on fiscal policies in Latin America.

[32] Indeed, slumps in commodity prices – particularly oil – are generally quite long lasting. For example, Cashin, McDermott, and Scott (2002) find that slumps in commodity prices typically last for about three and a half years, with slumps in oil prices on average lasting over four years.

To implement these ideas, it is first necessary to determine what constitutes a low revenue outcome, and in such circumstances, what fiscal adjustment the government could make. Here, a low revenue outcome is characterized by a revenue-to-GDP ratio that is two standard deviations below the average level, and the range of primary expenditure reductions that emerging markets have made in the past is taken as an indication of the fiscal adjustment that a government could potentially achieve. Using these assumptions allows the derivation of the maximum sustainable public debt ratios for two "typical" emerging market economies and an industrial economy for different assumptions about the possible variability of their future revenues (measured by the coefficient of variation) and their commitment to adjust expenditures if a low revenue outcome occurs. Both emerging market economies are assumed to have revenue and primary expenditure ratios of 20 per cent of GDP on average – broadly the averages seen in non-European emerging markets – while one (a "lower risk" country – Case A) has a real interest rate on public debt that is 5 percentage points higher than its growth rate, and the other (a "higher" risk country – Case B) has a real interest rate that exceeds its growth rate by 10 percentage points.[33] The industrial country (Case C) has revenue and primary expenditure ratios of 40 per cent of GDP on average, and a real interest rate that is 2.5 per centage points higher than its growth rate.

Looking at the first emerging market country example (Case A), the more stable its revenues – *i.e.*, the smaller the coefficient of variation of the revenue ratio – the higher is the maximum ratio of sustainable public debt to GDP for any given level of expenditure adjustment that it can commit to. The rationale for this is that when the government is faced with a low revenue outcome, the actual revenue-to-GDP ratio will be higher, and consequently the primary surplus larger, than if the variability of revenues is greater. For example, if this country has a coefficient of variation on its revenue ratio of 5 per cent and can commit to adjust primary expenditures by 5 per cent of GDP, then its maximum sustainable public debt ratio is 60 per cent of GDP. For the "high risk" emerging market country (Case B) with similar revenue and expenditure characteristics, the maximum sustainable debt ratio is just 30 per cent of GDP. But, if the coefficient of variation for this country is 7 per cent, then the maximum debt level is only 22 per cent of GDP. For the industrial country (Case C), the combination of a higher average revenue ratio, low revenue volatility and a smaller difference between the real interest rate and the real growth rate means its maximum sustainable debt ratio is higher than for the emerging market economies even if it can only commit to a modest cut in expenditures. For example, with a commitment to cut primary expenditures by 3 per cent of GDP and revenue volatility of 3 per cent, the maximum sustainable debt ratio for the industrial country is about 85 per cent of GDP.

These calculations illustrate the link between revenue generation capacity, revenue variability and primary expenditure adjustment – all of which affect the

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[33] While these assumed differences between the real interest rate and the real growth rate may seem high, they are intended to capture a situation where a country has been hit by a shock and spreads have increased sharply and growth weakened.

primary balance – and debt sustainability. If a country has low and variable government revenues, it will be able to sustain a lower public debt level than a country with a higher and more stable revenue base. This means that the sustainable debt level may vary – potentially by a considerable amount – between countries (it will also depend on real interest rates and growth). The implication is that differences in sustainable debt levels can be expected not only between industrial and emerging market economies, but also among emerging market economies themselves. For example, India – which has relatively stable government revenues – could be expected to sustain a higher debt level than Venezuela, where revenues are much more variable. (Of course, there may also be other reasons why India could sustain a higher public debt ratio, including the maturity profile and interest costs of the debt and the size of the domestic bond market.) Indeed, countries with higher average revenue ratios and lower revenue variability do in general have higher public debt ratios. Because revenue variability has important implications for debt sustainability, proposals have been made to create debt instruments that could help cushion emerging markets from changing economic conditions, for example, growth-indexed bonds.

7. Can governments in emerging markets economies sustain their Current debt levels?

A common theme running through the results presented in this section is that historically many emerging market economies have not generated large enough primary budget surpluses to ensure the sustainability of their public debt. This stands in sharp contrast to industrial countries. This inability to generate adequate primary surpluses is both a function of weak revenue bases (which generally have low yields and are volatile) and an inability to control expenditures during economic upswings (this appears to be particularly important in Latin America). These factors suggest that emerging market economies can generally sustain lower public debt ratios than industrial countries. Although this sustainable debt level will certainly vary – and potentially by a considerable amount – the calculations suggest that for the typical emerging market economy it is quite low. Of course, industrial countries face considerable pressures from population aging going forward, so this analysis should not be taken as suggesting that public debt levels in these countries are currently at a comfortable level.

8. How can high public debt levels be reduced?

If governments face high public debt levels, what can they do to reduce them? Governments have a number of potential policy options available to them to reduce their debt: (1) they can adjust fiscal policy and run primary budget surpluses sufficient to reduce the debt; (2) they can seek to grow or inflate their way out of their debt difficulties; (3) they can sell assets to retire debt; or (4) they can explicitly default on the debt.

While reducing the public debt ratio through strong economic growth would generally be a government's preferred option, this cannot be relied upon as growth is beyond the direct control of the government. Of course, the government can play an important role by creating an environment conducive to growth through the implementation of sound macroeconomic and structural policies (including by not accumulating excess debt that could adversely affect private sector activity).[34] The other options each have advantages and disadvantages. Reducing public debt by running primary budget surpluses, for example, maintains the fiscal credibility of the government, but is often difficult politically – particularly if high primary surpluses need to be maintained for any length of time – and may involve decisions that, at least in the short run, have a detrimental effect on activity.[35] An explicit default or high inflation provide ways of reducing debt without having to run larger primary surpluses, but they both entail costs. If it defaults, a government is likely to suffer a loss of reputation that could prevent or limit its future borrowing, and hence constrain its future fiscal policy options, while high inflation has significant negative effects on economic activity and welfare.[36] Finally, a policy of selling government assets is only likely to be successful in reducing debt if accompanied by responsible fiscal policy (so the proceeds are not simply spent), and the policy does not change the underlying net worth position of the government although it reduces debt.

To examine how large public sector debt reductions have occurred in practice, data for 79 industrial, emerging market, and other developing countries for the period 1970-2002 were used, and a sample of large public debt reductions was constructed as follows. Cases were identified where public debt was reduced over a three-year period, and then the top 15 per cent of these episodes (in terms of the size of the debt reduction, which in the sample corresponded to a drop in public debt of

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[34] A simple correlation between public debt and growth in emerging market economies since 1990 shows a clear negative relationship. More formally, Pattillo, Poirson, and Ricci (2002) find that external debt begins to have a negative effect on growth once it exceeds 35-40 per cent of GDP.

[35] Assessing the impact of fiscal consolidation on economic activity is not straightforward. While most evidence points to the conclusion that fiscal multipliers are positive – *i.e.*, that a fiscal consolidation will have a negative impact on growth in the short run – this appears not always to be the case (see Hemming, Kell, and Mahfouz, 2002). Recent studies in advanced countries have shown that if the fiscal consolidation is mainly achieved through a reduction in current spending it may be expansionary (see Alesina, Perotti, and Tavares, 1998). For emerging market economies where there is a public debt sustainability problem and the risk premia on interest rates are high, a credible fiscal consolidation could result in a large fall in interest rates, spurring private activity and more than offsetting the withdrawal of fiscal stimulus. Hemming and Ter-Minassian (2003) discuss the impact of fiscal tightening during crisis episodes.

[36] The costs of an explicit default and/or high inflation are difficult to measure. For an extensive discussion of reputation and sovereign debt, see Obstfeld and Rogoff (1996) and the references therein. A default affects a country's access to capital markets, its borrowing costs, and its trade relations with its debtors. Empirical evidence on the size of the costs of default, however, is mixed. For example, Lindert and Morton (1989) argue that investors pay little attention to the past repayment record of a borrowing government. Özler (1993) however, finds that countries with default histories faced higher commercial bank interest rates in the Seventies. In terms of costs through the trade channel, Rose (2002) finds that a sovereign debt default is associated with a decline in bilateral trade between a debtor and its creditors of about 8 per cent a year and this persists for about fifteen years. With regard to the costs of high inflation, Lucas (2003) estimates that the gains from eliminating an inflation rate of 200 per cent – a level observed in many Latin American countries during the Eighties – are in excess of 5 per cent of income in the long run.

at least 18 per cent of GDP) were chosen. Lastly, cases in which the debt stock at the end of the three-year period was still above the level three years prior to the event were eliminated. This selection process highlighted 26 debt reduction episodes in the emerging market economies in the sample.[37]

A large majority (19 out of 26) of these episodes were associated with a debt default. While it is not possible to identify the exact impact that the restructuring had on the outstanding debt, it appears to have generally been an important factor behind the decline in the debt ratio. The seven remaining episodes (which took place in five different countries) were then examined to understand the principal factors behind the debt reductions that have not involved a restructuring.[38] In these seven cases, the median decline in the public sector debt ratio was 34 per cent of GDP over the three-year period (Figure 3.14). Strong growth appears to have been a significant contributing factor to the decline in the debt ratio, with real GDP growth averaging 8.5 per cent a year. Fiscal consolidation played an important role as well, with a significant improvement in the primary balance beginning immediately before the debt began to fall. The fiscal consolidation was largely the result of expenditure restraint – with current expenditure being reduced and capital spending remaining constant – although the revenue ratio also increased somewhat. Moderate inflation of about 5 per cent also helped, while exchange rate appreciation acted to reduce outstanding external public debt.

This analysis suggests that while large debt reductions have often occurred in conjunction with debt defaults, there are cases where they have been brought about by a combination of strong economic growth and fiscal consolidation. Interestingly, in all five of the countries where debt was reduced without a restructuring, the public debt ratio is still below the level at the beginning of the identified debt reduction episode (although in the Asian countries, the ratio has again risen in recent years following the financial crisis in the region). The outcome is more mixed in the cases where debt reduction was associated with a default. While in 10 of these countries debt has remained below the level prevailing at the beginning of the debt reduction episode, in 5 cases the country has either defaulted again and/or debt is currently above the level at the beginning of the debt reduction episode. This suggests that default does not always provide a long-term solution to public debt problems and that, unless it is accompanied by complementary changes in fiscal and other economic policies, it will not be successful in fostering sustainably lower debt levels.

Whether it is achieved with or without a debt restructuring, a substantial and sustained reduction in public sector debt requires the implementation of sound economic and fiscal policies over a number of years. For example, Chile has implemented strong and sustained fiscal (and other economic) reforms since it defaulted on its external public debt in the Eighties, and the government has reduced

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[37] This exercise is roughly parallel to the analysis of major reductions in external debt in Reinhart, Rogoff, and Savastano (2003).

[38] These occurred in Hungary, Israel (twice), Korea, Malaysia (twice), and Thailand.

its debt from 54 per cent of GDP in 1990 to 21 per cent of GDP in 2002. Several elements have contributed to this successful adjustment, including expenditure restraint, improved revenue collections and state enterprise reform that transformed losses into significant profit transfers to the government. Privatization proceeds have also been used to reduce debt and real exchange rate appreciation has reduced external debt in relation to GDP. Chile did not impose specific rules for the fiscal balance, but other institutional factors played useful roles in maintaining fiscal discipline, including giving more power to the finance ministry than to other ministries or the legislature; prohibiting the central bank from extending credit to the government; and preventing lower levels of government from borrowing. Since 2001, the government has committed to an annual target – a surplus of 1 per cent of GDP – for the central government structural balance (adjusted for cyclical effects and copper price movements), thus allowing automatic stabilizers to work.

The benefits of these sustained policy actions are clear. The financial markets have confidence in Chile's fiscal policies and spreads on government debt are well below those of other governments in the region. Further, uninterrupted access to the capital markets has enabled the Chilean government to avoid the forced procyclical fiscal policies seen in other countries in the region, reinforcing confidence in its economic management.

A number of other countries have also made progress in reducing high levels of public debt. In Hungary, public debt has fallen from about 85 per cent of GDP in the mid-Nineties to less than 60 per cent now as a result of strong growth, a period of sustained primary budget surpluses (which, however, ended in 2002), and the proceeds from the sale of government assets. Bulgaria has reduced its public debt from about 160 per cent of GDP in the early Nineties to less than 60 per cent of GDP in 2002 as a result of debt restructuring, a fiscal consolidation program that has seen primary budget surpluses sustained since 1994, and high inflation (up to 1997). Lastly, in Mexico, public debt was reduced in the early Nineties as the country emerged from its Brady debt restructuring. Despite the Tequila crisis in 1995, which entailed a costly restructuring of the banking system, debt is currently about 50 per cent of GDP and the last of Mexico's Brady debt has recently been repaid.

9. Conclusions

High public debt is a cause for concern in many emerging market economies. At about 70 per cent of GDP, the average public debt ratio in emerging market economies now exceeds that in industrial countries. Not only does this high level of public debt raise the risk of a fiscal crisis in some countries, but it also imposes costs on the economy by keeping borrowing costs high, discouraging private investment and constraining the flexibility of fiscal policy. Lower public debt levels would likely enable governments in emerging markets to run a more countercyclical fiscal policy, with benefits for economic stability.

The analysis in this chapter suggests that, historically, many emerging market economies have not generated large enough primary budget surpluses to ensure the sustainability of their public debt. This stands in contrast to industrial countries. The inability to generate adequate primary surpluses appears to stem from the characteristics of the fiscal systems: governments in emerging market countries generally have weak revenue bases (with lower yields and higher volatility) and are less effective at controlling expenditures during economic upswings (this is particularly the case in Latin America).

While the sustainable level of public debt varies between countries – depending on the characteristics of each country – for the typical emerging market economy it is often quite low. For example, the analysis of overborrowing suggested that, based on past fiscal performance, the sustainable public debt level for a typical emerging market economy may only be about 25 per cent of GDP, while the estimates of the fiscal policy reaction functions indicated that emerging market economies as a group have failed in the past to respond in a manner consistent with ensuring fiscal solvency once public debt exceeds 50 per cent of GDP.[39] There are, however, regional differences, with Asian countries generally doing more to ensure debt sustainability than countries in other regions.

What can policymakers do to reduce public debt and cushion themselves against the risks that high debt presents? It is important to recognize that the past does not necessarily condition the future – policies and institutions do change. The example of Chile, in particular, shows that strong fiscal and structural policy reforms – sometimes in combination with an initial debt restructuring – can be effective in putting public debt on a firm and lasting downward path. To be successful, however, a broad and sustained package of reforms is needed that encompasses the following.

- *Tax and expenditure reforms*. Reforms to strengthen and broaden the tax base are needed so that governments have access to higher and less variable revenues. Effective tax rates in emerging market economies are generally low, suggesting that tax avoidance – through either legal or illegal means – and weak tax administration are serious issues that need to be addressed. The continued reliance on taxes and transfers related to commodity exports is a weakness of many current tax systems, and efforts are needed to broaden the tax base to reduce its variability. Better control of expenditures during economic upswings is also essential to ensure that periods of strong revenue growth result in higher primary surpluses rather than increased spending.
- *Steps to improve the credibility of fiscal policy*. Governments need to be able to demonstrate that their overall debt burden is manageable, and that it is likely to

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[39] These thresholds are not dissimilar from those found in recent studies on external debt crises in emerging markets. For example, IMF (2002) estimates a threshold of 40 per cent of GDP, Manasse, Roubini, and Schimmelpfennig (2003) estimate a threshold of 50 per cent of GDP, and Reinhart, Rogoff, and Savastano (2003) derive country-specific thresholds in the range of 15-20 per cent of GDP for countries that have repeatedly defaulted on their sovereign debt.

remain so under most circumstances. Building this credibility requires not only the implementation of effective fiscal reforms, but also a record of adhering to these reforms through upturns and downturns. The strengthening of fiscal institutions has a very important role to play in this regard. Fiscal rules – broadly defined as a permanent constraint on fiscal performance – in some cases may play a useful role in strengthening fiscal policy credibility if appropriately designed and obeyed. For example, the Fiscal Responsibility Law introduced in Brazil in 2000 – which established policy rules consisting of limits and targets for selected fiscal indicators for all levels of government, including debt ceilings and transparency requirements – appears to have helped strengthen the government's credibility in financial markets.[40] Poland has also introduced a constitutional limit on public debt of 60 per cent of GDP (including the risk-weighted stock of outstanding government guarantees) and corrective procedures that kick in when public debt exceeds 50 per cent of GDP.

- *Steps to reduce exposure to exchange rate and interest rate movements.* Given the structure of their public debt, many emerging market economies are exposed to considerable interest rate and foreign exchange risk. Steps are needed to reduce the reliance on domestically issued foreign currency and short-term debt. Policies to promote more open economies would help reduce the risks from external debt as exchange rate depreciations would then provide more of a boost to exports and government revenues to mitigate the impact on the budget of higher debt servicing costs. Recent proposals to create GDP-linked bonds could also provide some cushion during times of economic stress.
- *Structural reforms to boost growth prospects*. Historic experience suggests that it is difficult to bring public debt ratios down without robust economic growth. In this context, the implementation of a broad-based agenda of structural reforms is a crucial complement to fiscal consolidation efforts. As emphasized in the April 2003 *World Economic Outlook*, the strengthening of institutions could be expected to provide a significant boost to growth over the medium term. Addressing corporate and financial sector weaknesses will also be a key, while further steps to liberalize trade and promote long-term foreign investment will have lasting growth benefits.
- *Addressing the risks from contingent and implicit liabilities*. It is also important that governments act to minimize the risks they face from contingent and implicit liabilities. This applies not only to countries trying to reduce high debt levels, but also to those that currently have relatively low debt. The experience of many countries in recent years has shown that the recognition of such liabilities can significantly add to public debt and quickly raise questions about sustainability. The recapitalization of banking systems, in particular, has proved costly, while government guarantees on private sector projects are a further source of risk. Governments need to be fully aware of the contingent and implicit liabilities they

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[40] Kopits (2001) contains a detailed discussion of fiscal policy rules. For more detail on fiscal policy rules in Brazil, see Goldfajn and Guardia, forthcoming.

face – in this regard, improving fiscal transparency would help – and act to reduce them to the extent possible. Improving financial sector supervision is an essential step toward this goal.

More generally, the mechanisms for the restructuring of sovereign debt also need to be strengthened. Defaults on external public debt have been common among emerging market economies and certainly cannot be ruled out in the future. It is therefore important that mechanisms are in place to deal with such events in an orderly manner to minimize, to the extent possible, the costs and disruptions to all the involved parties. To this end, current efforts to promote the inclusion of collective action clauses in debt contracts and, more generally, to find ways to improve arrangements for sovereign debt restructuring within the existing legal framework are important.

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PUBLIC DEBT INDICATORS IN LATIN AMERICAN COUNTRIES: SNOWBALL EFFECT, CURRENCY MISMATCH AND THE ORIGINAL SIN

Ricardo Martner and Varinia Tromben[*]

Introduction

In economic models, government's behavior is often analyzed under an opportunistic perspective; indeed, some countries or geographic regions are viewed as "serial defaulters".[1] "Debt-intolerant" countries have weak fiscal structures and fragile financial systems. Thus, as a policy prescription, as the enhancement of institutions is a long term process, the safe thresholds of public debt should be set at a much lower level than in developed countries, perhaps 20 or 30 per cent of GDP.[2]

On the other hand international investors still lend to countries that have a background of defaulting their debt. A recent study demonstrates that international investors did not loose in those countries, considering the very high returns generally obtained in periods preceding the failure to pay.[3] Governments sometimes default debt not because they want to, but because they do not have alternatives.[4]

In this paper we argue that, in Latin American countries that have access to international capital markets, debt sustainability stands for a combination of endogenous factors, essentially the pro-cyclical bias of fiscal policies, and exogenous factors, like the sudden stop of capital flows which followed the Russian crisis.[5]

As the pro-cyclical bias (or fiscal sin) is an important explanation of debt accumulation during the Nineties,[6] there are other salient issues: the snowball effect, which quantifies the combined impact of the lack of growth and interest rates, and the original sin, which emphasizes the role of highly volatile exchange rates. Hence,

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[1] The expression, referring to "serial killers", belongs to Reinhart, Rogoff and Savastano (RRS, 2003).

[2] This is the recomendation of RRS; IMF outlines similar conclusions (see for example World Economic Outlook, 2003).

[3] Klinden, Weder and Zettemeyer (2002) calculate that the long-term return rate in emerging countries is quite similar to the U.S. Treasury bonds.

[4] See Neut and Velasco (2003).

[5] See Calvo (2003).

[6] In an earlier study (Martner and Tromben, 2003), we have found evidence of the fiscal sin, showing that during the early Nineties, retrospectively viewed as "good years", there were diverse behaviors, with some countries that reduced their debt burden considerably, while others were very pro-cyclical. These initial conditions influenced heavily in the debt dynamics in the "lost half-decade".

it seems very difficult and quite arbitrary to fix low thresholds in terms of GDP, as long as the exogenous component of public debt dynamics remains significant.

In the first section we expose some accounting difficulties concerning the proper definition of public debt in Latin American countries. In section 2 we quantify the snowball effect during the "lost half decade"[7] period (1998-2002), which in a number of countries represented more than five points of GDP. In other words, the exogenous component of public debt accumulation was significant, depicting an explosive situation in which debt servicing absorbs an increasing proportion of fiscal revenues. In general terms, the reaction function of fiscal policy (e.g., the possibility to generate in the short term debt-stabilizing fiscal primary surpluses) was not sufficient to avoid a growing snowball.

In section 3 we intend to combine traditional indicators of debt sustainability with a measure of currency mismatch. As other authors do, we compare the foreign currency liabilities of public sector with exports, a rough measure of external assets. Despite the crudeness of the exercise, it highlights the significance of currency mismatch in the explanation of recent crisis, and the importance of including the external balance of liabilities and assets of countries when assessing sustainability.

Using a *logit* model, in section 4 we explore the variables that can explain the entry into a debt crisis, constructing thereby an early-warning model for Latin American Countries. The significant variables are the level of debt in terms of GDP, interest debt payments, growth and openness, among others. Story also matters; debt sustainability hence depends on a combination of exogenous and structural factors that cannot be synthesized in a "one size fits all" safe threshold.

The concluding remarks address the problem of original sin,[8] which is defined as country's inability to borrow abroad in its own currency or to borrow long term, even domestically. This incompleteness in financial markets creates fragility inside the country, suffering from "currency mismatch" (when projects generating local currency are financed with foreign currency) and "maturity mismatch" (when long-term projects are financed with short-term loans). With original sin, movements in exchange rates have wealth effects that limit the effectiveness of monetary policy (Aghion, Bacchetta and Banerjee 2001, Céspedes, Chang and Velasco 2002).[9] Although it is argued that the original sin cannot be redeemed, some roads to deliverance are explored.

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7 See ECLAC (2003).

8 The expression was used for the first time by Eichengreen and Haussman (1999).

9 The fear of float depicts the usual situation in which authorities fear the wealth effects of devaluations when there is a substantial portion of dollar-denominated liabilities, both public and private; see Calvo, Reinhart (2002).

1. Salient features of public debt in Latin America

Since the crises of the Eighties, public debt management has been a constant preoccupation of fiscal authorities. At the Central Government level,[10] debt showed a clear decline, measured in percent of GDP, from the end of the Eighties until 1996. Coinciding with the business cycle reversion, from 1997 this indicator began to increase again. Sudden stops must be a true damnation in Latin America: when capital flows decrease significantly, public sector borrowing requirements increase, as the economic activity diminish and the cost of public debt measured in local currency begins to climb in flexible exchange rate regimes.

There are considerable difficulties in collecting the existing data on public debt, in terms of availability, coverage and definition issues. The Government Finance Statistics Manual (2001) defines public debt stock as following: "Debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future. Thus, all the liabilities in the Government Finance Statistics system are debt except for shares and other equity and financial derivatives" (p. 129). It recommends also treating obligations for social security benefits in the future and contingents contracts as a memorandum item and not as public debt.

Despite this clear definition, the public debt data is still quite heterogeneous in Latin America. The major issues that arise building a data set in Latin America are:

- The consolidation of liabilities and assets between institutions (for example between social security funds and the Central government). Doubts still exist concerning the correct methodology at the central government level, which is the coverage used by the majority of Latin American countries; many countries publish both the consolidated and the non-consolidated data. To increase the confusion, these are often called gross and net debt. Which is the correct number? Some say that the important point is the debt record, whoever is the debt holder, because there is an obligation to repay. Others say that by doing a consolidation we recognize that the financial flows inside the public sector have not the same macroeconomic effects than debt with the private sector.
- In some cases, countries include Central bank liabilities but do not incorporate the corresponding assets, such as international reserves.
- Some countries include indirect debts; these should be treated as contingent liabilities. It is the case in Bolivia, Ecuador, El Salvador, Nicaragua, and Paraguay.
- Some countries do not disseminate official data of domestic public debt, like Paraguay and Dominican Republic.

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[10] A complete description of public debt data available for Latin American countries can be found in www.eclac.cl/ilpes

Concerning the first point, the methodology of the European Union is clear: "Government debt means the total gross debt at nominal value outstanding at the end of the year of the sector of "general government", with the exception of those liabilities, the corresponding financial assets of which are held by the sector of "general government (Council Regulation (EC) N. 475/2000)".

Of course, credit rating agencies always focus on the highest data when they make their evaluations. This situation produces a huge damage on countries' public finances (for example in the case of Brazil, non consolidated debt of the public sector represented more than 70 per cent of GDP at the end of 2002, while the consolidated public debt represented 50 per cent of GDP for the same period (see Box 1).

Without a homogenous methodology that allows a complete coverage of liabilities and assets, the norm should be to record consolidated gross public debt of General Government, excluding Central Bank and public enterprises. If there are relevant quasi-fiscal operations or contingent liabilities with a high probability of occurrence, which incorporates also public guaranteed debt, the most appropriate is to record these operations separately.

Table 1 shows the evolution of public debt at the Central Government level in Latin American Countries, as well as the percentage of external debt. Two tendencies emerge; for eleven countries, public debt measured in percent of GDP has decreased during the Nineties (for several in a significant way: Chile, Dominican Republic, El Salvador, Honduras, Mexico, Nicaragua, Venezuela). Seven other countries heavily increased their public debt stock: Argentina, Brazil, Colombia, Costa Rica, Ecuador, Paraguay and Uruguay, rising by the same way interest payments. Three countries of the region have defaulted (Ecuador in 1999 and Argentina in 2001) or restructured (Uruguay in 2003) their public debt in recent years.

The 2002 jump of public debt stock in Argentina and Uruguay, resulting from huge devaluations of local currencies, illustrate in a dramatic way the so-called original sin. In the case of Argentina, the currency board in place until the end of 2001 diminished somewhat artificially the burden of public debt as a proportion to GDP. With devaluation and recession, the indicator almost tripled its value; the equilibrium exchange rate should be lower in the long term than the one recorded since 2002. The opposite situation happens in Ecuador where the persistence of a domestic inflation in spite of dollarization appreciated the real exchange rate, reducing public debt in terms of GDP.

In macroeconomic models with a representative agent with an infinite horizon and perfect markets, there is neutrality of government debt both in level (Ricardian equivalence) and in composition. But there is a gap between theory and practice: on one hand theory argue for neutrality of public debt management; on the other, a growing number of countries adopt explicitly for their public debt management practices of the private sector.

Box 1. Public debt accounting methodology in Brazil

The Federal government (defined as direct and indirect administration, public social security system, and non financial federal public funds) gross debt is composed by national government liabilities held by sub-national governments, public and private financial system, non financial private sector and the rest of the world. Obligations linked to the external sector are converted to *reales* with the exchange rate at the end of the period. Values of Federal government gross debt are recorded considering portfolio positions without taking into account operations of the Central bank. The items of the Federal government net debt (37.6 per cent of GDP) in 2003 are:

- Securities issued by the National Treasury – Federal domestic public debt constituted by public bonds issued by the National Treasury recorded in the Electronic Settlement and Custody System (SELIC) and those under the custody of the Central Office for Private Securities (CETIP) placed and redeemed in Brazilian currency, including securities at the Central Bank's portfolio (+43.3);
- Bank debt - Loans and financing granted by financial institutions to the non-financial public sector;
- Bank debt of decentralized agencies – Loans and financing granted by financial institutions to entities of indirect administration (governmental agencies, universities, foundations, etc);
- Social Securities deposits and investments – Corresponds to the public securities investment portfolio of the Social Security;
- Certificates of privatization (CP) – Securities issued by the National Treasury and usable in the purchase of shares of state-owned enterprises within the framework of the National Privatization Program;
- Debts of the Union and of state-owned enterprises assumed and renegotiated by the federal government and securitized through the issuance of securities registered with the CETIP;
- Agricultural debt securities (TDA) on the market – Securities backed by the INCRA/MA issued by the National Treasury in land expropriation procedures for agrarian reform;
- FAT investments in public securities -Worker Protection Fund investments in National Treasury securities;
- Investments of various funds – Refers to investments of public funds other than financial intermediaries in federal securities;
- Law 8727/93 – Debt of states, municipalities, and public enterprises at 6/30/93, refinanced by the Union under Law 8727/93;
- External debt – Short-, medium- and long-term external public debt (+13.9).

Federal government debt is disseminated as net and gross with a monthly periodicity, and the difference between them was 15 points of GDP in 2003 for Federal government. The net consolidated public sector debt (which is composed by General government, Central bank and public non financial enterprises) corresponds to net debt of National government (Federal government and Central bank) plus net debt of local and intermediate government with national government, public and private financial system, non financial private sector and the rest of the world. Social security public system and public funds are also included. The resulting stock is adjusted in order to obtain the concept of net fiscal debt: privatization adjustments, patrimonial adjustments, external debt adjustments (for exchange rate fluctuations) and domestic debt adjustments (also for exchange rate fluctuations when domestic debt is indexed to the US dollar). Net debt of the so-called harmonized public sector does not include the monetary basis as the Macroeconomic Monitoring Group of MERCOSUR (GMM) recommends. Finally, the question surges: which is the appropriate data?

Brazilian Public Debt

	1998	1999	2000	2001	2002	2003
Net Debt – National Government	25.0	29.8	30.6	32.8	35.3	37.2
Federal Government	25.6	29.6	29.8	33.4	35.7	37.6
Central Bank	–0.6	0.2	0.8	–0.6	–0.4	–0.4
Gross Debt – General Government	54.8	58.5	64.5	70.6	71.4	79.0
Net Debt – General Government	39.8	45.7	45.9	51.7	54.2	58.0
Federal Government	25.6	29.6	29.8	33.4	35.7	37.6
States and Municipalities	14.2	16.1	16.1	18.3	18.5	20.4
Net Debt – Consolidated Public sector (A)	41.7	48.7	48.8	52.6	55.5	58.7
General Government	39.8	45.7	45.9	51.7	54.2	58.0
Central Bank	–0.6	0.2	0.8	–0.6	–0.4	–0.4
Non Financial Public Enterprises	2.6	2.8	2.2	1.6	1.7	1.1
Net Debt – Harmonized Public sector					51.8	
Privatization Adjustment (B)	–3.2	–3.7	–5.1	–4.8	–4.0	–4.1
Patrimonial Adjustment (C)	3.3	4.2	4.6	6.2	5.8	6.0
Adjustment for external debt (D)	0.6	3.3	3.8	4.4	8.0	6.5
Adjustment for domestic debt (E)	0.7	4.4	4.9	6.0	9.6	8.3
Fiscal net Debt (A-B-C-D-E)	40.3	40.5	40.6	40.8	36.1	42.0

Source: Central Bank of Brazil.

Table 1

Central Government Consolidated Debt Stock and Its External Component
(percent of GDP and percent of total debt)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Argentina	…	…	…	29.4	31.3	33.8	35.7	34.5	37.6	43.0	45.0	53.7	145.9	138.1
	…	…	…	…	…	…	…	*74.1*	*74.0*	*69.5*	*66.3*	*61.2*	*62.8*	*56.6*
Bolivia [1]	65.1	52.9	51.5	63.5	64.3	61.8	54.9	57.9	57.4	61.1	62.6	71.7	74.9	92.4
	…	…	…	*77.3*	*78.1*	*77.7*	*74.7*	*76.7*	*76.2*	*72.7*	*69.0*	*63.2*	*62.5*	*71.1*
Brazil [2]	…	12.8	12.1	9.5	12.9	13.3	15.9	18.7	25.0	30.1	31.0	32.8	35.6	36.9
	…	…	*93.2*	*81.0*	*49.3*	*26.3*	*9.9*	*10.4*	*16.8*	*26.3*	*24.2*	*25.1*	*35.2*	*27.7*
Chile	45.4	38.8	31.7	29.2	23.5	17.9	15.1	13.2	12.5	13.8	13.7	15.0	15.7	13.3
	42.0	*43.2*	*42.6*	*40.0*	*39.8*	*32.1*	*28.1*	*24.2*	*25.5*	*28.9*	*26.6*	*30.3*	*36.5*	*42.4*
Colombia	14.8	14.0	15.0	14.5	12.7	13.9	14.4	17.8	22.1	29.5	36.9	44.3	50.5	53.2
	87.2	*89.0*	*80.5*	*69.3*	*63.8*	*58.6*	*54.1*	*50.2*	*52.0*	*51.1*	*49.5*	*50.1*	*50.4*	*49.5*
Costa Rica	...	28.5	23.3	24.3	26.8	28.7	33.2	30.0	39.5	35.2	36.6	38.6	40.8	38.2
	…	*65.4*	*61.2*	*52.7*	*44.0*	*40.3*	*27.7*	*26.1*	*20.5*	*24.4*	*27.7*	*28.3*	*29.9*	*32.7*
Ecuador	70.0	67.2	73.8	85.1	71.1	59.1	58.7	51.7	56.3	83.6	71.8	58.0	51.1	47.7
	97.1	*96.8*	*97.9*	*96.8*	*89.1*	*87.6*	*85.1*	*86.4*	*81.4*	*78.4*	*75.2*	*77.0*	*77.7*	*76.9*
El Salvador	45.7	41.7	43.1	44.3	41.7	37.3	37.8	36.2	33.3	26.0	27.4	31.1	36.0	38.0
	…	…	…	*64.0*	*60.9*	*61.2*	*64.5*	*66.8*	*66.2*	*69.5*	*64.4*	*61.6*	*67.5*	*69.7*
Guatemala	23.1	17.5	16.5	15.5	15.4	14.0	13.5	14.0	14.6	17.5	16.9	18.0	16.4	18.4
	55.9	*55.2*	*56.2*	*55.2*	*57.7*	*62.4*	*60.5*	*61.1*	*65.5*	*67.1*	*66.0*	*68.7*	*72.6*	*69.6*
Haiti	...	...	...	...	...	...	37.9	40.0	36.6	38.6	43.8	46.2	60.3	55.9
	…	…	…	…	…	…	*66.7*	*70.1*	*69.7*	*68.6*	*68.9*	*68.1*	*71.0*	*71.5*
Honduras [1]	84.4	81.0	76.8	85.9	94.6	87.0	82.2	80.3	72.7	77.2	69.7	68.7	71.0	71.8
	…	…	…	…	…	…	…	…	…	…	…	*94.8*	*94.5*	*94.6*
Mexico	46.5	38.1	28.1	25.3	35.3	40.8	31.1	25.8	27.8	25.6	23.2	22.5	24.0	24.7
	51.7	*56.0*	*57.8*	*57.6*	*64.3*	*79.3*	*75.6*	*66.6*	*64.6*	*56.9*	*47.1*	*41.6*	*39.6*	*39.2*
Nicaragua [1]	…	…	…	…	304.5	252.4	141.1	206.9	197.0	183.8	175.9	179.0	194.4	193.8
	…	…	…	…	*95.1*	*95.7*	*89.3*	*58.7*	*63.0*	*63.3*	*64.0*	*62.7*	*58.0*	*59.0*
Panama [1]	123.4	114.2	89.9	97.8	94.5	95.8	84.0	78.2	75.8	79.8	77.2	83.3	76.0	74.8
	85.6	*87.1*	*83.2*	*74.3*	*75.3*	*77.8*	*74.0*	*74.6*	*75.5*	*72.4*	*72.5*	*74.6*	*74.5*	*75.1*
Paraguay [3]	12.8	11.5	8.2	9.4	7.2	10.0	9.7	10.3	12.8	20.9	25.9	29.2	39.3	…
Peru	52.4	60.9	59.6	63.6	53.4	47.8	45.1	31.8	40.3	47.1	45.3	45.1	47.3	48.4
	…	…	…	…	…	…	…	…	*85.5*	*80.2*	*79.2*	*78.9*	*78.2*	*78.6*
Dominican R. [1][3]	84.7	60.6	49.2	47.8	37.5	33.2	29.2	23.9	23.1	20.9	19.0	19.6	24.0	40.2
Uruguay	…	…	23.3	21.5	21.0	19.9	20.2	21.3	23.2	25.6	30.9	37.8	76.8	95.9
Venezuela [1]	…	…	…	…	…	…	45.2	30.9	28.4	28.2	26.2	29.9	41.0	42.9
	…	…	…	…	…	…	*91.4*	*90.1*	*88.7*	*83.8*	*70.6*	*63.0*	*69.5*	*65.5*

Notes: In italics, we show the external component of public debt (as percent of total debt). – (1) Public sector debt stock. – (2) Net debt of federal government and central bank. – (3) It only includes external public debt.
Source: ECLAC, United Nations.

