How to of Fiscal Sustainability
A Toolkit for assessing FS in MICs

Concept Note
November 1, 2005

I. Background

There is a growing concern that public debt in emerging markets as a group maybe too high. Public debt in emerging markets as a group rose significantly after the mid-1990s, averaging 70 percent of GDP in 2002. The high public debt level of emerging markets has once again triggered concerns about fiscal sustainability. IMF(2003), explained that public debt in emerging markets as a group is too high because countries overborrow substantially in relation to public debt threshold warranted by their fiscal track record. Furthermore, the same study found out that fiscal policy response is found to weaken as public debt ratio rises and for public debt ratios above 50 percent, fiscal policy does not respond to public debt. Further, Reinhart, Rogoff, and Savastano (2003) argue that emerging market countries with a history of default, high inflation and weak institutions should target low external debt ratios (15-20 percent of GDP). Finally, Gill and Pinto (2005) expressed a rather pessimistic view about the role of public debt in emerging market countries – they found that public debt has likely enhanced macroeconomic vulnerability rather than growth.

While the aggregate debt ratio obscures large variations, public debt ratios increased significantly in many emerging market countries in 2002, as compared with their 1990 levels (See Figure 1). Dervis and Birdsall (2005) identify a group of “highly indebted middle-income countries”, for which debt burden significantly constrains their medium term growth performance and their poverty reduction efforts. In 2002, more than half of the emerging market countries had high debt ratios, debt structure skewed towards short maturities and high interest costs, which makes them particularly vulnerable to changes in market sentiments.

Many of these countries have been major recipients of net international resource flows (debt, FDI and equity portfolio) during 1990-1996. At the same time, there seems to be a correlation between the major recipients of capital inflows and the occurrence of balance of payments (BoP) crises (Gill and Pinto (2005). table 2, pp.9). This raises the question of what are the causes behind these BoP crises and how fiscal sustainability relates to these crises.

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1 Emerging market countries include 27 countries in the Emerging Market Bond Index (EMBI) at the beginning of 2002, plus Costa Rica, Indonesia, Israel, and Jordan. See IMF(2003)
2 See IMF(2003), Dervis and Birdsall (2005), and Gill and Pinto et al (2005).
Figure 1. Trends in Public Debt (percent of GDP)

Note: Countries in this figure are sorted by total debt – to – GDP ratios in 2002.

Turkey, Jordan and Brazil debt on net basis.

Fiscal sustainability is closely related to the topic of balance of payments (BoP) crises, if only because it is often a BoP crisis through which an unsustainable fiscal policy comes to an end. Yet there are more links between the two topics, and more ways in which carefully designed fiscal policy can contribute to reducing the risk of BoP crises occurring. To elaborate it helps to begin with a typology of crises, because the link is not the same in all circumstances. Roughly speaking, crises fall in one of three generations.\(^3\)

First, crises may be a reflection, and the ultimate resolution, of inconsistency between fiscal and monetary/exchange rate policy. If fiscal policy is too expansionary, i.e. the primary surplus/deficit leads to more financing needs than can be met from stable debt issue and seigniorage at given inflation targets set by monetary/exchange rate policies, the exchange rate will eventually give in. If investors anticipate this, they may in fact bring it forward through a speculative attack and a sudden drying up of access to new finance (Krugman 79). Setting fiscal policy parameters in a sustainable way is obviously a prerequisite for avoiding such crises.

Second, crises may occur simply because the country is vulnerable for reasons elaborated upon below, and investors may take fright for no fundamental reason other than fear of being caught out when others launch a speculative attack first (a self-fulfilling prophecy crisis). Such crises may for example be triggered by a crisis in another country (contagion), without there being any good reason to attack the first country in its own right. Vulnerability to such attacks is not related to inconsistency between different policy instruments but often to the structure of the debt if that structure leads to high peaks in refinancing needs. This occurs often when there is a substantial part of the debt issued at short maturity and/or indexed to FX. Here the policy challenge is more to improve debt management rather than to restore long term consistency between fiscal policy and other policy instruments.\(^4\)

Third, crises may originate outside the fiscal realm, but have strong fiscal repercussions, leading to sustainability doubts that did not exist before. Examples are the so called twin crises, where crises in the banking system lead to fear of large potential fiscal losses through contingent liabilities, for example bail out obligations of the commercial banks. This may trigger a crisis in the foreign exchange market which in turn exacerbates problems in financial markets because of the impact of devaluation on bank balance sheets. Here better solvency regulation and supervision is called for, together with careful management and control of contingent fiscal liabilities.

While crises are difficult to predict, crises of the first and third generations, which might be regarded as the most pertinent in emerging markets, have highlighted the importance of the intertemporal budget constraint (see Gill and Pinto (2005)). Motivated by the series of recent high-profile macroeconomic crises involving public debt either ex

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3 See Frankel and Wei (2004).

4 Note that the inability of the government to issue long-term fixed-term debt in domestic currency may also signal problems with fiscal sustainability. It is important to stress that in such cases financial engineering cannot be a substitute for strong macroeconomic fundamentals; it needs to be a part of wider fiscal and structural reform agenda.
ante (e.g., Russia and Argentina) or ex post (as a result of the fiscal costs of contingent liabilities, e.g., East Asia), fiscal sustainability analysis has become an important component of macroeconomic analysis for many developing countries. Given its medium-term emphasis and its importance for macroeconomic stability and growth, fiscal sustainability assessment is an essential element of the macroeconomic "pre-emptive work" of the Bank.

II. Objectives

Fiscal sustainability analysis is an important component of macroeconomic analysis for many developing countries and has attracted considerable attention in recent years. The department has responded to this growing demand by producing a reference book on Fiscal Sustainability in Theory and Practice to enhance understanding of fiscal policy and the constraints faced by policy makers. Furthermore, PRMED has developed a template for external and public debt sustainability in low-income countries and has put together several accompanying papers and a manual, jointly with the IMF. The department is also organizing ongoing courses on fiscal and debt sustainability.

In addition to this work, PRMED also plans to develop a toolkit for assessing fiscal sustainability in MICs, building on the previous work done within the department and outside. In particular, The FS tool will use the insights on conducting fiscal sustainability analysis, as discussed in Burnside (2005), the joint WB-IMF approach to public debt sustainability in LICs, IMF (2002, 2003), Anand and van Wijnbergen (1988) and Buiter (1990) among others. Specifically, the FS tool will build on the joint WB-IMF approach to public debt sustainability in LICs by using a scenario analysis to simulate the government budget constraint forward and by using sensitivity tests to detect major risks to fiscal sustainability.

