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A Structural Fiscal Balance Rule for Mexico

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Abstract*

This paper analyzes the convenience of adopting a structural fiscal balance rule in Mexico, and whether the necessary conditions exist in the country for the adoption of such a rule. Adjustments are made for cyclical factors and other sources of volatility, both on the revenue and the expenditure side, in order to estimate the structural fiscal balance and determine if an appropriate fiscal rule can be designed for Mexico's case. The analysis evaluates various possible oil production scenarios in Mexico and reaches the conclusion that adopting a rule that establishes a yearly structural fiscal surplus of 0.5 percent of GDP could be adequate to maintain sustainable levels of public debt.

JEL Codes: E62, H60
Keywords: Fiscal Policy, Fiscal Rules, Structural Fiscal Balance Rule, Oil Production, Oil Revenues

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1. Introduction

In recent years, Mexico and other Latin American countries made a transition from a period of fiscal irresponsibility (with high fiscal deficits and high levels of public debt) to a period of moderation and budgetary discipline which allowed them to reduce high levels of debt that had limited their capacity to grow for several years. In some cases this transition was motivated or induced by structural adjustment programs promoted by multilateral organizations; in others, the process happened autonomously and voluntarily, although in a discretionary manner. In Mexico's case, the adjustment was initially embarked upon voluntarily and on the country's own volition; more recently, fiscal discipline has become institutionalized through the enforcement of a simple fiscal rule designed to guarantee a balanced budget.

In spite of this seemingly positive transition, fiscal policy design in Mexico and other Latin-American countries continues to be beset by several problems, one of which is associated with the clearly procyclical character of their fiscal policy responses. These kinds of policy response, in which expenditure is adjusted up or down depending on whether the government's revenue increases or declines, have generated greater macroeconomic volatility in several indicators (Gavin and Perotti, 1996; Gavin et al., 1997). Unfortunately, the adoption of a balanced budget rule such as the one Mexico adopted only institutionalizes these kinds of responses and makes them even more rigid.

This paper analyzes the possibility that Mexico could transition from this kind of mechanism to one that is less rigid but that can simultaneously guarantee the sustainability of deficits and public debt, even if a predictably complex scenario should occur such as a potential decline in the revenue obtained from oil production and exports. The mechanism that is being proposed is known as a structural fiscal balance rule, which is a mechanism that separates the truly structural components of the budget from those that are temporary, allowing the adoption of fiscal rules and behavior criteria that do not depend on the economic cycle or other temporary factors.

After this introduction, this paper is divided into the following sections: Section 2 presents a brief description of Mexico's current economic and fiscal situation; Section 3 analyzes the sources of revenue and expenditure volatility, highlighting the strongly procyclical nature of Mexico's fiscal policy; Section 4 presents the results of estimates on revenue, expenditures, and

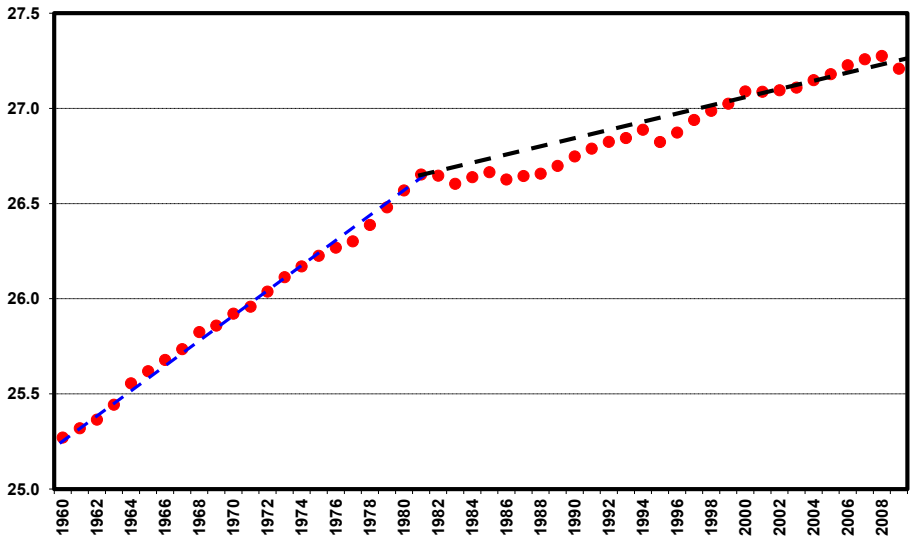
structural balance; Section 5 examines various scenarios for the application of a structural balance rule in Mexico; Section 6 analyzes whether the preconditions exist to allow the implementation of a structural fiscal balance rule in Mexico; finally, Section 7 presents our conclusions.

2. Mexico's Recent Economic and Fiscal Performance

Economic Activity in Mexico

Mexico's recent economic performance during the last three decades has been rather mediocre. After a period of strong and sustained economic growth that lasted almost five decades (from 1932 to 1981) and during which Gross Domestic Product (GDP) per capita grew at annual rates of over 3.3 percent on average, since the beginning of the 1980s, Mexico's economic growth has been much slower: from 1981 to 2009 it only achieved an annual per capita growth of about 0.5 percent (see Figure 1).

Figure 1. Mexico: Total GDP, 1960–2009 *(in logs of constant dollars)*



Source: World Development Indicators, World Bank

This abrupt change in the Mexican economy's long-term growth trend has sparked an increasingly abundant literature on the possible factors that may explain this situation. Among the various factors mentioned (which are not necessarily mutually exclusive) we can highlight the following: a low or even negative growth rate in total factor productivity (Faal, 2005; Garcia Verdu, 2007); a lack of investment, particularly public investment (Ros, 2008); the absence of structural reforms or the deficient implementation of those that were attempted (Gil Diaz, 2003; Esquivel and Hernandez-Trillo, 2009; Tornell et al., 2004); macroeconomic policy restrictions (Ros, 2009; Esquivel, 2010a); and issues associated with Mexico's process of integration to the world economy (Blecker, 2009; Esquivel, 2010a).

In the end, what probably explains the low growth of the Mexican economy during the last three decades is a combination of all these factors. Table 1 includes a summary of Mexico's economic performance, applying a standard exercise of growth decomposition. The table clearly shows the deceleration experienced since the beginning of the 1980s, as well as the negative trend in total factor productivity that has occurred since that time.

Table 1. Sources of Growth of Total GDP in Mexico *(in percentage points per year)*

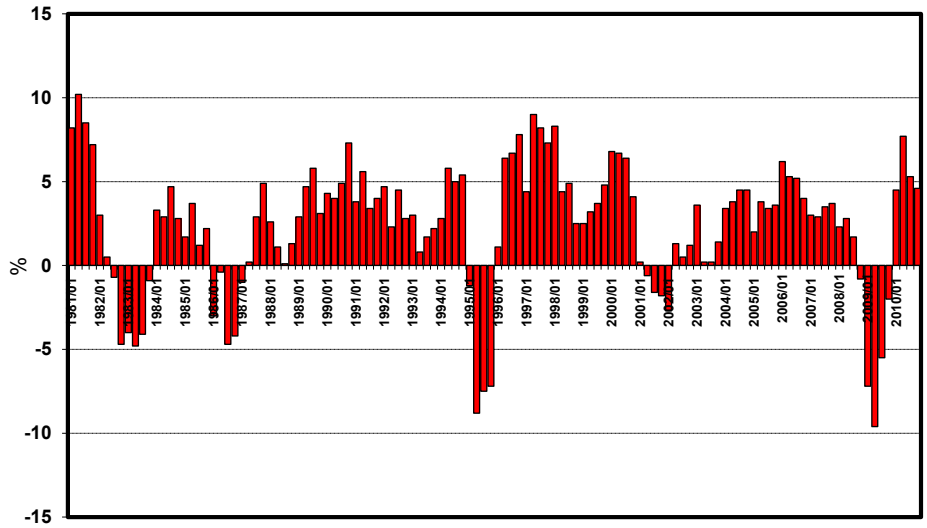
Period	Change in Total GDP	Change in Physical Capital	Change in Human Capital Composition	Change in Total Factor Productivity
1950-1970	6.10	1.67	0.63	3.80
1970-1982	5.97	2.54	1.94	1.49
1982-2006	2.42	1.22	2.07	-0.87

Source: Garcia Verdu (2007).

Table 1 also shows that the most important source of growth in Mexico is the change in the composition of human capital, and that the contribution of physical capital accumulation to growth has diminished significantly in recent times. This result is compatible with explanations that emphasize the role played by lack of investment, considering it to be the main factor that explains such low growth rates (Ros, 2008 and 2009).

Figure 2 shows quarterly GDP growth for 1981–2009. The Figure shows that during the last three decades Mexico's low economic growth rate is explained not only by trend factors, but also by cyclical ones. In fact, the Figure shows that during this period Mexico has gone through at least five clearly identifiable recessions: 1982–83, 1986–87, 1995, 2001–02 and 2008–09.[1]

Figure 2. Mexico: Quarterly GDP growth rate, 1981–2009 *(compared to the same quarter of the previous year)*



Source: INEGI.

The frequency, magnitude and duration of recent recessions have led some authors to suggest that Mexico's low economic performance could be explained, at least in part, by factors related to the management and design of economic policy. One of the factors mentioned with certain regularity is the strongly procyclical nature of fiscal policy; therefore, in the following section we will analyze this particular aspect of economic policy management in Mexico in more detail. In the remainder of this section, we will briefly describe the characteristics and basic indicators of Mexico's fiscal policy during the last two decades.

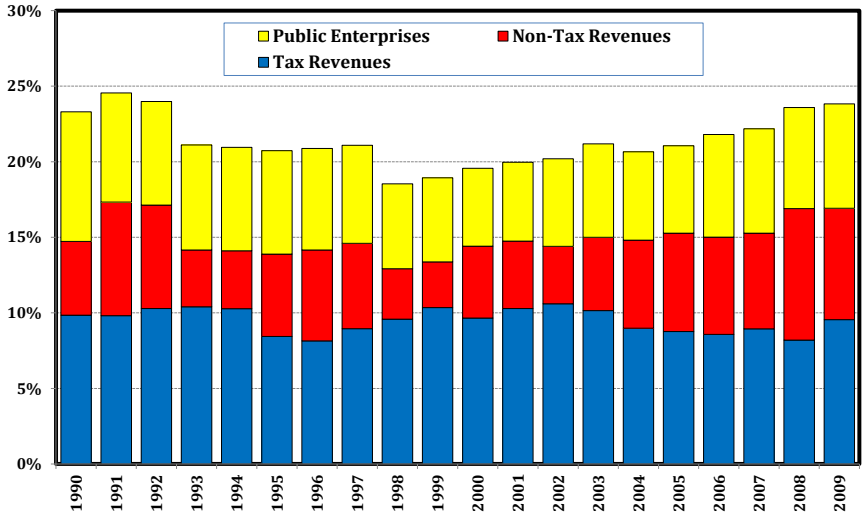
[1] Mexico has no officially recognized recession period categorization. However, these dates (except the last one) are the same as those identified in a recent study by Acevedo (2009).

Fiscal Policy in Mexico[2]

Revenue

In general terms, the Mexican public sector's revenues come from three different sources: tax revenues, non-tax revenues and revenues from public enterprises (see Table 2). During the last two decades, total revenues have fluctuated around 20 percent to 23 percent of GDP, as shown in Figure 3. Of this income, tax collections have been relatively stable at about 10 percent of GDP, one of the lowest tax burdens in the world, and certainly the lowest among OECD countries (OECD, 2010) and all Latin American countries (Jimenez and Gomez, 2009).

Figure 3. Mexico: Public Sector Revenues, 1990–2009 *(percentage of GDP)*

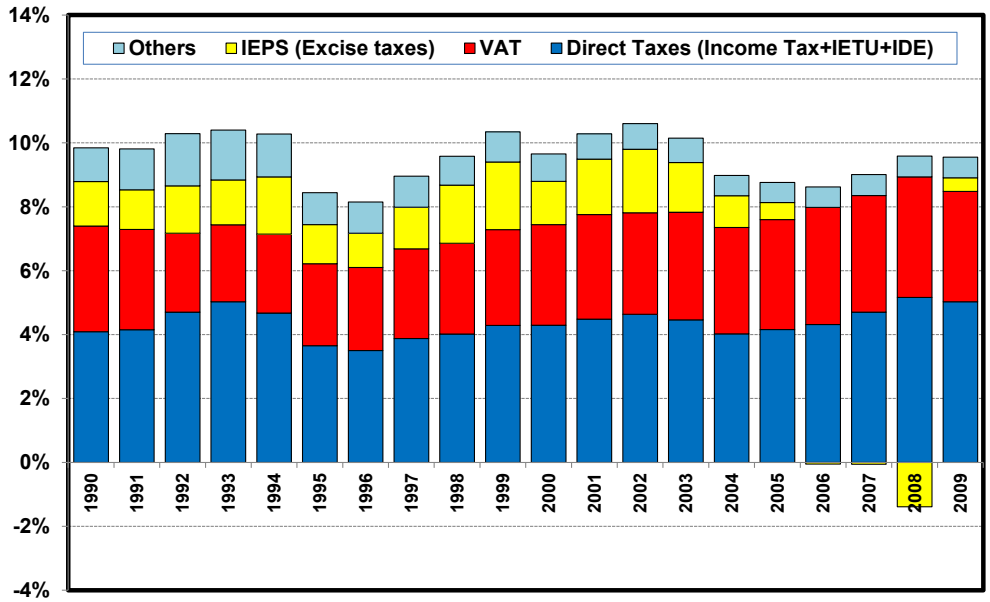


Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

[2] Alternative descriptions of the evolution of Mexico's fiscal policy can be found in Urzua (2000) and in Gil Diaz and Thirsk (2000). These papers do not, however, cover the changes that have occurred during the last decade.

Non-Tax Revenues, which includes mainly hydrocarbons fees (*oil royalties*) and revenues obtained from the privatization and sale of public enterprises, have been relatively volatile during the last few years, fluctuating between 3 percent and 9 percent of GDP. The evolution of this component will be discussed later in greater detail. Finally, income of public enterprises has been slightly more stable, although it has also fluctuated between 5 percent and 8 percent of GDP (see Figure 3). Regarding tax revenue, this comes mainly from three sources: direct taxes, value-added tax and special taxes on products and services (IEPS or *excise taxes*). Among the direct taxes we include the traditional income tax (on individuals and companies) which has been operating in Mexico since 1921, the recently created Single Rate Special Tax (IETU), and the Tax on Cash Deposits (IDE). The two latter taxes are deemed to be control taxes.[3] They were established by the Fiscal Reform Law approved by Congress in September of 2007, and entered into effect the following year.[4] During the last few years direct taxes have been equivalent to nearly 5 percent of GDP, and are the most significant source of tax revenues in Mexico (see Figure 4).

Figure 4. Mexico: Tax Revenues *(percentage of GDP)*



Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

[3] The IETU replaced the Assets Tax (IMPAC), which was also a control tax.
[4] Although the IDE is a tax that seeks to discourage informality and penalize cash transactions, we have included it among direct taxes because its payment is 100 percent deductible from income tax payments.

