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MEXICO

Selected Issues

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Approved by Western Hemisphere Department

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I. GDP Growth, Potential Output, and Output Gaps in Mexico[1]

Abstract

This paper analyzes the sources of Mexico's economic growth since the 1960s, and compares various decompositions of historical growth into trend and cyclical components. The role of the implied output gaps in the inflationary process is then assessed. Looking ahead, it presents medium-term paths for GDP based on alternative productivity growth rates. The results indicate that the most important factor underlying the slowdown in output growth from an average rate of 6½ percent during 1960–79 to only 2½ percent during 1980–2003 was a sharp decline in trend total factor productivity growth. While economic policy reforms and the introduction of NAFTA may have raised trend productivity growth in recent years, further increases in productivity growth would appear necessary to meet the government's medium-term growth objectives.

A. Introduction

1. Mexico has experienced sharply different growth episodes since 1960. GDP increased at an average rate of 6½ percent during 1960–79, but growth fell to 2½ percent during 1980-2003. More recently, GDP growth averaged more than 5 percent from 1996 to 2000, but dropped to less than 1 percent during 2001–03. This raises the question of the large shifts in the factors underlying historical GDP growth in Mexico, and the implications looking ahead.

2. This paper reviews Mexico's historical economic growth, constructs potential output and the implied output gaps, estimates a wage-price model of inflation, and then discusses Mexico's medium-term growth prospects. More specifically, the paper:

- Reviews trends in GDP growth and compares them with the experience of other Latin American, NAFTA, and Asian countries. An aggregate production function is then used to analyze the sources of past growth (using annual data for 1960–2003), estimate total factor productivity growth and its evolution.

- Decomposes growth into its cyclical and trend components using an unobserved components model and quarterly data from 1980:1–2003:4. Estimates of potential output and the implied output gaps are generated.

- Tests the plausibility of the derived estimates of the output gaps in a reduced-form markup model of inflation, and then uses the preferred measure to re-estimate the staff's model of wage-price dynamics.

[1] Prepared by Ebrima Faal.

- Analyzes Mexico's medium-term growth prospects in terms of the TFP growth and the investment rates that would be needed to generate alternative growth projections.

3. **The analysis shows that swings in growth are mostly accounted for by changes in the contribution of total factor productivity (TFP), as opposed to the factor inputs.** Various techniques, including univariate and structural methods are used to decompose output into its trend and cyclical components. All measures indicate that underlying TFP growth turned negative after 1980, although some pick-up starting in the mid-1990s can be attributed to NAFTA and other structural reforms. The preferred measure of the output gap has a significant effect on inflation in both the reduced form and the structural models. Looking ahead, three scenarios are considered based on different TFP assumptions. Assuming some fading of the effects of NAFTA and structural reforms, but still positive TFP growth, real GDP would grow at slightly over 3 percent over the medium term. If, in contrast, TFP reverted to the post-1980s experience, growth would fall to just over 2 percent, while an acceleration in TFP growth (spurred, for example, by recent financial reforms) could allow GDP to grow by about 4½ percent.

B. Trends in GDP Growth

Stylized facts

4. **Between 1960 and 1980, the Mexican economy grew at an average annual rate of over 6½ percent, resulting in significant improvements in GDP per capita and living standards.** Although economic policies during this period reflected an inward-looking bias and were dominated by a strategy of import substitution, the pursuit of generally sound fiscal policies through the early 1970s, and an absence of significant external shocks, allowed the economy to grow strongly. Economic growth began to slow in the mid-1970s due to the first oil price shock and a slowdown in overall productivity growth, but recovered later in the decade as public expenditure on infrastructure in the energy sector boosted aggregate demand.[2] By 1980, various macroeconomic imbalances that had been building since the mid-1970s led to an external debt crisis and sharp declines in GDP growth. Real GDP grew by less than 1 percent annually in 1980-87, while GDP per capita declined sharply and total factor productivity growth turned negative.

5. **Mexico recovered from the debt crisis and implemented extensive economic and structural reforms in the latter part of the 1980s.** These included reforms to the tax system, liberalization of the trade regime, privatization of public entities, establishment of full convertibility of the peso. Nevertheless, Mexico was unable to resume the growth performance of earlier decades. Growth averaged 3¾ percent during 1990–94, but output declined by 6½ percent in 1995, when Mexico was hit with another financial crisis. While the economy was more resilient and bounced back quickly, growth averaged only 2½ percent during 1995–2003,

[2] Mexico was a net importer of oil up until the mid-1970s, when large discoveries turned the country into a significant exporter of oil and other petroleum products.

well below the 6½ percent rate reached during the 1960–80 period. Figure 1 illustrates the trend in GDP and GDP per capita, showing the sharp break in GDP growth since 1980.

6. **Table 1 shows a breakdown of GDP by expenditure category.** Consistent with the authorities' inward-looking bias during the 1960s and 1970s, investment and public expenditure grew strongly, together increasing from 16.1 percent of GDP in 1950 to 37.2 percent of GDP in 1980. This switch in resource allocation was facilitated by a significant drop in private consumption, which fell by 17 percent of GDP over the same period. Foreign financing also played an important role, as the external current account moved from a surplus to deficit, notwithstanding rising oil revenues. Shares of exports and imports were lower in 1980 than in 1950. Following the 1982 debt crisis, capital inflows dropped significantly and other components of aggregate demand had to be cut to provide room for debt service.

Table 1. Mexico: Shares of Main Expenditure Categories in GDP, Selected Years, 1950-2003

Period	Private consumption	Public consumption	Gross capital formation	Exports of goods and nonfactor services	Imports of goods and nonfactor services
1950	81.8	4.4	11.7	17.0	14.8
1960	79.5	5.1	14.9	10.6	12.0
1970	71.9	7.2	20.0	7.8	9.7
1980	65.1	10.0	27.2	10.7	13.0
1990	74.0	8.9	19.0	19.8	21.0
1995	66.9	10.4	16.1	30.4	27.7
2000	67.1	11.1	21.4	31.0	33.0
2001	69.6	11.8	19.6	27.4	29.7
2002	69.0	12.1	19.3	26.8	28.7
2003	69.2	12.7	19.3	28.4	30.1

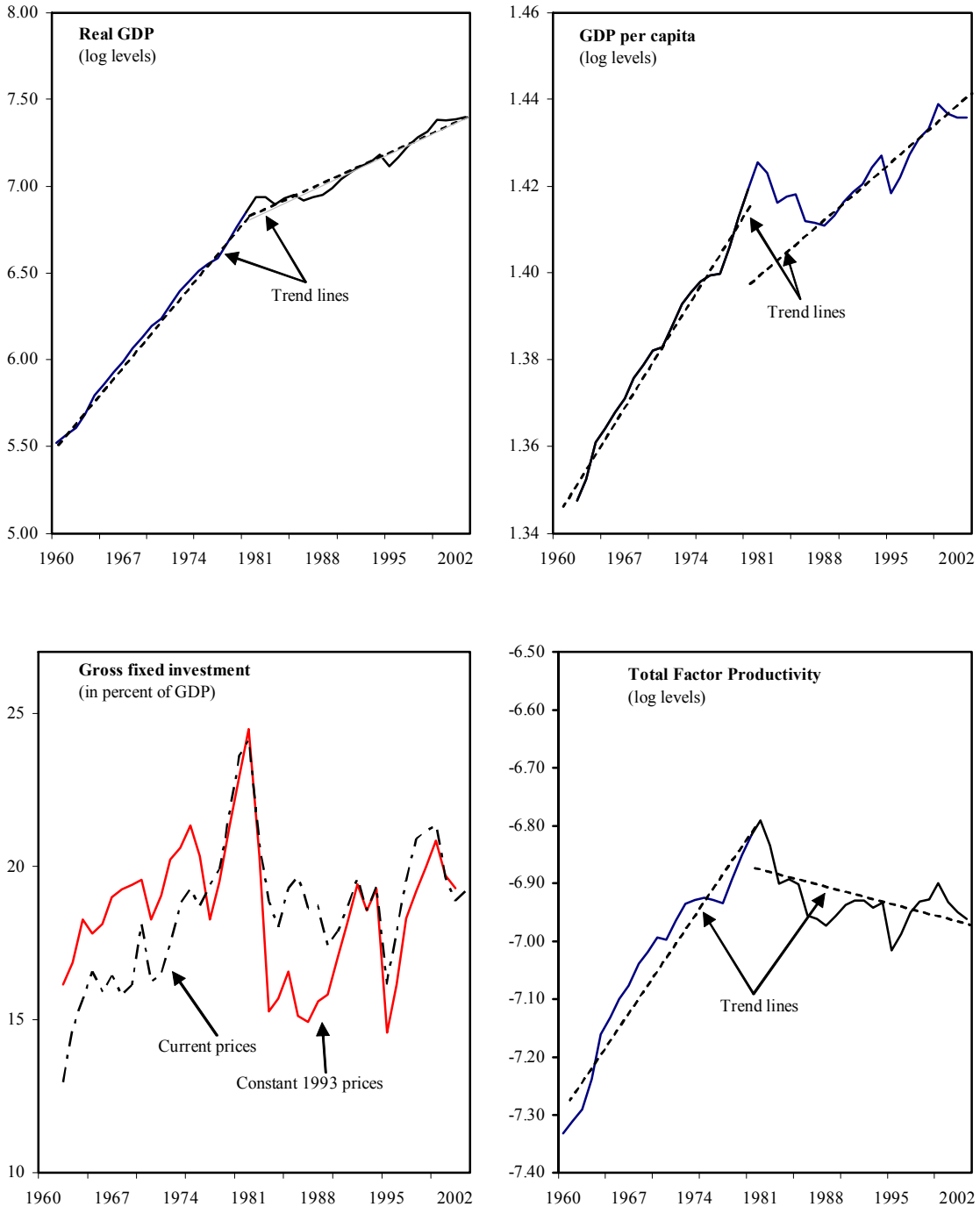
Sources: INEGI, IFS, and staff estimates.

7. **The growth slowdown post-1980 was broadly based.** Figure 2 presents average growth rates of primary, industry, and service output in Mexico. A common aspect of the post-1980 data is the striking decline in growth rates across all sectors. The declines in growth in the industrial and service sectors are particularly noteworthy.

International Comparison

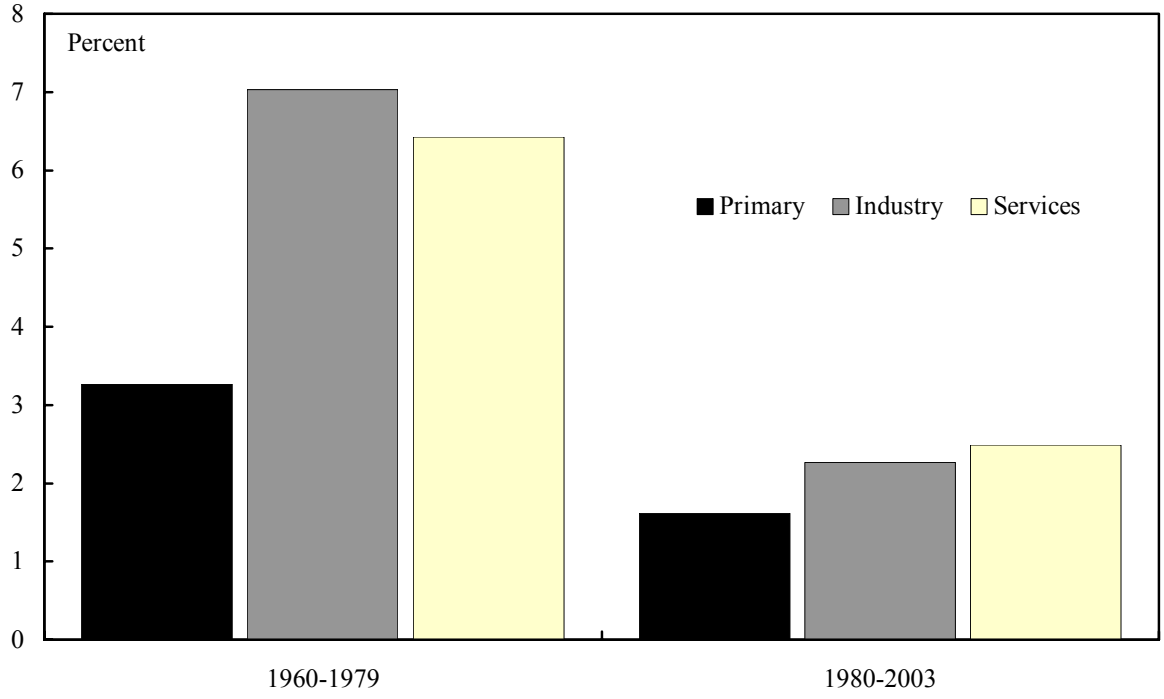
8. Table 2 presents purchasing power-parity based estimates of growth in GDP per capita for Mexico and selected Latin American and Asian countries. Within the region, Mexico's per capita growth rate of about 3½ percent during 1960-79 lagged only Brazil, which grew at a rate of around 5 percent. All countries, except Chile, experienced a decline in their growth rates in the 1980–2003 period, with Brazil's being the most dramatic, followed by Mexico. The East Asian countries and Chile stand out for their ability to sustain high growth rates, and in the case of Chile an increase in growth since 1980.

Figure 1. Mexico: GDP, Investment, and Total Factor Productivity, 1960-2003



Sources: INEGI, and IMF staff estimates.

Figure 2. Mexico: Sectoral Output Growth



Sources: INEGI, and IMF staff estimates.

Table 2: Average GDP Per Capita Growth Rates for Selected Countries

(PPP-based, in percent)

	1960-79	1980-2003	1995-2003
Mexico	3.4	0.9	2.4
Latin America			
Argentina	2.1	0.2	-0.3
Brazil	4.9	1.0	1.4
Chile	2.1	3.2	3.7
NAFTA			
United States	2.9	2.1	2.7
Canada	3.1	1.8	2.8
Asia			
Korea	6.0	5.6	4.3
Singapore	9.0	4.2	3.0
Thailand	5.0	4.7	2.7

Sources: Summers and Heston, and WEO.

C. Growth Accounting and Total Factor Productivity

9. **Total factor productivity provides a measure of the efficiency of a given bundle of factor inputs in generating output.** Output is produced by a bundle of capital and labor, and total factor productivity (TFP). Output (Y) is measured as deflated value added, while inputs are aggregated into the two primary inputs labor (L) and capital services (K). The Solow (1956) growth accounting equation can then be stated as:

$$\frac{d\ln Y}{dt} = s_L \frac{d\ln L}{dt} + s_K \frac{d\ln K}{dt} + \frac{d\ln A}{dt} \qquad \textbf{(1)}$$

Labor and capital contribute to value-added growth with contributions measured as the rate of change of each input times its share in total costs. The change in value added not explained by these contributions is attributed to multi-factor productivity growth, captured by the variable A. In practice, the rate of change of A is measured as a residual, by subtracting the contributions of labor and capital from the rate of output growth.

10. **An alternative way of presenting the growth accounting equation is in terms of a decomposition of the rate of change of labor productivity (*LP*)**, measured as the difference between output growth and labor input growth, such that:

$$\frac{d\ln(LP)}{dt} = \frac{d\ln Y}{dt} - \frac{d\ln L}{dt} \qquad \textbf{(2)}$$

Equations (1) and (2) can be rearranged to decompose the change in labor productivity into two parts. The first depicts the change in labor productivity due to capital deepening (labor productivity rises when more capital is used per worker) and the second represents the effect of TFP growth:

$$\frac{d\ln(LP)}{dt} = (1 - s_L)\left\{\frac{d\ln K}{dt} - \frac{d\ln L}{dt}\right\} + \frac{d\ln A}{dt} \qquad \textbf{(3)}$$

11. **The growth accounting exercise was performed over the 1960–2003 period, assuming a Cobb-Douglas production function with output elasticities of capital and labor of 0.33 and 0.67 respectively**.[3] Capital is derived from national accounts data on gross fixed investment using the perpetual inventory method, with an assumed depreciation rate of 10 percent. The labor input is defined as the economically active population aged 15 and over,

[3] The assumption of fixed weights of 0.67 for labor and 0.33 for capital is consistent with those of other researchers. See for example Bosworth 1998, Santaella (1998), World Bank (1998), Loayza, Fajnzylber and Calderon (2002), Bergoeing et al. (2002), and Blazquez and Santiso (2004). The United Nations (1986) estimated the factor share for labor to be 0.42. This does not include, however, compensation of the self-employed.

while TFP is derived as a residual.[4] Due to data limitations, our analysis did not attempt to control for fluctuations in capacity utilization nor in the quality of human capital. Figure 3 describes the evolution of TFP growth in Mexico, and Table 3 shows the resulting estimates of the contributions of the three factor inputs—capital, labor, and TFP—from 1960 to 2003.

12. **The data indicate that TFP accounts for most of the decline in output growth since 1980.** From 1960 to 1979, real GDP grew at an average rate of 6.5 percent, while TFP rose by 2.1 percent. From 1980 to 2003, however, real GDP growth slowed to 2.6 percent. About two-thirds of this decline of 3.9 percentage points is explained by lower TFP growth—indeed, the *level* of TFP declined at an average rate of 0.5 percent over this period. The sharp decline in TFP in the 1980s (the so called "lost decade") is not surprising when one considers the impact of the debt crisis on financial activity and investment. What is surprising is that, while the performance during the more recent 1996–2003 subperiod is more favorable, the outturn seems modest relative to the structural changes that were implemented, including significant trade and financial liberalization.

13. **These findings are qualitatively similar with the findings of other studies on Mexico.** Elias (1992), Santaella (1998), Bosworth (1998), World Bank (2000), Bergoeing et al. (2002) also found that TFP growth, in general, consistently declined between 1980 and the mid-1990s. Santaella (1998) estimates TFP growth of about 2 percent during1950–79, and -0.6 percent during 1980–94. Similarly, both the Bosworth and the World Bank found that TFP growth declined at an average annual rate of 0.8 percent in 1981–94.

D. Explaining Mexico's Output and Productivity Decline

The growth accounting exercise raises some important questions. First, while the magnitude of the 1982 debt crisis may explain the initial collapse of output and TFP growth, it is less clear why these have not recovered to pre-1982 levels after 2½ decades.[5] Second, why have output and TFP growth remained modest since the 1990s, even after implementing an extensive structural reforms beginning in the late 1980s? Of course, explaining why Mexico's productivity and real GDP growth was modest relative to pre-1980 even after significant trade, financial sector, and public sector reforms is complicated.[6] Nevertheless, it is useful to consider some of the factors that may have contributed to the weak performance of output and TFP.

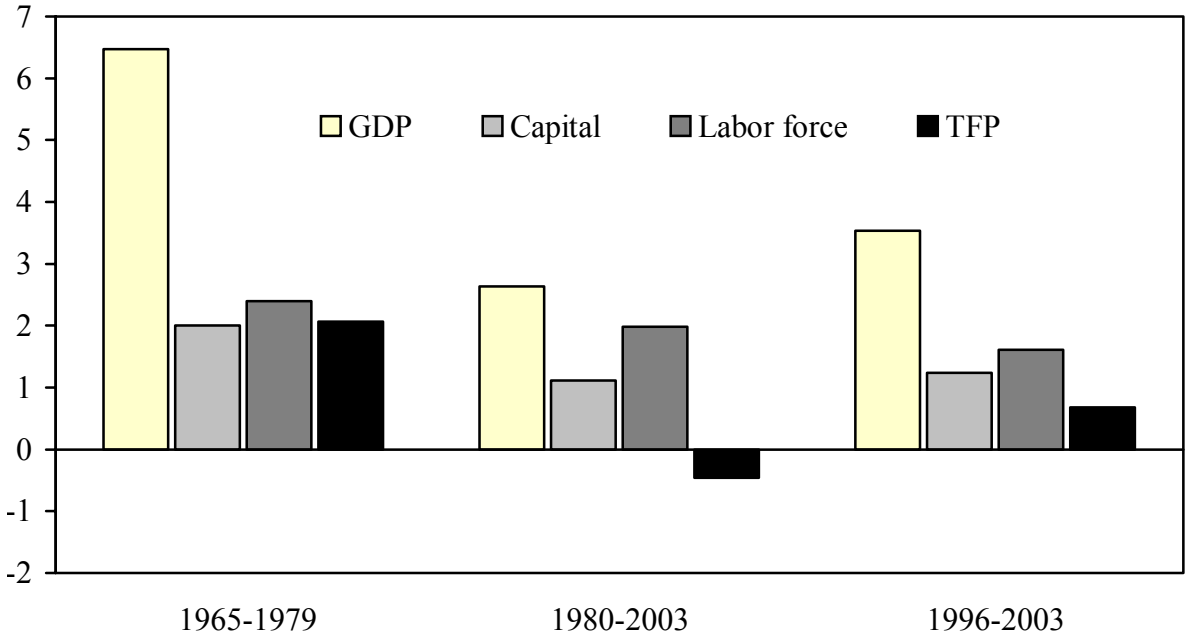
---

[4] The national accounts include an estimate of output of the informal sector, but the official "formal sector" employment measure excludes the self-employed, family workers, and jobs in the informal sector. We use the more comprehensive measure—the economically active labor force—in our analysis to try to capture the contribution of workers in the latter categories.

[5] Chile offers an interesting contrast in this respect. For a detailed comparison see Bergeonig et al. (2002).

[6] For a recent discussion of possible factors see Ortiz (2004), World Bank (2000), Lora (1997), and Loayza and Palacios (1997).

Figure 3: Growth Accounting, 1960-2003
(Contribution to GDP growth in percent)



Sources: INEGI, and staff estimates.

Table 3. Mexico: Sources of Growth, 1960-2003

	1965-79	1980-2003	1996-2003
Real GDP growth	**6.5**	**2.6**	**3.5**
Factor growth rates (in percent)			
Capital	6.1	3.4	3.8
Labor	3.6	3.0	2.4
TFP	2.1	-0.5	0.7
Factor contributions (in percentage points)			
Capital	2.0	1.1	1.2
Labor	2.4	2.0	1.6
TFP	2.1	-0.5	0.7
Memorandum items:			
Potential output growth	6.4	2.7	3.5
Trend TFP growth	2.0	-0.4	0.6

Sources: INEGI, and staff estimates.

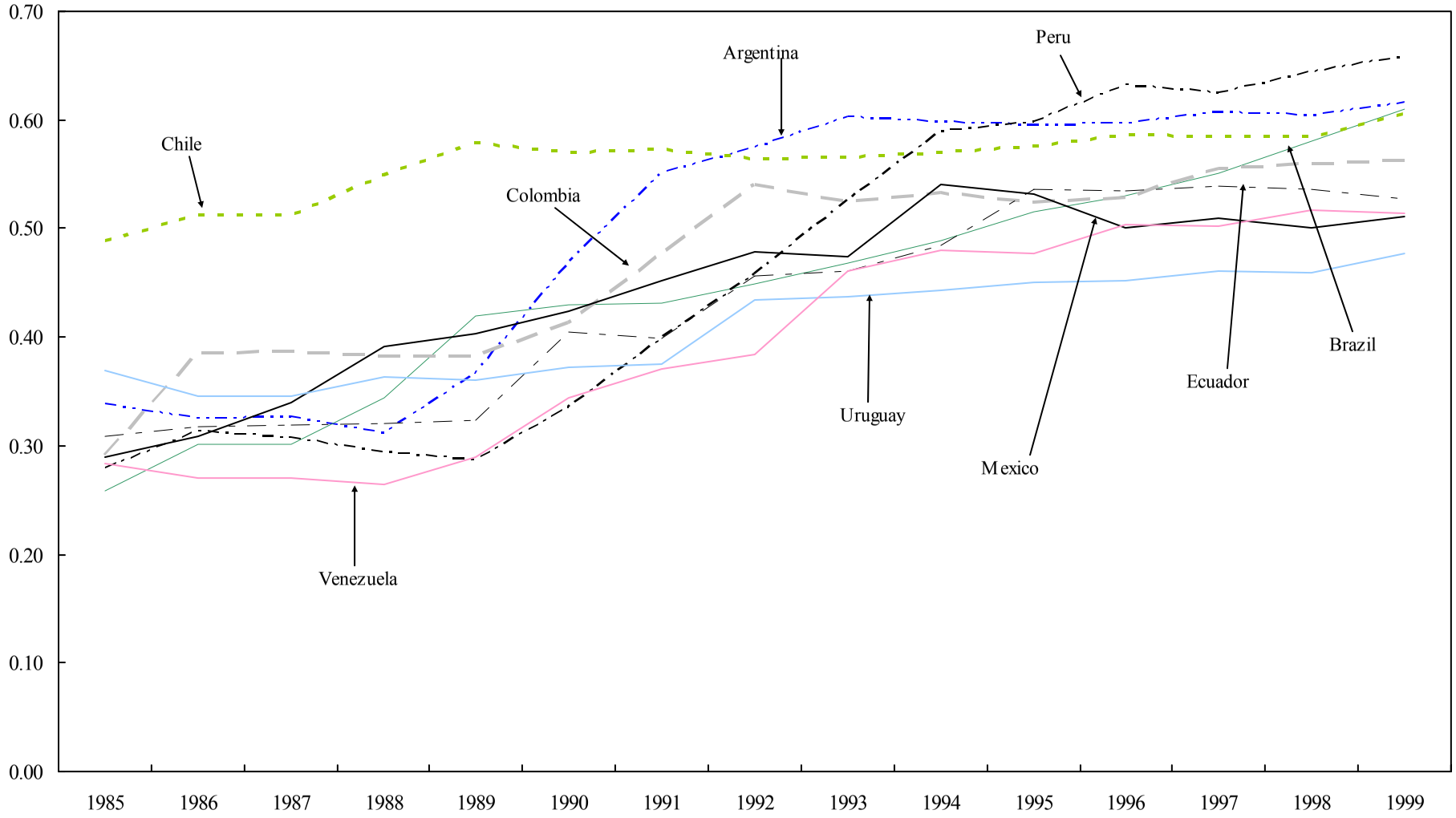
Role of Structural Reforms

14. **Mexico has implemented a wide range of structural reforms since the late 1980s.** Public sector reforms were implemented to open markets to private initiative, capital, and technology. The deregulation process included elimination of regulations that inhibit competition, create monopolies or oligopolies, prevent private-sector participation and/or generate unnecessary transaction costs. In terms of trade reform, Mexico opened up its economy and eliminated most quantitative restrictions on foreign trade. The process was complemented by membership in GATT/WTO, NAFTA, as well as other bilateral and multilateral agreements. As a result, average tariff rates on NAFTA imports have been reduced from 12 percent in 1993 to under 2 percent in 2001, while rates of effective protection have also declined and are projected to continue to decline with further integration with the North American and regional markets. Trade as a percent of GDP increased sharply from about 27 percent of GDP in 1980 to about 65 percent in 2003.

15. **It appears, however, that the pace of reform and liberalization, other than in the financial sector, slowed in the latter half of the 1990s**. It proved difficult to maintain the pace of reforms as they moved into politically sensitive areas—including tax policy, energy, labor markets, and the judicial system. Studies by Lora (1997), Loayza and Palacios (1997), Loayza, Fajnzylber, and Calderón (2002) have analyzed the issues relating to structural reforms and growth in Latin America. Their analyses indicate Mexico is lagging in a number of reform areas, both by regional standards and relative to other emerging economies in Asia. The regional comparison is reflected in the aggregate index of structural reforms constructed by Lora (1997) (Figure 4). Other observers (see, for example, Ortiz (2004)) have also alluded to the role that incomplete reforms have played in the growth slowdown.

16. **Of course, the weak performance of TFP since 1980 reflected both supply and demand factors, as the government was mostly constrained by the ongoing nature of the debt crisis, which cut off Mexico's access to capital markets (Bosworth (1998)).** The financial crisis in 1994–95 again caused a sharp contraction in aggregate demand. But the demand-side effects of these episodes of financial turmoil would be expected to fade in recent years. In this context, Chile provides an interesting contrast to Mexico. Chile suffered an output decline even larger than Mexico in the early 1980s, with GDP per worker falling by 18 percent between 1981–83, compared with 12 percent in Mexico (World Bank (1998)). However, Chile recovered faster from the collapse than Mexico, and was able to subsequently maintain high growth rates. One argument for the different recovery of growth in the two countries may have been the timing of economic reforms, which were largely completed before the crisis in Chile, but were pursued later in Mexico (Bergoeing et al. (2002).

Figure 4. Structural Reform Indices for Selected Latin American Countries, 1985-1999



Sources: Lora (1997) and updated calculations for 1998-99.

17. **Other reasons have been advanced for why the structural reform process has not provided a more robust boost to the supply-side performance of the economy**:

- **Incomplete reforms.** Several observers have argued that, while the earlier reforms of the 1980s and 1990s led to a recovery in investment and growth, the reform process remains largely incomplete (see Ortiz (2004)). In general, Mexico's reform process was more advanced in liberalizing external trade, but slower in terms of domestic deregulation and the promotion of labor market flexibility, in particular, in the electricity and petroleum sectors.

- **Financial sector repression.** Even though the financial system was progressively liberalized after 1988, it was slow to recover from previous "repression". The banking system, where domestic banks were protected from foreign competition, had limited experience in identifying and financing profitable investments and devoted most loanable funds to unproductive consumer and real estate loans. Furthermore, development of alternative financial instruments stagnated due to legal restrictions, and did not become an important source of investment finance.

- **Labor market distortions.** Loayza and Palacios (1997) characterized the Mexican labor market as one of the most distorted in Latin America and the Caribbean. In their view, the legal framework creates significant distortions as it protects workers, while making it costly for firms to introduce technological change; it also inhibits the mobility of resources from one sector to another. The visible and rapid expansion of informal sector activity since 1980 suggests that increases in nonwage labor costs, including severance costs, depressed the demand for labor in the formal sector and encouraged a shift to informal labor arrangements.[7] Since the informal sector is often characterized by lower wages and productivity, the expansion of the informal sector acts as a drag on overall productivity growth.

E. Estimates of Potential Output

18. **This section compares various approaches for decomposing real GDP growth into its cyclical and trend components, and derives estimates of potential output growth and the implied output gaps.** In general, strategies to estimate these unobserved variables may be classified as univariate (atheoretical), structural, or a multivariate (mixed) approach. The univariate approach views the problem as a statistical exercise in which actual data on output are used to construct an estimate of potential output. Therefore, it requires less information and relies solely on historical GDP data. Examples of this approach are the Beveridge-Nelson (1981) and the unobserved components (UC) time-series approaches proposed by Watson (1986) and Clark

[7] The World Bank (1998) estimates that the informal sector has absorbed over 50 percent of the increase in the total labor force since 1981 (p. 34).

(1989), and the Hodrick-Prescott filter (1997). An important shortcoming of these approaches is that they disregard other information, such as inflation, unemployment, and capacity utilization.