The main objective of this work is to maximize the utility of the fiscal sustainability analysis to the country economists and practitioners in general by developing an FS tool for MICs, which is standardized and simple, but at the same time flexible enough to allow for user-defined country-specifics. Another major advantage of this tool is that it will remain up-to-date through its online links to live databases, which allows country analysts and policy makers to undertake quick routine assessments of fiscal sustainability. Finally, the FS tool will provide country examples in issues that are relevant when performing fiscal sustainability assessments in middle income countries.

The main value added of this tool would be to improve on and adopt already existing fiscal sustainability tools by adding different features that will allow for adequate fiscal sustainability assessment for middle income countries and for oil-rich countries. In particular, implicit in this approach will be the proper consolidation of the general government accounts with the Central bank’s profit and loss account (cf Anand and van Wijnbergen (1988)). The reason for such an approach is that the government can often shift a substantial part of its deficit into central bank’s accounts. Such a consolidation, therefore, makes it possible to see through accounts and recognize money printing as a

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separate source of deficit financing. Similarly, such a representation acknowledges the fact that deficits could be financed not only by borrowing, but by running down the Central bank net foreign assets.

While inflation fell substantially in a number of MICs, the importance of such an approach has not diminished because: (i) developing countries have much larger tax base (base money to GDP ratios) than developed countries), which means that seigniorage is not likely to be trivial source of financing; (ii) seigniorage revenue could be substantial in fast growing economies and economies experiencing sizeable remonetization, and (iii) given the theoretical insights related to unpleasant monetary arithmetic (Sargent and Wallace (1981), seigniorage revenue maybe the only way to avoid costly default and/or adjustment, especially during a crisis and it is therefore an important part of the intertemporal budget constraint.

Besides explaining the basics of fiscal sustainability analysis, the FS guide will discuss issues of uncertainty surrounding public debt dynamics in MICs based on concrete country examples. Market access countries, for example, are often vulnerable to negative shocks to their borrowing costs, resulting from possible contagion effects from other emerging market countries or from liquidity problems resulting from sudden reversals of capital flows. In addition, even if the public sector has its house in order, large private sector imbalances and widening current account deficits (especially under pegged exchange rate arrangements) may trigger expectations of exchange rate depreciation which may have a profound impact on public debt dynamics both in terms of capital losses on foreign currency denominated debt, but also because of the pressure to bail out the banking system to avoid systemic banking crisis.

The FS toolkit will also include a customized version for fiscal sustainability analysis of oil-rich countries, utilizing case studies to demonstrate interesting features of oil-rich countries and the relevant steps that need to be taken to ensure adequate fiscal sustainability analysis. Such a customization is warranted because: first, oil is an exhaustible asset which means that fiscal revenues from oil extraction result from (natural) asset decumulation; this calls for treating oil revenue as a financing item, rather than current fiscal revenue. Second, faster oil reserves depletion today means that the future generation would be worse of as oil will not last forever; to avoid leaving future generations worse-off, part of the oil revenue needs to be reinvested in other forms of assets/capital. Finally, oil revenue and implicitly the size of the oil wealth are volatile, mainly because of volatile oil prices; this complicates fiscal management and underscores the importance of accounting for oil price volatility when assessing fiscal sustainability. The FS guide will include a discussion on why oil-rich countries warrant such a customization, what are the relevant steps when undertaking FS assessments for oil-rich countries, and how to incorporate oil price uncertainty into these assessments.

III. Methodology

6 Note that by the same token this toolkit could easily be applied by countries highly dependent on other exhaustible natural resources (the most famous success case has been the fiscal management of copper revenues in Chile).
At the outset, it is important to stress that fiscal sustainability analysis is based on a simple accounting framework and it does not contain a fully-specified macro model about the impact of public policy on growth and inflation. Therefore, the FS tool, which uses this analysis, cannot provide the government with a tool to set policy variables such that a particular welfare function is maximized; rather the goal is to design a sustainable fiscal policy, which is much more modest.\(^7\) As a result, it does not consider the inter-linkages such as the effects of public policy on exchange rates, interest rates, and growth (including the link between public investment and growth and therefore its indirect impact on fiscal sustainability). In a similar way, this approach does not consider Barro types of linkages, and does not explicitly take into account the impact of public policy on private savings.\(^8\)

This simple analysis could be further supplemented with more advanced issues such as assessing the consistency between fiscal and monetary targets, seigniorage revenues and the impact of financial sector reform, analyzing the impact of debt indexation, fiscal dominance and inflation targeting, how to deal with highly variable and temporary income components (e.g. designing fiscal rules for oil rich countries and more advanced methods for modeling oil price uncertainty), the impact of contingent/hidden liabilities, such as guarantees (minimum pension guarantees or deposit insurance), the impact of pension reform (or the absence of it) on fiscal sustainability, the issue of public expenditure efficiency, the impact of public expenditure on growth, fiscal sustainability at the sub-national level, and finally, more sophisticated techniques for dealing with uncertainty.

While these topics are interesting we can analyze them only in a country-specific context, rather than uniformly across countries due to informational availability or computational complexity or non-standard work involved (e.g. the econometrics necessary for estimating the impact of financial sector reform on seigniorage, the VAR approach to uncertainty as the VAR system would need to be estimated for the risk variables). Furthermore, some of the issues, such as fiscal sustainability for oil-rich countries require non-standard information/data that is not readily available for all these countries, which allows for only partial standardization of the fiscal sustainability analysis and therefore may require additional work to customize the analysis for individual oil-rich countries. Finally, fiscal sustainability at sub-national level is part of the work program of Decentralization and Subnational Regional economics thematic group of PRMED.

1. Basic concepts of fiscal sustainability

\(^7\) There maybe a number of ways to achieve fiscal sustainability and they are not necessarily optimal.

\(^8\) As pointed out by Barro (1999), if conditions hold for the Ricardian equivalence, which states that choices between debt and taxes do not matter as public borrowing can change the timing of taxes but not their present value. From this it follows that a tax cut does not change the present value of future taxes. As the private agents know that tax cut today will be financed by an increase in taxes tomorrow, a tax cut today will lead to an increase in private savings to compensate for higher taxes tomorrow, leaving the national savings unchanged. However, the empirical evidence especially from developing countries does not support the Ricardian equivalence hypothesis.
Fiscal sustainability analysis is an important component of macroeconomic analysis for many developing countries and has attracted considerable attention in the recent years. Furthermore, assessing fiscal sustainability is important, because the lack of it is a clear signal for future policy changes. When can we say that the fiscal policy stance is unsustainable? What advice can we give on the operational indicators for fiscal sustainability to guide policymakers?

By now there is a broad agreement that fiscal policy is unsustainable if the present and prospective fiscal stance results in a persistent and rapid increase in the public debt-to-GDP ratio. The size and growth rate of the debt-to-GDP ratio therefore is a key indicator of fiscal sustainability. Indeed, high debt ratios are costly and will eventually become unsustainable as creditors alter their expectations when realizing that present policies are not credible and will have to be revised. As the market realizes that the higher debt servicing costs will make it more difficult for the government to meet its budget constraint and this would require difficult fiscal retrenchment, it will be increasingly difficult for the government to sell its debt, which will increase the risk of monetizing the deficit or debt default.

