INTRODUCTION

This paper has the purpose of analyzing the sustainability of fiscal policy in Mexico from 2000 to 2025. The present time is appropriate to undertake this kind of analysis. On the economic front, the fiscal cost of rescuing the banking system in 1995-99 has already been consolidated into public debt. On the political front, Mexico is going to change administration by the end of 2000 and there are increasing pressures to raise government spending. Fiscal policy faces enormous challenges in the near future—to complete the pension reform, to overhaul the tax system, etc.—that should be addressed considering the possible available room that the current fiscal stance allows.

This paper initially describes the methodology used in the analysis. In the next sections, two simulations are presented: a basic simulation and an alternative scenario. The third section contains a sensitivity analysis.

DEFINITIONS AND METHODOLOGY

The definition of fiscal sustainability derives from the intertemporal budget constraint of the public sector, which can be constructed from the budget constraint for each period. Many authors, among others Buiter (1990) and Talvi and Végh (2000), have discussed the concept and meaning of fiscal policy sustainability. Moreover, the idea of fiscal
sustainability is intimately related with the public debt dynamics and, as such, has been treated also by numerous authors.

To better grasp the concept, it is convenient to start with the one-period budget constraint for the public sector. Let $B_t$ be the stock of public debt outstanding at the end of period $t-1$; $G_t$ the primary public expenditure, that is, public expenditure excluding interest payments the public debt; $T_t$ the public sector revenue; and $r$ the real rate of interest on public debt. All variables are expressed in real terms and for simplicity the interest rate is assumed to be constant. Then, the one-period budget constraint for the public sector can be written as:

$$B_t - B_{t-1} = G_t - T_t + rB_{t-1}. \tag{1}$$

Equation (1) shows that the change in public debt will be equal to the difference between public expenditures (including interest payments) and public revenues. This budget constraint also ignores, to ease the analysis, public revenues arising from the creation of money.

Equation (1) can be expressed as a fraction of real Gross Domestic Product as:

$$b_t = d_t + \left( \frac{1 + r}{1 + g} \right) b_{t-1}, \tag{2}$$

where $b_t$ is public debt as a proportion of GDP and $d_t$ is the primary deficit, also as a fraction of GDP. The rate of growth of output is denoted by $g$, which is also assumed to be constant over time.

One can build the intertemporal budget constraint for the public sector from equation (2). Since (2) involves the stock of public debt in two consecutive periods, one can iterate on it to eliminate the future stocks of public debt. Assuming the No-Ponzi-Game condition
that prevents public debt to grow unboundedly, such an iterative process would converge to the following intertemporal budget constraint for the public sector:

\[
\sum_{s=0}^{\infty} \left( \frac{1+g}{1+r} \right)^s d_{t+s}.
\]

This intertemporal budget constraint indicates that the initial stock of public debt should be equal to the discounted present value of the sequence of public primary surpluses (i.e., the negative of primary deficits) from \( t \) to infinity. Using equation (3) one can state the following definition: A fiscal policy is said to be sustainable if the planned trajectory of the primary deficit, from \( t \) to infinity, satisfies the intertemporal budget constraint (3).

To construct an indicator of fiscal sustainability, Talvi and Végh (2000) define the concept of permanent primary deficit \( d^- \) as that deficit, constant over time, whose present discounted value is equal to the planned trajectory of the primary deficit. Defined in such a way, one can calculate the permanent fiscal deficit for a sustainable fiscal policy as:

\[
(4) \quad d^- = \left( \frac{r-g}{1+r} \right) b_{t-1},
\]

which says that the permanent fiscal deficit should be equal to the effective interest payments on the initial public debt. It can be shown that when equation (4) is satisfied, the stock of public debt remains constant over time as a fraction of GDP.