19. **Structural approaches exploit economic theory to estimate potential output**. In general, data on employment and estimates of the capital stock are used to fit a production function, and estimates of potential output are then derived given "normal" levels of employment, productivity, and capital utilization.

20. **The multivariate approach combines the time series elements of the univariate model with aspects of a structural model.** Several researchers have used inflation and real output to obtain measures of potential outputs—Laxton and Tetlow (1992) for Canada, Kuttner (1994) for the United States, Gerlach and Smets (1999) for the EMU-area, and Benes and N'diaye (2001) for the Czech Republic. An important shortcoming, however, is the assumption that the relationship between the output gap and inflation is stable. This assumption is debatable for economies like Mexico, which have experienced sharp structural changes.

21. **We use the UC approach and the Kalman Filter to decompose real GDP into trend and cycle (plus an erratic component) within a univariate framework such as Watson (1986) and Clark (1987).** This essentially requires assumptions on the functional form of these components and the structure of the error processes, including cross correlation properties. We then compare the results from these approaches to the Hodrick-Prescott (H-P) filter. These techniques were also applied in a structural context by filtering the TFP residual. Inserting the trend value of TFP in equation (1) then provides an alternative measure of potential output.

Model

22. **The model used to decompose real GDP into a permanent and cyclical component is as follows**: [8]

$$y_t = y_t^p + z_t \tag{4}$$

$$y_t^p = \mu_t + y_{t-1}^p + \varepsilon_t^y \tag{5}$$

$$\mu_t = \mu_{t-1} + \varepsilon_t^\mu \tag{6}$$

$$z_t = \phi_1 z_{t-1} + \phi_2 z_{t-1} + \varepsilon_t^z \tag{7}$$

[8] The model follows closely Clark (1989), Kim and Nelson (1999a, b), Kim and Murray (2002), Morley (2002), and Morley, Nelson and Zivot (2001).

In equation (4), actual output (y_t) is decomposed into a "permanent" component (y_t^p) and a "transitory" component (z_t). The permanent and transitory components can be thought of as corresponding to potential output and the output gap terms, respectively. In equation (5), permanent output is assumed to follow a random walk with drift μ_t, while ε_t^y is a white noise disturbance with variance σ_y^2. If σ_y^2 is zero, then potential growth is constant. In equation (6), we allow the drift term to follow a random walk, since our estimation covers the period 1980-2003, and thus includes periods of important changes in macroeconomic conditions. To close the model, equation (7) assumes that the output gap follows a second-order autoregressive (AR(2)) process, where ε_t^z is a white noise disturbance with variance σ_z^2, which is uncorrelated with ε_t and the stationarity conditions hold (Kim and Nelson (1999), Morley (2002)).[9]

Characteristics of the model [10]

23. **The relative size of the standard deviations of ε_t^μ and ε_t^z, together with the coefficients on the autoregressive terms φ_1 and φ_2, determine the behavior of permanent output and thus the gap between actual and permanent series**. The standard deviation of the cyclical component, σ_z, measures the contributions of cycles. There are no cycles if the standard deviation of σ_z is equal to zero. If the standard deviation of the growth rate, σ_μ, is zero, then potential growth collapses to a constant. The default assumption in the model is that trend and cycle innovations are uncorrelated. This setup remains the standard treatment of trend-cycle decompositions in state-space framework, as in Kim and Nelson (1998) and Proietti (2002). We denote this zero covariance constrained UC-model as "restricted" and the model with a freely estimated covariance between the trend and cycle as "unrestricted".

F. Empirical Results—Potential Output and Output Gaps

24. **The estimation results are reported in Table 4 for the restricted and unrestricted models estimated using GDP, whereas Table 5 presents the estimates for TFP.** The results show that the sums of the coefficients for φ_1 and φ_2 are less than 1, implying stationary cycles for both models.[11] This implies that positive shocks to the output gap, ε_t^z, will cause it to increase for several quarters before returning to the steady-state level of zero. The estimates of trend output growth are also broadly similar in the two cases, averaging about 0.57 percent quarterly, or 2.3 percent annually for this period. The innovations in the trend process are at least twice as large in the unrestricted model as in the restricted model. By contrast, the cyclical innovations

[9] Harvey (1985) and Clark (1987) suggest specificfying ρ=2. Depending on the estimates of the AR(2) processes, z_t may have complex roots and thus obey a cyclical process.

[10] The state-space representation of the model is described in Appendix 1.

[11] In this section, trend GDP is generated using the Kalman Filter. Trend TFP is then derived as the difference between actual and trend GDP.

are significantly larger in the restricted model than in the unrestricted model. This implies that a greater proportion of the variance in output is explained by the cycle under the restricted model, and the period of the cycle is also longer.

Table 4. GDP: Estimates of the Restricted Unobserved Components Model 1/
(1980:1 - 2003:4)

	Restricted		Unrestricted	
	Parameter	Standard error	Parameter	Standard error
Trend process				
Drift: μ	0.599	0.090	0.551	0.194
Innovation: σ_μ	0.709	0.012	1.802	0.220
Cycle process				
Coefficient: $\varphi 1$	1.358	0.086	0.055	0.028
Coefficient: $\varphi 2$	-0.427	0.059	-0.472	0.128
Innovation: σ_z	1.120	0.118	0.466	0.171
Log likelihood	-150.266		-148.642	

Sources: INEGI, and staff estimates.
1/ Seasonally adjusted quarterly data.

Table 5. TFP: Estimates of the Restricted Unobserved Components Model 1/
(1980:1 - 2003:4)

	Restricted		Unrestricted	
	Parameter	Standard error	Parameter	Standard error
Trend process				
Drift: μ	-0.145	0.254	-0.154	0.182
Innovation: σ_μ	0.005	0.081	1.709	0.168
Cycle process				
Coefficient: $\varphi 1$	1.136	0.041	0.100	0.070
Coefficient: $\varphi 2$	-0.186	0.094	-0.878	0.030
Innovation: σ_z	1.651	0.157	0.317	0.080
Log likelihood	-167.643		-160.727	

Sources: INEGI, and staff estimates.

1/ Seasonally adjusted quarterly data.

25. **Figure 5 shows that HP filter estimates of the trend components of GDP and TFP are "smoother" than either of the UC estimates.**[12] Smoother trends can be obtained from the unrestricted unobserved component model by imposing a higher variance on the level disturbances. However, the resulting cycles are still smaller in amplitude and less persistent compared to the HP or the restricted models. Estimates of potential GDP growth follow similar patterns, with the unrestricted UC trend growth estimates showing significantly more volatility than the HP or the restricted UC models (Figure 6).

Assessing the Implied Output Gaps [13]

26. **Estimates of the output gaps are generated as the difference between the value of the series and the estimated trend.** As can be seen from Figure 7, and based on the relative variances of the gap measures, the HP filter gap estimates are "noisier" than those based on the UC models. The relative variance of the HP gap is 57 percentage points, compared with 33 and 53 percentage points for the for the restricted and unrestricted gaps, respectively. Also evident from Figure 7, however, is the similarity of the output gap profiles. Indeed, the correlation coefficients between the various GDP gap measures range between 0.79 and 0.98, while those of the TFP measures range between 0.74 to 0.96. Nevertheless, these approaches give conflicting answers about the output gap at particular points in time, underscoring the uncertainty about its absolute size. But the result that the profiles of the gap are broadly similar indicates that it is sensible to assess the relative size of the output gap at a particular point in time by comparing the current estimate of the gap to its recent history and to past peaks and troughs.

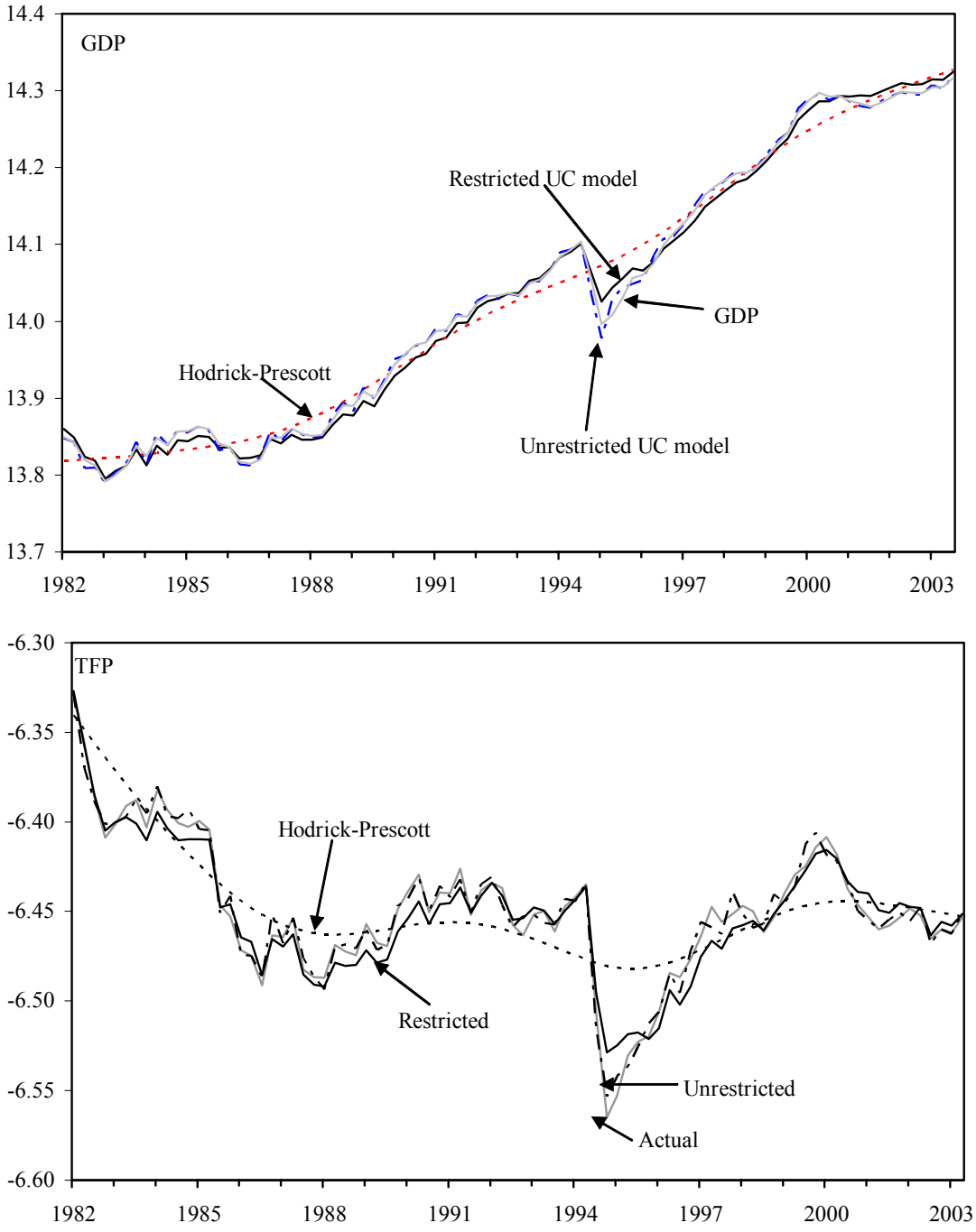
27. **Table 6 shows a comparison of results from this study and those reported in IMF Country Report 01/191 for the same sub-periods.** In general, estimates of potential GDP growth and the output gap were broadly similar. Estimates obtained from for the period 1983:2-2001:1 indicate potential GDP growth of 2¼ percent in the current study, compared with 2½ percent in the 2001 report. Estimates of potential GDP growth, however, differ by as much as

[12] We assumed the conventional 1,600 smoothing parameter for the quarterly data under the HP filter.

[13] The gap is defined as follows:

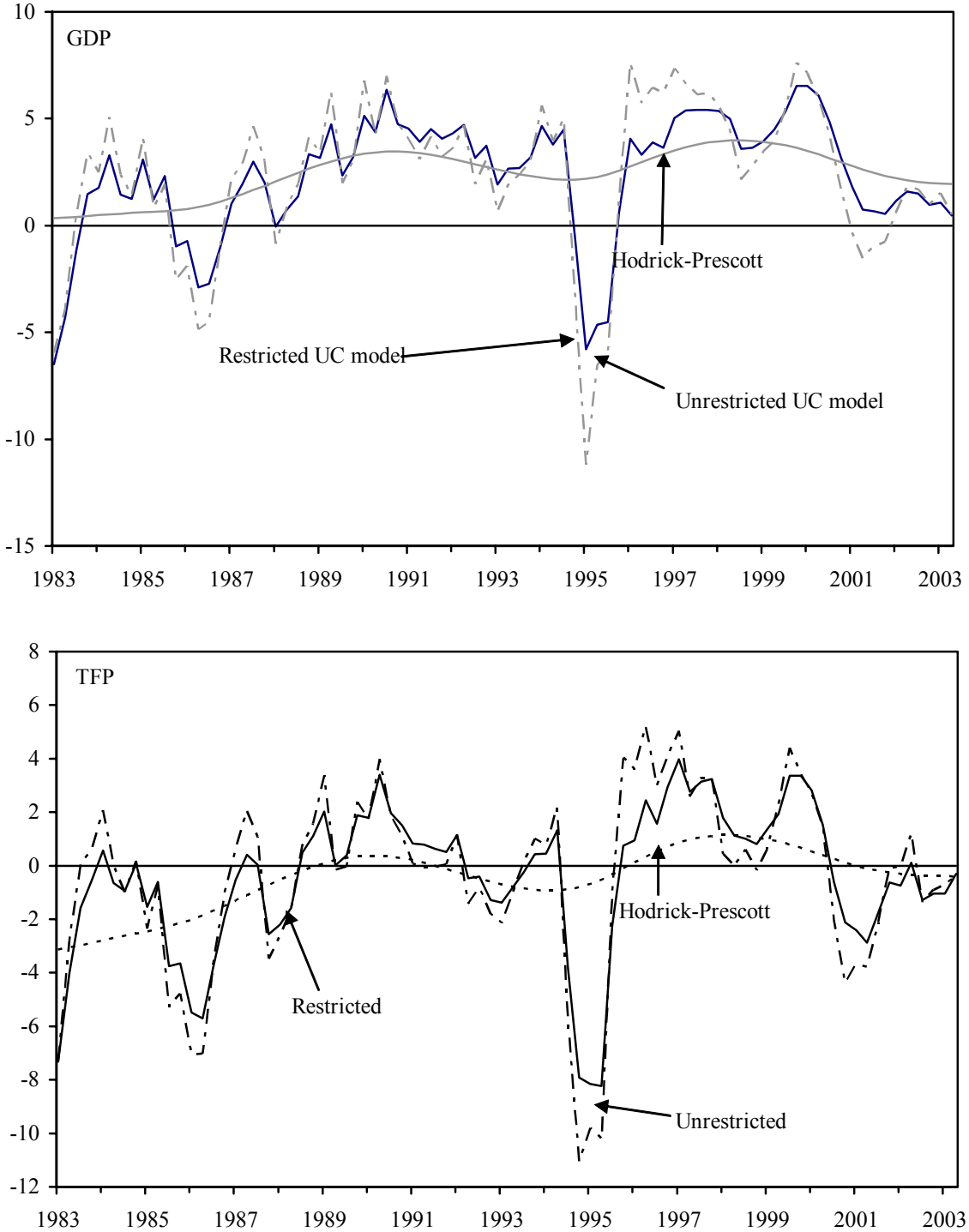
$$Outputgap = \frac{actual\ output - potential\ output}{potential\ output} * 100 .$$

Figure 5. Mexico: HP and UC Trend Estimates of GDP and TFP, 1982-2003
(in log levels)



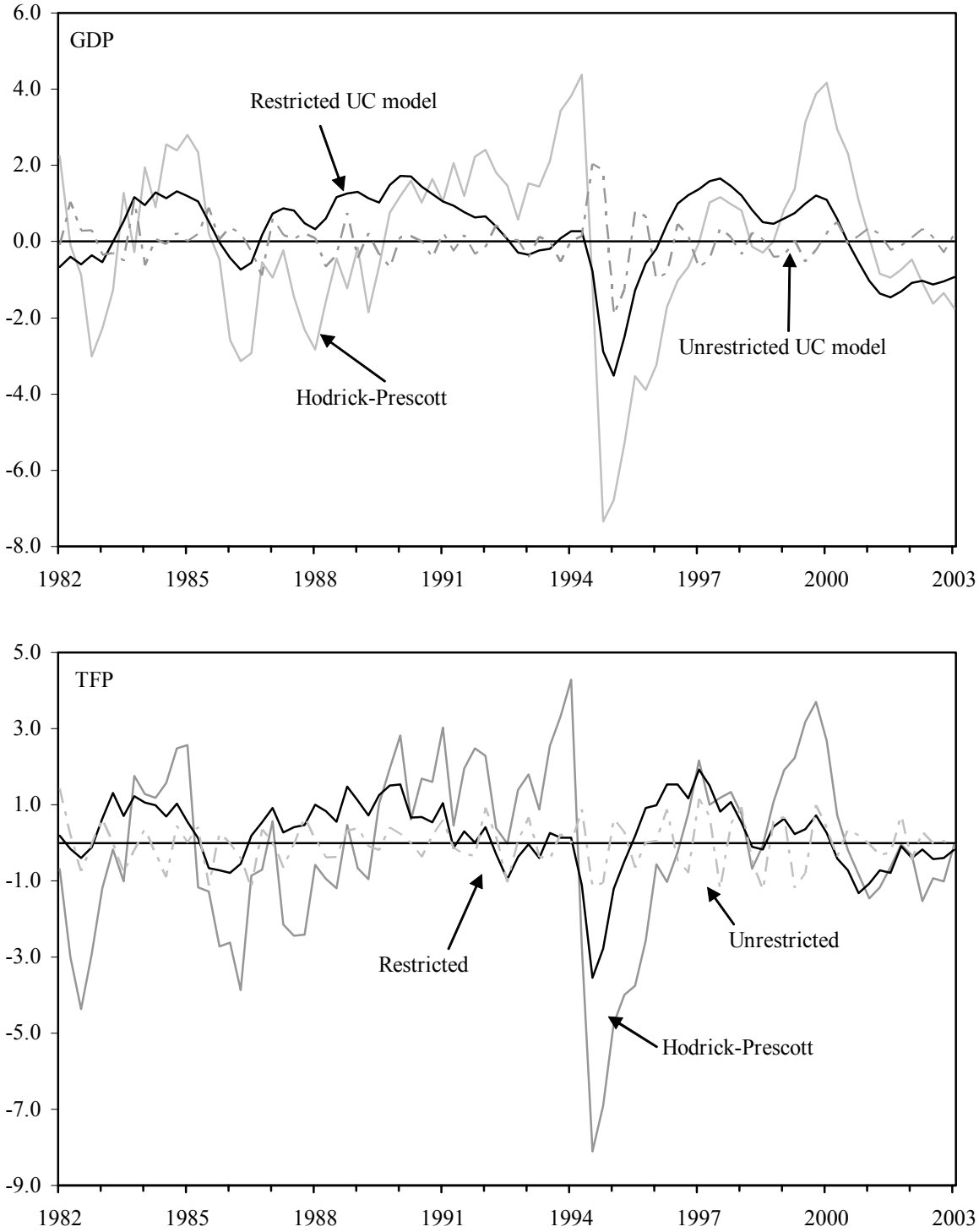
Sources: INEGI, and Fund staff estimates

Figure 6. Mexico: HP and UC Estimates of Trend Output Growth, 1983-2003
(4-quarter change, in percent)



Sources: INEGI, and Fund staff estimates

Figure 7. Mexico: HP and UC Estimates of GDP Output Gaps, 1982-2003
(in percent of potential output)



Sources: INEGI, and Fund staff estimates

1 percentage point in the quarterly estimates for the sub-periods 1983:2–1995:4 and 1996:1-2001:1. The corresponding output gaps are also higher in the 2001 report for the latter period. The two approaches to estimating the output gap illustrate the difficulty of identifying, with a reasonable degree of confidence, the permanent and cyclical components of the business cycle. Different techniques can point to the economy being at varied stages of the business cycle, despite being based on the same information set.

Table 6. Mexico: Comparison with Results from IMF Country Report No. 01/191.

	Current study	Country report	Current study	Country report	Current study	Country report
	Quarterly data 1/					
	1983:2-2001:1		1983:2-1995:4		1996:1-2001:1	
Actual output	2.3	2.6	1.5	1.6	5.0	4.9
Potential output	2.3	2.5	1.6	2.0	4.8	3.9
Output gap	0.0	0.1	-0.1	-0.4	0.2	1.0

Sources: IMF Country Report 01/191 data and results, and staff estimates.

1/ The estimation strategy for potential output in IMF Country Report No. 01/191 is the Hodrick-Prescott Filter. The current study uses a univariate unobserved components model.

28. **As one means of assessing which estimates of potential output and the output gap are most plausible, we estimate a simple "accelerationist" model of inflation**. The model in equation (8) relates current inflation (π) to a lagged four-quarters moving average gap (*gap*), lagged inflation, and a moving average error term to account for overlapping observations.[14] Current inflation is defined as the four-quarter change in the overall CPI.

$$\pi_t = \alpha + \beta\pi_{t-4} + \lambda gap_{t_{-1}-t_{-4}} \quad \textbf{(8)}$$

The results, shown in Table 7, indicate that the only measure that is significantly and positively related to inflation is that derived from the restricted UC model. None of the other estimates are significant, and typically have the "wrong" sign.

G. Estimating a Wage-Price Model for Mexico

29. **We use the restricted UC model to re-estimate inflation model in IMF Country Report No. 04/250.** The model analyzes the inflation process in terms of a two-equation model consisting of an expectations-augmented Phillips curve for wages and a mark-up equation for prices. It incorporates both backward- and forward-looking elements in the inflation process

[14] A more complete model incorporating supply-side factors and expectations is analyzed in the next section.

Table 7. Mexico: Inflation and Output Gaps, 1983:2-2003:4

	GDP Gaps			TFP Gaps		
	H-P filter	***Restricted***	Unrestricted	H-P filter	Restricted	Unrestricted
Inflation						
β-hat	0.21	***10.51***	-0.73	-0.70	-2.97	-12.42
t-statistic	0.25	***1.85*** *	-0.45	-0.77	-1.52	-1.70
P-value	0.80	***0.05***	0.67	0.44	0.13	0.09
Adjusted R-squared	0.96	***0.97***	0.96	0.96	0.96	0.96
Durbin-Watson	1.88	***1.92***	1.88	1.87	1.92	1.96

Indicates significance at the 5 percent level.

derived from the following two equations.[15] All variables are in logs, *w* stands for wages, *p* for the domestic price level, *p** for foreign export prices, y_{gap} for the output gap, π is inflation and *E* is the expectations operator.

$$\Delta w_t = \theta E_{t-1}\pi_t + (1-\theta)\pi_{t-1} + \phi ygap_{t-1} \quad \textbf{(9)}$$

$$\pi_t = \alpha + \beta_1(L)\Delta w_t + \beta_2(L)(\Delta p^* - \pi_{t-1}) + \beta_3(L)\Delta y_{gap} + \beta_4(L)(\Delta admp - \pi_{t-1}) \quad \textbf{(10)}$$

30. **We estimate wage dynamics and price inflation by ordinary least squares following a general-to-specific approach.** To abstract from the noise in the inflation data following the financial crisis, the estimation period covers the period 1998 :09–2003:12. Monthly GDP data and the corresponding gap estimates were generated as a linear interpolation of the quarterly series of actual and potential GDP. Wage growth is measured as the increase implied by contractual wage settlements; overall inflation and the change in foreign prices are measured as the 12-month log changes in the respective variable, while inflation expectations are the Bank of Mexico (BOM) survey measure of inflation expectations for the following 12 months. All parameters are expected to be positive. The overlapping observations in our measurement of the dependent variables induce moving-average processes in the residuals—these are accounted for by explicitly introducing moving-average terms in the estimation process.

31. **The estimation results for the wage equation exhibit the expected properties.** Table 8 shows that the weights on both forward and backward-looking inflation are about 50 percent. The fact that the coefficients on backward- and forward-looking inflation sum to roughly one is consistent with a vertical long-run Phillips curve—i.e. that there is no long-run trade off between activity and inflation.[16] The intercept term is positive and significant, proxying for the effect of

[15] See Chadha, Masson, and Meredith (1992) for a discussion of the rationale for including both forward- and backward-looking components of the inflation process.

[16] This restriction easily passes a Wald test.

productivity growth on real wage gains, while the output gap is highly significant.[17] The regressors explain most of the movements in contractual wages, with an adjusted R-squared of about 0.98. In addition, diagnostic tests indicate normality in the residuals and allow rejection of the presence of heteroskedasticity and autocorrelation, respectively.

Table 8. Mexico: Estimation Results for Wages, 1998:09-2004:05

Variable	Coefficient	T-Statistic	P-value
Constant	0.01	3.18	0.00 *
Output gap(-1)	0.06	3.33	0.01 *
Inflation expectations	0.51	5.01	0.00 *
Lagged inflation	0.47	4.35	0.00 *
Adjusted R-squared	0.98	...	...
Diagnostic tests			
Jarque Bera test for normality of the residuals	1.30		0.05
Serial correlation First order-Durbin Watson	2.20		
Serial correlation:-Higher order-Breusch-Godfrey LM Test	5.49		0.01
Homogeneity			
Wald F-Test	1.02		0.61
Normalized restriction	0.03	1.03	

Source: Staff estimates.

* Significant at the 1 and 5 percent levels.

P-values give the probability that the null hypothesis is accepted.

32. **The estimation results for the inflation equation are also as anticipated (Table 9).** The restriction that the sum of the coefficients on wage growth is unity is easily accepted, consistent with dynamic homogeneity of the wage-price process. The change in the output gap also helps to explain inflation, presumably capturing cyclical changes in markups.[18] Foreign prices affect domestic inflation with a "passthrough" coefficient of about 0.073 (about 8 percent in nominal terms), suggesting an impact that is typical of other economies with trade shares similar to Mexico that have enjoyed an extended period of low and stable inflation. Changes in administered prices also have a significant impact. The overall fit of the equation is high, with an adjusted R^2 of 0.99.

[17] In IMF Country Report 04/250, the coefficient on the output gap of 0.13 was insignificant at the 5 percent level. This compares with an estimate of 0.06 in the current study. The latter estimate is significant at the 1 percent level.

[18] In IMF Country Report 04/250, potential output and the output gap were estimated by applying the Hodrick-Prescott filter to the monthly global economic activity index (IGAE) for Mexico obtained from *INEGI*. The coefficient on the change in the output gap of 0.09, compares with 0.02 in the current study. Both coefficients are significant in explaining inflation at the 1 percent level.

Table 9. Mexico: Estimation Results for Inflation in Mexico, 1998:09-2004:05

Variable	Coefficient	T-Statistic	P-value
Constant	-0.01	-2.47	0.02 *
Change in output gap	0.02	1.85	0.05 *
Wages	0.35	17.92	0.00 *
Wages (-1)	0.31	19.72	0.00 *
Wages (-2)	0.34	18.52	0.00 *
Foreign prices (-1)	0.06	2.24	0.03 *
Admiistered prices (-1)	0.10	7.77	0.02 *
MA (1)	1.60	11.73	0.00 *
MA (2)	1.56	9.47	0.00 *
MA(3)	0.53	4.34	0.00 *
Adjusted R-squared	**0.99**	**...**	**...**
Diagnostic tests			
Jarque Bera test for normality of the residuals	2.04		0.48
Serial correlation First order-Durbin Watson	1.54		
Serial correlation: Higher order-Breusch-Godfrey LM Test	7.93		0.00
Homogeneity			
Wald F-Test	0.01		0.94
Normalized restriction	0.00	0.07	

Source: Staff estimates.

Significant at the 5 percent level.
P-values give the probability that the null hypothesis is accepted.

H. Medium-term Growth Projections

33. **In 2002, the Mexican government announced their economic policy framework and projections for the period 2002–06.** The National Program to Finance Development (PRONAFIDE) was designed to increase potential output within a stable macroeconomic environment. It envisioned two distinct growth paths that are differentiated by the success in realizing structural reforms. Average GDP growth of 5¼ percent was projected under the scenario where significant reforms in key economic and social sectors were implemented, and a more modest growth rate of 3½ under the assumption of only limited structural reforms. As was the case under the previous PRONAFIDE (1997–2000), the strategy also envisioned the creation of significant formal-sector jobs, supported by growing domestic savings, direct foreign investment, and disciplined monetary and fiscal policy. The authorities also assumed that the ongoing effects of earlier reforms, in particular those in the banking sector and further integration with NAFTA, would boost to GDP growth.

34. **Actual growth since slowed to less than 1 percent during 2001-03, well below the PRONAFIDE targets.** A significant part of the weak output performance reflects a cyclical decline associated with weakness in the U.S. economy. Nevertheless, the lack of progress in achieving legislative approval of key reforms has also threatened the achievement of the medium-term growth targets.

35. **The production function and associated growth accounting exercise discussed in section (C) provides a useful framework for discussing Mexico's medium-term growth potential (Table 10).** Our medium-term projections assume that growth in the capital stock is consistent with keeping the capital-output ratio constant at 1.5. As a result, the capital contribution is higher as we move from a low to a higher growth scenario because more investment is needed to maintain the fixed capital-ratio with faster growth. The labor force grows by 2.4 percent, and baseline trend TFP growth is 0.3 percent. The latter is above the average pace since 1980, but below that in the 1960s and 1970s. It is also below the 0.7 percent rate experienced in1996-2003, based on the assumption that growth was temporarily boosted by the effects of NAFTA and other structural reforms. We derive potential output as the sum of trend TFP and the contributions of the capital and labor inputs. Based on these assumptions, projected GDP grows at an average rate of 3.2 percent during 2005–09, while potential output grows by 2.9 percent. The difference reflects the unwinding of the output gap that is estimated to exist in 2004.

36. **The alternative "high" scenario shows the TFP growth that would be needed to support GDP growth of 4.5 percent**—the mid-point of the two PRONAFIDE growth paths constructed in 2002. While the implied trend TFP growth rate of 1¼ percent appears optimistic given the historical experience, it may be plausible if the significant reforms and restructuring that have taken place in the financial sector lead to significantly higher levels of intermediation and real private investment, and other key reforms are implemented. The "low" scenario extrapolates the 1980–2003 record of declining TFP, resulting in GDP growth of just over 2 percent. Of course, future developments will depend importantly on progress with structural reforms. But the difficult political environment for advancing reforms underscores the need for caution.

37. **The assessment in the paper suggests that looking ahead, there are benefits to be gained from further structural reforms to increase investment and enhance TFP**. For instance, a target of 5 percent growth over the medium to long term, assuming depreciation of capital stock of 10 percent, would imply that the minimum gross rate of investment needed for sustained growth would be 22.2 percent of GDP. Similarly, a 6.5 percent target would require an investment ratio of 24.5 percent of GDP. In contrast, the actual rate of investment has averaged 18.5 percent since 1985.

