

# THE FUTURE OF OIL IN MEXICO

*/ EL FUTURO DEL SECTOR PETROLERO EN MÉXICO*



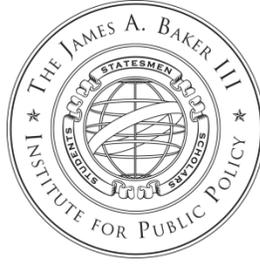
## The Macroeconomic Consequences of Falling Oil Revenues in Mexico: A Looming Crisis or a Mixed Blessing?

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A LOOMING CRISIS OR A MIXED BLESSING?

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## Macroeconomic Consequences of Falling Oil Revenues in Mexico

### ABOUT THE STUDY: THE FUTURE OF OIL IN MEXICO/ EL FUTURO DEL SECTOR PETROLERO EN MÉXICO

The energy industry plays an important role in the Mexican economy, and energy trade is a major component to the U.S.-Mexico relationship. The Mexican government relies on the oil industry for 35 percent of total government revenues, including taxes and direct payments from Petróleos Mexicanos (Pemex), the state oil company. Mexico is the third-largest foreign crude oil supplier to the United States. However, with declining production and rising demand, Mexico could become a net oil importer in the coming decade. President Calderón pushed for energy sector reform in Mexico, but more reforms will be needed for Mexico to reverse its current path toward importer status. This study identifies the dynamics of the political trends in Mexico that will impact future energy policy. The aim of this study is to promote a better understanding of the challenges facing Mexico's oil sector and to enhance the debate among policymakers, the media and industry on these important issues.

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## **Macroeconomic Consequences of Falling Oil Revenues in Mexico**

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## **Macroeconomic Consequences of Falling Oil Revenues in Mexico**

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Since its establishment in 2002, Oxford's Mexican Studies Programme has conducted research and promoted graduate teaching in Mexico's external relations; democratization and the functioning of democratic institutions in Mexico; and on various Mexican public policy issues, including economic and energy policies.

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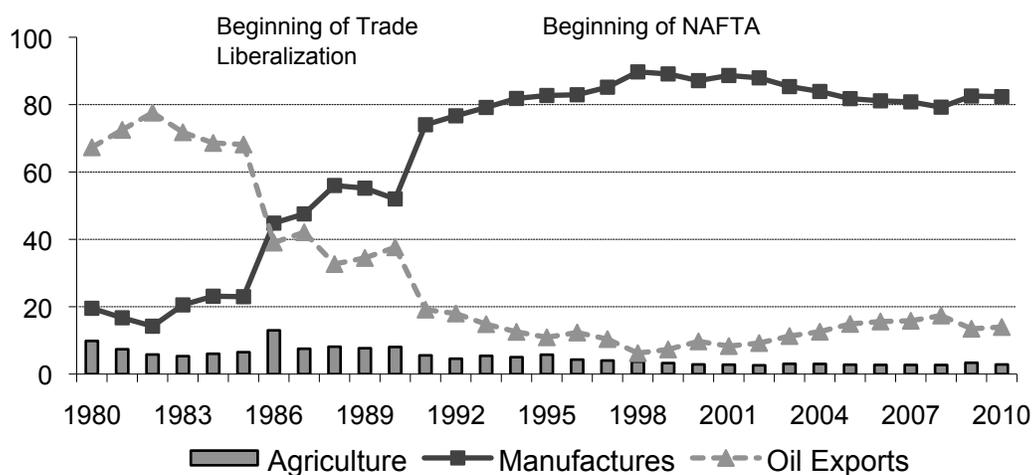
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# Macroeconomic Consequences of Falling Oil Revenues in Mexico

## I. Introduction<sup>1</sup>

Oil in Mexico is both an important export product and a major source of government revenue. In 2008, before the sharp 2009 recession, oil represented about 17% of foreign exchange earnings on account of exports (equivalent to 4.6% of Gross Domestic Product (GDP)) even though, as a result of a rapid increase in gasoline imports in recent years, the oil trade balance represented only 1.4% of GDP (or 30% of oil exports)<sup>2</sup>. The importance of oil in the external accounts has drastically changed in the past few decades as trade liberalization and the North American Free Trade Agreement (NAFTA) radically affected Mexico's pattern of trade specialization. From being in the early 1980s an oil exporting economy, in a short period of time Mexico became a relevant player in the world markets of manufactures and its export mix was radically transformed. As Figure 1 shows, from the mid-1980s onward the share of manufactures in total exports has been climbing steadily and substantially. By the end of the 1980s it was over 50% and in 2007—even though the price of crude oil had soared in the past few years—it was around 80%. Meanwhile, the share of oil in total exports sharply declined.