Value-Added Tax (VAT) is the second most important source of tax income in Mexico; in recent years it has been equivalent to about 3.5 percent of GDP. This tax was initially introduced in 1980 with a general rate of 10 percent, maintaining some exemptions for basic foodstuffs and other products (books, school tuition, etc.), as well as a lower rate in the border area with the United States (6 percent). During the last few years this tax has been modified several times; the most recent change was a standard increase from 15 percent to 16 percent and an increase on the border rate from 10 percent to 11 percent. These adjustments were introduced in 2010 and exemptions are maintained for all foodstuffs and medicines.[5]

Finally, it is interesting to analyze the behavior of the revenues from IEPS revenue. Figure 4 shows that this revenue is relatively volatile, and in recent years it has been either very small (2005 and 2009), practically non-existent (2006–07), or even negative (2008). As we shall see below, these revenue items have an inverse correlation with world oil prices due to the rules that are used to set gasoline prices in Mexico. This generates an effect that partially cushions the impact of oil price changes on Mexico's fiscal revenues, which is the reason why this revenue practically disappeared throughout the last decade (see Table 2).

Expenditures

During most of the last two decades (specifically between 1992 and 2004), Mexico's public expenditure fluctuated at levels close to 20 percent of GDP, although recently it has been experiencing a slightly upward trend (see Figure 5). The disaggregation of Total Expenditure into its two components: Programmable Expenditure (Current Expenditure plus Investment Expenditure) and non-Programmable Expenditure (Debt Servicing plus Transfers to the States) helps us understand the evolution of total expenditures. For example, the decline of Total Expenditure during 1990-92 is explained basically by the lower financial cost of public debt, while the recent increase is mostly associated with increases in programmable expenditure, boosted by the extraordinary revenue generated by the recent oil "boom."[6]

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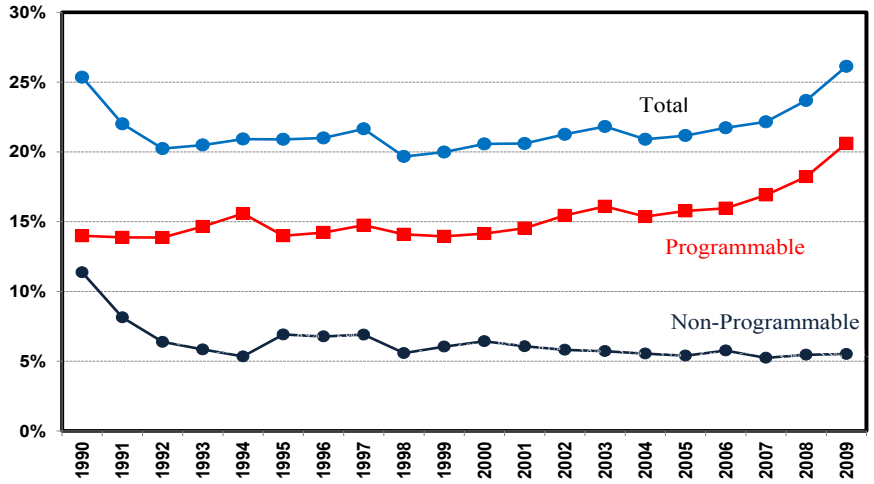
[5] Other changes to this tax include: an increase in the general rate from 10 to 15 percent in 1983, which was enacted in the middle of a deep economic crisis; a reduction to 10 percent in 1991; and a new general increase to 15 percent, enacted at the peak of the 1995 crisis. Changes have also been introduced for certain products, such as a 20 percent rate on items identified as "luxury goods," as well as additional reductions to the VAT on medicines or processed foodstuffs.

[6] The apparent increase in expenditure experienced in 2009 was due more to a decline in GDP than to an actual increase in the level of expenditure.

Figure 5. Public Expenditure in Mexico, 1990–2009 *(percentage of GDP)*

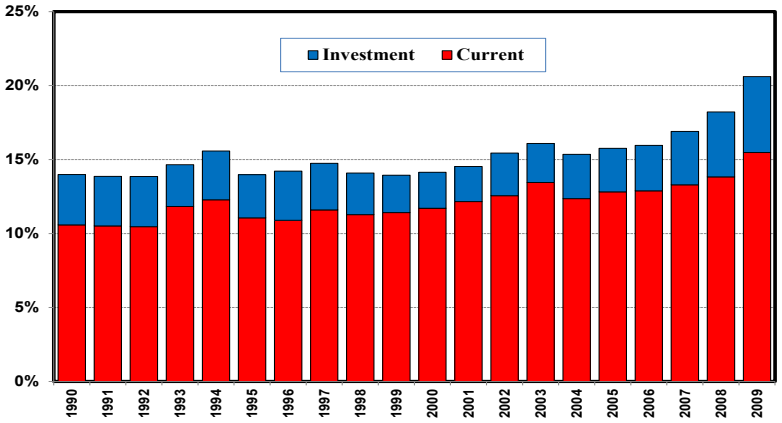


Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

To better illustrate the recent evolution of public expenditure in Mexico, Figures 6 and 7 show programmable and non-programmable expenditure, disaggregated into components. Figure 6 shows the behavior of Programmable Public Expenditure, which is divided into Current Expenditure and Investment Expenditure (both physical and financial). As can be seen in the Figure, this type of expenditure has grown by almost 7 percentage points from 1990 to 2009; most of this growth is attributable to an increase in current expenditure, which went from 10 percent to 15 percent of GDP during that period. On the other hand, the share of Capital Expenditure, as was already mentioned in the previous subsection, is relatively small in Mexico (about 4 percent of GDP), although it grew slightly as a percentage of GDP in 2008 and 2009.[7]

The evolution of non-Programmable Public Expenditure, shown in Figure 7, confirms what has been mentioned above, i.e., the very significant decline in the financial cost of the debt from 1990 to 1994 as a consequence of foreign debt renegotiation and a robust process of debt reduction (Aspe, 1993). This component grew slightly as a result of the 1994–95 crisis, and since the beginning of this century has remained basically stable around 2 percent of GDP.

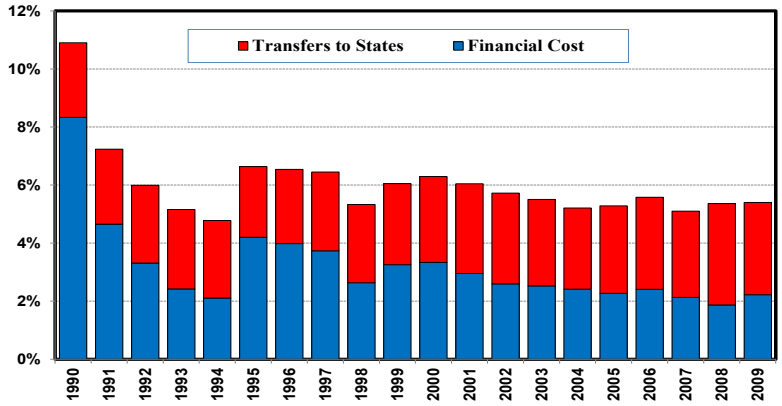
Figure 6. Mexico: Programmable Public Expenditure *(percentage of GDP)*



Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

Another component of Non-Programmable Public Expenditure, Transfers to States, seems to have remained relatively stable, although in fact it has been growing in relative terms and has already gone from slightly below 2 percent of GDP to slightly over 3 percent in 2009 (Figure 7). The combination of these two trends has allowed this expenditure category to remain relatively stable at about 5 percent to 6 percent of GDP during the last 17 years.

Figure 7. Mexico: Non-Programmable Public Expenditure *(percentage of GDP)*



Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

[7] As in the case of total expenditures, the 2009 increase is due more to a decline in the denominator (-6.5 percent in 2009) than to an increase in the numerator.

Table 2. Public Sector Revenues and Expenditures

	Percentage of GDP		Percentage of Total Revenue	
	1990-1999	2000-2009	1990-1999	2000-2009
Revenues				
Budgetary revenues	20.6	21.7	100.0	100.0
Federal Government revenues	14.1	15.4	68.8	71.1
Tax revenues	9.6	9.2	46.7	42.5
Income tax	4.1	4.6	19.9	21.1
Value-added tax	2.8	3.5	13.6	16.0
Import tax	0.6	0.3	3.0	1.5
IEPS	1.6	0.5	7.9	2.3
Gasoline and Diesel	1.2	0.1	5.8	0.6
Others	0.4	0.4	2.1	1.7
Other Tax revenues	0.4	0.3	2.2	1.6
Non-Tax revenues	4.5	6.2	22.1	28.6
Hydrocarbons Fees	2.7	4.5	13.0	20.7
Others	1.9	1.7	9.1	7.9
Agencies and companies	6.4	6.3	31.2	28.9
PEMEX	2.2	2.6	10.9	12.0
Others	4.2	3.7	20.3	16.9
Expenditures				
Net paid expenditure	20.7	22.3	100.8	102.7
Programmable expenditure	14.3	16.7	69.8	76.7
Current expenditure	11.5	13.4	56.1	61.5
Capital expenditure	3.1	3.4	14.9	15.8
Non-Programmable expenditure	6.4	5.6	31.0	26.0
Participations to States and Municipalities	2.7	3.1	12.9	14.3
Petroleum revenues	6.2	7.5	30.3	34.5
Non-Petroleum revenues	14.4	14.2	69.7	65.5

Source: Calculations made by authors with CEFP and SHCP data.

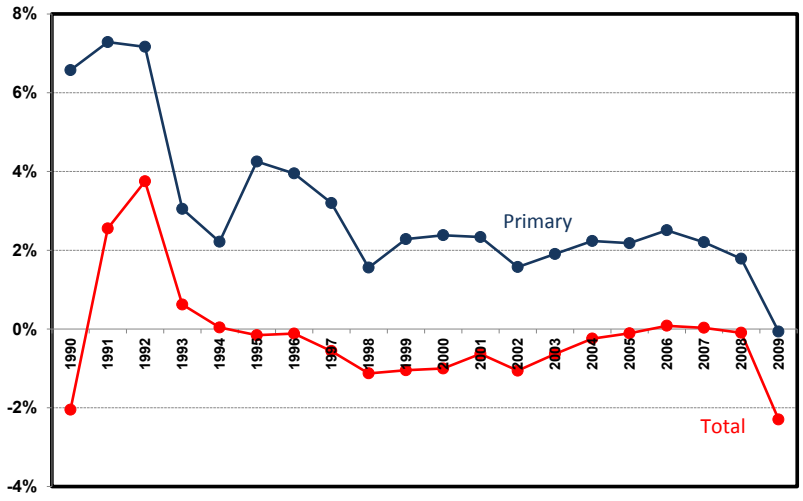
Deficit and Debt

The evolution of Public Sector revenues and expenditures briefly described above has contributed to a significant improvement in the country's fiscal profile and to the sustainability of public debt. In fact, in recent years the Mexican government has regularly secured yearly

primary fiscal surpluses close to 2 percent of GDP, which, along with the renegotiation and reduction of the public debt that took place at the end of 1980s,[8] has allowed the government to have mostly balanced fiscal budgets for the last 15 years or, at worst, a relatively small budget deficit.

Figure 8 shows the evolution of Mexico's primary and overall balances for the last two decades. It can be seen here that from 1994, and with 2009 as the only exception, fiscal accounts have remained relatively balanced. In fact, during 1991–93 Mexico reached important fiscal surplus, due to the non-recurring revenue generated by the privatizations done by the regime of President Salinas of Gortari (Aspe, 1993). These extraordinary revenues allowed a gradual payment and reduction of public debt, as can be seen in Figure 9.

Figure 8. Mexico: Total and Primary Fiscal Balance *(percentage of GDP)*



Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

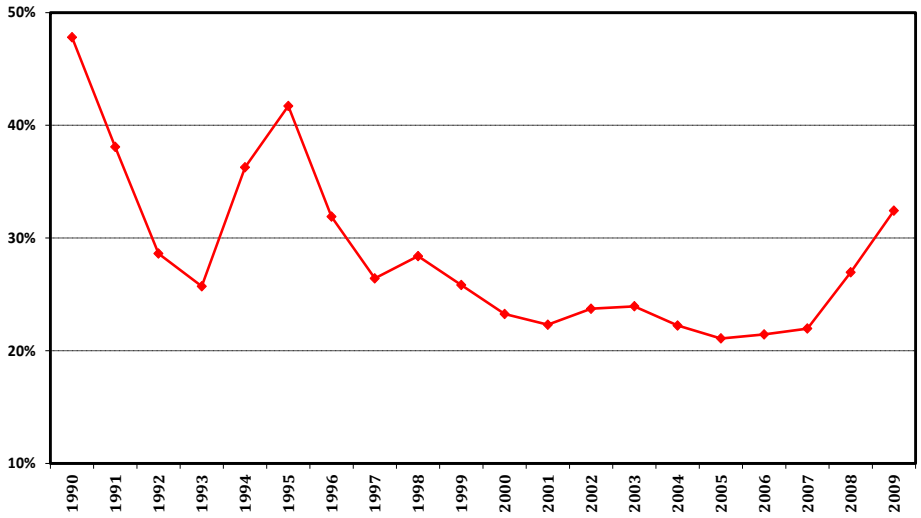
It is worth mentioning that during 2005–08 Mexico's fiscal accounts were practically in balance. This is no coincidence, since at the beginning of that period – 2005 – a balanced-budget rule was enacted. This rule, as defined in the Federal Budget and Financial Responsibility Law, requires the Federal Government to set an expenditure level that "must contribute to budget balance" (Art. 16). This fiscal rule, one of the simplest possible, therefore establishes – by decree – the

[8] For more details see Aspe (1993) and Urzua (2000).

obligation to keep a balanced budget. However, the Law does have a certain degree of flexibility: it allows, in certain circumstances, the possibility of having budget deficit (Art. 17). Indeed, this article was the basis on which the federal government made a request to incur a deficit in 2009, in a context of global economic crisis. We will later return to this point to analyze the implications of having adopted a rule such as the one described.

As previously mentioned, the Mexican Government had by then already achieved significant improvements in public debt that guaranteed its sustainability, different from the period during which the Latin American debt crisis was triggered, back in the 1980s.

Figure 9. Public Debt, 1990–2009 *(percentage of GDP)*



Source: *Banco de México* and *Secretaria de Hacienda y Crédito Publico.*

From 1990 to 2007 public debt declined, as a percentage of GDP, from about 50 percent to slightly over 20 percent (see Figure 9). This downward trend was only interrupted by a temporary debt increase associated with the 1994/95 Mexican crisis (the "tequila crisis"). After that episode, public debt continued its declining trend; by the first years of the new century, the public debt to GDP ratio had stabilized at levels close to 20 percent. This situation partially changed after 2008 due to two factors: first, in 2008 a series of public enterprise investment projects were finally recognized by the Mexican Government as public debt (the so-called PIDIREGAS, that is, Infrastructure Projects which Recording as Expenditure had been *Deferred*); secondly, the significant contraction of GDP in 2009 generated an increase in the debt

to GDP ratio. However, as we will discuss below, the level of Mexican debt as a percentage of GDP continues within acceptable margins and is perfectly sustainable. We will return to this matter in later chapters.