Table 10. Mexico: Alternative Medium-Term Growth Projections, 2005-09

	Low scenario	Baseline	High scenario
Real GDP growth	**2.1**	**3.2**	**4.5**
Factor contributions (in percentage points)			
Capital	0.8	1.1	1.5
Labor	1.5	1.5	1.5
TFP	**-0.2**	**0.6**	**1.5**
Memorandum items:			
Potential GDP growth	1.8	2.9	4.2
Trend TFP	-0.5	0.3	1.2

Source: IMF staff estimates.

I. Conclusions

38. **Mexico recorded remarkable growth between 1960–79. Since the 1982 debt crisis, however, there has been a dramatic slowdown in the rate of output and TFP growth.** Structural reforms in the late 1980s and 1990s provided some impetus for a recovery in TFP growth, but these have been modest in relation to the structural reforms that were implemented. Looking ahead, the implementation of the authorities' structural reform agenda in the energy, tax, labor market, and telecommunication areas would be crucial to raising investment rates. Capital formation spurred by the reforms of the energy sector in Mexico could provide the impetus that is needed to boost investment. Similarly, reform of the labor markets would be crucial to acceleration of growth over the medium term. But the difficult political environment for advancing reforms underscores the need for caution in constructing medium-term forecasts.

39. **The second part of the paper estimated potential output and output gaps using various approaches versions of the univariate UC model in which we let the data "speak" by just using the time series properties of the actual output data**. The estimates of trend output growth are also broadly similar in the restricted and unrestricted UC models, averaging about 0.57 percent quarterly, or 2.3 percent annually for this period. The innovations in the trend process are at least twice as large in the unrestricted model as in the restricted model. This implies that a greater proportion of the variance in output is explained by the cycle under the restricted model, and the period of the cycle is also longer. The analysis suggests that the gap measure that explains inflation best is derived from the estimation of the restricted UC model. The results of our estimation of the wage and price equations confirm the significance of gaps in the inflation process.

40. **The paper also presents medium-term paths for GDP based on alternative productivity growth rates and investment levels.** Assuming some fading of the effects of NAFTA and structural reforms, but still positive TFP growth, real GDP would grow at slightly over 3 percent over the medium term. If TFP reverted to the post-1980s experience, output

growth would fall to just over 2 percent. However, an acceleration in TFP growth (spurred, for example, by recent financial reforms) could allow GDP to grow by about 4 percent. In terms of investment, a target of 5 percent growth over the medium to long term, assuming depreciation of capital stock of 10 percent, would imply that the investment rate needed for sustained growth would be 22.2 percent of GDP. Similarly, a 6.5 percent target would require an investment ratio of 24.5 percent of GDP. In contrast, the actual rate of investment has averaged 18.5 percent since 1985.

State Space Representation of the Unobserved Components

Given the characteristics of output and TFP, equations (6) and (7) are transformed into state-space form.[1] The observation equation linking the current level of output to the four state variables is defined as follows:

$$y_t = [1 \;\; 1 \;\; 0 \;\; 0] \begin{bmatrix} y_t^p \\ z_t \\ z_{t-1} \\ \mu_t \end{bmatrix} \qquad (1)$$

The state variables evolve according to the system of transition equations below:

$$\begin{bmatrix} y_t \\ z_t \\ z_{t-1} \\ \mu_t \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & \phi_1 & \phi_2 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \\ z_{t-2} \\ \mu_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^y \\ \varepsilon_t^z \\ 0 \\ \varepsilon_t^\mu \end{bmatrix} \qquad (2)$$

We assume above that the covariance matrix of the disturbances is diagonal such that the variance-covariance matrix of the residuals of the errors is zero. This implies that shocks to the output gap are uncorrelated to the growth rate of potential.[2]

$$Q = \begin{bmatrix} \sigma_y^2 & 0 & 0 & 0 \\ 0 & \sigma_\mu^2 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \sigma_z^2 \end{bmatrix} \qquad (3)$$

For a given set of the parameters, initial values of the state variables and the corresponding variance-covariance matrix, optimal estimates of the unobserved components based on

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[1] See Harvey (1989) and Hamilton (1994) for a discussion of state-space models and the Kalman filter.

[2] It is possible that large output gaps could have lasting effects on the growth rate of potential, but there are no a priori reasons for this to be the case.

information at time t observations can be obtained by obtained using the Kalman filter and maximum likelihood estimation as described below:

$$\log L = -\frac{T}{2}\log(2\partial) - \frac{1}{2}\sum_{1}^{T}\log|F_t| - \frac{1}{2}\sum_{1}^{T} v_t^T F_t^{-1} v_t \qquad \textbf{(4)}$$

In equation (4), T is the sample size, v_t is the prediction error matrix and F_t is the mean square error matrix of the prediction errors.

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II. Structure and Cost of Public Debt in Mexico[1]

Abstract

This paper describes the significant steps Mexico has taken to strengthen the structure of its public debt in recent years, both in terms of currency composition and maturity. In conjunction with this process, financing costs have fallen, as financial stability has led to enhanced creditworthiness. We then seek to explain empirically changes in the structure of debt, based on standard debt management principles, and assess how far this process has taken Mexico relative to debt structures of comparator countries. Finally, the paper looks at upcoming challenges to Mexico's debt management program, including the evolving status of "off balance sheet" debt, and the possible trade off between lowering financing costs and strengthening the debt structure.

A. Introduction

1. **Strengthened debt management in Mexico has had wide-ranging benefits**. It has: reduced public sector vulnerabilities; helped fiscal consolidation by providing substantial debt service savings in NPV terms; and promoted the development of domestic financial markets. This chapter reviews these achievements and discusses some of the remaining challenges. First, debt management policies undertaken since 1998 and their effects on the debt structure are described. Second, the role of financial and external conditions in shaping the debt structure is investigated empirically. Third, Mexico's debt structure is compared to debt structures in other emerging market countries.

2. **This chapter extends an earlier staff paper on public debt management (see IMF Country Report 02/238)**. The earlier paper discussed in detail the public debt strategy followed by Mexico, including the institutional and legal framework as well as regulatory reforms aimed at modernizing the domestic debt market. It also provided a useful description of the specific debt instruments used by the authorities. These issues have therefore not been developed in detail in this chapter. In updating the analysis of debt management policies (section B), this chapter innovates by presenting indicators of debt structure for the consolidated public sector. The empirical investigation and country comparisons are also new.

B. Debt Management Policies 1998–2003

3. **There has been a continuous improvement in the structure of public debt since 1998**. This has been the result of well-articulated policies, improved market access, and declining

[1] Prepared by Vincent Moissinac, with research assistance from Bruce Culmer.

interest rates. This section describes the policies and the evolving structure of public debt since 1998.

Background

4. **Public debt in Mexico consists of the debt of the budget sector and debt guaranteed by the public sector**. The budget sector comprises the federal government, non-financial public enterprises, and other public entities such as the social security institutes. Public debt guaranteed by the public sector (the federal government, congress, or public companies) includes that of the Saving Protection Institute (IPAB), extrabudgetary trust funds, public development banks, and public sector investment projects undertaken by the private sector (PIDIREGAS). IPAB manages the debt resulting from the banking crisis that followed the 1994–95 financial crisis. The government provided an implicit guarantee on most bank liabilities at the time, and bore the bulk of the cost of the resolution of the banking problems. A trust fund for the rescue of toll roads (FARAC) was also established in the aftermath of the financial crisis, with the role of rescuing private toll companies. The debt used to finance PIDIREGAS projects is transferred to the government after completion of the project.[2]

5. **The authorities monitor two definitions of public debt (Figure 1 and Table 1)**. The traditional definition covers the debt under direct budgetary control and is used for the purpose of budgetary legislation. Specifically, it covers the domestic debt of the federal government and the external debt of the public sector, including public development banks, and a portion of the PIDIREGAS debt (an amount equivalent to amortization obligations for the next two years is recorded in the traditional debt upon completion of individual PIDIREGAS projects). The augmented definition encompasses all government and public-sector guaranteed debt, thus covering the entire nonfinancial public sector as well as the public development banks. The components of the augmented debt are reported on a quarterly basis, for information purposes. Budget laws (appendices) set legal ceilings for most of them on an annual basis.

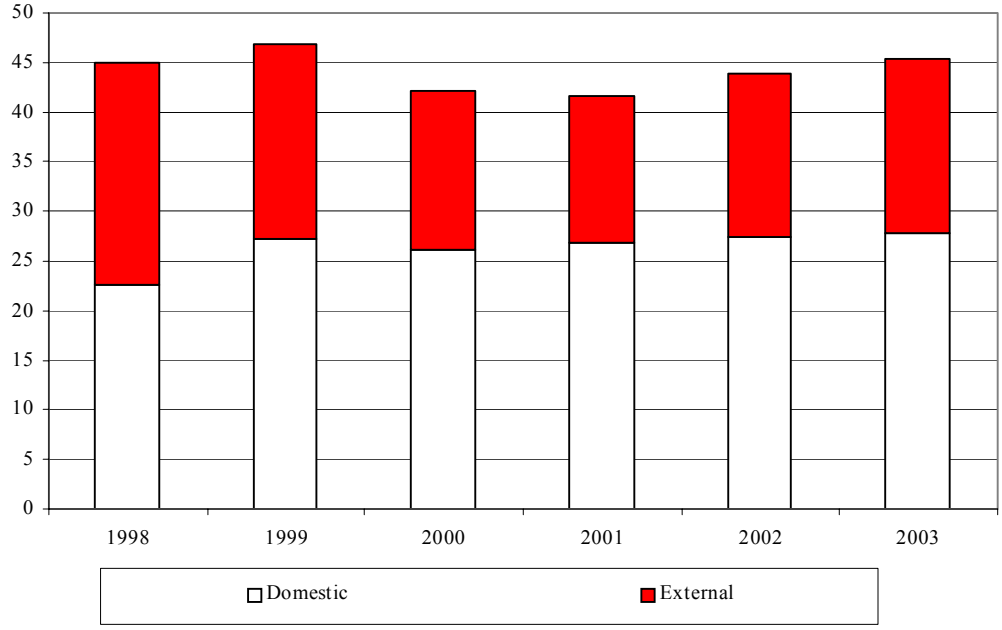
Overall strategy

6. **Debt policies have aimed at reducing both vulnerabilities and financing costs, while supporting the development of the domestic financial system, as stated in the government's 2002–06 economic program (PRONAFIDE).** There were four main objectives: (i) improving the debt amortization profile; (ii) reducing financing costs; (iii) reducing the vulnerability of public finances to interest rate and exchange rate variations; and (iv) attenuating the adverse effects of variations in international capital availability. Other objectives were also identified. The development of a long-term domestic yield curve was seen as important to enhance financial efficiency and facilitate private sector bond issues. Regarding external debt, the broadening of the investor base, the development of euro and yen yield curves, and liability management operations to reduce interest and exchange rate risks were priorities.

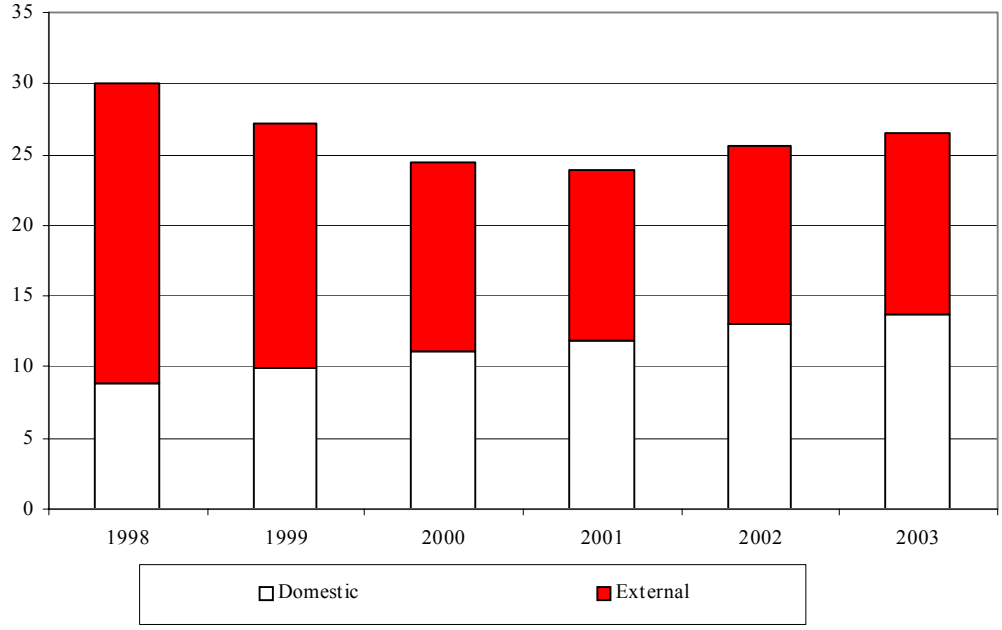
[2] PIDIREGAS projects are used to undertake priority investments while deferring their recording as government expenditure in the budget. The private sector provides the financing, including debt servicing costs, during the construction of the project—until the government acquires the assets.

Figure 1. Mexico: Indicators of Net Public Debt, 1998-2004

Net Augmented Debt (in percent of GDP)



Net Traditional Debt (in percent of GDP)



Source: SHCP

Table 1. Mexico: Public Sector Gross and Net Debt, 1998–2004

	1998	1999	2000	2001	2002	2003	2004 1/
	(In percent of GDP)						
Total net augmented debt	45.0	46.8	42.2	41.5	43.8	45.4	...
Domestic	22.6	27.2	26.1	26.8	27.4	27.8	...
External	22.3	19.6	16.1	14.7	16.4	17.6	16.5
Total gross augmented debt	52.6	55.9	49.3	47.8	49.7	51.0	...
Domestic	27.7	34.4	31.8	32.4	32.9	33.1	...
External	24.9	21.5	17.5	15.3	16.9	17.9	16.6
Federal government debt	27.8	25.6	23.2	22.4	24.0	24.7	23.5
Domestic	9.8	11.0	12.3	13.1	14.5	15.0	14.3
External	18.0	14.6	11.0	9.3	9.5	9.7	9.2
Nonfinancial enterprises	3.9	3.3	2.6	2.2	2.2	2.3	...
Domestic	0.6	0.5	0.3	0.2	0.2	0.2	...
External	3.3	2.9	2.3	2.0	2.0	2.0	2.1
PIDIREGAS	1.2	2.3	2.8	2.7	3.9	5.2	4.9
Domestic	0.0	0.0	0.0	0.0	0.0	0.4	0.8
External	1.2	2.3	2.8	2.7	3.9	4.7	4.1
Development banks	2.8	2.3	2.0	1.9	1.8	1.7	...
Domestic	0.4	0.7	0.5	0.6	0.3	0.3	...
External	2.4	1.7	1.5	1.3	1.4	1.4	1.3
Rest of public sector 2/	16.8	22.3	18.7	18.5	17.8	17.1	14.3
IPAB	10.4	15.7	13.6	13.4	12.6	11.9	11.5
FARAC and other trust funds	5.5	5.5	4.1	4.1	4.4	4.5	2.1
Debtor support programs	0.9	1.1	1.0	1.0	0.8	0.8	0.7
Financial assets	-7.6	-9.1	-7.0	-6.2	-5.9	-5.6	...
Federal government	-3.5	-3.0	-2.7	-1.8	-1.9	-1.6	-1.8
Domestic	-0.9	-1.1	-1.3	-1.2	-1.4	-1.3	-1.7
External	-2.6	-1.8	-1.4	-0.6	-0.5	-0.3	-0.1
IPAB	0.0	-1.4	-1.7	-1.4	-1.3	-1.2	-1.3
Trust funds	-4.1	-4.8	-2.6	-3.0	-2.8	-2.8	...
Memorandum items:							
Traditional net public sector debt	30.0	27.2	24.4	23.9	25.6	26.5	25.1
Domestic	8.9	9.9	11.0	11.9	13.1	13.7	12.7
External	21.1	17.3	13.3	12.0	12.5	12.8	12.5

Source: SHCP.

1/ As of end-March 2004; ratios refer to quarterly nominal GDP.
2/ All domestic debt.

7. **The federal government has made great strides in adjusting the structure of its debt in line with these objectives.** The strategy has been to substitute domestic for external debt, while developing the domestic debt market. The federal government started in 2001 to finance its entire fiscal deficit in the domestic market. A further step was taken in 2004, as domestic borrowing was used to repay external debt (US$500 million). As a result, the share of external debt in net traditional debt declined from 70 percent in 1998 to 48 percent in 2003. The decline was less pronounced for net augmented debt, from 50 percent to 38 percent during the same period, reflecting the growth of foreign-currency PIDIREGAS debt (Figure 1).

8. **Sustained efforts have been made to develop the domestic debt market**. Its rapid growth has been supported by the rise in domestic savings.[3] Financial regulations have been modernized to facilitate the growth of institutional investors' domestic assets, while specific debt instruments have been created to fit their portfolio requirements. Initiatives to broaden the investor base include the deepening of the domestic derivative market and the development of a zero-coupon government bond market, in order to attract foreign investors and investors requiring long-duration instruments. Measures have been taken to promote liquidity in the secondary market, by improving regulations (e.g., market-maker programs) and by reopening issues to provide fewer and more liquid benchmark issues. Transparency has also been improved. In january 2004, the federal government for the first time made public its domestic debt strategy for the year, and has since published quantitative auctioning targets for each type of security on a quarterly basis.

Domestic debt

9. **Domestic debt management has concentrated on reducing interest rate and refinancing risks**. The main vehicle has been the development of long-term fixed-rate instruments and the lengthening of other instruments' maturities. These policies have resulted in the extension of the average duration of market debt, the development of a domestic yield curve, and the smoothing of future amortizations. Another milestone has been the transformation of IPAB's debt structure. The concentration of amortization payments in 2005–06 has been partly resolved through large-scale refinancing operations. Legal impediments to completing these efforts have also been resolved, as the government and banks recently reached agreement over disputed FOBAPROA notes.[4] This agreement should result in the exchange of the old

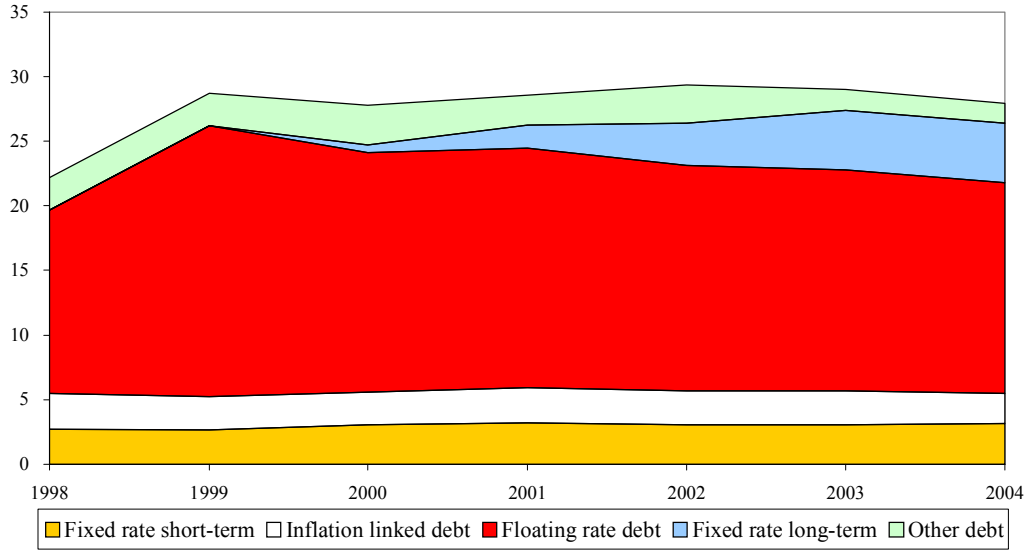
[3] Nonresident holdings of domestic securities (as reported by the central bank for federal government and IPAB domestic securities) have remained below or around 3 percent since May 1999.

[4] FOBAPROA is the banking deposit insurance agency that rescued the banking system following the 1994–95 financial crisis. All its liabilities were passed on to IPAB in 1998. Liabilities relating to bank rescues remained in dispute, however. As widespread irregularities were suspected, the government wanted audits of the banks' loan portfolios in order to claim back parts of the bonds. Such audits were not legally possible until the banks and the government reached a formal agreement in July 2004.

FOBAPROA notes for new IPAB debt that can be refinanced. Until now, IPAB debt has continued to consist entirely of indexed short-duration instruments, thereby limiting the strengthening of overall public sector debt.

10. **The federal government has strengthened its debt structure by using long-term fixed-rate debt**. In 1998, the federal debt consisted entirely of short-term debt and debt indexed to short-term rates or inflation. The first bonds with fixed nominal interest rates were introduced in 2000 with tenures of 3 and 5 years. Longer maturities were issued in the following years, with ten-year bonds in 2001, a seven-year bond in 2002, and a 20-year bond in 2003. This has made the composition of the federal government market debt safer, with more than a third in fixed-rate bonds as of March 2004. From the perspective of the broader public sector, progress has been slower. The share of long-term fixed-rate debt in the consolidated domestic debt of the government, IPAB, and FARAC, rose from zero to 16½ percent from 1998 to March 2004 (Table 2 and Figure 2). IPAB debt is still almost entirely indexed to short-term rates. The debt of FARAC, in contrast, has been refinanced using inflation-linked instruments.[5] As a result of the use of fixed-rate bonds, the shares of inflation-indexed and short-term indexed debt have declined by 4 and 5½ percentage points since 1998, whereas the share of other debts (essentially loans) has declined by 6 percentage points.

Figure 2. Mexico: Consolidated Government Domestic Debt by Type of Instrument, 1998-2004 1/
(in percent of GDP)



1/ Includes Federal government (budget sector), IPAB/FOBAPROA, and FARAC debt.
2004 refers to first quarter data.

[5] Information about the structure of FARAC's bank loans is not publicly available. Reportedly, only a limited portion would have been inflation-linked and the rest would have been at fixed rates. It was assumed for the purpose of this analysis that all loans contracted by FARAC were contracted at nominal rates.

Table 2. Mexico: Public Sector Domestic Debt by Debtor and Type of Instrument, 1998–2004

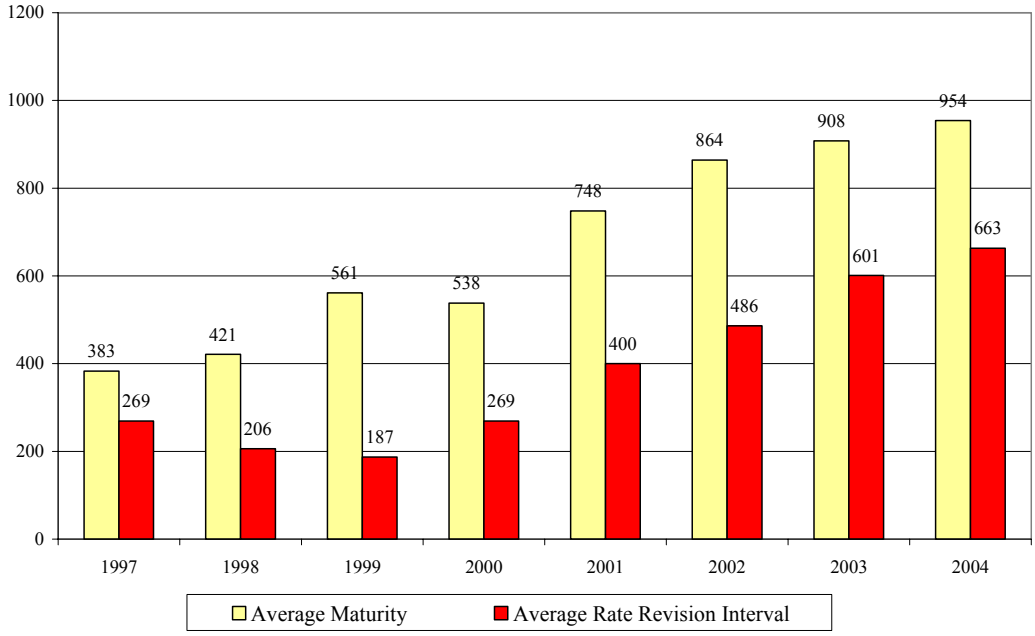
	1998	1999	2000	2001	2002	2003	2004 1/
	(In percent of GDP)						
Net domestic debt							
Traditional	8.9	9.9	11.0	11.9	13.1	13.7	12.7
Augmented	22.6	27.2	26.1	26.8	27.4	27.8	...
Gross domestic debt							
Traditional	9.8	11.0	12.3	13.1	14.5	15.0	14.3
Augmented	27.7	34.4	31.8	32.4	32.9	33.1	...
Gross domestic debt							
Federal government	9.8	11.0	12.3	13.1	14.5	15.0	14.3
Marketable debt	8.4	9.6	10.3	11.7	12.7	14.2	13.6
Cetes	2.7	2.7	3.1	3.2	3.1	3.1	3.2
Bonos	0.0	0.0	0.6	1.8	3.3	4.6	4.6
Bondes	3.7	5.3	5.0	5.1	4.9	5.3	4.8
Udibonos	1.7	1.7	1.6	1.6	1.5	1.2	1.0
Ajustabonos	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Nonmarketable debt	1.4	1.4	2.0	1.4	1.8	0.8	0.8
Retirement Funds	1.0	1.0	1.0	0.9	0.6	0.6	0.6
Other	0.4	0.4	1.0	0.5	1.2	0.2	0.2
IPAB	10.4	15.7	13.6	13.4	12.6	11.9	11.5
BPAs and BPATs	0.0	0.0	1.3	2.6	3.3	3.9	4.2
Other	10.4	15.7	12.3	10.8	9.3	8.0	7.3
Trust funds	5.5	5.5	4.1	4.1	4.4	4.5	2.1
FARAC	1.9	2.0	1.9	2.1	2.3	2.2	2.1
PICs and CBICs 2/	0.8	0.8	0.9	1.1	1.1	1.4	1.3
Loans	1.1	1.1	1.0	0.9	1.1	0.8	0.8
Other	3.6	3.5	2.2	2.0	2.1	2.3	...
Debtor support programs	0.9	1.1	1.0	1.0	0.8	0.8	0.7
Nonfinancial public enterprises	0.6	0.5	0.3	0.2	0.2	0.2	...
Development banks	0.4	0.7	0.5	0.6	0.3	0.3	...
PIDIREGAS	0.0	0.0	0.0	0.0	0.0	0.4	0.8
Financial assets	-5.0	-7.3	-5.6	-5.6	-5.5	-5.2	-3.0
Federal government	-0.9	-1.1	-1.3	-1.2	-1.4	-1.3	-1.7
IPAB	0.0	-1.4	-1.7	-1.4	-1.3	-1.2	...
Trust funds	-4.1	-4.8	-2.6	-3.0	-2.8	-2.8	...
Memo items:							
Consolidated debt of federal government							
IPAB/FOBAPROA and FARAC	22.2	28.7	27.8	28.6	29.4	29.0	28.0
Fixed rate short term	2.7	2.7	3.1	3.2	3.1	3.1	3.2
Fixed rate long term	0.0	0.0	0.6	1.8	3.3	4.6	4.6
Floating rate debt	14.2	21.0	18.6	18.5	17.5	17.1	16.3
Inflation linked debt	2.8	2.5	2.5	2.7	2.6	2.6	2.3
Other debt	2.5	2.5	3.0	2.3	3.0	1.6	1.6
Marketable debt	9.2	10.5	12.5	15.4	17.1	19.4	19.1
Nonmarketable debt	13.0	18.2	15.3	13.2	12.2	9.6	8.8

Source: SHCP.

1/ As of end-March 2004; ratios refer to quarterly nominal GDP.
2/ Staff estimate for 1998 and 2004.

11. **The use of longer-duration instruments has lengthened the maturity profile of the federal government domestic debt (Figure 3)**. The average maturity of federal domestic securities more than doubled between 1998 and 2003, reaching 2.6 years in early 2004. This was achieved initially by relying on debt indexed to short-term rates, and subsequently by using fixed-rate bonds. The duration of bonds indexed to short-term rates or inflation was also extended. The average time interval between rate revisions increased from 34 to 78 days between 1998 and early 2004 for bonds indexed to short-term rates; and from 36 to 63 months for bonds indexed to inflation.[6] As a result, the average duration of federal securities has risen faster than their average maturity since 2001 (65 percent versus less than 30 percent). Progress has been slower with respect to other public sector securities (Table 3). While the duration of FARAC securities has stayed in the 10–11 year range, the duration of IPAB securities has improved only marginally, reaching between 30 to 50 days in early 2004.[7] The duration of IPAB's total debt is even lower, at about 17 days, reflecting the more frequent rate revisions of its bank loans (Table 4).

Figure 3. Mexico: Maturity of Federal Government Domestic Securities
(in days)



[6] This number does not reflect *ajustabonos,* which were still used in 1998 and were inflation-linked.

[7] This range reflects different duration estimates (Tables 3 and 4). These differences most likely reflect differences in the discount rate.

Table 3. Maturity Structure of Public Sector Domestic Securities

	2001	2002	2003				2004
	Q4	Q4	Q1	Q2	Q3	Q4	Q1
			(In days)				
Average maturity	1,261	1,231	1,190	1,204	1,249	1,275	1,333
Federal securities	735	832	889	908	893	908	948
IPAB securities	805	681	714	798	873	905	918
FARAC securities	7,050	6,686	6,308	5,956	6,408	6,426	6,645
Average duration	586	607	553	599	623	649	675
Federal securities	343	430	475	492	496	526	563
IPAB securities	28	33	36	41	45	48	50
FARAC securities	3,926	3,926	3,252	3,742	3,926	3,993	3,944

Source: IMF staff estimates.

12. **The domestic amortization profiles of the federal government and IPAB have improved**. The share of government domestic debt with remaining maturity of less than a year fell from 62 percent at end-1998 to 34 percent at mid-2004 (Figure 4). In the case of IPAB, amortization humps expected in 2004 and 2005 have been substantially reduced compared to the original profile (Figure 5). This has been achieved through pro-active liability management. As of June 2004, 60 percent of the initial debt had been refinanced (Table 4). The recent agreement between the government and banks to exchange old FOBAPROA notes has created further scope for smoothing IPAB's amortization profile. These notes represented close to 28 percent of IPAB's total debt or 3¼ percent of GDP as of end-2003. While the entire stock falls due in 2005-06, the notes could not be refinanced because they were disputed. The exchange is expected to result both in the refinancing and reduction of the IPAB debt. Tentatively, it has been estimated that banks will receive close to half of the outstanding amount of FOBAPROA notes in new IPAB bonds, with the difference reflecting recovered loans, loss sharing covered by banks, and related credits banks will pay. The terms of the exchange are to be finalized following the audits of the banks' loan portfolios.