FS analysis therefore leads to conclusions about the appropriateness of fiscal policy, often characterized in terms of the balance between revenue and expenditure given the government’s public sector debt level, its inflation, exchange rate and growth projections. Fiscal sustainability is a concept, intimately linked to the concept of solvency and liquidity. Solvency usually refers to the government’s ability to service its debt obligations without explicitly defaulting on them. Liquidity refers to government’s ability to roll-over its maturing liabilities with its liquid assets and available financing. Liquidity problems can be triggered by contagion effects from crises in other countries, without any fundamental reason within the country. Vulnerability to such problems is related to structure of debt (when debt is skewed towards short-term debt and/or debt indexed to FX). However, it is often hard to make a clear distinction between solvency and liquidity, as for example sudden stops in capital inflows would imply that marginal rate of debt becomes infinite, thus calling into question solvency of the country. Fiscal sustainability, on the other hand, is defined as the government’s ability to maintain the same set of fiscal and monetary policies without becoming insolvent.

<table>
<thead>
<tr>
<th>Box1. Government Budget Constraint</th>
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<tbody>
<tr>
<td><strong>PS financial deficit</strong></td>
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<tr>
<td>Primary expenditure</td>
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<tr>
<td>+ Net interest payments on debt</td>
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<tr>
<td>- Taxes</td>
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<td>=</td>
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<tr>
<td><strong>Financing sources</strong></td>
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<tr>
<td>Debt sales to the public</td>
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<tr>
<td>+ Sales of PS assets</td>
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<tr>
<td>+ Money creation</td>
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Note that the government is always solvent, as long as it can/will adjust its fiscal and monetary policy to avoid default. However, political feasibility constraints on the required expenditure reduction and revenue increases may make debt default unavoidable.

It is also important to find out what sort of adjustments are needed to ensure sustainability and the implications of these adjustments for meeting goals other than solvency (e.g. MDGs, optimal policy, etc).
The fundamental building block of all tools for fiscal sustainability is the “flow” government budget constraint or the constraint during the current year (See Box 1).\textsuperscript{11} This constraint implies that any excess of expenditure over current revenues has to be financed by asset sales, public borrowing (foreign or domestic) or money creation. Note that the macroeconomic impact of the government deficit depends very much on the way the deficit is financed. For example, excessive foreign borrowing could lead to an external debt problem, depletion of foreign exchange reserves - to an exchange rate crisis, excessive domestic borrowing especially in underdeveloped capital markets may lead to high real interest rates, which through automatic debt dynamics may have a snowballing effect on public debt. Finally, excessive money creation may lead to high and volatile inflation with all the negative consequences for growth.

The intertemporal, or solvency constraint of the government is then obtained by summing over time the succession of single period budget identities and imposing the condition that the present discounted value of the initial level of debt (infinitely far in the future) is equal to zero. As Buiter (1990) put it: “If the world were known to come to an end at some fixed future date, ..., the state cannot leave any net debt. When there is no final terminal date, solvency is conventionally defined by the requirement that the state cannot engage in Ponzi finance. Ponzi finance means always borrowing at least as much as is required to service net debt (interest plus repayment of principal).” Since the commonly accepted concept of solvency rules out such ever-lasting pyramid schemes, this implies that the present value of its expected eventual net liabilities is zero.\textsuperscript{12}

<table>
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<tr>
<th>Box 2. The intertemporal budget constraint</th>
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<tbody>
<tr>
<td>Net Public = PV of terminal net liabilities</td>
</tr>
<tr>
<td>Debt to output ratio + PV of primary surpluses to output ratio</td>
</tr>
<tr>
<td>+ PV of seigniorage to output ratio</td>
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Ruling out such ever-lasting pyramid schemes simplifies the intertemporal budget constraints and defines the solvency constraint – that is the requirement that the present value of future primary fiscal surpluses and seigniorage be at least as large as the initial debt ratio.\textsuperscript{13} This implies that the government cannot forever pay the interest on its outstanding debt by additional borrowing. At some point of time the debt must be serviced either by running primary surpluses or by printing money (seigniorage) which

\textsuperscript{11} Note that the term government here means the consolidated public sector, which at the very least includes the general government and the Central Bank profit and loss account. For more details, see Anand and van Wijnbergen (1989).
\textsuperscript{12} This condition is satisfied when real interest rate is higher than real growth rate, which is most usual case in the long run.
\textsuperscript{13} See Burnside (2005), lecture notes, pp. 24 for the formal expression in discrete time.
will be inflationary. This solvency constraint is used as a basis for conducting fiscal sustainability analysis.

The FS template will use the two basic tools of fiscal sustainability analysis: the public debt dynamics equation and the long run sustainability condition.

**Public debt dynamics** refers to the evolution of the measured debt to GDP ratio and it is a critically important basic tool for fiscal sustainability assessment. A better understanding of the evolution of the public debt ratio and its determinants is of key importance for assessing a country’s macroeconomic environment and private investment climate. For example, if macroeconomic projections result in debt dynamics that lead to a rapidly increasing public debt to GDP ratio, this is evidence that the present mix of fiscal and monetary policies needs to be corrected to ensure solvency.

Public debt dynamics can be used to create a baseline projection of future trends in the public debt to GDP ratio, utilizing existing macroeconomic projections. In its simplest form (assuming that nominal GDP is constant and that debt is issued in domestic currency), the change in public debt ratio would be equal to the sum of interest payments on net public debt to GDP ratio and the primary deficit to GDP ratio, net of revenue from seigniorage (See Box 3). In real life, however, with a positive domestic inflation and non-zero growth, and with a large part of public debt issued in foreign currency, public debt dynamics would be more complicated as it would need to reflect the cost of external and domestic borrowing, the impact of inflation, the growth rate and capital gains and losses on foreign currency denominated debt stemming from the change in the value of domestic currency per unit of foreign currency (e.g. per 1 USD). These terms will be discussed in a greater detail in the following section.

<table>
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<tr>
<th>Box 3. Public Debt Dynamics</th>
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<tr>
<td>$\Delta \text{ Public Net Debt} = \text{Net Interest Payments to GDP ratio to GDP ratio} + \text{Primary deficit to GDP ratio} - \text{Seigniorage to GDP ratio}$</td>
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**Long-run sustainability condition** is another simple tool for fiscal sustainability assessment which can be used as a consistency check on a specific set of plans for future fiscal deficits and their financing by borrowing, asset sales and printing money. Under the assumptions that all variables are at their constant long run (steady state values), the intertemporal budget constraint could be further simplified to derive the required primary balance to ensure that public debt remains bounded at the end of the projection period (see Box 4.).
Some countries, e.g. countries joining the EU, maybe interested in appropriate fiscal policy targets if the public debt is to reach a specific debt target over a specified time horizon. In these circumstances, a modification of the long-run sustainability condition could be used to calculate the required primary balance for the country to reach its debt target within the pre-specified time horizon (see Burnside (2005)).