Finally, Talvi and Végh (2000) define the indicator of fiscal sustainability \( I^- \) as:

\[
(5) \quad I^- = \left( \frac{r-g}{1+r} \right) b_{t-1} + d^-.
\]
If $I_t^* \leq 0$ then the planned fiscal policy from $t$ onward is sustainable in an ex-ante sense because the permanent primary deficit is no greater than the effective payment of interest on the initial stock of public debt. In contrast, if $I_t^* > 0$ then the planned fiscal policy is unsustainable. In this case the permanent primary deficit that is planned from $t$ onward is not enough to cover the effective interest payments on the initial stock of public debt and therefore it violates the intertemporal budget constraint of the public sector.

In practice, it is not easy to calculate the sustainability indicator $I_t^*$. The difficulty lies on the knowledge of the permanent primary deficit $d_t^*$, which captures the value of the future sequence of planned fiscal deficits from $t$ to infinity. Knowing the whole sequence of future fiscal deficits is difficult in practice. Thus, Blanchard (1990) suggested using a similar indicator but based on a permanent primary deficit for a finite number of periods. The exact number of periods considered in this alternative would correspond to the planning horizon of fiscal policy.

Additionally, Talvi and Végh (2000) suggest calculating what they call the macro-adjusted primary deficit. This deficit would correspond to the primary deficit that would prevail under “normal times”. Such “normal times” vary from one country to another depending on the factors that would affect in any given period the stance of fiscal policy. The proposed adjustment could depend on the stage of the business cycle if the fiscal deficit varies according to this cycle, in which case one would obtain the so-called structural primary deficit. But the adjustment could also be made in relation to the permanent level of private consumption, or the price of some commodity if the fiscal stance depends crucially on any of these determinants. In any of these cases, the primary deficit would be oscillating around the macro-adjusted primary deficit obtained in “normal conditions”.

Whatever concept of primary fiscal deficit is used (either the true permanent primary deficit, or any of the two alternatives) it is possible to get a fiscal sustainability indicator according to equation (5). It is important to note that Talvi and Végh (2000) have shown
that the permanent-but-finite primary deficit proposed by Blanchard (1990) or the macro-adjusted primary deficit, although much simpler to compute, would not produce a sustainability indicator as precise as the true $I_t^*$. Thus, it is very useful to complement the results arising from the sustainability indicator with information of the public debt dynamics, which is given by equation (2).

FISCAL SUSTAINABILITY IN MEXICO: BASIC SIMULATION

Using the previous framework, the sustainability of fiscal policy in Mexico can be studied. As should be clear from the discussion, the sustainability depends fundamentally on the following variables:

- The initial stock of public debt outstanding, $b_{t-1}$.
- The permanent or macro-adjusted primary deficit, $d_t^*$.
- The real interest rate on public debt, $r$.
- The rate of growth of output, $g$.

In the basic simulation, the following values were used for these variables starting in 2000. Except for the stock of public debt, which changes every period according to equation (2), the rest of the variables were assumed to remain constant throughout the simulation period 2000-2025 in the basic scenario.

<table>
<thead>
<tr>
<th>Basic Simulation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$b_{t-1}$</td>
<td>0.416</td>
</tr>
<tr>
<td>$d_t^*$</td>
<td>-0.021</td>
</tr>
<tr>
<td>$r$</td>
<td>0.08</td>
</tr>
<tr>
<td>$g$</td>
<td>0.05</td>
</tr>
</tbody>
</table>
The initial stock of public debt outstanding (i.e. the stock at the end of 1999) is perhaps the most controversial parameter of the previous table. The value used in the basic simulation was taken from adding up the net public debt at the end of 1999 as reported by the Ministry of Finance (24.8% of GDP) and the debt arising from the rescue of the banking system as reported by the Institute of Protection of Banking Savings (16.8% of GDP). The controversy over the value of this parameter arises from the possibility that there might be some contingent liabilities for the public sector that are not included in the basic calculation. These contingent obligations could arise from the reform of public sector employees (including employees at the local level), the incentive system to finance public investment with private sector funds, etc. Given this controversy, the next section of this paper discusses an exercise to tackle the issue of contingent liabilities for the government.