13. **Another beneficial effect has been the establishment of a domestic yield curve with long-term benchmarks (Figure 6)**. Efforts underway to promote the liquidity of the benchmarks are gradually improving the efficiency of the curve (by reducing the number of outlier issues).

Table 4. Mexico: Structure of IPAB Debt, 1999–2004

	1999	2000	2001	2002	2003	2004 1/
	(In percent of the outstanding debt)					
Debt Composition						
Bonds	0.0	11.3	20.7	29.5	38.6	43.0
Bank loans	100.0	88.7	79.3	70.5	61.4	57.0
Original loans by programs	100.0	71.2	59.0	46.5	41.2	40.2
Capitalization & loan purchase program	28.6	26.8	26.7	26.5	27.5	27.5
Financial Strengthening	71.4	32.9	25.3	16.3	12.9	12.7
Banks in intervention or liquidation	0.0	11.5	7.0	3.7	0.8	0.0
New loans	0.0	17.5	20.3	24.0	20.1	16.8
Memorandum items:						
Refinancing of the debt 2/	0.0	28.8	41.0	53.5	58.8	59.8
Share of FX denominated debt	3.2	2.8	2.2	1.8	1.8	2.0
Debt Maturity						
Average maturity, in years	...	...	4.3	3.6	3.2	2.9
BPAs	...	...	2.2	1.9	2.5	2.6
Bank loans and notes	...	...	4.8	4.3	3.6	3.2
Average duration, in days	...	...	10.5	12.8	16.2	17.8
BPAs	...	...	15.4	23.3	31.4	32.5
Bank loans and notes	...	...	9.2	8.5	6.5	6.6
	(In percent)					
Debt cost 3/						
Overall	...	14.8	9.1	7.2	7.0	...
Bonds	...	13.2	11.3	6.8	6.5	...
Loans	...	14.9	8.7	7.3	7.3	...
Memorandum item:						
Debt cost of federal government domestic debt 3/	...	...	12.6	9.0	8.3	...

Source: IPAB.

1/ As of June 2004.
2/ New debt issued since 1999 to refinance the original debt, as a percentage share of the outstanding debt..
3/ Calculated as the ratio of accrued interests to the average of the debt stock at the beginning and the end of the year. Excludes commissions and fees.

Figure 4. Mexico: Amortization Profile of Federal Government Domestic Debt, 1998-2004
(in percent of outstanding debt)

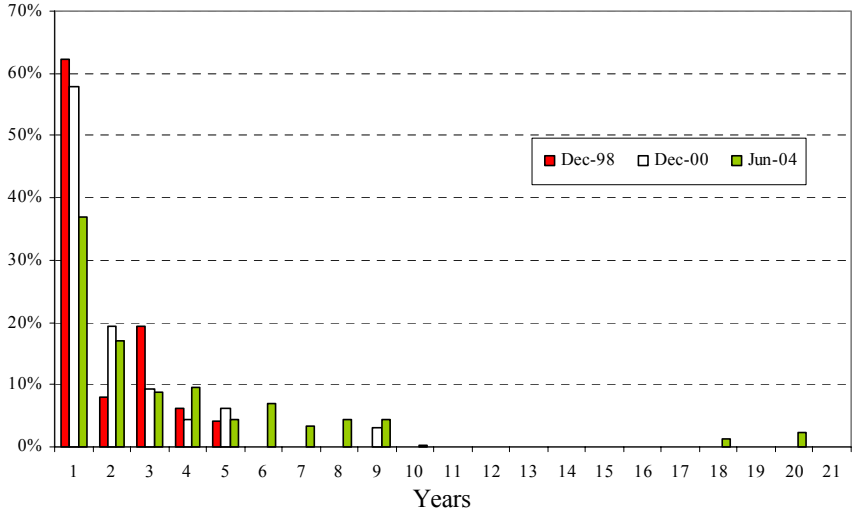
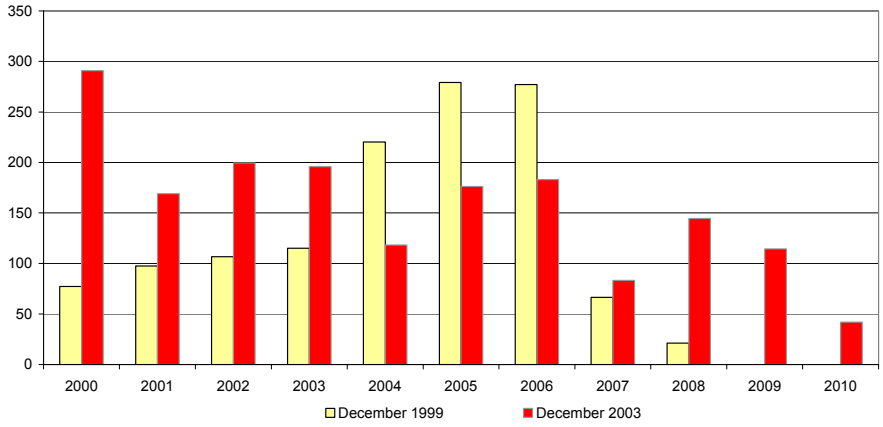
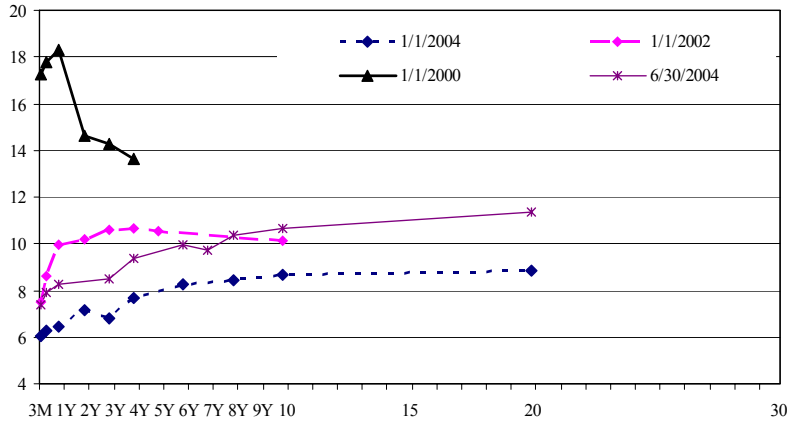


Figure 5: Mexico: Amortization Profile of IPAB Debt, as of 1999 and 2003
(in billions of pesos)



Source: IPAB.

Figure 6. Mexico: Government Peso Yield Curve, 2000-04
(In percent)



Source: Bloomberg.

External debt

14. **External liability management has been pro-active against the backdrop of declining world interest rates and strong investor demand for emerging market securities**. The main feature of liability management has been the substitution of global bonds for restructured debts, allowing reductions both in the stock of external debt and in future debt-servicing costs. New bond issues aimed at improving the liquidity and structure of bonds and diversifying the investor base. Refinancing risks have been kept under control.

15. **The significance of capital market debt in public sector external debt has grown rapidly since 1998 (Figure 7)**. The share of capital market debt, including PIDIREGAS debt,[8] in public sector external debt increased from 29 percent at end-1998 to 43 percent at end-March 2004. This reflected the pre-payment of restructured debts and the growth of PIDIREGAS debt. Mexico finished pre-paying its outstanding Brady bonds in July 2003 (for US$3.5 billion). These pre-payments, permitted by the call option embedded in the bonds, resulted in substantial external debt reduction and net present value savings. The pre-payment produced some external debt reduction because the bonds were bought back at a discount and the collateral released was partly used to repay the debt. Similar pre-payments have been initiated for debt that was obtained at less favorable market conditions. For example, two floating-rate notes, which included call options, were bought back in 2002 (for a total close to US$900 million); and several multilateral loans have also been recently pre-paid.

16. **New global bonds were issued with special attention given to improving the liquidity and structure of bonds and diversifying the investor base**. The liquidity of bond benchmarks has been increased by doing larger issues and reopening them. For instance, ten-year dollar denominated bonds of US$2 billion were placed in 2003, double their size in 1997–99. The structure of bonds has been improved by including Collective Action Clauses (CACs). CACs have been included in all new bonds since March 2003. Financing sources have also been diversified by tapping more in non-U.S. capital markets. A recent example is the sovereign placement of a 20-year, 500 million British pound sterling denominated bond in 2004—the cost of which was lower than a similar placement in dollars.[9]

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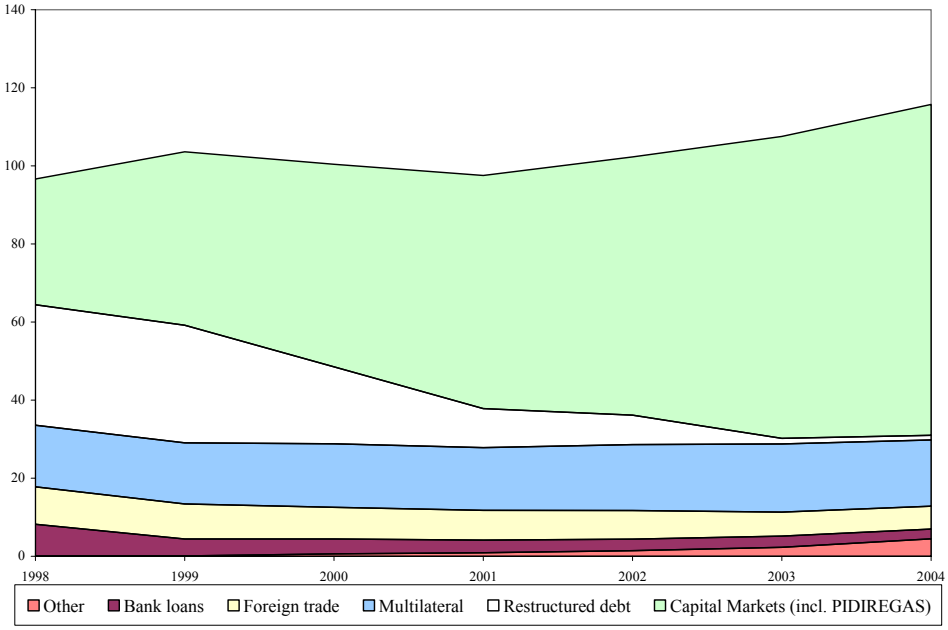
[8] The PIDIREGAS debt mainly consists of global bonds issued by the PEMEX Master trust fund. The definition of external debt used to compute shares consolidates the federal government and PIDIREGAS debt.

[9] As Mexico tapped into non-U.S. capital markets, derivative instruments were used to take currency risk mainly vis-à-vis the U.S. dollar and no other foreign currencies (Table 6). This has reduced currency mismatches for the public sector and the country as a whole.

Figure 7. Mexico: Public Sector External Debt by Type of Creditor, 1998-2004
in billions of US$



17. **Refinancing risks have been kept under control**. The government has been able to extend the maturity of foreign bond issues. The average maturity of bonds issued in 2001–03 was significantly higher than the maturity of bonds issued in the three previous years (Figure 8). At the same time, the average maturity of the market external debt has continued to decline. This reflects the effect of the pre-payment of the Brady bonds, in addition to the natural downward drift in the maturity of existing debt.[10] Nevertheless, refinancing risks have been kept under control, as the government has managed to maintain a favorable amortization profile (Figure 9). As in 1998, the share of short-term debt by remaining maturities represented only 15 percent of the government external debt at the end of 2003.

18. **As in the case of domestic debt, external debt management has had a strong focus on improving the efficiency of the yield curve (Figure 10).** Benchmarks in the yield curve have been developed through new issues and reopenings. For instance, a 20-year U.S. dollar bond was issued for the first time in 2002. Mexico completed in 2004 an exchange of global bonds to improve the efficiency of the yield curve (the first debt exchange of this type by an emerging market country).[11] The exchange was designed to allow investors to trade out bonds that perennially traded above the yield curve into bonds that priced closer to the curve.

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[10] Resulting from the fact that the term to maturity of the debt which is not refinanced is automatically reduced by one year every year.

[11] The government exchanged U.S. dollar denominated bonds due 2019, 2022 and 2026 for reopenings of UMS 2014 and 2033 notes. The operation amounted to US$3.05 billion (37 percent of the outstanding amount). In addition to making the yield curve more efficient, the debt exchange produced net present value savings, increased the maturity of the exchanged debt by 4 years, and increased the share of debt with CACs.

Table 5. Mexico: Public Sector External Debt by Type of Creditor, 1998–2004

	In billions of U.S. dollars				In percentage shares			
	1998	2000	2002	2004 1/	1998	2000	2002	2004 1/
Total gross external debt	96.7	100.4	102.3	115.7	100.0	100.0	100.0	100.0
Capital markets	27.8	36.1	42.7	49.9	28.8	35.9	41.7	43.1
Bonds	19.9	22.0	21.6	19.3	20.6	21.9	21.1	16.7
Notes	8.0	14.1	21.1	30.5	8.3	14.0	20.6	26.4
Bank loans	8.2	3.8	3.0	2.5	8.5	3.8	2.9	2.1
Direct	1.5	2.1	1.8	0.8	1.6	2.1	1.7	0.7
Syndicated	6.1	1.3	1.2	1.7	6.3	1.3	1.2	1.4
Commercial paper	0.6	0.4	0.0	0.0	0.6	0.3	0.0	0.0
Foreign trade	9.6	8.1	7.3	5.9	9.9	8.1	7.2	5.1
Eximbanks	3.2	3.0	2.4	2.2	3.3	3.0	2.4	1.9
Bilateral	4.5	3.8	3.3	2.9	4.7	3.8	3.2	2.5
Syndicated	1.1	0.9	0.8	0.4	1.1	0.9	0.8	0.3
Commercial paper	0.7	0.4	0.8	0.3	0.8	0.4	0.8	0.3
Multilateral creditors	15.8	16.3	16.9	17.0	16.3	16.3	16.5	14.7
IDB	5.6	5.8	6.8	7.0	5.8	5.8	6.6	6.0
IBRD	10.2	10.5	10.1	10.0	10.5	10.4	9.9	8.6
Restructured debt	30.9	19.7	7.5	1.2	31.9	19.6	7.4	1.0
Brady bonds	24.0	16.1	5.6	0.0	24.8	16.0	5.4	0.0
Other	6.9	3.6	2.0	1.2	7.1	3.6	1.9	1.0
PIDIREGAS	4.4	15.8	23.5	34.8	4.5	15.8	23.0	30.1
Other 2/	0.0	0.6	1.4	4.5	0.0	0.6	1.4	3.9
Memorandum item								
Capital markets and PIDIREGAS	32.2	51.9	66.2	84.7	33.3	51.7	64.7	73.2

Source: SHCP.

1/ As of end-March 2004.

2/ Includes FX stabilization fund and PIDIREGAS debt assumed by the government.

Table 6. Mexico: Public External Debt by Currency, 1998–2004

	In billions of U.S. dollars		In percentage shares	
	1998	2004 1/	1998	2004 1/
Total external debt	96.7	115.7	100.0	100.0
By currency	92.3	80.9	95.5	69.9
U.S. dollar	74.6	75.5	77.1	65.3
Japanese yen	7.0	3.7	7.2	3.2
Euro-zone currencies	6.0	0.0	6.3	0.0
Pound sterling	0.8	1.1	0.9	0.9
Canadian dollar	0.4	0.0	0.4	0.0
Swiss franc	0.3	0.2	0.3	0.2
Other	3.2	0.4	3.3	0.3
Not-specified 2/	4.4	34.8	4.5	30.1

Source: SHCP.

1/ As of end-March 2004.
2/ Refers to PIDIREGAS external debt. These are mainly in U.S. dollars.

Figure 8. Mexico: Maturity of the Federal Government External Market Debt, 1998-2003
(in years)

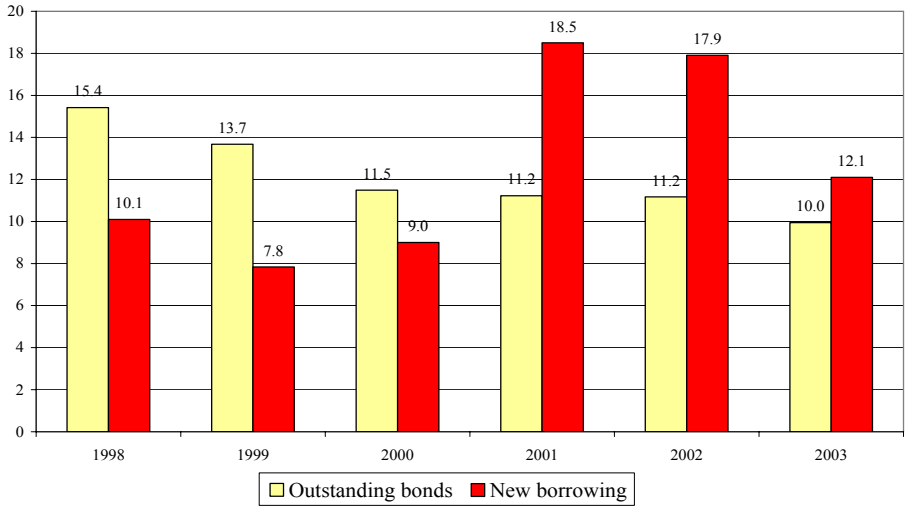
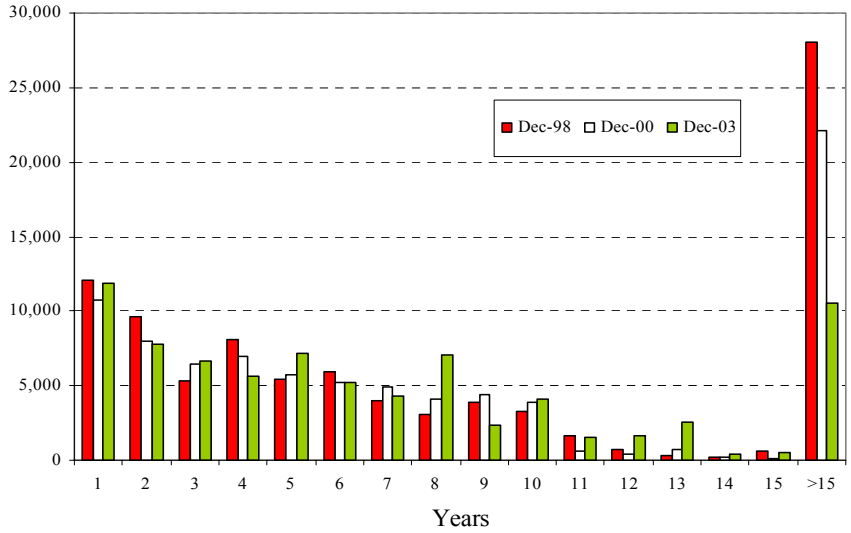
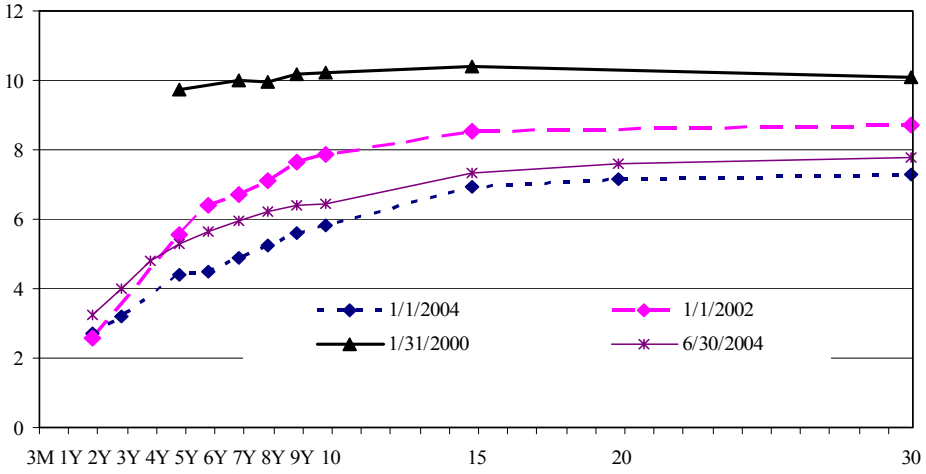


Figure 9. Mexico: Amortization Profile of Public Sector External Debt 1/, 1998-2004
(in millions of U.S. dollars)



1/ Excluding PIDIREGAS debt.

Figure 10. Mexico: Government U.S. Dollar Yield Curves, 2000-2004
(in percent)



Source: Bloomberg.

Debt costs

19. **While the strengthening of the domestic debt structure may entail additional interest costs, the evolution of debt costs suggests scope for interest savings on external debt (Figure 11)**.[12] The average cost of domestic debt was higher than the 28-day *cetes* rate by 2.3 percentage points in 2003. This gap, which has grown, partly reflects the premium paid for strengthening the debt structure, in addition to fees equivalent to 0.5 percentage points in that year. It is expected to grow further as the government expands its use of long-term nominal debt. Higher interest costs could also materialize if IPAB debt is to be strengthened. The cost of IPAB debt is currently lower than the cost of government debt, reflecting its indexation structure. The gap between the average cost of the external debt and the cost of new borrowing was significant in 2003 (estimated at 2.3 percentage points for the whole external debt of the federal government, including bonds and other borrowings, compared to none in the previous year). While fees increased significantly in 2003, this gap mainly reflected the slow response of the debt structure to interest rate changes, being mostly long-term and at fixed-rates (Table 7 shows this for external bonds alone). Interest savings should take place in the future. Liability management operations were substantial in 2003, with new bond issues equivalent to 17½ percent of outstanding external bonds at end-2002, and primarily guided by cost-reducing objectives. The lag and the magnitude of future cost reductions is difficult to forecast, however.

Table 7. Mexico: Structure of the Federal Government External Marketable Debt, 1998–2003 1/

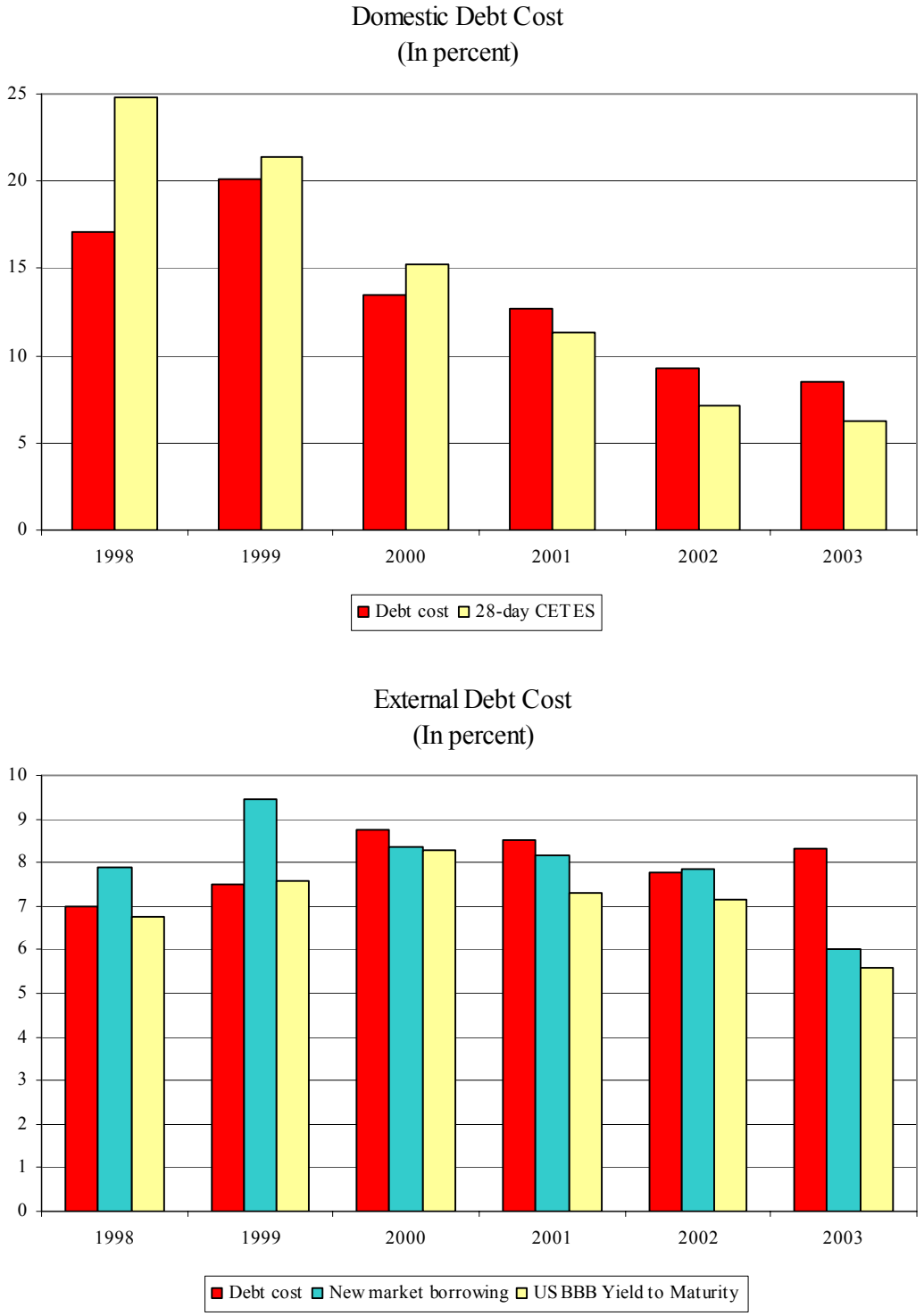
	1998	1999	2000	2001	2002	2003
Average maturity, in years						
Total outstanding	15.4	13.7	11.5	11.2	11.2	10.0
New borrowing	10.1	7.8	9.0	18.5	17.9	12.1
Average interest rate, in percent 2/						
Total outstanding	7.5	7.7	7.9	8.3	8.4	8.2
New borrowing	7.9	9.5	8.4	8.2	7.9	6.0
Bond issues, in billions of U.S. dollars						
Total outstanding	43.6	47.7	44.5	41.3	42.1	43.6
New borrowing	2.0	5.2	6.9	9.0	4.0	7.4
Composition by type of return, in percent						
Fixed rate	77.9	78.5	86.5	92.3	96.1	96.1
Floating rate	22.1	21.5	13.5	7.7	3.9	3.9
Term structure of the traditional external debt, in percent						
Share of short-term debt by original maturity	4.8	4.7	5.1	4.6	3.5	2.1
Share of short-term debt by remaining maturity	13.1	12.4	12.7	14.9	14.1	14.7

Source: SHCP.

1/ All sovereign bonds.
1/ Average coupon of the fixed-rate bonds

[12] The effective cost of the debt is computed as the ratio of interest payment to the average of the debt stock at the beginning and end of the year.

Figure 11. Mexico: Financial Cost of Federal Government Debt, 1998-2004 1/



Source: SHCP and staff calculations.

1/ Includes commissions and fees. For domestic debt, fees have been stable at around 0.3-0.5 percent since 2001. For external debt, fees have been more volatile. They amounted to 0.8 percent in 2001, 0.2 percent in 2002, and 0.7 percent in 2003.

C. Determinants of Debt Structure

20. **Debt management responds to optimization criteria and outside constraints**. This section attempts to identify factors influencing the structure of public debt in Mexico.

Theoretical background

21. **The available literature provides two ways to think about a country's appropriate debt structure**. One is the type of debt structure that is optimal for the borrowing country. The other is the perspective of lenders (or investors) and the type of risk sharing that they are willing to take.[1]

22. **The optimality of sovereign debt structures has been linked to the credibility of macro-policies and the robustness of the budget in the borrowing country**. The borrowing country can gain or lose in both respects by varying the composition of its debt. On the one hand, anti-inflationary credibility can be improved by increasing reliance on indexed, short-term, or foreign currency debt relative to long-term domestic nominal debt. On the other hand, the vulnerability of the budget to inflationary shocks can be diminished by relying on nominal debt rather than indexed debt when inflationary shocks worsen the fiscal balance. There are other, similar, tradeoffs of relevance for sovereign debt structures. For instance, the use of short-term debt will increase vulnerability to confidence crises compared to long-term debt. Also, the use of short-term debt and foreign-currency debt can constraint monetary and exchange rate policies, respectively. Borrowing countries can be expected to adjust the structure of their debt to optimize this type of trade-off.

23. **Attempts at estimating optimal sovereign debt structures have been made using risk management tools**. For instance, Giavazzi and Missale (2004) found that the risk-return characteristics of treasury securities in Brazil warranted a greater share of inflation-linked debt and a further reduction in foreign debt. With risk minimization as the main goal, the preferred debt instruments are those with stable returns and good hedging properties for the budget. The optimal debt structure then reflects covariations of each security's returns with shocks affecting the budget (e.g., output, price, exchange rate, and interest rate shocks in the Brazil study).

24. **Attention has also been given to constraints from the lending side**. Vulnerable sovereign debt structures have often been associated with the reluctance of investors to lend in domestic currency and at longer terms. Primarily, investors want to protect themselves from uncertainty arising from high and variable inflation. This gives a central role to macroeconomic stability and puts countries with more frequent disturbances at a disadvantage. Nevertheless, demand for foreign-currency and/or indexed debt tends to persist long after disinflation or fiscal adjustment have been achieved. Borensztein and al. (2004) provides several explanations. Anti-inflationary credibility can take a long time to establish, with some countries being unable to

[1] The literature has also focused on more structural factors, such as the stage of development of domestic financial markets. These factors are more difficult to investigate empirically and are therefore left out in our exercise.

demonstrate discipline in the presence of long-term domestic debt. There may be impediments to transiting to new debt instruments, including investors' familiarity with the current instruments. In addition, foreign investors tend to remain reluctant to hold exchange rate risk.

25. **Altogether, these considerations point to the country specificity and the broad range of determinants of sovereign debt structures**. Among other things, debt structures will reflect the quality of a country's macro-policies, the robustness of its budget to inflationary and real shocks, the hedging properties of debt instruments, and investors' willingness to share risk. The variety of these determinants warrants an empirical investigation.

Empirical approach

26. **Our empirical investigation of Mexico's debt structure focuses on two questions**: (i) the significance of credibility and hedging motives, and (ii) the influence of economic shocks. With a view to inferring the effects of debt management improvements, the same estimations are repeated for two time intervals, from 1996 to mid-2004[2] and from 1999 to mid-2004.

27. **The role of credibility and hedging motives is based on Goldfajn (1998)**. Goldfajn investigates the relationship between the share of nominal debt (respectively the share of foreign-currency debt) with the size of public debt, the variance of inflation (respectively the real exchange rate), and the covariance of inflation and budgetary spending (respectively of the real exchange rate and spending). Consistent with the trade-off between credibility and hedging motives, he finds that the proportion of nominal debt is negatively correlated with the size of public debt and the variance of inflation, and positively correlated with the covariance of inflation and budgetary spending. The average maturity of debt is found to behave in the same way. No significant relationship is found between the proportion of foreign debt and the variance of the real exchange rate and its covariance with spending.