2. **Description of the Fiscal Sustainability Tool**

The FS tool will use the insights on conducting fiscal sustainability analysis, as mentioned in the previous section and previously discussed in Burnside (2005), Public debt sustainability in LICs, IMF (2002, 2003), Anand and van Wijnbergen (1988) and Buiter (1990) among others. Specifically, the FS tool will build on the joint WB-IMF approach to public debt sustainability in LICs by using a scenario analysis to simulate the government budget constraint forward and by using sensitivity tests to detect major risks to fiscal sustainability.

First, the FS will provide a baseline scenario of likely future trends in public debt-to-GDP ratio, utilizing the available macroeconomic projections of key determinants of public debt dynamics. Second, the FS template will build several alternative scenarios, which will serve as a “reality check” of the baseline public debt dynamics scenario. Finally, by performing standardized stress tests to the baseline scenario, public debt dynamics may identify important risks/threats to fiscal sustainability in the future.

*Incorporating Public Debt Dynamics in the FS Template*

As mentioned in the previous section, public debt dynamics typically breaks down the changes in public debt-to-GDP ratio into components attributable to primary fiscal deficit net of seigniorage revenues and automatic debt dynamics or the increase of public debt resulting from the excess of the real interest rate on public debt over the real growth rate. Furthermore, the real increase in external debt would also include the capital gains or losses on net external debt due to changes in the real exchange rate. In what follows equation (1) presents the net public sector debt dynamics and its main determinants as outlined above.  

\[
\dot{d} = b + b^* - nfa^* = (pd - \sigma) + (r - g)b + (r^* - e - g)(b^* - nfa^*) + \text{other factors} \tag{1}
\]

Note that to simplify the exposition we present a continuous time formula. However, as shown in the Annex, in the FS template we use the discrete time formulas for deriving the public debt dynamics.
where $d_t$ is the net public debt-to-GDP ratio, $pd_t$ is the primary deficit as a share of GDP, $g$ is the real GDP growth rate, $r$ is the real interest rate on domestic debt, $r^*$ is the real interest rate on external debt, $\pi$ is domestic inflation rate, $\pi^*$ is the foreign inflation rate, $e\text{-hat}$ is the change in (bilateral, foreign currency per local currency unit) real exchange rate$^{15}$.

Implicit in this approach is the proper consolidation of the general government accounts with the Central bank’s profit and loss account (see Anand and van Wijnbergen (1988)).$^{16}$ The reason for such a consolidation is the fact that the government can often shift a substantial part of its deficit into the Central bank’s accounts. Furthermore, such a consolidation makes it possible to see through accounts, realizing that the Central bank’s credit to the government is debt of one public entity to another. As a result, it cancels out when consolidating the government and the central bank’s accounts, while money printing is established as a separate source of deficit financing.$^{17}$

Based on this equation, the fiscal sustainability template separates between the different channels that contribute to the evolution of public debt to GDP ratio: (i) the primary fiscal balance; (ii) the revenue from seignorage; and (iii) automatic debt dynamics, which include factors such as the real GDP growth; the real interest rate on domestic and external debt and the real exchange rate.

The tool will also allow for other debt increasing/reducing factors such as fiscal costs associated with contingent liabilities such as bank bailouts, which have proven to be extremely costly in the recent past. Furthermore asset sales, such as privatization revenues, or for example sizeable oil revenues, can contribute significantly to the decline of net public debt. However, oil revenues are known to be extremely volatile and require special attention when discussing fiscal sustainability.

Finally, this equation could be even more complicated as many developing countries may borrow in multiple foreign currencies. To this end, any changes of the real bilateral exchange rates of different foreign currencies expressed in terms of local currency units would result in real capital gains or losses on their public external debt to GDP ratio. To this end, future projections should also take into account the impact of changes in cross-exchange rate (e.g. the change in USD/Euro exchange rate).

**Incorporating the Long-run fiscal sustainability condition**

If macroeconomic projections result in ever rising debt ratios as the result of the parameters of the macroeconomic program, a clear signal is given that policy change is unavoidable. If fiscal adjustment is postponed, the risk arises that inflation will then be the residual tax, meeting the budget constraint through inflationary erosion of debt and

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$^{15}$ $e\text{-hat}>0$ denotes a real exchange rate appreciation.

$^{16}$ Note that equation (1) could easily be transformed in the familiar gross debt dynamics representation if needed.

$^{17}$ For detailed derivation see Anand and van Wijnbergen (1988).
money holdings. If even that mechanism cannot close the gap, for example because of the short maturity or extensive level of indexation of the public debt, actual default becomes a real possibility; with the corresponding impact on the risk premia the government can expect to have to pay if any further debt is to be issued successfully.

To close the model, the FS template will further impose fiscal sustainability in the long run (assuming that all the parameters reach their long run constant values at the end of projection period). The long-run (steady state) fiscal sustainability condition will offer several ways to close the model: (i) the user would be able to select either an instrument which will have to be adjusted to ensure fiscal sustainability in the long run or (ii) the user can specify a particular target and a timeframe within which such a target can be achieved.

For example, one way to close the model is to find out what is the required fiscal adjustment (of the primary balance) if the public debt-to-GDP ratio is to remain stable at the end of the projection period. Implicit in this approach here is the view that lenders will impose such a constraint because potential tax revenue, the ultimate source from which debt will need to be serviced, is obviously limited as a share of GDP.

The size of the required fiscal adjustment would then be calculated as the difference between the actual projected primary surplus and the surplus that stabilizes the actual public debt to GDP ratio at the end of the projection period (the primary gap). A large gap at the end of the projection period, therefore, signals issues with fiscal sustainability and would require some sort of adjustment in the primary deficit and/or inflation target to take place to ensure sustainability at the end of the period. Furthermore, if the issue in a country is the relatively low tax revenue as a share of GDP, it is possible to calculate the tax gap to GDP ratio, as the sum of the actual tax revenues and the required fiscal adjustment to stabilize the debt to GDP ratio.

Alternatively, the fiscal template will also provide for the possibility to input a debt target, lets say for n periods ahead and to calculate the required primary surplus needed for the current debt ratio to reach the pre-specified debt target after n periods, as derived by Burnside (2005).