Summary

In summary, Mexico's public finances are basically balanced, due in part to the existence of a Balanced-Budget Fiscal Rule, and partly to the fact that previously adopted reforms, both on the revenue and the expenditure side, were already geared towards this objective. It should be noted, however, that this kind of rules generate significantly procyclical fiscal behaviors (Esquivel, 2009; Ter-Minassian, 2010) which can be undesirable due to their effects on macroeconomic volatility (Gavin et al., 1996, 1997).

On the other hand, Mexico's public debt can be viewed as relatively low, transparent and sustainable, while the country's tax burden is deemed to be very low, and revenues depend to a great degree (over 30 percent) on revenue from petroleum (see Table 2). Finally, and in spite of these considerations, an increasing growth of current expenditures, combined with a relatively low level of investment expenditure, are potential sources of concern. These trends will surely generate difficulties for Mexico's return to sustained and relatively high economic growth rates in the medium and long term.

3. Sources of Budget Balance Volatility in Mexico

During 1990–2009, the volatility of fiscal balance in Mexico is explained to a great extent by the combination effects of three different factors: the business cycle, the petroleum cycle, and the size and irregularity of non-recurring revenue. We will briefly analyze each one of these three sources of volatility.

The Business Cycle

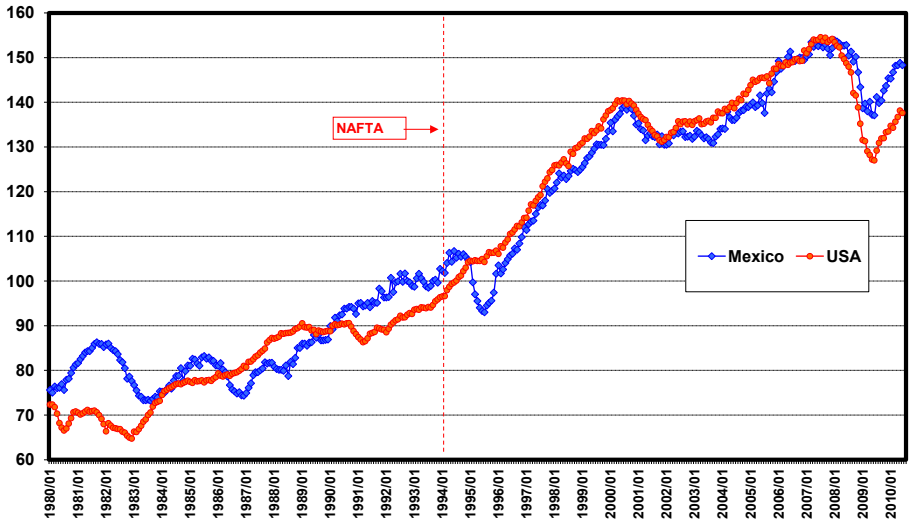
As mentioned in the previous section, during the last three decades Mexico has had five economic recessions (Figure 2). Curiously, two of the last three recessions (1994–95 and 2008–09), were among the deepest since modern times. In fact, at the trough of Mexico's most recent

recession, total quarterly GDP declined at a 10 percent annual rate, level considered by some as the threshold that separates depressions from simple recessions (Barro and Ursua, 2008).

In any case, it makes sense to differentiate the nature of the different recessions that have affected Mexico in recent decades. The two recessions in the 1980s and the 1994–95 recession emerged from the country's own internal dynamics, and more specifically from problems associated with the country macroeconomic management (Lustig, 1998). However, the two 21st Century recessions seem to have been determined fundamentally by external factors; more specifically, they seem to have been closely linked with the increasing economic integration between Mexico and the United States.

This can be inferred from a series of recent studies that suggest the existence of a shared North American business cycle, a phenomenon that became stronger with the operation of the North American Free Trade Agreement (NAFTA).[9] In fact, the simple correlation between industrial activity growth rates in Mexico and the United States from 1997 to 2010 is already greater than 90 percent, as can be seen in Figure 10.

Figure 10. Industrial Activity Indexes in Mexico and the United States, 1980–2010



Sources: INEGI and Federal Reserve.

[9] See Sosa (2008), Blecker (2009), and Esquivel (2010th), as well as the multiple references quoted in those papers.

In any case, and though the origin of the recent economic recessions in Mexico may be traced to other countries, it is however true that the policy responses adopted (or lack thereof, depending on each case) may have had a certain impact on their length and depth (Esquivel 2010a). Particularly, the existence of a balanced budget rule such as the one introduced in 2005 may have strengthened the procyclical nature of the fiscal policy detected in other studies, therefore contributing to make the recent 2000–02 and 2008–09 recessions deeper and/or longer-lasting than they would have been otherwise if this kind of policy had not been in place.[10]

The Petroleum Cycle

The second source of budget balance volatility in Mexico is, undoubtedly, the world petroleum cycle. Mexico is the world's seventh oil producer, producing slightly over 2.5 million barrels a day. Of that production, Mexico exports over 1.3 million barrels a day, making it the world's twentieth oil exporting country. Although the country has achieved an enormous diversification of its exports during the last two decades, its public finances still depend substantially on oil revenues. In fact, as mentioned above, oil revenues provide over 30 percent of Mexico's entire public revenues. In fact, the oil price boom of the latter half of the first decade of the 2000s increased the contribution of oil income to public revenues to over 34 percent of the total (see Table 2).

This would seem to imply that changes in world oil prices can have a significant effect on Mexico's fiscal revenues. This effect, however, is smaller than could be expected, because although Mexico is an oil producer and exporter, it is also a gasoline-importer country. In fact, in recent years Mexico has imported about 40 percent of its total gasoline consumption. Therefore, oil price changes affect the country in two ways: both in terms of exports, and in terms of imports. This in turn has two important consequences: first, the effects of oil price shocks (both positive and negative) on the country's terms of trade are getting smaller with time; secondly, the impact of the changes in world oil prices on Mexico's public finances is twofold, operating through both the two mechanisms mentioned. On the one hand, a direct effect is felt through the collection of hydrocarbons export fees *(royalties*); on the other, an indirect (and opposite) effect occurs through the price impact of the gasoline imports made through the state monopoly

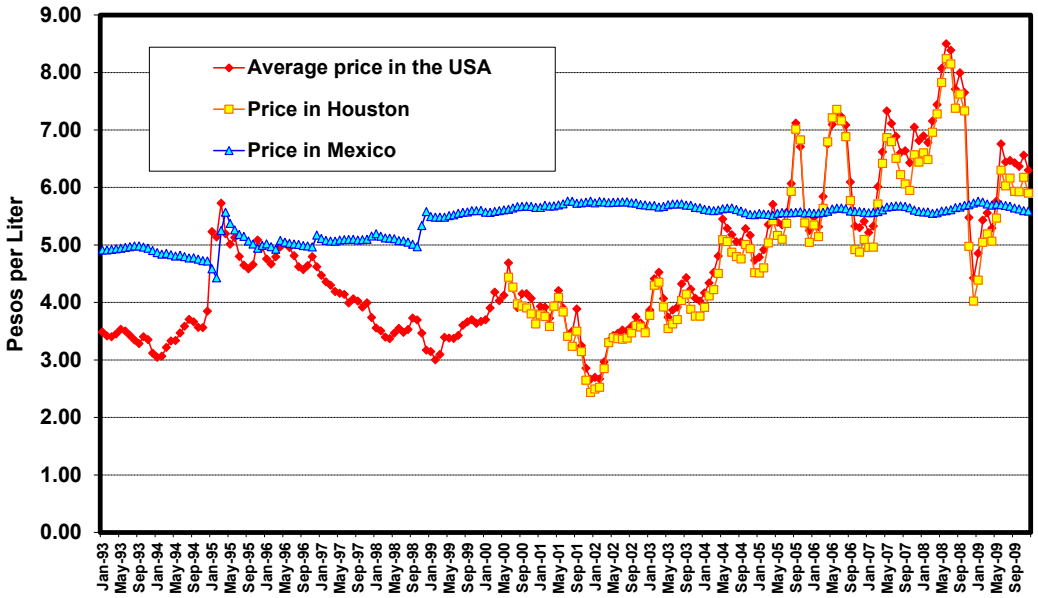
[10] See Gavin and Perotti (1996), Gavin *et al* (1997), Burnside and Meshcheryakova (2005).

Petroleos Mexicanos (PEMEX) and then subjected to the price fixing mechanism we will describe in the following section.

Gasoline Prices in Mexico

The current gasoline price fixation mechanism in Mexico has two peculiarities: on one hand, imports, distribution, and marketing of this product are done in their entirety through the PEMEX monopoly; secondly, the mechanism through which retail prices are determined has an implicit goal: keeping gasoline prices stable in real terms. This implicit target is revealed in Figure 11, where we can see that during the last 10 years the relative price of gasoline in Mexico has remained basically constant.

Figure 11. Prices of "Magna" Gasoline in Mexico and Regular Unleaded Gasoline in the United States *(in pesos per liter, Mexican 2002 prices)*



Source: BDI.

This behavior is particularly odd, particularly considering that during the last decade international oil prices were extremely volatile, which should have been reflected in the final price of gasoline. In fact, Figure 11 also shows gasoline prices in two markets that are relevant for Mexico (the Houston market and the average price in all the United States), converted into

their equivalent in pesos and expressed in real terms using a standard deflation technique. The behavior of these variables follows the trend of world oil prices, and reveals a volatility that is not apparent in Mexico's domestic gasoline prices.

The circumstances described, combined with the fact that a substantial portion of the gasoline that Mexico uses is imported, means that someone must be either absorbing the cost—or benefiting from the surplus—associated with the price differential between one market and the other. Since the imports are being carried out through the state company PEMEX, the Mexican Government pays PEMEX the equivalent of international prices, and then absorbs the cost—or benefits from the surplus—associated with the price differential.

This mechanism has a significant impact on the volatility of revenues obtained through the collection of the special tax on gasoline sales (one of the "Special Taxes on Products and Services," IEPS): when gasoline prices in Mexico are greater than those in the United States (which happened systematically from 1995 to the end of 2004, as seen in Figure 11), the tax is positive and provides an important source of revenue for the public sector. However, when the opposite occurs, i.e., when international gasoline prices are higher than the price in Mexico (as happened recurrently from 2005 to 2008), this tax becomes a subsidy, since its net collection is negative. For this reason, the collection of IEPS taxes on gasoline and diesel in Mexico was negative from 2005 to 2008 and practically non-existent in 2009 (see Table 2). In summary, relatively stable gasoline prices are achieved at the cost of generating greater volatility in public finances.

In summary, the petroleum cycle impacts public finances in two directions and in two different ways. On one hand, regarding the amounts involved, the effect is relatively large, although smaller that could have been expected, given the size of the compensatory effect that takes place through the opposite impact on the size of the tax (or subsidy) associated with the cost of gasoline. On the other hand, this also means that we must bear in mind that two separate and opposite effects occur that have an impact on two different revenue sources: on one hand, non-tax revenue is collected through hydrocarbons fees; on the other, tax revenue of an opposite sign that is either collected or distributed through the IEPS.

Attempts to Reduce the Petroleum Cycle's Volatility

It is worth noting that in recent years some efforts have been made to reduce the impact of the volatility of the petroleum cycle on Mexico's fiscal revenues. To this end, certain measures have been taken aimed at stabilizing such effect on public revenues. Among a set of different measures, the two most important are the following:

1) Introduction of a formula in the law that allows the calculation of an average expected price for each barrel of exported oil, which helps to define the expected oil revenue[11], and
2) The creation of three stabilization funds with **part** of the excess resources, both from petroleum and non-petroleum sources, where surplus petroleum resources are defined as those collected over and beyond the anticipated revenues identified using the formula mentioned in the paragraph above.[12]

According to the statute that regulates these funds, excess resources should be assigned as follows: (a) 25 percent to a Federated Entity Revenue Stabilization Fund; (b) 25 percent to an Oil Infrastructure Investment Stabilization Fund; and (c) 40 percent to an Oil Revenue Stabilization Fund. The remaining 10 percent must be used for investment in infrastructure projects and equipment for federated entities.

Although the establishment of these funds seemed to be a good strategy to reduce volatility of fiscal revenues, in practice they didn't work well, since the three funds had relatively low pre-established ceilings which were quickly reached during times of economic boom; and when oil prices collapsed, the funds were also emptied very quickly.[13]

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[11] The specific formula is contained in Article 31 of the Federal Budget and Financial Responsibility Law and includes information on the following: 1) the observed international price of the Mexican blend during the previous 10 years; 2) the average price of futures for delivery during the following three years in the New York Mercantile Exchange; and 3) the average price of one year futures in the NYMEX, multiplied by an adjustment factor (0.84).

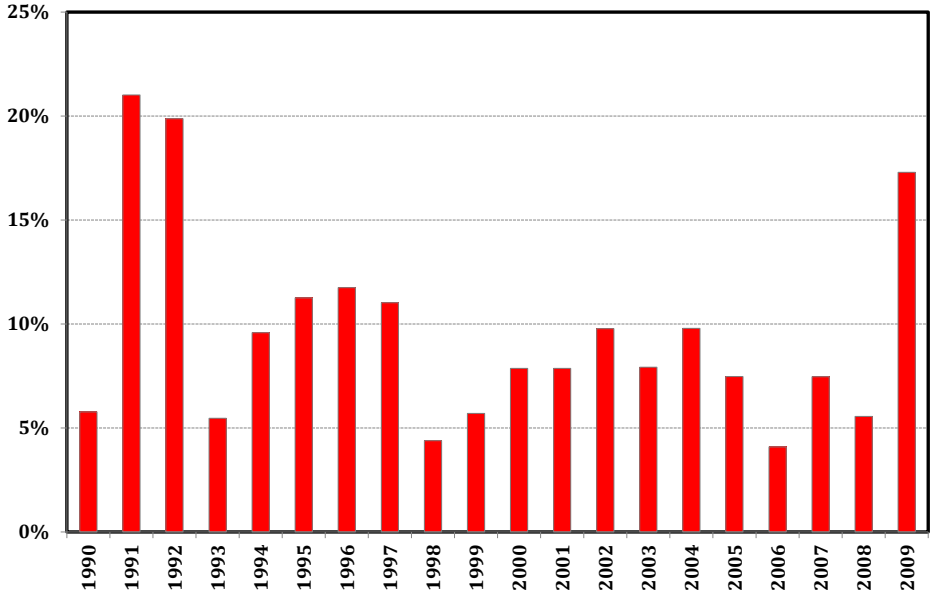
[12] The establishment of these funds is contemplated in Article 19 of the Federal Budget and Financial Responsibility Law. Although the creation of these funds initially would seem to be very transparent and defined, their operation is actually subjected to a significant degree of discretionality, since the funds' financing is limited to the resources "remaining" after having financed other contingent and non-contingent expenses.