The value used for the primary deficit is equal to the average of the observed primary deficits for 1998 and 1999. Perhaps the most important component to consider in the budget to calculate the macro-adjusted or permanent primary deficit, is the performance of public revenues that depend on the price of oil. In fact, close to one third of the revenues of the federal government are, one way or another, linked to the price of oil. In this respect, 1998 and 1999 are good years to capture the volatility of the oil price and estimate “normal conditions”. The oil price plummeted in 1998 and, partly as a consequence, the primary surplus was only 1.7% of GDP. The next year (1999), when the oil price strongly recovered, the primary surplus was equal to 2.5% of GDP. An average of these two years is a good approximation to the primary deficit in “normal conditions” under the current stance of fiscal policy.

The other two parameters should be less controversial and subject to debate. The real interest rate is assumed to be equal to an annual 8%, a value that is not far from observed rates in recent years for the indexed government bonds (Udibonos) and for some global UMS bonds. Finally, the rate of growth of GDP used in the basic simulation (5% per year) is very close to the average rate observed since 1996.
The results of the basic simulation are in Figure 1, which shows the values of the simulated public debt and the sustainability indicator. As can be seen, this basic simulation shows that, under the assumed parameters, fiscal policy is sustainable even with a rather wide margin. In fact, in 2025 the stock of public debt falls quite notoriously, reaching less than 10% of GDP. The sustainability indicator shows that the primary surplus could be almost 1% of GDP lower and still be enough to keep a constant stock of public debt as a fraction of GDP. The marked reduction in public debt under this basic simulation contributes, of course, to the improvement in the sustainability indicator, which reaches a value of –0.018 for 2025.

Figure 1. Fiscal Sustainability: Basic Simulation.

FISCAL SUSTAINABILITY: INCORPORATING CONTINGENT LIABILITIES

As was mentioned in the previous section, the existence of contingent liabilities for the public sector could modify substantially the stance of fiscal policy. For example, the pension reform undertaken in 1997 already envisages a fiscal cost that should be faced in the following decades. Similarly, the program to finance public investment projects with
private sector funds could easily mean additional public debt given the guarantees that these projects have.

To give an idea of the magnitude of the problem, consider only the case of previsional liabilities of the public sector. It has been estimated that the contingent liabilities of the reform of private pensions that have not already been included in the budget could be in the order of 45% of GDP. Moreover, the cost of the pensions for public employees at the federal and local levels could reach 33.8% of GDP. Adding up these amounts to the initial stock of public debt assumed in the basic simulation, could give a value equal to 120.4% of GDP instead of 41.6%.

However, changing the initial stock of debt to analyze the sustainability of fiscal policy in the face of contingent liabilities is not straightforward. It seems preferable to modify the flows of debt instead of the stocks of debt. Thus, it is more convenient to change the assumed path for the primary deficit to reflect the fact that reserves are been created period by period to face the contingent liabilities, instead of modifying the assumed and explicit stock of public debt for 1999 in order to incorporate these contingent liabilities before these materialize.

In the spirit of the previous argument, a second exercise was considered to study the sustainability of fiscal policy in Mexico. Needles to say, the idea is to vary the primary deficit to reflect de steady appearance of contingent liabilities. In this simulation, the primary surplus is reduced by 0.1% of GDP each year starting in 2001. In this way, the primary surplus, which starts equal to 2.1% of GDP in en 2000, ends up in 2025 with a value equal to -0.4% del PIB. This modification to the assumed path of the primary deficit is not enormous because there are estimates that the fiscal cost of the pension reform could reach almost 4.0% of GDP.

The results of the alternative simulation are shown in Figure 2. It is evident that the results are very different from the outcomes of the basic simulation. In the case of the stock of public debt, it falls for a few years to reach a minimum of 36% of GDP in 2010.
From that year onward, the stock of public debt starts to grow continuously, reaching by 2025 a stock of 48.5% of GDP, larger than the stock of 1999. The behavior of public debt is reflected in the evolution of the fiscal sustainability indicator. This indicator becomes turns in 2011, which means that fiscal policy becomes unsustainable that year. The indicator keeps growing, and with it, the necessary fiscal adjustment to return to a sustainable path. In 2025 the sustainability indicator shows that the fiscal adjustment needed to make fiscal policy sustainable—that is, to stabilize the stock of public debt as a percentage of GDP—is 1.7% of GDP.