It is important to stress that the size of the required fiscal adjustment would also depend on the size of the real resources under control of the government because of its legal power to print money (the seigniorage revenue). If there are political constraints to fiscal adjustment, the risk arises that inflation will then be the residual tax, meeting the budget constraint through inflationary erosion of debt and money holdings. To this end, the template can also provide a simple framework for benchmarking the seigniorage revenue and for determining the seigniorage maximizing inflation rate.

Benchmarking seigniorage revenues

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18 This is a direct application of the long-run sustainability condition as described in Box 4.
A government can finance public expenditure by raising tax revenue, by borrowing (and asset sales), or simply by printing money. For example, excessive government borrowing from the central bank is equivalent to issuing base money or deficit monetization, which leads to excess supply of cash and drives up the price level. A sovereign’s power to control real resources by printing money is known as seigniorage.\footnote{Since the cost to the government of printing money is negligible, but it acquires purchasing power over resources equivalent to the face value of the banknote, it gains revenue simply by providing money to the economy.}

Seigniorage revenue received from the government, expressed as a fraction of GDP is defined as the product of nominal base money growth and the share of real base money in GDP:

\[ \sigma_t = \mu m \]  

The faster the nominal base money growth, the higher will be the demand for nominal money balances, and as a result, the government can appropriate a higher volume of real resources through the inflation tax. However, excessive base money growth will tend to drive up the price level and therefore lead to higher inflation. Higher inflation and higher nominal interest rates associated with it will tend to reduce the demand for real money balances. This means that printing money will increase the revenue from seigniorage up till some point. If the money growth would increase further beyond this point, seigniorage revenue will fall, as the second effect of falling real money balances would dominate the first effect of higher money growth.

Seigniorage can be seen as a sum of a "pure seigniorage" component and an "inflation tax" component. The pure seigniorage component is the change in real money balances resulting either from the real economic growth or from a favorable shift in the demand for base money. In the long run, assuming that velocity is constant, the pure
seigniorage equals the product of the real growth rate and the real money balances. The “inflation tax” component is equal to the product of the inflation rate, “the tax rate”, and the stock of real money balances held by the public (the tax base). In the absence of inflation, the inflation tax would be zero, but seigniorage will still be collected unless there is no growth in real money balances.

\[ \sigma = m + \pi m \]  

(3)

To account for the Laffer curve property of seigniorage revenue with respect to nominal money growth and inflation, the FS template would benchmark seigniorage revenue using a simple Cagan money demand function.\(^{20}\) The only additional requirement then is to estimate the coefficient of the elasticity of money demand with respect to nominal interest rate (or inflation), which represents the opportunity cost of holding money. The estimated coefficient will then be used to determine the maximum amount of seigniorage revenue that the government can get from printing money, as well as the seigniorage maximizing rate of inflation.\(^{21}\)

### 3. A Modification of Fiscal Sustainability Template for Oil-Rich Countries

Assessing fiscal sustainability for oil-rich countries requires distinguishing between the oil and non-oil fiscal position.\(^{22}\) Such a distinction is warranted because of the different nature of the oil-related fiscal revenue. First, oil is an exhaustible asset which means that fiscal revenues from oil extraction result from (natural) asset decumulation; this calls for treating oil revenue as a financing item, rather than current fiscal revenue. Second, faster oil reserves depletion today means that future generations would be worse off as oil will not last forever; to avoid leaving future generations worse-off, part of the oil revenue needs to be reinvested in other forms of assets/capital. Finally, oil revenue and implicitly the size of the oil wealth are volatile, mainly because of oil price volatility; this complicates fiscal management and underscores the importance of accounting for oil price volatility when assessing fiscal sustainability.

Apart from complicating fiscal sustainability analysis, oil price volatility has adverse economic consequences. First, linking government spending to current oil revenues immediately transmits this volatility to the real exchange rate. This is damaging to the non-oil traded goods sector, notably, agriculture and manufacturing—the so-called “Dutch disease”. Second, basing government expenditures on current revenues could lead to wasteful spending, when investments are made during boom periods beyond the country’s ability to absorb or maintain them when prices subsequently fall. Third, volatile government expenditure translates directly into volatile aggregate demand for the rest of

\(^{20}\) Note that while the relevant money aggregate for estimating the seigniorage revenue is base money, the demand for base money is not possible to estimate directly as it is inherently unstable. For a more detailed discussion of this issue and for explicitly incorporating the commercial banking sector in understanding the link between fiscal policy, money growth and inflation see Anand and van Wijnbergen (**).

\(^{21}\) See Annex 1 with the mathematical derivations.

\(^{22}\) See PREM note (2005) and Davis at al (2004).
the economy. And last but not least, when oil prices unanticipatedly drop, it is often difficult and costly to adjust expenditure downwards.

**Steps in assessing fiscal sustainability for oil-rich countries**

There are three important steps when implementing a sustainable fiscal strategy for oil-rich countries (See chart 1). The first step is to project the income stream of fiscal oil revenues, net of extraction costs, based on oil reserve estimates, oil price forecasts, and assumptions about oil exploration and extraction and oil sector taxation regimes. These projections should also account for the stochastic nature of oil prices and for possible errors in assessing physical oil reserves.

The second step is to estimate the income flow, which can be spent without depleting the real stock of oil wealth, or to design a rule for the non-oil deficit path. Broadly speaking, this would depend on the rate of return to oil wealth. If the objective were to maintain the government’s net asset position, then this income flow also defines the ceiling for the non-oil fiscal deficit. If the non-oil deficit exceeds this limit, then the government would need to borrow, worsening its net asset position. The implementation of an “oil price fiscal rule” is often seen as a sensible fiscal rule for oil-rich countries. This is a fiscal rule whereby oil revenues are calculated at a pre-agreed price per barrel, called the reference price; revenues above this price are then saved by the government for use when oil prices might be lower. Oil revenues computed at the reference price now serve as a benchmark for the non-oil fiscal deficit. This practical approach has three advantages: that of simplicity and hence ease in implementation; imparting a measure of fiscal discipline with regard to the non-oil deficit; and breaking the link between government spending and current oil prices, thereby lowering the volatility of the real exchange rate and minimizing Dutch disease issues.