[13] The ceiling of the three stabilization funds was equivalent to US$1.875, US$1.875 and US$3.75 per barrel produced during the year respectively. This was equivalent to about 10 percent of the revenue obtained through petroleum exports during a year, or less than 1 percent of GDP. These ceilings were recently extended to US$3.25, US$3.25 and US$6.5 per barrel, which continues to be relatively small. In 2010 a reform was also introduced that mandated a temporary expansion of the amounts to be deposited in the Petroleum Revenue Stabilization Fund to a total equivalent to 65 percent of excess revenues.

Non-recurring Revenues

The last component that adds a certain degree of volatility to fiscal revenue is Non-Recurring Revenues. This revenue consists basically of income from divestments (privatizations), operational remainders of Banxico, PEMEX excess returns, dividends, etc. This income is what makes up most of the revenues included in the "Uses" item. In certain years (1991, 1992 and 2009) they have represented a significant portion of the revenue of the Federal Government (Figure 12).

Figure 12. Mexico: Revenue from Uses, 1990–2009 *(percentage of total revenue)*



Source: Banco de México and Secretaria de Hacienda y Crédito Publico.

In summary, the three aforementioned sources of volatility in fiscal revenue need to be given special treatment in order to identify the truly structural portion of revenue and obtain the correct definition for a structural fiscal balance rule for Mexico. The following section is devoted to this topic.

4. Estimation of Structural Revenue and Expenditure in Mexico

Estimation of the Potential Output and the Output Gap

The first step in the calculation of the structural balance is to estimate the Potential Output, usually defined as the output level that the economy would have in a situation of "full employment" or had a "natural rate of unemployment". Once the potential output is estimated, calculations can be made to estimate the magnitude of the output gaps by determining the differences, in percentage terms, between the observed output and its potential level. It then becomes possible to analyze the correlations that fiscal revenues and expenditures may have with the business cycle.

The methods used to estimate the Potential Product are usually divided into two sets of techniques: methods based on the statistical properties of time series of macroeconomic aggregates (such as the widely used Hodrick-Prescott filter), or estimates based on structural models (estimating, for example, an aggregate production function). Unfortunately, in the case of Mexico the data required to use the second approach is not easily available, or calculating this indicator would involve an extensive reliance on theoretical assumptions.[14] Therefore, in this paper we will use Potential Output estimates obtained through methods that examine time series.

Particularly, the filter designed by Hodrick and Prescott (1997) (HP, from here on) is the most frequently used to calculate the trend of production at any particular time. To do so, it uses data both from past and the future. However, when "future" observations are relatively scarce, the HP filter often cannot measure the cyclical component of production adequately. This problem is significant at the end of the sample, which are usually the most relevant points from a policy formulation perspective, since they show the size of the gap with the current production. In the literature there are at least two alternatives that seek to address this problem: the St. Amant-van Norden filter (1997) and the Christiano-Fitzgerald filter (2003). These two methods are better than the HP filter in dealing with the "end of sample problem" (Anton, 2010).

[14] Such is the case, for example, of the information on capital stock, or the indicators of capacity utilization. For more details on the problems associated with estimating the potential GDP in Mexico see Acevedo (2009), Anton (2010), and Faal (2005).

Hodrick-Prescott Filter (HP)

May y_t be the logarithm of real GDP. The HP filter decomposes this time series into a cyclical component y_t^c and a trend y_t^c. To obtain the HP filter's trend the objective function must be minimized:

$$\sum_{t=1}^{T}(y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1}[(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*)]^2$$

Parameter λ is the smoothing parameter. In other words, as the value of λ increases, the smoother will be the trend component. It is obvious that if λ = 0 the trend will simply be equal to the original series. On the other hand, if λ tends towards infinity, the trend will be a straight line. For quarterly data, the conventional value of λ is 1600.

St. Amant-van Norden Filter (SAVN)

The SAVN filter is an extension of the HP filter. This method adds an additional condition to the minimization formula:

$$\sum_{t=1}^{T}(y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1}[(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*)]^2 + \lambda_{ss} \sum_{t=T-j}^{T}(\Delta y_t^* - u_{ss})$$

The new term smoothes the deviation of the growth trend from the long-term product's growth rate in the final portion of the sample. There are two new parameters in the minimization formula: the series long-term growth rate u_{ss} (a constant determined by the researcher) and the counteracting parameter λ_{ss} that smoothes out the trend for the last *j* observations in the sample.

Christiano-Fitzgerald Filter (CF)

Christiano and Fitzgerald (2003) propose a method based on a band-pass filter in order to recover the time series trend with a regularity that ranges from an lower limit (p_l) to an upper one (p_u). This filter requires an infinite number of data points to generate an ideal trend. Therefore, the proposed filter is a linear approximation of the ideal filter. To decompose the original series, the data should be generated by a "random walk" (although this approximation is false in many cases). The expression to be calculated is as follows:

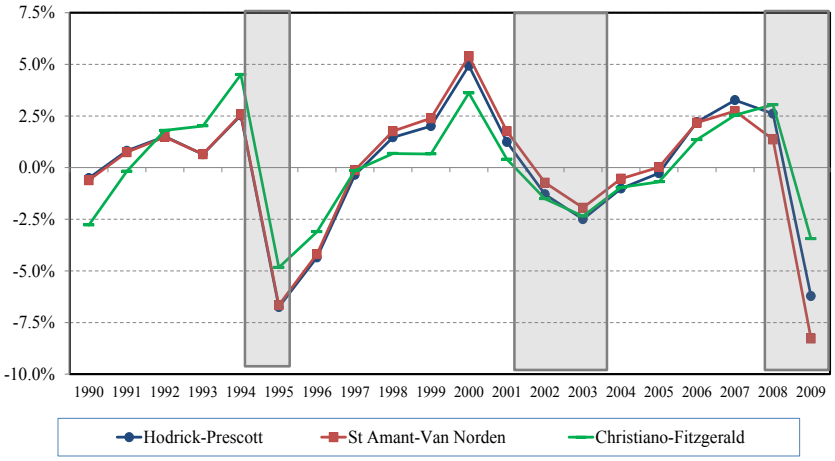
$$y_t^* = B_0 y_t + B_1 y_{t+1} + \cdots + B_{T-1-t} y_{T-1} + \tilde{B}_{T-t} y_T + \cdots B_{t-2} y_2 + \tilde{B}_{t-1} y_1 +$$

Where the coefficients B_t are the weights applied to the variables in the course of time, and are functions of p_l and p_u. Undoubtedly, the CF filter is also exposed to the "end of sample" problem; however, even after considering this problem it has been argued that estimations of the output gap made with the CF filter operate better than those generated with the HP filter methodology (Anton, 2010; Christiano and Fitzgerald, 2003).

Results

Figure 13 shows the results of the application to Mexico's case of the three methodologies described above during 1990–2009 period.

Figure 13. Output Gaps, 1990–2009
(Percentages)

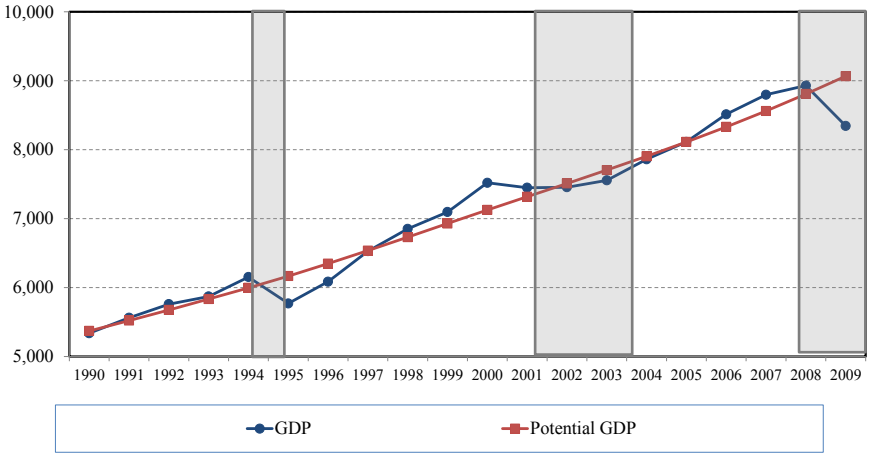


Source: Calculations made by authors with INEGI data.

Figure 13 shows the product gaps associated with each of these methodologies, as well as the periods of economic recession that have occurred recently in Mexico (shaded). The first two recessions correspond to the periods identified by Acevedo (2009); the authors of this paper estimated the last period. As expected, Figure 13 and Table 3 show a close correlation among the results of the three methodologies during most of the period. However, the figure also shows some important discrepancies at the end of the sample. It should be noted that the estimated output gap for 2009 goes from 3 percent to 8 percent, depending on the methodology used. From here on in, and following Anton (2010), we will use the results of the St. Amant-van Norden (SAVN) methodology as our preferred results. Figure 14 shows the results of this estimation along with the observed GDP.

Table 3. Correlations between Measurements of GDP's Cyclical Component, 1990–2009			
	HP	**SAVN**	**CF**
HP	1.00		
SAVN	0.98	1.00	
CF	0.91	0.86	1.00
Source: Calculations made by authors with INEGI data. Note: HP: Hodrick-Prescott filter; SAVN: St Amman-van Norden filter; CF: Christiano-Fitzgerald filter.			

Figure 14. Observed and Potential GDP, 1990–2009 *(in billions of 2003 pesos)*



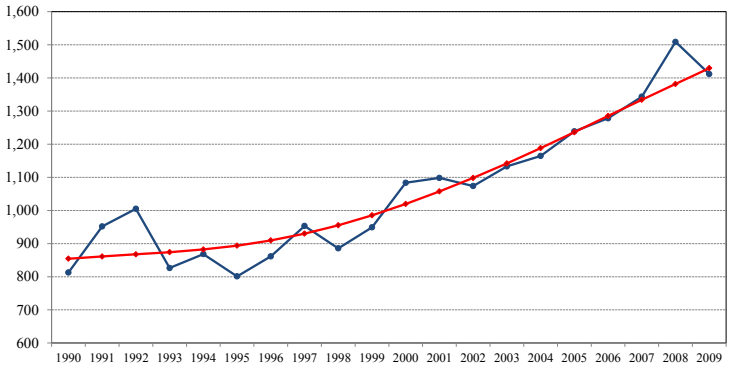
Source: Calculations made by the authors with data from INEGI.

Analysis of Cyclical Correlations of Fiscal Revenue and Expenditures

Figure 15 shows the trend components of the main fiscal revenues and expenditure items in Mexico after applying the SAVN filter estimated in the previous subsection. The gap (in percentage points) between the actual values and the trend values is the cyclical component of these variables. The comparison of these cyclical components with the estimated product gap is shown in Figure 16.

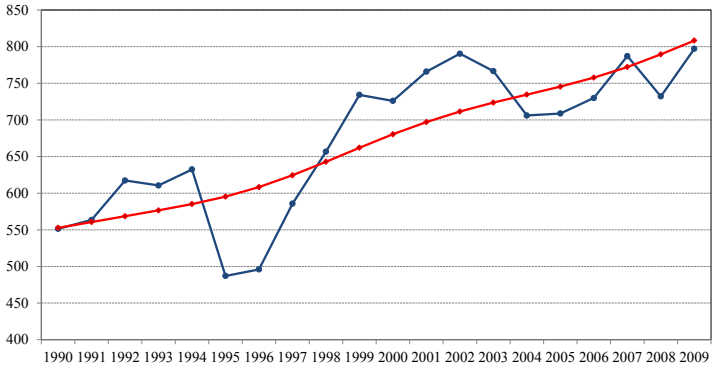
Figure 15. Revenue and Expenditure Trends, SAVN Filter

Federal Government Revenues, 1990–2009 *(billions of 2003 pesos)*



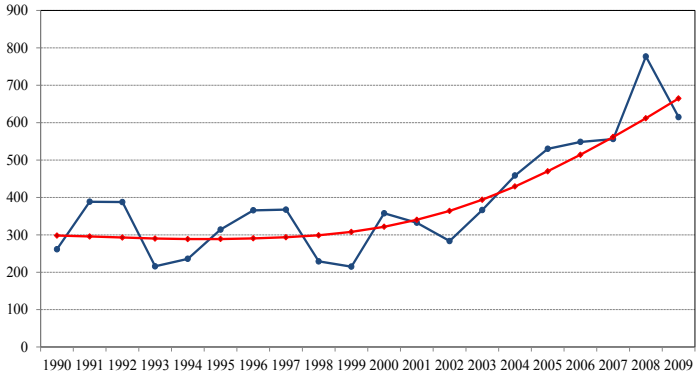
Source: Calculations made by authors with CEFP and SHCP data.

Tax Revenues, 1990–2009 *(billions of 2003 pesos)*



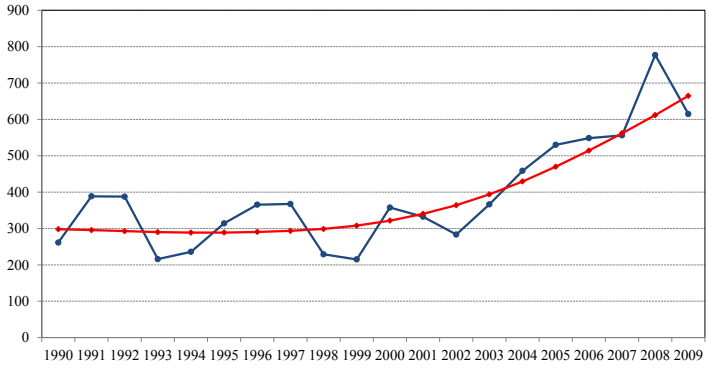
Source: Calculations made by authors with CEFP and SHCP data.

Non-Tax Revenues, 1990–2009 *(in billions of 2003 pesos)*



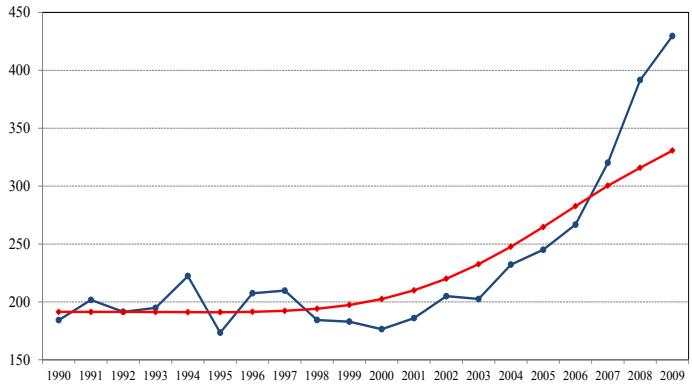
Source: Calculations made by authors with CEFP and SHCP data.