Referring to public debt composition, data shows a clear tendency to use in a more intensive way domestic debt instruments. This situation should reduce the exposition of countries to exchange rate fluctuations (at least in the case of those domestic instruments which are not indexed to foreign currency). The increase of the share of domestic public debt is outstanding in Brazil, Colombia, Costa Rica, Mexico and Peru. This is in part a result of the difficulties to borrow abroad, and also the outcome of the dissemination of international guidelines for debt management of IMF and World Bank (see Box 2).

Box 2. Public debt management strategies

Public debt strategies in which countries appeal to excessive external debt in foreign currencies and short-term debt (including also floating interest rates) are very risky. For example, debt expressed in foreign currencies may appear, *ex ante*, less expensive than debt expressed in local currency with the same maturity, but may result more expensive in instable capital market or in the case of a depreciation of the local currency. Furthermore, public debt management authorities must take into account that the exchange regime can affect linkages between debt management and monetary policy. For example, debt expressed in foreign currency may appear less expensive in a fixed exchange regime where exchange instability is limited, but may result very risky if the exchange regime turn to be unsustainable.

A framework should be elaborated that allow public debt management authorities to identify and find an arbitrary solution between anticipated cost and risk of the public debt instruments portfolio. Generally public debt management authorities deal with different type of risk; the major role of the unit in charge of the public debt management is to identify those risks, evaluate if possible their magnitude and elaborate the best feasible strategy in order to find an arbitrary solution between cost and risk. To accomplish this task, they must have access to financial and macroeconomic projections. To assess risk, debt managers should regularly conduct stress tests of the debt portfolio on the basis of the economic and financial shocks to which the government – and the country more generally – are potentially exposed. When constructing such assessments, debt managers needs to factor in the risk that the government will not be able to roll over its debt and be forced to default, which has costs that are broader than just government's budget. Moreover, debt managers should consider the interactions between the government's financial situation and those of the financial and non-financial sectors in time of stress in order to ensure that government's debt management activities do not exacerbate risks in the private sector. In general, models used should enable government debt managers to undertake the following types of risk analysis:

- Project expected future debt servicing costs over a medium-to long-term horizon based on assumptions regarding factors affecting debt-servicing capability, such as: new financing requirements; the maturity profile of debt stock; interest rate and currency statistics of new debt; assumptions for future interest rates and exchange rates and the behavior of relevant non-financial variables (e.g., commodity prices for some countries);
- Generate a debt-profile, consisting of key risk indicators of the existing and projected debt portfolio over the projected horizon;
- Calculate the risk of future debt servicing costs in both financial and real terms by summarizing the results of stress tests that are formulated on the basis of the economic and financial shocks to which the government and the country more generally are potentially exposed. Risks are typically measured as the potential increase in debt servicing costs under risk scenarios relative to the expected cost; and
- Summarize the costs and risks of alternative strategies for managing the government's debt portfolio as a basis for making informed decisions on future financing alternatives.

The theoretical framework of assets and liabilities administration for public debt management is a useful method, because cost and risk analyses of portfolio's instruments of public debt is directly linked to fiscal resources. In this framework, characteristics and risks of the assets cash flow are examined, and if it is possible liabilities with the same characteristics are selected in order to minimize probabilities of a liquidity shortage caused by a currency or maturity mismatch. The IMF and the World Bank establish that "the main objective of public debt management is to ensure that the government's financing needs and its payment obligations are met at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk".

2. Public debt dynamics: the snowball effect

Even if many countries did significant efforts to reduce their public debt stock, the combination of high interest rates, sharp devaluations and recessive episodes had devastating consequences on public finance. An explosive debt dynamics – a snowball effect – can result, in which debt servicing absorbs an increasing proportion of fiscal revenues.

In order to calculate the snowball effect, public debt dynamics can be expressed by the following equation:

$$B_t = B_{t-1} - GB_t + SF_t \tag{1}$$

where Bt is public debt stock, *GBt* the global government balance, *SFt* the stock-flow adjustment that ensures the consistency between government balance and the variation in the stock of debt; *t* denotes the year. The stock-flow adjustment includes the accumulation of financial assets, the change in the value of debt stock denominated in foreign currency and remaining statistical adjustments. The equation can be presented emphasizing the role of the primary balance:

$$B_t = B_{t-1}(1+i) - PB_t + SF_t \tag{2}$$

where *PBt* is the primary balance, and *i* is the implicit interest rate. The implicit interest rate is calculated as the interest paid as a percentage of debt stock at the end of the year (*t–1*). Rewriting the equation in terms of GDP (*Yt*):

$$\frac{B_t}{Y_t} = \frac{B_{t-1}}{Y_{t-1}} . \frac{1+i}{1+n} - \frac{PB_t}{Y_t} + \frac{SF_t}{Y_t} \tag{3}$$

where n is the rate of growth of GDP. Rearranging:

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = -\frac{PB_t}{Y_t} + \frac{B_{t-1}}{Y_{t-1}} \cdot \frac{i-n}{1+n} + \frac{SF_t}{Y_t} \tag{4}$$

If lower case letters represent ratios in terms of GDP:

$$\Delta b_t = -pb_t + b_{t-1} \cdot \frac{i-n}{1+n} + sf_t \tag{5}$$

The debt dynamics (Δb) can be separated in three components, the primary balance (*pb*), the contribution of interest and real growth rates or snowball effect, and the stock-flow adjustment[11] (*sf*). The data used for calculations are available on demand. Table 2 shows the importance of the snowball effect for several episodes and countries, and a comparison with the European Union countries.

In the period 1990-2002, the maximum snowball effect reached on average 4.1 points of GDP – associated with a public debt of 54.6 – in Latin American countries, with peaks of 12.2 in Ecuador, 8.8 in Argentina, 7.9 in Venezuela, and more than 5 points of GDP in Brazil, Honduras and Mexico. By contrast, in the early Nineties the maximum in European countries averaged 3.8 points of GDP – with an associated debt of 72.8 – with peaks of 9.9 in Italy and 7.2 In Belgium. The problem is more acute in Latin American countries in 1998-2002, and will continue to damper severely if the financial conditions remain unchanged.

Figure 1 shows debt dynamics for the period 1998-2002, separating 18 countries into three groups: in group A, countries that have access to the international capital markets to issue public debt (market access countries)[12] and public debt increased; in group B, countries that have access to international markets, and public debt has decreased or has been constant; and in group C, countries that cannot issue sovereign bonds in the international capital markets.

In the first group, the main reason of the rising of the debt is currency devaluation in 2002, as it can be seen in the magnitude of the stock-flow adjustment in Argentina and Uruguay. In Brazil, the positive primary balance was not sufficient to impede the increase of debt, due to exogenous factors. In Colombia the negative impact of these factors came together with a persistent primary deficit. In Venezuela the increase was quite small.

In Brazil fiscal authorities began to generate systematic primary surpluses since 1999 with the Fiscal Responsibility Law, approved in 2000 which defines annual fiscal targets for the next three exercises. The aim is to achieve primary surpluses allowing the public debt-to-GDP ratio stabilization. But the effort was not sufficient to impede public debt growth, because of the deterioration of economic growth rate and of financing conditions. In the case of Brazil, fixing primary surplus targets (instead of global balance) was *per se* a success, because it permitted the separation of fiscal goals from interest and exchange rates fluctuations. Thus, if during the period 1999-2002 global deficits were bigger than expected, the year

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[11] The devaluation of the local currency hits directly in two of the components of debt dynamics: on the snowball effect through the increase of the flow of interests paid measured in terms of GDP, and on the stock-flow adjustment through the increase of the stock of debt.

[12] We define as "market access countries" the twelve Latin-American countries belonging to JPMorgan's EMBI Global Index.

Table 2

The Magnitude of the Snowball Effect
(percent of GDP)

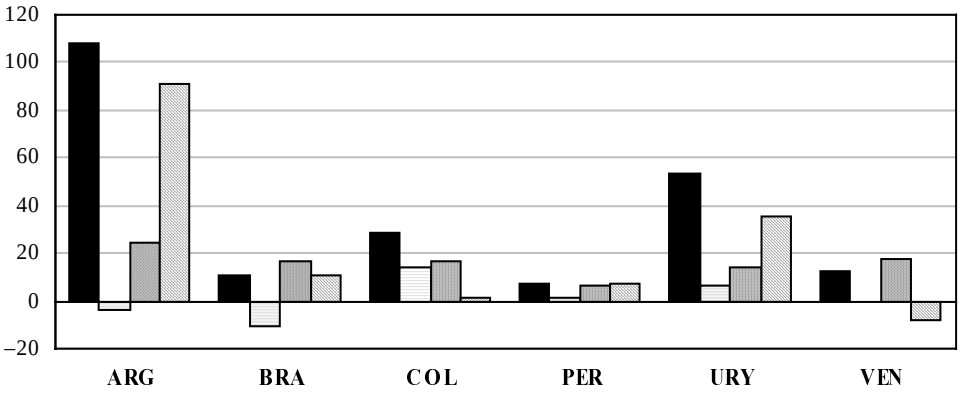
	Maximum of the snowball effect	Public debt associated with maximum of the snowball effect	Accumulated snowball effect	Accumulated public debt stock
	1990-2002		**1998-2002**	
Latin American countries	**4.1**	**54.6**	**9.1**	**16.0**
Argentina	8.8 (2002)	145.9	24.0	108.3
Bolivia	1.4 (2001)	71.7	2.6	17.5
Brazil	5.2 (1999)	30.1	16.7	10.6
Chile	0.5 (1999)	13.8	0.5	3.2
Colombia	4.3 (1999)	29.5	16.7	28.4
Costa Rica	4.4 (1996)	33.2	10.5	1.3
Ecuador	12.2 (1999)	83.6	21.5	–5.2
El Salvador	0.9 (1996)	37.8	2.4	2.7
Guatemala	1.0 (2001)	18	3.5	1.8
Haiti	0.8 (2002)	60.3	0.5	23.6
Honduras	5.7 (1994)	94.6	4.5	–1.6
Mexico	6.4 (1995)	40.8	9.8	–3.8
Panama	3.9 (2001)	83.3	10.0	0.2
Paraguay	1.4 (2002)	39.3	5.0	26.5
Peru	4.7 (1992)	59.6	6.2	7.0
Dominican Republic	0.4 (2002)	24	–1.9	0.9
Uruguay	4.7 (2002)	76.8	14.0	53.6
Venezuela	7.9 (2002)	41	18.0	12.6
European countries	**3.8**	**72.8**	**3.2**	**–7.2**
Belgium	7.2 (1993)	138.2	13.5	–13.5
Denmark	6.4 (1993)	78	11.6	–10.7
Germany	2.7 (1996)	59.8	9.7	–0.1
Greece	2.8 (1993)	110.1	0.3	–1.1
Spain	1.7 (1996)	68.1	–3.6	–10.8
France	3.0 (1993)	45.3	5.4	–0.5
Ireland	1.1 (1992)	100.2	–19.5	–22.5
Italy	9.9 (1993)	118.1	11	–9.6
Luxembourg	0.2 (2002)	5.7	–0.6	–0.6
Netherlands	4.3 (1993)	79.3	2.3	–14.4
Austria	2.5 (1993)	61.8	7.1	3
Portugal	5.1 (1993)	59.1	–1.6	3.1
Finland	3.9 (1993)	55.9	2	–5.9
Sweden	4.7 (1996)	73.5	7.5	–15.3
United Kingdom	1.7 (1992)	39.2	2.4	–9.1

Source: Authors' calculation for Latin American countries and European Commission (2003) for European countries.

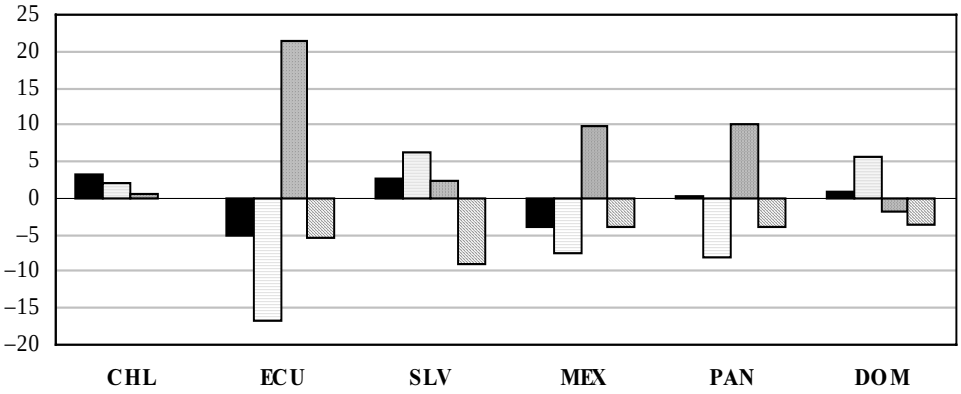
Figure 1

Contribution to the Change of Public Debt Stock in Latin America, 1998-2002

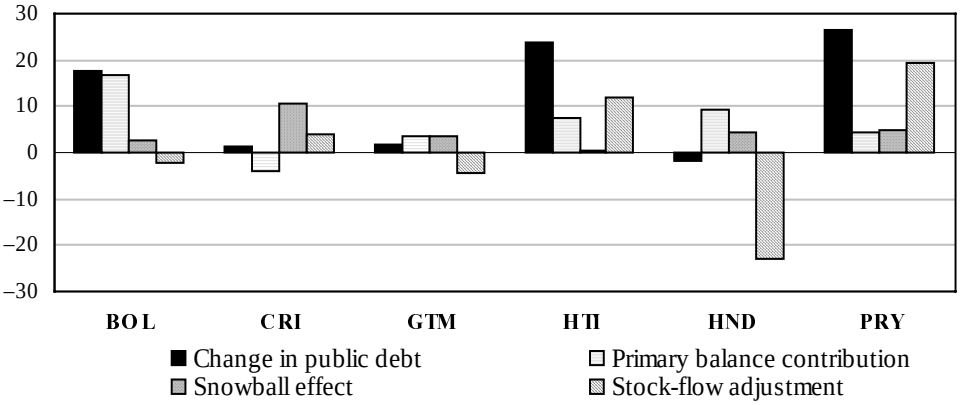
A – Market-Access Countries with Increasing Public Debt



B – Market-Access Countries with Decreasing Public Debt



C – Countries That Cannot Issue Sovereign Bonds



Source: Elaboration of the authors.

2003 should represent the beginning of a virtuous circle, leading to the absorption of the public debt-to-GDP ratio if the exchange rate converges to a lower level.

In group B, there has been a decline of the public debt-to-GDP ratio in Ecuador and Mexico, meanwhile in the other countries this ratio was relatively constant. In El Salvador, there has been a negative stock-flow adjustment, which can be attributed to the recent dollarization process. The particular case of Ecuador is highlighting: this country needed to cumulate eighteen points of GDP of fiscal primary surpluses to reach a decrease of its public debt of five points of GDP from 1998 to 2002. As in El Salvador, there has been also a negative stock flow adjustment attributed to the dollarization process. In Dominican Republic, the decline in the public debt-to-GDP ratio has been completely reversed with the crisis of the financial system of 2003. The consolidated public debt rose from 24 per cent of GDP in 2002 to 40 per cent of GDP in 2003. In the case of Mexico, the fiscal authorities managed to balance the negative impact of the exogenous variables with primary surpluses. The negative stock-flow adjustment also contributed to reduce public debt. It is nonetheless remarkable the complete absence of snowball effects in Chile, a country with very low levels of public debt and interest rates.

In group C, the impact of the snowball effect is much lower, except for Costa Rica. In Honduras, Haiti, Guatemala and Bolivia the implicit interest rate is quite low. In these countries, external financing relies mainly on the "Poverty Reduction and Growth Facilities" programs.

3. Debt sustainability indicators

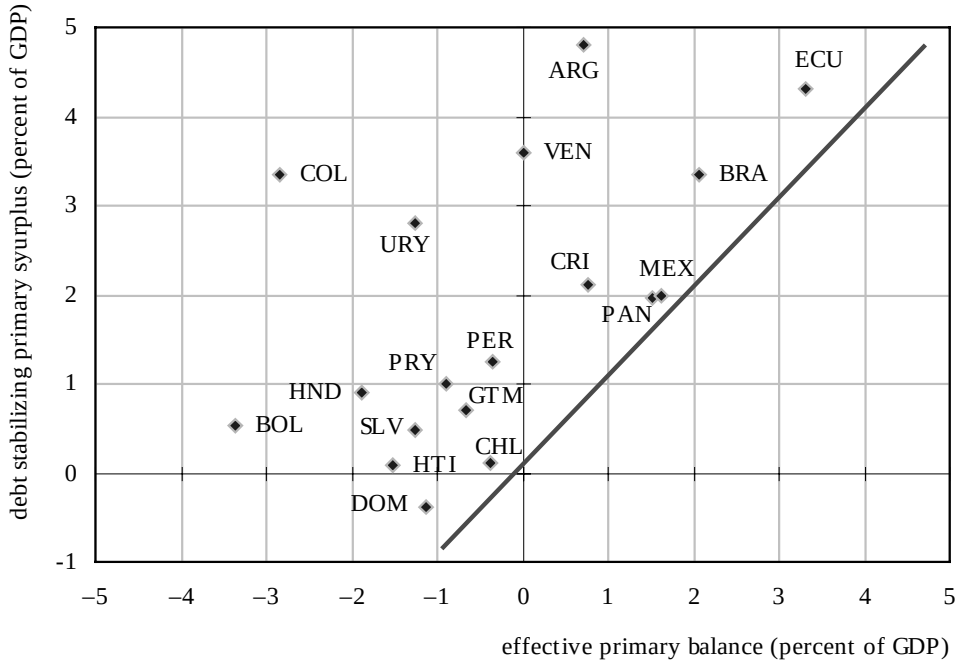
The required debt-stabilizing primary balances are extremely fluctuant, as a consequence of the volatility of interest, exchange and real growth rates. In such a context, it is really a hard task to fix short-term targets in the public debt-to-GDP ratio. Debt sustainability indicators should take into account this exogenous component; analysts that aim to formulate general policy prescriptions should do the same.

During the period 1998-2002, some countries had systematically a negative difference between their effective primary balance and the required one to stabilize debt. A combined process of generation of primary balances and improvement in the financial conditions seem to be the only way to ensure debt sustainability. In figure 2 we represent, as an average for the 1998-2002 period, the effective primary balance and the debt-stabilizing primary balance, calculated as the standard short-term Blanchard's (and others, 1990) indicator. To do so, we assume no stock-flow adjustment and we suppose $\Delta b_t = 0$. From (5), the short-term debt-stabilizing primary balance can be derived as:

$$pb_t = b_{t-1} \cdot \frac{i-n}{1+n} \tag{6}$$

Figure 2

Effective and Debt-stabilizing Primary Surplus, Average for 1998-2002
(percent of GDP)



Source: Authors' calculations.

It clearly appears that there has been a significant negative difference between these two variables, except for Chile, Dominican Republic, Mexico and Panama. The gap represented up to five points of GDP in Colombia, and three points in Argentina, Bolivia, Uruguay and Venezuela. Recent papers develop some refinements to this kind of indicators, introducing a fiscal policy reaction function and taking into account the currency mismatch of debt.

3.1 Introducing government's reaction function

Croce and Hugo (2003) propose a fiscal sustainability indicator, calculated with an operationally simple recursive algorithm that is derived from the debt-to-GDP ratio subject to the government's reaction function. The authors suppose that government has the ability to react when the debt-to-GDP ratio exceeds the target ratio, by generating a primary surplus consistent with the target ratio.

We start from equation (3), assuming there is no stock-flow adjustment. The same equation can be written in lower cases as follows:

$$b_t = \frac{1+i}{1+n} b_{t-1} - ps_t \qquad \text{(6-bis)}$$

We define now as *ps* the primary surplus, instead of the primary balance *pb*. The authors add two additional equations in order to define targets on primary surplus and debt and the government's reaction function:

$$b_t = \beta_t b_{t-1} - ps_t \qquad \text{where } \beta_t = \frac{1+i_t}{1+n_t} \qquad \text{(6-bis)}$$

$$ps^* = (\beta^* - 1) b^* \qquad (7)$$

$$ps_t = ps^* + \lambda_t (b_{t-1} - b^*) \qquad (8)$$

In equation (7), β^* and ps^* are respectively the discount factor and the primary surplus that would prevail once convergence to the target debt b^* is reached. In equation (8), λ_t is a parameter that indicates the intensity of the policy response at time t, namely the deviation of the observed public debt ratio from the target. From equations (6-bis), (7) and (8) we get the budget constraint that include the government reaction ability:

$$b_t = (\beta_t - \lambda_t) b_{t-1} - (\beta^* - \lambda_t - 1) b^* \qquad (9)$$

The authors assume furthermore that $b_{t-1} > b^*$. This implies, following the equation (9), that b_t would converge to b^*, if and only if $|\beta_t - \lambda_t| < 1$. Therefore, they propose to use as an indicator of fiscal sustainability (IFS):

$$IFS_t = (\beta_t - \lambda_t) = \left(\frac{1+i_t}{1+n_t} - \frac{ps_t - ps^*}{b_{t-1} - b^*} \right) \qquad (10)$$

If $IFS_t < 1$ fiscal policy is sustainable; if $IFS_t \geq 1$ then fiscal policy is unsustainable. According to the authors, one advantage of this indicator over Blanchard's is that no estimations of future GDP and interest rates are required: the indicator can generate its results based on current, past, and target values of relevant variables.

Croce and Hugo fix β^* at 1.02 for developed countries and 1.03 for developing countries; this values represent the median of the distribution of the observed values. However, this value is far from being representative; Table 3 shows the calculations for Latin American countries that issue sovereign bonds and whose public debt increased in the period 1997-2002. It can be seen that the value of β is very dissimilar for different years and among countries. On average, the observed spread between interest rates and the rate of growth was very high, except for the case of Peru. If we fix a target value of public debt b* of 25 per cent of GDP

for all countries, we can estimate the target primary surplus, using alternative values for β*.

When we estimate β* as the spread between interest rate and real growth rate in the 1997-2002 period, the indicator is above 1 for all the countries except for Chile. Critical values are reached by Brazil, Colombia and Venezuela where the spread is 12 points percent.

The IFS shows problems of sustainability for most of the countries in the recent years (except for Ecuador), which is still another way to confirm that debt rose. Of course, if the bad financing conditions and the lack of growth of this period

Table 3

Indicator of Fiscal Sustainability with a Government Function Reaction for Selected Countries, 1997-2002

			1997	1998	1999	2000	2001	2002
			β					
Argentina			0.976	1.025	1.114	1.088	1.140	1.163
Brazil			1.061	1.303	1.209	1.063	1.090	1.066
Colombia			1.101	1.177	1.204	1.135	1.097	1.071
Ecuador			1.028	1.067	1.216	1.052	1.002	1.024
Peru			0.973	1.064	1.043	1.015	1.045	0.992
Uruguay			1.014	1.017	1.113	1.101	1.119	1.125
Venezuela			0.993	1.084	1.177	1.068	1.094	1.305
	β^*_1	ps^*	IFS_1					
Argentina	1.084	2.11	1.13	1.20	1.29	1.14	1.24	1.18
Brazil	1.132	3.30	0.73	0.91	…	1.30	1.25	1.14
Colombia	1.131	3.27	0.61	0.61	–0.22	3.28	1.59	1.40
Ecuador	1.065	1.62	0.99	1.13	1.14	0.97	0.96	0.99
Peru	1.022	0.56	0.95	1.04	1.15	1.07	1.11	1.03
Uruguay	1.082	2.04	…	…	…	…	1.79	1.33
Venezuela	1.120	3.01	1.37	0.90	2.17	4.12	–0.08	1.81
	β^*_2	ps^*	IFS_2					
Argentina	1.03	0.75	1.00	1.06	1.18	1.06	1.17	1.13
Brazil	1.03	0.75	1.01	1.31	…	0.80	0.83	0.81
Colombia	1.03	0.75	0.86	0.88	0.40	2.33	1.34	1.27
Ecuador	1.03	0.75	0.97	1.10	1.12	0.95	0.94	0.97
Peru	1.03	0.75	0.96	1.06	1.16	1.08	1.11	1.04
Uruguay	1.03	0.75	…	…	…	…	1.57	1.23
Venezuela	1.03	0.75	1.24	0.57	1.57	3.18	–1.89	1.22

Notes: β_1^* is the average for 1997-2002 for each country; β_2^* is the value suggested by Hugo and Croce (2003). For both indicators the target value of debt is 25 per cent). We omit to show values when $b^* = bt$.

Source: Elaboration of the authors.

are taken into account, the indicator worsens, and the associated "stationary" primary surplus is higher. If on the contrary we assume that these factors are temporary (when $\beta_2^* = 1.03$), the evaluation of sustainability is less severe. For example, in Brazil the effort that has been made to generate high primary surpluses is well captured by the second indicator, delivering the country from the "unsustainable" condition.

As the authors have pointed out, it is very difficult to encapsulate in one number the complex issue of fiscal sustainability. In this particular case, the indicator only applies when the current public debt-to-GDP ratio is higher than the targeted value, loosening then generality. Another deficiency (indeed pointed out by the authors) is that the indicator does not incorporate the effects of real exchange rate misalignment on fiscal sustainability. This caveat applies indeed to all fiscal sustainability indicators.

3.2 A measure of currency mismatch

A currency mismatch is a situation in which the currency denomination of a country's or a sector's assets differs from that of its liabilities such that its net worth is sensitive to changes in the exchange rate. In almost all emerging countries, public debt is labeled in foreign currency, while government revenues relies to a large extent on domestic output. This situation creates a currency mismatch in the public sector balance sheet, making fiscal sustainability very sensitive to exchange rate movements.

Calvo, Izquierdo and Talvi (2002) analyze the specific case of Argentina and propose a fiscal sustainability indicator that compares the composition of debt with the degree of openness, linking in a very aggregate manner the evolution of external debt with the capacity to obtain resources from exports.

In order to obtain a debt-to-GDP ratio constant ($\bar{b}$), from equation (6) we can see that the primary surplus must satisfy:

$$ps_t = \bar{b}\left[\frac{(1+i)}{(1+n)} - 1\right] \tag{11}$$

Debt-to-GDP ratio can be expressed as:

$$\bar{b} = \frac{B}{Y} = \frac{B^{nt} + eB^*}{Y^{nt} + eY^*} \tag{12}$$

where e is real exchange rate (defined as relative price between tradable and non-tradable goods); B^{nt} is debt in terms of non-tradables; B^* is debt in terms of tradables; Y^{nt} is output in terms of non-tradables and Y^* is output in terms of

tradables (proxied by exports). The currency mismatch measure is $(B^{nt} / eB^{*})/(Y^{nt} / eY^{*})$. Consider the limit cases:

- if $b = \frac{eB}{Y^{nt}}$ then all valuation effects take place on debt only. This is the worst scenario in which real exchange rate depreciation hits fully on sustainability,
- if $(B^{nt} / eB^{*})/(Y^{nt} / eY^{*}) = 1$, the composition of debt and output is perfectly matched, and real exchange rate depreciation has no effect on fiscal sustainability.

In Table 4, we calculate for some Latin American countries two public debt mismatch measures (the lower, the worse), only with external debt first and then using also domestic debt denominated in foreign currency to estimate B^{*}.

Table 4

Public Debt Mismatch Measures, 2002

	External debt / Total public debt (%)	Exports / GDP (%)	Currency mismatch measure 1	Currency mismatch measure 2
Argentina	62.8	27.7	0.23	0.12
Brazil	35.2	15.5	0.34	0.08
Chile	36.5	34.5	0.91	0.03
Colombia	50.3	17.5	0.21	0.20
Ecuador	77.7	25.4	0.10	...
El Salvador	66.9	26.7	0.18	...
Mexico	39.7	27.2	0.57	0.57
Peru	78.2	16.4	0.05	...
Uruguay	74.8	21.6	0.09	...
Venezuela	67.1	29.0	0.20	...

Notes: Public sector debt mismatch measure 1 considers only external public debt. Public sector debt mismatch measure 2 includes also domestic debt expressed in foreign currency.

Source: Elaboration of the authors.

The indicator may be inappropriate in dollarized countries like Ecuador and El Salvador, but it clearly shows high degrees of mismatch in Argentina, Brazil, Colombia, Peru, Uruguay and Venezuela. Most of these countries exhibit a relatively low degree of openness (when measured by exports in GDP), when compared to their external public debt level. Of course, the public/private composition of exports should also matter in this evaluation of sustainability.

Nevertheless, in recent years many countries are collecting export taxes in primary sectors and royalties in the mining sector, in order to diminish their own currency mismatch.

Mexico and Chile are in a much better position, when we use the first mismatch indicator. What is the ideal number? If the value is one, countries could pay in a year their external obligations if all the amount of exports were used to this purpose. Obviously, this would be an implausible situation. May be something like 0.5 would be an indicator of currency alignment, from the public finance point of view.

Of course, public debt mismatch measure worsens when we take into account domestic debt denominated in dollars.[13] In Brazil for example, around 30 per cent of domestic public debt was indexed to the dollar, increasing this way their currency mismatch. An exception is Mexico where public internal debt is entirely issued in domestic currency. It appears thus that the traditional indicators of sustainability are not well suited to address the key issue of currency mismatch.

4. An early-warning model

Sustainability has become a central element of the work of IMF. As emphasized by Ter-Minassian (2004), this encompasses both the assessments of external and fiscal sustainability and is probabilistic in nature, as the debt dynamics depend on uncertain macroeconomic and fiscal developments and changes in asset prices. Thus, assessing sustainability is analyzing the probability that debt dynamics become unstable. The template can provide upper-bound estimates of the likely evolution of the debt stock, but does not indicate what level of debt is too high. Thus, this approach is flexible enough to avoid general conclusions concerning debt thresholds.

From a comparative perspective, which is the one adopted here, more flexible ways to address this issue than single-number indicators are to estimate either fiscal policy reaction functions (IMF, 2003) or *logit* models (Manasse, Roubini and Schimmelpfenning, MRS, 2003). In the first case, the primary fiscal balance responds to both the level of public debt and other temporary factors, like the business cycle, inflation and commodity prices. This approach has the merit to estimate for each country a primary balance target, depending on exogenous conditions. A second way to assess fiscal sustainability is to estimate an early warning model. Using a panel data set for 47 market access countries, the authors (MRS) estimate a *logit* model of debt crisis to find critical thresholds that depend on many variables.

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[13] In the case of Chile, this indicator is misleading. The domestic debt of the Treasury is mainly owned by the central bank, issued in dollars with a very long maturity.

A country is defined to be in default if it is classified so by Standard & Poor's or if it receives a disbursement in the first year of a large Fund Arrangement (over 100 per cent of quota). The explanatory variables are divided into six groups: external debt variables, public debt variables, variables from the Fund's currency crisis Early Warning System, other macroeconomic variables, fiscal variables and political variables. Therefore, they proceed along a three-stage strategy: first, they regress each variable against sovereign default indicator; second they pool the best performers within each group of variables and run the *logit* regression; and third they combine the best performers from each group in a general model. In formal terms, the probability of being in debt crises, in year t is given by:

$$P_t = f((1 - SCI_{t-1}) * X_{t-1}; SCI_{t-1} * X_{t-1}) \tag{13}$$

where *SCI* denotes the sovereign debt crisis indicator and *Xt* denotes the vector of explanatory variables. The first argument corresponds to the probability of entering into a crisis in *t* (given that the country was not in crisis in *t–1*), and the second argument corresponds to the probability of being in crisis, or in other words not exiting from crisis in *t* (given that the country was in crisis in *t–1*).

In this section we apply the same methodology for market access Latin American countries. The discussion behind predicting sovereign debt crises is highly important, and it is crucial also to understand the nature of sovereign debt default: is it associated to liquidity problems or to solvency issues? The model proposed here will help to answer this question. Table 5 summarizes the debt crisis episodes for the twelve emerging market access countries in Latin America, their number and their average length for each country. In the database there are 25 crisis episodes during the period 1970-2002. Table 6 shows means of some of the variables that will be used in the regression estimates, during crisis and non-crisis episodes, for the 1980-2002 period, for 12 countries.

As it can be observed, the mean of the external public debt-to-GDP ratio is 42.1 per cent, when countries are in crisis; this ratio is 25.4 per cent in "normal" circumstances. External liquidity variables, like short-term public debt, the current account balance, the financial account balance and the foreign direct investment (inflows), measured as percentage of GDP, are significantly different when countries are in crisis. For instance, the Financial Account balance represents 3.7 per cent of GDP during normal periods and –1.8 per cent of GDP during crisis. These numbers illustrate the episodes of "sudden stop" of capital flows. Referring to fiscal variables, it can be seen that all the relevant variables have the expected differences: debt interest payments and short-term debt are higher in crisis episodes. By contrast, primary balances are higher during crisis, showing the pro-cyclical adjustment efforts of Latin American central governments.

Table 7 shows the results of the regression, using the *logit* approach with a robust variance estimator. The coefficients have the expected signs, and z-values are significant at a 5 per cent level. The liquidity variables, such as the financial account balance, the interest debt payments to GDP ratio and international reserves, have higher marginal effects than solvency variables, such as total external debt to GDP

Table 5

Countries and Debt Crisis Years in the Database (1970-2002)

	Number of crisis	Average length (years)	Years in crisis	Crisis episodes
Argentina	3	5.0	15	1982-94, 1995-96, 2001-
Brazil	3	5.3	16	1983-95, 1998-00, 2001-
Chile	1	8.0	8	1983-91
Colombia	1	3.0	3	2000-
Dominican Republic	2	3.0	6	1983-1986, 1992-1994
Ecuador	2	8.0	16	1982-96, 1999-01
El Salvador	1	16.0	16	1981-97
Mexico	2	5.0	10	1982-91, 1995-96
Panama	1	14.0	14	1983-97
Peru	3	6.3	19	1976-77, 1978-81, 1983-98
Uruguay	3	2.0	6	1983-86, 1987-88, 1990-92
Venezuela	3	3.3	10	1983-89, 1990-91, 1995-98

Source: Authors' calculation.

Table 6

Means of Variables in the Database (1980-2002)

	All	Non-crisis	Crisis	Number of observations
Fiscal variables				
Total Public Debt/GDP (1990-2002)	38.7	30.8	47.5	68
Debt interest payments on total public debt / GDP	2.9	2.1	3.5	245
Short term debt / GDP	9.1	7.6	10.2	264
Short term interest /GDP	0.5	0.5	0.6	264
Primary balance / GDP	1.0	0.6	1.3	183
External variables				
External public debt / GDP	35.1	25.4	42.1	266
Current account balance / GDP	–2.4	–3.2	–1.8	276
Financial account balance / GDP	0.9	3.7	–1.1	275
Foreign Direct Investment (net inflows) / GDP	1.9	2.6	1.3	265
Reserves / GDP	7.7	8.8	7.0	264
Interest on external debt / GDP	3.3	2.9	3.7	264
Interest on external debt / XGS	15.2	13.2	16.6	264
Other variables				
Openness / GDP	52.2	53.9	50.9	276
Real growth GDP (percent)	2.4	2.8	2.1	276
Inflation (percent)	138.0	20.2	226.5	275

Source: Authors' calculation.