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23 Oil futures prices have historically been a poor predictor of future spot prices. (IMF, 2005.)
24 This is a simplified presentation. Borrowing to invest in high economic rate of return projects could strengthen the public finances over the long run. In practice, one has to contend with wasteful spending and white elephant projects.
25 This rule, which is a variant of the permanent income hypothesis, is especially relevant for mature oil producers with a relatively constant oil extraction profile. It might need to be modified for countries with new oil discoveries, such as Azerbaijan, which might find that they can suddenly and substantially raise the non-oil deficit. While the same considerations—such as absorptive capacity, impact on real exchange rate and non-oil economy, and intergenerational equity—apply, the relative emphasis would be different, with absorptive capacity becoming much more important. For countries where oil is running out, such as Yemen, the emphasis on the non-oil economy and diversification should receive more prominence.
26 It is important to note that choosing the budget reference price is very difficult but nevertheless should account for the fact that the cost of overestimating the price of oil is much higher than the cost of underestimating the price of oil.
The third step requires modifying the government budget constraint and the resulting public debt dynamics equation to isolate the impact of oil on public finances and to reflect the special features of oil discussed above. It is mainly this step that the FS template would incorporate as the first two steps require taking into account country specific features and detailed projections of oil production, exports and fiscal revenues. These in turn require very detailed data and assumptions and therefore, an industry-specific perspective. The public debt dynamics equation (eq. 1) is modified by bringing in the special features of oil: 27

\[ d = b + b^* - nfa^* - o\alpha^* = (f - Roil - \sigma) + (r - g)b + (r^* - e - g)(b^* - nfa^* - o\alpha^*) + \text{other factors} \]

\[ (1') \]

A key point is that in equation (1’), *Roil* refers to projected oil fiscal revenues (at projected WEO/DECPG oil prices); the oil price fiscal rule is captured in the projections

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27 Ideally eq. 1’ requires using the non-oil GDP as opposed to overall GDP because once the oil is depleted the long run growth is ultimately determined by the rate of growth of the non-oil GDP.
for the non-oil primary deficit, $f$, while the change in the net public debt ratio also accounts for the accumulation of assets in a ring-fenced oil fund, $oa^-\cdot dot$.  

Equation (1’) while similar to equation (1) contains several major changes. First, it renders transparent the fact that a substantial share of fiscal revenues is derived from oil, the primary fiscal deficit (non-interest spending minus revenues) is replaced with the non-oil primary deficit, isolating net oil revenues as a financing flow. Second, the change in net debt-to-GDP ratio now also accounts for fiscal savings out of oil, accumulated in a ring-fenced oil fund. Third, given the importance of oil price volatility for assessing fiscal sustainability, the template also deals explicitly with the impact of oil price uncertainty on the net public debt dynamics.

4. **Incorporating Uncertainty**

The fiscal sustainability analysis above assumes deterministic paths for the underlying variables. Clearly, a great deal of uncertainty exists in the real world. The accumulation of small shocks each period could lead to a substantial deviation of debt dynamics from its baseline in the medium-to-long run. To this end, policy recommendations should also account for the impact of various shocks to the baseline scenario.

For example, uncertainty surrounding public debt dynamics is often associated with risks related to medium term projections of the economic growth rate, the primary balance, the cost of public sector borrowing and the existence of either explicit or implicit guarantees of debt or bank deposits. Market access countries, for example, are often vulnerable to negative shocks to their borrowing costs, resulting from possible contagion effects from other emerging market countries or from liquidity problems resulting from sudden reversal of capital flows. In addition, even if the public sector has its house in order, large private sector imbalances and widening current account deficits (especially under pegged exchange rate arrangements) may trigger expectations of exchange rate depreciation which may have a profound impact on public debt dynamics both in terms of capital losses on foreign currency denominated debt, but also because of the pressure to bail out the banking system to avoid a systemic banking crisis.

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28 Choosing a non-oil deficit rule that ensures that the economy is on a fiscally sustainable path is a topic on its own, as it depends on whether the country is a young or mature oil producer. Furthermore, this rule would be different for countries that are faced by the prospects of oil reserves depletion. The FS template can only utilize existing projections for the non-oil deficits and evaluate its impact on net public debt.

29 Note that written in this way, eq. 1’ can explicitly account for the asset accumulation rule of a ring-fenced oil fund. The user will be given a choice to either enter the projected asset accumulation manually, or if an oil fund does not exist, all the values will be automatically set to zero.

30 Ring-fenced oil funds can only be successful if complemented with a rule that limits the non-oil deficit or public debt. Otherwise, the government will accumulate assets in the oil fund while at the same time borrow, so the net asset position may even deteriorate as the cost of borrowing is typically higher than the interest earned on oil fund assets.
Incorporating alternative scenarios and standardized stress tests

A short-cut approach to incorporate uncertainty is to conduct a set of model-independent sensitivity tests to the baseline scenario, assuming that the underlying variables swing away from their means by one or two standard deviations. This approach, as a partial remedy for deterministic point projections of debt, typically ignores the endogenous interactions among factors. The merit is that this approach significantly reduces the computational complexity and leads to substantial applicability. The most important sensitivity analyses include stress tests with respect to real interest rate on public debt, real output growth, primary balance, and changes of the real exchange rate.

The FS template follows the IMF approach in incorporating two types of sensitivity tests: a set of alternative scenarios, which will serve as a “reality check” of the baseline projections for public debt dynamics and a set of bound tests will be used to identify important risks/threats to fiscal sustainability in the future (see Box 5). As discussed in the IMF(2003), the bound tests have been calibrated to provide the intended probabilistic upper bound to the public debt ratio, without necessarily warranting a policy response. The purpose of the alternative scenarios, on the other hand, is to allow for less extreme and more probable scenarios which can be used as a basis for discussion of key vulnerabilities of the economy and will ensure more realistic fiscal sustainability assessments.

For example, overly optimistic macroeconomic assumptions (e.g. high real economic growth or low borrowing costs) and optimistic medium term fiscal projections may lead to overly optimistic fiscal sustainability assessments. To check the realism of the baseline policy projections, it is useful to run an alternative scenario, where all variables determining debt dynamics are set equal to their long run historical averages. Furthermore, the fiscal sustainability assessment may also incorporate a country specific shock scenario, resulting in a one-standard deviation decline in the output growth. The FS template can be also used to assess the impact of reforms embedded in the medium term projection framework in the base case, by running a counterfactual scenario where the primary balance remains unchanged during the projection period as compared to its actual level during the current year. The FS template could also incorporate an additional scenario, where financial variables (exchange and interest rates) are set equal to their forward or futures values, while consensus forecasts could be used for variables such as growth and inflation.
The set of bound tests, on the other hand, provide a probabilistic upper bound for the debt dynamics under various assumptions on macroeconomic developments, borrowing costs and policy variables. The bound tests include real interest rate shock, real output shock, primary balance shock, exchange rate shock, a realization of contingent liabilities, and a combined shocks of all variables (see Box 5). Using an event study approach, the IMF(2003) concluded that these tests are appropriate confidence bounds in capturing the increase in the debt ratio in the run-up to crisis.  

The FS template will provide these standardized bound tests but it would also allow for country-specific tests to be imputed manually by the user. For example, a useful reality check is to find out if there are major differences between the average and the marginal real interest rate on public debt. If the interest rate on new debt issues is much higher than the average real interest rate, and if the maturity of public debt is relatively short, in that case marginal rates are good predictors of average rates not too far in the future. This would require an FS scenario, which uses the marginal as opposed to average real interest rate. Furthermore, instead of using the historical average of real interest rate or assuming a 30 percent real exchange rate depreciation, the user maybe allowed to

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As pointed out in the IMF(2003), these tests come close to a 95-99 percent confidence interval around the projected evolution of public debt ratio, conditional on a debt crisis occurring.
introduce the historical value of the real interest or the change in the real exchange rate in
the run-up to financial crisis (provided that the country has suffered such a crisis in the
past).