**Figure 1. Composition of Exports (percentages of total exports), 1980-2010**



Source: Based on INEGI, Banco de Información Económica

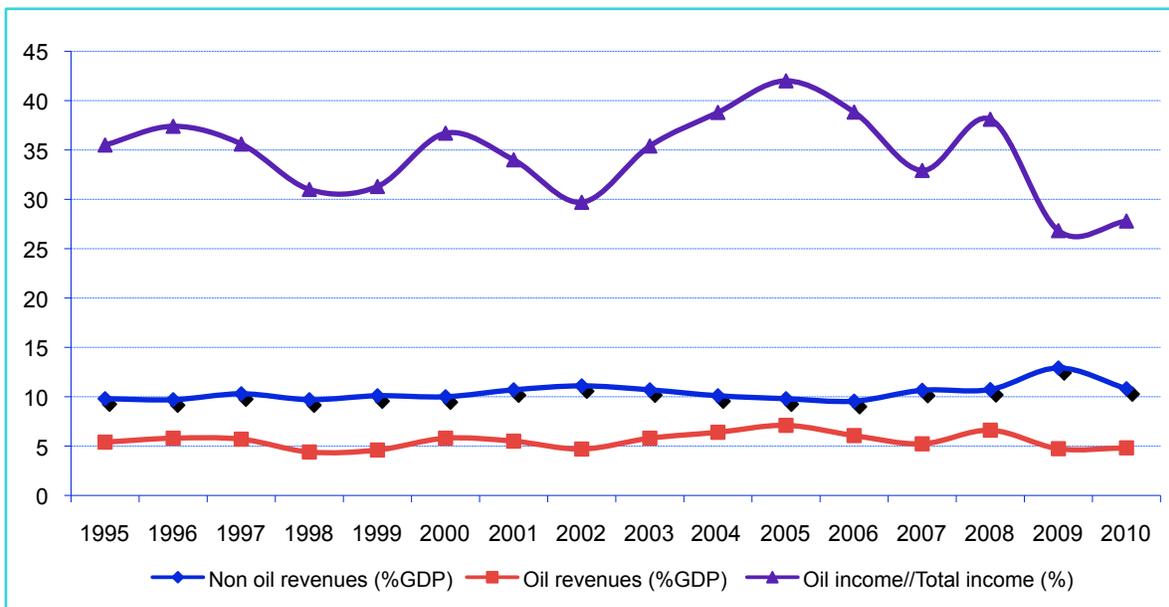
<sup>1</sup> I am grateful for comments on a previous version of this paper to Amy Jaffe, Ron Soligo, Laurence Whitehead, an anonymous referee, and other participants at the workshop on the future of oil in Mexico, November 4, 2010, Oxford University. I am solely responsible for any remaining errors.

<sup>2</sup> The oil trade balance here follows the Banco de México which has a broad definition of oil exports and imports including oil and derivatives.

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

At the same time, oil revenues in the fiscal accounts represented 37% of total public sector revenues in 2008, or about 8.7% of GDP. In contrast to its importance in the external accounts, the importance of oil as a source of fiscal revenue has not decreased over time, although it has fluctuated markedly as a result of volatile oil prices. In fact, from 2002 to 2005, the share of oil income in total government revenue sharply increased, reaching 42% in 2005 (Figure 2), before falling again along with the price of oil in 2008-2009.