28. **The same relationships are estimated for Mexico, using monthly data**. The primary balance of the nonfinancial public sector is used as the fiscal variable. Monthly debt statistics of the Ministry of Finance, covering the traditional debt,[3] are used to compute debt shares. The debt is divided into three categories: (i) nominal debt (cetes and fixed-rate bonds); (ii) indexed debt (floating-rate and inflation-linked debt); and (iii) foreign currency (external and dollar-linked debt). The size of public debt is measured as a ratio to GDP using quarterly statistics. Variance and covariance time series are computed as in Goldfajn (1998), using VAR estimations for inflation, the real peso-dollar exchange rate, and the primary balance. For each observation, a new VAR is estimated with the previous 60 observations and two lags. Variances and covariances are calculated using the VAR's residuals.

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[2] Starting in 1996 minimizes the interference of the 1994–95 financial crisis. Nonetheless, volatility indicators computed for the regressions used 1992–95 data. Regressions were also estimated starting earlier (in 1993). The results were broadly similar, though not as clear.

[3] Statistics about the composition of the augmented debt are not available on a monthly basis.

29. **The role of economic shocks is studied focusing on oil prices, U.S. interest rates, and Mexico's business cycle**. Regressions are estimated linking indicators of debt composition with PEMEX's oil export price, the yield of 3-month U.S. treasury bills in the secondary market, Mexico's industrial production index, and the variance of these indicators. To avoid problems of nonstationarity, first differences are used for the oil price and the industrial production index. Variance time series are computed as before, using variables in levels.

Results

30. **A simple look at the joint evolution of debt composition, maturity, inflation, and the debt ratio suggests a strong influence of macro-fiscal conditions on the structure of debt**. The first two charts in Figure 12 show that the transition to a safer debt structure was largely concurrent with disinflation and the reduction of debt levels. The last chart in Figure 10, showing the fall in the volatility of inflation and the real exchange rate around 2000, corroborates this finding.

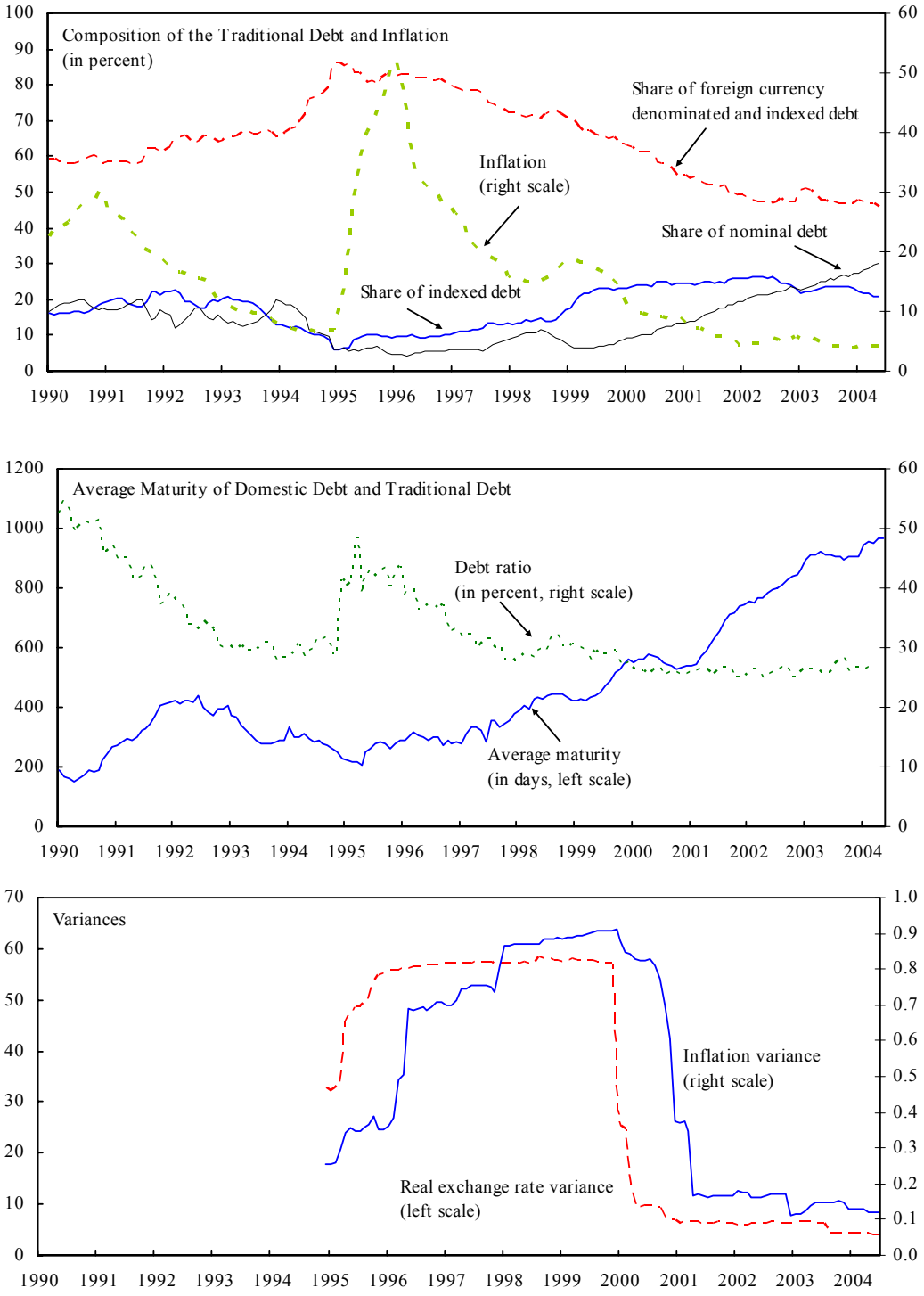
1996–2004

31. **Regression results are broadly consistent with the theory (Box 1)**. The first set of regressions finds a significant relationship between the composition of public debt and the size of the debt and the volatility of inflation, consistent with credibility considerations. Reliance on indexed and foreign debt tends to increase with the size of debt and the volatility of inflation. In turn, hedging variables are not found to be significant except for one specification (equation 4). Nevertheless, these variables generally appear with the expected signs. In the estimation results, a positive covariance between inflation and the primary balance tends to reduce the share of nominal debt; and a positive covariance between the real exchange rate and the primary balance tends to increase the share of foreign currency debt. Both relations are consistent with the search for debt instruments that smooth budgetary needs. One observation is that these covariance series have not been stable throughout the period, making it difficult to link the choice of debt instrument to the budget's sensitivity to inflation and real exchange rate shocks.

32. **The second set of regressions demonstrates the influence of U.S. interest rates, the oil price, and the level of industrial activity on the structure of debt**. These variables, or their volatility, are correlated significantly with parameters of the debt structure. The coefficients have the expected signs—with greater volatility associated with riskier debt structures. The regressions show that an improvement in the external environment, including a reduction in the level and volatility of U.S. interest rates and a higher oil export price, tends to be associated either with a rise in the share of nominal debt or an extension of the average maturity.

33. **The latter result has two explanations**. First, investors may be more willing to take risks in lending to Mexico when the external environment is more favorable. Second, the cost of improving the debt structure in good times tends to be lower, and the authorities can seize the opportunity to reduce the risk of their debts. The risk-cost trade-off tends not to be a constraint during those times.

Figure 12. Mexico: Monthly Financial and Debt Variables, 1990 - 2004



Source: SHCP, Central bank of Mexico, and Fund staff estimates.

Box 1. Regression Results, 1996–2004

Notations:

m: average term to maturity of federal government securities

S_{NOM} : share of nominal debt in total debt

S_{FX} : share of foreign currency debt in total debt

d: debt ratio

i: 12-month inflation

rer: real exchange rate against the U.S. dollar

pb: primary balance

P_{OIL} : oil export price

r_{US} : U.S. interest rate

y: production index

t: time trend

D(-) indicates the first difference of a variable, using a 12 month lag

Var(-) indicates the variance series of a variable

Cov(-,-) indicates the covariance series between two variables

MA(*a,b*) indicates a moving average process, with coefficients *a* and *b* for the first two lags

Estimation Results:[1]

$$m = \underset{(33.3)}{5.9} \cdot t - \underset{(-2.7)}{2.7} \cdot d - \underset{(-5.4)}{121.4} \cdot Var(i) + \varepsilon \quad \text{with } \varepsilon \sim MA(1.1, 1, 0.6) \tag{1}$$

$$S_{NOM} = \underset{(22.9)}{0.2} \cdot t - \underset{(-3.1)}{0.1} \cdot d - \underset{(-7.2)}{7.2} \cdot Var(i) - \underset{(-1.6)}{0.3} \cdot Cov(i, pb)_{(t-12)} + \varepsilon \quad \text{with } \varepsilon \sim MA(1.3, 1.1, 0.5) \tag{2}$$

$$S_{FX} = \underset{(47.5)}{1.8} \cdot d + \underset{(3.6)}{10.5} \cdot Var(i) + \underset{(5.1)}{0.1} \cdot Var(rer) + \underset{(1.5)}{0.9} \cdot Cov(rer, pb)_{(t-12)} + \varepsilon \quad \text{with } \varepsilon \sim MA(0.9, 0.4) \tag{3}$$

$$D(S_{NOM}) = \underset{(10.4)}{0.1} \cdot t - \underset{(-3.7)}{0.1} \cdot d - \underset{(-2.4)}{1.8} \cdot Var(i) - \underset{(-5.6)}{0.7} \cdot Cov(i, pb)_{(t-12)} + \varepsilon \quad \text{with } \varepsilon \sim MA(1.3, 1.2, 1.2, 0.2) \tag{4}$$

$$m = \underset{(81.8)}{5.8} \cdot t + \underset{(1.8)}{1.1} \cdot D(P_{OIL}) - \underset{(-12.2)}{33.9} \cdot r_{US} + \underset{(2)}{2} \cdot D(y) - \underset{(-1.3)}{9.6} \cdot Var(y) + \varepsilon \quad \text{with } \varepsilon \sim MA(0.1, 0.5) \tag{5}$$

$$S_{NOM} = \underset{(27.3)}{0.2} \cdot t - \underset{(-4.0)}{4.5} \cdot Var(i) - \underset{(-2.5)}{0.1} \cdot D(P_{OIL}) - \underset{(-7.1)}{1.2} \cdot r_{US} - \underset{(-3.6)}{91.4} \cdot Var(r_{US}) + \underset{(2.7)}{0.1} \cdot D(y) + \varepsilon \tag{6}$$

$$\text{with } \varepsilon \sim MA(1.1, 0.9, 0.4)$$

$$S_{FX} = \underset{(6.2)}{0.2} \cdot t - \underset{(-3.24)}{3.7} \cdot Var(P_{OIL}) + \underset{(14.7)}{3.8} \cdot r_{US} + \underset{(5.6)}{285.7} \cdot Var(r_{US}) + \underset{(20.3)}{15.6} \cdot Var(y) + \varepsilon \quad \text{with } \varepsilon \sim MA(1, 0.6) \tag{7}$$

1/ t-statistics are shown in parentheses. The Durbin Watson statistic is close to 2 for all equations.

1999–2004

34. **The results are broadly unchanged by reducing the time interval to 1999–2004 (Box 2)**. The responsiveness of the debt structure to the size of debt and the economic environment seems to change, although not necessarily in statistically significant terms. On one hand, the oil price and the volatility of inflation seem to lose some significance as determinants of the debt structure. On the other hand, the debt structure responds more to U.S. interest rates and the size of the debt (equations 9 and 13).

Box 2: Regression Results, 1999–2004

$$m = \underset{(18.8)}{6.1} \cdot t - \underset{(-2.3)}{4.2} \cdot d - \underset{(-4.7)}{103.7} \cdot Var(i) + \varepsilon \text{ with } \varepsilon \sim MA(1.1, 1.3, 0.8) \quad \textbf{(8)}$$

$$S_{NOM} = \underset{(16.4)}{0.3} \cdot t - \underset{(-6.4)}{0.6} \cdot d - \underset{(-5.8)}{6.1} \cdot Var(i) - \underset{(-0.53)}{0.1} \cdot Cov(i, pb)_{(t-12)} + \varepsilon \text{ with } \varepsilon \sim MA(0.9, 0.9, 0.5) \quad \textbf{(9)}$$

$$S_{FX} = \underset{(2.5)}{0.1} \cdot t + \underset{(6.2)}{1.2} \cdot d + \underset{(7.5)}{19.3} \cdot Var(i) + \underset{(1.8)}{0.1} \cdot Var(rer) + \underset{(0.2)}{0.1} \cdot Cov(rer, pb)_{(t-6)} + \varepsilon \text{ with } \varepsilon \sim MA(1.1, 0.6) \quad \textbf{(10)}$$

$$D(S_{NOM}) = \underset{(5.6)}{0.1} \cdot t - \underset{(-3.2)}{0.2} \cdot d - \underset{(-0.9)}{1.1} \cdot Var(i) - \underset{(-2.8)}{0.5} \cdot Cov(i, pb)_{(t-12)} + \varepsilon \text{ with } \varepsilon \sim MA(1.3, 1.7, 1.2, 0.7) \quad \textbf{(11)}$$

$$m = \underset{(61.9)}{6} \cdot t + \underset{(2.4)}{1.6} \cdot D(P_{OIL}) - \underset{(-13.2)}{33.1} \cdot r_{US} + \underset{(1.8)}{1.6} \cdot D(y) - \underset{(-2.7)}{36.5} \cdot Var(y) + \varepsilon \text{ with } \varepsilon \sim MA(1, 0.4) \quad \textbf{(12)}$$

$$S_{NOM} = \underset{(30.1)}{0.2} \cdot t - \underset{(-2.1)}{2.7} \cdot Var(i) - \underset{(-9.7)}{1.6} \cdot r_{US} - \underset{(-6.4)}{139.2} \cdot Var(r_{US}) - \underset{(-3.4)}{2.5} \cdot Var(y) + \varepsilon$$

$$\text{with } \varepsilon \sim MA(0.9, 0.6, 0.2) \quad \textbf{(13)}$$

$$S_{FX} = \underset{(5.9)}{0.2} \cdot t - \underset{(-3.5)}{4.3} \cdot Var(P_{OIL}) + \underset{(15.9)}{4.0} \cdot r_{US} + \underset{(5.4)}{276.9} \cdot Var(r_{US}) + \underset{(7.5)}{12.8} \cdot Var(y) + \varepsilon \text{ with } \varepsilon \sim MA(0.9, 0.5) \quad \textbf{(14)}$$

D. Country Comparisons

35. **This section presents international comparisons of government debt structures**. Indicators of the size, composition, maturity, and average cost of government debt are assembled for twelve emerging market countries and Canada. These countries have sovereign ratings in the same range as Mexico (e.g., Croatia, Malaysia, South Africa), a higher range (e.g., Korea, Poland), or a lower range (e.g., Brazil, Turkey). Canada serves as a reference for the debt structures of more economically advanced countries.

Coverage issues

36. **The focus is limited to central government gross debt**. While national authorities document the debt of the wider public sector, they generally do not provide a consolidated analysis of the debt structure. Government assets are not taken into account, as conventions for identifying assets that can be netted out and valuing them remain largely country-specific.[36]

37. **A common definition of central government debt is used**. The debt of public financial restructuring agencies is considered as government debt. Countries that experienced banking crises have often established agencies separate from the government to intervene in troubled banks. This has been the case in Colombia, Korea, Malaysia, Mexico, and Thailand. These agencies are typically responsible for recapitalizing or liquidating banks, taking over their non-performing assets, and providing assistance to bank debtors and depositors. These agencies' debts, guaranteed implicitly or explicitly by the government, represent an additional debt burden and need to be taken into account in international comparisons. Other countries have generally included the debt resulting from financial restructuring in the government debt records (e.g., Turkey and the Philippines) or are in the process of transferring these liabilities to the government (e.g., Thailand).[37] In the case of Chile, the debt of the central bank needs to be consolidated with that of the government. The central bank still holds debt that it issued to bail out the financial sector in the 1980s.[38] In addition, the central bank has been the main issuer of public domestic debt, with the aim to support financial sector development through establishing benchmark issues. On similar grounds, the debt of extrabudgetary funds (e.g., FARAC in Mexico) needs to be counted as government debt, because their activities are generally budgetary in other countries. In the case of Mexico, the definition is extended to the debt of direct PIDIREGAS projects. By design, this debt is bound to be transferred to the government at the time of completion of the projects.

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[36] For instance, Brazil counts international reserves as an asset as a result of focusing on the consolidated liability position of the federal government and the central bank.

[37] What the authorities have called the "fiscalization" of the losses of the Financial Institution Development fund.

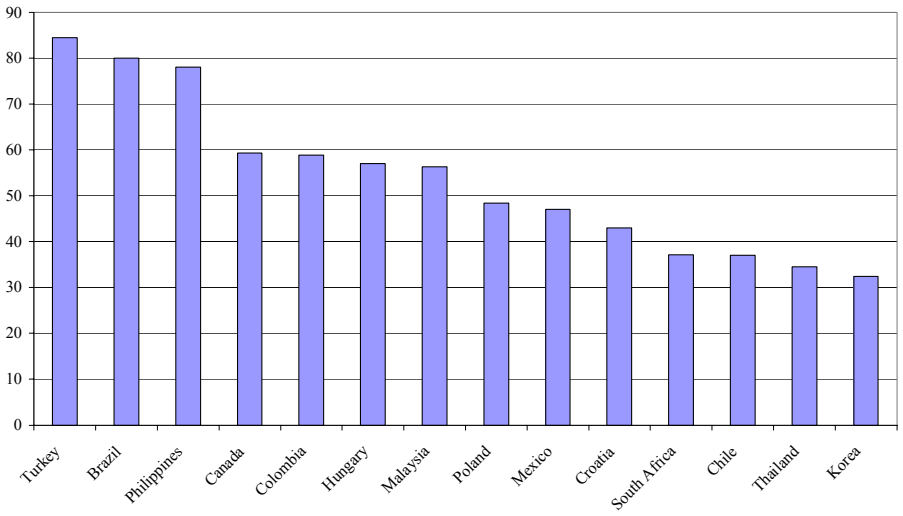
[38] Despite compensation from the central government, this debt has remained a drain on the central bank's operating balance.

Debt levels

38. **The size of the government debt is an important constraint on the quality of the debt structure**. The previous section found a significant relationship between the improvement in the debt structure and debt reduction in Mexico. Country comparisons corroborate this finding. Higher levels of debt are generally associated with greater reliance on foreign currency and domestic indexed debt, and shorter maturities (Figures 13, 14, and 15).

39. **While the size of Mexico's government debt is lower than the middle range of the sample, the government's aim at further debt reduction appears appropriate (Table 8)**. Mexico's debt, at 47 percent of GDP at the end of 2003, is 5 percentage points lower than the median value of the fourteen countries compared. This is significantly lower than the level of debt observed in countries which have recently been hit by crises (e.g., Brazil and Turkey). Countries like Hungary, Malaysia, and Poland also combine similar or higher levels of debts with higher sovereign ratings, suggesting that the size of Mexico's debt does not, in itself, prevent future rating upgrades. However, the government's aim at continuing to reduce Mexico's debt-to-GDP ratio is appropriate to bolster resistance to crisis.[39] The short average maturity of domestic debt combined with the high share of debt indexed to short-term rate or foreign-currency denominated suggests a lower threshold of sustainable or "tolerable" debt for Mexico than for countries that have relied more on long-term domestic nominal debt.

Figure 13. International Comparisons: Size of Central Government Debt
(in percent of GDP)



[39] Hemming and Roubini (2004) present indicators of balance sheet vulnerabilities in fourteen emerging market countries as they were hit by financial crises (starting with Mexico in 1994). Their data show an equal number of crisis episodes with a higher level of government debt than Mexico's current level as with a lower level.

Table 8. International Comparisons: Size of Central Government Debt, As of End-2003

Country	Moody's Rating 1/	Total Gross Debt (A) + (B)	Gross Central Government Debt (A)	Financial Restructuring Agencies (B)	Other Reported Guarantees	Comments
				(In percent of GDP)		
Mexico	Baa2	47.1	34.4	12.7	3.9	The debts of public trust funds and PIDIREGAS projects are included in central government debt. The debt linked to debtor support programs is included in the IPAB debt. Total public sector debt was 51 percent of GDP.
Brazil	B2	80.0	80.0	...	...	Federal bonded debt was 63.2 percent of GDP
Chile	Baa1	37.0	37.0	...	1.3	As of June 2003. Consolidated government and central bank debt. The debt, net of government and central bank assets, was only 7.3 percent of GDP. Guarantees are within the public sector
Colombia	Ba2	58.9	56.7	2.2	...	Includes pension bonds, issued to finance private pension funds. Bank recapitalization bonds are partly outside the budget.
Croatia	Baa3	43.0	43.0	...	7.9	Includes bank restructuring and deposit insurance debt equivalent to 2.3 percent of GDP
Hungary	A1	57.0	57.0	...	...	
Poland	A2	48.4	48.4	...	...	
Turkey	B1	84.5	84.5	...	2.4	Includes non-cash domestic debt of 19 percent of GDP, which is mostly bank recapitalization debt. Guarantess are external debt guarantees granted within the public sector.
Korea	A3	32.4	18.5	13.9	...	As of 2002. Two public agencies, respectively responsible for deposit insurance and the management on nonperforming assets, handle financial sector restructuring.
Malaysia	Baa1	56.4	48.2	8.2	...	Two public agencies have been responsible for financial sector restructuring. Only the agency responsible for the management of nonperforming assets, had outstanding debt as of end-2003. Total public sector debt at the end of 2002 was 69.6 percent of GDP.
Philippines	Ba2	78.1	78.1	...	16.5	The financial sector debt assumed by the government and the recapitalization cost of the central bank are reflected in the government debt.
Thailand	Baa1	34.5	27.5	7.0	11.4	About a third of the financial restructuring debt, which totals 20 percent of GDP, is still held outside the budget. Guarantees are loan guarantees granted to public enterprises. Total public sector debt was 48.9 percent of GDP
South Africa	Baa2	37.1	37.1	...	11.1	As of March 2003. Total contingent liabilities are shown as reported guarantees.
Canada	Aaa	59.3	59.3	...	...	As of March 2003; gross interest-bearing debt was 52.5 percent of GDP and net debt was 47.8 percent of GDP .
Average	...	53.8	50.7	8.8	7.8	
Median	...	52.4	48.3	8.2	7.9	

Source: National Authorities Official Reports, IFS, and staff calculations.

1/ See Moody's Statistical Handbook, April 2004. Ratings are for long-term foreign currency borrowing.

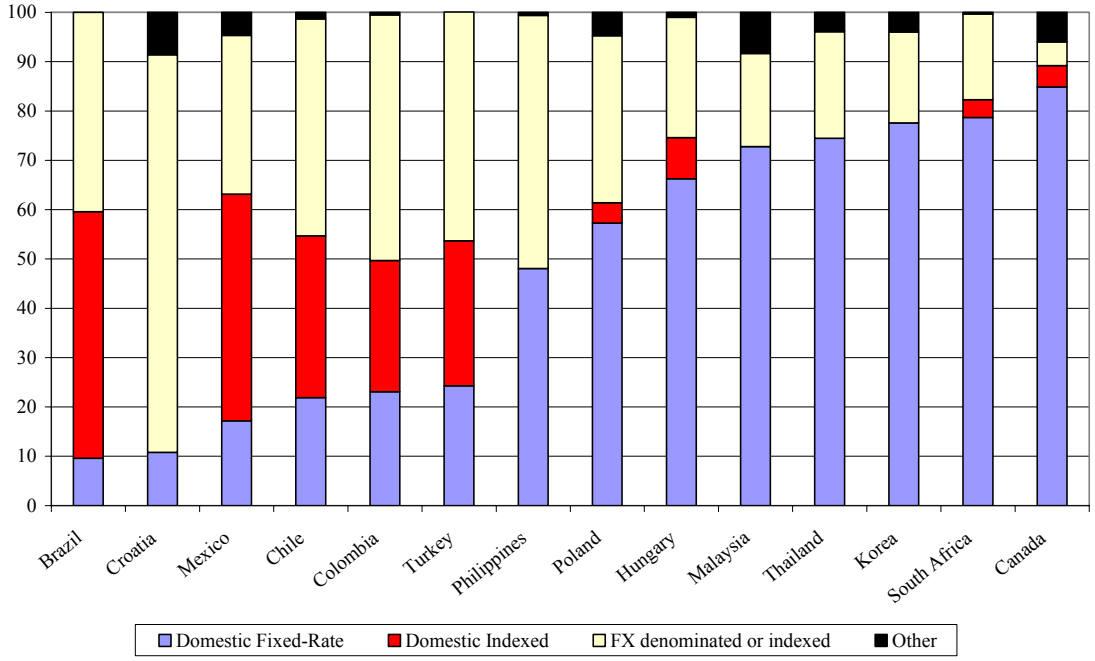
40. **Table 8 underscores the need to focus on broad measures of the debt.** Narrow measures indicate an artificially low debt level for emerging market countries in Asia and Mexico, which manage financial restructuring outside the government sector.

Debt composition

41. **The composition of the debt determines its vulnerability to refinancing risks and interest rate and exchange rate risks**. Overall risk grows with reliance on foreign currency and short-term domestic instruments as opposed to long-term nominal domestic-currency denominated debt. Domestic debt of longer maturity, but indexed to short-term interest rates, protects the debt against refinancing and exchange rate risks but maintains exposure to the full interest rate risk.

42. **Mexico is at an intermediate stage in terms of debt structure risk**. Emerging market countries in Asia and Eastern Europe have been able to rely more on domestic-currency nominal debt and less on external debt and indexed domestic debt compared to Mexico. They have benefited from more developed domestic markets and, in some cases, a higher level of domestic savings.

Figure 14. International Comparisons: Composition by Type of Instrument
(in percent)



43. **More specifically, Mexico's debt structure stands out in the following respects (Table 9):**

- Mexico's share of external debt is in the middle range of the sample. Adjusting for the fact that other countries use foreign exchange indexed domestic debt, Mexico's share is close to the median value of 33 percent. Canada, Poland, Hungary, and most of the East Asian countries rely substantially more on domestic debt than Mexico.

- Mexico relies heavily on domestic floating-rate debt. On the positive side, Mexico has eliminated foreign-exchange indexed debt, which continues to be used in Brazil, Croatia, Turkey, and Chile.[40] Mexico's share of inflation-indexed debt is in line with the median value and only marginally higher than in Canada. However, Mexico's use of debt indexed to short-term interest rates is the largest of the countries in the sample. Combining all types of indexation (to short-term interest rates, inflation, and foreign exchange), only Brazil and Chile have a higher share of indexed debt than Mexico. Other countries, in Eastern Europe and Asia, have been able to use fixed-rate bonds as their main debt instrument. Until recently, Canada had a policy of maintaining the share of fixed-rate debt at around two thirds (it was 63 percent in March 2003).[41]

- The use of floating-rate and inflation-indexed debt has enabled Mexico to reduce refinancing risks in line with other countries, based on debt maturity. Mexico's share of long-term domestic debt reached 60 percent in 2003 (based on original maturity), close to the median value of the sample. [42] It is higher than in Hungary and Poland, but lower than in Malaysia, Thailand or Korea. Again, this reflects the ability of the East Asian countries to issue large amounts of domestic nominal bonds.

- Mexico's external debt is more concentrated in securities than the other emerging market countries. Together with Malaysia, the significance of official financing in the external debt is the lowest.

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[40] In the case of Chile, the dollar-linked debt has been issued by the central bank mainly in the context of foreign currency interventions.

[41] The definition of fixed-rate debt used by Canada covers all the domestic and foreign currency market debt, excludes short-term securities, and considers half of the inflation-indexed debt (i.e. real return bonds) to be fixed-rate. Against the backdrop of improving economic conditions, Canada has recently relaxed its target for fixed-rate debt from two thirds to 60 percent, with the aim of reducing its debt costs.

[42] Excluding other Latin American countries, for which information is not available.

Table 9. International Comparisons: Composition of Government Debt by Type of Instruments, as of end 2003 1/

Country	Domestic debt								External debt				Memorandum items			Comments
	Total	Treasury bills	Fixed rate bonds	Floating rate debt	Inflation linked debt	FX-linked debt	Loans	Other debt	Total	Bonds	Loans		Long-term domestic debt 2/	Non-marketable domestic debt 3/	Size of the underlying debt	
											Official	Commercial				
	(In percent of total debt)												(in percent of GDP)			
Mexico	67.6	6.9	10.3	40.2	5.8	0.0	1.8	2.7	32.1	23.1	5.7	3.4	60.7	23.2	44.8	Structure of the consolidated debt of the federal government, IPAB, FARAC, and PIDIREGAS projects.
Brazil	76.4	...	9.6	39.7	10.3	16.8	0.0	0.0	23.6	...	...	...	...	0.0	63.2	Structure of the consolidated bonded debt of the federal government and the central bank
Chile	81.4	...	21.9	0.0	32.8	25.4	0.0	1.3	18.6	...	...	...	...	1.3	37.0	Structure of the consolidated debt of the government and the central bank. All the domestic debt is issued by the central bank; as of June 2003
Colombia	51.8	...	23.1	4.2	22.4	1.6	0.0	0.4	48.2	26.2	19.6	2.5	...	4.6	52.8	Structure of government debt excluding pension debts
Croatia	38.6	7.9	2.9	0.0	0.0	19.2	8.6	0.0	61.4	41.6	...	19.8	22.1	8.6	43	
Hungary	75.6	19.6	46.7	8.3	0.0	0.0	1.1	0.0	24.4	14.1	...	10.2	55.0	7.2	57	
Poland	66.3	12.7	44.6	4.1	0.0	0.2	...	4.8	33.7	11.7	21.7	0.3	53.6	4.9	46.5	Structure of the state budget debt
Turkey	68.7	...	24.3	29.4	0.0	15.1	...	...	31.3	13.2	15.0	3.0	...	22.6	84.5	
Korea	81.6	...	77.6	0.0	0.0	0.0	1.8	2.2	18.4	3.8	11.3	3.3	79.4	20.3	18.5	As of end 2002. Excludes the debt of bank restructuring agencies. Debt is the form of contract authorizations is classified as other domestic debt.
Malaysia	81.1	2.2	70.6	0.0	0.0	0.0	4.7	3.5	18.9	0.0	4.6	14.3	78.9	8.3	56.4	Investment certificates (islamic banking instruments) are classified as other domestic debt.
Philippines	50.7	14.8	33.3	0.0	0.0	2.1	0.5	0.0	49.2	24.7	...	24.6	35.9	3.4	78.1	
Thailand	78.5	6.6	67.9	0.0	0.0	0.0	0.0	4.0	21.6	...	...	...	69.9	4.0	34.5	Promissory notes, used for deficit financing and liability restructuring, are classified as other debt. They have fixed rate.
South Africa	82.6	5.4	73.3	0.1	3.5	0.0	0.0	0.2	17.4	12.1	...	5.3	77.2	0.4	37.1	As of march 2003
Canada	95.1	23.7	61.2	0.0	4.3	0.0	0.0	5.9	4.8	4.8	0.0	0.0	65.5	5.9	37.2	Structure of the federal market debt. The share of fixed-rate debt reported by the authorities was 63 percent. It covers both foreign and domestic debt and half of the inflation indexed debt.
Average	71.1	11.1	40.5	9.0	5.7	5.7	1.5	1.9	28.8	15.9	11.1	7.9	59.8	8.2	49.3	
Median	76.0	7.9	39.0	0.1	0.0	0.1	0.3	1.3	24.0	13.2	11.3	3.4	63.1	5.4	45.7	

Source: National Authorities Official Reports, IFS, and IMFstaff calculations.