Net Paid Expenditures, 1990–2009 *(in billions of 2003 pesos)*



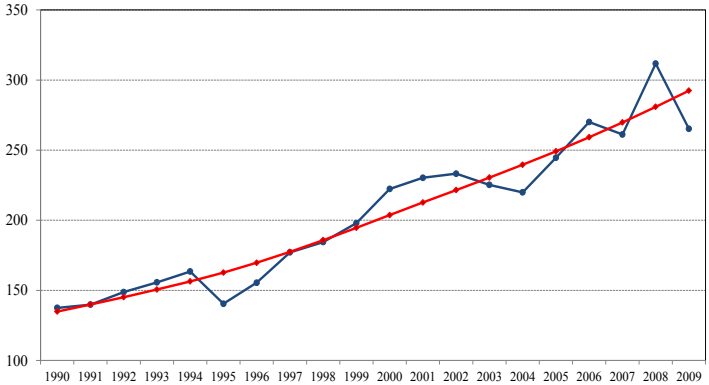
Source: Calculations made by authors with CEFP and SHCP data.

Capital Expenditures, 1990–2009 *(in billions of 2003 pesos)*



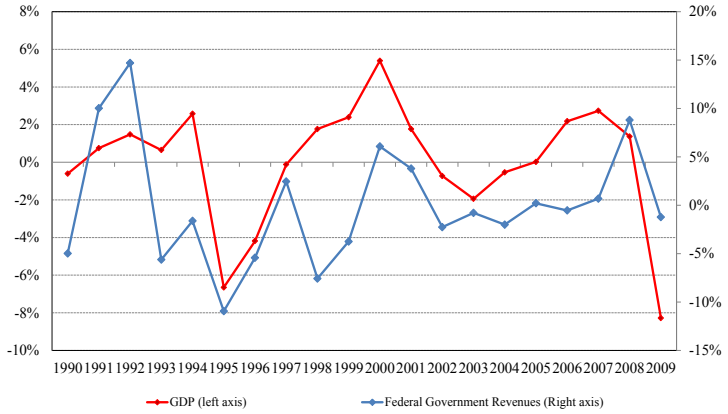
Source: Calculations made by authors with CEFP and SHCP data.

Distributions to States and Municipalities, 1990–2009 *(in billions of 2003 pesos)*



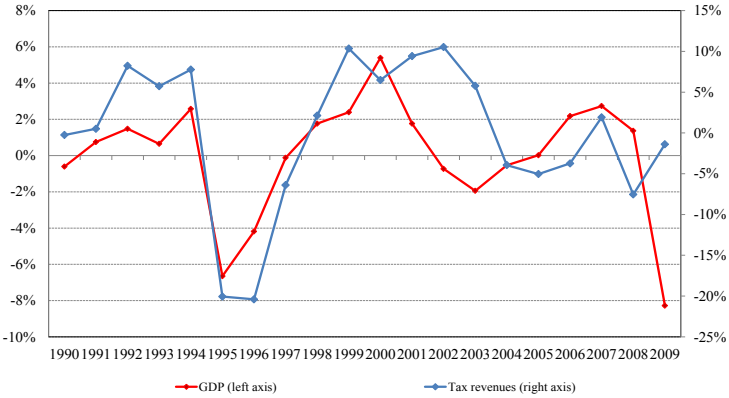
Source: Calculations made by authors with CEFP and SHCP data.

Figure 16. Cyclical Correlations of Revenue and Expenditure Federal Government Revenues, 1990–*2009* *(percentage)*



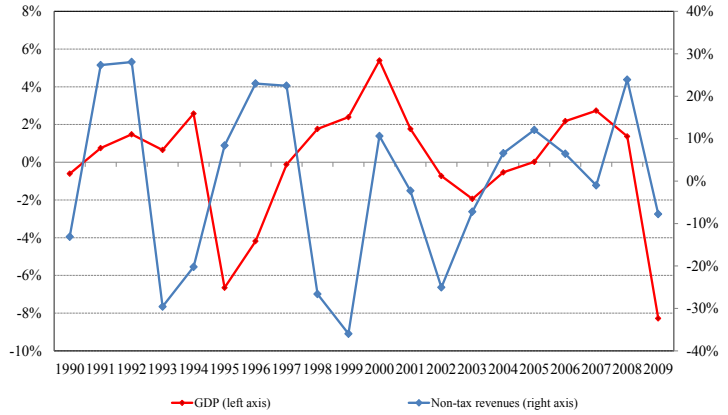
Source: Calculations made by authors with CEFP and SHCP data.

Tax Revenues, 1990–2009 *(percentage)*



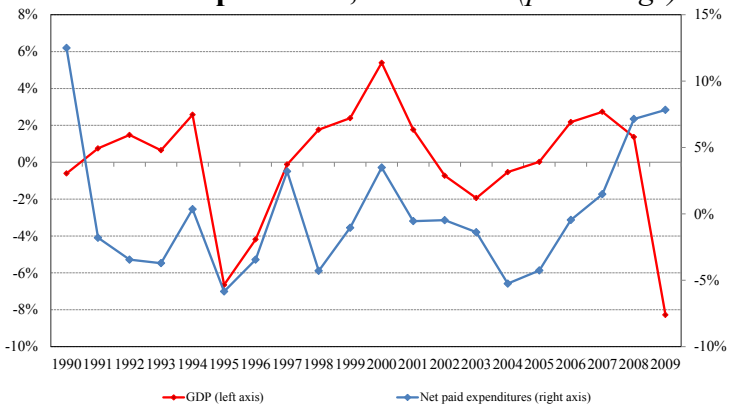
Source: Calculations made by authors with CEFP and SHCP data.

Non-Tax Revenues, 1990–2009 *(percentage)*



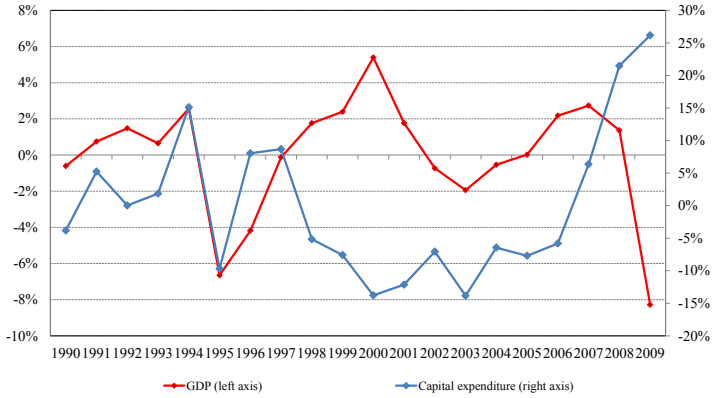
Source: Calculations made by authors with CEFP and SHCP data.

Net Paid Expenditure, 1990–2009 *(percentage)*



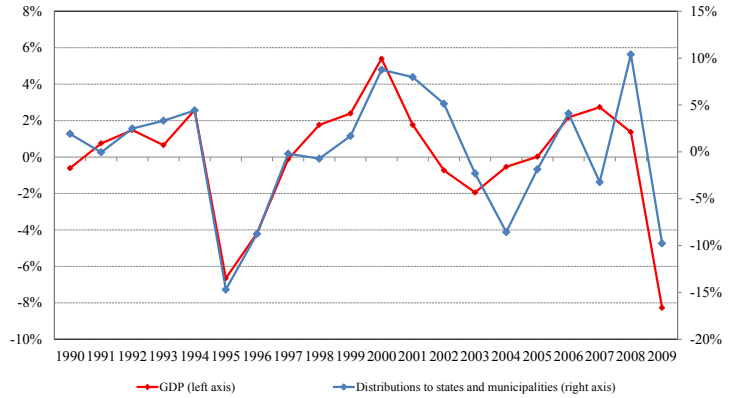
Source: Calculations made by authors with CEFP and SHCP data.

Capital Expenditure, 1990–2009 *(percentage)*



Source: Calculations made by authors with CEFP and SHCP data.

Distributions to States and Municipalities, 1990–2009 *(percentage)*



Source: Calculations made by authors with CEFP and SHCP data.

Table 4 shows the correlation of the cyclical components of public sector revenues and expenditures with the output gaps, as well as their standard deviation. Items for which movements are noticeably correlated with the output gap have been shaded; these are, basically, revenue items associated with Income Tax, VAT and Import Tax, as well as total Non-Petroleum Revenue and Tax Revenue. On the expenditure side, the only component significantly correlated with the output gap was Participations to States and Municipalities, which closely depends on Distributable Federal Collections, which in turn is associated with total revenue collection.

Table 4. Correlation of Public Revenues and Expenditures with the Economic Cycle

Revenues	**Correlation with GDP**	**Standard deviation (percent)**
Budgetary revenues	0.36	4.72
Federal Government revenues	0.43	6.25
Tax revenues	0.57	8.96
Income tax	0.64	9.26
Value-Added tax	0.73	7.43
Import tax	0.74	13.72
IEPS	-0.21	212.40
Gasoline and Diesel	-0.23	366.10
Others	-0.08	12.04
Other Tax revenues	0.31	16.33
Non-Tax revenues	-0.08	20.20
Hydrocarbons Fees	-0.04	25.17
Others	-0.44	32.73
Agencies and companies	-0.05	6.40
PEMEX	0.25	4.72
Others	-0.30	15.74
Expenditures		
Net paid expenditure	0.00	4.79
Programmable expenditure	0.14	4.54
Current expenditure	0.40	4.26
Capital expenditure	-0.27	11.45
Non-Programmable expenditure	-0.03	11.96
Participations to States and Municipalities	0.78	6.55
Petroleum revenues	0.05	9.62
Non-Petroleum revenues	0.54	6.17

Source: Calculations made by authors with CEFP and SHCP data.

Revenue and Expenditure Elasticities in Relation to the Cyclical Component of Output

The elasticities of the cyclical components of revenue and expenditure are estimated with the following equation:

$$r_t^c = e^* y_t^c + u_t \qquad (1)$$

Where:

e: elasticity of the *R* item's cyclical component in relation to the output gap
$r_t^c = \ln (R_t/R_t^f)$; $y_{tc} = \ln (Y_t/Y_t^f)$; R_t: revenue or expenditure item; Y_t: GDP;
R_t^f and Y_t^f: versions of the R_t and Y_t series filtered using the SAVN method

Additionally, in order to estimate asymmetric elasticities, we estimate the following equation, which considers the possibility that responses may be different during expansionary or recessive periods in the economy:

$$r_t^c = e_1^* y_t^c + e_2^* dum_t^* y_t^c + u_t \qquad (2)$$

where *dum* is a dichotomic variable that takes a value of one when the output gap is negative and a value of zero when it is positive.

The results of these estimates are presented in Table 4. The revenue items with significant elasticities in relation to the output are the following: Federal Government Revenue, Tax Revenue, Income Tax, VAT, Tax Revenue and non-Tax Revenue different from Hydrocarbons fees. Among the expenditure items, only Distributions to States and Municipalities and Current Expenditures show statistically significant output elasticities. The estimation of asymmetric elasticities shows no clearly differentiated patterns between the elasticities associated with expansionary periods and recessive periods.

Interestingly, most of the elasticities estimated for the different items of tax revenues have elasticities greater than one, even though the elasticity estimated for the Federal Government revenues as a whole is lightly below 1. In the case of Current Expenditure, the estimated elasticity was relatively low, but positive and statistically significant.

Table 5. Elasticities of Public Revenues and Expenditures [a] [b]						
	Elasticity with respect to GDP		Asymmetric elasticities with respect to GDP			
	Elasticity	Standard deviation	Expansionary periods	Standard deviation	Recessive periods	Standard deviation
Revenues						
Budgetary revenues	0.52	0.31	0.49	0.56	0.54	0.39
Federal Government revenues	0.82**	0.40	0.79	0.72	0.83*	0.50
Tax revenues	1.59***	0.52	1.59	0.93	1.59**	0.65
Income tax	1.82***	0.50	2.01**	0.91	1.72***	0.63
Value-Added tax	1.66***	0.36	1.27*	0.64	1.85***	0.44
Import tax	3.12***	0.65	3.96***	1.16	2.72***	0.80
IEPS	-13.98	14.91	-23.78	26.75	-9.28	18.53
Gasoline and Diesel	-26.26	26.14	-67.03	45.69	-6.70	31.65
Others	-0.30	0.85	-1.06	1.52	0.06	1.05
Other Tax revenue	1.57	1.10	0.46	1.95	2.10	1.35
Non-Tax revenue	-0.49	1.42	-0.69	2.57	-0.40	1.78
Hydrocarbons Fees	-0.34	1.78	-1.36	3.20	0.15	2.21
Others	-4.44**	2.08	-2.77	3.72	-5.24**	2.57
Agencies and companies	-0.11	0.45	-0.20	0.81	-0.06	0.56
PEMEX	-1.43	1.06	-1.47	1.92	-1.42	1.33
Others	0.36	0.32	0.13	0.58	0.47	0.40
Expenditures						
Net paid expenditure	-0.01	0.34	0.19	0.61	-0.10	0.42
Programmable expenditure	0.20	0.32	0.37	0.57	0.12	0.40
Current expenditure	0.52*	0.28	0.57	0.50	0.50	0.35
Capital expenditure	-0.97	0.78	-0.69	1.40	-1.10	0.97
Non-Programmable expenditure	-0.12	0.84	-0.01	1.52	-0.17	1.06
Participations to States and Municipalities	1.57***	0.29	1.47***	0.52	1.62***	0.36
Petroleum revenues	0.15	0.68	-0.29	1.22	0.37	0.84
Non-Petroleum revenues	1.02***	0.37	0.95	0.66	1.05**	0.46

[a] Estimates obtained through Ordinary Least Squares.
[b] One, two and three asterisks denote that the coefficient is statistically significant when estimated at the 10, 5 and 1 percent level, respectively.
Source: Calculations made by authors with CEFP and SHCP data.

Estimation of the Structural Component of Non-Petroleum Tax Revenues

The Non-petroleum Tax Revenue items that show movements correlated with the output gap are: Income tax, VAT and Imports tax.

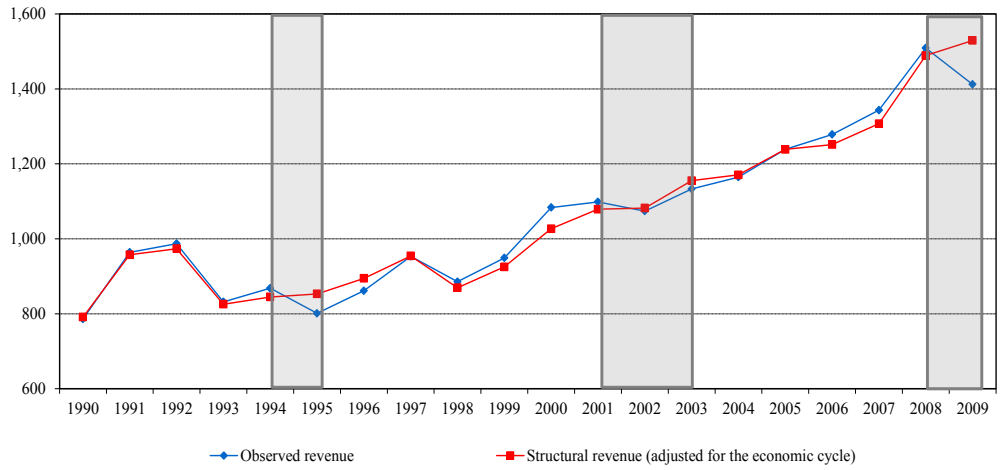
The cyclical component (Rtc) of these items is obtained through the following equation:

$$R_t^c = R_t * exp\ (-e*y_t^c) \qquad (3)$$

where: R_t is the revenue or expenditure item; e is the estimated elasticity and y_t^c is the economic cycle.