**Figure 2. Composition of Federal Government Revenues**



Source: Based on Anexos Estadísticos al Informe de Gobierno

This paper examines the macroeconomic consequences of alternative oil scenarios over the period 2010-2020, focusing on the direct implications for the balance of payments and the fiscal accounts, and on the indirect consequences for economic growth that may result from the exchange rate and fiscal adjustments to the changing importance of oil. As we shall see, even under a pessimistic scenario in which oil revenues fall significantly in both the external and fiscal accounts, the consequences on economic growth are not unequivocally bad and depend crucially on the government's response to the new scenario.

## **Macroeconomic Consequences of Falling Oil Revenues in Mexico**

The paper is organized as follows. After this introduction, Section 2 specifies two alternative scenarios defined by more or less pessimistic assumptions about the oil production platform. Section 3 then addresses the effects on the balance of payments of the evolution of oil exports and the oil trade balance in the two scenarios and the possible response of the real exchange rate. Section 4 looks at the implications for the fiscal accounts, government revenues, and government spending. Section 5 concludes.

### **II. Alternative Oil Scenarios**

The two scenarios considered differ in the assumption made about the oil production platform. The “status quo scenario” assumes a constant production of crude oil at a level of 2.56 million barrels per day (b/d) for the period 2010-2020. This is a simple extrapolation of the current level of oil production, keeping it at a constant level. This is less optimistic than the scenario considered by Mexico’s Ministry of Energy (SENER 2008) up to 2017, which assumes an oil production platform of 2.9 million b/d. The alternative, more pessimistic, scenario assumes that oil production continues to fall steadily from 2010 to 2020, as in the recent past, reaching in 2020 60% of the 2010 level (and thus falling from 2.56 to 1.54 million b/d over the period). This is more pessimistic than the Business Monitor International (BMI) projection, which assumes a level of oil production in 2019 equivalent to 80% of the 2010 level.

The rest of the assumptions are common to both scenarios. They include:

1. Real GDP grows at a rate of 4.4% in 2010 and then at an average rate of 3% per year from 2010 to 2020 (around 1.9-2% in per capita terms). This rate is higher than the one recorded in 2000-2008 before the sharp 2009 recession (2.4% per year) but less than the rates recorded in the 1990s, both before and after the sharp 1995 recession (3.5% in 1990-1994 and 5.5% in 1995-2000). There is reason to believe that the growth rate will be higher than it was between 2000 and 2008 on account of the exchange rate adjustments of 2008-2009 and their positive effects on the profitability of, and investments in, the tradable goods sector. The 3% growth rate is the same as the estimate by the IMF of the potential output growth rate for the period 2002-2007 (IMF 2010).

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

2. The price of Mexican oil recovers from its low level in 2009 and remains, on average, constant at about US\$70 per barrel (the level achieved in mid-2010) for the rest of the decade. This assumes a return to moderately high oil prices and, at the same time, a slight long-term decline in real oil prices given a positive rate of inflation in the international economy.
3. Oil consumption grows steadily at a rate of 1.1% per year. This is the same assumption made for the period 2010-2014 by Business Monitor International, which also assumes a growth rate of GDP of 3% per year.
4. Oil imports return to 2008 levels in 2010 and then grow at the same rate as domestic consumption and therefore at a much smaller rate than in the period 2004-2008. Changes in the balance between domestic production and domestic consumption (which differ between the two scenarios) are therefore not reflected in different paths of oil imports, but only in different paths of oil exports.

The assumption on GDP growth deserves more attention. Note, indeed, that we are assuming the same rate of growth of GDP in the two oil scenarios (3% per year after 2010), and thus assuming that GDP growth is independent of what happens to the oil production platform. This, in fact, is not likely to be the case. In addition to its direct impact on total output, the evolution of oil production is likely to affect that of GDP for at least two reasons. First, the faster the decline in oil production, the larger the external shock on the balance of payments and the more the real exchange rate will have to depreciate. This depreciation will affect the competitiveness of the economy and the profitability of the tradable goods sector, with a positive effect on the evolution of non-oil GDP. Second, the faster the decline in oil production, the larger the fiscal shock on government accounts. This is bound to have a negative effect on GDP, especially if the government compensates for the loss of government revenues through a reduction in public investment. The size of this effect is very uncertain, as it depends crucially on how the government compensates for the lower oil income in the fiscal accounts (reduction in public investment, reduction of current expenditure, or increase in non-oil revenues). It is worth noting, however, that the two effects on GDP—that through the real exchange rate and that through the

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

fiscal accounts—tend to some extent to compensate each other. This is a reason, in addition to the need to keep the analysis tractable, for assuming the same evolution of GDP.