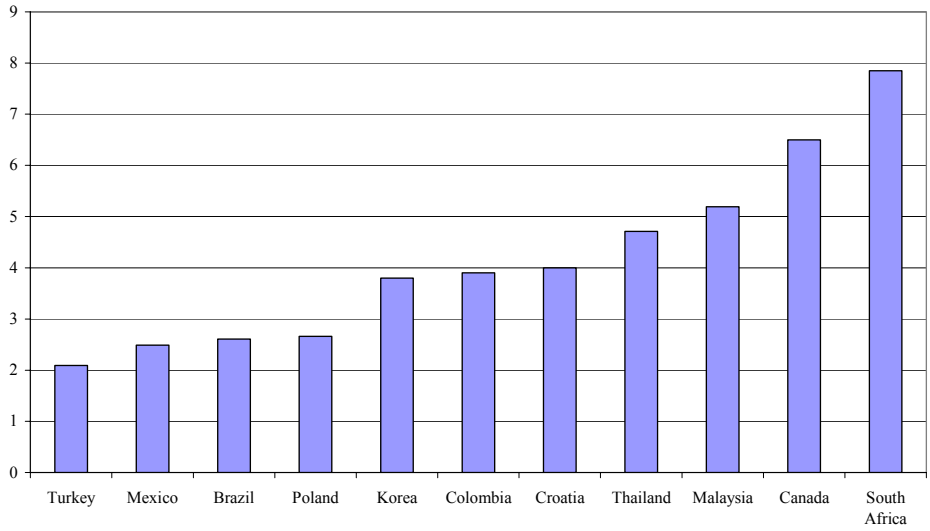
1/ Uses for some countries (e.g. Korea) a narrower definition of the debt due to data availability.
2/ Computed by assuming that treasury bills are the only short-term domestic debt, when the information was not available.
3/ Computed as the sum of known non-marketable securities and other debt and loans, when the information was not available.

Maturity structure

44. **Indicators of average maturity and duration allow an assessment of exposure to refinancing and interest rate risks**. With few exceptions (e.g., Turkey, Brazil, South Africa), countries in the sample have taken advantage of the recent period of low interest rates to increase the maturity of their domestic debt. Even Canada, presumably exempt from refinancing risks, has increased slightly the maturity of its debt, and had the second longest maturity of the sample in 2003.

45. **Despite its rapid rise, the maturity structure of Mexico's domestic debt[43] is generally lower than in other comparator countries (Table 10)**. The average maturity of Mexico's domestic debt was 2½ years at the end of 2003 compared to a median value of almost 4 years. Brazil and Poland have broadly similar maturity structures, based on average maturity and the shares of short-term debt by remaining maturities. Duration indicators, however, indicate that Brazil's debt is re-priced more frequently than Mexico's (11 versus 17 months), while Poland's debt is more robust to interest rate changes. Colombia provides an interesting example of a country with, on the one hand, a higher level of debt and a higher share of foreign-currency debt, and, on the other hand, longer domestic debt maturity than Mexico.

Figure 15. International Comparisons: Average Term to Maturity of Domestic Debt
(in years)



46. **The case of Turkey shows the potential impact of nonmarketable debt on maturity measures.** The average maturity of Turkey's domestic debt was only half a year lower than Mexico's at end-2003. More detailed data indicate that this is due to the structure of the nonmarketable debt (i.e. the bank restructuring debt).

[43] Federal government domestic debt only.

Table 10. International comparisons: maturity indicators, as of end 2003

Country	Domestic debt				Foreign debt			Comments
	Average term to maturity *in years*	Average duration *in years*	Short-term debt / Total domestic debt: By original maturity *in percent*	Short-term debt / Total domestic debt: By remaining maturity *in percent*	Average term to maturity *in years*	Short-term debt / Total external debt: By original maturity *in percent*	Short-term debt / Total external debt: By remaining maturity *in percent*	
Mexico	2.49	1.44	20.7	36.9	9.95	2.1	14.7	Maturity and duration estimates for federal government securities and external bonds. The share of short-term externel debt are based on the traditional debt definition (all except PIDIREGAS).
Brazil	2.61	0.91	...	35.3	5.95	9.4	29.1	Covers federal bonded debt
Colombia	3.90	2.30	...	16.0	7.20	...	6.7	
Croatia	4.00	...	26.3	...	...	...	...	
Hungary	...	...	26.3	33.7	...	...	10.1	
Poland	2.66	2.12	19.5	37.9	...	0.0	...	
Turkey	2.09	...	19.1	...	...	0.0	...	Treasury bills have an average maturity of 2.8 months; bonds issued in cash 14.6 months; and bonds not issued in cash 51.2 months.
Korea	3.80	3.30	0.0	...	...	0.0	...	Maturity and duration are computed for all government bonds (with less than 5 percent foreign-denominated), excluding financial restructuring debts.
Malaysia	5.19	...	3.0	16.3	...	0.0	4.3	Excluding financial restructuring debts
Philippines	...	...	29.1	...	19.40	0.0	...	Foreign debt maturity covers all public sector
Thailand	4.71	...	9.9	19.0	10.21	11.9	...	As of March 2004
South Africa	7.85	4.67	6.6	14.3	4.83	0.0	4.3	As of March 2003. Covers treasury bills and bonds. Bonds alone have an average maturity of 8.3 years and duration of 5 years.
Canada	6.50	4.50	26.6	34.7	...	12.3	33.1	Maturity and duration estimates cover all domestic and foreign currency market debt (excludes the retail debt).
Average	4.16	2.75	17.01	27.12	9.59	3.57	14.61	
Median	3.90	2.30	19.50	33.70	8.58	0.00	10.10	

Source: National Authorities Official Reports, IFS, and staff calculations.

Focusing on marketable debt, Mexico's average maturity was more than twice as high. The use of non-marketable debt has also contributed to the higher maturity of domestic debt in Korea—where national housing bonds, which are not traded, have maturities up to 20 years whereas the maximum maturity of treasury bonds is 10 years.

47. **The maturity structure of Mexico's public external debt compares favorably to other countries**. The average maturity of government external bonds in Mexico (10 years) is longer than in Colombia, Brazil, and South Africa. It is similar to or lower than the maturity of overall external debt in Thailand and Malaysia. In the case of Thailand, however, this reflects reliance on bilateral and multilateral loans, which have very long maturities (around 20 years and 10 years respectively for the consolidated public sector as of March 2004). The maturity of Thailand's external bond issues (consolidated public sector), at 4.2 years, is less than half the maturity of Mexico's government external bonds.

Debt costs

48. **An important issue is the interest rate premium associated with establishing a safer debt structure**. The evolution of domestic debt costs has already shown a widening gap between the average cost of domestic debt and short-term rates, as Mexico strengthens its debt structure. However, in time, the strengthening of the debt structure may help reduce interest costs, as perceptions of country risk diminish and domestic markets become more liquid. Hence the rise in debt costs would be a temporary phenomenon.

49. **The situation in other countries suggests that there are little or no long-term costs, in terms of higher interest payments, for improving the debt structure, while there are clear benefits in terms of reducing vulnerability (Table 11).** Effective debt costs do not appear to be higher in countries relying less on short-term, floating-rate, or foreign debt than Mexico. These costs, estimated by the ratio of interest payments in 2003 to the average of the debt stock (domestic and external) at the beginning and end of the year, were lower in Poland, Korea, Malaysia, Thailand, and Canada than in Mexico. This finding remains true when considering separately the domestic and external debt and adjusting for inflation (with the caveat of missing data for several countries). Two factors need to be noted. First, lower inflation contributes to reduce debt costs. As anti-inflationary credibility is established, real interest rates tend to decline and a country is able to issue medium to long-term domestic debt at lower interest rates. Poland is a good example of the benefits of disinflation (Figure 16). Second, Mexico's relatively high external debt costs suggest a longer lag in the transmission of world interest rates than in other countries. Of course, endogeneity is an issue in making these simple comparisons, as countries benefiting from low financing costs for exogenous reasons (e.g. EU accession) are more likely to achieve low-risk debt structures.

50. **Hence the interest rate premium Mexico would have to pay to strengthen its debt structure may fade over time.** As the public sector balance sheet becomes more robust, disinflation further progresses, and domestic debt markets gain in depth, the yield curve is likely to shift down, reducing the upfront cost of a safer debt structure. Importantly, the cost for a safer

debt structure needs to be seen as the price of buying insurance, as a safer debt structure will reduce vulnerability to costly financial crisis.

Table 11. International Comparisons: Effective Cost of Central Government Debt, as of 2003 1/

	Effective nominal interest rate			Average	Real effective rate
	Total debt	Domestic debt	Foreign debt	inflation	domestic debt
		(In percent)			
Mexico	8.5	8.5	8.3	4.0	4.3
Colombia	9.3	11.4	7.5	7.1	4.0
Croatia	5.3	6.3	4.6	1.5	4.7
Hungary	8.2	...	...	4.7	...
Poland	6.5	...	...	0.8	...
Turkey	22.2	30.5	6.5	25.3	4.2
Korea 2/	5.7	6.7	2.5	2.8	3.8
Malaysia	5.0	5.1	4.6	2.2	2.8
Philippines	7.3	9.3	5.3	3.1	6.0
Thailand	4.0	...	...	1.8	...
South Africa 3/	10.7	11.5	6.4	3.7	7.5
Canada	6.2	6.2	...	2.7	3.4
Average	8.2	10.6	5.7	5.0	4.5
Median	6.9	8.5	5.9	3.0	4.2

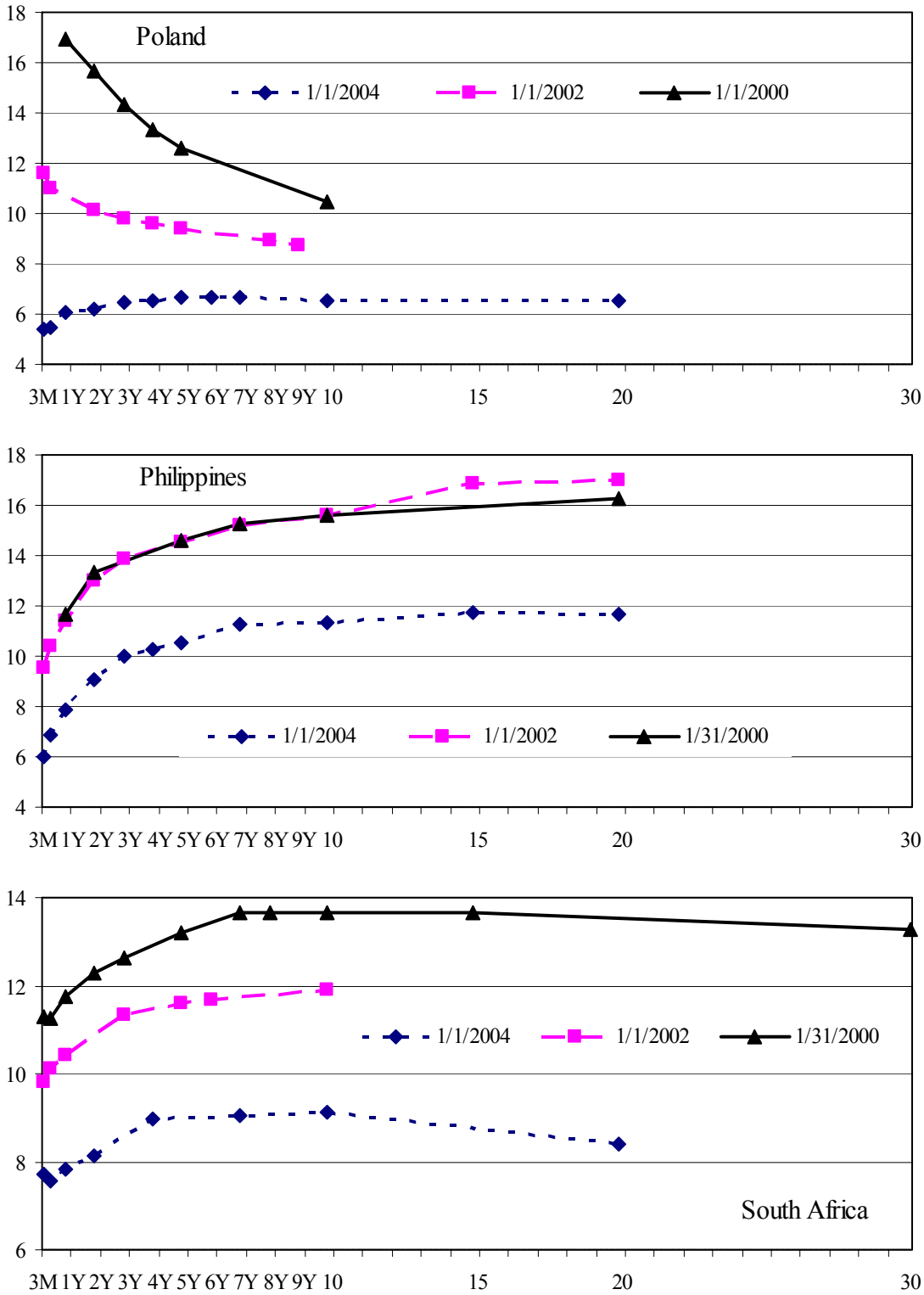
Source: National Authorities Official Reports, IFS, and staff calculations.

1/ Computed as the ratio of annual interest payments to the average of the debt stock outstanding at the beginning and at the end of the year. Includes commission and fees for Mexico. Uses end-of-period exchange rates.

2/ As of 2002.

3/ As of fiscal year 2003/2004.

Figure 16. Emerging Market Country Yield Curves, 2000-2004
(in percent)



Source: Bloomberg.

E. Conclusions

51. **Mexico's debt management has made considerable progress in the past five years**. A comprehensive strategy has been implemented consistently and with increasing transparency. Progress has been facilitated by declining interest rates, which allowed the reduction of debt vulnerabilities to be combined with lower financing costs. The most important achievements have been the reduction in the share of foreign currency debt, the development of a domestic market for long-term nominal debt, and the pre-payment of expensive external restructured debt. Debt management has also contributed to improving the efficiency of the financial sector, by establishing a long-term peso yield curve.

52. **Despite important progress, the public sector remains exposed to refinancing and interest rate risks**. The average maturity and duration of federal government debt have increased at a fast pace, but from low levels.They remain below the levels seen in other emerging market countries. In addition, IPAB debt has remained entirely indexed, and has a short average duration. As a result, exposure to interest rate risks is higher in Mexico than the main emerging market countries in Eastern Europe and East Asia. Other non-budget debts are also a source of risks. In particular, PIDIREGAS projects were entirely financed through external borrowing until recently.

53. **Further strengthening of the debt structure, as planned, would be beneficial, despite possible interest payment costs in the short term**. The recent evolution of debt costs suggests that further interest savings may materialize only for the external debt. Domestic interest costs could increase as more long-term domestic debt is substituted for foreign and indexed debt, and, possibly, measures are taken to raise the duration of the IPAB debt. The costs of these actions may not be permanent, however. As suggested by the situation in other countries, the interest rate premium for a more robust debt structure may fade over time. Moreover, a stronger debt structure reduces vulnerability to costly financial crisis; any cost in terms of higher interest payments may be seen as the price of buying insurance.

54. **Fiscal consolidation and an improved economic environment would support efforts to improve the debt structure**. The empirical investigation of the paper has linked the improvement of the debt structure with the reduction of the debt, the stabilization of inflation and the real exchange rate, and the economic environment, such as oil prices and the level and volatility of U.S. interest rates. Accordingly, strengthening the debt structure could become more difficult if some of these factors become less favorable. This underscores the importance of further medium-term fiscal consolidation, as progress in debt management would probably be hastened by a decline in the level of public debt.

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III. MEXICO—AN UPDATE OF THE MEDIUM-TERM FISCAL FRAMEWORK

Abstract

This paper describes the evolution of the government's medium-term fiscal framework in recent years. It reviews revisions to macroeconomic assumptions and fiscal targets, and discusses the required fiscal adjustment effort. It also assesses the sensitivity of the public debt path to fiscal slippages and the macroeconomic outlook.

1. **This note updates the 2003 Selected Issues chapter "Towards Sustained Debt Reduction: Mexico's Fiscal Framework."**[1] Recent Mexican administrations have developed a medium-term National Development Plan, backed by sectoral plans and a financing framework, PRONAFIDE (*Programa Nacional de Financiamiento del Desarollo*). The most recent PRONAFIDE was published in 2002, describing the objectives for the Fox administration through 2006. As discussed in last year's analysis, however, the medium-term fiscal frameworks have lacked a formal connection to the annual budget process. In addition, prior to 2004, the macroeconomic and fiscal projections were not updated during their lifespan—as a result, these projections tended to be overtaken by events, especially for augmented measures of fiscal deficits and debt. For example, the 2002 PRONAFIDE aimed at substantial fiscal consolidation and debt reduction between 2002 and 2006. In the event, augmented debt levels edged up by 3 percentage points of GDP between 2001 and 2003, and the augmented deficit for 2004 is expected to lie only slightly below the 2002 level.[2]

2. **In contrast to previous practice, the medium-term macroeconomic framework was updated for the first time for the 2004 budget, and it was revised again in the draft budget for 2005 (Table 1, Figure 1).** Each update has extended the end year of the framework by one year, thus the end date of 2008 in the 2005 update is now two years beyond the life of the current administration. The updating of growth projections was particularly significant in the 2004 exercise, as actual GDP growth rates in 2002 and 2003 had fallen short of the PRONAFIDE "*inertial"* projections—the low growth scenario without significant structural reforms. Against this background, the 2004 update called for medium-term growth only slightly above that in the *inertial* scenario in the 2002 PRONAFIDE. While growth in 2004 is now expected to be slightly stronger than projected, the 2005 update further revises down medium-term growth to around the 2002 PRONAFIDE *inertial* scenario of about 4 percent per year (Figure 1). This is closer to, but still above, the staff's current baseline projection, which is described in Chapter I.[3] Despite

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[1] Chapter II in IMF Country Report No. 04/250.

[2] Exchange rate depreciation contributed significantly to the increase in the debt-to-GDP ratio (approximately 2 percentage points).

[3] Given that no major structural reforms were enacted, and GDP growth fell short of the PRONAFIDE *inertial* scenario, we limit our comparison to the assumptions underlying the latter scenario, as the Mexican authorities commonly do. Figure 1 demonstrates the sharp divergence in 2002 and 2003 between actual and projected growth rates from the PRONAFIDE *reforma* scenario.

Figure 1. Mexico: GDP Growth Assumptions

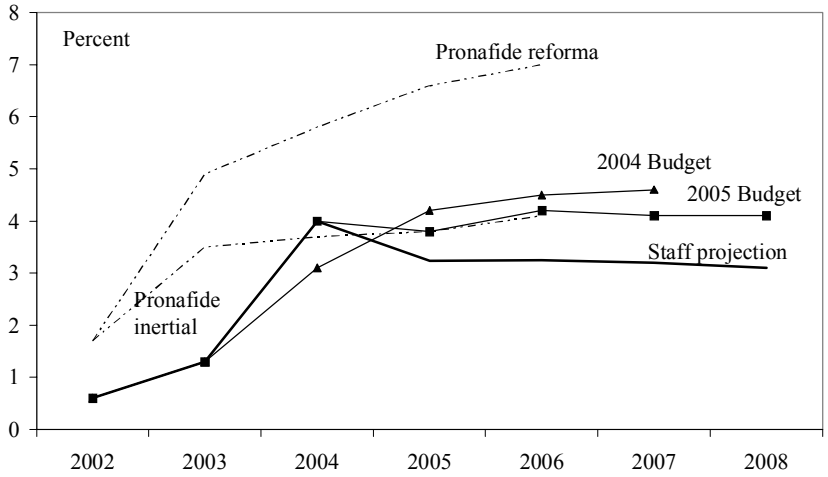


Table 1. Mexico: Medium-Term Macroeconomic Assumptions

	2002	2003	2004	2005	2006	2007	2008
			Real GDP growth (percent)				
PRONAFIDE *reforma*	1.7	4.9	5.8	6.6	7.0		
PRONAFIDE *inertial*	1.7	3.5	3.7	3.8	4.1		
2004 revised MT 1/	0.6	1.3	3.1	4.2	4.5	4.6	
2005 revised MT 1/	0.6	1.3	4.0	3.8	4.2	4.1	4.1
Staff projection	0.6	1.3	4.0	3.2	3.3	3.2	3.1
			CPI inflation (end-of-period)				
PRONAFIDE *reforma*	4.5	3.0	3.0	3.0	3.0		
PRONAFIDE *inertial*	4.5	3.3	3.3	3.3	3.3		
2004 revised MT 1/	5.7	4.0	3.0	3.0	3.0	3.0	
2005 revised MT 1/	5.7	4.0	3.9	3.0	3.0	3.0	3.0
Staff projection	5.7	4.0	4.2	3.8	3.0	3.0	3.0
			Nominal interest rate (average)				
PRONAFIDE *reforma*	9.7	7.9	7.8	7.6	7.4		
PRONAFIDE *inertial*	9.7	8.4	8.3	8.3	8.2		
2004 revised MT 1/	7.1	6.2	6.5	5.9	6.7	7.1	
2005 revised MT 1/	7.1	6.2	6.7	7.8	7.8	7.9	7.9
Staff projection	7.1	6.2	6.7	7.5	7.1	6.7	6.7

Source: Mexican authorities and staff estimates and projections.

1/ 2002 and 2003 actuals.

higher-than-anticipated inflation in 2003 and so far in 2004, inflation projections have remained generally consistent with the Bank of Mexico's target of 3 percent. Interest rate projections have followed trends in world and domestic interest rates. Following a significant decline in the 2004 budget, nominal interest rate projections were increased in the 2005 budget, albeit still below the initial assumptions of the 2002 PRONAFIDE. The authorities' oil price assumptions have also been increased to reflect higher international prices, although the revisions have not kept pace with futures prices, as reflected in WEO projections.

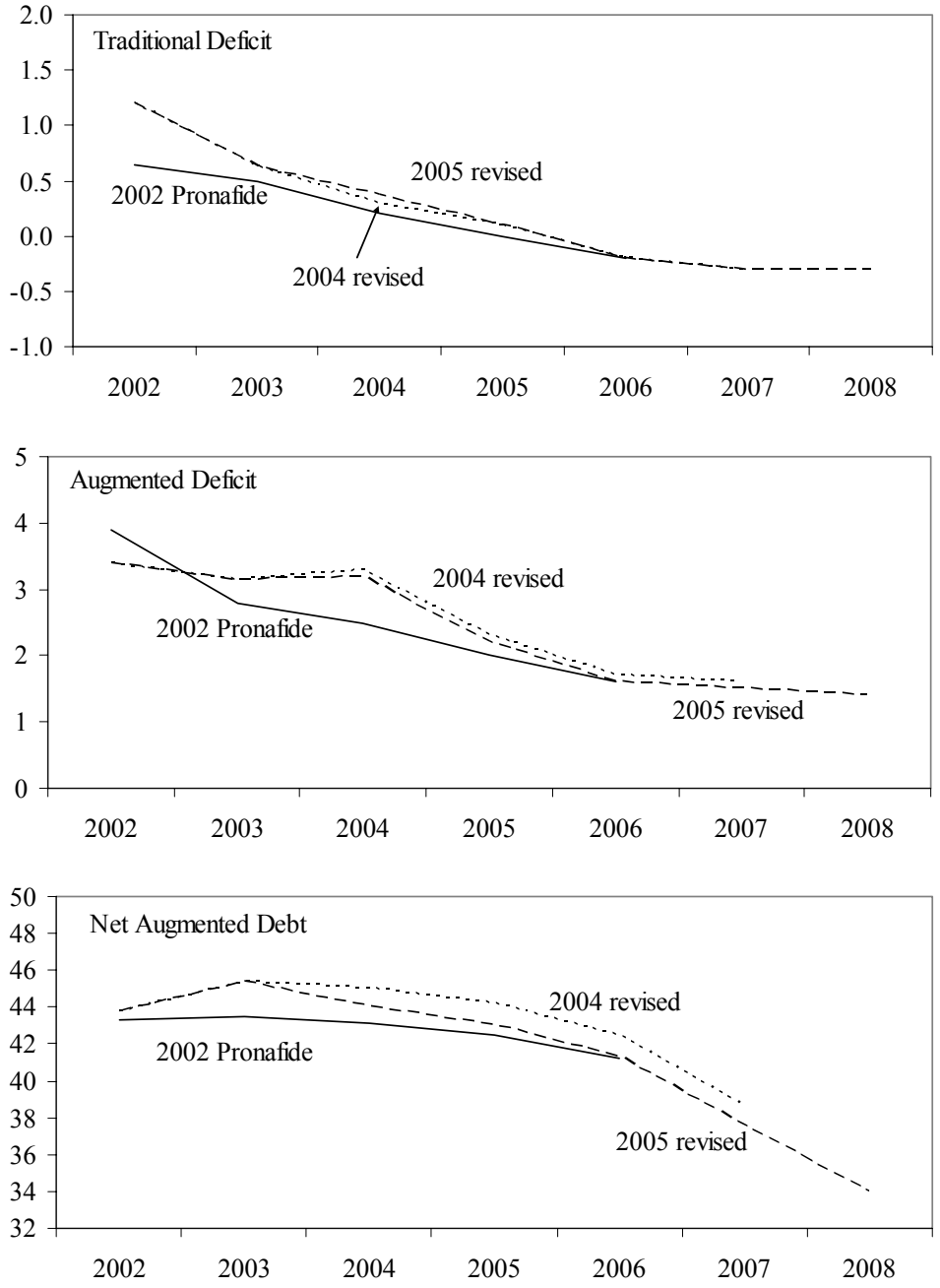
3. **The authorities have broadly maintained their goals for fiscal balances by 2006 in the revised medium-term frameworks (Figure 2).** The traditional balance is projected to move into a modest surplus, while the augmented deficit falls to about 1½ percent of GDP. Slight further improvements in fiscal balances are projected beyond 2006. The deficit targets for 2006 have been maintained in spite of some overshoot of deficits, especially for the augmented definition, in 2003 and 2004. In particular, the 2004 augmented deficit is currently projected at slightly over 3 percent of GDP, or a little more than ½ percent of GDP higher than in PRONAFIDE. Higher deficits have resulted from exceptional expenditures (such as the cost of a voluntary retirement scheme for civil servants), greater-than-assumed reliance on non-recurrent revenue, and higher off-budget financing needs (such as development bank financing, and PIDIREGAS financing in 2004). These slippages vis-à-vis the original consolidation plan in 2003-04 make the adjustment path during 2005–06 more challenging. In 2005, the augmented deficit is projected to decline by 1 percent of GDP in an environment of rising interest rates, somewhat slower growth, and (in the authorities' framework) a sharp decline in oil prices.

4. **These fiscal consolidation plans, combined with faster economic growth, are projected by the authorities to achieve the original debt reduction objective of PRONAFIDE.** The latest medium-term framework targets a public debt-to-GDP ratio close to 40 percent of GDP by 2006, broadly in line with the 2002 PRONAFIDE. This convergence toward the original PRONAFIDE objective can be attributed to a more favorable growth-interest rate differential and higher nonrecurrent revenues than in the original projections, offsetting the effects of higher deficits and currency depreciation in 2002–03. These favorable factors have been particularly significant in 2004, as the debt ratio is projected to decline by 1½ percent of GDP during this year (both official and staff projections). The debt ratio then falls significantly further to around 35 percent of GDP by 2008.

5. **In light of future spending pressures, achieving the medium-term fiscal targets without tax reform would require significant spending compression.** The medium-term plans contain no details on specific measures that would be implemented to meet the deficit objectives. Based on the authorities' projected reductions in oil and nonrecurring revenues, however, and assuming no tax reform, staff estimate that programmable expenditures would have to be compressed by around 1 percent of GDP annually between 2004 and 2006 (from the 2003 base).[4] The required expenditure reductions in discretionary areas would be even larger, as

[4] This compression assumes that non-oil recurring revenues would remain broadly constant in relation to GDP. While administrative reforms would be desirable to raise the revenue yield of the existing tax system, the experience of recent years suggests that revenue increases from this source would be modest.

Figure 2. Mexico: Medium-Term Fiscal Frameworks
(in percent of GDP)



Source: SHCP

additional pressures amounting to 1½ to 3 percent of GDP are expected to arise from pension and wage payments, the health and education spending laws, and PIDIREGAS projects.[5] Some savings in oil-related expenditures are expected, but these would be limited in relation to their level in 2003 (when the average oil price was below $25 per barrel). Protecting social spending and public investment may also be difficult. Austerity measures at the federal level in the 2004 budget have already brought some savings but these have been partly offset by growth in other outlays, including public enterprises' operating and wage costs.[6] The quality of fiscal adjustment will hinge the authorities' ability to extend fiscal consolidation to the whole of the public sector.

6. **Sustained high oil prices would lessen the required fiscal effort.** If oil prices remain as high as current WEO projections suggest, staff estimates that the target for the traditional deficit could be met with half the fiscal restraint described above (with net spending cuts of about ½ percent of GDP annually between 2004 and 2006). Meeting the augmented deficit targets would largely depend on developments in servicing costs for bank restructuring debt, the financial requirements of the development banks, and the extent of PIDIREGAS investment.

7. **The staff's baseline scenario shows a more gradual decline in the augmented debt ratio than the authorities' framework (Figure 3).** The difference is largely due to the staff's lower growth forecast of 3¼ percent on average during 2005-2008, versus about 4 percent underlying the 2005 medium-term framework. If the authorities' projections were adjusted to reflect staff macroeconomic assumptions, the projected debt paths would be similar. Of course, the margin of error for medium-term growth forecasts is known to be wide, and the recovery may strengthen beyond the current forecasts. Aside for the possibility of higher growth in the U.S., recent financial reforms and possible regulatory reforms that would boost competition may produce a durable expansion of private investment. This could result in a faster pace of debt reduction than currently projected by the authorities or staff. The staff also constructs an "unchanged policies" scenario, calculated by holding non-oil related primary spending and tax revenues constant as a percentage of GDP. In this case, the augmented debt ratio would edge up over the medium term.