Table 7

Regressions Results: Coefficient Estimates
(Dependent Variable: Debt Crisis Indicator)

	Marginal effect	*Logit* coefficient	z-value
External public debt / GDP	0.009	0.09	2.03
Financial account balance / GDP	–0.029	–0.16	–2.71
International Reserves / GDP	–0.023	–0.12	–2.64
Short term debt / GDP _1	0.012	0.07	1.82
Public Debt interest payments / GDP	0.060	0.33	2.01
Openness / GDP	–0.003	–0.02	–2.98
Real growth GDP (percent) _1	–0.024	–0.13	–1.72
Constant		–2.44	–2.60
Lagged crisis indicator	0.762	4.42	7.30

Notes: 1/ *Logit* regression with robust variance estimates, allowing for country-specific variances (Huber White sandwich estimator). 2/ Marginal effects calculated at sample means for each variable. For the crisis indicator (dummy variable), marginal effect has been calculated for the change from 0 to 1.

Source: Authors' calculation.

Table 8

Regressions Results: Model Performance
(Dependent Variable: Debt Crisis Indicator)

	Early Warning Model
Observations	225
Wald-test for joint significance	Chi 2 (8) = 198.98
Debt crisis entries correctly	Argentina 1995 and 2001, Brazil 2001, Chile 1983, Ecuador 1999, Mexico 1982 Peru 1983 and 1998, Uruguay 1983, Venezuela 1983 and 1995.
Debt crisis entries not predicted	Colombia 2000, Ecuador 1982, Dominican R. 1992 and 1995, Uruguay 1990.

Source: Authors' calculation.

ratio. Trade openness and real growth also matters; the former encapsulate the effects of currency mismatch, while the latter reveal the importance of the snowball effect in crisis episodes.

Finally, the model performance is summarized in Table 8. Our logit model predicted the majority of debt crises entries, while sending no false alarm. The performance of the model could be improved significantly if data were in a quarterly frequency, which would allow more debt crisis entries.

5. Concluding remarks: the Original Sin and roads to redemption

This paper has argued that the poisonous cocktail of growth slowdown, currency depreciation and dollarized liabilities played a key role in recent public finance crises in some Latin American countries. Foreign currency-denominated debts intensify the uncertainty of public debt service, thus lowering credit ratings. As stressed by Eichengreen, Haussman and Panizza (EHP, 2003), "if countries attempt to minimize these risks by limiting their recourse to foreign sources of funding, they may then be starved of the finance needed to underwrite their growth. The process of economic and financial development will be slowed. Countries in this situation thus face a Hobson's choice".

These authors construct different indicators of original sin and explore the causes of the phenomenon. A first hypothesis is that original sin is a symptom of inadequate policy credibility, which tends to be a particular problem in developing countries. In this view, original sin is not a problem in itself; it is more of a symptom, signaling the presence of weak institutions or rule of law. Reinhart, Rogoff and Savastano (2003) show that a poor track on debt repayment or inflation lowers the rating of countries and increases risk.

An alternative definition of original sin is the generalized liability dollarization that prevails in Latin American countries. Large RER devaluations take place in the context of sudden stops of capital flows, which in turn can be explained by externalities such as distortionary taxes and low tax bases, weak rule of law and poor creditor's protection (Calvo, 2003). If original sin reflects institutional weaknesses, there are no easy tricks, like compulsory "pesificación" or a quick UF.[14] Calvo emphasizes that if Institutions are slow to change, full dollarization may be a second-best solution. This is by the way the same prescription made by Eichengreen and Haussman (1999) in their seminal paper, and this is why many people associate original sin with dollarization. The argument is that once the dollar is accepted for all domestic payments, currency mismatch dissolves, and maturity mismatches are attenuated, because it becomes easier to issue long term papers in dollars.

If we discard this drastic solution,[15] the other way is to become more like Australia, achieving redemption from original sin and delivering from the fear of float by reducing debts and inflation and developing deep and liquid financial domestic markets. The countries should then accumulate a track record and develop a reputation to maintain price stability. IMF surveillance would have to pay much greater attention than in the past to the build-up of vulnerable external and domestic debt positions in emerging economies. According to Goldstein (2003), the Fund's

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[14] The "pesificación" refers to the process of the compulsory conversion of dollar-denominated debts in Argentina, and the UF is the "Unidad de Fomento", a CPI indexed unit generally used in Chile for medium and long-term contracts.

[15] Dollarization was promoted intensively at the end of the Nineties by some International Finance Institutions. While Ecuador and El Salvador adopted full dollarization, the rest of Latin American countries has rather moved to more flexible exchange rates.

staff now argues that Latin American countries ought to be aiming toward eventual upper limits on government debt-to-GDP ratios of 25-30 per cent and that fiscal policy should be dominated by the debt constraint when debt ratios reach the upper limit of a prudent band.

This standard advice is somewhat contradicted by the fact that, no matter the macroeconomic performance, most development countries and all Latin American countries have an index of original sin of one. In other words, some countries have been unable to borrow abroad in their own currencies even with sound public finances, low inflation and deep financial markets. Consistently, the relationship between institutional quality and original sin is neither statistically nor economically significant, according to EHP.

The proposal of EHP to overcome the original sin is to develop an appropriate currency basket index, a unit of account that would include a well-diversified set of emerging-market and developing-country currencies, weighted by their GDPs at purchasing power parity. This unit will be more stable than the US dollar, since shocks that are positive for some economies will be negative for others. Then the International Financial Institutions should start issuing debt in such an index. The IFI's would thereby eliminate the currency mismatch generated by their own lending, thus becoming a solution instead of a source of original sin. The only practical way for developing countries to escape original sin is to develop an international initiative to build a market for this currency basket index.

Other proposals try to ensure sustainability by diminishing the impact of the snowball effect, or the lack of growth, in public finance. For instance, Borensztein and Mauro (2002), arguing that debt crises are generally triggered by growth slowdown, suggest that countries could protect themselves by issuing bonds indexed to the real growth of rate of their GDP. This mechanism would then help to diminish the pro-cyclical bias of fiscal policy, lowering interest debt payments in bad times and paying more when GDP gap is positive, maintaining therefore the debt/GDP ratio at sustainable levels. Promoting this kind of self-insurance schemes would be another challenge to International Finance Institutions.

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FISCAL SUSTAINABILITY AND VULNERABILITY IN A SMALL OPEN ECONOMY: THE URUGUAYAN EXPERIENCE

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Introduction

The strongly volatile macroeconomic environment that characterizes countries like Uruguay, together with the level and structure of indebtedness results in a very vulnerable position. It can be asserted that the debt-to-GDP ratio is vulnerable to changes in relative prices, GDP evolution and reference interest rate. Within this framework, the analysis of fiscal policy sustainability based only on the dynamics of the debt-to-GDP ratio is clearly insufficient, reducing the possibilities of pertinent corrective measures. Therefore, in this paper we broadened the traditional analysis by developing a set of vulnerability indicators that quantify and evaluate the risks related to the volatility of debt determinants and access conditions to capital markets.

Starting from the traditional solvency indicators, in Section 2 we introduce some extensions in order to explicitly address the risks related to the debt structure by currency, maturity and interest rate. Based on the historical behavior of debt determinants, we develop vulnerability indicators that quantify the risks of deviation from trend values. Finally, we analyze liquidity problems that are implicit in the time profile of the debt and its financing possibilities.

The development of these indicators turned out to be very useful both for evaluating the recent debt dynamics, showed in Section 3, and for building medium and long-term simulations, which are shown in Section 4.

Historical analysis (1988-2002) shows that the reduction of debt-to-GDP ratio observed in the Nineties was an endogenous process due to favorable evolution of debt determinants: economic growth, real appreciation, and primary surplus. Later deterioration of macroeconomic conditions explained the sharp increase in this ratio, which reached 65 per cent of GDP after a four-year recession. We concluded that, in spite of the low levels of debt-to-GDP ratio observed at the beginning of the decade, vulnerability to shocks in debt determinants was very high during the whole period.

Projections (2003-15) presented in section 3, based on an inertial scenario suggest the need of corrective measures to assure sustainability. In this context we evaluate the policy measures that were taken by the authorities in 2003: primary fiscal adjustment and public debt restructure.

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The opinions expressed in this paper are those of the authors and do not necessarily represent the views of the Banco Central del Uruguay.

We conclude that only a permanent primary adjustment could change former debt dynamics and assure long term sustainability. Moreover, taking into account the short term liquidity problems due to deterioration of access conditions to capital markets, a debt restructure program should be considered as a first step towards the structural reforms needed to achieve a sustainable path in the long run. These findings tackle the issue of the restrictions that current debt level imposes over futures fiscal policies.

The paper is organized as follows: section 1 presents the conceptual framework; section 2 shows the indicators used for analysis; section 3 analyzes the recent evolution, while section 4 presents long-term simulations. Finally, we infer the conclusions. At the end of the document we have included three appendixes: the derivation of the main equations presented in section 2 appear on Appendix 1; Appendix 2 presents simulations taking into account the model broadened to endogenously-determined spreads, while Appendix 3 analyzes the financing gap in depth.

1. Conceptual framework

Public debt dynamics is linked with the concept of solvency, which is derived from the public sector intertemporal budget constraint.[1] A Government is solvent if its debt does not grow in an explosive way. Should the solvency requirement be fulfilled, the public sector intertemporal budget constraint shall be.[2]

$$d_{t-1}=\sum_{j=0}^{\infty}\left(\frac{(1+g)(1+\rho)}{1+i}\right)^{j}s_{t+j} \qquad (1)$$

Being: d_t the non-monetary public debt at the end of period t as a proportion of GDP; i_t the nominal interest rate on public debt; g_t the growth rate of real GDP; ρ_t the growth rate of GDP deflactor; and s_t the primary surplus.

The public sector intertemporal budget constraint shows that the discounted value of future primary surpluses should equal to the initial value of public debt. By using equation (1) we can define the following concept.

1.1 Solvency

A Government is solvent in period *t* if the planned trajectory of primary surpluses from *t* to infinity fulfills the intertemporal budgetary restriction for given values of *g, i,* ρ and d_{t-1}. That is to say that the discounted value of its current and

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[1] Many authors have developed the concept of public solvency; among several relevant works, Buiter (1985) and Blanchard (1990) influenced the approach in this section.

[2] Derivation of main equations in this section is presented in Appendix 1.

future primary surpluses should be higher than or equal to the initial stock of indebtedness.

The definition of solvency is a concept *ex ante* and not *ex post*, because it refers to the planned trajectory of primary surplus. Equation (1) is an identity, and in an *ex post* sense, the public sector will always comply with its budgetary restriction, either through adjustments in its income and expenses or through modifications in its debt value.

So, a Government ability to fulfill its obligations requires not only projections of future income and outlays, but also judgments about whether such projections are social and politically feasible. Therefore, not only the ability to pay is important, but also the will to do so. Likewise, the ability to pay depends not only on the public sector but also on its interaction with the private sector, for a negative perception of the latter about the recovery of its assets would result in an increase in the financing cost for the Government, which could affect the solvency requirement.

It is then necessary to introduce a new concept that gathers such considerations.

1.2 Sustainability[3]

A Government shows a sustainable fiscal policy if it fulfills the solvency requirement without need for a significant adjustment in its planned trajectory of future income and outlays, given the financial cost that it faces in the market.[4]

On the one hand, the concept of sustainability incorporates the notion that there exist social and political limits to possible adjustments required in the fiscal policy that determine the will beyond the ability to pay the public debt.

On the other hand, the financing cost is a determinant factor of the public debt dynamics and thus of the fiscal policy sustainability. Therefore, the concept of sustainability incorporates not only the concept of solvency but also the one of the public sector liquidity.

1.3 Liquidity

It is said that a Government is in an illiquid position, regardless of whether it fulfills the solvency requirement or not, if it's liquid assets and its available financing are not enough to face its liability maturities.

Therefore, depending on the financing possibilities, one of the aspects included in the concept of sustainability will be more relevant: solvency or liquidity.

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[3] See IMF (2002) , "Assessing Sustainability".

[4] This excludes the situation in which a significant adjustment may be necessary as a consequence of a shock.

Given a situation of restrictions in the credit markets and a low level of indebtedness, the concept of liquidity will be more relevant, while solvency will be important in the case of high levels of indebtedness.

Hence, the analysis of fiscal sustainability is based on projections of policy and exogenous variables, and on judgments about social and politic feasibility of possible adjustments required. The implicit risks in such projections connect the sustainability analysis with the concept of vulnerability.

1.4 Vulnerability

It refers to the risk of violation of liquidity and/or solvency requirements in the case of changes in the macroeconomic conditions.

Debt exposure to changes in the exchange rate, interest rate, level of activity or access-to-market conditions represents a complementary approach to the analysis of sustainability. Then, we are interested in analyzing the public debt dynamics given the expected trajectory of the main macroeconomic variables, and how discretionary fiscal policy would be affected by shocks in fundamentals.

This concept is especially relevant for countries that, like Uruguay, face a high level of volatility of its main macroeconomic variables. Risks connected with volatility of real GDP growth are high, becoming explicit in the cyclical downswing.[5] Therefore, sharp changes in relative prices affect the Government's debtor position, being able to reach unsustainable levels.[6] Likewise, changes in the conditions of access to credit markets could lead to an increase in the financing costs that would trigger a liquidity crisis or the failure in the fulfillment of the solvency requirement.[7] Finally, another source of risk connected with indebtedness and fiscal position projections is related to the existence of contingent liabilities in the Public sector. These are difficult to be measured and they are generally not noticed for long periods, being made explicit when a crisis occurs. Once they are explicit, they are introduced into the debt dynamics, meaning an additional burden on the fiscal policy sustainability.[8]

The empirical application of these concepts was made through some indicators presented herein below.

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[5] Fiscal performance is endogenously deteriorated in the cyclical downswing due to its effects on income, reducing primary surpluses and hence increasing the debt-to-GDP ratio.

[6] Net Debt increases after a real exchange rate depreciation, like the one occurred in 2002 in Uruguay.

[7] An exogenous increase in the interest rate, like the one occurred in the Eighties, or the closure of access to credit in international markets at reasonable rates, like the one occurred in 2002 for Uruguay, are good examples of this point.

[8] The contingent liabilities most studied in the literature are the ones referring to the Social Security System. Another important case is implicit collaterals given by the Government to deposits in the financial system. In the Uruguayan case, the financial crisis of 2002 made this contingent liability explicit, meaning for that year 15.3 per cent of GDP of additional financing needs.

2. Indicators

The most frequently used indicator in the analysis of the debt dynamics is the public debt-to-GDP ratio. It compares debt stocks, gross or net, in a particular moment with the production flow in a 12-month period. This indicator has many advantages, and it is considered as a standard in the analysis of the debt. Nevertheless, it presents important limitations that have been addressed by the traditional indicators of fiscal solvency: primary gap and medium term tax gap.

2.1 Primary gap

A simple way of approaching the relationship between fiscal performance and debt dynamics is to propose as a target a constant debt-to-GDP ratio. Looking back to equation (1), reorganizing terms, and after a few calculations[9] we arrive to the following equation:

$$k_t = s_t^* - s_t \tag{2}$$

where s^* is defined as the primary balance necessary to keep constant the debt-to-GDP ratio. From the comparison between s^* and the effective primary balance s we can obtain the *primary gap* indicator *(k).*[10] Such indicator measures the adjustment required in the primary balance in order to stabilize the ratio in a particular level (generally the current level).

A positive sign shows the need for a fiscal adjustment in order to keep constant the debt-to-GDP ratio, while a negative sign means a comfortable fiscal position.

2.2 Medium-term tax gap

Assuming that primary expenditures *(PE)* are not flexible in the medium term, the tax burden *(T/GDP)* is the only variable left for discretionary fiscal policy.

Including in the definition of primary balance $S = T–PE,$ with similar calculations[11] we can derived the tax gap (*TG*), defined as the difference between T^* and the effective rate T. It constitutes another indicator of potential problems of

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9 See Appendix 1.

10 See Blanchard (1990).

11 See Appendix 1.

public solvency by evaluating the need for, and the magnitude of, a tax-income-based fiscal adjustment.[12]

$$TG_t = \left(\frac{T^*}{GDP}\right)_t - \left(\frac{T}{GDP}\right)_t = t^* - t \tag{3}$$

These indicators constitute the traditional approach of public sector solvency. They exclusively focus on the indebtedness level, without taking into account its composition by currency, interest rate or maturity. However, the analysis of debt composition allows us to make explicit the risks related to variations in the exchange rate, interest rate and conditions of access to capital markets, bringing us closer to the concept of vulnerability. The following set of indicators considers these issues.

2.3 Primary gap by currency

This indicator incorporates the role that the exchange rate plays in the debt dynamics, by disaggregating total debt (*d*) into domestic currency debt (d^s) and foreign currency debt ($d^* = E.d^*_{ME}$) both expressed in domestic currency. After some calculations, the extended equation can be expressed as:

$$s_t^* = \frac{\left[\alpha \cdot (i-\pi) + (1-\alpha)\cdot(i^* + \delta - \pi)\right] - g}{(1+g)(1+\pi)} d_{t-1} \tag{4}$$

$$\alpha = \frac{d^s}{d} \;\; ; \;\; (1-\alpha) = \frac{d^*}{d}$$

where i^* is the dollar interest rate and δ is the devaluation rate.

This equation allows us to identify three effects on the foreign currency debt which affect both flows and stocks:

- reference interest rate effect: the debt grows when the foreign currency reference interest rate increases;

[12] Similarly, we can develop an indicator which determines the amount of the reduction needed in primary expenditure in order to keep constant the debt/GDP ratio, especially in countries with a high tax burden, like Uruguay. Both of them determine the same value, and give an idea about the effort that must be done from the fiscal front in order to assure solvency, both from the public income and outlays points of view.

- real devaluation on interest effect: the debt also grows ceteris paribus when real devaluation is positive, that is to say, when nominal devaluation surpasses inflation;

$$\frac{\delta - \pi}{(1+g)(1+\pi)}$$

- balance sheet effect, on the debt stock, this being the quantitatively most important factor. Equation (5) explicitly shows the role of relative prices in the foreign currency debt ratio d^*:

$$d^* = E.d^*_{ME} = \left(\frac{E}{P}\right)\left(\frac{D^*_{ME}}{dgp}\right) \tag{5}$$

Discrete variation of d^* may be expressed as:

$$\Delta d^* = d^*_t - d^*_{t-1} \cong \left[(\delta - \pi) + (\varpi - g)\right] \cdot d^*_{t-1} \tag{6}$$

where $\varpi = \frac{\Delta D^*_{ME}}{D^*_{ME}}$ is the growth rate of foreign currency debt.

In equation (6) we observe that debt denominated in foreign currency grows every time that relative prices change, although the remaining factors are canceled out. This equation incorporates the notion that in economies with dollarized debt, devaluation is not neutral.

Following this idea we make sensitivity analysis of the exchange rate, determining the exchange rate vulnerability of the debt. In equations (4) and (5) we observe that a real devaluation determines higher stocks and debt service in its component denominated in foreign currency.

In the same way we can analyze the debt vulnerability to its composition by currency. Equation (4) shows that the higher the proportion of foreign currency denominated debt (1–α), the greater the effect of a real devaluation on the debt ratio. Moreover, as long as rigidities in the adjustment of relative prices exist, dynamics will also depend on the timing of the real devaluation. The smaller the devaluation-to-inflation pass through is the more permanent the effect of real devaluation and the bigger the necessary fiscal effort will be.

2.4 Primary gap by type of interest rate

This indicator incorporates the effects on public debt of changes in the international interest rate. The debt has a fraction γ committed at a fix rate:

$r_F = i^* + \delta - \pi$, which once fixed is not affected by the evolution of the reference rate.[13] The rest of the debt, which weights $(1-\gamma)$, is indexed with a reference variable rate as follows: $r_{V,t} = (i_t^* + \delta - \pi)$ where i_t^* represents the international interest rate in force in each period (generally, the *Libor* rate). The variable rate faced by the economy is the former one plus a spread θ_t, agreed in the contract of each instrument. In this way, the extended equation can be expressed as:

$$s_t^* = \frac{\left[\gamma \cdot r_F + (1-\gamma) \cdot (r_{V,t} + \theta_t)\right] - g}{(1+g)(1+\pi)} \cdot d_{t-1} \qquad (7)$$

Using this equation we can determine the debt vulnerability to changes in the interest rate. Clearly, the higher the reference rate is, the higher the debt service will be and thus, the bigger the necessary fiscal effort in terms of primary balance. On the other hand, the bigger the spread θ_t and the share of debt issued at variable rate $(1-\gamma)$ are, the wider this effect will be.

Until now we have dealt with the concept of vulnerability within the primary gap framework. That is to say, given the debt composition by currency, interest rates, etc., we estimate the reaction of the primary balance in order to stabilize the debt-to-GDP ratio. Another approach to fiscal vulnerability is presented in the following set of indicators, which try to measure the effects on the debt-to-GDP ratio produced by changes in its main determinants.

2.5 Vulnerability indicators

All indicators previously presented require projections both of macroeconomic and policy variables, and thus they are exposed to volatility risk. As a way of quantifying the existing risk in each period, we propose a set of scenarios where changes in the main debt determinants can be analyzed: economic activity *(GDP)*, international interest rate in dollars *(i*)* and real devaluation *(e–p)*, taking as reference the historical variance around its mean.

We begin from a baseline scenario where a debt-to-GDP ratio (D/GDP_B) is determined. From there on, we define two additional sets of scenarios for which the debt ratio is calculated:

- We assume that debt determinants *(GDP, i^*, e–p)* vary in the first two years of projection by plus-minus its variance $(\pm\sigma)$, returning to the baseline scenario values in the third year. We define $AD/GDP_{+\sigma}$, as the average debt-to-GDP ratio of the three years in the case in which the determinants vary by $+\sigma$, and $AD/GDP_{-\sigma}$ in the case in which they vary $-\sigma$.
- We make the same analysis but considering variations of $(\pm 2\sigma)$.

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[13] Which in the Uruguayan case are Eurobonds and Global Bonds issued abroad.

In this way we define four scenarios, determining a variation range for the debt-to-GDP ratio. The probability of each scenario will depend on the probability distribution function, which is country-specific.[14]

Then we define $\mu, \lambda, \tau, \omega, \psi$ as the variations of average debt-to-GDP ratios of the 3 following years after a shock in relation to its current value in the five scenarios.

$$\mu = \Delta\frac{D}{GDP_B} \quad ; \quad \lambda = \Delta\frac{AD}{GDP_{+\sigma}} \quad ; \quad \tau = \Delta\frac{AD}{GDP_{-\sigma}} \quad ; \quad \omega = \Delta\frac{AD}{GDP_{+2\sigma}} \quad ;$$

$$\psi = \Delta\frac{AD}{GDP_{-2\sigma}}, \quad \text{with} \quad \Delta\frac{AD}{GDP} = \left(\frac{AD}{GDP}\right)_{t-1,t+3} - \left(\frac{D}{GDP}\right)_t$$

The comparison of variations determined by $\lambda, \tau, \omega, \psi$ with the one that occurs in the baseline scenario μ gives us a measure of the debt vulnerability to changes in the macroeconomic environment. This set of indicators, which we call ε_i, is defined as follows:

$$\varepsilon_1 = \lambda - \mu = \Delta\frac{AD}{GDP_{+\sigma}} - \Delta\frac{D}{GDP_B} \quad ; \quad \varepsilon_2 = \tau - \mu = \Delta\frac{AD}{GDP_{-\sigma}} - \Delta\frac{D}{GDP_B}$$

$$\varepsilon_3 = \omega - \mu = \Delta\frac{AD}{GDP_{+2\sigma}} - \Delta\frac{D}{GDP_B} \quad ; \quad \varepsilon_4 = \psi - \mu = \Delta\frac{AD}{GDP_{-2\sigma}} - \Delta\frac{D}{GDP_B}$$

ε_1 and ε_2 measure the $\pm\sigma$ variation range of debt-to-GDP ratio related to the baseline scenario, while ε_3 and ε_4 present a bigger variation range by considering $\pm 2\sigma$. The higher the value of ε_i is, the higher the vulnerability degree.

In this way, we construct vulnerability indicators for debt-to-GDP ratio to changes in its determinants, represented in this paper by the GDP growth rate, the interest rate, and the real devaluation.

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[14] We follow the general idea presented in the IMF sustainability template, IMF (2002).

2.6 Financing gap

Indicators presented above implicitly assume that the country has a permanent access to capital markets, succeeding in being financed at every moment regardless of its debt-to-GDP ratio. Nevertheless, it is not obvious that this assumption comes true in the whole simulated trajectory. Therefore, the analysis of solvency must be completed with another kind of indicators measuring potential liquidity problems.

The concept of *financing gap* (hereinafter FG) refers to the difference between needs and sources of financing.[15] The financing needs include the fiscal performance and total public debt amortizations,[16] while sources refer to future disbursements of international loans, placements of Government securities, sale of Government assets, deficit monetization and fiscal adjustment.

By taking into account the maturity profile of the debt, this indicator is useful for the analysis of liquidity problems. The FG evaluates the credibility of debt projections, determining whether the gap between needs and sources of the public sector can be financed.

We define a new indicator ***t***, which accounts for the number of years that the current and planned trajectory of public income and expenditures can be hold, given the conditions in force in the credit market.

To sum up, we have presented a set of indicators which allow us to evaluate fiscal policy sustainability. First, we have presented traditional indicators of public solvency. Second, we worked with some extensions in order to make explicit the vulnerabilities related to the debt structure. Third, we developed debt vulnerability indicators using the historical variance rate of main determinants of public debt dynamics. Finally, we have focused on liquidity problems through the analysis of the time structure of Public debt and its possibilities of financing.[17]

These indicators have proved to be very useful for the analysis of the recent evolution of the Uruguayan public debt, as it is presented in section 3, and for the construction of long-term simulations, presented in section 4.

3. Recent evolution: 1988-2002

The evolution of gross and net public debt figures for the Uruguayan economy in the last 15 years is showed in Figure 1. This evolution was determined

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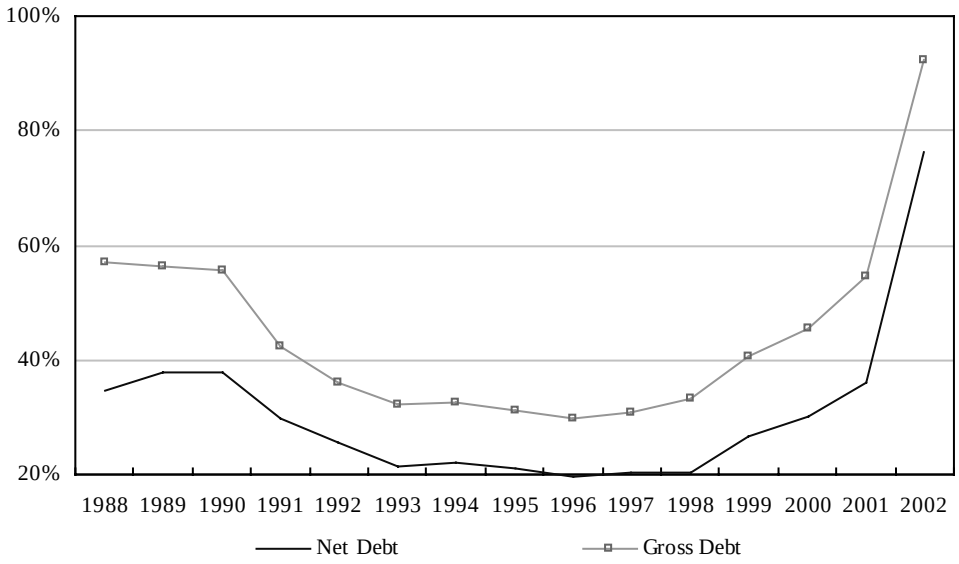
15 The development of the instruments used in this analysis was in charge of Mariana Sabates.

16 They are formed by amortizations already agreed and those that are being originated by future indebtednesses.

17 There are other indicators that could be included in order to improve the analysis of the Public debt dynamics; in this paper we will focus on the ones presented in this section. In Appendix 2 we present an additional indicator which corresponds to the Primary Gap with endogenous *spreads*.

Figure 1

Gross and Net Public Debt, 1988-2002
(percent of GDP)



by the interaction of both the policy measures, and the macroeconomic environment (Figure 2).

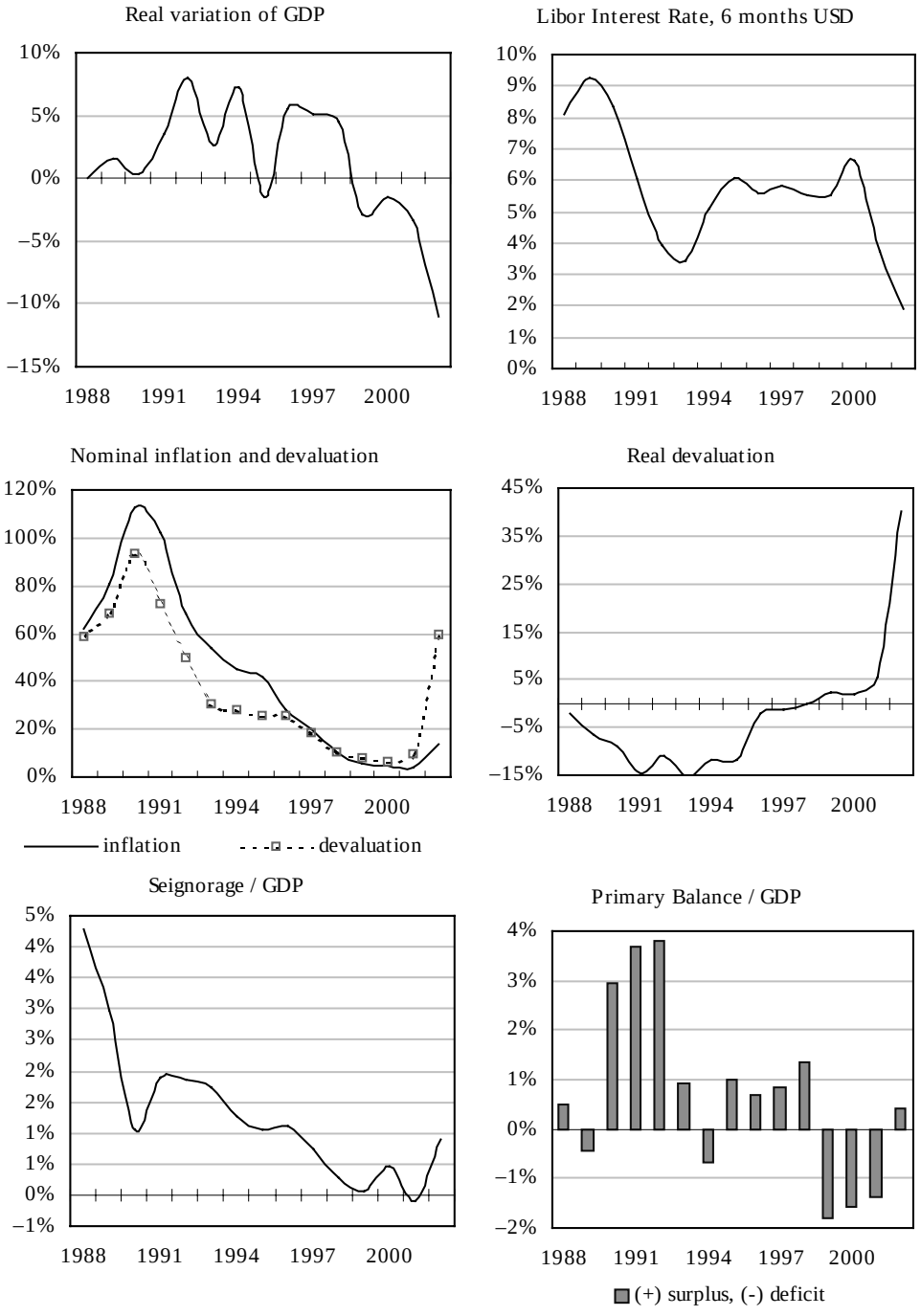
We identified four subperiods for analysis: 1988-1990, period of several debt renegotiations within a stagnation framework; 1991-1998, the return to growth with a particularly favorable combination of debt determinants; 1999-2001, a quick deterioration of macroeconomic conditions and the first warning signals of fiscal unsustainability; and 2002, when the materialization of previous risks took place.

A closer analysis of these periods will allow us to discuss the following issues:

- Which were the determinants of the public debt dynamics.
- How vulnerable was the public debt in this period.
- Which warning signals (if any) were provided by the indicators presented in section 2.
- How the Public debt sustainability and vulnerability were affected by the strategy followed by the authorities in this period.
- Which restrictions are imposed over future macroeconomic policy by the current level a structure of public debt.

Figure 2

Relevant Macroeconomic Variables
(1988-2002)



3.1 1988-90: debt restructure

Different refinancing episodes in a framework of limited growth situated the net debt-to-GDP ratio at about 40 per cent.[18] The primary balance was similar to the interest payments, while the high interest rate of the debt (close to 10 per cent in dollars) was countered by a moderate but growing real appreciation, in such a way that the change of debt-to-GDP ratio was negligible. It was in this context that a series of economic and policy changes began.

3.2 1991-98: the regional dynamism

At the beginning of the Nineties we can highlight three major economic events: the debt renegotiation in 1991, the return to economic growth, and the exchange rate-based stabilization plan, which was complemented with a fiscal adjustment.

In 1991, through the Brady plan agreement the Central Bank of Uruguay repurchased debt in the secondary market, reducing its gross stock by US$ 634 (5 per cent of GDP), and extended debt maturity by issuing new collateralized bonds.[19]

In addition to this stock reduction, the debt dynamic was favorably affected by the evolution of its determinants. On the one hand, within a framework of regional growth together with the implementation of the Mercosur free trade agreement, the Uruguayan economy returned to a sustained growth path during the whole period, which reduced endogenously the debt-to-GDP ratio.

The important capital inflow to the region, allowed the public sector to have broad access to international capital markets. In this context, the country achieved in 1997 the *"Investment Grade"*. The spread of gross public debt went from about 300 bp to about 50 bp in the second half of the decade. In addition, taking into account the low levels for the reference Libor rate, which stabilized at about 5.5 per cent at the end of the period, it is clear that the financing cost for Uruguay had substantially improved in relation to the previous decade.

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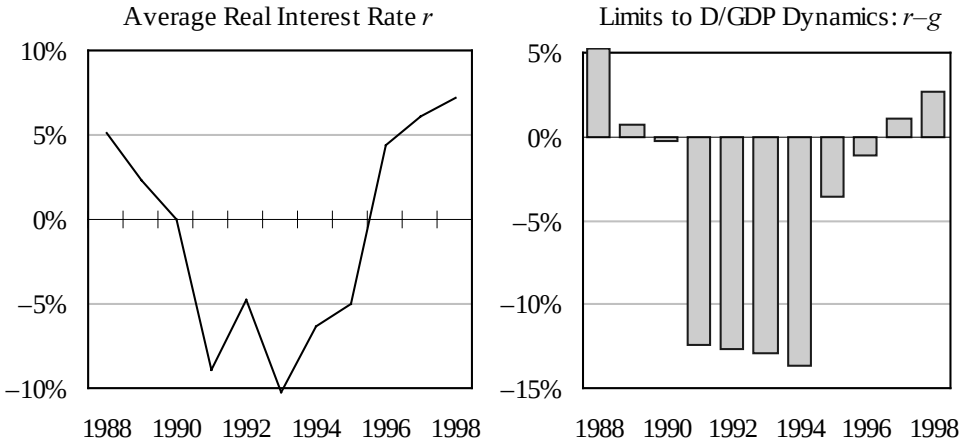
[18] After the 1982 crisis, Uruguay renegotiated its foreign debt in years 1983, 1986 and 1988, ending in a global refinancing in 1991, within the framework of the Brady plan.