### III. Implications for the Balance of Payments

Tables 1 and 2 show the evolution of oil exports, oil imports, and the oil trade balance from 2009 to 2020 in the two scenarios. Consider first the pessimistic scenario. In this scenario, in which oil production is 40% below its 2010 level in 2020, oil exports fall from over US\$45 billion in 2010 to US\$5 billion in 2020 while oil imports continue to grow steadily by a cumulative 11-12% over 10 years. The oil trade balance turns negative in 2013 and continues to deteriorate throughout the decade, reaching a negative value of nearly US\$30 billion in 2020. This implies a negative shock to net exports over a period of 10 years that is equivalent to about 11-12% of the 2008 level of total exports.

**Table 1. Oil Trade in the Pessimistic Scenario (billions of U.S. dollars)**

	2008	2009	2010	2015	2020
Oil exports	50.6	30.9	44.8	22.6	5.1
Oil imports	35.7	20.5	30.6	32.3	34.1
Oil trade balance	14.9	10.4	14.2	-9.7	-29.0

To put the size of this shock in perspective, it is worth noting that it pales in comparison with the 1986 oil price shock. At that time, oil exports represented 68% of total exports (1985) compared to 17% in 2008 (with net oil exports being a much smaller proportion— only 5% of total exports). As a result, the reduction of oil exports from US\$14.8 billion to US\$6.3 billion between 1985 and 1986 represented about 40% of the 1985 level of total exports. This triggered a real depreciation of the exchange rate of about 40% from December 1985 to December 1986 (the real exchange rate did not continue to depreciate significantly afterward).

If the exchange rate this time responded to the relative size of the shock as it did in 1986, one could expect that the consequence would be an 11-12% real depreciation over a period of 10

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

years. In other words, the fall in net oil export revenues (as a proportion of total exports) is very moderate and so will be the adjustment of the real exchange rate.

While moderate, the effects on economic growth of the real depreciation (through the increase in the economy's competitiveness and in the profitability of the non-oil tradable goods sector) will likely be positive and significant. While real exchange-rate depreciation can inhibit fixed investment in developing countries by increasing the relative prices of imported machinery and equipment and raising the real value of dollar-denominated debts, it also shifts relative prices in favor of tradable goods sectors, increasing the profitability of the tradable goods sectors and stimulating capital accumulation in these activities. The empirical evidence is quite conclusive on this. Indeed, the relationship between the real exchange rate and growth has received much attention in recent years after the slow growth recorded by a large number of countries with overvalued real exchange rates and the extraordinarily high growth rates in countries that have deliberately undervalued their real exchange rate (this is the case of China and, in the Latin American context and to a lesser extent, of Argentina). As a result, there is today a large literature documenting a positive relationship between a high real exchange rate and growth.<sup>3</sup>

For the Mexican case, Blecker (2009) estimates that the real appreciation of the peso between 1996-2000 and 2003-2007 (a 9% appreciation) reduced Mexico's GDP growth rate by as much as 1.3 percentage points.<sup>4</sup> He also finds that an appreciated peso has had a more negative effect on growth since trade liberalization, especially since NAFTA took effect, as the weight of foreign trade in the economy increased. Ibarra (2010) also finds a highly significant effect of the

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<sup>3</sup> In this recent literature, the effect of the real exchange rate on investment profitability, already mentioned, is the main but not the only mechanism through which the real exchange rate affects growth. The impact of investment on growth is amplified by the greater productivity of invested capital, mainly in sectors subject to international competition (Polterovich and Popov 2002). Moreover, a high real exchange rate reallocates resources toward the tradable goods sectors, which may present increasing returns to scale and whose expansion may generate economies of specialization and technological externalities that are captured by the less dynamic sectors (Frenkel and Ros 2006; Rodrik 2008). Levy Yeyati and Sturzenegger (2007) also highlight the increase in domestic saving that results from the redistribution of income in favor of profits derived from a high real exchange rate. In their view, small- and medium-size firms with limited access to external finance will then record an increase in internal funds with a positive effect on their investments. For large firms that finance their investments in the capital market, the increase in overall savings will tend to reduce the cost of capital with a positive effect on investment.