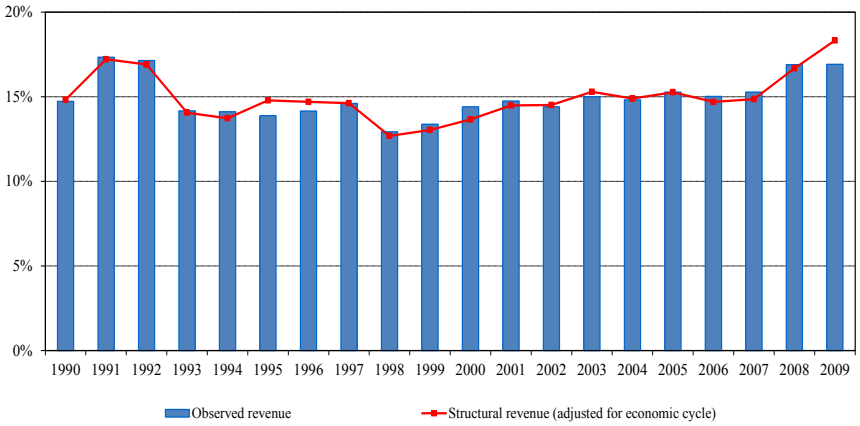
Once the cyclical revenue is calculated, it is subtracted from the original components to obtain the structural portion of the corresponding revenue item. Figures 17a and 17b show the comparison, in billions of pesos and as a percentage of GDP, respectively, of the Federal Government's structural and observed revenue (in both cases, the red line is the structural component). In general terms, the differences between the two revenues are small; nevertheless, as expected, during recessionary periods observed revenues, in contrast to its structural counterpart, moves along with the cycle and tends to be below its corresponding structural level.

Figure 17a. Federal Government Revenues, 1990–2009 *(in billions of 2003 pesos)*



Source: Calculations made by authors with SHCP data.

Figure 17b. Federal Government Revenues, 1990–2009 *(billions of 2003 pesos)*



Source: Calculations made by authors with SHCP data.

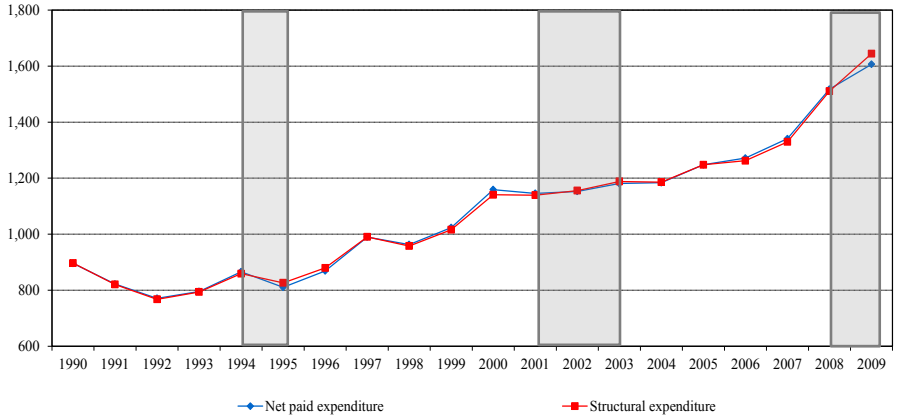
It should be noted that the largest fluctuations in observed and structural revenues occur in years during which non-recurring revenues are significantly high. For example, during the first years of the 1990s, revenues were relatively high due to the privatization and divestment of certain state-owned enterprises. Also, the substantial increases in international oil prices experienced during 2008–09 were reflected in an important increase in both observed and structural revenues.[15]

Estimation of the Structural Component of Public Expenditure

The only expenditure item that is significantly correlated with the output gap is the Distributions to States and Municipalities. Therefore, in order to estimate the structural component of Public Expenditure, the cyclical component of Distributions is calculated in a way similar to the one used for revenues; this component is then subtracted from the original series to obtain the structural component of Expenditure. The result of this adjustment is shown in Figure 18.

[15] It is important to keep these two aspects in mind, since the existence of multiple sources of revenue volatility must be taken in to account when designing a proposal for the creation of a structural fiscal rule that can be truly sustainable. We will later return to this topic.

Figure 18. Federal Government's Structural Expenditures, 1990–2009 *(in billions of 2003 pesos)*



Source: Calculations made by authors with SHCP data.

As can be seen in Figure 18, the difference between observed expenditure and its structural component is negligible. Only during the recessive periods of 1995 and 2009 we find expenditures, which are slightly below what their structural levels. This outcome is compatible with the procyclical behavior of fiscal policy in Mexico described in various studies, and is also congruent with the lack of automatic stabilizers.[16]

Therefore, and though it is possible to obtain stable estimates of structural revenue (such as those shown in previous Figures), estimating a structural component of expenditure that is relatively stable turns out to be a more complicated task. It tends to complicate the analysis of Mexico's structural balance. In fact, this explains why the efforts made to estimate structural balance in the country have tended to obtain outcomes in which structural balance fluctuates in a similar way to the observed balance.[17]

This structural balance volatility contrasts with the intuition that suggests that a structural balance should be relatively stable over time. Due in part to this reason, the following subsections will try to obtain structural revenue results that are more refined. They do so by trying to eliminate the volatility in fiscal revenues associated with fluctuations in non-recurring revenues and adjustments in petroleum revenues attributable to changes in world oil prices.

[16] See Shepherd and Villagomez (2007), and references indicated therein.

Non-recurring Revenue Accumulation Rule

The introduction of a non-recurring revenue accumulation rule would contribute to stabilize the Federal Government's non-Tax revenue. During the 1990s, significant amounts of revenue were obtained from divestments of public enterprises, particularly through the sales of TELMEX and commercial banks (CEFP, 2004). Other sources that contribute to non-recurring revenue are PEMEX's excess returns and remaining from operations of Banco de Mexico.

The creation of a non-Recurring Revenue Fund (FINR) would help eliminate a source of volatility in public finances. In this document, we made a simulation that assumes the creation of a FINR for 1990–2009 in order to evaluate the level of stability that this mechanism could provide to Mexico's fiscal revenues.

The rule suggested to simulate a FINR is simple: it is proposed that the "Uses" item should increase every year by 4 percent in real terms (a rate similar to the average real growth of the Federal Government's non-Petroleum revenue during 1990–2009). If the revenue obtained through this item should increase at a greater rate, the surpluses would be deposited in the Fund; if its growth rate is lower than 4 percent, resources are drawn from the Fund in order to reach that goal. To facilitate the comparison between observed revenue and structural revenue, any amount remaining in the Fund once the period ends is distributed uniformly, assigning an equal portion to each year in the sample.

Petroleum Rule

The introduction of a Petroleum Rule would allow a better use of the revenues associated with petroleum activities and would contribute to limit the procyclical bias of fiscal balance. The first component of the Petroleum Rule proposed here is that internal gasoline prices should not differ from international reference prices; the Special Tax on Production and Services (IEPS) being levied at present—which operates, depending on the circumstances, as a tax or a subsidy in order to contribute with the stabilization of gasoline prices—should therefore be replaced with a true indirect tax (or *excise tax*) on the internal sales of diesel and gasoline.

The exercise presented here is based on the premise of eliminating the price mechanism described above and proposes establishing an indirect tax on Gasoline and Diesel sales that would generate a constant amount of revenue in real terms, equivalent to 44 billion 2003 pesos

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[17] Chavez *et al* (2010) and Shepherd and Villagomez (2007).

(amount equal to the historical average of the revenue collected through the IEPS on Diesel and Gasoline).[18]

The second component of the Petroleum Rule is the establishment of a true Petroleum Stabilization Fund (FEP) that would allow the injection of petroleum wealth into the economy in a controlled and stable manner. The proposed rule would therefore include a mechanism to manage the resources obtained by the Federal Government through the collection of Hydrocarbons fees and Taxes on Petroleum Returns.

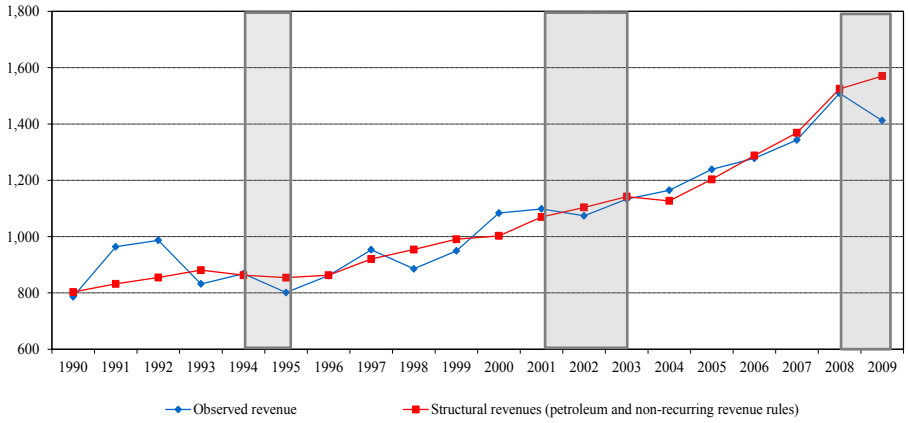
A simulation of the Petroleum Rule is done for the period under study in order to compare the revenues that would have been obtained with the application of such a rule and the level of revenue that was actually collected. The rule establishes that each year petroleum revenues should be at least equivalent, in real terms, to the petroleum revenues obtained during the previous fiscal exercise. If petroleum revenues are greater, a portion of the excess revenues (20 percent) is spent during the current fiscal period; the remainder is deposited in the FEP. If the petroleum revenues are insufficient to meet the rule of maintaining the same petroleum revenues in real terms, money is drawn from the Fund to reach that goal. As in the case described above, the resources that remain in the FEP at the end of the period are distributed proportionally along the 20 years of the sample.[19]

The outcomes of the simultaneous application of the non-recurring revenue accumulation rule and the petroleum rule would generate levels of structural revenue shown in Figures 19a and 19b. It should be noted that in comparison with the results of Figures 17a and 17b, the results now obtained are much more smooth and stable:

[18] This exercise, of course, does not take into account the possibility that gasoline consumption could increase in the future. That assumption can however be easily changed without negatively affecting this paper's conclusions.

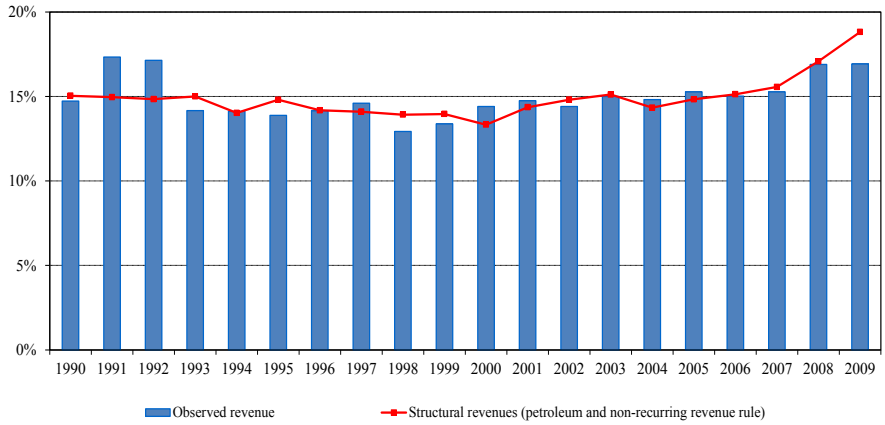
[19] The rule on the use of surplus petroleum revenue is only presented for illustrative purposes, but does not affect this paper's main conclusions in any way. It is simply presented as a plausible example and, in what may be a realist consideration, a possible design for this kind of rule.

Figure 19a. Federal Government's Structural Revenue, 1990–2009 *(in billions of 2003 pesos)*



Source: Calculations made by authors with SHCP data.

Figure 19b. Federal Government Structural Revenue, 1990–2009 *(percentage of GDP)*

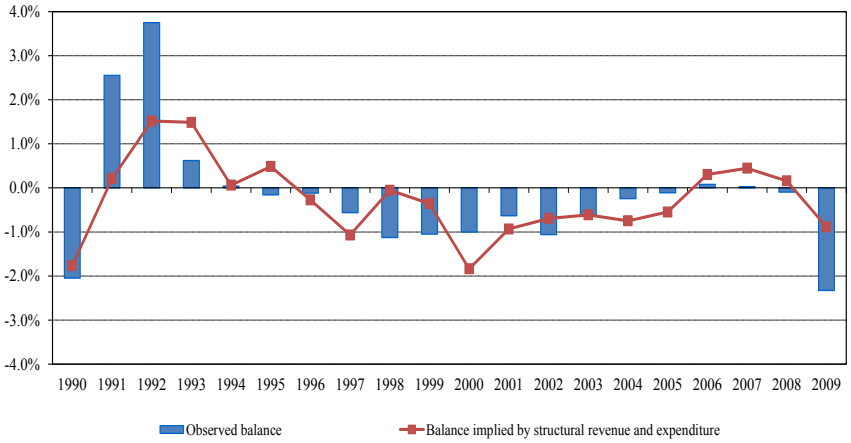


Source: Calculations made by authors with SHCP data.

Structural Balance

The "structural balance" outcomes that appear in Figure 20 (red line) compare only the Federal Government's structural expenditure (which is, as mentioned, very similar to observed expenditure) and its structural revenue. The latter is obtained through a simultaneous adjustment of Tax Revenue items for changes in the economic cycle and the simulated non-recurring revenue accumulation and petroleum rules described above.

Figure 20. Federal Government Structural Balance, 1990-2009 *(percentage of GDP)*



Source: Calculations made by authors with SHCP data.

Figure 20 also compares the structural balance of the Federal Government with its observed balance. The results in the Figure suggest that a structural balance rule would help limit the procyclical bias of public finances since, for example, the 1991 and 1992 fiscal surpluses—which were derived mostly from revenue generated by divestments—diminish significantly once the measurement of the fiscal balance only includes structural revenue. Also, the figure suggests that during recessionary years structural fiscal balance improves in comparison to earlier calculations, since the estimates are based on structural revenue that is more stable.