[19] Through an agreement signed in January 1991, Uruguay renegotiated part of its debt for a total amount of US$ 1,609. It did so through debt repurchase at a market value of 56 per cent for US$ 634 and issuance of Brady Bonds in dollars and pounds, with maturities in 2007 and 2021, for a total amount of about US$ 1,060, depending on the sterling pound arbitrage. As main guarantee, Uruguay purchased a *zero coupon bond* from the USA at an effective value of about US$ 50 and a nominal value of US$ 530, which was deposited with the Federal Reserve Bank of New York. As the Gross Debt and assets decreased effects on the Net Debt did not exist. A detailed analysis of the modality and the effects of this refinancing go beyond the aims of this paper.

Figure 3

Real Interest Rate and Budget Constraint



At the beginning of the Nineties a new exchange rate-based stabilization plan begun, having important consequences on several determinants of the debt dynamics: real exchange rate appreciation, and fiscal performance.[20]

The real appreciation, which in the period 1990-1995 was 12 per cent average per year, determined two favorable effects on the debt. First, the strength of the currency together with a high dollarization degree accounts for an endogenous reduction of the debt-to-GDP ratio through the balance sheet effect. Second, both the evolution of the Libor rate and the spreads, and the real appreciation resulted in a negative real interest rate between 1990 and 1995, as it is illustrated in Figure 3.

Moreover, the reasons for the improvement in the fiscal position observed in this period are twofold. The consumption boom occurred in the first stage of the stabilization plan explains the endogenous expansion in tax collection. In addition, important fiscal adjustment measures were taken at the beginning of the Nineties.[21]

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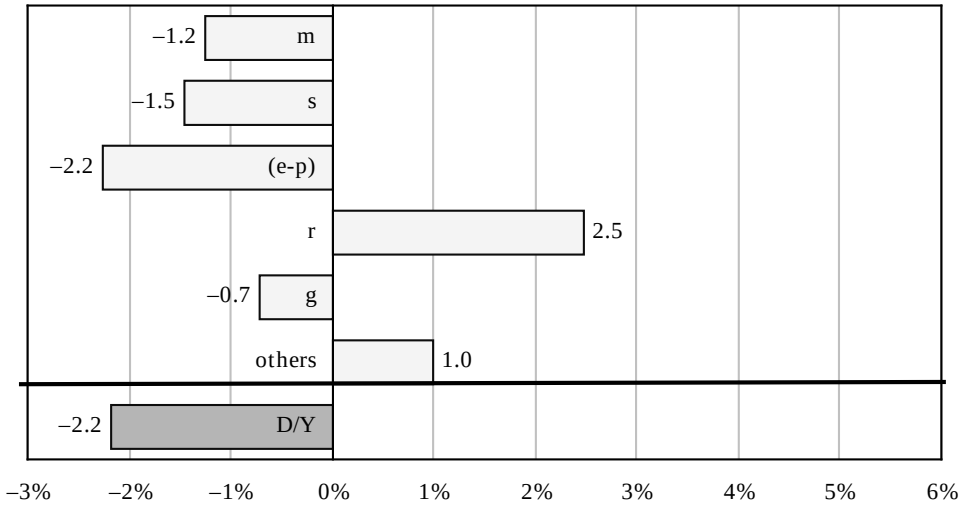
[20] Real appreciation (devaluation) is here understood as the difference between nominal appreciation (devaluation) and domestic inflation, without taking into account the evolution of international inflation. In other words, it is the inverse of prices in dollars. This is the relevant concept in the analysis of debt, determining levels, through assets and liabilities valuation in domestic currency; and flows, through its influence on the real interest rate.

[21] The fiscal adjustment, set on law 16.107 of March 3, 1990, was based on an increase in tax rates and baselines of main taxes. The most important measures were: increase in the VAT baseline rate from 21 to 22 per cent, increase for one year in the rent tax rates (*IRIC*, *IRA* and *IMAGRO)* from 30 to 40 per cent, increase in some tax rates on goods and services (*IMESI* and *IMABA)* (the applicable rate went from 0.75 per cent to the legal maximum, 1.75 per cent). On the other hand, there was an increase in labor tax rates (*IRP)*, both of the employer (from 1 to 4.5 per cent) and employee (maximum rates went from 2 to 7.5 per cent), together with a diversification in bands.

Figure 4

Marginal Debt Components, 1991-98

(percent of GDP)



As we can see in Figure 4 and Table 1, all debt to GDP determinants have acted favorably, accounting for a reduction in the debt ratio of 2.2 points of GDP for 1991-1998 on average.[22] The real appreciation was the most relevant factor that explained the decrease of the debt level, followed by the primary balance and seignorage. Economic growth reduced the debt-to-GDP ratio by almost 1 point on average, while the interest payments showed an average expansionary effect of 2.5 points of GDP.

These results, together with the traditional solvency indicators showed in Table 2, would lead us to the conclusion of a comfortable fiscal position for this period.[23]

Moreover, the analysis of the financing gap shows that due to the favorable conditions in the capital markets, between 1995 and 1998 Uruguay's gross issuances were enough to allow the rollover of previous debt, finance the fiscal deficit, and accumulate reserve assets (Figure 5).

Under these conditions, the public sector met the solvency requirement. As it has been mentioned, this is a necessary but not a sufficient requirement for

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[22] The contribution of a factor x to the dynamics of the relation $d = D/Y$ is given by xd; this is what is shown in Figure 5. A positive (negative) value indicates that it contributes to increase (decrease) the marginal debt.

[23] A negative Primary Gap shows that the effective primary balance was consistently above the necessary one to stabilize the debt-to-GDP ratio. Similar results are observed with the medium term gap.

Table 1

Determinants of Δ(*D/Y*) (Net Debt)
(percent)

	1991-1998 average	1999-2001 average	2002
Marginal debt	**–2.2**	**5.1**	**29.3**
Variation of GDP: *g*	–0.7	0.7	3.8
Interests: *r*	2.5	2.6	4.5
Real devaluation: *e* – *p* (1)	–2.2	0.9	15.9
Primary balance: *s*	–1.5	1.6	–0.4
Seignorage: *m*	–1.2	–0.1	–0.9
Others [24]	1.0	–0.9	6.5

(1) (+) devaluation (–) appreciation.

Table 2

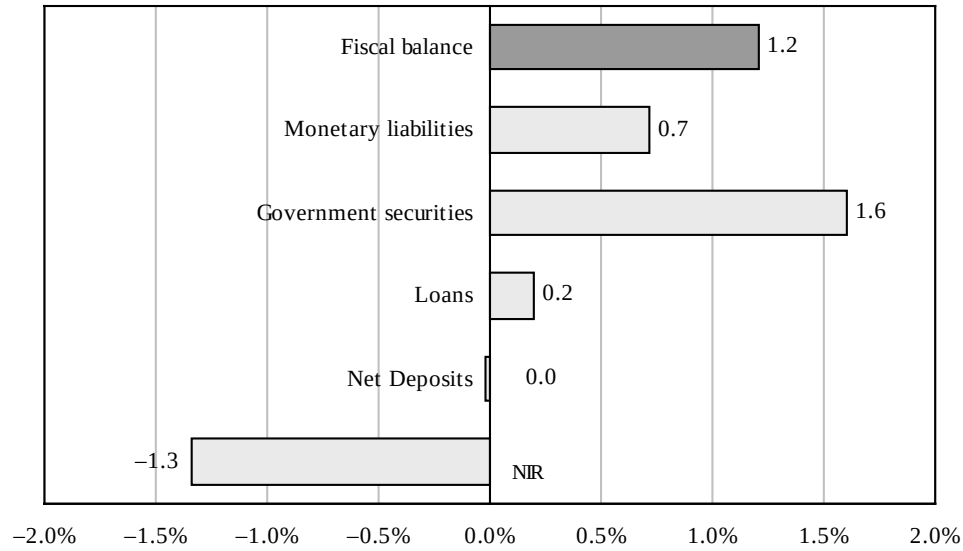
Solvency Indicators
(percent of GDP)

	1991-1998 average	1999-2001 average	2002
Gross Public debt	33.6	47.0	92.4
Net Public debt	22.5	30.9	65.3
Primary Gap *s** – *s*	–4.5	6.4	22.8
Medium-term tax gap *t** – *t*	–3.1	4.2	21.1

[24] This residual aroused from methodological adjustments made within the framework of reconciliation of flows of financing with debt stocks, in the spirit of the new IMF manual on Government Finance (2001). These differences mainly aroused by different valuation criteria between both statistics (exchange rates, arbitrages, valuation of Government Securities) and by differences in volume of net assets (adjustments in stocks). Readers interested in studying these criteria in depth can consult the BCU's website and access to the new methodology of debt and financing (November 2001 version) elaborated by the Fiscal Analysis Department of the BCU's Economic Policy Division.

Figure 5

Sources of Financing, Average 1995-98
(percent of GDP)



sustainability. The private sector should expect that the public sector meets its solvency restriction, without making major corrections in income and expenditure programs. These subjective requirements may be approached through the values of the Uruguayan debt in the secondary market, or through the country risk, measured by the *spreads* of sovereign debt. In this regard, 2027 Bond quoted with a *spread* between 200 and 300 bp for the years 1997 and 1998, which was a very low level in the context of emerging markets.[25] This illustrates favorable expectations from the private sector about the Uruguayan Government's capacity and will to pay, confirming the idea that the Uruguayan fiscal policy was sustainable.

To sum up, during this period where debt-to-GDP ratio adjusted very slowly and was kept at relatively low levels, none of the traditional indicators showed warning signals of possible sustainability problems.

Nevertheless, towards the end of this period this strategy began to nest the snake's egg. On the one hand, the structure of debt increased its concentration in Government securities, most of them denominated in foreign currency.[26]

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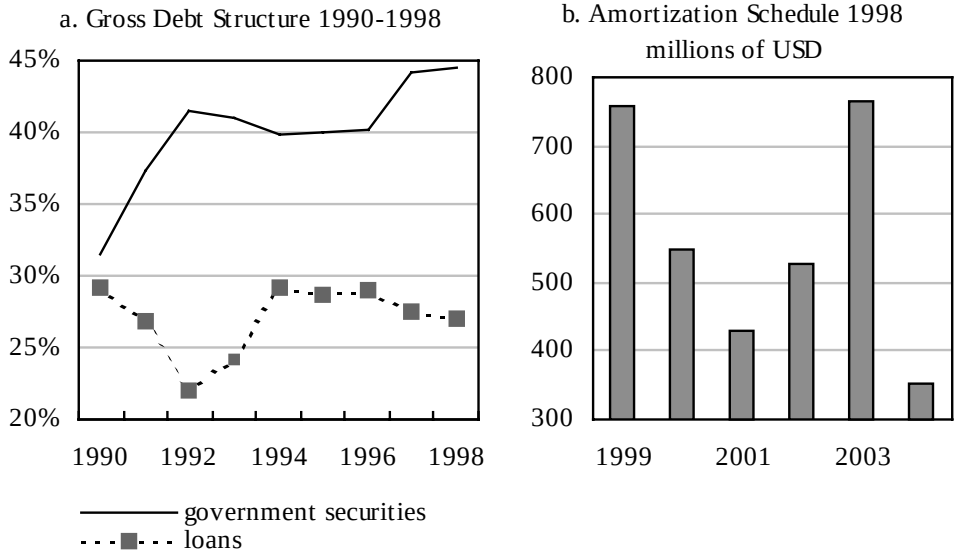
[25] The average *spread* for 1998 was of 253 bp, while the one of other emerging economies which issued at similar terms was of 562 bp for Mexico, 603 for Argentina, 893 for Brazil, and 1,052 for Venezuela.

[26] In addition to the 2027 Bond mentioned above, Uruguay made another 6 issuances in international capital markets since 1994 up to the end of this period, all of them in foreign currency (US Dollar, Deutsche marks and Yens), each one between US$ 100 and US$ 300, with maturities between 5 and 10 years.

Figure 6

Instrument and Maturity Debt Structure



On the other hand, this happened together with a maturity concentration in the year 2003. Therefore, this indebtedness strategy, although it had not consequences on the debt level, increased its vulnerability in terms of time structure and exchange rate.

3.3 1999-2001: The quick deterioration

This period was characterized by the deterioration of the macroeconomic environment. Economic recession promoted the deterioration of the endogenous-determined fiscal balance, while Uruguayan competitiveness was negatively shocked by the devaluation of the Brazilian currency in January 1999, and later by the Argentinean recession.

The economy experienced a recessive adjustment with low interest and devaluation rates. No significant changes in relative prices took place in this period, and the average interest rate was stabilized at low levels.

Fiscal deficit increased during these years, reaching 4 per cent of GDP on average (Table 3). The drop in tax collection under the influence of the economic downturn, and the rigidity of the primary expenditures accounted for this evolution.

Table 3

Selected Macro Indicators, 1999-2001

Data in variation rates	**1999**	**2000**	**2001**
Δ real GDP	–2.8%	–1.4%	–3.4%
Inflation	5.7%	4.8%	4.4%
Devaluation	8.3%	6.8%	10.0%
Libor rate (USD)	5.5%	6.6%	3.7%
Debt average interest rate (USD)	5.6%	6.0%	6.2%
Data in percent of GDP			
Consolidated fiscal balance (1)	–4.0%	–4.1%	–4.3%
Interest payments	2.2%	2.5%	2.9%
Primary balance	–1.8%	–1.6%	–1.4%
Primary public expenditure (2)	31.2%	30.7%	30.8%
Gross public debt	40.8%	45.5%	54.7%
Public Assets	–14.0%	–15.5%	–18.7%
Net public debt	26.7%	30.0%	35.9%

(1) (+) surplus, (–) deficit.
(2) Non-Financial Public sector.

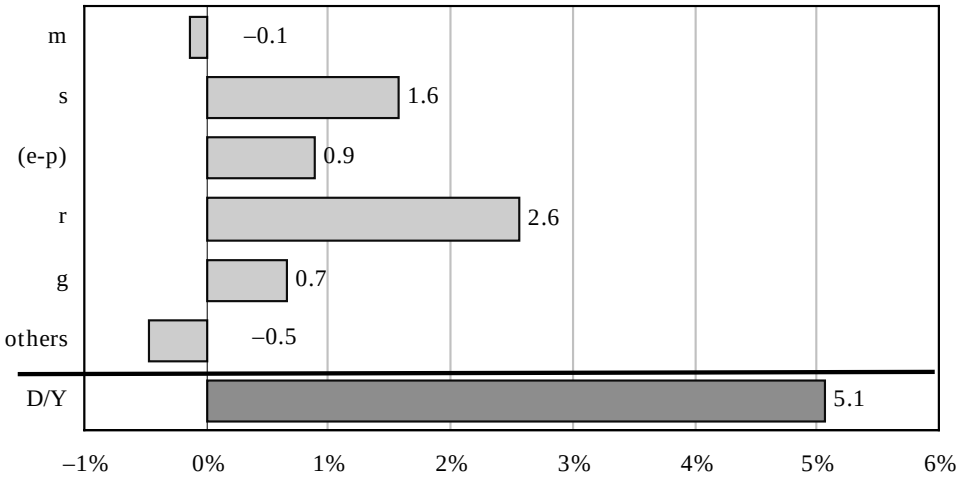
In spite of the increase in the fiscal imbalance, access to capital markets remained unchanged. Then, the financing of the deficit pushed the debt-to-GDP ratio up to 55 points of GDP in 2001 in gross terms.

Although debt levels were similar to those observed at the beginning of the Nineties, the increase by 22 points of GDP in gross terms (15 points in net terms) relative to 1998, raised questions of concern. In Figure 7 and Table 1 we can see that, contrary to what happened in previous years when all debt determinants helped to reduce the debt-to-GDP ratio, from 1999 onwards they contributed to its expansion.

Recession and real devaluation, though moderates, became expansive factors added to the permanent pressure of interests, leading to a significant deterioration of the primary balance together with an increase in debt-to-GDP ratio. This situation undermined private sector confidence.

Figure 7

Marginal Debt Components, 1999-2001
(percent of GDP)



Some indicators started to show warning signals, as it is clear from Table 2. It happened so with the primary gap: it turned up to a positive value of 6.4 per cent of GDP on average, showing the magnitude of the adjustment needed to keep constant the debt-to-GDP ratio relative to the previous year. The feasibility of an adjustment of such magnitude was very low, taking into account both the tax burden level (31 per cent of GDP, one of the highest in America Latina), and the rigidity of expenditures, at least in the context of low inflation rates and price stability.[27]

Furthermore, given the economic recession, a fiscal adjustment would be procyclical and therefore would not necessarily ensure an improvement in the fiscal position or in the debt dynamics.

In addition, even though these were soundness signals to the markets, the new issuances increased the share of foreign currency-denominated debt that reached 98 per cent of total debt in this period, and concentrated maturities between 2003 and 2006.[28]

After three years of recession the financing of a persistent fiscal imbalance with an increasingly high level of indebtedness left the Uruguayan Government in a

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[27] In the short term public expenditure can only be reduced significatively through its liquefaction promoted by a strong and non-anticipated inflation increase, reducing public wages and social benefits in real terms, which represent 2/3 of primary expenditure.

[28] The resulting structure at the end of 2001 showed that the Uruguayan Public sector should serve debt for US$ 1,746 in 2003 and for amounts slightly higher than US$ 1,000 in each year of the period 2004-2006.

very vulnerable position. The risks related to the volatility of the main debt determinants, and to changes in the conditions of access to credit markets became more evident after Argentina abandoned the *Convertibility Plan* in December 2001.

Nevertheless, no clear signals of lack of confidence from the private sector could be recognized, since the Uruguayan economy continued to access the international markets at relatively comfortable rates, as shown in Table 4.

Within this framework, the debt strategy followed by the authorities was to increase the level of indebtedness beyond the needs of fiscal financing in order to accumulate foreign assets. In doing so, they deepen the previous debt structure and therefore increased debt vulnerability.

3.4 Latent vulnerability in the Nineties

The vulnerability to changes in the macroeconomic environment can be explicitly addressed by the use of the indicators εi developed in section 2. From Table 5 we can conclude that relative prices ($e–p$) and economic growth g are the variables that show higher volatility ratios:

$$cv = \frac{\mu^2}{\mu^2 + \sigma^2}$$

The main statistics of the determinants of public debt are summarized in Table 6.

Based on actual debt-to-GDP ratios in four different moments of the Nineties, we simulated the impact effects on such ratios caused by shocks in each of the main debt determinants (output growth, real devaluation and interest rates).[29]

Table 4

Uruguayan Bonds Spreads
(Basis points, annual average)

	1998	**1999**	**2000**	**2001**
2027 Bond	253	225	266	316
2010 Bond	-	-	286	276
2009 Bond	-	205	250	267

[29] Note that the simulated shock lasts for two years, returning to its mean values in the third year.

Table 5

Volatility Ratios
(1974-2003)

Variable	*e–p*	*g*	*p*	*e*	*i**
CV	0.01	0.09	0.55	0.66	0.81

Table 6

Main Statistics
(1974-2003)

	g	*e–p*	*i**
Mean $\overline{X}$	1.6%	–2%	7.5
Standard deviation σ	5.1%	18%	3.6
$\overline{X}+\sigma$	6.7%	17%	11.1
$\overline{X}-\sigma$	–3.5%	–20%	3.8
$\overline{X}+2\sigma$	11.8%	34%	14.7
$\overline{X}-2\sigma$	–8.6%	–38%	0.3

We can see in Figure 8 that a negative shock on output growth of two standard deviations during two years (which means a real drop of 8.6 per cent per year) would determine an increase of less than 5 point on the debt-to-GDP ratio. In the case of changes in the interest rate, the results are similar: a negative shock of two standard deviations (which would mean a Libor rate close to 15 per cent) would increase the debt-to-GDP ratio between 2 and 4 points, depending on the moment chosen to simulate the shock. We can conclude that debt vulnerability to changes in output growth and interest rate is relatively low.

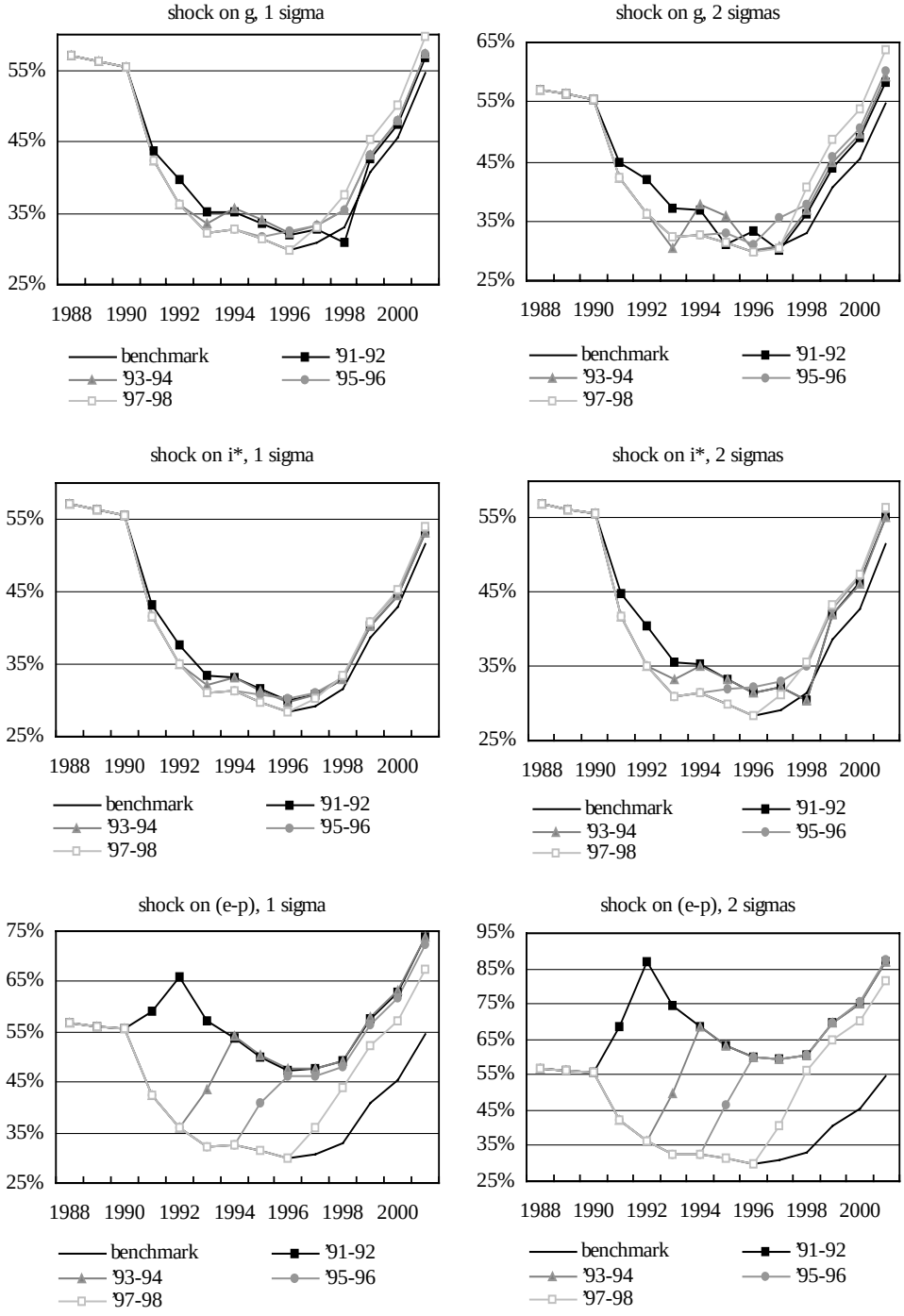
Finally we present the vulnerability to changes in relative prices. We found that in the case of a shock of 2σ (34 per cent real devaluation for two years)[30] the average increase in debt-to-GDP ratio would be of 35 points. These figures make explicit the debt vulnerability to changes in relative prices in the whole decade.

---

[30] Real devaluation of 2 σ for 2 years accumulates 80 per cent, a similar figure to the one experienced in the period 1982-1983. On the other hand, in 2002-2003 it reached 60 per cent. The effects on the debt in these historical events follow the line of the ones we found here; in particular, in 2002 the real devaluation effect was 24 per cent of GDP.

Figure 8

D/GDP Evolution after a Shock on *g*, *i, (*e*–*p*)**



3.5 2002: Materialization of latent risks

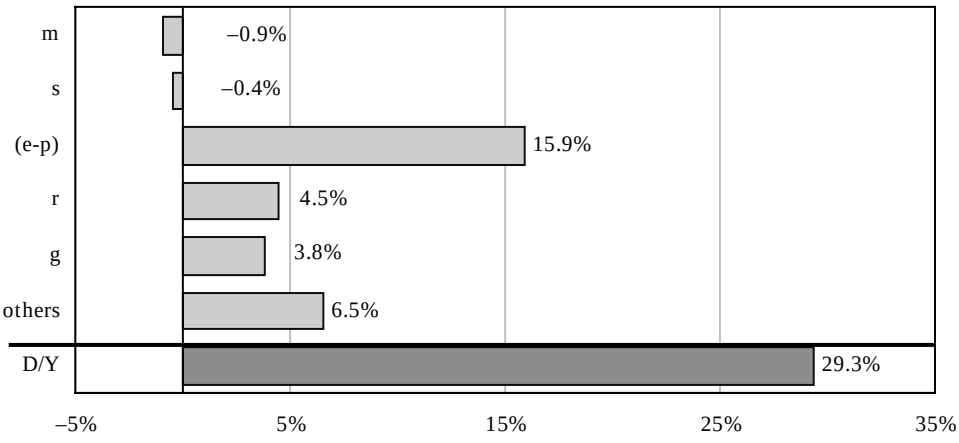
The private sector perception of Uruguayan fiscal sustainability quickly deteriorated during the first months of 2002, after a new round of negative regional shocks. The economic activity dropped for the fourth consecutive year, this time by 11 per cent in real terms. The nominal exchange rate devaluation that followed the announcement on June, 20 of the free floating regime caused a significant distortion in relative prices: real devaluation reached 40 per cent on average for 2002.

In spite of the strong measures both in public income and expenditures, the fiscal position remained unchanged, with a deficit of 4 per cent of GDP.[31]

In this framework, public debt increased almost 30 points of GDP; first, as a result of the adverse evolution of all its determinants, second, due to the outcome of the banking crisis. This dramatic increase in just one year is mainly explained by the real devaluation, which represented 16 points of the total, the drop in the economic activity, which explains almost 4 points, and interest payments, that explains close to 5 points (Figure 9). We can conclude that a real devaluation is not neutral it increases the debt burden together with the probability of fiscal insolvency.

Figure 9

Marginal Debt Components, 2002



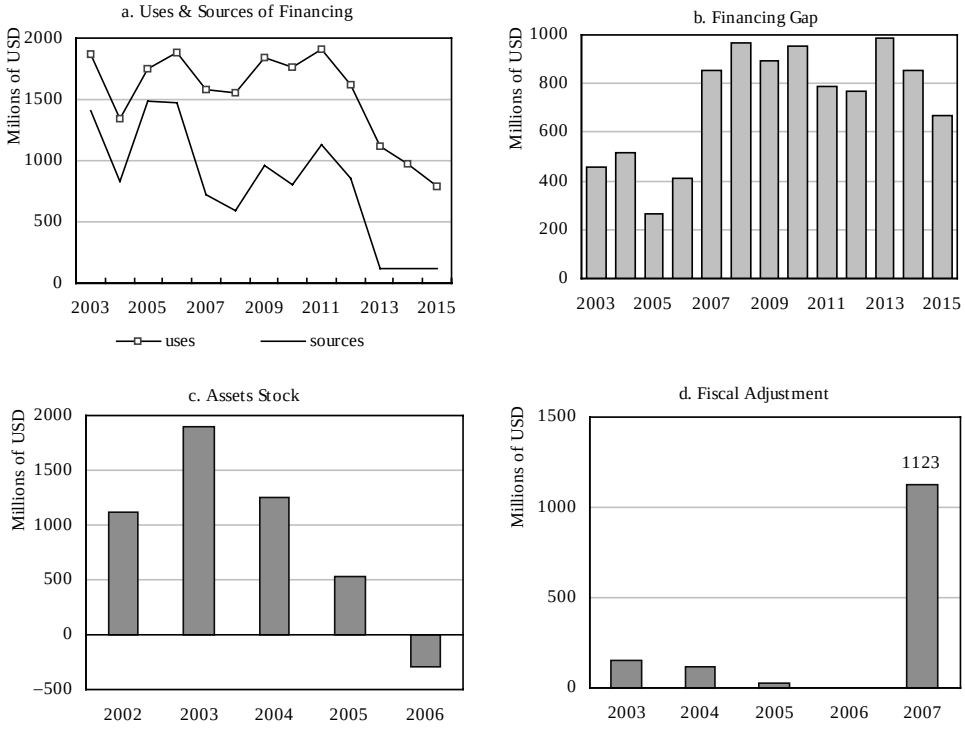
[31] The main tax measure adopted was the multiplication of bands and the broadening of labor tax rates (IRP). Law 17.453 of the Februaty 28, 2002 extends the upper ancient band to 5 bands, while creating differential additional rates between public and private workers up to a maximum of 16 per cent (previously, the maximum rate was 9 per cent). IRP regulations will suffer a new amendment through law 17.502 of the May 31, 2002, creating new bands and taking the maximum rates up to 20 per cent.

In Table 2 we see that all traditional indicators deteriorate even further, reinforcing the perception of unsustainability. Within this framework, the country lost the "*Investment Grade"* and later the access to international credit markets.[32]

By the end of 2002, loans from multilateral agencies: IMF, IDB and IBRD were the only source of financing left to the Uruguayan Government. The financing gap was closed by sales of reserve assets and new adjustments to the primary balance. Given the stock of reserve assets, the fiscal position and the debt payments schedule, a simulation exercise showed that the public sector would have become insolvent by no longer than 2006 (Figure 10).[33] [34]

Figure 10

The Financing Gap



[32] The *spread* of 2027 Bond averaged in 2002 1,009 bp, while the ones corresponding to 2009 and 2010 Bonds rose to 1,314 and 1,334 bp respectively. These averages took in a growing evolution in the year; maximum values were reached in October, being 1,617, 2,017 and 2,110 bp respectively.

[33] Conceptually there exists another alternative to close the gap, which is the *seignorage*; nevertheless this analysis did not take it into account given its quantitatively low relevance.

[34] Assumptions for simulation as well as a detailed analysis of the different alternatives for closing the gap are presented on Annex 3.

Few policy options were left to the authorities: whether income or expenditure programs were changed (fiscal adjustment), or higher seignorage was collected through higher inflation (deficit monetization), or changes to the value of the debt were negotiated (write off, maturity extensions, etc.). Any of these options implied the unsustainability of the public sector and would impose severe restrictions to future macroeconomic policies. Finally, a new debt renegotiation was carried out in May 2003.[35]

4. Long-term simulations

Based on effective data as of December 2002, previous to the debt restructure of May 2003, we analyzed the sustainability of the fiscal policy through simulations of the public debt dynamics. The analysis covers up to 2015, when all exogenous variables are supposed to reach their long term values.

We present three scenarios with different assumptions:

- A **baseline scenario,** which incorporates the short term official projections included in the renegotiation with the IMF at the beginning of 2002. Then it assumes the most probable transition to the long term values of its fundamentals. It is considered as an inertial scenario because it shows the results that would have been obtained if no further measures were taken place. As a way of eliminating the restrictive assumption of independence between fiscal performance and interest rate, these simulations are extended to an endogenous spreads scenario. Even though it enriches the analysis and relies on a more solid theoretical baseline, main conclusions are not substantially changed; therefore its analysis is derived to Appendix 2.
- A **primary adjustment scenario**, which includes corrective measures in the primary balance as a way of stabilizing the debt-to-GDP ratio. It shows the kind of measures included in the letter of intent signed by the Government and the IMF in 2003.[36]
- A **debt restructure scenario**, which analyzes the policy measures undertaken in May 2003.

Finally we present a debt vulnerability analysis to changes in its main determinants: economic activity, interest rate, and real devaluation.

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[35] Public debt rescheduling determined the constitution of 3 big bonds, called *benchmark Bonds*: 2011 Bond for US$ 500, and 2015 and 2033 Bonds for some US$ 1,060 each.

[36] The first agreement was signed on the 24th February, being revised on the 27th of June. Both are available on the BCU's website (www.bcu.gub.uy).

Table 7

Main Assumptions(1)

	2002	2003	2004	2005	2006	> 2006
Δ real GDP	–11.0%	–1.0%	3.9%	3.3%	2.5%	2.5%
Average inflation	14.0%	20.0%	11.5%	7.6%	6.0%	3.0%
Average devaluation	59.6%	40.3%	10.0%	6.2%	2.0%	1.0%
Δ prices in US$	–28.6%	–14.5%	1.4%	1.3%	3.9%	2.0%
Libor interest rate (USD)	1.9%	1.3%	2.2%	3.4%	4.2%	growing slowly
Primary fiscal surplus	0.0%	1.7%	2.3%	3.0%	3.6%	growing slowly

(1) Actual values for 2002.

4.1 The baseline scenario

This scenario incorporates official projections included in the negotiations with the IMF at the beginning of 2003. Table 7 shows the main assumptions used in the simulation analysis.

After a moderate contraction in real terms projected for 2003, we assumed that economic activity slowly recovers, reaching in 2006 its long term trend of 2.5 annual real growth. Prices in US$ keep falling up to 2003, when they start to recover to finally get to its last-twenty-years average level. The reference interest rate, 1.3 per cent for 2003, increases slowly and stabilizes at 6.5 per cent at the end of the period, close to its historical mean.[37]

No discretionary measures where included in the projection of the primary balance in this stage. While the components of the discretionary fiscal balance were assumed constant at their average levels of the last twenty years, the endogenous-determined deficit is mainly explained by the dynamics of the social security system.[38]

Further assumptions used in the simulation are related to the evolution of public assets derived from the financial assistance during the banking crisis in 2002, as well as to the liabilities structure by currency, interest rate and type of instrument. We assumed that total financial assistance, which represented about 11 per cent of GDP in 2002, will not be recovered. Therefore we assumed that it will reduce the

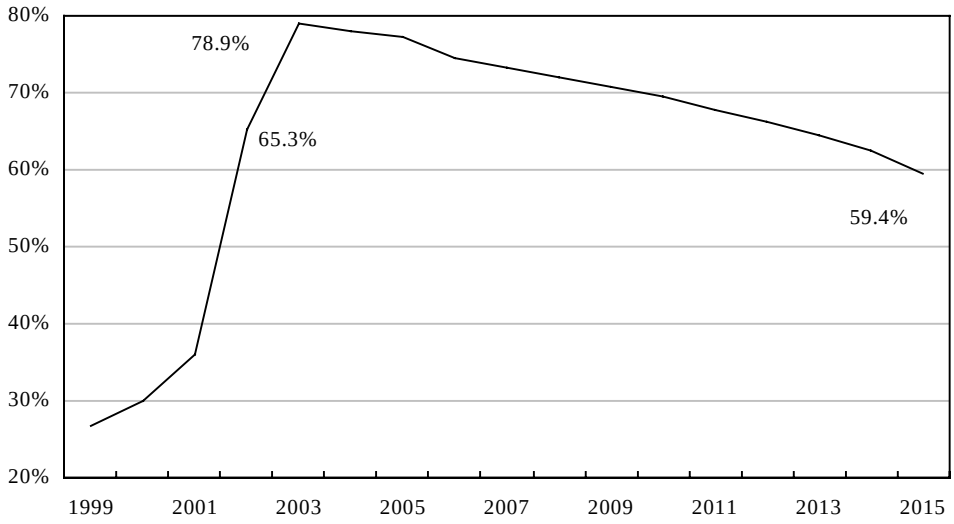
---

[37] We assumed that the average flat rate remains fixed on its current level of 6.2 per cent in dollars terms. Average floating rate was projected by forward rate plus a constant spread on 270 bp.

[38] The analysis of these dynamics is explained on Masoller and Rial (1997).