<sup>4</sup> Other factors contributing to the fall in the growth rate (of about 2.1 percentage points between the two periods) were a slower growth of the U.S. economy and lower net financial inflows, while a higher real oil price had a positive effect on the growth rate.

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

real exchange on investment even after controlling for industrial production and exports, suggesting therefore a very significant “profitability effect” of the real exchange rate.

The fall in net oil exports is, of course, even more moderate in the status quo scenario, and in this case the oil trade balance remains positive by 2020. With oil production constant at 2010 levels and oil consumption steadily rising, oil exports fall by about US\$5 billion and the trade balance deteriorates by about US\$8 billion, well below the deterioration in the pessimistic scenario. The real exchange rate adjustment necessary to absorb this shock is thus likely to be very moderate.

**Table 2. Oil Trade in the Status Quo Scenario (billions of U.S. dollars)**

	2008	2009	2010	2015	2020
Oil exports	50.6	30.9	44.8	42.4	40.0
Oil imports	35.7	20.5	30.6	32.3	34.1
Oil trade balance	14.9	10.4	14.2	10.1	5.9

### IV. Implications for the Fiscal Accounts

I assume that oil revenues in real terms follow the same evolution as the oil production platform, something that, in the face of increasing gasoline imports over time, requires a change in the policy of past years of keeping gasoline prices constant in real terms (which generally implies lower prices than the international reference prices in the United States).

Table 3 shows the evolution of oil revenues in the two scenarios, both as a percentage of GDP and as a percentage of total public sector revenues. In the pessimistic scenario, oil revenues fall to less than 4% of GDP in 2010, 5 percentage points below the 2008 value (8.7%), and down to 19.6% of total public sector revenues (compared to 35% in 2010).

The declines are, of course, more moderate in the status quo scenario. Indeed, since oil production remains constant, the reduction in this scenario of oil revenues as percentages of GDP and total public sector revenues are the result of the increase in GDP (and non-oil revenues) in

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

the face of stagnant real oil revenues in absolute terms. As percentage of GDP, oil revenues fall to 6.1% (2.6 percentage points below the 2008 level) and to 28.6% as a percentage of total public sector revenues (compared to 19.6% in the pessimistic scenario).

**Table 3. Oil Government Revenues in the Two Scenarios**

	2008	2009	2010	2015	2020
<i>Status Quo Scenario</i>					
As % of GDP	8.7	7.4	8.2	7.1	6.1
As % of Public Sector Revenues	36.9	31.3	35.0	31.8	28.6
<i>Pessimistic Scenario</i>					
As % of GDP	8.7	7.4	8.2	5.5	3.7
As % of Public Sector Revenues	36.9	31.3	35.0	26.6	19.6

A loss of government revenues on the order of 5% of GDP, as in the pessimistic scenario, can have substantial effects on the rate of economic growth or not, depending on how the government responds to it. Suppose, for example, that the whole of the adjustment takes place on the spending side and in particular in public investment. This would make public investment (on the order 4.4% of GDP in 2004-2007) completely disappear at a time when public investment, particularly in infrastructure, has already been dramatically brought down from its peak level of 11% of GDP during the oil boom of 1979-81 as a result of the type of fiscal adjustment followed after the debt crisis. Such an investment compression would have highly deleterious effects on growth. The overall investment rate would fall from about 20% of GDP to about 15%, the lowest level in many decades (even less than the level achieved during the Tequila crisis of 1994-1995) and this assumes that the private investment rate would not be adversely affected—an unlikely event considering that a significant amount of the compression would fall upon infrastructure investment, which has the highest potential of positively affecting productivity and investment in the private sector.<sup>5</sup> Note that in the period 2001-2006, Mexico was already last among the large