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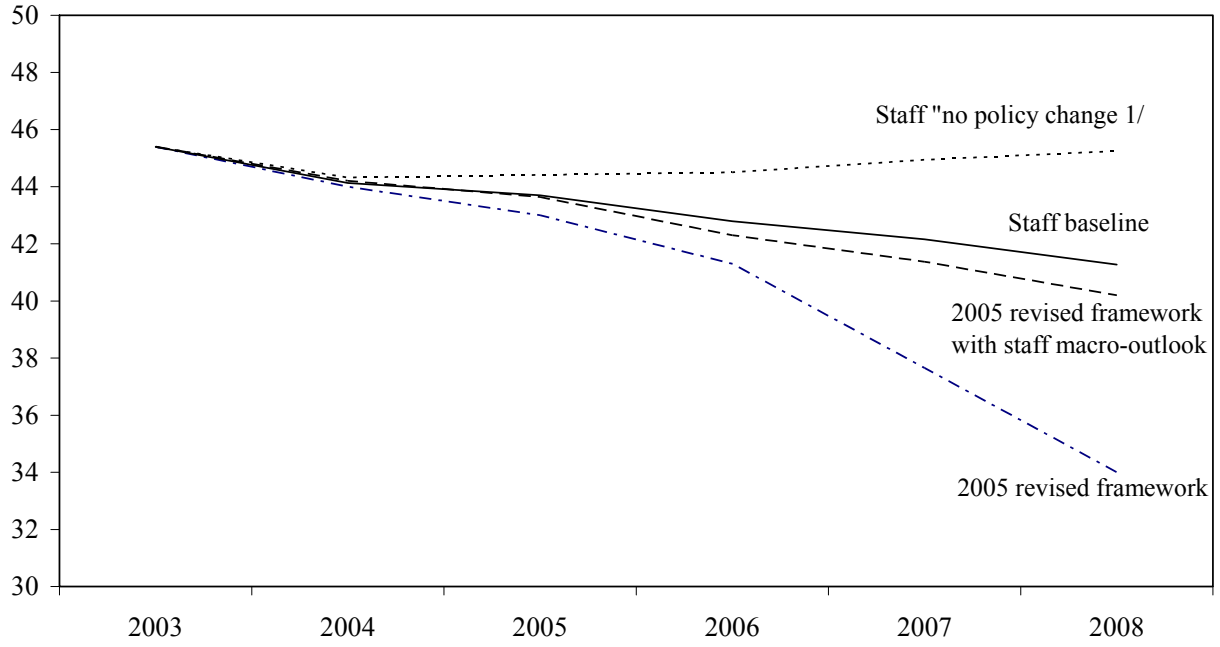
[5] Reflecting growing investment needs in the energy sector and the assumption of PIDIREGAS-related debt by the government when completed projects are handed over to the public sector.

[6] Included cuts in administrative outlays and a wage freeze for middle- and higher-level federal workers.

Figure 3. Mexico: Medium-Term Debt Trajectories
(Net augmented debt, percent of GDP)



1/ Holding non-oil related primary spending and tax revenues constant in relation to GDP.

IV. MEXICO'S EXTERNAL TRADE: RECENT DEVELOPMENTS AND POLICIES[1]

Abstract

The paper examines developments in Mexico's exports during 1980-2004. There is little evidence that the relationship to U.S. activity has broken down in recent years, or of export displacement by Mexico's competitors. The recent loss of U.S. market share appears to be related to a strong reaction to the U.S. business cycle and changes in the composition of U.S. demand, and could be partly reversed during the current expansion. Simulations of the impact of various possible trade agreements on Mexico suggest that their effect would be generally small, with the largest impact coming from the phasing out of global Multi Fiber Agreement.

A. Introduction

1. **As a result of trade liberalization in the late 1980s and then entry into NAFTA in 1994, Mexico has been transformed from a commodities exporter to an exporter of manufacturing products.** Fast growth in manufacturing exports—between 1990 and 2003 the U.S. dollar value of nonoil exports increased almost 4.5 times—slowed markedly in 2001, however, and began to recover only in early 2004 (Figures 1 and 2). During the same period, Mexico grew more dependent on the U.S. market, which is now the destination for more than 85 percent of Mexico's nonoil exports. This paper discusses recent developments, examining the factors that have affected Mexico's performance, and assessing the possible impact of future changes in international trade agreements (CAFTA, Multi Fibre Arrangement, etc).

2. T**he paper finds a limited impact of Mexico's competitors on its export performance—in particular, there is little evidence that China's exports have displaced those of Mexico.** The recent slow growth of Mexico's exports is explained in a VAR model by a strong reaction to the U.S. business cycle and changes in the composition of U.S. demand. Simulations using the Global Trade Analysis Project (GTAP) model suggest that the impact of various free trade agreements on Mexico will be small, while structural reforms raising productivity in manufacturing would have a profound impact on exports and growth.

B. Recent Export Performance and Stylized Facts

3. **Although Mexico's post-1980 trade performance has been remarkable, the slowdown since 2000 has highlighted the country's vulnerability to swings in external**

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[1] Prepared by Aleš Bulíř. Nita Thacker was involved in the design of the paper. Section D is based on inputs by Yongzheng Yang and Jean-Jacques Hallaert. Bruce Culmer provided splendid research assistance.

demand (Figure 1, upper panel). At the onset of the 1980 debt crisis, Mexico exported less than 10 percent of its GDP, and most of those exports were primary commodities (Figure 1, middle panel). By the end of the 1990s, Mexico exported close to 30 percent of GDP, with more than 80 percent of total exports being manufactured goods (Figure 1, bottom panel). However, export expansion did not translate into a marked acceleration in economic growth,[2] while Mexico grew increasingly dependent on the U.S. market (Figure 2, upper panel). The share of Mexico exports to the U.S. increased to about 85 percent in 2002–03, and those exports remained highly correlated with the U.S. business cycle.

4. **The annual rate of growth of total and nonoil exports averaged 10 percent and 10 ½ percent during 1980-2000, respectively, and these rates were close to those of China.** As a result, during this period, the export shares of Mexico and China grew in tandem (Figure 2, middle panel). Somewhat surprisingly, membership in the North-American Free Trade Area (NAFTA) appears to have no lasting visible impact on Mexico's rate of nominal export growth (Figure 2, bottom panel).[3]

5. **Much of Mexico's exports remain concentrated in the *maquiladora* sector.**[4] These firms generally have a high import component of their inputs and high labor-to-capital ratios. *Maquiladora* firms, typically stationed across the border from the United States, import semi-finished products and, after using mostly low-skilled labor, export finished products back to the United States. *Maquiladoras* tend to be concentrated in the automotive and electrical/electronic sectors (Table 1). The share of gross *maquiladora* exports in nonoil exports rose from one-third in the early 1980s to more than one-half recently.

6. **Following China's entry into the World Trade Organization (WTO) in December 2001, its exports to the United States grew on average 6 times faster than those of Mexico (Figure 2, bottom panel).** At a disaggregated level, in 2002 and 2003

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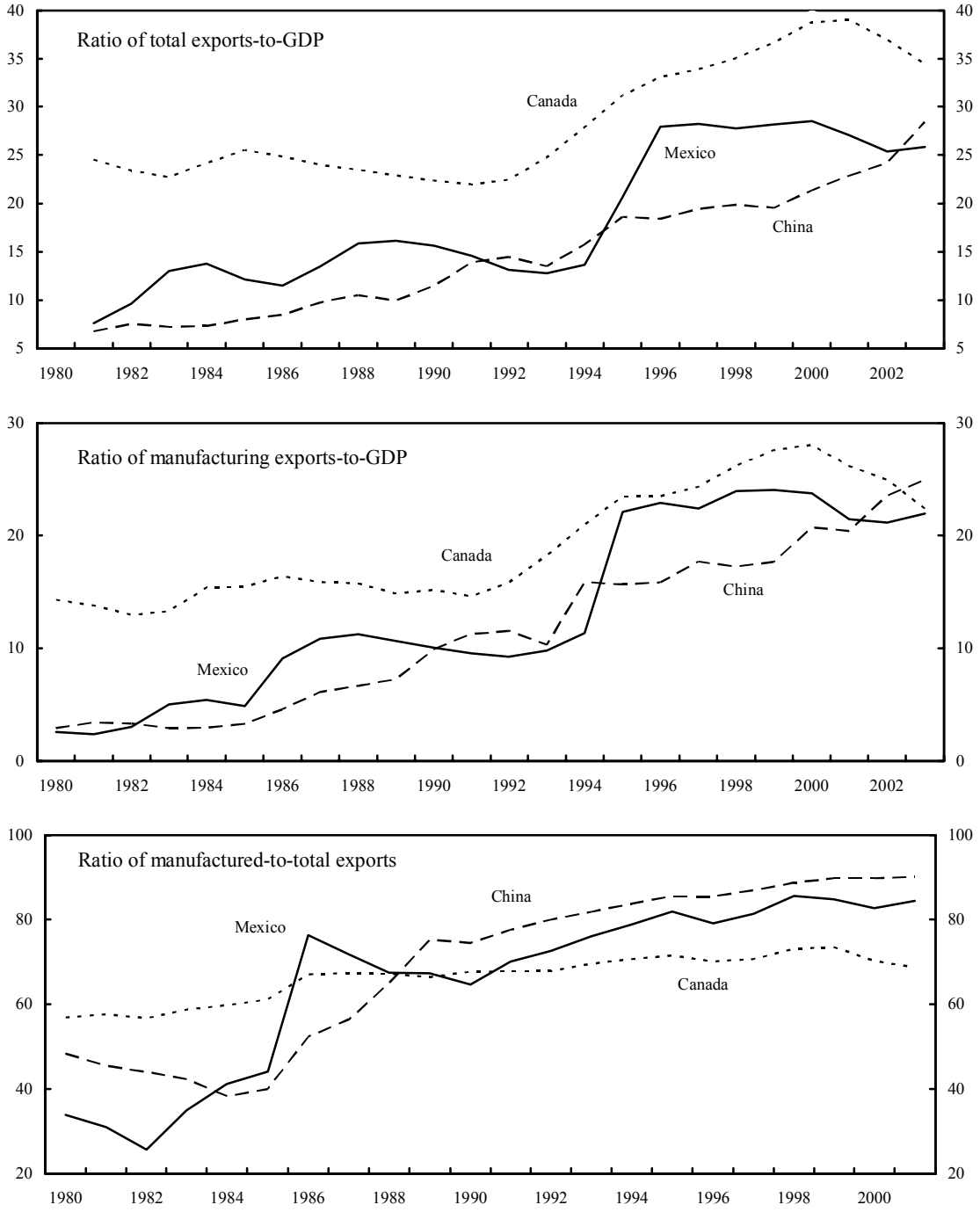
[2] See Chapter I in this document. For a broader description of recent Latin American developments see Ocampo (2004).

[3] Konno and Fukushige (2003) argued that the above-average export growth during 1995–96 was a cumulative result of liberalization processes that started in the 1980s, as opposed to a one-off impact of NAFTA. Another complicating factor is the effect of the sharp depreciation of the peso in late-1994 and 1995 on export performance.

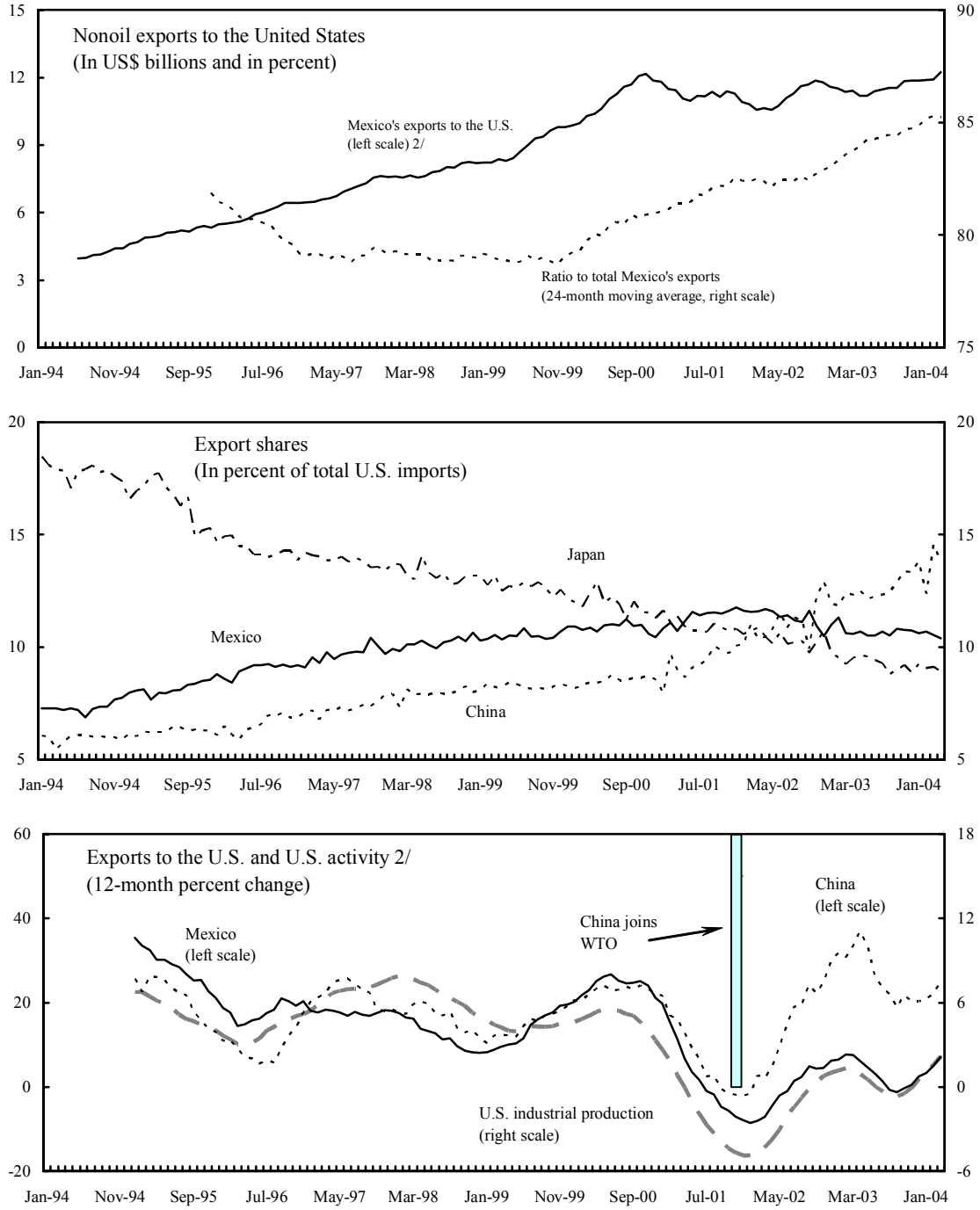
[4] A *maquiladora* is a Mexican corporation that operates under a *maquila* program approved by the Mexican Secretariat of Commerce and Industrial Development (SECOFI). A *maquila* program entitles the company, first, to foreign investment participation in the capital and management of up to 100 percent without special authorization; second, it entitles it to duty-free temporary imports, subject only to posting a bond guaranteeing that such goods will not remain in Mexico permanently. Formally, the current *maquila* legislation is the "Decree for Development and Operation of the Maquiladora Industry," published by the *Diario Oficial* on December 22, 1989.

Figure 1. Mexico, China, and Canada: Export Developments, 1980-2003
(In percent)



Source: WEO and OECD databases.

Figure 2. Mexico: Nonoil Export Developments, 1994-2004 1/



Source: IMF

1/ All export data are c.i.f. and seasonally adjusted.
2/ Nominal variables; 6-month moving average.

Table 1. 30 Largest *Maquiladora* Enterprises in Mexico, 2004

Rank 2004	Company	Employees	No. of plants	Country of origin	Industrial sector
1	Delphi Automotive Systems	68,643	70	USA	Automotive
2	General Electric Company	27,900	34	USA	Industrial
3	Yazaki North America	27,506	22	Japan	Automotive
4	Alcoa Fujikura Ltd	23,000	19	Japan	Automotive
5	Sanmina-Sci	12,000	8	USA	Electronics
6	The Offshore Group	11,635	1	Mexico	Shelter serv.
7	Philips Electronics	11,500	16	Netherl.	Electronics
8	Visteon Corporation	11,200	15	USA	Automotive
9	Thomson Electronics (RCA)	10,874	6	USA	Electronics
10	Sony Corp. of America	9,679	4	Japan	Electronics
11	Siemens Ag	9,500	14	Germany	Automotive
12	Ford Motor Company	9,150	3	USA	Automotive
13	Lear Corporation	8,569	8	USA	Automotive
14	Nissan Motor Co., Ltd	8,500	3	Japan	Automotive
15	Daimler Chrysler	8,200	6	USA	Automotive
16	Sumitomo Systems	7,500	14	Japan	Electrical
17	Kemet Corporation	7,005	5	USA	Electronics
18	Tyco International Ltd	6,785	4	USA	Electronics
19	A.O. Smith Corporation	6,598	8	USA	Electrical
20	Cardinal Health	6,500	5	USA	Medical
21	Motorola, Inc	5,961	2	USA	Electronics
22	Sanyo Group	5,879	2	Japan	Electronics
23	Samsung	5,789	2	Korea	Electronics
24	Key Safety Systems, Inc	5,687	4	USA	Automotive
25	Emerson Electric Co.	5,678	7	USA	Electrical
26	Matsushita Electric of America	4,986	4	Japan	Electronics
27	Daewoo Industrial Co., Ltd	4,856	3	Korea	Electronics
28	General Instruments Corporation	4,589	3	USA	Electronics
30	Johnson And Johnson Company	4,569	5	USA	Medical
Total		340,238	297		

Source: *Maquila* Portal, http://www.maquilaportal.com/cgi-bin/top100/top100.pl.

Mexico experienced negative export growth in twice as many commodity groups as China (based on the 5-digit end-use classification).[54] Moreover, in Mexico the contracting commodity groups were in industries that constitute a significant part of Mexico's exports to the United States—approximately 25 percent of total exports (electric appliances, computers, telecommunications equipment, cars, and apparel). In contrast, China's export share losses were in sectors that contributed less than one percent of total exports.

7. **Evaluating other key exporters to the U.S. market, Mexico fared better than Canada and Japan, whose exports declined in about 40 percent of commodity groups.** More important, contractions in several of Japan's export commodity groups (such as electric apparatus, machine tools, computer accessories and peripherals, telecommunication instruments, semiconductors, and engines) were matched by similar increases in China's commodity groups. Until 2001, the combined shares of Japan and China in the United States market were fairly stable at around 14 percent; they then increased to about 18 percent only after China's entry into the WTO. These results may indicate that, as real appreciation of the yen has priced Japan's exports out of the U.S. market, Japanese firms have increasingly moved their manufacturing processes into China.

8. **Trends in the real exchange rate and growth in nonoil exports suggest a possible long-term effect of relative price on exports (Figure 3, upper panel).** Real appreciation of the peso from 1996 until end-2001 was associated with a slowdown in export growth, while real depreciation from 2002 on has been associated with some acceleration of exports. Moreover, domestic nonoil producer prices grew faster than exports prices (Figure 3, bottom panel). In the next section we will explore these relationships in multivariate regressions.

9. **The external environment is unlikely to get less competitive, and maintaining a steady rate of export growth will be a challenge for Mexico.** While some industries will always retain the advantage of proximity to the U.S. markets,[55] the future of other industries will depend on macroeconomic and structural polices and infrastructure improvements.

C. An Empirical Model of Mexican Exports

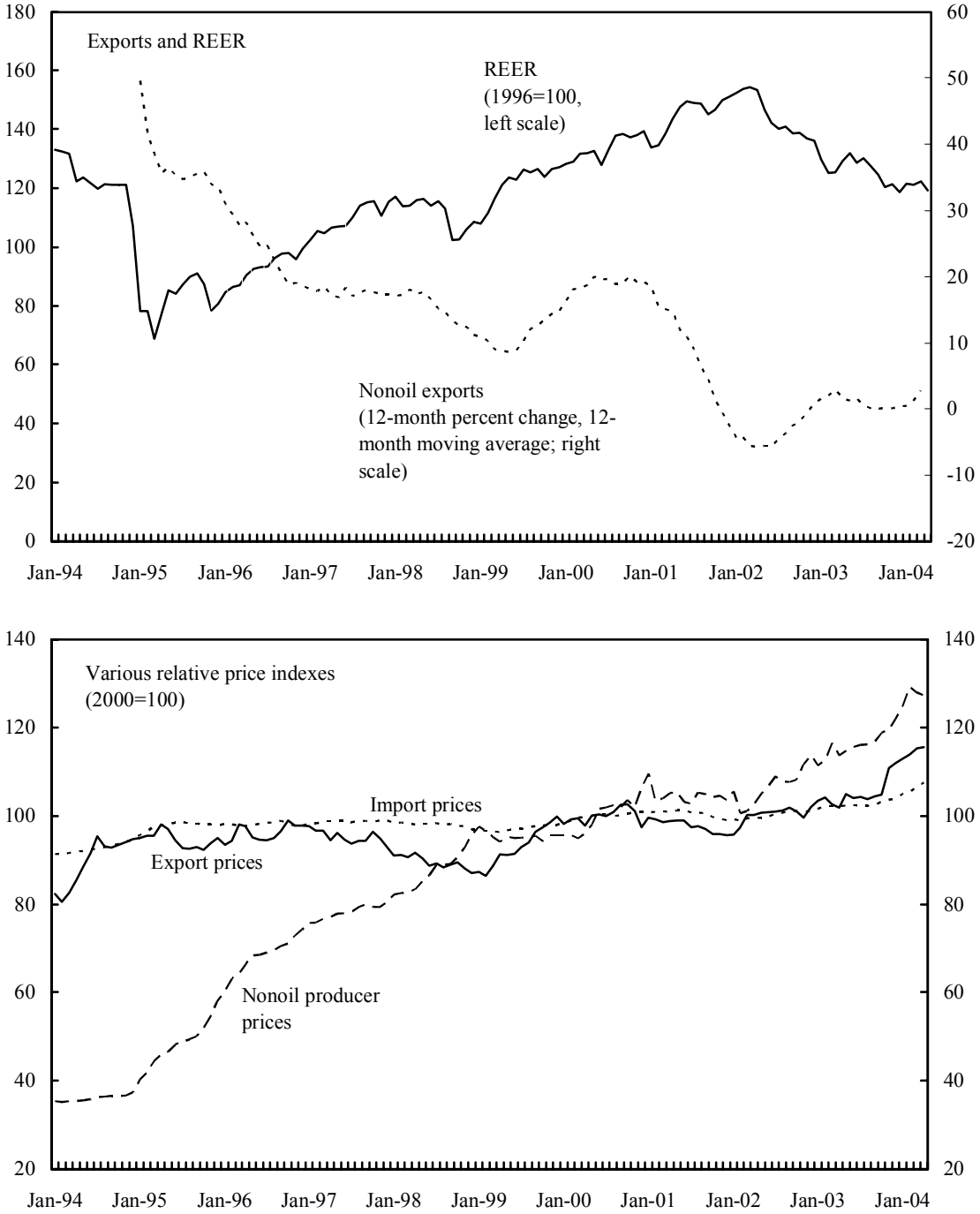
10. I**n this section we present a VAR model linking the share of Mexican nonoil exports in the U.S. market to the U.S. business cycle, the composition of U.S. demand, a measure of real exchange rate, and China's and Japan's exports.** The hypotheses to be tested are as follows:

- Mexico's exports follow closely the U.S. business cycle;

[54] This comparison is based on the ratio of the value of 2002 and 2003 exports to an average of 1999 and 2000 exports.

[55] Although during 1998–2003 the cost of shipping from China declined by about one-half in U.S. dollar terms, it still takes about three months for the goods to reach the U.S. customer.

Figure 3. Mexico: Exports, the Real Effective Exchange Rates, and Prices, 1994-2004



Source: IMF and Bank of Mexico.

- The composition of U.S. demand matters in determining U.S. market shares, as Mexico exports mostly intermediate products, while China and Japan export mostly final consumer products;
- Appreciation of the real exchange rate slows down export growth;
- China has displaced Mexico's exports to the United States

11. **The empirical findings suggest that Mexican exports are closely tied to U.S. output, and that their post-NAFTA export expansion was largely unrelated to competitiveness as gauged by a real exchange rate measure.** Moreover, we find little support for the hypothesis that Mexico's exports are being displaced by China's exports. The slowdown in Mexico exports to the United States during 2001–04 is explained, instead, by the U.S. recession and the relative decline in U.S. demand for intermediate products vis-à-vis consumer products. At the same time, following the entry of China into the World Trade Organization in December 2001, the growth rate of its exports increased without disturbing the Mexico-U.S. export link.

Methodology

12. **This study uses a VAR model to characterize trade developments among the U.S., Mexico, China, and Japan.** The processes are modeled by

$$A_0 x_t = \sum_{i=1}^{n} A_i x_{t-i} + \varepsilon_t \ ,$$

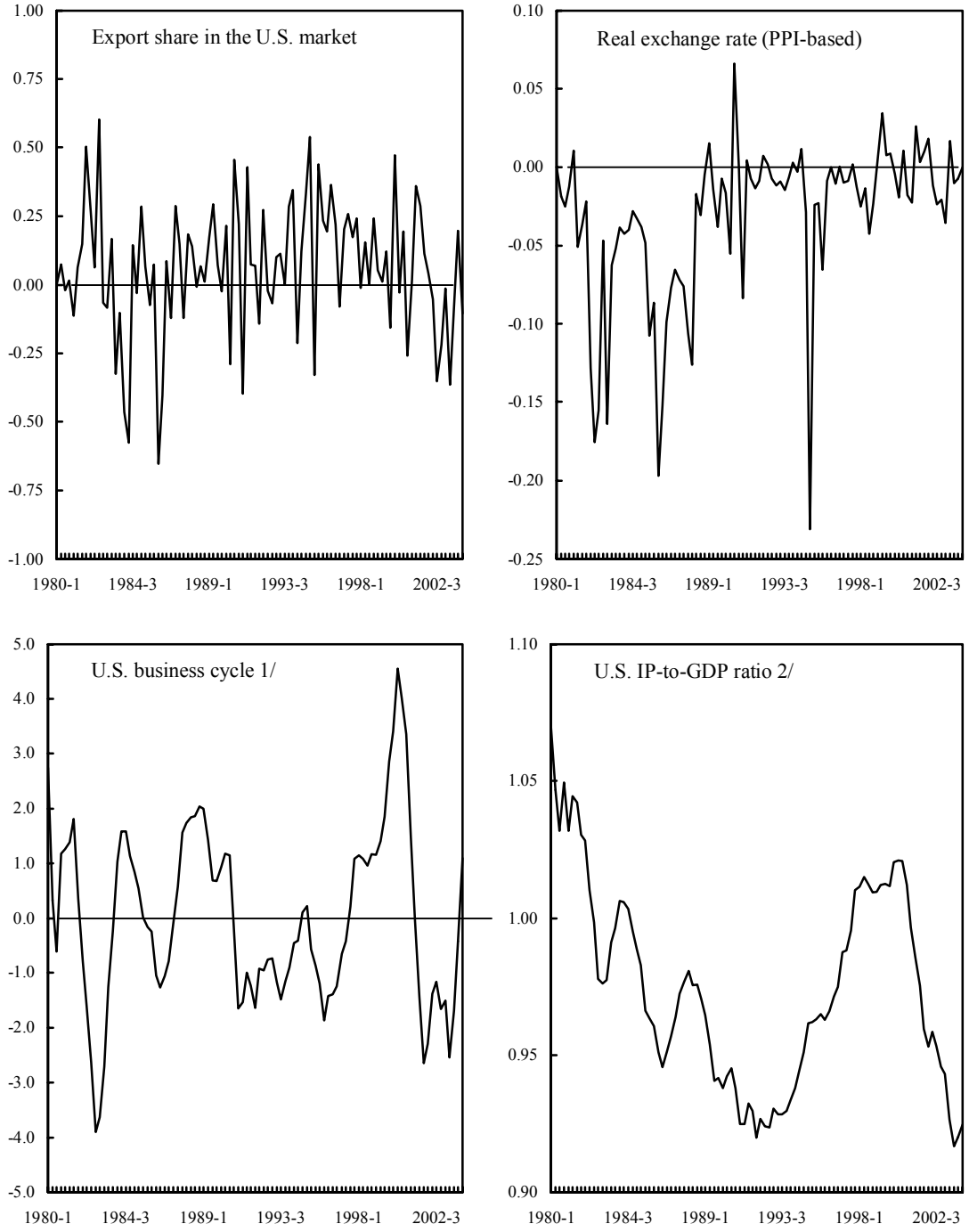
where x_t is a vector of endogenous variables—the trade shares in the U.S. market of Mexico, China, and Japan—and ε_t is a vector of uncorrelated white noise structural disturbances. In addition, the VAR captures effects exogenous to the system, namely the U.S. output gap, and real effective exchange rates. Finally, we included an intercept dummy capturing the impact of China's entry into the WTO. The system is estimated using quarterly data from 1980(1) to 2004(1). Regarding lag length, both the Akaike and Schwarz tests indicated three lags.

Data

13. The variables (Mexico's series are plotted in Figure 4) and their sources are as follows:

- Exports—seasonally adjusted shares of Mexico, China, and Japan nonoil c.i.f. exports to the U.S. (source: U.S. Department of Commerce);
- U.S. output gap—index of industrial production, deviation from the Hodrick-Prescott filter. (source: Federal Reserve System);
- Composition of U.S. demand—the ratio of U.S. industrial production to GDP. (source: Federal Reserve System);

Figure 4. Mexico: Variables Used in the VAR Model, 1980-2004
(Variables in first differences)



Source: IMF, U.S. Department of Commerce.

1/ Deviation from the Hodrick-Prescott filter.
2/ A ratio of industrial production and GDP indexes.

- Price level—seasonally adjusted producer price indexes. (source: International Monetary Fund);[56]
- Nominal exchange rate vis-à-vis the U.S. dollar. (source: Information Notice System, International Monetary Fund);
- A time dummy to capture the impact of China's entry into the World Trade Organization (zero until 2001(3) and one afterward).

The model was estimated in first differences, as the variables in question are nonstationary (Sims *et al*., 1990).

14. **The VAR analysis of exports to the U.S. presents some special difficulties.** First, Mexico completed its gradual move away from protectionist policies with entry into NAFTA. The process of regime switching was slow rather than abrupt, and thus is not consistent with the use of binary dummy variables.[57] Second, the Tequila crisis at end-1994 brought about significant economic and structural changes that accelerated Mexico's integration with the U.S. economy, accelerating export growth temporarily. However, a Tequila crisis dummy variable was statistically insignificant. Third, the rise of China and its integration into the world economy created other shifts in trade patterns (International Monetary Fund, 2004). Driven by steady reduction of trade barriers, high investment, fast labor productivity growth, and the availability of a large labor pool, China exports to the U.S. expanded from ½ percent of total U.S. imports in 1980 to 14 percent in early 2004.