Figure 11

Net Public Debt/GDP, 1999-2015



level of public assets by 1 per cent of GDP per year. Finally, the structure of public liabilities by currency, interest rate and instrument was kept constant at 2002 values.[39]

Recession, real devaluation and small primary surpluses make the worst combination for 2002-2003, explaining the sharp increase in public net debt (Figure 11). From 2004 onwards, macroeconomic conditions (economic activity, inflation and devaluation) improve, leading to a gradual reduction of the debt-to-GDP ratio, even though it stabilizes at very high levels.

The analysis of the contribution to this debt dynamics shows that the sharp increase in 2002-2003 is mainly determined by the strong adjustment in relative prices *(e–p)* given the high share of foreign currency in debt composition (Figure 12).

Real growth *(g)* accounts for similar effects: in the short term recession contributes significantly to increase the debt-to-GDP ratio; then it looses relevance when it takes up its trend values. In contrast, interest payments *(r)* show an opposite evolution, preventing the debt-to-GDP ratio to converge to lower levels. The evolution of the primary balance is endogenously derived from the dynamics of the

[39] More specifically, published data corresponding to December 2002 show that foreign currency-denominated debt is 96 per cent of the whole amount, while the debt at flat rate is 53 per cent of the total, while at floating rate is the remaining 47 per cent. Finally, structure by instrument is formed by Government Securities (51 per cent), loans (44 per cent) and net deposits (5 per cent).

Figure 12

Debt/GDP Dynamics: Components, 1999-2015

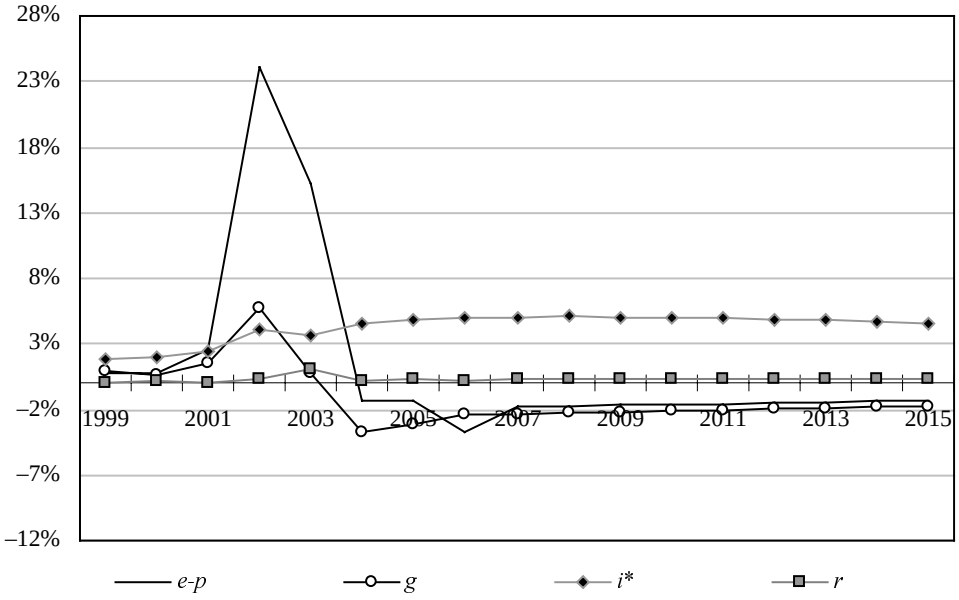
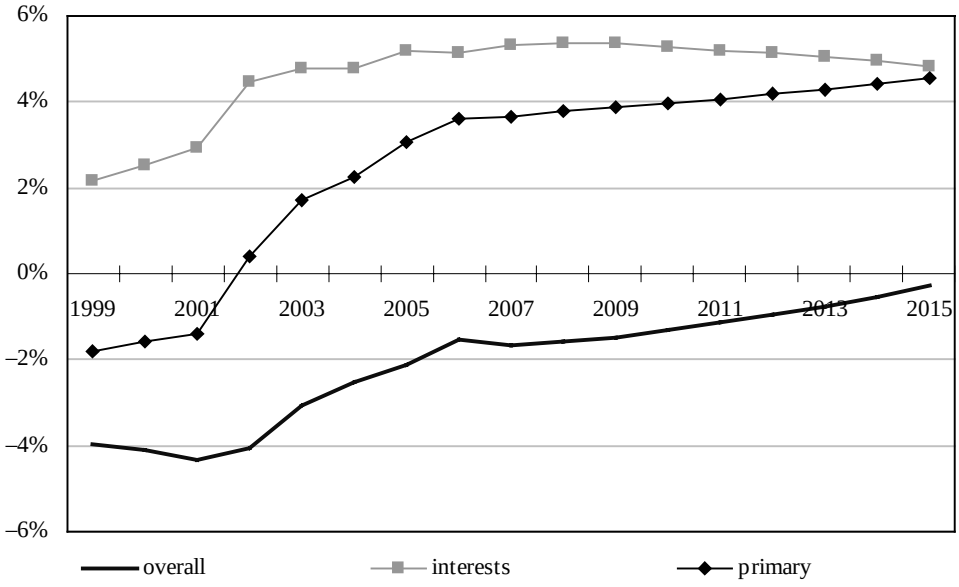


Figure 13

Fiscal Balance/GDP, 1999-2015



social security system. This determines a growing primary surplus just enough to compensate the interest burden (Figure 13).

Even though technically this scenario does not show an explosive public debt behavior, and no absolute or relative benchmark exist for debt-to-GDP ratio, stability at high levels for such a long period would probably deteriorate the conditions of access to capital markets. Therefore, it would be considered an unsustainable path. Consequently, corrections to previous dynamics began to be suggested. The first option proposed was a fiscal adjustment that would result in higher primary surpluses reducing the debt level. Second, the solvency problems could be approached through a change in the maturity of outstanding debt. Some measures in these directions were actually taken by the authorities in 2003, which are presented below.

4.2 Changes in dynamics: primary adjustment

We considered the simplest case of improving the primary balance by a fixed amount *k* each year. This parameter *k* is set to 1 and 2 per cent of GDP. Table 8 presents the evolution of the primary balance for selected years, while Figure 14 shows the evolution of the debt-to-GDP ratio in each simulation.

An adjustment in the primary balance, either by higher revenues or lower expenditures, of 1 per cent of GDP each year, generates a "pleasant arithmetic" in the dynamics of the debt. However, not significant changes can be seen in the short run; by 2010 the debt would still be higher than 60 per cent of GDP. Therefore, it is not until the end of the period that we can observe significant results.

We can say that in order to achieve a quicker convergence to lower debt levels, it is required a permanent fiscal adjustment of at least 2 points of GDP. The

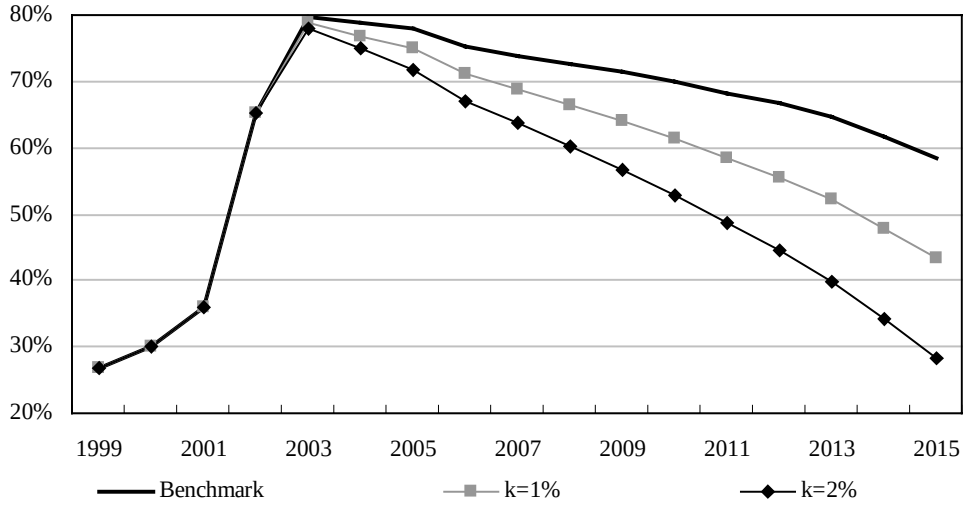
Table 8

Primary Balance for Alternative Scenarios of Fiscal Adjustment *k*
(percent of GDP)

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2015**
Baseline	1.7%	2.3%	3.0%	3.6%	3.6%	3.8%	3.9%	4.5%
K=1%	2.7%	3.3%	4.0%	4.6%	4.6%	4.8%	4.9%	5.5%
K=2%	3.7%	4.3%	5.0%	5.6%	5.6%	5.8%	5.9%	6.5%
***Memo*: IMF agreement**	3.2%	3.3%	3.3%	3.5%	3.7%	3.9%	4.0%	4.0%

Figure 14

Fiscal Adjustment and Net Debt, 1999-2015



agreement signed by the authorities with the IMF, where the government committed to achieve a primary surplus of 4 per cent of GDP in the medium term, took into account similar considerations.

These results raise attention towards the restrictions that current level of public debt imposes over future policies, as well as the feasibility of the adjustment required to overrun this situation.

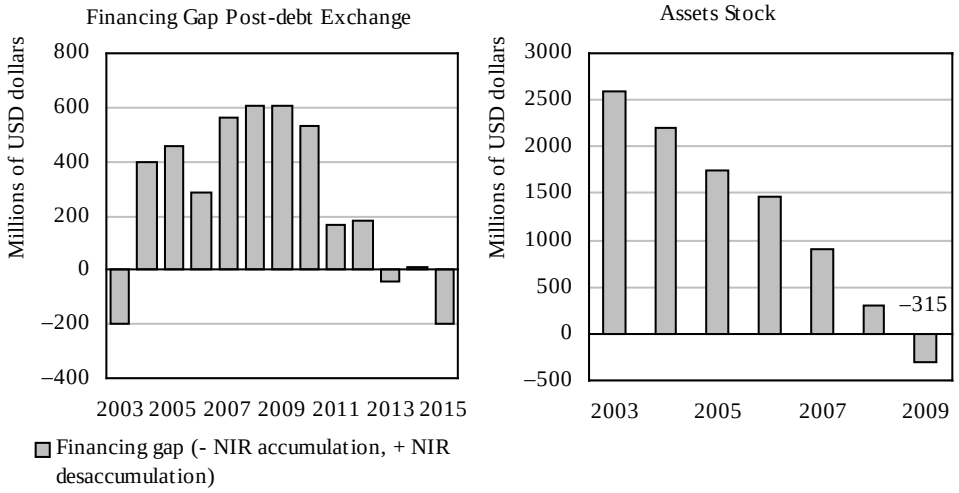
On the one hand, Uruguay has already a very high tax burden, so future adjustments will have to be done through contractions in expenditures. This is in contradiction with the increase in social demands that will likely appear in the next political cycle. On the other hand, even with a contractionary fiscal policy, debt level will continue to be high in the short run. Therefore the fiscal adjustment is considered as a first step towards a major solution that would be a time restructure of public debt. That was made effective in May 2003, and is presented in the next section.

4.3 Changes in financing gap: time restructure

As a way of overcoming the liquidity restriction, in May 2003 the Uruguayan government went through a major public debt exchange. The total amount of the exchange involved some US$ 5.000 in Government securities whose maturity was

Figure 15

Post-exchange Financial Gap



extended by 5 years on average.[40] The debt exchange was considered to be very successful with an acceptance ratio of 93 per cent.[41]

By loosening the short term financial restrictions, the debt exchange determined a less vulnerable fiscal position. Figure 15 shows that by 2008, previous to the debt exchange, the financing gap would have reach US$ 1.000, decreasing to US$ 600 after it took place. Nevertheless, interest payments are higher than in the baseline scenario, and the dynamics of debt-to-GDP ratio has not been significantly changed. The financing gap would have collapsed sometime around 2009 when public assets were exhausted or the required fiscal adjustment reached 2.3 per cent of GDP.

Therefore, in order to not only postpone financial problems, the debt exchange should be accompanied by a restrictive fiscal policy.

The sustainability requirement is linked not only with the restructure of the debt service but also with the achievement and maintenance of a primary surplus higher than the endogenous one. The debt reprofile is useful to the extent it allows to make the necessary structural adjustments to change debt dynamics. Therefore, in order to return to a sustainable path both measures must be combined, which is analyzed next.

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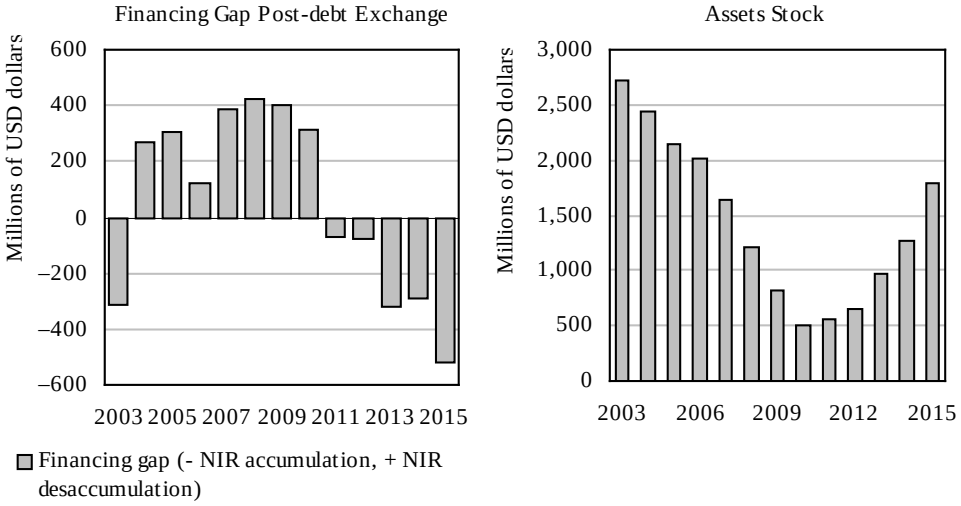
[40] Maturity of government securities increased from 8 to 13 years, while total debt maturity increased almost in 3 years from 5.9 to 8.7 after the exchange.

[41] Readers interested in details of this operation may consult the BCU's website at: http://www.bcu.gub.uy/autoriza/pepmaf/deudapublica/canje.xls.

This simulation picks up the previous one and includes an additional fiscal adjustment of 1 per cent of GDP each year in relation to the endogenous result, as it was done in section 4.2. While the effects on debt dynamics were analyzed in that section, here we focus on the financing gap (Figure 16).

Figure 16

Post Exchange Financing Gap and fiscal adjustment of 1 per cent of GDP



A higher primary surplus reduces the financing gap to a maximum value of US$ 400. Consequently, the stock of public assets, although still showing a downward evolution, is enough to close the gap in the whole period.[42]

Therefore, a combination of time restructures and permanent primary adjustment of 1-2 per cent of GDP would allow the Uruguayan Public sector to return to a sustainable path.

Meeting this requirement, however, implies several costs. On the one hand, a primary adjustment imposes restrictions to the future fiscal policy. On the other hand, the debt restructure determines higher interests payments, both due to the time extension and to higher interest rates at which securities were refinanced; these interest rates are presented on Table 9.

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[42] In fact, these assets reach a minimum of some US$ 400 (3 per cent of GDP) in the period 2010-2011. There should be remarked that this scenario supports the shortest maturity of the *benchmark* bond for US$ 500, bond which is due precisely in 2011.

Table 9

Average Interest Rate of Public Debt

	Pre-exchange	Post-exchange	Variation
Securities	5.7%	6.9%	1.2%
Loans	4.2%	4.2%	0.0%
Global rate	5.2%	5.9%	0.8%

4.4 Vulnerability analysis

Picking up the vulnerability analysis presented in section II we developed a set of simulations where we studied the effects of different evolutions of GDP growth, relative prices and *Libor* rate, on the level and structure of public debt.

The baseline scenario presented above shows the most probable medium-term evolution of debt-to-GDP ratio, primary gap and tax gap. It is a partial analysis because it is only based on debt levels without taking into account its structure. Therefore, it must be completed to include the analysis of changes in debt determinants.

4.4.1 GDP growth

By introducing the volatility of GDP into the analysis, and taking as a reference the evolution of debt-to-GDP ratio in the baseline scenario, we can see that while in the most favorable scenario a quick convergence is achieved, in the most negative one debt remains at high levels towards the end of the period (Figure 17).

The right panel of Figure 17 presents the vulnerability indicator ε. We can see that if the economy grows σ times above its historical average for two consecutive years, the debt-to-GDP ratio would decrease by 5 per cent on average for 2003-2005. If GDP grows σ times less than its average, the debt-to-GDP ratio would be almost 6 per cent higher than in the baseline scenario for the same period. In this way we calculated a measure of debt vulnerability to changes in GDP growth by one standard deviation that is represented by a range of –5 and +6 point of GDP.

4.4.2 Relative prices

The evolution of future real exchange rate according to its historical average and standard deviation is presented in Figure 18.[43]

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[43] Keeping constant the international inflation rate, the evolution of domestic inflation and devaluation determines the real exchange rate equivalent to the last 30 years average.

Figure 17

Vulnerability of Debt-to-GDP Ratio to Changes in *g*

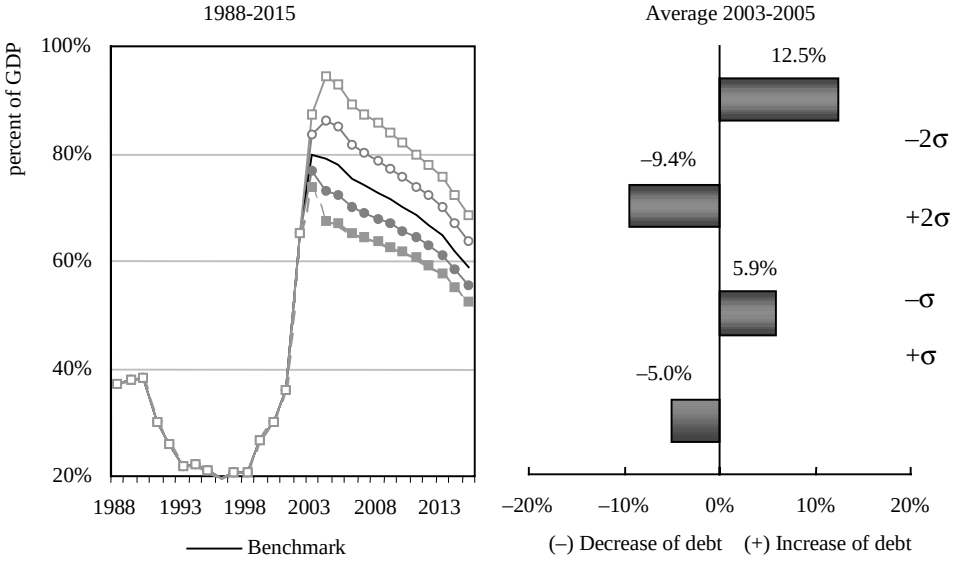
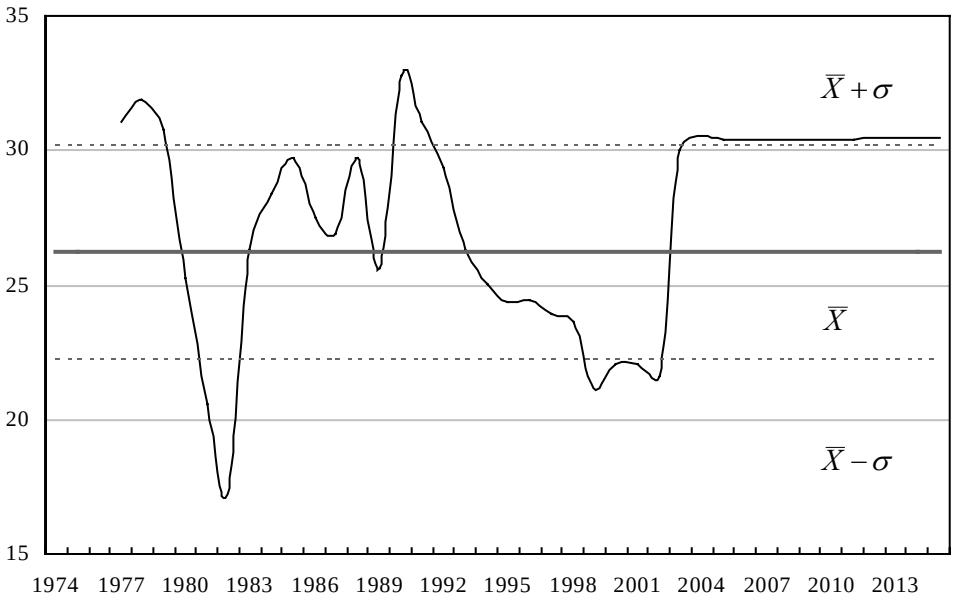


Figure 18

Real Exchange Rate, 1974-2015



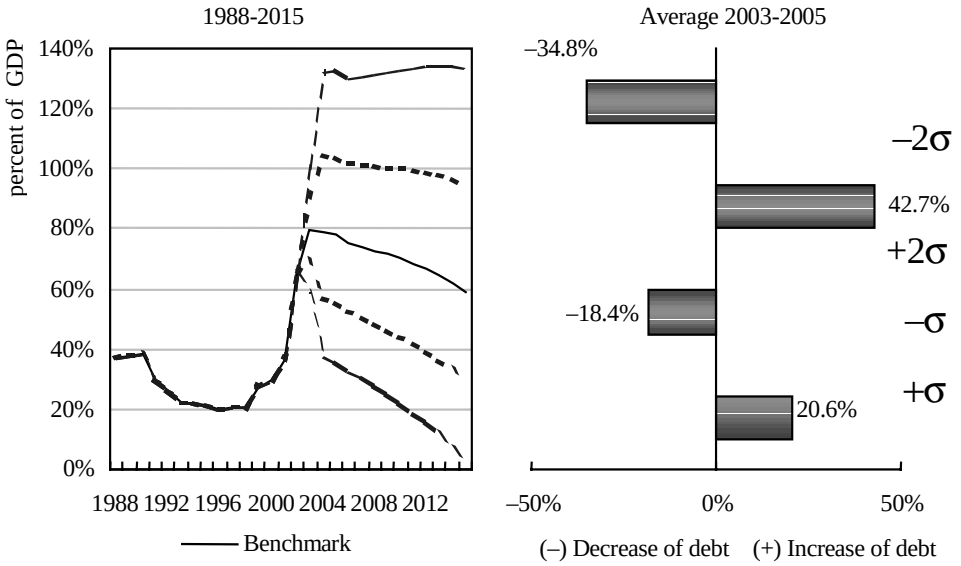
$\overline{X} - \sigma$ (real appreciation) simulates the effect on the debt ratio of a quick convergence of prices in dollars;

$\overline{X} + \sigma$ (real devaluation) represents a scenario where prices in dollars keep increasing in the two following years.

From Figure 19 we can conclude that the effects on the debt-to-GDP ratio of changes in relative prices are much more significant than in the previous case. The magnitude of the impact is determined by the degree of dollarization of the debt level.

Figure 19

Vulnerability of Debt-to-GDP Ratio to Changes in *e–p*



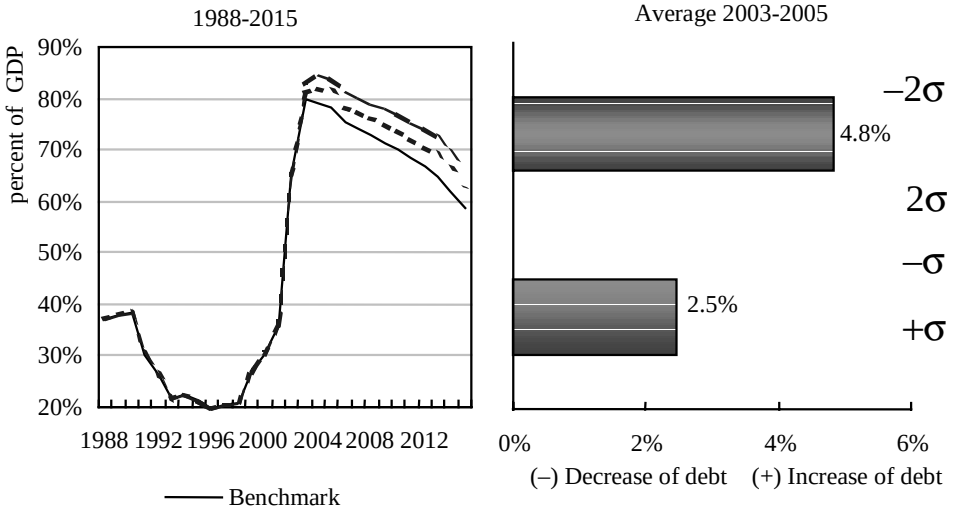
A real devaluation of $\overline{X} + \sigma$ that is to say 18 per cent, during 2 years determines a debt-to-GDP ratio almost 21 per cent higher than in the baseline scenario for the average 2003-2005. Similarly, a quick convergence of prices in dollars for 2 years ($\overline{X} - \sigma = -20\%$) reduces the debt-to-GDP ratio in 18 points in comparison with the baseline scenario. The debt vulnerability to changes in relative prices is clearly illustrated by the two divergent paths: after the real devaluation, *ceteris paribus*, the debt ratio is stabilized at around 100 points of GDP, while the dynamics originated by the real appreciation determines a convergence of debt-to-GDP ratio to levels lower than 30 per cent.

4.4.3 Interest rate

Finally we present the effects on debt ratio of changes in the interest rate. Results are presented in Figure 20.[44]

Figure 20

Vulnerability of Debt-to-GDP Ratio to Changes in *i



We conclude that the vulnerability of public debt to changes in the interest rate is very low. The reasons for this behavior are twofold: first, and as it was mentioned in section III, the interest rate shows the lowest relative volatility; second, the debt structure by type of interest rates, with similar shares at fix and floating rates, mitigates the impact.

The structure of the Uruguayan public debt by currency and interest rate together with the intrinsic volatility of its determinants, results in a high vulnerability to changes in relative prices, followed by the vulnerability to changes in GDP and interest rate (Table 10). As a result, a strategy that increases the share of debt denominated in domestic currency would reduce a major source of vulnerability.

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[44] Given the current levels of the *Libor* rate, lower than 2 per cent, cases of $-\sigma$, -2σ would determine negative nominal interest rates, being left aside of the economic logic. Therefore, they are not taken into account.

Table 10

Net Public Debt/GDP, Average 2003-2005

	g	e–p	i*
$\overline{X}+2\sigma$	70%	122%	84%
$\overline{X}+\sigma$	74%	99%	81%
Inertial	79%	79%	79%
$\overline{X}-\sigma$	85%	61%	–
$\overline{X}-2\sigma$	91%	44%	–

5. Conclusions

This paper presented a framework from which several indicators were derived to analyze issues of solvency, sustainability and vulnerability of public debt. This framework proved to be useful both in the historical analysis and in the simulations of the debt dynamics.

Based on the analysis of the evolution of the Uruguayan public debt in the last 15 years, we concluded that the use of traditional indicators of fiscal solvency showed no signal of stress while the economy was growing within a framework of regional dynamism and full access to capital markets. On the contrary, sustainability and vulnerability indicators did not show such a positive fiscal position, and therefore they turned out to be advance indicators.

The simulations of the debt level for 2003-2015 based on effective data as of December 2002 showed an unsustainable path, hence the need for corrections. Two different fiscal measures were analyzed. First, we concluded that a permanent primary fiscal effort of 2 per cent of GDP relative to the endogenous trend would be required in order to return to a sustainable path. The agreement signed by the authorities with the IMF, where they committed to achieve a primary surplus of 4 per cent of GDP in the medium term, advanced in this direction. Second, the debt exchange, even though necessary to loosen liquidity problems in the short term, did not change *per se* the long term restrictions; however it gives time to make the required fiscal adjustment.

The vulnerability analysis showed that given its current structure, the Uruguayan public debt shows the highest relative vulnerability to changes in relative prices, being lower in relation to the level of economic activity and interest rate. As a result, the increase in the share of debt denominated in domestic currency would reduce the major source of debt vulnerability.

To summarize, we conclude that in the case of a small emerging economy facing recurrent shocks of significant magnitude, the analysis of fiscal sustainability based on the dynamics of the debt level is a limited approach. Then, the debt *level* is as important as its *structure* by currency, interest rate, maturity, type of instrument, etc. Therefore, the sustainability analysis must be complemented with the study of debt vulnerability to changes in the macroeconomic environment.

APPENDIX 1
DERIVATION OF THE MAIN EQUATIONS

A.1.1 Public sector budget constraint (equation 1)

The current fiscal balance *(FB_t)* can be separated into primary balance S_t plus interests paid at a nominal rate i_t on the debt stock of the previous period D_{t-1}. Said there is a deficit; it can be financed by issuing non-monetary debt *(ΔD_t)* or printing money *(ΔM_t)*.

$$FB_t = -S_t + i_t \cdot D_{t-1} = \Delta D_t + \Delta M_t \quad \text{(i)}$$

Using $\Delta D_t = D_t - D_{t-1}$ we can solve for D_t:

$$D_t = -S_t + (1+i_t) \cdot D_{t-1} - \Delta M_t \quad \text{(ii)}$$

This equation can be expressed in terms of current GDP, designating with small letters the variables deflated by the GDP:

$$d_t = -s_t + (1+i_t) \cdot \frac{D_{t-1}}{Y_t} - \Delta m_t \quad \text{(iii)}$$

Finally, the term $\frac{D_{t-1}}{Y_t}$ may be expressed as:

$$\frac{D_{t-1}}{Y_t} = \frac{D_{t-1}}{Y_{t-1}} \cdot \frac{Y_{t-1}}{Y_t} = d_{t-1} \cdot \frac{P_{t-1}.y_{t-1}}{P_t \cdot y_t} = d_{t-1} \cdot \frac{1}{(1+\rho_t) \cdot (1+g_t)} \quad \text{(iv)}$$

being $\rho_t = \frac{P_t}{P_{t-1}} - 1$ the growth rate of the GDP deflator, and $g_t = \frac{y_t}{y_{t-1}} - 1$ the growth rate of real GDP.

Incorporating (iv) in (iii), and being: d_t the end-of-period non-monetary public debt as a proportion of GDP*;* i_t the nominal interest rate on public debt*;* g_t the growth rate of real GDP*;* ρ_t the growth rate of GDP deflactor; s_t the primary surplus and Δm_t the deficit monetization or *seignorage*, both expressed as percentage of GDP; then, the public sector budget constraint for a sole period may be written as:

$$d_t = \left(\frac{1+i_t}{(1+\rho_t) \cdot (1+g_t)} \right) \cdot d_{t-1} - s_t - \Delta m_t \quad \text{(v)}$$

In order to simplify the presentation we will hereinafter ignore *seignorage* ($\Delta m_t=0$), and we will assume *i, g,* ρ as constants. The solution to this equation in differences is obtained by repeating (v) towards the future.

$$d_{t-1}=\sum_{j=0}^{n}\left(\frac{(1+g)(1+\rho)}{1+i}\right)^{j}s_{t+j}+\left(\frac{(1+g)(1+\rho)}{1+i}\right)^{n}d_{t+n-1} \qquad \text{(vi)}$$

A government is solvent if its debt does not grow in an explosive way, in this case the last term of the equation (vi) tends to zero when *n* tends to infinity. The solvency requirement imposes that:

$$\lim_{n\to\infty}\left(\frac{(1+g)(1+\rho)}{1+i}\right)^{n}d_{t+n-1=0} \qquad \text{(vii)}$$

Should the solvency requirement be fulfilled, the public sector intertemporal budget constraint shall be:

$$d_{t-1}=\sum_{j=0}^{\infty}\left(\frac{(1+g)(1+\rho)}{1+i}\right)^{j}s_{t+j} \qquad \text{(viii)}$$

Equation (viii) corresponds to equation (1) of section 1.

A.1.2 Primary gap

Starting from (v) we ignore income by *seignorage* and we assume that *i, g,* ρ are constant, we propose the discrete variation of d_t, imposing the requirement of zero variation:

$$\Delta d_t = d_t - d_{t-1} = \left(\frac{1+i-(1+\rho)\cdot(1+g)}{(1+\rho)\cdot(1+g)}\right)\cdot d_{t-1} - s_t = 0 \qquad \text{(ix)}$$

The numerator on the right side of the equation can be approximated as:

$$1+i-(1+\rho)\cdot(1+g) = i-\rho-g-\rho\cdot g \cong i-\rho-g \qquad \text{(x)}$$

The "interaction term" $\rho\cdot g$ can be discarded in contexts of low rates of inflation and/or real growth of GDP.[45] Incorporating (x) in (ix) and finding s_t we have:

$$s_t = \left(\frac{(i-\rho)-g}{(1+\rho)\cdot(1+g)}\right)\cdot d_{t-1} \qquad \text{(xi)}$$

Finally, assuming that the growth rate of prices π evolves in a similar way

[45] This term could only be relevant if high rates of inflation and economic growth occurred simultaneously. In the case of Uruguay during the period under study this only happened in 1986-1987, when the error made for leaving this term aside is a bit higher than 2 per cent of GDP per year. In the rest of the period, the difference between approximation and the complete formula was lower than 1 point of GDP per year.

to the one of the deflactor ($\pi_t \approx \rho_t$) we come to the equation (xii), where the term *(i–π)* is a good approximation of the real interest rate *r*.[46]

$$s_t^* = \frac{i - \pi - g}{(1+g)(1+\pi)} d_{t-1} \quad \text{(xii)}$$

*s** is defined as the primary balance necessary to keep constant the debt-to-GDP ratio. Equation (xii) shows that the primary fiscal effort will be higher whether real interest rate is higher, real growth rate is lower and debt-to-GDP ratio is higher.

From the comparison between *s** and the effective primary balance *s* we can obtain the *Primary Gap* indicator *(k)*.[47] Such indicator measures the adjustment required in the primary balance in order to stabilize the ratio in a particular level (generally the current level).

$$k_t = s_t^* - s_t \quad \text{(xiii)}$$

Equation (xiii) corresponds to equation (2) of section 2.

A.1.3 Medium-term tax gap

Including in (xii) the definition of primary balance *S = T–PE*, we obtain a tax level *T**, that represents the necessary tax rate in order to keep constant the debt-to-GDP ratio, considering as given the projected average expenditure for the following *n* years.

$$\left(\frac{T^*}{GDP}\right)_t = \frac{\sum_{t=j}^{j+n}\left(\frac{PE}{GDP}\right)_j}{n} + \frac{(i - \pi - g)}{(1+g)(1+\pi)} d_{t-1} \quad \text{(xiv)}$$

The tax gap (*TG*) in equation (xv), defined as the difference between *T** and the effective rate at *t*, constitutes another indicator of potential problems of public solvency. Besides, it allows evaluating the need for and the magnitude of a tax-income-based fiscal adjustment.

$$TG_t = \left(\frac{T^*}{GDP}\right)_t - \left(\frac{T}{GDP}\right)_t = t^* - t \quad \text{(xv)}$$

Equation (xv) corresponds to equation (3) of section 2.

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[46] The nominal interest rate is broken down into real rate and inflation For low levels of inflation and/or real rate the interaction term $r.\pi$ can be neglected, resulting in the approximation herein presented. This one proved to be very useful in the empirical analysis, for the term $r.\pi$ has never been relevant in the period studied.

[47] See Blanchard (1990).

A.1.4 Primary gap by currency

We take up equation (i) of this appendix; the debt is separated into domestic foreign currency-denominated ones ($D^{\$}$, D*), both expressed in domestic currency. We assume again that $\pi_t \approx \rho_t$ and constancy of i, g, π, and we leave aside financing by *seignorage*.

$$FB_t = -S_t + i \cdot D^{\$}_{t-1} + E_t \cdot i^* \cdot D^*_{t-1} = \Delta D_t = (D^{\$}_t - D^{\$}_{t-1}) + E_t \cdot (D^*_t - D^*_{t-1}) \qquad \text{(xvi)}$$

Finding D_t,

$$D_t = (D^{\$}_t + E_t \cdot D^*_t) = -S_t + (1+i) \cdot D^{\$}_{t-1} + E_t \cdot (1+i^*) \cdot D^*_{t-1} \qquad \text{(xvii)}$$

Deflating by Y_t, expressing the resulting ratios in small letters we obtain:

$$d_t = -s_t + \frac{(1+i)}{(1+g)(1+\pi)} \cdot d^{\$}_{t-1} + \frac{(1+i^*)(1+\delta)}{(1+g)(1+\pi)} \cdot d^*_{t-1} \qquad \text{(xviii)}$$

Being $\delta = \frac{E_t}{E_{t-1}} - 1$ the devaluation rate.