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<sup>5</sup> Even if private investment increases, it is unlikely to compensate fully for the decline in public investment. Whether there are crowding out or crowding in effects of public investment on private investment is subject to controversy (see, for opposite views, Lachler and Aschauer 1998, who find a partial crowding-out effect, and Ramirez 2004, who finds an important crowding-in effect). There is, however, consensus on the fact that, even if crowding-out effects exist, these are at worst partial; that is, an increase in public investment increases total investment rather than displacing fully an equal amount of private investment. It follows that a decline in public

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

Latin American economies with available information in infrastructure investment as a fraction of GDP, and this applied to both public and private investment (Table 5). During that period, Mexico invested in infrastructure 4 percentage points of GDP less than Chile, the only country in Table 5 with an increase in infrastructure investment between 1981-1986 and 2001-2006. Mexico also stands out for having the largest contraction in infrastructure investment (50%), with the exception of Brazil. The fall in infrastructure investment took place in road construction, water provision, and electricity. Only in the case of telecommunications was there a recovery of investment in the 1990s. However, even in this case Mexico is today lagging behind other Latin American countries such as Chile and Brazil, which were behind Mexico in 1980 (Calderón and Servén 2004).

**Table 4. Infrastructure Investment (percentage of GDP)**

	Total		Public		Private	
	1981-6	2001-6	1981-6	2001-6	1981-6	2001-6
Chile	3.4	5.2	3.4	1.7	0.0	3.5
Colombia	3.1	2.8	3.1	1.7	0.0	1.1
Brazil	5.2	2.1	3.6	1.2	1.5	1.0
Peru	2.1	1.5	2.1	0.5	0.0	1.0
Argentina	2.8	1.7	2.8	0.7	0.0	1.0
Mexico	2.4	1.2	2.4	0.5	0.0	0.7

Source: Calderón and Servén (2011)

The rather large adverse effects on investment and growth of adjusting to the loss in oil revenues through a reduction in public investment can be avoided if the adjustment falls upon the income side of the fiscal accounts. This leads to the topic of fiscal reform on which the recent experience does not provide grounds to be optimistic. The recent attempts at tax reforms have either failed or are insufficient to compensate for the expected fall in oil revenues. Indeed, the administration of former President Vincente Fox largely focused, unsuccessfully, on increasing the value added

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investment would lead to a fall in the overall investment rate and may even have an adverse effect on private investment (if crowding-in effects predominate).

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

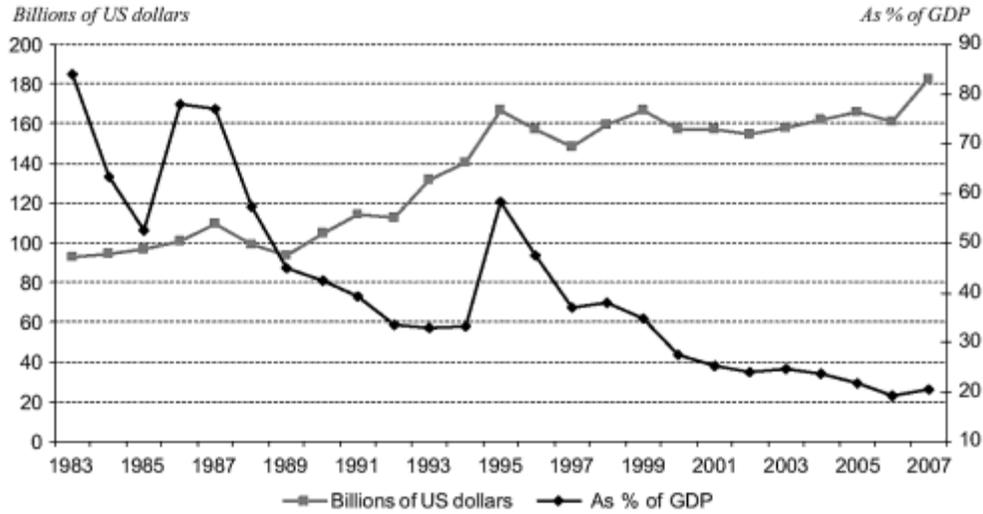
tax base by eliminating tax exemptions on foodstuffs and medications, aiming at increasing tax revenues by only about 2% of GDP. The tax reform proposed by the administration of President Felipe Calderón, approved by the Chamber of Deputies in September 2007, aimed to raise revenues by 2.5-3% of GDP. Central features of the reform are an increase in corporate taxes (a 16.5% charge on corporate income after deductions, which include investments) and the attempt to increase tax collection in the informal sector by establishing a 2% tax on cash bank deposits exceeding a cumulative total of 25,000 pesos per month. While more ambitious than the failed fiscal reform of the Fox administration, this recent tax reform falls short of what is needed, as the expected future decline in oil production and revenues is enough, as we have seen, to practically negate its effects.