5. Scenarios for the Application of a Fiscal Structural Balance Rule

Zero-Based Structural Balance Rule

The establishment of a structural balance rule will smooth out expenditure fluctuations and improve fiscal planning. Besides, if a rule of this nature is implemented during a period of economic expansion, it would be expected to have an effect on public savings, with positive implications for debt dynamics (IMF, 2010). Therefore, in this subsection we shall present a simple example of the application of a structural fiscal balance rule equal to zero, that is to say, a structurally balanced-budget rule. Under this rule, Public Sector expenditures would be equal to structural revenues, not to actual revenues. Once this is determined, actual expenditures are

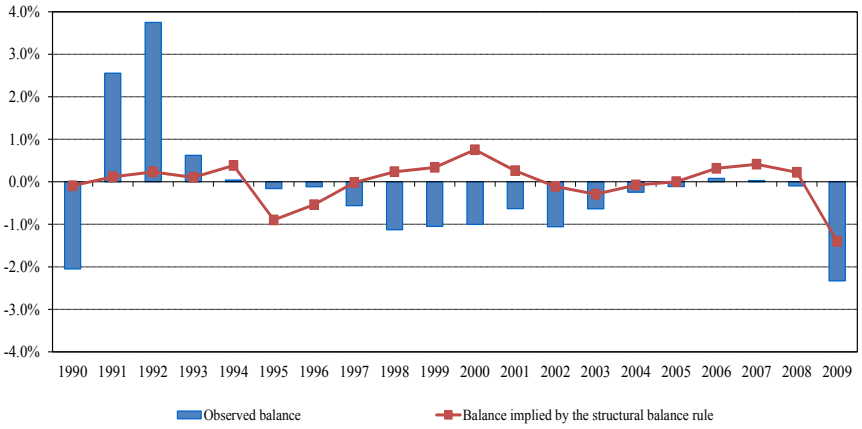
subtracted from actual revenues to obtain the balance associated with a structurally balanced budget[20].

Figure 21a shows the budget deficit associated with a structurally balanced-budget rule (red line) and compares it with the observed fiscal balance (blue bars). In this case, the structural balance is determined using the structural revenue obtained after removing only the cyclical component of the (above mentioned) tax revenue items. Figure 21b, on the other hand, shows the path that public sector debt would have followed (red line) if the balanced structural balance rule had been implemented during the 1990–2009 period.

The implied balance shown in Figure 21a is obtained by subtracting structural revenues (which, by definition, would be equal to observed expenditure) from the observed revenue. Therefore, it is not surprising that the balance associated with this type of rule has a counter-cyclical behavior; that is, one in which deficits are observed during periods with recessive gaps (or negative output gaps, such as those observed in 1995–96 and 2009), and surpluses when the economy has an expansionary gap.

On the other hand, Figure 21b shows that debt dynamics under a structurally balanced-budget rule would be a bit more volatile, although public debt would also have been smaller during the later years of the analyzed period.

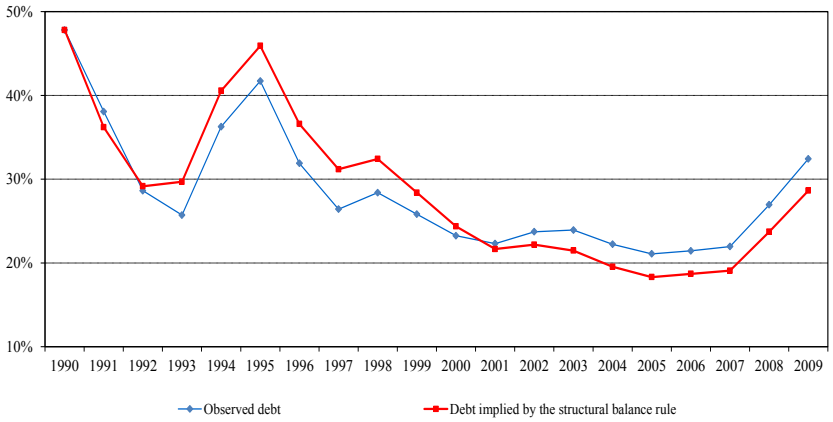
Figure 21a. Federal Government Balance, 1990–2009 (percentage of GDP)



Source: Calculations made by authors with SHCP data.

[20] When preparing these scenarios, we assume that fiscal decisions have no effect on product levels. Of course, this assumption may be put into question, but the inclusion of more realistic behavior would require building an analytical framework that would be much more complicated than the one we are using here.

Figure 21b. Debt Stock with the Structural Balance Rule, 1990–2009 *(percentage of GDP)*



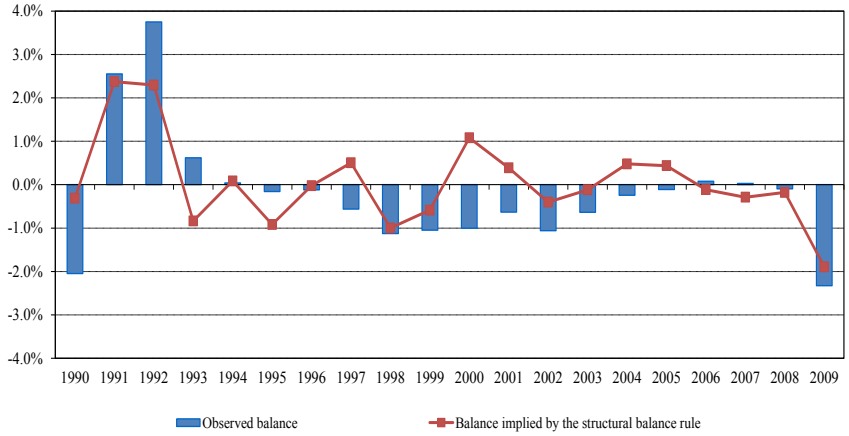
Source: Calculations made by authors with SHCP data.

Zero Structural Balance Rule with Petroleum Rule

Next, we shall repeat the exercise of simulating the implementation of a structurally balanced-budget rule, but this time we will assume that structural revenues have been adjusted not only for the economic cycle, but also applying the non-recurring revenue accumulation rule and the petroleum rule described above.

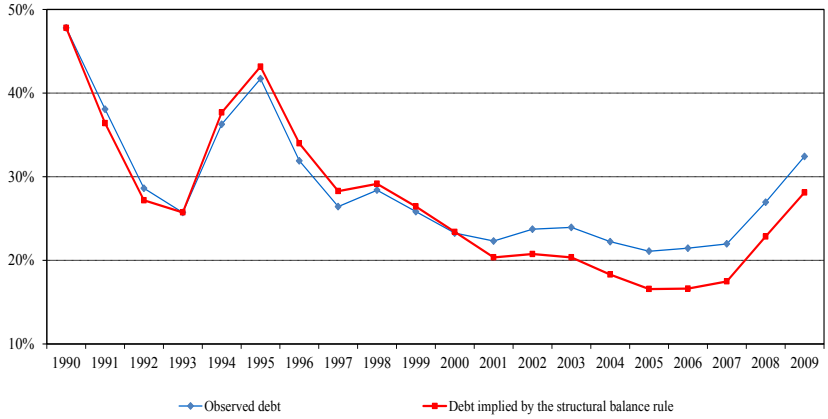
The associated balance shown in the left panel of Figure 22a is slightly more volatile than the one obtained previously mainly due to the fact that the expenditure component would be even more stable than before because of the new adjustments, while observed revenues would remain as volatile as before. In any case, the implementation of a structurally balanced-budget rule would continue to imply deficits during periods of recessive gaps exist, and of surpluses in periods with positive output gaps, as well as lower levels of public indebtedness towards the end of the period. Here it is worth mentioning that since this rule is associated with a public expenditure that is more stable, it also implies a greater public debt decline compared to the one observed in the previous scenario.

Figure 22a. Federal Government Balance, 1990–2009 *(percentage of GDP)*



Source: Calculations made by authors with SHCP data.

Figure 22b. Debt Stock with the Structural Balance Rule, 1990–2009 *(percentage of GDP)*



Source: Calculations made by authors with SHCP data.

Zero Structural Balance Rule with Decreasing Petroleum Production

So far, we have assumed that the most significant source of petroleum revenue volatility is the fluctuations in world oil prices. However, in Mexico's case we must also keep in mind that a structural component of petroleum revenue is associated with a downward trend in petroleum production that has intensified in recent years (IMF, 2010). Consequently, in this subsection we will present a brief extrapolation of the possible evolution of budget balances and public debt under various oil production scenarios. This exercise will allow us to analyze the possible implications of adopting a structural fiscal balance rule that is compatible with this trend.

The exercise is done only for the medium-term (2010–15), and only for illustrative purposes. Although the numeric results both in the base scenario and the variables under analysis

may change, it is reasonable to believe that the basic conclusions will continue to be valid; that is to say, that once we take into consideration this structural components of public finances we will need to be a little more cautious regarding the possible evolution and sustainability of both the budget deficit and the public debt. In order to carry out the exercise described, our starting point will be the base scenario described in Table 6.

Table 6. Base Scenario 2010–15

	2010	2011	2012	2013	2014	2015
GDP (real percent change)[a]	3.6%	3.4%	3.4%	3.2%	3.0%	3.0%
Output gap[b]	-3.0%	-1.9%	-0.9%	-0.4%	-0.3%	-0.2%
Oil price (dollars per barrel)[c]	65.0	65.1	65.1	65.1	65.1	65.1
Non-recurring revenue (percent of GDP)[d]	0.5	0.5	0.5	0.5	0.4	0.4

[a] Based on the 2010 forecasts taken from Esquivel (2010b).
[b] Potential GDP estimated using the SAVN filter.
[c] The oil price forecast for 2010 was taken from the General Pre-Criteria of Economic Policy for 2010, prepared by the SHCP. For 2011–15 it is assumed that prices remain constant.
[d] It is assumed that non-recurring revenue remains constant in real terms, with a value consistent with historical trends.
Source: Authors' calculations and sources mentioned in the notes.

For 2010–15 it is expected that the product gap will gradually close, and that the petroleum production platform will continue to decline. The exercise presented here is similar to the one by Palomba (2010), in which it is assumed that oil prices follow a "random walk" process $Pt_{t+1} = P_t + u_t$, where u_t are normal innovations with an average standard deviation equal to the historical sample deviation of Mexican blend export prices. Also, non-recurring revenues are modeled as an independent process with a normal distribution in which the average and standard deviation are estimated using data from the historical series.

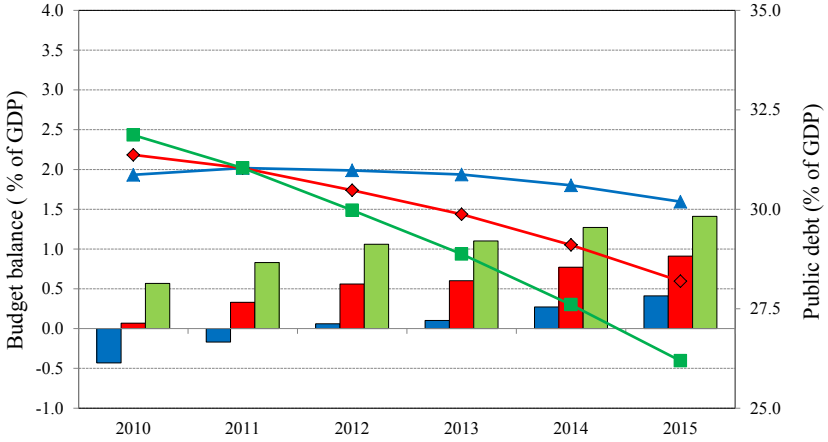
The procedure to estimate the results is as follows:

1. The output gap is used to estimate the structural and cyclical components of the non-petroleum revenues. [21]
2. The base scenario is used to estimate the structural components of non-recurring revenues and expected petroleum revenues.[22]
3. 1,000 simulations are performed for oil prices and non-recurring revenue; each simulation estimates trajectories for surplus petroleum revenue, budget deficits and public debt. The following results were obtained by calculating the average results of those simulations.

In the following figures, the simulation results are presented in terms of budget balances and debt (as a share of GDP), assuming different petroleum production scenarios. The graphic analysis allows an evaluation of the effects generated by changes in the structural balance rule.

Scenario 1 is optimistic, since it assumes that petroleum production remains constant at 2 million 500 thousand barrels a day. The bars represent the average fiscal balance; the lines show the average path of public debt. Different possible structural balance goals are presented: 0 percent (blue), a 0.5 percent surplus (red), and a 1 percent surplus (green). The results show that a scenario of constant petroleum production is consistent with fiscal surpluses and a medium-term reduction in the relative size of public debt.

Figure 23. Budget Balance and Public Debt, Scenario 1



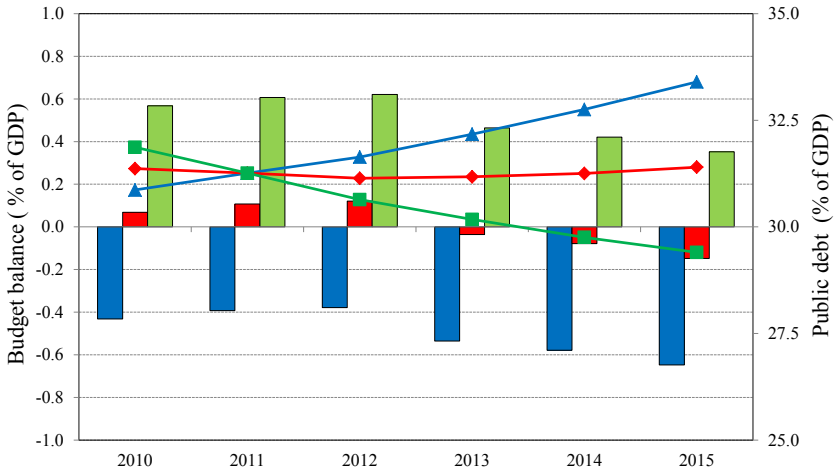
Source: Authors' calculations.

[21] The elasticity of the relevant revenue relative to the business cycle is very close to 1 percent. Therefore, we have decided to use the specific value of 1.05 estimated in OECD (2009).

[22] A simple linear regression model is used to estimate petroleum revenue, based on the changes observed in petroleum prices and production.

However, a more plausible alternative is that petroleum production will not remain constant, but instead follow a declining trend. Scenario 2 shows a -4.2 percent yearly decline in oil production (equal to the average decline observed during the 2004–09 period). Under this scenario, a structural balance goal of 0.5 percent of GDP is consistent with a balanced budget and a constant path of debt. In contrast, a structural balance goal of zero would generate recurring budget deficits, while a surplus goal of 1 percent of GDP would be consistent with continuous surpluses. In any case, the size of the fiscal imbalances would be relatively small, around 0.5 percent of GDP.

Figure 24. Budget Balance and Public Debt, Scenario 2

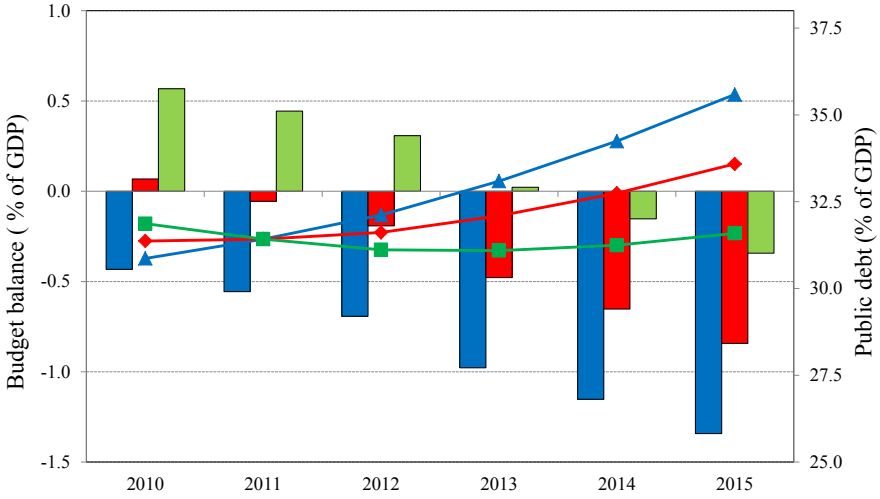


Source: Authors' calculations.