The debt change in discrete terms appears given by:

$$d_t - d_{t-1} = -s_t + \underbrace{\left[\frac{(1+i)}{(1+g)(1+\pi)} - 1\right]}_{[A]} \cdot d^{\$}_{t-1} + \underbrace{\left[\frac{(1+i^*)(1+\delta)}{(1+g)(1+\pi)} - 1\right]}_{[B]} \cdot d^*_{t-1} \qquad \text{(xix)}$$

Numerator of [A] $\approx (i-\pi) - g$ once again leaving aside the term $g \cdot \pi$.

Numerator of [B] $\approx (i^* + \delta - \pi) - g$ leaving aside the terms $g \cdot \pi$, $i^* \cdot \delta$.

Introducing these approximations in (xix), imposing the requirement of $d_t - d_{t-1} = 0$ and finding s_t:

$$s_t = \left[\frac{(i-\pi)-g}{(1+g)(1+\pi)}\right] \cdot d^{\$}_{t-1} + \left[\frac{(i^* + \delta - \pi) - g}{(1+g)(1+\pi)} - 1\right] \cdot d^*_{t-1} \qquad \text{(xx)}$$

Finally, incorporating $\alpha = \frac{d^{\$}}{d}, (1-\alpha) = \frac{d^*}{d}$ and reorganizing terms we obtain the equation (4) of the paper:

$$s^*_t = \frac{\left[\alpha \cdot (i-\pi) + (1-\alpha) \cdot (i^* + \delta - \pi)\right] - g}{(1+g)(1+\pi)} \cdot d_{t-1} \qquad \text{(xxi)}$$

APPENDIX 2
SCENARIO WITH ENDOGENOUS SPREADS

A.2.1 Indicators

An interesting extension of the primary gap methodology is the endogenous determination of the country risk, measured through the spread of sovereign debt θ. The country risk can be incorporated through a simple equation linking the marginal spread to the fiscal balance (equation xxii), or the previous debt stock (equation xxiii).

$$\theta_t = \theta_0 + \phi \cdot fb_{t-1}, \phi < 0 \quad \text{(xxii)}$$

$$\theta_t = \theta_0 + \lambda \cdot d_{t-1}, \lambda < 0 \quad \text{(xxiii)}$$

Both equations state the direct relationship between the spread in a specific moment θ_t above a historical minimum level θ_0 and the fiscal variable chosen.

Incorporating this requirement to (xi) we obtain:

$$s_t^* = \frac{(r + \theta_0 + \phi \cdot fb_{t-1} - g)}{1+g} \cdot d_{t-1} \quad \text{(xxiv)}$$

$$s_t^* = \frac{(r + \theta_0 + \lambda \cdot d_{t-1} - g)}{1+g} \cdot d_{t-1} \quad \text{(xxv)}$$

Noting that the fiscal performance is formed by the primary balance plus interests (xxiii) can be seen as an equation in first differences in relation to the primary balance. Therefore, the fiscal effort of a period depends on the fiscal effort of the previous period. An initial primary deficit determines bigger spreads, bigger interest payments and thus the need for a better future primary balance in order to stabilize the debt ratio. Equation (xxiv) states the same idea but in relation to the debt-to-GDP ratio. Both equations allow simulating the effects on debt produced by changes in the conditions of access to capital markets through the analysis of sensitivity on ϕ, λ.

A.2.2 The endogenous spreads scenario

The determinants of sovereign spread are several and difficult to be easily incorporated to our model, as some empirical works of the Uruguayan case show.[48]

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[48] That is the case in A. Pena, (BCU) "Calificación de riesgo soberano-Análisis de sus determinantes", XV Jornadas de Economía – BCU, November 2000; and M. Larzábal, M. Valdés and S. Laporta, (República AFAP) "Spread soberano: evidencia empírica del caso uruguayo", XVII Jornadas de Economía – BCU, July 2002.

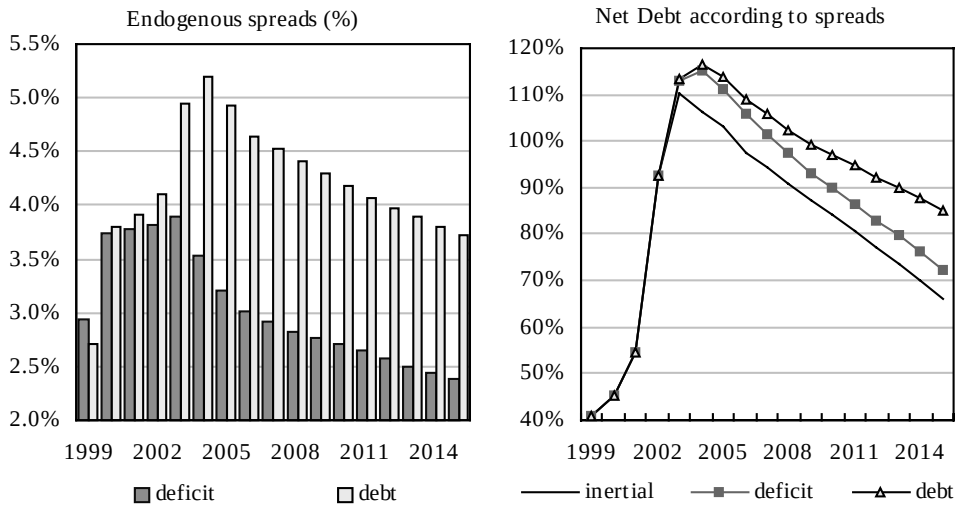
Therefore, we tried 3 ways of modeling them: two simple versions, in which the spread depends on a sole fiscal variable, whether the previous fiscal performance or the previous debt-to-GDP ratio, and a more complex version, which tries to capture a number of the fundamentals, as the quoted works do. Results in relation to the timing of spread were similar in the 3 versions, although they had differences in the levels attained. Endogenous spreads are incorporated to the floating rate in dollars iV, that depends on the Libor rate plus a variable spread. This variable spread in its turn inversely depends whether on the fiscal performance or on the debt-to-GDP ratio, starting from a minimum, which was fixed as the average of the last 3 international placements made in conditions of macro stability: 233 bp.[49] Finally, the value taken by the ratio linking the spread with its determinant variable was 0.26 for the deficit and 0.03 for the debt, values that arise from an average among the three results determined in the works quoted. Therefore, equations used where the following:

$$A: i_{V,t} = i_t^* + (2.33 + 0.26 \cdot rf_{t-1});$$

$$B: i_{V,t} = i_t^* + \left[2.33 + 0.03 \cdot \left(\frac{D}{Y} \right)_{t-1} \right]$$

Figure 21

Endogenous Spreads and Debt Dynamics



[49] This value arises from averaging the spreads of Global Bonds placed in 1998-1999. In 1998 two placements were made; a 10-years-maturity bond with a spread of 140 bp, and a 5-years-maturity bond, which paid 345 bp The placement of 1999, another 10-years-maturity bond, determined a spread of 212.5 bp. On the other hand, this average spread is very similar to the implicit effective one for 2001.

Resulting spreads are maintained above the benchmark case, but its evolution is not explosive. The immediate consequence is a higher payment of interests, determining "more unpleasant debt arithmetics", which brings to deepen the problem of solvency.

The resulting dynamics are similar but at higher levels: the chart illustrates that the debt-to-GDP ratio is situated, in the medium term, at around 10 per cent of GDP above the baseline scenario in any of the options of modeling spreads. Starting from there, the evolution is different for each scenario: in the case A the debt-to-GDP ratio is situated only 6 per cent of GDP above the benchmark in 2015, originating similar conclusions. In the case B, debt-to-GDP ratio is 19 per cent of GDP higher towards the end of the period, strengthening the conclusions referring to the necessary fiscal effort in the medium term.

This extension to variable spreads adds a bigger interest burden to the original dynamics, determining a debt-to-GDP ratio that reproduces the original dynamics but with higher levels. Therefore, these simulations strengthen and deepen the problems previously posed in the document.

APPENDIX 3
THE FINANCING GAP

A.3.1 The initial situation

First, we present the FG resulting at the end of December 2002, taking into account a projection of debt depending on the baseline scenario of section 4 and the following elements:

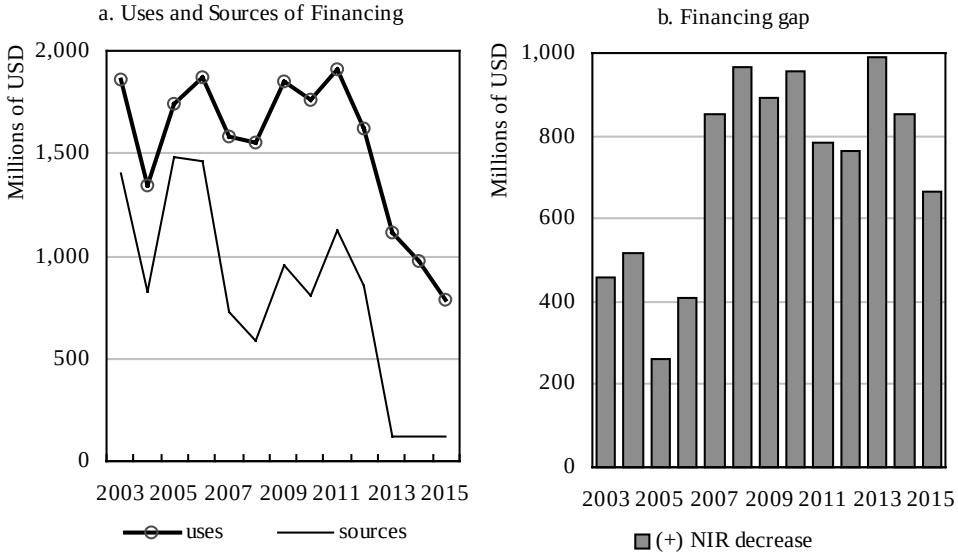
- the situation arisen after the reschedule of May 2003,

  schedule of loan disbursements of multilateral agencies negotiated at December 2002,
- amortization schedule for the disbursements of multilateral agencies already negotiated,
- no placement of Government securities, nor additional disbursements to the ones already agreed,
- no assumptions about the evolution of public assets have been done, and no discretionary fiscal measures have been projected.

Next we present uses and sources for the period 2003-2015, as well as the resulting financing gap. A positive gap means need for financing, while a negative sign shows excess of financing.

Figure 22

Uses, Sources and Financing gap



It can be observed that the gap is positive in the whole period, for the sources of financing are never enough to finance the fiscal deficit and debt amortizations. Therefore we need to think alternative scenarios for closing the gap. Such scenarios are presented as follows.

A.3.2 New disbursements and placements; closure through assets sale

This scenario proposes a financing based on placements of Government securities and disbursements of foreign loans modeled through its rollover ratios, closing a possible additional FG through the sale of Public Sector assets. This framework is constructed by incorporating the following elements:

- debt reschedule of May 2003 is not included as a way of presenting an inertial scenario,
- future placements of Government securities with a rollover ratio less than one (ϕ<1) for the following two years, being ϕ>1 as from 2005, reflecting a progressive softening of liquidity constraints. In particular, we assumed ϕ = 0.8 until 2004 and ϕ = 1.5 as from 2005. That means that for years 2003 and 2004 20 per cent of security stock is amortized in net terms, while from 2005, 50 per cent of the debt amount starts to be placed in net terms,
- this methodology explicitly incorporates the effect of the average maturity in the need for financing. In a first stage we assumed for new placements a maturity identical to the current one, which for Government securities is of 7.69 years,
- for loans of international agencies additional to the ones already agreed we assume a rollover ratio of ϕ = 1.5 for the medium term, as a way of reflecting a better access to these credits; this ratio is maintained until 2010, and after this year we assume ϕ = 1,
- for new disbursements the maturity is identical to the current one: 5.86 years,
- the potentially remaining gap after the new placements and disbursement is closed with the sale of public assets. If the gap is negative, there exists an excess of financing; in this case assets are accumulated,
- no discretionary fiscal measures are assumed.

This scenario determines the following evolution of the financing gap for the period 2003-2008.

Starting from the assets stock as of December 2002, given the assumptions and the simulation of net needs presented above, this scenario would collapse in the year 2006, because the asset stock is finished, while the financing needs are higher than placements and disbursements arisen from the rollover ratios.

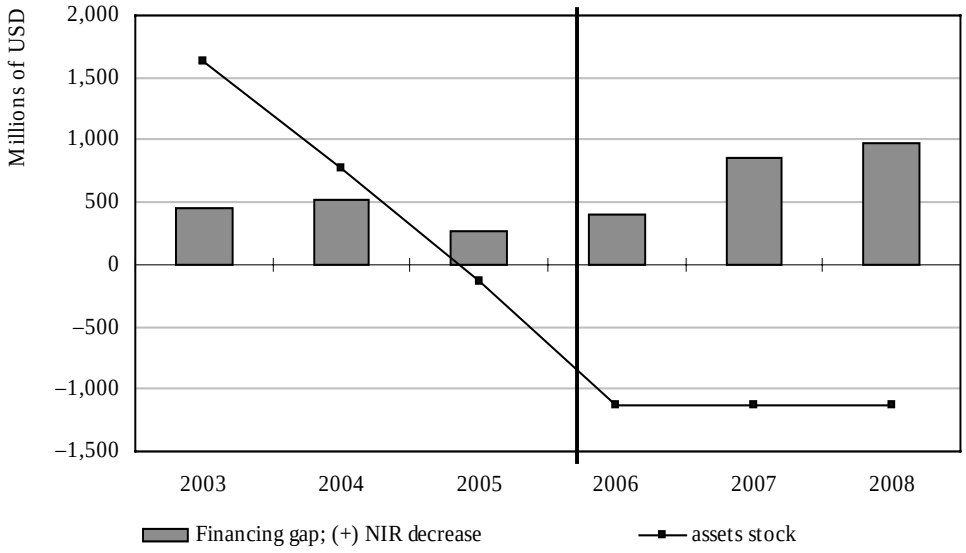
This scenario assumed an extreme case of assets sale only, while in a certain way it was optimistic in the assumptions of ϕ's values. However, even in these conditions, as early as in the year 2006 the Government would not be able to make the whole debt service. This invalids the traditional analysis of solvency made in

section 4.1 for the period after 2005 and warns about the need to make corrections in the time structure of the Public Debt.

The solution of closing the gap with a fiscal adjustment instead of with assets sale is analyzed in the following scenario.

Figure 23

Closing the Financing Gap with Assets Sales



A.3.3 New disbursements and placements, closure through the fiscal adjustment

Assumptions handled in this scenario are similar to the ones of the previous point, with some variants:

- the financing gap is closed with discretionary measures on fiscal income and/or outlays,
- public assets are maintained at its 2002 level.

Owing to presenting the same assumptions of uses, placements and disbursements, the financing gap is the same that the one for the previous scenario. Therefore, for the first year, a fiscal looseness of some US$ 1,000: would be accumulated, looseness that would be quickly lost in the year 2004, determining again that the FG would not be able to be closed in 2006: in that year, the fiscal

adjustment necessary to close the gap is 9 per cent of GDP, which is clearly unlikely.

A.3.4 Conclusions

- Both scenarios are closely related because they start form the same financing needs and, according to the baseline scenario developed in section 4, do not incorporate the debt exchange of May 2003. The difference between them consists in the way of closing the gap: assets sale or fiscal adjustment. A mixed scenario does not greatly alter the conclusions: the combination only defers the collapse in one year. So, this pre-exchange scenario showed that whatever the combination between assets and fiscal adjustment, the FG led to unsustainability in a close horizon, thus requiring some of the following corrections:
- bigger disbursements of international loans than the ones assumed, modeled by the rollover ratios,
- fiscal measures that succeed in improving the fiscal performance beyond what was assumed (analyzed in section 4.2),
- A reschedule of the current debt, modeled through improvements in its maturity (analyzed in section 4.3).

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FISCAL AND GENERATIONAL IMBALANCES: NEW BUDGET MEASURES FOR NEW BUDGET PRIORITIES

Jagadeesh Gokhale[*] *and Kent Smetters*[**]

Introduction

Traditional budget measures are becoming obsolete as federal budget priorities shift from providing "brick and mortar" public goods toward delivering social insurance services. As the share of retirees in the nation's population balloons and human life spans continue to lengthen, Social Security and Medicare transfers will increasingly dominate total federal outlays. Traditional annual cash-flow budget measures may have been sufficient when Congress could directly allocate almost all budgetary resources via the annual appropriations process. During this century, however, federal spending will be determined mostly by factors outside of short-term legislative control. Because the current structure of Social Security and Medicare involves long-term payment obligations, backward looking or short-term measures such as debt and deficits need to be complemented by long-term, forward looking ones that explicitly measure future payment obligations relative to the resources available to meet them under current laws. Such measures are needed to assess how far the federal budget is from fiscal sustainability, and the size of policy changes needed to achieve sustainability.

Many, if not most, analysts and policymakers use traditional fiscal measures such as debt held by the public, deficit projections over limited (usually five- or ten-year) horizons, or 75-year estimates of Social Security and Medicare financial

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shortfalls.[1] Some budget analysts acknowledge that short-term measures such as national debt and deficits are inadequate, as they significantly understate the financial shortfall that the federal government faces under today's fiscal policies.[2] As a consequence, the degree to which current policy is unsustainable remains hidden from policymakers. In addition, we argue here, reliance on traditional measures introduces a policy bias favoring current debt minimization at the expense of policies that are sounder from a long-term perspective. Even under 75-year budget measures, we believe the federal fiscal shortfall would be significantly understated, hindering objective fiscal policymaking. Nevertheless, official budgeting agencies continue to promote such measures: The recently published Budget of the United States Government for Fiscal Year 2004 (hereafter Budget) reports 75-year "actuarial deficiency" measures for Social Security and Medicare.

We propose that federal budget agencies such as the Office of Management and Budget and the Congressional Budget Office should begin reporting a pair of measures on a regular basis to track the true costs of current fiscal policy: Fiscal Imbalance (FI) and Generational Imbalance (GI). The FI measure for the federal government is the current federal debt held by the public plus the present value in today's dollars of all projected federal non-interest spending, minus all projected federal receipts. The FI measure indicates the amount in today's dollars by which fiscal policy must be changed in order to be sustainable: A sustainable fiscal policy requires FI to be zero.[3]

The GI measure indicates how much of this imbalance is caused, in particular, by past and current generations. The FI measure is similar to the standard perpetuity "open-group liability" concept that is sometimes used to analyze shortfalls in social insurance programs, while the GI measure is similar to the standard "closed-group liability" concept. The FI measure is also sometimes called the "fiscal gap" (see Auerbach, Gale, Orszag and Potter, 2003). We argue here that the FI and GI measures together possess several desirable properties, the most important being that they render policy decisions free of the aforementioned bias because they enable comparisons of alternative policies on a neutral footing.

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1 See Budget of the United States Government, Fiscal Year 2004, Analytical Perspectives, Chapter 3 "Stewardship".

2 "Beyond Borrowing: Meeting the Government's Financial Challenges in the 21st Century," Remarks of Under Secretary of the Treasury Peter R. Fisher to the Columbus Council on World Affairs Columbus, Ohio, 14 November 2002, available at http://www.ustreas.gov/press/releases/po3622.htm. See also the related subsequent article by Steven Cecchetti, "A Forward Looking Fiscal Policy Strategy," Financial Times, 23 December 2002, available at http://economics.sbs.ohio-state.edu/cecchetti/pdf/cpi23.pdf. Also see Howell Jackson (2002). For an even more recent discussion, see the Federal Reserve Board's Semiannual Monetary Policy Report to the Congress Before the United States Senate Committee on Banking, Housing, and Urban Affairs, 11 February 2003, available at: http://www.federalreserve.gov/boarddocs/hh/2003/february/testimony.htm

3 This requirement assumes that the economy is characterized by "dynamic efficiency." A dynamically inefficient economy is one with excessive capital relative to the labor force – one where living standards can be improved by discarding capital. Abel, Mankiw, Summers, and Zeckhauser (1989) suggest that the U.S. economy has been characterized by dynamic efficiency since 1929.

The Fiscal Imbalance associated with today's federal fiscal policy is very large. Taking present values as of fiscal year-end 2002, and interpreting the policies in the FY 2004 federal budget as "current policies," the federal government's total Fiscal Imbalance is $44.2 trillion. By "present value," we mean that all future spending and revenue are not only reduced for inflation but are additionally discounted by the government's (inflation-adjusted) long-term borrowing rate. This calculation allows us to determine how much money the government must come up with *immediately* to put fiscal policy on a sustainable course. Since the government obviously does not have an extra $44.2 trillion today, it must make cuts or increase revenue in future years that add up to $44.2 trillion in present value. Of course, for their discounted value to equal $44.2 trillion in *present value*, the cumulative value of these policies will have to be substantially *more than* $44.2 trillion. See Box 1 for a discussion of the present value concept.

Of the current federal FI of $44.2 trillion, Social Security's FI is about $7 trillion in present value. Medicare's FI is $36.6 trillion (for both Parts A and B), of which Part A (the Hospital Insurance program) contributes $20.5 trillion and Part B (the Supplementary Medical Insurance program) contributes $16.1 trillion.[4] By contrast, the rest of the federal government's FI is only $0.5 trillion, which comprises a $4.6 trillion surplus in revenues minus obligations to Social Security, Medicare, and publicly held debt of $5.1 trillion.

Our estimate of today's federal Fiscal Imbalance is more than ten times as large as today's debt held by the public that arose from *past* federal financial shortfalls. The reason is that FI also includes *prospective* financial shortfalls. Hence, policy changes that only eliminate the debt held by the public would still leave the federal government far from being financially solvent. In particular, spending must be reduced and/or taxes increased in order to put federal fiscal policy on a sustainable course. Moreover, the FI grows by about $1.6 trillion per year to about $54 trillion by just 2008 unless corrective policies are implemented before then. This rapid annual increment is also around ten times as large as the official annual deficit reported for 2002.

How much must we cut federal spending or increase federal receipts to eliminate the current $44.2 trillion FI? We estimate that an additional 16.6 per cent of annual payrolls would have to be taxed away *forever* beginning *today* to achieve long-term fiscal sustainability – implying a greater than doubling of the current payroll tax rate of 15.3 per cent that is currently paid in equal shares by employees and employers to the Social Security and Medicare systems. Alternatively, income tax revenues would have to be hiked *permanently* by another two-thirds beginning immediately – increasing their share in GDP from 9.5 to 15.9 per cent. Yet other (equally drastic) alternatives would be to cut Social Security and Medicare

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[4] As we explain later, consistent with the Social Security and Medicare trustees, we assume that health care per capita grows one percentage point faster than GDP per capita until 2080 – a very conservative assumption relative to the past two decades. Between 2080 and 2100, the one percentage point differential is gradually reduced to zero, thereby assuming that health care spending grows no faster than GDP. Even with these very cautious assumptions, very large Medicare Fiscal Imbalances exist.

Box 1

Viewing government obligations and revenue in "present value"

As most investors know, a dollar received one year from today is not worth as much as a dollar received today. The reason is that a dollar received today can be invested, say in a bank account, to earn interest income over the year. This same intuition holds for the government as well. A dollar received in revenue in the future is not as valuable to the federal government as a dollar of revenue received today. The reason is that a dollar received today would allow the government to reduce its level of federal debt held by the public and, hence, reduce the interest payments it must make to nongovernment entities. Similarly, it costs the government more to pay a dollar today than paying a dollar next year, because of larger borrowing costs.

The "present value" operation is a way of converting future dollars to current dollars. It not only adjusts for changes in inflation over time, it additionally "discounts" (*i.e.*, reduces) the value of future dollars in order to recognize that a future dollar is not worth as much as a dollar received or paid today. Naturally, dollars in the distant future are discounted by more than dollars at a nearer date since the government must pay more interest income to borrow money over many years. The present value operation, therefore, allows us to consistently compare dollars received or owed at different times by adjusting for the interest costs. Failing to discount future dollars could potentially present a very misleading picture of the government's financial position by ignoring borrowing costs.

While the government often uses the present value operation to compare different policy options, the five-year and ten-year budget tables reported by OMB and the CBO are not stated in the present-value form. Instead, when describing accumulated deficits, the CBO and OMB use an *ad hoc* approach to adjust for the government's borrowing costs: They include interest spending as part of the government's outlay and then sum *undiscounted* values over different years. But this approach facilitates attempts at "budget arbitrage" even within the short five-year and ten-year budget windows. Bazelon and Smetters (1999) discuss how the present value concept is used in the federal budget process.

benefits by 45 per cent immediately and forever or *permanently* eliminate *all* future federal discretionary spending – although the latter policy still falls short by about $1.8 trillion. Moreover, the size of the necessary corrective policies will grow larger the longer their adoption is postponed. For example, waiting until just 2008 before initiating corrective policies would require a permanent increase in wage taxes by 18.2 percentage points, rather than 16.6 percentage points if we began today.

Finally, this monograph shows that the estimated Fiscal Imbalance remains large regardless of variations in underlying economic assumptions. Calculations under alternative growth and discount rate assumptions suggest a low-side estimate of federal FI of $29 trillion and, under very conservative assumptions, a high-side estimate of $64 trillion. Although FI expressed in today's dollars is fairly sensitive to these economic assumptions, we argue below that this sensitivity only strengthens the need to focus on FI rather than on traditional shorter-term fiscal measures. Furthermore, the ratios of FI to the present value of GDP and future payrolls – and consequently, estimates of tax hikes or spending cuts required to restore fiscal sustainability – are less sensitive to alternative economic assumptions because the denominators (GDP and the payroll base, respectively) are similarly sensitive to the underlying assumptions. As discussed below, although FI is smaller ($36.9 trillion) under our low productivity growth rate assumption, it declines by less than the present value of payrolls. Consequently, the wage-tax hike needed to eliminate FI is *larger* under the low productivity growth rate assumption – 18 percentage points compared to 16.6 percentage points under baseline assumptions. Under our high growth rate assumption, a 14.8 percentage point wage-tax increase would be needed to eliminate FI.

1. The fiscal imbalance measure

The federal government provides a myriad of public goods and services. Programs such as Social Security and Medicare provide retirement and health security to American citizens and residents. Other programs include national defense, homeland security, judicial and legislative operations, international diplomacy, transportation, energy, infrastructure development, education, and income support for the needy.

Whether these programs can continue to operate indefinitely at current service levels depends upon the availability of resources to finance them. All federal purchases and debt-service payments must be financed out of future federal revenues. Sources of federal revenue include tax receipts, net income of public enterprises, fees, and other levies. Although the government can borrow money, additional debt must also be serviced out of future tax receipts. Hence, current (net)

debt held by the public plus the government's future non-interest spending must be balanced over time by its future receipts.[5]

The government's total fiscal policy may be considered balanced if today's publicly held debt plus the present value of projected non-interest spending is equal to the present value of projected government receipts. The spending and revenue projections are made under today's fiscal policies. "Present values" mean that dollars paid or received throughout the future are discounted at the government's long-term interest rate in order to reflect their true value today (see Box 1). A fiscal policy that is balanced can be sustained without changing either federal outlays or federal revenues. Hence, the Fiscal Imbalance measure as of the end of year t is defined as

$$FI_t = PVE_t - PVR_t - A_t \tag{1}$$

This definition is simply understood as the excess of total expenditures over available resources in present value. Here, PVE_t stands for the present value of projected expenditures under current policies at the end of period t. PVR_t stands for the present value of projected receipts under current policies, and A_t represents assets in hand at the end of period t.

The FI measure can be calculated for the entire federal government. It can also be calculated separately for federal programs that are financed with dedicated revenues, such as Social Security and Medicare. FI can also be calculated for the rest of the government, reflecting the government's spending obligations and tax resources outside of Social Security and Medicare.

When calculating FI for programs such as Social Security and Medicare, A_t is positive and equal in value to the program's respective trust fund, which reflects the excess of previous payroll contributions over spending by past and current generations. When calculating FI for the rest of government, however, the value of A_t is negative since it reflects monies owed to these trust funds as well as the money owed to the public that is holding government debt. The level of debt held by the public, in turn, reflects the excess of spending over revenue by past and current generations.

While the variable A_t reflects the excess of revenue over spending done by past and current generations, the difference, $PVE_t - PVR_t$, shown in equation (1) reflects the contribution to FI from all projected financial shortfalls and surpluses – those on account of living and future generations. Hence, FI measures the aggregate financial shortfall from all generations – *past, living, and future*.

For the entire federal government's policy to be sustainable, its FI must be zero. The government cannot spend and owe more than it will receive as revenue in

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[5] Because outstanding debt held by the public is included among the obligations that must be financed, projected interest outlays are excluded when calculating the present value of projected spending to avoid double counting.

present value. In other words, while the government can spend more than it collects in taxes on *some* generations, other generations must eventually "pay the piper," thereby returning the fiscal imbalance to zero.[6] Similarly, FI's for programs such as Social Security and Medicare must equal zero if they are to continue without changes to revenues or outlays. Hence, if the FI measured under current policies is positive, those policies are unsustainable and policymakers will have to change them at some future point in time.

2. The generational imbalance measure

To be useful to policymakers, any proposed measure must be able to fully reflect the fiscal impact of all possible policy changes. The FI measure alone, however, is not capable of doing so for all types of policy changes. As is obvious from equation (1), any new policy that changes projected expenditures and revenues so that their increments are exactly equal in present value will produce offsetting increases in PVE_t and/or PVR_t, leaving FI unchanged. However, such FI-neutral policies could nevertheless transfer net tax burdens from living to future generations. Therefore, we need a complementary measure to show such redistributions of fiscal burdens.

For example, suppose that Congress passes legislation to immediately reduce Social Security payroll taxes but sharply increase payroll taxes in twenty years. If the revenue loss from the immediate tax reduction is equal in present value to the magnitude of the revenue gain in twenty years, then the value of PVR_t shown in equation (1) remains unchanged. As a result, Social Security's FI remains unchanged, as does the federal government's total FI. But clearly such a policy would shift substantial amounts of resources across generations.

As another example, suppose Congress creates a new Medicare benefit and finances it by raising payroll taxes such that each year's additional outlay is matched by additional revenue. By construction, this policy has no impact on Medicare's FI and, therefore, no impact on the federal government's total FI. The reason is that the values of PVE_t and PVR_t shown in equation (1) increase by the same amount after this policy change, thereby producing no change in the value of their difference, $PVE_t - PVR_t$. Nevertheless, this policy could potentially shift a substantial amount of resources away from future generations and toward current generations, similar to the previous example. In particular, current retirees and workers about to retire at the time of the policy change would gain from the new Medicare benefit, for which they will pay little or nothing. Younger workers and future generations, however, would be worse off because they will not fully recover the value of their additional taxes via their own additional retirement benefit: The investment income that they would

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[6] Geanakoplos, Mitchell, and Zeldes (1998) discuss the implications of this type of zero-sum constraint for analyzing Social Security reform.

lose on the resources now devoted to paying additional payroll taxes will not be fully made up by their future benefits.[7]

To identify such fiscally induced redistributions, therefore, we need to augment the FI measure with another measure. Because FI exclusively reflects the sustainability of a given policy, the complementary measure should indicate how FI is distributed across population subgroups. Although it is possible to complement FI with measures of its distribution across cohorts distinguished by year of birth, gender, race, and so forth, we adopt a more modest approach and follow the standard "closed-group liability" concept – showing the component of FI that arises due to *past and living generations.* We call this measure Generational Imbalance, or GI. We define the GI measure as:

$$GI_t = PVE_t^L - PVR_t^L - A_t \tag{2}$$

PVE_t^L represents the present value of projected outlays that will be paid to current generations, PVR_t^L represents the present value of projected tax revenues from the same generations. A_t again, represents the program's current assets. Note that if the program has positive current assets, past tax payments exceeded the program's outlays to date. Therefore, GI captures the part of FI arising from all transactions with past and living generations throughout their lifetimes. The projected contribution to FI by *future* generations simply equals the difference, FI minus GI.[8]

Our proposed GI measure should not be confused with Generational Accounting – the measure developed by Auerbach, Gokhale, and Kotlikoff (1991).[9] Generational Accounting involves a hypothetical policy reform that restores FI to zero by increasing the net tax burden on unborn generations. Generational Accounting's measure equals the difference in the net tax burdens per capita on current newborns (not affected by the hypothetical reform) and future generations. Hence, Generational Accounting's measure incorporates a hypothetical and sustainable policy. In contrast, the FI and GI measures correspond to current law, making them more applicable as a budget concept. One reason why the FI and GI measures are easy to understand is that they don't incorporate any hypothetical policy change.

Returning to the previous example, a new pay-as-you-go Medicare benefit would *increase* Medicare's imbalance on account of past and living generations (GI) and *reduce* the imbalance on account of future generations (FI-GI) by the same

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7 This result, again, assumes that the economy is dynamically efficient. See footnote 3.

8 As shown in Appendix A in Gokhale and Smetters (2003), the measure for future generations, FI-GI, can be further broken down into projected net transfers to each future birth cohort under current policy. These estimates are not reported in this paper, but they are available from the authors upon request.

9 For the latest available estimates of United States' generational accounts, see Gokhale and Kotlikoff (2001).

amount, leaving the overall Fiscal Imbalance (FI) unchanged (see Box 2). In other words, past and living generations would receive a windfall that is directly offset by a reduction in the resources available to future generations. Medicare's FI does not capture this redistribution because it adds together the net Medicare transfers received by all generations – past, living, and future – under current policies. This redistribution is, however, indicated by the change in GI.

Note that the traditional focus on the publicly held debt would also not capture the redistributive impact of the Medicare policy described earlier: Outstanding debt remains unchanged for any new outlay that is financed on a strictly pay-as-you-go basis since the outlays in each year are financed with taxes collected in that year. Note, however, that the level of publicly held debt *would* increase for a lengthy amount of time in the previous example where taxes are decreased initially and then increased after twenty years. Interestingly, both policies shift a large financial burden from current generations to future generations; in fact, with only minor adjustments, it is possible to construct both policies so that *identical* burdens are shifted across generations. Yet the level of publicly held debt increases in the tax cut example but not in the Medicare benefit example. This distinction makes little sense economically – a point emphasized by Kotlikoff (2001).

So, while the Fiscal Imbalance measure properly captures many large unfunded payment obligations not included in traditional accountings of public debt, both measures fail to reveal the resource transfers across generations that some policies can cause. The GI measure does, however, capture the redistributive effect of all policies. Under the pay-as-you-go financed Medicare policy described above, the GI measure increases even though FI does not change. Of course, this implies that the imbalance on account of future generations decreases. Hence, FI and GI measures taken together comprise a powerful analytical tool for policymakers, enabling more informed decisions.

In the future, policymakers must achieve two objectives simultaneously: First, they must reduce the Fiscal Imbalance to zero by a combination of increased taxes or reduced spending. This can be accomplished in a myriad of ways, each of which will affect the burden placed on future generations differently. For example, lowering the growth of entitlement benefits – which affects current retirees and those about to retire – will be more beneficial to future generations than increasing, say, payroll taxes – which leaves today's older generations unaffected but negatively impacts today's workers and future generations. Hence, the second objective for policymakers is to choose a policy that delivers the best tradeoff in costs imposed on different generations. The GI measure offers policymakers a parsimonious approach for analyzing this issue and choosing among different sustainable paths.