**Figure 2. Fiscal Sustainability: Simulation with Contingent Liabilities.**

<table>
<thead>
<tr>
<th>Sensivity Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The modified simulation gives the message that, under certain assumptions, fiscal policy in Mexico could become unsustainable. The idea of this section is to provide a better understanding of the conditions that would turn the basic stance of fiscal policy into an unsustainable path. With this purpose in mind, this section undertakes a sensitivity analysis.</td>
</tr>
</tbody>
</table>
To perform this sensitivity analysis, the values used for the four parameters departed from the values assumed in the basic simulation. In a first exercise, both the initial stock of public debt and the primary deficit were modified, keeping the real rate of interest and the rate of growth of GDP constant at their basic simulation values. In a second exercise and analogously, the real interest rate and the growth of output are changed, but now keeping constant the initial stock of public debt and the primary deficit at their basic values.

<table>
<thead>
<tr>
<th>Sensitivity of Fiscal Sustainability to Changes in Public Debt and Primary Deficit</th>
<th>( b_{t+1} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( d_t^* )</td>
<td>0.3</td>
</tr>
<tr>
<td>-0.030</td>
<td>S</td>
</tr>
<tr>
<td>-0.025</td>
<td>S</td>
</tr>
<tr>
<td>-0.021</td>
<td>S</td>
</tr>
<tr>
<td>-0.020</td>
<td>S</td>
</tr>
<tr>
<td>-0.015</td>
<td>S</td>
</tr>
<tr>
<td>-0.010</td>
<td>S</td>
</tr>
<tr>
<td>-0.005</td>
<td>U</td>
</tr>
</tbody>
</table>

S: Sustainable, U: Unsustainable

<table>
<thead>
<tr>
<th>Sensitivity of Fiscal Sustainability to Changes in Rate of Interest and Growth of GDP</th>
<th>( r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g )</td>
<td>0.07</td>
</tr>
<tr>
<td>0.04</td>
<td>S</td>
</tr>
<tr>
<td>0.05</td>
<td>S</td>
</tr>
<tr>
<td>0.06</td>
<td>S</td>
</tr>
</tbody>
</table>

S: Sustainable, U: Unsustainable
As can be seen in the previous tables, the basic simulation (in bold) has ample room in three dimensions before becoming unsustainable. Thus, *ceteris paribus*, with an initial stock of public debt of 70% of GDP, fiscal policy is still sustainable. Similarly, despite a reduction in the rate of growth of GDP to 4%, or an increase in the real rate of interest to 10%, fiscal policy in Mexico is still sustainable, when we vary the parameters one at a time.

However, the maneuver room is very tight when we consider the primary deficit. In this dimension, a permanent primary deficit of 1.0% of GDP, *ceteris paribus*, would place fiscal policy in an unsustainable path. This result readily confirms the message from the modified simulation in the previous section about the importance of the primary surplus to guarantee fiscal solvency.

**CONCLUSIONS**

This paper has considered the sustainability of fiscal policy in Mexico. Using the conventional methodology based on the dynamics of the public debt and the intertemporal budget constraint, two fiscal policy scenarios were simulated for the period 2000-2025.

In the first simulation, which tries to replicate the underlying “normal conditions” of 2000 for the rest of the period, the result is that it is not imminent that fiscal policy in Mexico is unsustainable. In fact, with the assumed path for policy, the stock of public debt falls quite nicely as a fraction of GDP.

The second simulation tries to be more realistic regarding the possibility of contingent liabilities for the public sector. Such liabilities were modeled with a constant reduction of the primary deficit in each period. The consequence of this exercise, is that the presence of contingent liabilities in the not-too-distant future could easily switch the current stance of fiscal policy to an unsustainable path.
Finally, the sensitivity analysis confirms the previous result. The elbowroom with respect to the primary deficit is very narrow. Even under the same assumptions of initial stock of public debt, interest rate, and growth of output, a primary surplus of 1.0% of GDP renders fiscal policy unsustainable.