An important caveat of this approach is that this approach is rather simplistic, as it
may not capture some of the relationships among the variables that are theoretically
important (e.g. the primary balance (the policy variable) might respond to the stock of
debt, or the interest rate might depend on the stock of debt or the primary
balance). Furthermore, some of the stress tests may not deal adequately with uncertainty
in a country specific context – for example, the impact of an oil price shock maybe the
most critical bound or alternative scenario test for an oil-rich country.

An alternative approach to incorporate uncertainty into sustainability analysis (cf
IMF 2003) is to allow for interactions among the underlying debt dynamics factors (e.g. GDP
growth rate, interest rate, inflation rate, exchange rate, etc.) by estimating a vector
autoregressive model (VAR) on historical data. The distribution of the debt-to-GDP ratio
at the end of the projection period can then be based on large scale Monte Carlo
simulations. This model could then be used to indicate which shock, and to what degree,
should be given particular attention in the formation of policy recommendations. This
approach, however, is not straightforward and requires subjective judgment in terms of
model setup, selection of variables and can therefore be implemented only in a country
specific context, not as part of a generic template.

Dealing with oil price uncertainty

Dealing with oil price uncertainty is by far the most important uncertainty aspect
which should be incorporated into fiscal sustainability analysis for oil-rich countries.
Public debt dynamics as reflected in eq. 1’ do not consider the uncertainty in oil revenue,
$Roil$. Given the importance of oil prices for determining debt dynamics, it is critical that
fiscal sustainability assessment for oil rich countries include an additional alternative
scenario (or country-specific one) of a permanent negative oil price shock. As
illustrated in Box 5, an oil price shock, either permanent or transitory, can be introduced
in the magnitude of one or two standard deviations. The downside of such an approach is
that it is difficult to justify the timing and duration of the deviations.

An alternative approach, which could be used, is to estimate a stochastic model
for the path of oil prices, which could then be used to run Monte Carlo simulations to
draw a distribution of the public debt-to-GDP ratio at the end of the projection period.
The price fluctuations could be forced to fall within a band in order to avoid an
unreasonably wide distribution of oil prices, and consequently of the public debt ratio.

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32 Burnside (2005)
33 This is especially important given the fact that the cost of overestimating the oil prices is much higher
than the cost of underestimating them. Furthermore, there is some evidence that because of its high
dependence on oil, oil-rich countries maybe inherently more volatile than countries which enjoy well
diversified, broad-based economies.
The introduction of uncertainty of oil price is a meaningful improvement relative to deterministic debt analysis.

Furthermore, while such an approach of tracing the impact of negative oil price shocks on oil fiscal revenue, assuming all else constant simplifies the computational complexity, it also has its own caveats. For instance, it treats all other contributing factors independent of the oil revenue path. A more elaborate assessment, however, would recognize that a (permanent) oil price shock would have implications for the whole macro projection framework, meaning that other factors of public debt dynamics (output growth, exchange and interest rates) are likely to change in response to the negative oil price shock. A similar VAR model could also be designed to allow for interactions among variables in oil-rich countries.

5. **Issues of Measurement and Detailed Data Definitions**

The toolkit will also stress the importance of properly defining the public sector when applying the fiscal sustainability framework. For example, using a narrow definition of the public sector may be misleading for the purposes of fiscal sustainability (e.g., the central government without consolidating other local and/or extra-budgetary expenditure) when sizeable expenditure are not taken into account. It is therefore critical to ensure that the fiscal sustainability analysis is using the right boundaries of the government, or the most comprehensive measure of the public sector. At the very least, this definition should include the consolidated general government sector and the central bank. General government in turn includes the central or federal government, state or provincial government and local or municipal government. As defined by Buiter, there are 2 main criteria for deciding whether to include a particular entity in a fiscal sustainability analysis: A) is the state ultimately responsible for its debt? and B) does the state appropriate the profits of the entity and make up its losses? Further, the inclusion of the central bank in the fiscal sustainability analysis means that any present quasi-fiscal deficit of the Central bank will be taken into account in the fiscal sustainability assessment.

The FS toolkit will also emphasize the importance of using consistent fiscal and public debt data. Indeed, the definition of the public sector net debt should include all contractual liabilities of the state for the purpose of the fiscal sustainability assessment. This variable should also include a fair valuation of any traded or non-traded contingent contractual liabilities the government may have, despite the fact that these liabilities may not be included in government’s fiscal accounts.

The FS template should also be applied only after ensuring a proper consolidation of the Treasury and the Central Bank Balance sheet (see Anand and van Wijnbergen (1989)). This involves netting out the net foreign assets of the Central Bank from the public sector gross external public debt. In addition, this requires netting out of direct government borrowing from the Central bank as this is just a liability of one public body

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34 See Buiter (2003), Fiscal Sustainability.
35 For more information see Brixi and Schick (2002), Government at Risk.
to another one, and cancels out when consolidating the two balance sheets and adding up the government revenue from printing money as a separate source of deficit financing. Similarly, the interest payments used should represent the interest payments on net public debt (net of Central Bank’s assets).

IV. Outputs

- **A Template**
  - A baseline scenario
  - Alternative scenarios under various assumptions:
    - Key variables at historical average
    - No Policy Change (Constant Primary Balance)
    - Country-Specific Scenario
    - Key Variables Consistent With Market Forecast
  - Stress Tests:
    - Real Interest Rate Shock
    - Real Output Shock
    - Primary Balance Shock
    - Combined One Standard Deviation Shock
    - Real Exchange Rate Shock
    - Contingent Liability Shock
  - “Input_fiscal” worksheet, where raw data are input
  - “Table_SR” worksheet, where debt ratios of all the scenarios and stress tests are summarized
  - “Graphs” worksheet, where public debt dynamics and composition are presented in graphs

- **Linking the FS template with the LDB and WEO database**
  - The role of DECDG (Victor Gabor)