Identifying the GI component of FI is feasible for programs such as Social Security and Medicare, where outlays can be easily attributed to different individuals. It cannot be easily identified, however, for the rest of the federal government because the benefits of outlays (such as spending on national defense or public infrastructure) cannot easily be allocated to different generations. For example, much of the benefit from spending on education or national defense

Box 2

Pay-as-you-go programs and the generational imbalance measure

Consider the following simple example: Divide each generation's lifespan into two parts – "work" and "retirement." For simplicity, assume that both phases require the same length of time; that there is no inflation; that the interest rate equals 3 per cent; and that productivity growth always equals zero.[10] All generations are assumed to live for exactly two periods. A new generation of workers of fixed size is born in each period. One period's workers grow to be the next period's retirees. Hence, one generation of workers and one generation of retirees are alive in any given period.

Now suppose that a new pay-as-you-go Medicare program conferring $100 benefit to retirees is introduced in Period 1 and it is financed by a payroll tax on Period 1's workers of $100. The *net* value of this benefit to Period 1's retirees is $100 – equal to the benefit they receive in Period 1. For workers in Period 1, however, the value of the new program equals the present value of next period's Medicare benefit – $100/1.03 = $97.09 – minus Period 1's payroll tax of $100. Hence, the *net* value of this program for these workers is a *loss* of $2.91. It equals the present value of the interest they could have earned in Period 2 on their $100 payroll taxes – $3/1.03 = $2.91. Hence, the GI corresponding to just this new Medicare policy is $100 – $2.91 = $97.09. This GI will be in addition to any preexisting GI.

Now consider the impact of this Medicare policy on future generations. Workers in Period 2 also pay $100 when working and receive benefits worth $100 when retired. Hence, when the present value is taken as of Period 2, they also lose $2.91. However, discounting this loss back to Period 1 reduces it to $2.91/(1 + 0.03) = $2.83. Similarly, workers in Period 3 lose $2.91 when the present value is taken as of Period 3. But this loss equals $2.91/$(1 + 0.03)^2$ = $2.74 as of Period 1. As of Period 1, therefore, the present value loss to all future generations equals the sum: [$2.91/(1 + 0.03) + $2.91/$(1 + 0.03)^2$ + $2.91/$(1 + 0.03)^3$ + …]. When taken over all future generations, this sum equals exactly $97.09. This loss to all future generations is exactly equal to the gain to past and living generations in present value as of Period 1. Hence, FI is unchanged by this policy because the gain to past and current generations (GI) is exactly offset in present value by the loss to all future generations (FI-GI).

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[10] Incorporating productivity growth makes the example complicated but does not change its basic message as long as this growth is not so large as to imply dynamic inefficiency (see footnote 3).

accrues to society in general, and to some extent, to unborn generations. Only the revenue side of the rest-of-government's budget may be so attributed.[11] Hence, for the rest of the federal government, we can only report how revenues can be distributed into the accounts of past and living generations. Although this does not fully correspond to the GI measure, it is nevertheless useful to know the generational distribution of the burden of paying for the rest-of-government's outlays under current policies.

3. The desirable properties of a fiscal measure

As we outline in Table 1, the FI and GI fiscal measures have several desirable characteristics that other fiscal measures do not. We discuss these properties in this section.

The first desirable property of a proper fiscal measure is that it should be *forward looking*. Under current budget accounting, many analysts and policymakers (as well as the general public) tend to focus on annual deficits and the level of debt held by the public.[12] For years, policymakers and public-interest groups have debated how to control deficits and debt. These measures, however, substantially understate the true magnitude of the fiscal shortfall that the federal government faces. Specifically, the large future obligations associated with Social Security and Medicare are not reported in standard budget documents, which focus primarily on the effect that current policies have on current fiscal flows. Adopting new forward-looking budget measures would reveal a very different and more accurate picture of the federal government's financial status, as well as the size and nature of needed policy adjustments. Indeed, as the results below suggest, even if we could immediately pay off the entire $3.5 trillion of outstanding debt, federal spending would nevertheless have to be reduced and/or revenues increased by about $41 trillion in present value to make the system sustainable in the long run.

A second desirable feature of a proper fiscal measure is that it should include all future years. That is, it should be *calculated in perpetuity*. Several agencies have been regularly reporting other forward-looking measures. For example, the Social Security and Medicare Trustees' measure of "actuarial balance" incorporates those programs' assets and 75-year-ahead projections of revenues and outlays. Normal cash flow budget reporting covers a span of only five or ten future years. However, the most recent Budget also reports 75-year present-value "actuarial deficiencies" for Social Security and Medicare based on information included in the Trustees

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[11] Note that we can only estimate the direct and immediate incidence of taxes on different generations but not the ultimate incidence that includes the distorting effects that taxes have on work-effort and consumption-saving decisions. Bohn (1992) discusses this type of difficulty in more detail.

[12] To be sure, alternative concepts of debt do exist in budget reports – gross debt, debt subject to ceiling, debt held in trust funds, and debt held by the public. But these measures suffer from the same problems as the debt held by the public that we identify here. We focus our attention on debt held by the public because it is the most meaningful concept for measuring overall federal indebtedness.

Table 1

Properties of Alternative Fiscal Measures

	Various Budget Measures					
Properties of Budget Measures	Annual Deficit	Debt Held by the Public	75-year actuarial deficit	Generational Accounting	Accrued Obligation Measures	FI and GI Composite Measure
Forward Looking			✓	✓	✓	✓
Comprehensive	✓	✓		✓		✓
Calculated in Perpetuity				✓		✓
Based on Current Law	✓	✓	✓			✓
Correctly Indicates Impact of All Policies				✓		✓
Easy to Communicate	✓	✓			✓	✓

Reports and prepared by the same actuaries. As is well known, however, such measures do not completely account for those programs' fiscal imbalances because of the arbitrary truncation of the projection horizon at 75 years. As the 75-year projection window moves forward over time, the cumulative inclusion of an additional year's deficit or surplus will impart instability to such measures even if the underlying revenue and outlay projections remain unchanged. If deficits (or surpluses) beyond the 75th year are especially large and growing, measures based on 75-year-ahead projections will severely understate the true magnitude of the program's Fiscal Imbalance by two-thirds or more, as we show later.[13] Moreover, 75-year measures preserve some of current policy-bias in favor of short-term fixes. That would be true, for example, if the costs of a future reform falls within the 75-year window while some of its benefits fall outside it.

Indeed, the bias created by the 75-year measure was the key reason why the maximum size of the personal accounts was limited to a $1,000 annual contribution (indexed over time with wages) in Model 2 of the President's Social Security Commission. Whereas today's Social Security benefit formula allows for growth in the real (inflation adjusted) value of successive retiree cohorts' benefits, Model 2 proposes eliminating such growth. As a result, the purchasing power of Social Security benefits received by later-retiring cohorts would remain the same (rather than increase) relative that of earlier retiring cohorts. Social Security's scheduled outlays, therefore, would decrease over time. However, much of the cost saving from such a change falls outside of the 75-year window and, therefore, is not captured by the 75-year estimate. Had Model 2 been analyzed using the FI and GI measures suggested herein, the commissioners would have had the flexibility to recommend larger personal accounts.[14]

A third desirable feature of a fiscal measure is that it be *complete* – that is, it should encompass the entire government's operations. Otherwise, the measures

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[13] Before 1965, Social Security's Trustees calculated that program's financial imbalance in perpetuity. However, because Social Security benefits were not indexed to prices, the perpetuity estimates incorporated "level-cost" benefits over time. Imbalance estimates based on level costs were not heavily influenced by the truncation of the projection horizon to 75 years. Indeed, the 1965 Advisory Council noted that truncation reduced the projected shortfall by less than 3 per cent. Not surprisingly, the 1965 Advisory Council on Social Security concluded: "It serves no useful purpose to present estimates as if they had validity in perpetuity." However, Social Security's chief actuary at the time agreed that including all future years was the appropriate choice, at least in theory. (See the Oral History Interview by Robert Myers available at http://www.ssa.gov/history/myersorl.html). Today, however, retirement benefits are indexed for price inflation. Moreover, Social Security benefit formulae take into account real wage growth over beneficiaries' working lifetimes. Therefore, the practical motivation for truncating the projection horizon to 75 years no longer exists. Indeed, such truncation underestimates Social Security's long-term imbalance by two-thirds.

[14] As we explain in the next section, the creation of personal accounts alone does not affect FI or GI when the new personal accounts are actuarially fair. However, the personal accounts in Model 2 were constructed to be more than actuarially fair. The personal accounts in Model 2, therefore, would cost the government more resources in present value in the form of diverted payroll taxes than they would save the government in the form of smaller future outlays, a point emphasized by Diamond and Orszag (2002). As a result, the personal accounts alone would increase Social Security's FI. However, taken as whole, Model 2 would substantially reduce Social Security's FI and, in particular, could have accommodated much larger personal accounts.

would be subject to manipulation – "budget arbitrage" – by reshuffling revenues and outlays among programs. This issue has been particularly important in recent Social Security reform discussions where some plans recommend using general revenues to shoulder some of the burden of future shortfalls. These transfers are not indicated by the traditional measures that focus only on Social Security and Medicare, creating the illusion of free money.

A fourth desirable property is that the measure should be *based on current fiscal policy*. For a proposed measure to be useful for policymaking, it must characterize today's fiscal policy. That is, it should incorporate projected revenues and outlays based on the continuation of current policy, revealing how far current policy is from being sustainable.[15] The measure should not incorporate hypothetical policies.[16]

For example, a Social Security "shutdown" liability measure based on "accrual accounting" is one potential alternative to the GI measure proposed here.[17] Like the GI measure, accrual accounting attempts to measure the unfunded financial obligations arising because of current and past generations. The accrual concept considers a hypothetical reform in which current participants are effectively bought out of the Social Security system based on their previous contributions, thereby allowing Social Security to be shut down. However, many current participants would actually be better off if they left the Social Security system, because it represents a bad deal for them. Indeed, they would be willing to pay to leave the system. Hence, accrual accounting overestimates the true burden imposed by current and past generations associated with the continuation of Social Security (see Smetters and Walliser, forthcoming). Accrual accounting must also rely on some fairly arbitrary rules for determining a person's benefit when he or she has a limited work history. Finally, accrual accounting deviates from current law by treating past contributions as liabilities of the United States government – that is, as benefits "owed" rather than as a description of scheduled benefits corresponding to current policy.[18] The accrual concept makes sense for a private corporation that cannot assume that it will be in business in future years and, therefore, cannot include future

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[15] In some cases – such as discretionary outlays subject to annual appropriations – it is uncertain what "current policy" entails for the long-term. For example, under the Budget Enforcement Act of 1990, discretionary appropriations were temporarily subject to statutory limits with no clear principle guiding their evolution after the limits expired. In such circumstances, our proposed measure would adopt a convention consistent with longer-term historical experience: Long-term outlay/revenue growth will occur in tandem with overall economic growth after such temporary rules expire.

[16] An example of a measure based on such a hypothetical policy is the concept of generational balance developed in Auerbach, Gokhale, and Kotlikoff (1991), and discussed briefly above. This measure distributes a component of the overall fiscal burden equally across all future-born cohorts. See the critique by Diamond (1996). Also, see Liu *et al.* (2002).

[17] Accrual accounting for Social Security has been analyzed by Jackson (2002). See also the Federal Reserve Board's Semiannual Monetary Policy Report to the Congress Before the United States Senate Committee on Banking, Housing, and Urban Affairs, 11 February 11 2003, op. cited.

[18] In Flemming vs. Nestor 363 U.S. 603 (1960), the Supreme Court made it clear that Social Security benefits are subject to the discretion of policymakers.

expected pension contributions into its analysis. The concept appears less appealing for describing the federal government's finances.

Fifth, the measure should also *correctly reflect the impact of all policy changes.* This condition has two complementary components: First, the measure should not change when policy changes are actuarially neutral for all generations. That is, if a policy alters future taxes, benefits, or outlays in a way that leaves all generations' resources unaffected in present value, the measure should remain unchanged. Second, it must accurately reflect all actuarially *non-neutral* policies. As noted in the previous section, the measure should correctly reflect the size and direction of intergenerational redistributions engineered via pay-as-you-go policies.[19]

Finally, the sixth desirable feature is that the measure should be conceptually straightforward and possess properties that are *easy to communicate*. One advantage of the FI measure is that, under given budget projections, it grows over time at the rate of interest – just like a corpus of debt. Hence, change in the measure from one year to the next can be broken down into the amounts due to accumulated interest, policy changes, differences in economic outcomes relative to projections, and updates to economic assumptions used in making budget projections. The GI measure is also simple: It equals the amount of FI due to current and past generations. However, other complementary measures could also be used, including ones that describe imbalances by narrowly defined birth-cohorts, gender, race, and so on.

4. The bias in policymaking arising from current budget accounting

The previous section emphasized that focusing exclusively on backward-looking or short term fiscal measures – such as publicly held debt – substantially understates the true magnitude of the federal government's fiscal shortfall. This section discusses the biases that such an understatement can introduce into policymaking, in particular with regard to our choices among ways of financing programs such as Social Security and Medicare.

Currently, these programs are financed mostly on a *pay-as-you-go* basis, whereby worker's payroll taxes are immediately used up to pay retiree benefits. Individual Social Security taxes are not saved to pay for the contributors' future benefits. To be sure, Social Security and Medicare both have trust funds that reflect past payroll tax revenue and other receipts in excess of past benefit payments. But

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[19] The desirable features mentioned here imply that the measure will be invariant to accounting conventions adopted in describing different transactions between the government and private entities (Kotlikoff 2001). The FI and GI measures proposed here are both invariant to the choice of accounting labels. For example, if Social Security taxes and benefits were relabeled as "borrowing" and "repayment," the size of FI for the entire federal government would remain unchanged. However, this labeling change would result in Social Security's FI being reclassified as a part of debt held by the public.

their size is very small in comparison to the programs' future obligations. Moreover, the trust funds represent an obligation on the rest-of-federal-government account.[20]

An alternative system would give individuals the option to invest some of their payroll taxes in personal accounts that they would own and control. Suppose, in exchange for this option, a person's Social Security benefit is reduced one dollar in present value for each payroll tax dollar that the person is allowed to invest in his or her personal account. The retirement benefits of those who participate in such a system would consist of reduced traditional Social Security benefits plus income derived from their personal account assets. But to pay current retiree benefits, the federal government would have to borrow an additional dollar for each dollar invested in a personal account rather than paid to the government as payroll taxes. This would drive up annual deficits and public debt. Under traditional accounting, therefore, this reform does not look favorable.

However, the level of publicly held debt is just one component of the government's true fiscal imbalance. Another component includes the present value of Social Security's future scheduled benefits that are not currently tracked in official federal budget reports. Under this reform, future Social Security obligations would decrease by the same amount as the increase in the debt; the government's true fiscal imbalance, therefore, would remain unchanged. In other words, current discussions about Social Security reform start from a *biased* position since even a neutral reform looks bad under the current focus on public debt. Including the present value of future Social Security benefits into the current budget would remove this bias.

Now suppose, for example, that future Social Security benefits were reduced by a little more than one dollar for each dollar of payroll that a person invests into a personal account. This example is very similar to Model 1 of the President's Social Security Commission, where future benefits were discounted by 50 basis points above the government's borrowing rate. Many people might choose this plan in order to have more control over their retirement resources. This reform would increase publicly held debt over the short-term because the government would need to borrow additional resources to meet current benefit obligations, but the government's true long-term fiscal imbalance would actually *decline,* because the increase in debt would be less than the reduction in present value of future Social Security benefits. Nonetheless, policymakers would not favor such a plan if debt were the only measure used for judging the government's fiscal position.

The traditional focus on publicly held debt, therefore, creates a bias in decision-making against potential reforms to Social Security and Medicare that could reduce the government's fiscal imbalance. This bias is especially problematic given the large existing imbalances. A more complete accounting, which explicitly

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[20] Whether previous trust fund surpluses have reduced the debt held by the public or produced higher levels of spending, however, is an area of active research. See Schieber and Shoven (1999), Diamond (2003), and Smetters (2003).

recognizes the future net obligations of Social Security and Medicare as well as the rest of the government, would reduce this bias.

5. Estimates of federal fiscal and generational imbalances in the United States

This section reports estimates of total Fiscal Imbalance (FI) and, where appropriate, the Generational Imbalance (GI) for the federal government under the assumption that the Budget's policies represent "current policies." This so-called policy inclusive treatment of the federal budget is consistent with how the Budget is usually presented. The calculations are based on long-term budget projections (through the year 2080) provided by the Office of Management and Budget (OMB) and, naturally, incorporate OMB's economic assumptions, including a real GDP per capita growth rate of 1.7 per cent per year after ten years (*i.e.*, after projected short-run cyclical effects have elapsed).[21] We use a real discount rate of 3.6 per cent, corresponding to the average yield on 30-year Treasury bonds during the past several years.

As demonstrated later, the most important assumption is the future growth rate in real health-care (Medicare and Medicaid) outlays per capita. Consistent with the Medicare Trustees, our baseline assumes that real health-care outlays per capita will grow at an annual rate that is 1 percentage point faster than the growth rate in GDP per capita until 2080.[22] Between 2080 and 2100, that differential is gradually reduced to zero, so that health care outlays grow as a share of GDP only because of population aging after 2100. These assumptions are considerably more conservative relative to historical experience. Indeed, between 1980 and 2001, health care expenditures have grown by 2.3 percentage points faster per year than GDP.[23]

Constructing the GI measures for Social Security and Medicare as well as extending OMB's projections beyond 2080 required detailed work using micro data sets.[24] In particular, we constructed eight age-sex profiles using various micro data sets corresponding to every tax category (labor, payroll, capital, estate, excise, customs duties, gift taxes, and miscellaneous receipts). Moreover, eighteen other

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[21] This rate of real GDP growth per capita is obtained by deflating projected nominal GDP per capita by the projected CPI rather than by the GDP deflator. This procedure implies that all constant dollar values reflect the opportunity cost in consumption units. In addition, because the CPI is known to contain an upward bias, the FI and GI estimates reported here are likely to err on the low side.

[22] See the Medicare trustees assumptions on the growth in health care outlays, available at http://www.cms.gov/publications/trusteesreport/2003/tabid1.asp

[23] This calculation is based on the Centers for Medicare and Medicaid Services' estimates of national health care expenditures (see http://www.cms.hhs.gov/statistics/nhe/historical/t1.asp). Heffler *et al.* (2003) provide a more detailed breakdown by period. They show that during 1966-88, real national health expenditures grew at an annual average rate of 6.3 per cent, whereas the chain-weighted GDP index grew at 5.4 per cent – a difference of 0.9 per cent. During 1989-93, the numbers were 6.3 per cent and 3.2 per cent respectively; and during 1994-2000 they were 3.8 per cent and 1.8 per cent respectively.

[24] See appendices B through F in Gokhale and Smetters (2003).

age-sex profiles were constructed corresponding to each of the major outlay programs that targets specific population subgroups (Social Security, Medicare, Medicaid, federal civilian retirement, veterans' benefits, SSI, WIC, etc.). Outlay programs whose benefits are more diffused throughout the population (national defense, justice, international affairs, etc.) were distributed equally across population in year of spending. This equal distribution does not represent an "allocation of benefit" to specific generations. Rather, it is an intermediate step used for projecting aggregate discretionary outlays beyond OMB's projection horizon of 2080. The projection method assumes that public goods and services per capita grow at the same rate as GDP per capita beyond 2080 – 1.7 per cent per year.

These age-sex profiles were then used to decompose the OMB numbers by generation before 2080 and then to extend OMB's numbers beyond 2080 using demographic projections relevant for those years. The age-sex profiles also allow us to break down the revenue side of the rest-of-government finances by generation. The profiles must be indexed by age since the amount and type of taxes paid varies by age. The profiles must also vary by gender because women are projected to live longer than men and, therefore, pay different levels of taxes and receive different levels of benefits. Even though we do not break down our final results by gender, its incorporation into the underlying calculations improves the accuracy of our estimates. See the appendices for more details.

FI calculations are reported beginning with fiscal year-end 2002. However, to show the evolution of FI and GI under current policies and projections, they are recalculated each year through 2008. Present values are calculated using projected interest rates on long-term treasury securities (also provided by OMB). The appendices provide detailed descriptions of the methods used in extending OMB's budget projections.

5.1 Total federal fiscal imbalance

Table 2 comprehensively documents total federal FI, its sources by program, and its breakdown into the GI attributable to past and living generations. The first three panels show FI and GI measures for Social Security, Medicare Part A, and Medicare Part B. In each of these panels, the GI measure is subdivided into the present value of prospective payments and receipts by living generations and the trust fund that includes the net contributions from past transactions. The last row in each panel shows the residual – FI minus GI – that indicates the contribution to FI on account of future generations. Panel 4 of Table 2 shows the FI measure for the rest of the federal government – that is, for non–Social Security and non-Medicare transactions. As mentioned earlier, the GI measure is not calculated for the rest of the federal government because outlays cannot be easily distributed across generations. Instead, only prospective revenues are subdivided into those that living and future generations are projected to pay under current fiscal policy.

Table 2

Fiscal and Generational Imbalances in Social Security, Medicare, and the Rest of the Federal Government

(present values in billions of constant 2002 US dollars; fiscal year-end)

	2002	2003	2004	2005	2006	2007	2008
1. Fiscal Imbalance (FI) in Social Security	**7,022**	**7,204**	**7,436**	**7,692**	**7,967**	**8,258**	**8,569**
Imbalance on Account of Past and Living Generations (GI)	**8,771**	**8,943**	**9,171**	**9,424**	**9,694**	**9,981**	**10,289**
Future Net Benefits of Living Generations†	10,100	10,398	10,762	11,166	11,593	12,043	12,518
Trust Fund	–1,329	–1,455	–1,591	–1,742	–1,899	–2,062	–2,230
Imbalance on Account of Future Generations††,♣	**–1,749**	**–1,739**	**–1,736**	**–1,732**	**–1,727**	**–1,723**	**–1,720**
2. Fiscal Imbalance (FI) in Medicare – Part A	**20,497**	**21,071**	**21,764**	**22,513**	**23,285**	**24,091**	**24,939**
Imbalance on Account of Past and Living Generations (GI)	**8,526**	**8,867**	**9,265**	**9,696**	**10,136**	**10,600**	**11,088**
Future Net Benefits of Living Generations†	8,755	9,118	9,537	9,991	10,459	10,949	11,464
Trust Fund	–229	–250	–271	–295	–323	–350	–377
Imbalance on Account of Future Generations††,♣	**11,972**	**12,204**	**12,499**	**12,817**	**13,148**	**13,491**	**13,851**
3. Fiscal Imbalance (FI) in Medicare – Part B	**16,145**	**16,519**	**16,978**	**17,479**	**18,009**	**18,562**	**19,144**
Imbalance on Account of Past and Living Generations (GI)	**6,633**	**6,853**	**7,109**	**7,392**	**7,693**	**8,011**	**8,343**
Future Net Benefits of Living Generations†	6,671	6,881	7,140	7,423	7,728	8,046	8,381
Trust Fund	–39	–28	–32	–32	–35	–36	–38
Imbalance on Account of Future Generations††,♣	**9,513**	**9,666**	**9,869**	**10,087**	**10,315**	**10,552**	**10,801**
Fiscal Imbalance (FI) in Medicare (Parts A and B)	**36,643**	**37,590**	**38,742**	**39,992**	**41,293**	**42,653**	**44,084**
4. Fiscal Imbalance (FI) in the Rest of the Federal Government	**550**	**676**	**753**	**864**	**1,005**	**1,153**	**1,310**
Future Outlays	80,676	81,701	83,161	84,780	86,503	88,307	90,202
Future Revenues	–85,263	–86,552	–88,295	–90,103	–91,985	–93,917	–95,938
Living Generations†	–32,596	–33,273	–34,141	–34,997	–35,885	–36,781	–37,698
Future Generations††	–52,667	–53,278	–54,154	–55,106	–56,100	–57,136	–58,240
Excess Future Outlays Over Revenues	**–4,587**	**–4,851**	**–5,134**	**–5,323**	**–5,482**	**–5,609**	**–5,736**
Obligations to Social Security and Medicare Trust Funds	**1,597**	**1,734**	**1,894**	**2,069**	**2,256**	**2,448**	**2,644**
Debt Held by the Public	**3,540**	**3,793**	**3,993**	**4,119**	**4,231**	**4,314**	**4,402**
Total Federal Fiscal Imbalance (FI)	**44,214**	**45,470**	**46,930**	**48,548**	**50,265**	**52,064**	**53,962**

Note: Positive items increase the Fiscal Imbalance.

† Those born fifteen years ago and earlier. In 2002, for example, this category includes people born before 1988.

†† Those born fourteen years ago and later. In 2002, for example, this category includes people born during 1988 and later.

♣Calculated as FI minus GI.

Source: Authors' calculations.

Total FI for the federal government as of fiscal year-end 2002 equals $44.2 trillion (Table 2, last row). The Social Security program contributes $7 trillion. Medicare contributes $36.6 trillion – the largest share by far. The rest-of-federal-government's contribution is relatively small – only $0.5 trillion. It can be shown that the total fiscal imbalance grows at the rate of interest if no policy action is taken to reduce it.[25] This relationship implies that if future projected revenues and outlays remain unchanged, the imbalance will quickly grow larger over time. By 2008, for example, it will have grown to $54 trillion.

5.2 Social security

Social Security's FI of $7 trillion equals the present value of projected Social Security benefits plus administrative costs minus the present value of projected payroll taxes, federal employer payments, income taxes on Social Security benefits, and minus the initial balances in the Social Security trust fund. It is broken down into the GI of $8.8 trillion and the residual, FI minus GI, of minus 1.7 trillion.

Social Security's imbalance is caused by past and living generations. In particular, as of 2002, past and living generations are projected to receive over $8.8 trillion more in benefits than they will contribute in payroll taxes (using the present value of both benefits and taxes). In contrast, future generations are projected to pay $1.7 trillion more in taxes than they will receive in benefits. Hence, under current tax and benefit rules, future generations are projected to reduce Social Security's imbalance by $1.7 trillion, but not by enough to restore the Social Security program to a sustainable system in the presence of the $8.8 trillion liability "overhang" left over from current and past participants.[26] For Social Security to fully return to balance, living and future generations must collectively receive fewer benefits and/or pay more taxes by $7 trillion in present value. For example, if only future generations were required to carry the full burden of eliminating Social Security's FI, they would need to pay an additional $7 trillion in taxes or receive equivalently lower benefits. As another example, suppose that living generations were required to cover half of Social Security's imbalance in the form of lower benefits or higher taxes while future generations were required to cover the remainder. In that case, the imbalance on account of past and living generations would decline to approximately $5.2 trillion in 2002 while the imbalance on account of future generations would be minus $5.2 trillion. Thus, some generations must receive less or pay more in order to

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[25] See Appendix A in Gokhale and Smetters (2003).

[26] Geanakoplos, Mitchell, and Zeldes (1998) show that most of Social Security's overhang stems from past generations receiving substantially more in benefits than they paid in taxes. In particular, under our calculations, if the amount of Social Security benefits received by past and current generations were equal in present value to the benefits that they received and are projected to receive in the future, the size of the trust fund would be $10.1 trillion in 2002, thereby reducing Social Security's GI to zero. In this case, we would say that Social Security was "fully funded." The actual value of the trust fund, however, is only $1.3 trillion. Most of the $8.7 trillion difference stems from past generations receiving more in benefits than they paid in taxes.

return Social Security to sustainability. Regardless of which policy is chosen, creating balance in Social Security (*i.e.*, a zero Social Security FI) requires that the Generational Imbalance (GI) caused by past and current generations be exactly offset by the imbalance on account of future generations (FI minus GI).

5.3 Medicare

Medicare's FI is $36.6 trillion – more than five times as large as Social Security's imbalance. This number reflects the projected faster growth of Medicare outlays per capita, in addition to the aging of the population during the century. The Medicare program has two parts – Part A (Hospital Insurance) and Part B (Supplementary Medical Insurance). Unlike Medicare Part A, which is financed out of dedicated payroll taxes, Part B is partially financed out of premiums paid by those who choose to participate. Premiums cover roughly 25 per cent of Part B's annual outlay. The remaining 75 per cent is financed through transfers from the general fund (rest-of-government account) to Medicare Part B's trust fund. The transfers are made several times each year, based on estimated outlays through the following year. Consistent with the view of Social Security's Trustees, we follow the convention of not counting these transfers as a dedicated resource for Medicare Part B.[27] This choice reflects the principle of associating FI with the program that incurs the outlays. Hence, Medicare Part B's FI is calculated as the present value of projected spending minus the present value of projected premium receipts.[28] Table 2 shows the breakdown of Medicare's FI arising from Parts A and B. It shows that Part A contributes $20.5 trillion, or about 56 per cent of Medicare's total FI. At $16.1 trillion, Medicare Part B's FI is about 80 per cent as large as that of Medicare Part A.

In sharp contrast to Social Security, a majority of Medicare's FI arises from future generations (FI minus GI) rather than from past and current generations (GI). For example, the GI for Medicare Part A is only $8.5 trillion whereas the residual (FI minus GI) contributes $12 trillion to Medicare Part A's total imbalance of $20.5 trillion. The contributions of past, current, and future generations to Medicare Part B's aggregate Fiscal Imbalance shows a similar pattern. The reason for future generations' significantly larger contribution is the rapid projected growth in Medicare outlays per capita during the next several decades. As with Social Security, some current or future generations must receive less or pay more for Medicare to become fiscally sustainable.

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[27] For example, see Chart E in the Trustees' Summary of the 2003 Annual Reports available at: http://www.ssa.gov/OACT/TRSUM/trsummary.html

[28] If, alternatively, general revenue transfers were treated as dedicated revenue to Part B, they would appear as an outlay in the rest of the budget and, therefore, have no effect on the federal government's total FI. To be sure, the exact placement of Part B's revenue in the table is open to interpretation. However, we follow the Social Security and Medicare Trustees' lead by not representing this revenue as "free" to the Medicare program.

5.4 The rest of the federal government

Table 2 shows that the rest of the federal government's FI is $550 billion. Under current projections, the present value of the rest-of-federal-government's projected receipts exceeds its non–Social Security and non-Medicare outlays by $4.6 trillion. However, the Treasury securities held by the Social Security and Medicare trust funds, and counted among those programs' dedicated resources, must be entered as a liability on the rest-of-government's account. This liability plus debt held by the public exceeds the prospective surplus of rest-of-government receipts over outlays by $0.5 trillion. Out of the present value of all prospective receipts of $85 trillion, past and living generations are projected to contribute only $32.6 trillion, or about 37 per cent. Future generations contribute the remainder – $52.7 trillion. OMB revenue estimates include a secular rise in revenues relative to GDP that could arise from the taxation of withdrawals from assets in tax-deferred saving accounts – as recently claimed by Boskin (2003), real bracket creep, or an increase in the number of taxpayers subject to the Alternative Minimum Tax.[29]

Under the convention adopted here of not counting general revenue financing of Medicare Part B as a resource dedicated to that program, an overwhelming majority – 98.8 per cent – of total federal FI arises from Social Security and Medicare.

6. Evaluating the size of federal fiscal imbalance

6.1 Comparison with official estimates

The FI estimate shown in Table 2 dwarfs the traditional measure of fiscal indebtedness – debt held by the public – by more than a factor of ten. The Budget acknowledges the inadequacy of traditional budget measures as indicators of the government's long-term financial solvency. For example,

> *"A traditional balance sheet with its focus on past transactions can only show so much information. For the government, it is important to anticipate what future budgetary requirements might flow from future transactions. Even very long-run budget projections can be useful in sounding warnings about potential problems despite their uncertainty. Federal responsibilities extend well beyond the next five or ten years, and problems that may be small in that time frame can become much larger if allowed to grow."* [Budget]

Nevertheless, the Budget's summary tables do not include complementary indicators of the federal government's fiscal position.[30] Rather, the budget devotes a

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[29] When asset growth in tax-deferred plans is evaluated on a risk-adjusted basis, however, tax deferral costs the government money.

[30] These comments also apply equally to other budget reporting agencies such as the Congressional Budget Office, Joint Tax Committee, and others who employ short-term reporting horizons.

separate chapter to report the prospective shortfalls in Social Security and Medicare only. An analysis of these estimates is presented in the Analytical Perspectives volume of the Budget. These estimates, however, are based on the economic assumptions of the Social Security and Medicare Trustees, which differ from the economic assumptions that OMB uses in preparing the forecasts that appear elsewhere in the budget. Moreover, the Social Security and Medicare calculations reported in the budget are limited to a projection horizon of 75 years and do not include the administration's own new policy recommendations, in contrast to the "policy inclusive" nature of the rest of the budget. Social Security's "long-term deficiency" is reported as $3.4 trillion and Medicare's is $13 trillion. Both estimates include the programs' trust funds balances as resources dedicated for those programs. Because of the truncated projection horizon (and the non-policy inclusive nature of the Social Security and Medicare projections), these estimates understate considerably the true magnitude of fiscal imbalance embedded in the Budget's policies.

More recently, the 2003 Social Security and Medicare trustees' report shows 75-year as well as infinite-horizon shortfall estimates for that program. The trustees also reported Social Security's closed-group liability, which is constructed in the same way as the GI concept herein. The trustees' 75-year shortfall estimate closely approximates the figures reported in the Budget. Their infinite horizon estimate is $10.5 trillion – larger than that reported in this monograph. We suspect that this difference is primarily due to the higher discount rate that we use – a rate consistent with OMB's projection of interest rates on long-term Treasury debt. Medicare's trustees, however, do not provide an infinite horizon estimate of Medicare's fiscal imbalance. The estimate of Medicare's FI that we report is almost three times as large as the 75-year number reported in the budget. Our estimate, however, also includes the policy proposals contained in the FY 2004 budget.

This paper does not endorse the use of an FI measure calculated over just 75 years. However, for comparison with the estimates in the Budget and in the trustees' report (both of which are based on the trustees' economic assumptions and exclude the Budget's newest policy proposals), Table 3 shows 75-year estimates of FI based on policy-inclusive OMB projections and OMB's own economic assumptions that it uses in the rest of the budget.[31] Our estimate of the 75-year FI for Social Security is only $1.6 trillion, compared to $3.4 trillion that was reported in the Budget. The difference primarily stems from the higher assumed rate of productivity growth under the OMB assumptions that we use. Higher productivity growth increases payroll tax receipts over the short- and medium-term and increases Social Security benefit outlays over the long-term. Also OMB's long-term real discount rate – 3.6 per cent per year – is about 60 basis points higher than that used by the Social Security trustees. The cumulative effect over a 75-year projection window is to make our 75-year estimate of Social Security's FI smaller than that reported in the Budget.

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[31] OMB did not provide projections excluding the administration's latest budget proposals.

Table 3

Seventy-five-year Fiscal Imbalances

(present values in billions of constant 2002 US dollars; fiscal year-end)

Fiscal Years	2002	2003	2004	2005	2006	2007	2008
75-Year Fiscal Imbalance – U.S. Federal Government	**16,315**	**17,101**	**17,943**	**18,889**	**19,900**	**20,966**	**22,097**
Social Security	1,596	1,689	1,804	1,932	2,072	2,224	2,389
Medicare	15,080	15,676	16,361	17,102	17,868	18,672	19,518
Rest of Federal Government	–360	–264	–222	–145	–41	70	190

Source: Authors' calculations.