Yet another alternative would be a combination of tax and debt financing of the fiscal gap. Over the past two and one-half decades—as a result of large privatization revenues, debt relief (granted under the 1989 Brady Plan), and fiscal adjustment—the government has been able to reduce its debt as a proportion of GDP to low levels by international standards (see Figure 3 for the evolution of external debt). The central government debt as a percentage of GDP is on the order of 25% (2007), a very low value compared to other Organisation for Economic Co-operation and Development (OECD) countries. In fact, in a group of 20 OECD countries only three (Australia, Norway, and New Zealand) had a ratio lower than Mexico, which in turn had less debt as percentage of GDP than, for example, the United States, Germany, the United Kingdom, or France (OECD 2009).<sup>6</sup> In these conditions, the use of debt financing is unlikely to lead the economy into a debt trap, given the large fiscal space associated with these low levels of public debt in relation to GDP. A greater mobilization of this fiscal space is, however, prevented by the balanced budget rule of Mexico's 2006 fiscal responsibility legislation, which would need to be amended in order to make this option a viable one.

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<sup>6</sup> In the non-traditional measure of the public debt—which includes the net debt of the federal government, non-financial public enterprises, development banks, official trust funds, liabilities related to banking sector restructuring and PIDIREGAS—the ratio to GDP was 40% at the end of 2008 (OECD 2009) and also quite low by OECD standards.

Figure 3. Total External Debt, 1983-2007



Source: Moreno-Brid and Ros (2009), based on Oxford Latin American Economics History Database (OxLAD) and Banco de México, Informe Annual (several issues)

## V. Conclusions

The decline in the oil trade balance and in government oil revenues in Mexico is likely to have important implications for the balance of payments and, even more so, for the fiscal accounts, especially in a pessimistic scenario in which oil production steadily declines throughout the next decade. The type of adjustment and its effects on economic growth will be determined by what happens to the real exchange rate and public sector spending, revenues, and debt.

Interestingly, the effects of declining oil revenues on economic growth are not all negative. The effects on the balance of payments are likely to trigger a moderate real depreciation of the peso that will have beneficial effects on the competitiveness of non-oil exports, as well as on the profitability of, and investment in, the tradable goods sector. Moreover, the real depreciation of the peso tends to increase the real value of the public sector foreign exchange balance (largely made up of oil revenues minus interest payments on external debt) that will tend to compensate, at least in part, the negative fiscal effects of the fall in oil revenues.

## **Macroeconomic Consequences of Falling Oil Revenues in Mexico**

Nevertheless, the impact on government revenues can be very large (5% of GDP in the pessimistic scenario) with potentially catastrophic consequences on the future growth path. The negative impact on investment and growth would be especially adverse if the adjustment to the fiscal gap takes place through a reduction of public investment rather than through a compensating increase in non-oil government revenues or debt financing.

Another conclusion from our projections is that the decline in oil revenues is likely to be gradual rather than triggering a sudden deep crisis. While this gives time for the government to undertake an orderly adjustment, it can also generate incentives to postpone it or adjust to the fall in government revenues through the least costly solution in the short run, such as cutting public investment, which can, at the same time, generate the greatest adverse effects in the long run.

## Macroeconomic Consequences of Falling Oil Revenues in Mexico

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