An even less favorable scenario would occur if in the following five years production declines as steeply as it has been during the last three (-7.2 percent on average). If this should be the case, public finances would experience ever increasing deficits and a rising public debt balance if the structural balance goal is set 0 percent or 0.5 percent of GDP. In that case, a 1 percent structural balance would be advisable and consistent with a stable public debt path. It must be recognized, however, that this scenario may be too pessimistic, since the production decline experienced during the last few years was due not only to supply factors in Mexico, but also to factors related to world demand.

In any case, and since the most probable scenarios of petroleum production are the scenarios 2 and 3 described above, we must conclude that a structural balance goal policy between 0.5 percent and 1 percent of GDP would be consistent with balanced public finances and with a sustainable path of the public debt.

Figure 25. Budget Balance and Public Debt, Scenario 3



Source: Authors' calculations.

6. Analysis of the Preconditions for a Structural Fiscal Balance Rule in Mexico

In this section we shall comment briefly on whether the economic and institutional conditions required for the establishment of a structural fiscal balance rule in Mexico exist and are adequate for that purpose. To determine the existence of these preconditions, we need to examine various dimensions of the Mexican economy[23], such as: the sustainability of fiscal policy in the medium and long term; the compatibility of this rule with existing institutional arrangements, both at the federal and the state level; the consistency of this type of rule with automatic stabilizers, or with volatile revenue (oil revenue, for example); the credibility, transparency, and reliability of fiscal accounts; the coordination between fiscal and monetary policy; and, finally, the soundness of the financial system as a whole. All these topics reflect aspects that could allow a better application of a structural fiscal balance rule, while avoiding the possibility that the country's fiscal,

[23] For more details on the preconditions required to implement this kind of rule, see Ter-Minassian (2010).

financial, or macroeconomic structures could endanger its economic stability if such a rule were implemented. Therefore, in the text below we will briefly discuss some of these topics.

Sustainability of Fiscal Policy in the Medium and Long Term

In recent studies, Mexico's fiscal policy has been found to be sustainable in the medium and long term.[24] This is partly due to the implementation of the balanced budget rule contemplated by the Federal Budget and Financial Responsibility Law, but it is also explained by the relatively strict fiscal discipline followed since mid-1990s. In fact, as a result of these measures (except in 2009, which was an atypical year) Mexico has consistently registered primary surpluses, which have been close to 2 percent of GDP (Figure 8). Given the size of the current public debt, a primary surplus of this size is perfectly compatible with a reduction in the debt/GDP ratio over the medium and long term.

On the other hand, when the "primary gap indicator" originally suggested by Blanchard (1990)[25] is estimated, we find positive values even when including the drastic decline of GDP in 2009 (-6.1 percent) in the estimated average GDP growth. In general, this suggests that Mexico's fiscal position is sustainable and compatible with public debt reduction, as had in fact been occurring up to 2007 (see Figure 9).

Compatibility with other Institutional Arrangements

Regarding the institutional arrangements at the federal level, it should be mentioned that Mexico has already been applying a fiscal rule for several years, as contemplated by the Federal Budget and Financial Responsibility Law. This law includes an explicit balanced budget rule, with certain leeway to allow small deficits when extraordinary circumstances occur (Art. 19). It also contemplates that there can be no expenditure increases without corresponding revenue increases. As mentioned previously, this rule is evidently pro-cyclical, and clearly inferior to a structural fiscal structural balance rule.

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[24] This conclusion is similar to what has been reported in other studies. See, for example, Croce and Juan-Ramon (2003), Paunovic (2005), Mendoza and Oviedo (2009), and IMF (2010).

[25] This indicator is defined as the difference between the primary surplus (as a percentage of GDP) and the total debt, multiplied by the difference between the real interest rate and the GDP growth. See, among others, Talvi and Vegh (1998).

Therefore, if an effort is made to implement a structural fiscal balance rule in Mexico, the entire second chapter of the Federal Budget and Financial Responsibility Law would need to be modified in order to adapt it to the new concepts and criteria.

Regarding the rule's compatibility with the institutional arrangements between the Federation and sub-national entities, certain aspects would need to be addressed. In the first place, the fact that Mexico has a Federal Government and 32 sub-national entities (31 states and a Federal District) should be taken into account. The relationships between these various levels of government is regulated through the Fiscal Coordination Law, which describes the nature of the transfers and existing fiscal agreements between the federation and local governments. In most cases, the states continue to collect certain relatively minor taxes, but have transferred most of their fiscal authority to the federal government (such as VAT and income tax, for example). In exchange, the Federal Government redistributes a significant part of the resources received through two main conduits called *Contributions* and *Participations*. The former comprises earmarked or conditional transfers; the latter are unconditional.

Most of the resources transferred to the states are drawn from general revenue collection. However, as was already mentioned above, 25 percent of excess resources are placed in a stabilization fund (Federated Entities Revenue Stabilization Fund) from which resources are distributed to state governments. Also, an additional 10 percent of these resources it is distributed among the states for expenditures in infrastructure projects and equipment. These arrangements would need to be re-examined if a decision is taken to establish a structural fiscal balance rule, since the excess resources would need to be distributed over time, rather than among the federated entities.

On the other hand, it must be mentioned that there are no rules to guarantee the fiscal sustainability of the states, since these have the freedom and autonomy to determine both their levels of expenditure and indebtedness. However, after a widespread rescue of several states in 1995 (as a result of the 1994/95 economic crisis), a change was made in the legal framework that governs the acquisition of debt by states, seeking to limit the incentives to incur in fiscal indiscipline.[26] The adjustment seems to have worked; after its implementation, no more rescues to state governments have occurred. In any case, it would seem desirable to make some reforms

[26] For more details see Hernandez, Diaz-Cayeros, and Gamboa (2002).

at the sub-national government level that could contribute to the successful implementation of a structural fiscal balance rule. The most important reforms would be associated with the importance of also establishing fiscal rules for the sub-national governments, the need to use common accounting methods and the implementation of a mechanism of sanctions should deviations occur in the application of the state fiscal rule.

On the other hand, it should be pointed out that the federated entities may also have strong incentives to favor the application of a structural component. As mentioned before, transfers to the States are directly and closely associated with federal revenue collection, and therefore have a substantially procyclical behavior (Table 4). This, however, may be an undesirable outcome for local governments, since any contraction in economic activity limits its revenue and has an impact on its medium-term programs. This was precisely what happened with the 2009 economic crisis, which significantly compromised expenditure targets in some states. Therefore, it may be that federal and state governments' interests could be aligned on the need and convenience of establishing a structural balance rule.

Consistency with Automatic Stabilizers and/or Volatile Revenue

Mexico has practically no significant automatic stabilizers of any kind, such as a national unemployment insurance program or anything equivalent, as a part of its current budget (IMF, 2010). In fact, and although a slight increase in public expenditure did occur during the recent 2009 macroeconomic crisis, this expenditure was mostly of a discretionary nature, associated with an increase in the subsidy for the beneficiaries of the "Oportunidades" program, and with emergency subsidies granted to certain companies so they would maintain certain employment levels. These kinds of discretionary responses, allowed within the framework of the Federal Budget and Financial Responsibility Law, should not be allowed in the context of a structural fiscal balance rule, since the magnitude of these extraordinary supports should be determined by strictly technical criteria and clearly delimited within the new fiscal rule.

On the other hand, and although some attempts to implement automatic stabilizers associated with petroleum revenue do exist and were described in Section 3 of this paper (the formula to calculate expected revenue and the mechanisms to establish and use the stabilization funds which were described above), it would seem that there is still space for the design of mechanisms to smooth out the peaks and troughs of petroleum revenue over time, such as sovereign funds or instruments of an equivalent nature that allow petroleum resources to be kept

and distributed over longer periods of time. In any case, another important problem related to the uncertainty that surrounds petroleum revenue in the medium and long term has to do with the decreasing trend in petroleum production, analyzed in Section 5. However, this does not pose a fundamental problem, since the impact of that path can be easily incorporated into the design of a fiscal structural balance rule. In summary, this issue does not seem to generate any fundamental problems for the establishment of a structural fiscal balance rule in Mexico.

Credibility, Transparency and Reliability of Fiscal Accounts

The credibility of fiscal policy in Mexico has been demonstrated by its strict compliance with the explicit balanced budget rule established in the 2006 Federal Budget and Financial Responsibility Law (even before that law entered into effect), as well as by the explicit commitment that the deficit incurred in 2009 will be covered over the course of the next few years. The reduction of public debt as a percentage of GDP, declining from almost 80 percent in the mid-eighties to slightly over 20 percent at the beginning of 2008, has also contributed to significantly improve the credibility of Mexico's fiscal accounts.

Regarding the level of transparency, this indicator has also improved substantially as a consequence of the recognition of PEMEX's debts associated with so-called "Pidiregas" projects (Infrastructure Projects whose Recording as Expenditure has been Deferred) as public debt, and after the implementation of a reform of the public pensions system (ISSSTE) that transformed contingent debt into effective debt. In fact, these two modifications explain the recent increase in public sector debt observed during the last quarter of 2008 and in 2009.

At this time, the only agency that continues to use "Pidiregas" projects is the Federal Electricity Commission (CFE). These projects can be classified into two general kinds: 1) projects that are direct investments which will eventually generate a financial obligation for the public sector, and should therefore be registered as public debt in accordance with the stipulations specified in Article 18 of the General Law on Public Debt; and 2) private projects which do not necessary generate financial obligations unless circumstances of *force majeure* should arise. In this regard, it would be advisable that the CFE "Pidiregas" projects – at least those of the first category described above – be given a treatment similar to those of PEMEX and be officially recognized as public debt. It should be noted that doing so would not have an effect

on the Historical Balance of Public Sector Financial Requirements, since those are pre-existing liabilities that have already been recorded in that accounting ledger.

As for the reliability of fiscal accounts, the only problems that seem to exist are those associated with the accounting of petroleum activities and, particularly, the effects generated by the gasoline price setting mechanism (OECD, 2009). As has been mentioned in other parts of this paper, if a fiscal rule that includes a petroleum component is to be established, the present mechanism should be replaced, since a mechanism that makes the real price of gasoline more rigid must be eliminated and prices should be allowed to fluctuate according to world prices.

Independently of these considerations, however, it is also important to make the necessary adjustments in terms of accounting practice, since at this time the subsidy that is paid when the internal gasoline prices are below international prices is registered as a negative tax, not as an expenditure. In this regard, this mechanism could be changed in tandem with adjustments to the price index used to determine inflation targets. These would involve excluding energy prices from the index's calculation – as is done in the United States – In order to avoid incorporating changes in the price of these products into the target level of inflation.

Coordination between Fiscal and Monetary Policies

In general, it can be said that a good coordination exists between the fiscal and monetary authorities. For example, there is an Exchange Commission in which both the Treasury Secretariat and Banco de Mexico participate. This commission has decided to follow a quasi-flexible exchange rate policy (with certain intervention through the purchase of foreign currency from PEMEX). Banco de Mexico also has an inflation target scheme which seems compatible with a structural fiscal balance rule. Additionally, in mid-2010 a Financial Stability Council was created that includes not only the officials in charge of fiscal and monetary policy, but also incorporates financial authorities.

In any case, a relatively effective macroeconomic coordination between fiscal and monetary authorities seems to exist in Mexico. Furthermore, Mexico has a (semi) flexible exchange rate policy and a mechanism that contemplates inflation targets which, according to Ter-Minassian (2010), are in principle consistent with the adoption of a fiscal policy based on the structural rule discussed here.

Soundness of the Financial System

After the 1994–95 crisis the Mexican Financial System improved its regulation significantly; it is now well capitalized (15 percent) and has a good level of liquidity (190 percent) (IMF, 2010). Mexico also has a good system for the protection of bank savings, with clear and transparent rules and good coverage. Besides, the liquidity requirements imposed on Mexican banks are even stricter than the ones currently operating in many advanced economies. It is therefore reasonable to believe that the Mexican financial system would continue to be solid and stable even if an eventual regulatory reform of the global financial system leads to the enforcement of stricter criteria.

Also, since 1998 Mexico has a well-defined deposit insurance mechanism, operated by the Institute for the Protection of Bank Savings (IPAB). This agency defines clearly and precisely which bank obligations are subject to guarantees, and limits its coverage to a total amount of US$ 135,000 per account. As of March, 2010, over 80 million accounts were protected by deposit insurance, from which 99.86 percent were protected in their entirety. However, in spite of the wide extent of the deposit insurance coverage, and due to significant disparities in bank account sizes, the protection only extends to 58.6 percent of the total value of the deposits that are in protected accounts.

In summary, the prospects that Mexico will be able to maintain and guarantee financial stability are very favorable, and it can therefore be said that the country fully complies with the preconditions required to implement a structural fiscal balance rule. This conclusion is based in the fact that Mexico has the strength and the necessary institutions to avoid three typical sources of financial instability: public debt crises, banking crises and currency crises. In recent years, Mexico's indicators in terms of the vulnerability, fiscal transparency and soundness of its financial system have clearly improved. Additionally, the current combination of macroeconomic policies, which includes a flexible exchange rate and an inflation target regime, is considered to be the most adequate for the adoption of the proposed scheme.

7. Conclusions

In conclusion, Mexico seems to be well prepared to adopt a structural fiscal balance rule. Several factors contribute to this assessment, including the fact that Mexico has already had a fiscal rule place for some years now, through which a certain degree of fiscal discipline has been imposed and greater transparency in its accounting practices has been achieved.

In this regard, and due to the multiple advantages associated with a structural balance rule when compared with the simple balanced budget rule currently in place (Marcel, 2010 and Ter-Minassian, 2010), it would seem natural and desirable for Mexico to move in the direction of adopting a structural fiscal balance rule. The analysis and exercises presented in this paper suggest that a structural balance rule that sets a structural surplus goal of only 0.5 percent of GDP could be sustainable in the medium and long term, even taking into consideration the possibility that oil production may continue to decline.

The possible adoption of a rule of this nature, however, should not make us lose sight of more fundamental aspects that should be included in an authentic fiscal reform in Mexico. These are: an expansion of the tax base; a substantial improvement in the efficiency of revenue collection and its current procedures; a reduction in the horizontal tax inequality generated by a multiplicity of special mechanisms (exemptions) in the payment of direct taxes; a strengthening of automatic stabilizers (the introduction of national unemployment insurance, for example); and, very importantly, greater revenue collection which would in turn allows more and better spending, not only for the provision of basic health and education services, but also for public investments which along with private investment would help improving the relatively limited growth prospects faced by the Mexican economy in the medium and long term.

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