- **A Guide on Fiscal Sustainability**
  - Basic concepts of fiscal sustainability
  - A description of the structure of the template
    - A description of the input data sheet and various data definitions
    - A Description of output results and graphs
  - A technical description of the tools used in the FSA
    - How to calculate debt dynamics
    - How to treat indexed and floating rate debt
    - How to treat seigniorage explicitly
    - How to use the long run sustainability condition
  - Incorporating alternative scenarios and stress tests
  - Issues of measurement
    - How to measure fiscal balance
    - How to measure net public debt
    - How to consolidate the government and the Central bank’s balance sheet
  - Instructions on how to use the template step by step
How to use the debt dynamics sheet in a forward-looking analysis and how to interpret results
- How to interpret inflation, growth, real interest and real exchange rate effects
- How to construct alternative scenarios and various stress tests
- How to interpret various fiscal sustainability indicators, using the long-run fiscal sustainability condition
  - Advanced issues related to FS analysis
  - A Glossary of concepts and terms used throughout the guide and the template.
  - A Mathematical Appendix documenting all the Formulas used in the template.
  - An Annex with Statistical Data Requirements for the FSA

- Examples of analyzing fiscal sustainability using the template
  - Data base and template for 15 MACs
  - Making modifications based on country-specific circumstances
  - FS analysis
  - A cross-support to apply the framework

- Post relevant information on the website
  - Handbook of FSA, the FS Guide, The FS Template
  - Examples
  - A dataset on public debt and deficits for MACs
  - The analysis of debt and its determinants for 15 MACs

- A hands-on course on FSA throughout the year and during the PREM Week

V. Preliminary Outline on the How to of FS

5. Basic concepts of fiscal sustainability

This section will describe the basic tools of fiscal sustainability in a simple non-technical language, building on the Fiscal sustainability source book. This section will introduce the flow and the lifetime budget constraint, the long-run sustainability condition, as well as the debt dynamics.

6. Description of the fiscal sustainability template

This section will contain detailed instructions in using the template, including a description of the input data sheet, output results and graphs, and various data definitions used. This section will be also supplemented with the Glossary at the end of this guide for the exact data definitions.

In addition, this section will derive the public sector debt dynamics and discuss its main determinants. Further, it will illustrate how to use the debt dynamics sheet in a
forward-looking analysis and how to interpret results; how to interpret inflation, growth, real interest and real exchange rate effects and how to construct and interpret alternative scenarios and various stress tests, as well as various fiscal sustainability indicators. This section will discuss the long-run sustainability condition and various indicators of fiscal sustainability. This section will also be supplemented by the Mathematical appendix at the end of this guide.

7. **A Modification of Fiscal Sustainability Template for Oil-Rich Countries**

   This section will discuss why fiscal sustainability for oil-rich countries requires a distinction between the oil and non-oil fiscal position. Further, this section will discuss the necessary steps of assessing fiscal sustainability in oil rich counties. Given the importance of oil price volatility for fiscal sustainability assessment, this section will also discuss and present practical ways to handle oil price volatility as an explicit stress test. Finally, the section will conclude with presenting a case study (Nigeria?).

8. **Incorporating uncertainty**

   This section will discuss methods used to deal with uncertainty and its implication for FS analysis. In particular, this section will describe how the FS template will incorporate alternative scenarios and standardized stress tests to provide useful “reality check” of the base case scenario and to outline risks to fiscal sustainability.

9. **Issues of measurement and Data requirements**

   This section would introduce the audience to the issues of measurement of the fiscal balance, net public debt, treatment of financial obligations of the government that are other than direct public debt. This section will also explain how to consolidate the government and the Central bank’s balance sheet.

   This toolkit will focus further on the measurement of debt levels and the meaning and usefulness of various debt and debt service ratios designed to capture government’s (or country’s) vulnerability to solvency or liquidity problems.

6. **Advanced Issues related to FS analysis**

   This section will discuss in non-technical terms issues that bear crucial importance for fiscal sustainability assessments. For example, such issues maybe related to the issue of consistency between fiscal and monetary targets and the importance of coordinated economic policies (or the fiscal roots of inflation), seigniorage revenues and the impact of financial sector reform, analyzing the impact of debt indexation, fiscal dominance and inflation targeting, how to deal with highly variable and temporary income components (e.g. the oil wealth and its impact of fiscal sustainability), the impact of contingent/hidden liabilities, such as guarantees (minimum pension guarantees or deposit insurance), the impact of pension reform (or of the absence of it) on fiscal sustainability.

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sustainability, the issue of public expenditure efficiency, and finally, more sophisticated techniques for dealing with uncertainty.

5. Putting it together - country applications.

This section will provide country applications of the fiscal sustainability template.

6. A Glossary of the basic concepts/terms used throughout the manual

This section will provide definitions for all the relevant concepts and terms used throughout this guide.

7. A Mathematical Appendix with Formulas used in the template

This section will provide the mathematical appendix, deriving all the relevant formulas used throughout this guide and the template.

8. Web-links with additional information on FS

This section will include reference and summaries of papers and books, e.g., Burnside's book on Fiscal Sustainability and his lectures, academic papers, a description and a derivation of the IMF template, the Guide for Debt sustainability in LICs, links to papers discussing more advanced issues related to the concept of fiscal sustainability.

IV. Team, Timetable and Budget

The members of the task team are Nina Budina (overall task manager, overall coordination and supervision), Nina Budina and Sweder van Wijnbergen (analytical framework for fiscal sustainability, including the consolidation of fiscal and central bank’s accounts, and fiscal sustainability for oil-rich countries, co-authoring the manual, case studies supervision and developing a hands-on course), Gaobo Pang (developing the uncertainty component and describing it in the guide, implementation of fiscal sustainability for oil-rich country), Luca Bandiera (implementation of the FS template for Turkey and Nigeria, data and variables definitions, developing case studies inputs to the FS guide), Victor Gabor (linking the FS template to LDB, WEO and other public databases), excel design and programming specialist - to create a user—friendly interface).

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<th>Staff weeks</th>
<th>Budget</th>
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<td>Nina Budina PRMED</td>
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<td>19</td>
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<td>Luca Bandiera</td>
<td>PRMED</td>
<td>Implementation of the FS template for Turkey and Nigeria</td>
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<td>Victor Gabor</td>
<td>DECDG</td>
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<td>Gaobo Pang</td>
<td>PRMED</td>
<td>Developing and implementation of the uncertainty component, fiscal sustainability for oil-rich country</td>
<td>5</td>
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<tr>
<td>Excel design and programming specialist</td>
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<td>Excel design and programming to create a user—friendly interface</td>
<td>2</td>
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<tr>
<td>Sweder van Wijnbergen</td>
<td>Consultant</td>
<td>Advising on the analytical framework for fiscal sustainability and on case studies, co-authoring the manual, and help with developing a hands-on course</td>
<td>11 days</td>
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<tr>
<td>Thomas Laursen</td>
<td>ECSPE</td>
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<td>Craig Burnside</td>
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**Timeline**

(i) Developing the FS tool for Turkey  
Dec 2005

(ii) Creating a user-friendly interface and linking the FS template with LDB/WEO database  
Jan 2005

(iii) Developing the FS tool for Nigeria  
Feb 2006

(iv) Draft Manual and Case studies  
Apr 2006
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