Table 4

Total Fiscal Imbalance as a Share of Present Values of Payroll, GDP, and Various Outlays

	Fiscal Year-End						
	2002	2003	2004	2005	2006	2007	2008
Total Fiscal Imbalance (FI)	**44,214**	**45,470**	**46,930**	**48,548**	**50,265**	**52,064**	**53,962**
PV of Payroll Base	265,646	272,027	275,398	280,161	285,399	290,918	296,641
Total FI as a Percent of PV of Payroll	**16.6**	**16.7**	**17.0**	**17.3**	**17.6**	**17.9**	**18.2**
PV of Income Taxes	64,564	65,593	66,995	68,474	70,005	71,561	73,181
Total FI as a Percent of PV of Income Taxes	**68.5**	**69.3**	**70.1**	**70.9**	**71.8**	**72.8**	**73.7**
PV of Payroll Taxes	47,038	47,655	48,517	49,456	50,451	51,482	52,565
PV of FI as Percent of Payroll Taxes Plus Taxes on Social Security Benefits	**94.0**	**95.4**	**96.7**	**98.2**	**99.6**	**101.1**	**102.7**
PV of Discretionary Outlays	42,458	42,884	43,533	44,260	45,045	45,875	46,752
PV of FI as a Percent of PV of Discretionary Outlays	**104.1***	**106.0***	**107.8***	**109.7***	**111.6***	**113.5***	**115.4***
PV of Social Security and Medicare Outlays	97,666	99,675	102,234	105,022	107,959	111,017	114,232
PV of FI as a Percent of Social Security and Medicare Outlays	**45.3**	**45.6**	**45.9**	**46.2**	**46.6**	**46.9**	**47.2**
PV of Non-Social Security and Non-Medicare Outlays	80,676	81,701	83,161	84,780	86,503	88,307	90,202
PV of FI as a Percent of Non-Social Security and Non-Medicare Outlays	**54.8**	**55.7**	**56.4**	**57.3**	**58.1**	**59.0**	**59.8**
PV of GDP	682,156	699,070	708,187	720,896	734,861	749,573	764,811
Total FI as a Percent of PV of GDP	**6.5**	**6.5**	**6.6**	**6.7**	**6.8**	**6.9**	**7.1**

Note: Positive items increase the imbalance.

* Exceeds 100 per cent: An immediate and permanent elimination of discretionary spending is insufficient to achieve a sustainable fiscal policy (*i.e.*, FI = 0).

Source: Authors' calculations.

By contrast, Table 3 shows that our 75-year $15.1 trillion estimate of Medicare's FI (using OMB assumptions) is larger than the $13 trillion value reported in the Budget. Our estimate would have been much lower than the Budget's estimate because of the higher discount rate under OMB assumptions if we had also excluded the president's newest policy proposals. However, the impact of new Medicare proposals in the Budget more than offset the effect of using a higher discount rate. In general, we conclude that our estimate for Social Security's FI is more conservative than official estimates. Medicare's FI would also be smaller but for the impact of new Medicare policies proposed in the Budget.

6.2 Comparison of FI with present values of payroll, GDP, and other aggregates

Another way to assess the magnitude of total federal FI is to compare it to the present value of future GDP or future payrolls. Table 4 shows that as of the end of fiscal year 2002, total FI equaled 6.5 per cent of the present value of all future GDP and about 16.6 per cent of the present value of future capped payrolls. So, for example, restoring a balanced fiscal policy could, in theory, be accomplished with an immediate and permanent wage tax increase of 16.6 percentage points. If we instead choose to eliminate FI by increasing federal income taxes, those revenues would have to be increased by another two thirds. Alternatively, Table 4 shows that future Social Security and Medicare outlays would have to be permanently lowered by 45 per cent or non–Social Security and non-Medicare outlays would have to be cut by 54.8 per cent immediately and forever. Alternatively, eliminating the entire federal discretionary budget immediately and permanently would still fall about $1.8 trillion short of achieving fiscal sustainability. Such tax hikes or spending cuts would obviously be devastating to the economy. However, the alternative of waiting to make the adjustment is worse: Waiting until just 2008 to make the adjustment would require an immediate and permanent wage tax hike of 18.2 percentage points rather than 16.6 percentage points, or a 73.7 per cent increase in income tax revenues instead of 68.5 per cent. If the entire adjustment were made by cutting non–Social Security and non-Medicare outlays, they would have to be reduced by 59.8 per cent in 2008 instead of 54.8 per cent today.

6.3 Sensitivity to alternative assumptions

Federal revenue and outlay projections – and, hence, the values of FI and GI – obviously depend on the underlying assumptions. This section reports the sensitivity of FI to variations in three key underlying parameters: the government's long-term annual discount rate (r); the annual growth rate of GDP per capita (g); and the differential (h) between the annual growth rate of outlays on Medicare and Medicaid per capita and g. The differential, h, however, only exists until 2080. Between 2080 and 2100, the annual growth rate of outlays on Medicare and Medicaid per capita is gradually reduced to g so that the differential, h, becomes zero where it remains after 2100. As a result, health care outlays per capita

(distinguished by age and sex) grow no faster than GDP per capita beyond the year 2100. This projection of entitlement outlay growth causes the share of Medicare and Social Security spending in GDP to rise from 7.6 per cent in 2002 to 13.1 per cent by 2080. Under the baseline set of assumptions corresponding to results presented earlier, r = 3.6, g = 1.7, h = 1 per cent. We now consider two alternative values – low and high – for each parameter.[32] The low and high values for r are 3.3 and 3.9 per cent; those for g are 1.2 and 2.2 per cent; and those for h are 0.5 and 1.5 per cent.[33]

Table 5 shows that the FI for fiscal year-end 2002 is quite sensitive to the discount rate assumption: FI is estimated to be $34.6 trillion under the high discount rate assumption (r = 3.9 per cent), whereas it is $58.6 trillion when the assumed discount rate is low (r = 3.3 per cent). The high sensitivity of FI to the different values of r is not surprising. Notice, for example, that the baseline total FI is almost three times larger than the truncated 75-year estimate (see Tables 2 and 3), suggesting that annual imbalances are projected to grow considerably beyond the 75th year. This high projected growth of annual imbalances in the distant future causes the FI to be very sensitive to variations in the assumed discount rate.

To understand the sensitivity of FI to the discount rate, consider, for example, two different time series of annual imbalances. Assume that both series are initially equal in present value at a given discount rate. By the process of compound interest, a change in the discount rate alters the discount factor applicable to values further in time by more than those nearer in time. Hence, between these two time series, the one that exhibits growing annual imbalances will be more sensitive to discount rate changes than one that is stable over time. Therefore, the high sensitivity of FI to changes in the discount rate indicates that projected annual financial shortfalls continue to grow over time. Hence, the sensitivity of FI only confirms the inappropriateness of using short-term fiscal measures or measures based on an arbitrarily truncated projection to assess the extent of policy unsustainability.

Turning now to the productivity growth rate assumption, g, Table 5 also shows that the total FI is $55.9 trillion under the high growth rate assumption (g = 2.2 per cent). Social Security's FI increases from $7 trillion under baseline

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[32] An increase in g does not necessarily have the same impact as an equal decline in r because higher growth does not necessarily imply higher outlays in every category. For example, higher growth is likely to result in lower social welfare outlays. Hence, we show below the sensitivity of FI estimates to variations in r and g separately.

[33] We consider the sensitivity of each parameter relative to the baseline set of parameters. Future work could extend this analysis by considering different parameter combinations, combined with the probability of each combination in order to create a distribution of possible outcomes.

Table 5

Sensitivity of Fiscal Imbalance (2002) to Discount Rate and Growth Assumptions
(present values in billions of constant 2002 US dollars; fiscal year-end)

	Baseline Assumptions	Discount Rate		GDP Growth Per Capita		Health Care Outlay Growth Per Capita	
		High	Low	High	Low	High	Low
Total Fiscal Imbalance – U.S. Federal Government	**44,214**	**34,564**	**58,608**	**55,892**	**36,908**	**63,930**	**29,450**
Social Security	**7,022**	5,025	9,978	**11,975**	**4,933**	**7,022**	**7,022**
Medicare	**36,643**	28,910	47,962	**66,071**	**23,194**	**50,035**	**26,644**
Rest of Federal Government	**550**	**629**	**668**	**–22,153**	**8,781**	**6,874**	**–4,215**
Present Value of Excess of Outlays Over Receipts	–4,587	–4,508	–4,470	–27,290	3,644	1,737	–9,352
Liability to SS and Medicare	1,597	1,597	1,597	1,597	1,597	1,597	1,597
Debt Held by the Public	3,540	3,540	3,540	3,540	3,540	3,540	3,540

Source: Authors' calculations.

Table 6

Sensitivity of Total Fiscal Imbalance (2002) as a Share of the Present Value of Payroll

	Policy Baseline	High	Low
Discount Rate	16.6	15.0	18.8
Productivity Growth Per Capita	16.6	14.8	18.0
Health Care Outlay Growth Per Capita	16.6	24.1	11.1

Source: Authors' calculations.

assumptions to $12 trillion under the high growth rate assumption.[34] Medicare's FI increases from $36.6 trillion to $66.1 trillion because greater productivity growth also occurs in the Medicare sector (*i.e.*, the differential, *h,* is unchanged). However, for the rest of government, faster productivity growth also brings in more general revenue and reduces the outlays on Medicaid, unemployment compensation, and various welfare programs. As a result, the rest-of-federal-government's FI shifts from $0.5 trillion under the baseline to minus $22.2 trillion. Nevertheless, across all government programs, the net effect of higher productivity is to increase total FI relative to its value under baseline assumptions.

Conversely, lower assumed productivity growth (g = 1.2 per cent) reduces Social Security and Medicare's imbalances, but increases the imbalance on account of the rest of the federal government. The resulting total FI is $36.9 trillion, which is smaller than the $44.2 trillion baseline value.

The impact on FI of alternatively assuming higher- and lower-than-baseline growth rates in federal health care spending is more substantial. Under the high-h assumption (h = 1.5 per cent), FI is $63.9 trillion, whereas it comes in at just $29.5 trillion under the low-h assumption (h = 0.5 per cent).[35] Under the high-h assumption, annual health care costs per capita are assumed to grow at 1.5 percentage points above the annual GDP per capita growth rate until 2080 – an assumption that is actually quite plausible when compared with experience during the previous two decades when, as noted above, we witnessed an annual differential of 2.3 percentage points. Under the low-h assumption, however, health care costs are assumed to grow at just 0.5 percentage points above GDP, an assumption that strikes us as fairly unlikely. In both cases, between 2080 and 2100, the differential is reduced to zero where it stays forever – an assumption that is clearly conservative by historical standards.

The *ratio* of FI to the present values of payroll and GDP, however, exhibits greater stability than the present value constant 2002 *dollar* amounts in response to changes in the various parameter values because the denominator – the present value of future payrolls or GDP – changes in the same direction as total FI. In other words, while the dollar value of the Fiscal Imbalance is sensitive to the underlying assumptions, the size of the tax rate increase or percent decrease in spending

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[34] The increase in Social Security's FI seems counterintuitive at first glance because faster future productivity growth does not affect the real value of existing retirees' benefits. Rather, payroll tax revenues increase immediately but benefits rise only gradually as faster wage growth (stemming from the assumed faster productivity growth) is incorporated in calculating future retirees' benefits. To understand why Social Security's FI increases in value, suppose that in response to faster productivity growth, the payroll tax base, payroll tax revenues, and outlays double. The imbalance between outlays and revenues would also double. However, if, more realistically, outlay increases are delayed by a few years, the imbalance would increase to less than twice its original size. We discuss below how the total FI changes relative to payroll tax base and other measures as we change the underlying economic assumptions.

[35] Notice that Medicare's FI is actually larger under the high-g assumption relative to the high-h assumption even though the assumed growth rate of future health, g plus h, is identical under both assumptions. The reason is that we follow OMB rules and begin the high-g assumption in 2003 while starting the high-h assumption in 2014.

required to achieve sustainability is much less sensitive. Table 6 shows that under baseline assumptions, the total FI is 16.6 per cent of the present value of the (uncapped) payroll tax base as of fiscal year-end 2002. Under high and low productivity growth assumptions, it is 14.8 and 18 per cent, respectively. Recall that, as reported earlier, the total FI is larger in present-value dollar terms under the high productivity growth assumption. In contrast, it is actually *smaller* as a share of the present value of future payrolls relative to the baseline. The reason is that FI grows proportionally less than the payroll base because of larger rest-of-government receipts and smaller outlay growth for some expenditure categories. Under the high and low health-care growth assumptions, the variation in the ratio of FI to the present value of payrolls is wider – between 24.1 and 11.1 per cent respectively. This variation is not so surprising given the 100 basis point difference *per year* between our high- and low-cost health growth rate assumptions, which produces a large compounded difference over time. These numbers show that an immediate and permanent 11.1 percentage point tax increase on all wages is needed to return U.S. fiscal policy system to sustainability even under very optimistic assumptions about growth in health costs per capita.

7. Conclusion

The federal government's spending priorities are set to change over the coming decades as the baby boom generation retires: future federal outlays will predominantly consist of social insurance payments. In such a budget environment, traditional measures such as debt held by the public, five- or ten-year-ahead cash-flow deficit projections, and longer-term but truncated summary measures have limited usefulness for policymaking. Indeed, continuing to focus on such measures is likely to sustain a policy bias that favors short-term debt reduction over policies that would be beneficial in addressing the nation's true longer-term Fiscal Imbalance. To evaluate and compare all available policy alternatives on a neutral footing, we need to introduce new fiscal measures as part of our fiscal vocabulary.

The FI and GI measures proposed here possess several desirable properties. The main effect of adopting them would be to place the debate on entitlement reform on a *neutral* basis. These measures would provide policymakers with a powerful tool for analyzing the long-term financial health of the federal government: The FI measure informs us about the extent of the federal government's long-term insolvency and the GI measure provides a metric for choosing among alternative sustainable policies to strike an acceptable balance between the costs imposed on different generations. The GI measure could also be augmented with other, more detailed measures of the impact of fiscal policies across population subgroups.

Based on OMB's policy-inclusive budget projections, the federal government's long-term Fiscal Imbalance is $44.2 trillion as of fiscal year-end 2002. This value is ten times as large as the size of debt currently held by the public; it is also several times larger than similar values published elsewhere under a 75-year projection horizon. To fully eliminate the existing FI, wage taxes, for example, will

have to be increased by 16.6 percentage points forever. Eliminating all discretionary spending immediately and forever would fall short by $1.8 trillion.

To be sure, the dollar value of the FI is sensitive to underlying growth and discount rate assumptions. But this occurs because of the rapid growth in projected financial shortfalls – which only reinforces the case for reporting the perpetuity FI measure rather than a truncated 75-year measure. The ratio of the FI to the tax base or GDP – and, hence, the sizes of alternative fiscal reforms to achieve solvency – is much less sensitive to changes in these economic assumptions since the tax base and GDP tend to respond in the same direction as FI.

We remain optimistic about the potential for further reform in federal budget accounting. Positive changes have already occurred in the official reporting of the long-term financial status of Social Security and Medicare: The Social Security trustees have adopted the FI and GI measures for that program along with other changes including stochastic analysis. We hope that the trustees will soon begin officially reported these measures for Medicare and that CBO and OMB will begin reporting these measures for the rest of the federal government as well.

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COMMENTS ON SESSION I: ASSESSING PUBLIC LIABILITIES

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My comment focuses on issues discussed in the four papers on public debt in emerging markets. The comments are fairly general, not so much to each paper separately.

The papers give a useful account of the public debt situation in emerging market economies. The papers were interesting and informative.

Generally, they report that the level of public debt in emerging market countries has been on the rise since the mid-Nineties. The rise seems to be caused by interest and exchange rate movements and the recognition of off-balance sheet and contingent liabilities. The transition countries in Europe are important exceptions. Here the debt ratios have fallen sharply as many of these countries have taken measures necessary for accession to the European Union. Generally, the primary fiscal balance has not itself added to the debt stock during this period. Another interesting observation is that the share of domestic debt has increased in Asia and Latin America.

Why worry?

We may worry about the high levels of debt if it hampers economic growth and development. There may be two channels through which that might happen. First, debt servicing requires resources that otherwise could be used for productive investments. Second, a risk of default or an actual default might create uncertainty and turbulence that reduce investments, trade, retrench demand and create other types of turbulence that reduce growth and development.

Empirically, the high interest rates on emerging-market public debt show that the risk of a default is costly. There are also costs from actual default, but those costs might have been somewhat exaggerated. As far as I know, there are only a limited number of empirical studies concerning penalties from default, but these studies do not provide evidence of a very strong punishment in terms of the premia charged to countries with default histories (see references in Rose and Spiegel, 2002, and in note 37 in Daniel and co-authors' paper). However, several studies indicate that debt rescheduling is followed by reductions in trade (see, for example, Rose, 2002).

I am not aware of any empirical study of public debt and growth. Daniel and his co-authors report in footnote 35 that a simple correlation between public debt

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and growth in emerging-market economies since 1990 shows a clear negative relationship. Theory and empirical studies suggest a non-linear concave relationship between external debt and growth (Pattillo *et al.*, 2002). There is, probably, a similar relationship between public debt and growth. The optimal level of lending is where the gain from additional investments (or consumption) is smaller than the cost from additional borrowing. Where the optimal level of debt is may be hard to say, however, and will probably vary considerably between countries.

Apart form our concerns regarding the development in each specific country, we may worry about the high levels of debt because of contagion to other countries. The risk of a debt crisis and an actual debt crisis is likely to be contagious between countries. The default on Russian government debt in August 1998 led to significant turbulence in financial markets worldwide, including financial markets in the developed world.

Assessing sustainability

In the papers presented this morning, the authors try to assess whether the high debt levels are sustainable.

When comparing actual external debt to GDP with the levels at which a credit event has occurred earlier, Clavijo finds that most non-oil based economies in Latin America have surpassed the range of external debt tolerance. Using different measures of debt sustainability, Daniel and his co-authors indicate that the level of public debt in many emerging-market economies is higher than what is sustainable. Martner and Tromben come to similar conclusions for many countries in Latin America. Rial and Vicente also use several approaches and find that the debt levels in Uruguay prior to 2002 were unsustainable.

As Daniel *et al.* point out, there is no simple rule for determining whether, in practice, a government's debt is sustainable or not. In some of the approaches used, the current debt levels are compared with some historic threshold values. The threshold values may be levels where historically there have been defaults, or they may be levels of debt where historically the fiscal policies have stopped correcting rising debt. Other approaches are based on extrapolation of current primary surpluses into the future or other assumptions that seem somewhat unrealistic.

Considered together, these measures may give a useful account of the situation for the emerging markets as a group, but when assessing the situation in each country separately, we should be more careful. Historical threshold values may not be good measures of sustainability today. The cost of default is one factor that may change over time and influence the government's willingness to service the debt. If a country was not willing to service its debt at some levels in the past, it may be now if, for example, the cost of default has increased. Furthermore, if the government is investing heavily today and can expect a higher primary surplus in the coming years, extrapolation of current surpluses is unsatisfactory.

I therefore think a good measure will have to take seriously that the borrowing and default decision of a government is the result of a dynamic political economy game.

A government finds it optimal to default if the cost of doing that – including political cost – are smaller than the cost of creating the necessary primary surplus to service the debt. It does not matter if the country is economically able if its government is not willing. Similarly, a borrowing decision is the result of the government optimizing its expected utility.

Creating a measure or approach that takes seriously that the borrowing and default decision of a government is the result of a dynamic political economy game is not easy. But let me briefly sketch an idea. The idea is inspired by a model in an IMF working paper by Jahjah and Montiel (2003). To simplify, I will only have one period.

Some symbols: U is the utility of the incumbent government, y is GDP, t is the tax rate and g is government spending. The level of government debt is D. The policy parameter θ measures the share of D that is in default. The variable a measures the cost of default.

I abstract from explicit politics and many other relevant elements and assume that the government's utility be given by:

$$U = (1-t-z(t))y+g-a\theta D, \qquad z'(t) > 0, \qquad z''(t) > 0 \tag{1}$$

and the government's budget constraint by:

$$ty \geq g+(1-\theta)D \tag{2}$$

We may think of a as capturing some vital dynamic elements, namely the consequences of a default on the future utility. $z(t)$ may capture both economic and political costs of rising taxes.

Isolating θ in (2) and plugging this into (1) and maximizing with respect to the tax rate t, we get the following first order condition for the government's utility:

$$1+z'(t^*) = a \tag{3}$$

The default strategy θ^* is then given by:

$$\theta^* = 1-(t^*y-g)/D \tag{4}$$

Using (3), (4) and simply assuming that $z(t) = \frac{1}{2}t^2$, we find that we may express the cost of default as

$$a = 1+ [(1-\theta)D+g]/D \tag{5}$$

The variables on the right hand side are observable. So we might calculate the costs of default for the different countries. We may then regress this series on the factors we believe determine the cost of default to construct an econometric model for the cost of default. The right-hand side variables should be factors that have been suggested as explaining sovereign debt repayment in the literature (see, for example,

Eaton and Fernandez, 1995 and Amador, 2002). This could be the variation in GDP growth and/or export revenue, a measure of the diversification of trade, a measure of the degree of access to asset markets abroad, a measure of the degree of collusion between banks and potential lenders, the value of assets abroad and so on.

This model of the cost of default may then be used to predict the running cost of default. Plugging the predicted *a* together with predictions for the other variables in the model into (4), we have a prediction for the default rate.

This model is probably too simple to be useful, but a more elaborate model along this line and with explicit dynamics could be useful, and is probably possible to develop.

Political institutions

Before concluding, I would like to a make final observation/comment to the question of what can be done to get out of the situation where countries borrow too much. To answer this question, it is useful to ask if it is actually a rational strategy for the governments to borrow extensively, knowing that they will default later. Similarly, is it rational for the lenders to lend to the defaulters?

If we answer "yes" to both of these questions, and at the same time worry about the rising levels of debt, then we are saying that we are in some inferior equilibrium. In this equilibrium there are high interest rates and the countries default regularly. This creates turbulence and risks and reduces growth, compared to an equilibrium without default. How can we get out of such a bad equilibrium?

I am tempted to suggest that something has to be done with political institutions. Limited political competition and information asymmetries allow politicians to extract rents and to maximize something else than social welfare. Furthermore, political competition can be a strong force pulling towards economically-efficient policies regardless of the aim of policies (see Becker, 1976, and other proponents of the so-called Chicago view in political economy).

Finally, a question to the authors: I have searched for the datasets used in some of the papers but have not found any. It would be useful for further research on these issues if the datasets were made public.

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COMMENTS ON SESSION I:
ASSESSING PUBLIC LIABILITIES

Jorge Correia da Cunha[*]

Let me start by thanking the organizers for inviting me to participate as a discussant in this conference. Though I found all the presentations very interesting, I thought it would be more useful to focus my comments on the paper by Ferretti and Moriyama, as they address a key issue in the EU fiscal framework. As it is well known, several national governments implemented recently or plan to implement fiscal operations that improve the main fiscal indicators used in the excessive deficit procedure, but have no structural impact on government finances. Indeed, the fiscal balance (even if compiled according to a complete system of accounts by all member states) and the gross consolidated debt of general government are variables vulnerable to "creative accounting". Unfortunately, as the authors underline, there is still very limited empirical work on this issue.

My comments on the paper focus on the relative merits of gross debt and net worth as far as the analysis of non-structural measures, fiscal sustainability and vulnerability to "creative accounting" are concerned. Additionally, I elaborate very briefly on the empirical results presented by the authors and on how to curb "creative accounting". The table below shows a very simplified typology of the transactions that may affect the deficit, gross debt and net worth.

Several points should be highlighted:

- Net worth is, up to a point, superior to gross debt as a fiscal indicator as: i) it is not affected by the recomposition of general government financial assets/liabilities (type III non-structural measures), ii) it is not affected by acquisitions/sales of non-financial assets (type II non-structural measures – in this respect net worth is also superior to the deficit).
- However, net worth requires the measurement of the general government capital stock and its depreciation (a non-trivial practical problem indeed).
- Distinct indications from gross debt and net worth will tend to fade away in the long-run, as the stock of marketable non-financial assets and financial assets declines (type II and type III measures).
- Both gross debt and net worth are affected when type I measures are implemented. It should be underlined that many operations involving capital transfers are of a self-reversing nature, increasing simultaneously future liabilities. They may encompass, for example, a rise in future pension payments or in payments related to the construction of infrastructures under some forms of

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Table 1

Typology of non-structural measures that may affect the deficit, gross debt and net worth

	Type of measure		Deficit	Gross debt	Net worth
Transactions	I	Impacting net savings/capital transfers [1)]	Δ	Δ	Δ
	II	Sale of non-financial assets⇒debt redemption	Δ	Δ	=
	III	Sale of financial assets⇒debt redemption	=	Δ	=
Other flows	IV	Impacting other changes in volume of debt [2)]	=	Δ	Δ

Notes: 1) For example, a capital transfer from a public corporation in exchange for the taking over by general government of future pension payments.
2) For example, a debt assumption from an institution that already ceased to exist.

PPP. In this context, neither the gross debt nor the net worth provide useful information. The only way out is to take into account additional information showing imputed liabilities stemming from future expenditure commitments. This is important, for example, in the framework of the inclusion of pension funds and their liabilities in the general government.

- Finally it is important not to mix measures, as privatisations, which have an economic rationale independent from the assessment of public finances in the context of the excessive deficit procedure and the SGP, with measures that simply aim at benefiting of ESA loopholes for "window dressing" as some capital injections. Both indicators are vulnerable to the latter problem.

Turning now to the empirical results, according to the authors, in contrast with what happened between 1992 and 1997, from 1997 to 2002 the correlation between the changes in government assets and liabilities is almost nil, and thus the changes in the net worth follow quite closely the changes in the gross financial liabilities. A possible explanation could rely on the less punishing nature of fiscal rules after 1997. However, it should be reminded that the SGP came into force at the beginning of 1999, strengthening, – at least apparently – the fiscal discipline in the EU. Therefore, I would rather think that it was the favourable macroeconomic developments that allowed the fulfilment of the fiscal rules without requiring the implementation of non-structural fiscal measures. As most EU economies

decelerated in 2001-03, fiscal temporary measures reappeared, in the context of a very loose implementation of the SGP.

I suppose we all agree that creative accounting is an ugly outcome stemming from fiscal rules. But how is it possible to limit it? I would make only two points. Firstly, in my view, in the fiscal policy assessment at EU level, a central role should be attributed to a set of sustainability indicators, beyond the fiscal balance and gross debt already taken into account in the excessive deficit procedure and the SGP. However, any use of the sustainability indicators for policy assessment requires that they are calculated in a comparable way for all EU member states. That should be assumed as a priority both by the Commission and the national authorities. Secondly, the transparency in the compilation of data on public finances should be substantially increased in several member states, defining a common standard to be followed by every country at the EU level, reinforcing the independence of the national statistical institutes and beefing up the ability of the Parliaments to follow fiscal developments. If these guidelines were followed, the role of the Commission in the assessment of national fiscal policies would have all the conditions to be much more effective and we would be spared from having unpleasant surprises when the governments of some countries change.

COMMENTS ON SESSION I: ASSESSING PUBLIC LIABILITIES

Yoshiko Sato[*]

Let me start by expressing my profound gratitude to Mr. Daniele Franco and all the staff at Banca d'Italia for inviting me to this Public Debt workshop. I believe that their sincerity and integrity are the very pillars of this workshop, which continues to attract experts in the field of public finance and policymakers from around the world.

Assessing public liabilities is where we must begin. We start by defining the nature of public debt, and how we should measure it, before proceeding to the issues of sustainability and implications for existing policy. But it quickly becomes apparent that assessing public liabilities is not as easy as it seems. Significant differences exist between countries regarding data availability and recognition of public liabilities.

Despite these difficulties, all the papers in this session have produced interesting results based on the unique conditions of each country and region. Though differences obviously exist, two common themes that emerged in the papers focused on debt sustainability and, more broadly, fiscal soundness. Especially worth mentioning is that four out of six papers focused on Latin America, indicating increasing concern on public debt sustainability in that region, where people have started to ask whether warning signs are again cropping up. The other two papers focused on Europe, and some mechanisms related to the improvement of fiscal balance there.

It thus makes sense to divide my comments – one set for Latin America, and the other for Europe.

1. Latin America: fresh warning signs?

Latin American countries have undergone several crises during the period from the mid-Nineties to 2002. Mexico in 1995, Brazil in 1999, and Argentina in 2001 stand out as examples of currency crises that brought about fears of government defaults. Although those events were primarily currency crises, they also forced us to reconsider the sustainability of public liabilities.

One obvious feature of Latin American public debt is that it is often exposed to external risks. Public debt is sometimes denominated in foreign currency or borrowings from abroad. In these cases, public debt sustainability depends on the exchange rate conditions. As Martner and Tromben demonstrated in their paper,

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external factors have sometimes played a large part in the increase of public debt. Assessing public debt, therefore, leads to the issues of exchange rates and policies on capital markets.

Public debt in Latin America seems to be on rise again. As laid out in the paper by James Alexander Daniel *et al.* in this session, the "increase in debt has more than reversed the decline that took place in the first half of the Nineties" in emerging market economies. In these circumstances, researchers and policymakers will become more responsible for assessing public liabilities than they were in the past. To determine whether Latin American countries are showing warning signs again, the authors have given us a major contribution toward the search for better ways of assessing public liabilities.

Generally speaking, theoretical frameworks to examine sustainability are already in place. The authors have made use of these frameworks and applied them according to their objectives. Some of them challenge conventional methods of evaluating debt. Others propose different viewpoints.

I will first summarize the main points of the papers, and then comment on each paper.

- Many Latin American countries are not producing a primary surplus sufficient enough to keep public debt sustainable;
- Hidden liabilities will have certain additional impacts on public debt;
- External factors contribute to public debt accumulation;
- Enhancing growth and strengthening domestic macroeconomic conditions are important; at a minimum, remedies should be in place before debt dynamics develop.

Daniel *et al.*'s paper gives a comprehensive analysis on the recent development of public debt in emerging market economies, and investigates whether public debt is sustainable from four perspectives: 1) debt stabilizing primary balance, 2) fiscal policy reaction function, 3) overborrowing, and 4) uncertainty of revenue. The results are disturbing. First, Latin American countries have run short of primary surplus compared to the debt stabilizing level. Second, fiscal policy has been unresponsive: the improvement of the output gap does not increase primary surplus as much as it does in developed countries. Third, many countries overborrow. And fourth, revenue volatility reduces the maximum level of sustainable debt.

The paper is content-rich, but I'd like to comment on one point in particular: the importance of growth. The authors studied large public debt reduction experiences for the period 1970-2002. Surprisingly, 19 out of 27 examples were associated with debt default. The remaining seven cases were backed by strong real GDP growth averaging 8.5 per cent. Debt default is apparently not the best solution, whereas expenditure cuts may offset the recovery momentum, which in turn limits the extent to which fiscal balance improves. Therefore, the story tells us how economic growth plays a key role in public debt reduction. Bringing down public

debt to a sustainable level is not a task for the public sector only. Instead, achieving sustainability is closely related to private sector competitiveness. In this regard, I tend to see public debt as an outcome of the existing policy more than just a cause of concern.

Clavijo's paper emphasizes the distinction between gross and net and that between implicit and explicit public debt. He also calculates the debt tolerance level in Colombia and other Latin American countries. The broader definition of debt is intended to analyze hidden liabilities in Colombia like intra-government debt, public guarantees and pension liabilities, which are usually neglected but which might become significant risks regarding public debt sustainability. The paper concludes that in Colombia debt level increases by 10 percent of GDP, including intra-government debt, and that debt stabilizing primary surplus is required to deliver an additional 1 percent of GDP, when including contingent liabilities.

What differentiates this paper from the others is that it dares to include the impact of contingent liabilities into the public debt assessment. Although it is usually difficult to quantify the risk of contingent liabilities, we are obviously paying more attention to contingent liabilities than we did in the past, as a source of risk in public debt. In this context, the intention of this paper should be appreciated.

At the same time, the paper provides us with the seeds for future discussions to make similar analyses internationally more comparable. For example, 1) what should we include in gross and implicit debt definition and how should they be evaluated in cross-country analysis? And 2) how should we treat accounting matters such as the choice of accrual or cash basis in pension liabilities?

Martner and Tromben's paper examines the problems behind the public debt accumulation in Latin America in the past five years. Their focus is on how exogenous factors have contributed much to debt accumulation, especially for countries with access to international capital markets. As seen in Argentina and Uruguay, currency devaluation has played a large part in the increase of public debt stock, while interest rates have also proven to act more or less negatively on the accumulation of debt in other countries. The important implication from the analysis is that we can never separate the public debt problem from other policy areas, especially currency stability, price stability, and access to capital market in developing countries.

I would also like to add a related comment. In the paper, it is stated that "original sin is not a problem in itself; it is more of a symptom, signalling the presence of weak institutions or rule of Law." In many countries, when a government is serious about strengthening its domestic macroeconomic conditions, *i.e.*, improving economic efficiency, growth prospects and institutional credibility, it is also likely to raise the expectations of international investors as well, which in turn will work favorably toward long term debt sustainability. Therefore, resorting to fiscal policy may not be the only solution: a package of policies may sometimes work.

Rial and Vicente's paper provides more support to my view. It gives a thorough analysis on the Uruguayan experience and concludes that "only a sustainable primary balance adjustment could change former debt dynamics and assure long-term sustainability." The primary balance reflects the growth of GDP. Therefore, the paper assures that efforts to improve internal economic conditions ultimately help to improve debt sustainability, especially when debt dynamics are unavoidable.

This paper also presents some long-term simulations, in which Uruguayan net public debt never falls under 60 per cent of GDP by 2015, after reaching up to 80 per cent in 2003. Upward pressure dies hard for a long period. Once the latent risks materialize and the debt level jumps upward, containing the debt to previous levels is quite difficult. Although some reservations are called for in interpreting the results, since there is a range pertaining to long-term simulations, the case is a good example of showing how difficult it is to manage public debt sustainably.

2. Europe: on improving the fiscal balance

Fiscal conditions in European countries as a whole are viewed as being good compared to the emerging market economies. EU countries have reduced their public debt under the Maastricht Treaty, while the other European countries are also showing relatively good signs, as opposed to the early Nineties, partly because of the favorable economic environment.

Although the pressure to adjust the debt level for these countries is not too high, many issues remain to be studied. One of the two papers here deals with the fiscal operations that occurred in the run-up to Maastricht, while the other explains a unique treatment carried out by the Norwegian government. The topics are different, but both deal with fiscal soundness.

Milesi-Ferretti and Moriyama provide a very interesting view on the public debt of EU countries during the pre-Maastricht period. Their approach is simple: by focusing on the "net worth" effect of a government's balance sheet, they distinguish debt reduction with asset reduction from that with a net worth increase, *i.e.*, no change in assets. The paper is successful in showing that in the period 1992-97, debt reduction in these countries is associated with asset reduction, providing the evidence of fiscal operations; more specifically, the authors call them "nonstructural fiscal measures" and "creative accounting." They also point out that the "evolution of gross public debt provides only limited information on changes in the government's intertemporal position."

What is interesting about this paper is their compounded eyes: they focus on both assets and liabilities. Debt figures sometimes do not tell much about how they are produced. Even though the debt figures incorporate the fiscal operations, we cannot easily detect them on the other side of the balance sheet without specific analysis. Moreover, I agree with the idea that it is important to focus on net worth

rather than on gross debt if our concern is on the intertemporal budgetary position. Gross debt does not represent future tax burden.

Nevertheless, there are at least two reservations in the application of this method: 1) the asset price estimation problem, and 2) the interpretation of net worth. For the first point, let's take the example of an asset price bubble. Should we regard the fiscal burden to be permanently eased in the face of a temporary increase in asset prices? Since asset prices are extremely volatile, it is not easy to judge whether it is permanent or temporary. Net worth, therefore, entails the effect of asset price fluctuations that have essentially nothing to do with fiscal policy. In this context, for the second point, we should be careful in understanding what net worth really explains; the interpretation may depend on the macroeconomic asset price conditions specific to the period concerned.

Gjersem's paper introduced Norway's unique scheme of a "petroleum fund", which acts mainly as a buffer to short-term fluctuations in the Norwegian government's oil revenues, which has been, Gjersem argues, successfully managed. I would like to summarize three important properties of the fund: 1) returns on the fund are used to finance non-oil budget deficits; 2) the portfolio of the fund is diversified into equities and bonds; and 3) independent performance reviews are conducted by the experts from outside the external expertise. In my view, although they are unique, the three properties can be applied inherently to any country's budget account. We sometimes observe the same kind of special account treatment to support the general government budget balance.

My question arises from the first property. Under regulation, the fund is only allowed to invest abroad so as not to undermine the position of the fiscal budget. But doesn't it have the same consequence as domestic investment, since the fund is designed to finance the overall budget deficit? The government may, for example, be tempted to invest heavily in domestic infrastructure; it still can depend on the fund as a source of finance to make up for the deficit caused by the domestic investment. In such a case, the fund becomes a loophole: even if the fund is allowed to invest only abroad, it is ultimately used for domestic investment.