Estimation Results

15. **The results for Mexico exports from the VAR estimation are broadly consistent with earlier literature,[58] as well as with the relationships observed in Figure 1 and 2.** They seem to contradict, however, the relationship between the real exchange rate and export growth. Summary statistics are satisfactory: the model explains about 55 percent of variability in the differenced endogenous variables and an *F*-test on the regressors fails to reject the model. The actual and fitted export shares for Mexico, China, and Japan are shown in Figure 5 and the latter seem to explain reasonable well the recent development.

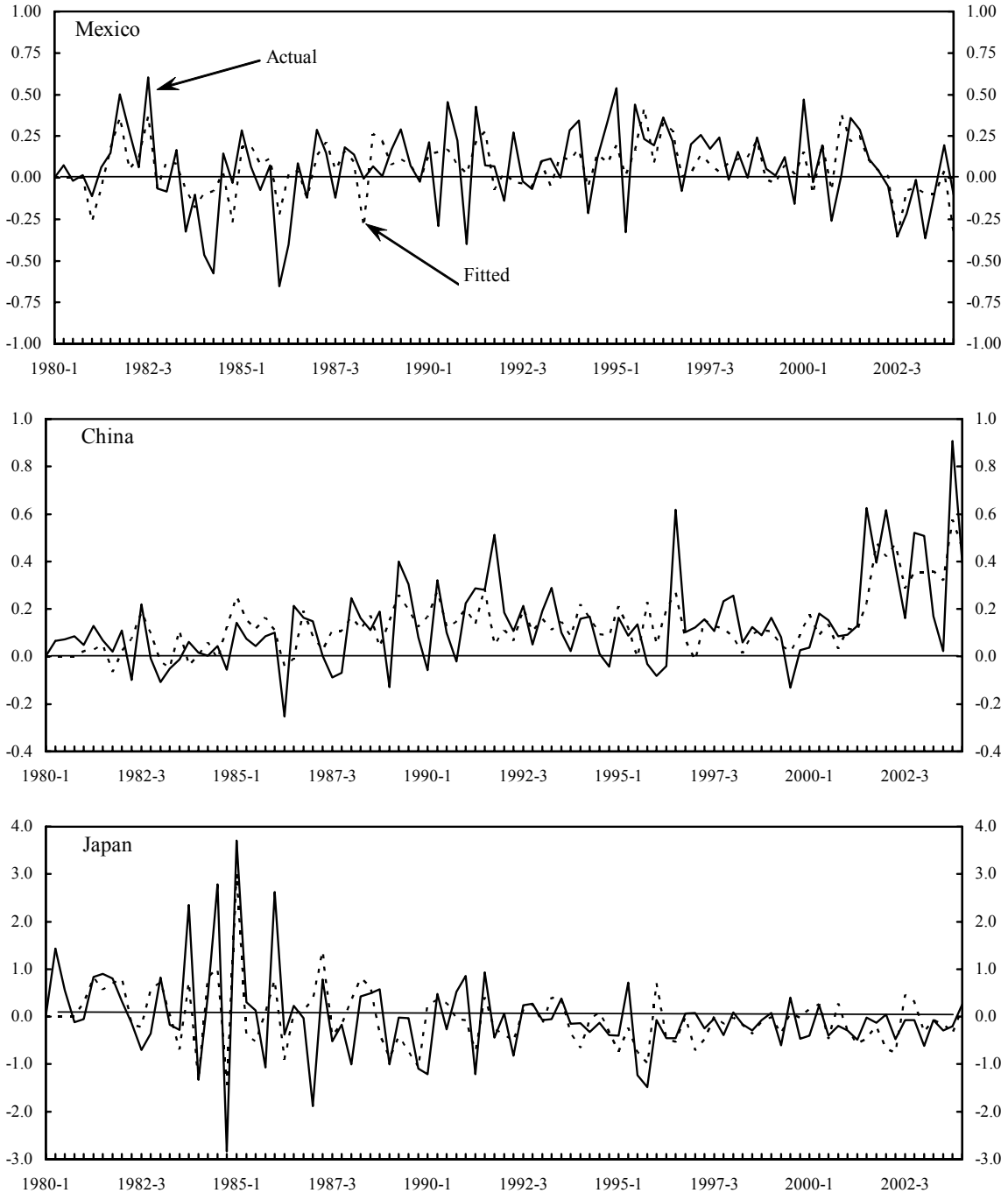
16. **Impulse response functions (IRF) show how the system reacts to one-standard-error shocks to the key variables: the results for Mexico, China and Japan are shown in Figures 6, 7, and 8, respectively.** Overall, the estimates show that the

[56] An alternative to producer price indices used in industrial countries are indices based on unit labor costs. Unfortunately, consistent unit labor cost series are available neither for Mexico nor China.

[57] Konno and Fukushige (2003) estimated bilateral Mexico-U.S. import functions with shift variables consistent with gradual switching.

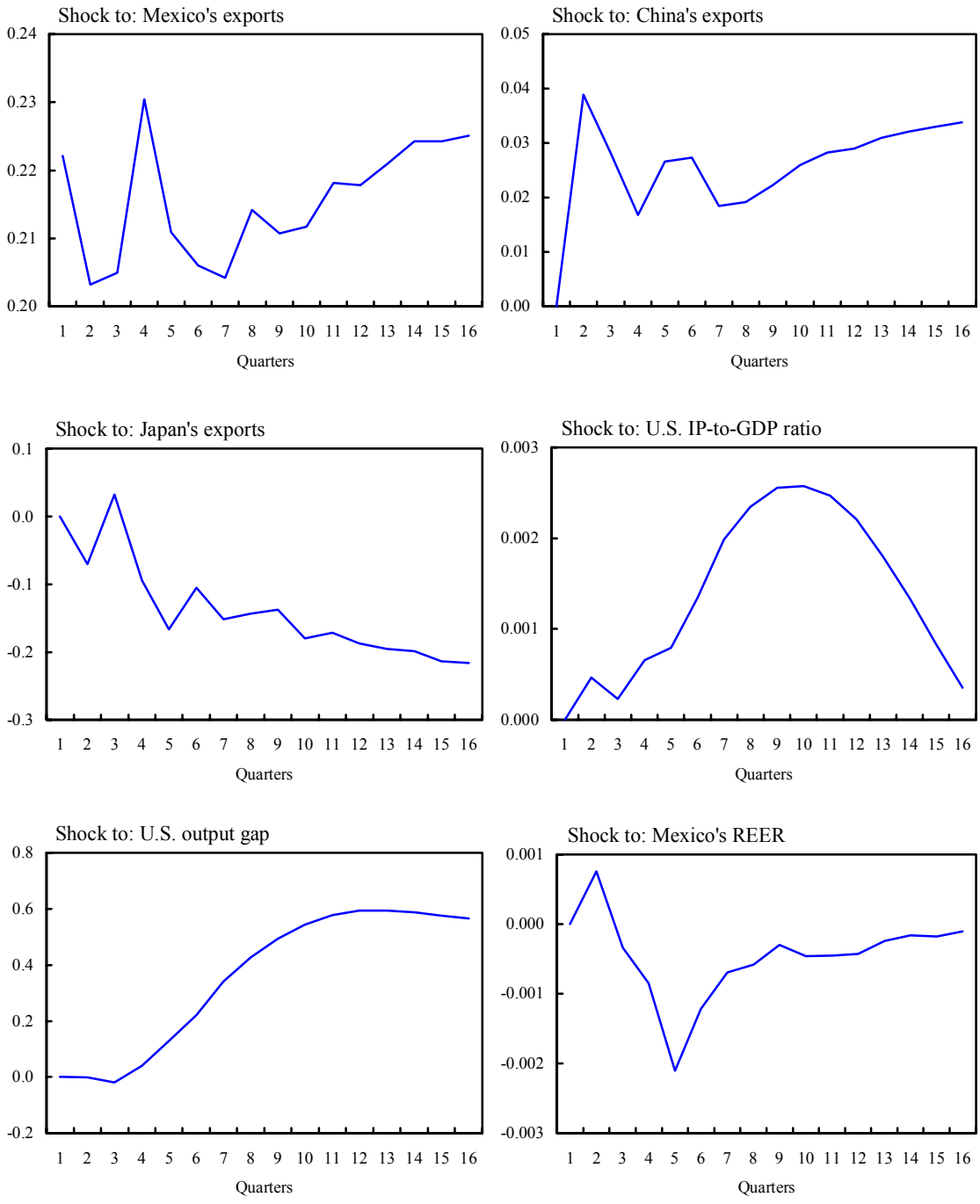
[58] See Kose *et al*. (2004) for a survey.

Figure 5. Mexico, China, and Japan: Actual and Fitted Trade Shares, 1980-2004
(In percent of U.S. imports, first differences)



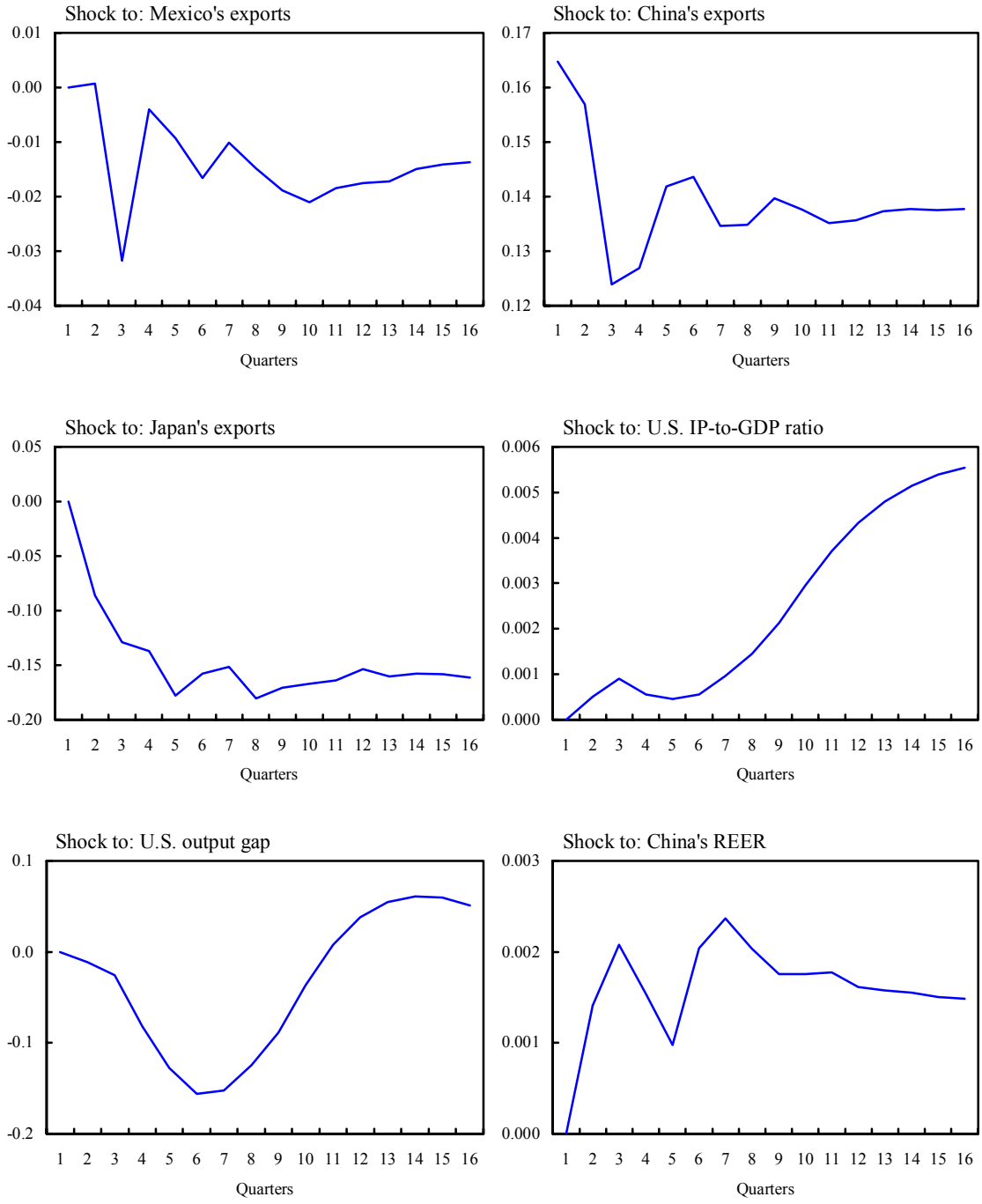
Source: Author's calculations.

Figure 6. Impulse Responses of Mexico's Export Share to Various Shocks
(VAR in first differences with 3 lags; one standard error shocks)



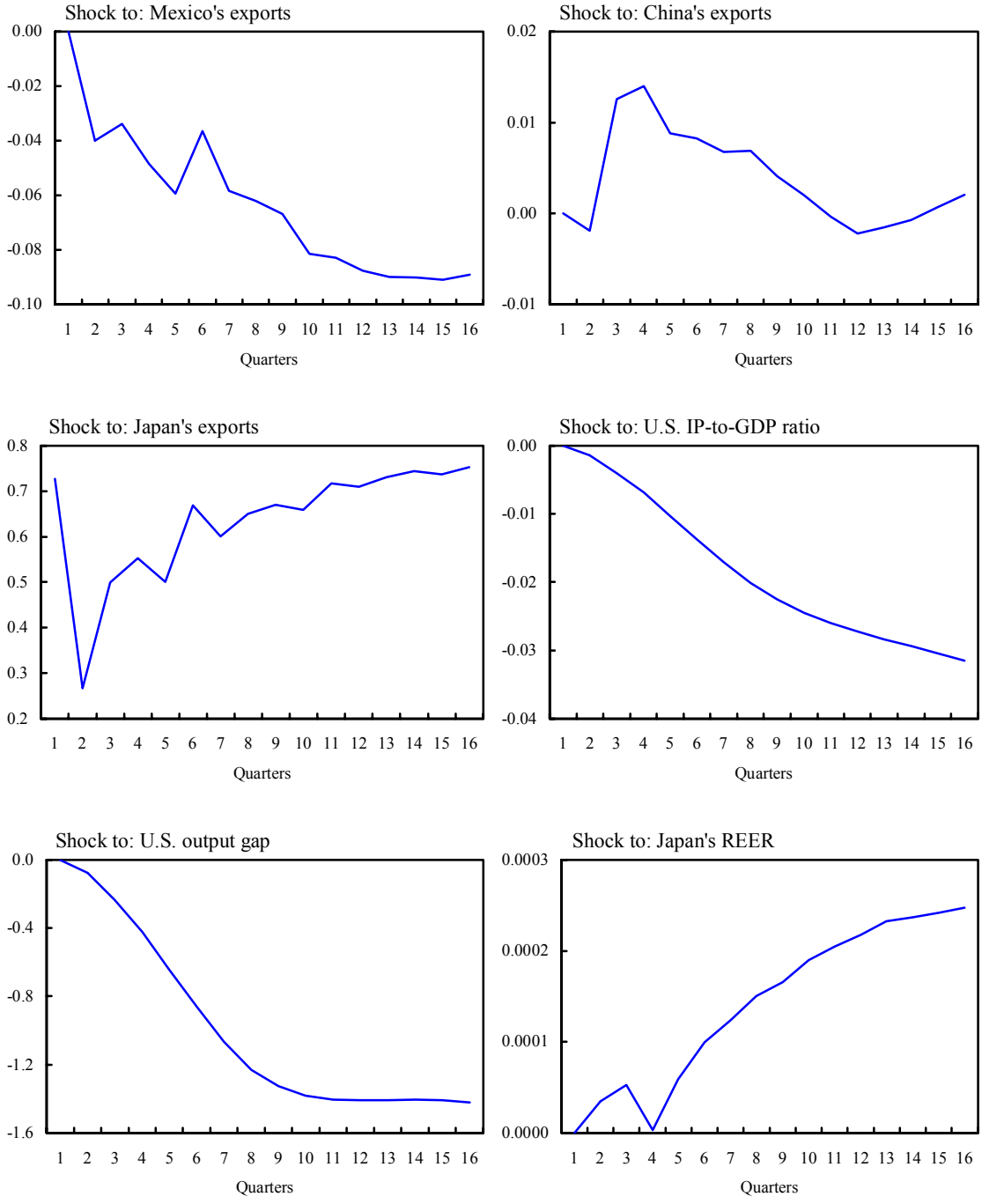
Source: Author's calculations.

Figure 7. Impulse Responses of China's Export Share to Various Shocks
(VAR in first differences with 3 lags; one standard error shocks)



Source: Author's calculations.

Figure 8. Impulse Responses of Japan's Export Share to Various Shocks
(VAR in first differences with 3 lags; one standard error shocks)



Source: Author's calculations.

autoregressive part of the system is strong for all countries—an increase in own-country export share remains broadly stable for the duration of the simulation (16 quarters).

Country results

17. ***Mexico.*** **First, Mexico's exports to the United States follow closely the path of the U.S. output gap.** Second, we find that during industrial production slowdowns in the U.S. economy—during which the IP-to-GDP ratio declines—the share of Mexico's exports declines, as its exports are more tied to industrial production. Third, the IRF of the real exchange rate is very small, suggesting that the quantitative role of price and exchange rate shocks was limited during the period under consideration. Fourth, we find little evidence that China exports displace Mexico exports—on the contrary, the IRF suggests that a rise in China's share is associated with an increase in Mexico's exports. In contrast, the IRF suggests that Mexico may have displaced Japan's exports to the United States.

18. ***China*****. First, China's share appears inversely related to the U.S. business cycle, as measured by the deviation of U.S. industrial production from a trend, reflecting the steady increase in the China's exports.** Second, similarly to Mexico, China's exports appear positively related to the U.S. IP-to-GDP ratio. Third, a positive shock to Japan's export share tends to reduce China's shares. Fourth, an increase in China's competitiveness, that is, real depreciation, is associated with a modest increase in the export share. Finally, the time dummy variable for China's entry into the WTO is statistically significant.

19. *Japan***. First, Japan's share appears inversely related to the U.S. business cycle, as measured by the deviation of U.S. industrial production from a trend, reflecting the steady decline in the Japan's exports to the U.S..** Second, and in contrast to Mexico and China, Japan's exports—mostly final consumer products—appear negatively related to the U.S. IP-to-GDP ratio. Finally, real appreciation of the yen is associated with long-term losses in the export share.

What explains the recent weakness in Mexico's export share?

20. **In the context of this model, two main factors explain the relative weakness in the Mexico's export share in 2001–03.** First, Mexico's reaction to the U.S. business cycle is strong and opposite to that of China. Second, the change in composition of U.S. demand (the IP-to-GDP ratio) has a more pronounced impact on Mexico than on China.

21. **What may explain the insignificant role of the real exchange rate for Mexico?** First, the share of peso-denominated inputs, that is, labor and services, has been comparatively small (Table 2). While labor, both skilled and unskilled, accounts for only about 15 percent of total cost in Mexico, its share in the United States and Europe is around 30 percent. Similarly, the share of service inputs is much smaller in Mexico. Second, the standard deviation of the real exchange rate has been small during the post-NAFTA period compared with the other variables in our sample.

Table 2. Mexico, the United States, and Europe: Cost Structure in Export Industries, 1997
(In percent of total)

Industry	Mexico	United States	Europe
Land	1.2	0.2	0.1
Unskilled labor	11.0	18.2	14.8
Skilled labor	4.2	12.9	9.9
Capital	30.7	18.9	19.9
Natural resources	0.9	0.2	0.1
Food	6.1	2.6	3.2
Mining	2.1	1.1	0.9
Textiles	1.0	0.6	0.6
Clothing	0.0	0.1	0.2
Manufacturing	23.4	16.5	21.1
Services	19.2	28.7	29.3
Total	100.0	100.0	100.0

Source: GTAP database.

22. T**o check the sensitivity of the results to changes in the trade regime, the VAR was re-estimated separately for 1980(1)-1994(4) and 1995(1)-2004(1) and we also checked the parameter stability in recursive regressions.** The key link of the Mexico export share to the U.S. business cycle remains unchanged, albeit the absolute size of cumulative impact is larger in 1995–2004 as compared to 1980–94. Similarly, the direct relationship between Mexico and China exports remained statistically insignificant.

Displacement of Mexico's Exports: Much Ado About Nothing?

23. **Although the VAR results for aggregate series do not show displacement of Mexico's exports by China, it is possible that such effects would be observed using disaggregated data.** To this end, we compared detailed 2000-2003 trade series to see if losses in certain commodity groups by one country were offset by gains in other countries. As shown in Table 3, monthly changes in exports are positively correlated across countries. The relationships are qualitatively similar even when allowing for lags, different time

Table 3. Correlation Between Mexico's and China's Exports, 1997-2004
(Full sample, 2002:1-2004:4 in parentheses)

	Total	Food	Raw materials	Chemicals	Manufac. goods	Machinery	Other manufacturing
Total	0.51 (0.51)	-0.12 (0.07)	0.26 (0.15)	0.70 (0.11)	0.53 (0.44)	0.51 (0.55)	0.46 (0.43)
Food		0.20 (0.50)					
Raw materials			0.39 (0.50)				
Chemicals				0.27 (0.12)			
Manufactured goods					0.56 (0.23)		
Machinery						0.35 (0.49)	
Other manufacturing							0.25 (0.49)

Source: U.S. Department of Commerce; author's calculations.

periods, and alternative definitions of monthly changes.[59] We also tested whether changes in China's exports preceded changes in those of Mexico, that is, Granger causality, and we failed to detect such relationship. The only robust finding was Granger causality from U.S. industrial production or other measures of U.S. demand to sectoral imports. [60]

Additional Contributing Factors to Mexico's Export Performance

24. In this section we briefly outline some additional, supply-side, factors mentioned in the literature that are difficult to capture in regression models.

25. **First, the post-Tequila credit crunch has been relatively deep and protract, generating financial bottlenecks that have blocked growth in the tradable goods sector (Tornell *et al*., 2004).** Indeed, real private sector credit declined cumulatively by almost 20 percent between 1999 and 2003. There are signs, however, that private sector credit has begun to pick up in the first half of 2004.

[59] As export shares were found to be nonstationary, the series had to be differenced. The results do not change materially whether we use 12-month changes, month-on-month changes of seasonally adjusted (X12) series, or differences from the Hodrick-Prescott filter.

[60] These finding are similar to those by Acevedo (2002), who investigated the causes of recession in the *maquiladora* sector in 2001–02. He found China's products to be substitutes for *maquiladora* exports only in a few very narrow commodity groups.

26. **Second, the sluggish supply reaction of Mexico can perhaps reflect lower investment.** While Mexico invests more than the average in Latin America, its total investment-to-GDP ratio and foreign direct investment are smaller than those of both industrial and transition countries. While it is too early to assess the impact of the current U.S. expansion on profitability and investment in Mexico, foreign direct investment is growing strongly and anecdotal evidence suggests that U.S. companies have resumed investing in manufacturing facilities in Mexico.

27. **Third, Mexico has recently lost market share in one of its seemingly safest export industries—the automotive sector—because of its past orientation on, first, small- and medium-sized cars and, second, the Big Three producers (GM, Ford, and Chrysler).** Both segments of the U.S. car market have declined recently. Regarding the former, Mexican factories specialized in the burgeoning SUV market have done well and are expanding. Regarding the latter, the authorities are trying to attract car producers from outside the United States to make automotive exports less dependent on U.S. producers.

28. **Fourth, electric/electronic industries declined as a result of the product cycle: some goods have become "commoditized," no longer requiring fast shipment or interaction with U.S. producers, and production has shifted to the country of the lowest cost producer.** Finally, in surveys of investment climate, exporters and investors complain less about wage cost or exchange rates and more about issues such as a lack of skilled labor, poor infrastructure, red tape, and insufficient progress on structural reforms.[61]

29. **Mexico's proximity to the U.S. gives it a permanent advantage in industries with the following characteristics**:

- Product specifications are complex and routinely changing, and therefore requiring close interaction with the outsourcing company (electronic products in early stages of the product cycle, autoparts);
- The inventory cycle for a product is short (all sectors where "just-in-time" delivery is required);
- The goods are large in size, so that the cost of shipping offsets the cost advantages of producing in Asia (large household appliances).

[61] See, for example, *Maquila* Portal, http://www.maquilaportal.com/cgi-bin/top100/top100.pl.

Implications

30. **The empirical findings suggest that Mexican exports exhibit a strong trend, affected by long-term outsourcing relationships with the U.S. firms, and are primarily driven by U.S. activity, while real exchange rate fluctuations have had a limited impact.** To date, China's exports do not seem to have displaced Mexican goods from the U.S. market, unless these exports had a clear cost advantage.

D. Effect of Trade Policy Changes and Other Shocks

31. **To assess the implications of changes in external and domestic environment on Mexico exports, we employ the Global Trade Analysis Project (GTAP) model (International Monetary Fund, 2004).** GTAP is a computable general equilibrium model that captures the geographic and sectoral structure of trade flows, providing a wealth of output at the aggregate and sectoral level. It is therefore well suited to analyzing the impact of free trade areas and changes in international and domestic economic conditions. For the purpose of this paper we focused on real GDP, welfare changes (equivalent variation of aggregate consumption),[62] terms of trade, exports and imports, the trade balance, and sectoral output changes.

32. **The standard GTAP framework, however, has limitations. First, being a comparative-static model, it calculates only changes to the levels of the relevant variables, not rates of growth.** Second, it treats world economic growth as exogenous. Third, GTAP generally assumes that adjustment processes are smooth and costless. Fourth, the existing version of the GTAP database reflects data for 1997, that is, it reflects neither the long-run effects of NAFTA nor the entry of China into the World Trade Organization. Overall, the quantitative results obtained through the GTAP framework are sensitive to various assumptions, such as, for example, fixed versus flexible real wages, and the degree of international capital mobility. However, even with these caveats, the qualitative results provide insights into the relative importance of various shocks to the Mexican economy; the mechanism of structural and macroeconomic adjustment to these shocks; and the importance of the macroeconomic framework within which the economy reacts to the shocks.

33. **The following shocks were analyzed: (i) introduction of CAFTA and the Mexico-Japan free-trade area, (ii) elimination of Multi Fibre Arrangement (MFA) quotas, (iii) lower transportation cost of Mexico exports to the United States, and (iv) a productivity increase in the Mexico manufacturing sector.** We found the impact of various proposed trade arrangements to be broadly neutral, while the negative impact of MFA is more pronounced. Structural reforms that permanently increase Mexico's productivity have strong positive effects.

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[62] Equivalent variation is the compensating payment that—in the absence of the economic change—moves the consumer to an identical welfare level as that associated with the change.

Central American Free Trade Agreement (CAFTA)[63]

34. **The first scenario evaluates the impact of the elimination of tariffs associated with CAFTA on trade flows among CAFTA countries (Table 4, first column).** The aggregate impact is small, affecting primarily the clothing sector in Mexico (a cumulative decline of some 10 percent), while the impact on real GDP and aggregate welfare is negligible. Despite a deterioration in the terms of trade, a small depreciation of the real exchange rate leads to a positive impact on the trade balance, with significant resource reallocation away from the clothing sector and toward other manufacturing and service sectors.

Mexico-Japan Free Trade Agreement

35. **The second scenario evaluates the impact of elimination of bilateral tariffs on non-farm products and a 50 percent cut in bilateral tariffs on farm goods between Mexico and Japan (Table 4, second column).** The simulated outcome suggests a modest boost to Mexico-Japan trade and a small welfare increase for Mexican consumers, mostly through lower prices of imports. Under the assumption of a 50 percent tariff reduction, Mexico's food exports to Japan would increase considerably, but the increases of other exports are limited because Japan's tariffs on these products are already low. Mexico's trade balance with Japan would deteriorate modestly, as domestic investment expands somewhat. These results are in line with the limited size of Japan's trade with Mexico (less than 3 percent of total exports) and the offsetting nature of tariff cuts.

Multi Fibre Arrangement (MFA)[64]

The third scenario evaluates the impact of elimination of MFA quotas on exports and imports of textiles and clothing (Table 4, third column). This scenario results in somewhat larger GDP and welfare losses for Mexico than under the CAFTA scenario. A large contraction in textile and clothing output, by 14 percent and 35 percent, respectively, is offset by reallocation of resources toward other sectors, eventually resulting in a practically unchanged trade balance.[65] Also, the regional composition of Mexico's exports would change: losses in the U.S. and Central American markets are offset by gains in the markets of Europe and Japan.

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[63] The free trade area includes the United States, El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, and the Dominican Republic.

[64] Quotas introduced under the Multi Fibre Arrangement are being phased-out in stages over the period 1995-2005. The MFA (in place since 1974) resulted in a complex system of bilateral quotas on of textile and clothing exports from developing to industrial countries. For more detailed description of the MFA and Uruguay Round Agreement on Textiles and Clothing, which stipulate the phase-out of MFA quotas, see http://www.wto.org/english/thewto_e/whatis_e/eol/e/wto01/wto1_44.htm#note4.

[65] The speed of such a massive reallocation is a feature of the standard GTAP model. It can be restrained by introducing a lower degree of factor mobility across industries.

36. **It is interesting to compare the phase-out of MFA quotas with CAFTA tariffs, given that both shocks directly affect the textile and clothing industries, although the effect of the elimination of MFA quotas is narrower than CAFTA.** It turns out that the former shock has a more pronounced impact compared with the latter, primarily because the export potential of CAFTA countries is limited and poses moderate competition in the U.S. market to Mexican exports, while the phase-out of MFA quotas will open further the U.S. market to exports from Asia.

Table 4. Mexico: The Impact of Various Shocks on Key Macroeconomic Variables in the GTAP Model

	CAFTA	Mexico-Japan FTA	Multi Fibre Agreement	Manufacturing productivity increases by 20 percent		Lower transportation cost
				Without capital flows 1/	With capital flows 2/	
Real GDP 3/	-0.0	0.1	-0.1	12.5	12.1	0.0
Welfare change 4/	-0.3	0.2	-0.5	43.9	45.8	0.2
Terms of trade 3/	-0.2	0.0	-0.2	-1.6	-0.3	0.2
Exports 5/	-0.2	1.7	0.3	26.9	10.2	0.2
Imports 5/	-0.6	2.3	-0.1	17.9	25.2	0.5
Trade balance 6/	0.2	-0.4	0.1	10.4	-14.2	0.0
Sectoral output 5/						
Food	-0.1	0.9	0.3	-11.5	-12.3	0.20
Mining	0.1	-0.1	0.6	-15.6	-17.9	0.19
Textiles	-2.8	-0.8	-14.7	15.7	7.1	-0.11
Clothing	-10.1	-2.4	-35.4	43.5	26.1	-0.13
Manufacturing goods	0.7	-0.4	2.3	36.0	27.2	-0.11
Services	0.0	0.0	0.0	-1.0	2.8	-0.03

Source: Authors' calculations.

1/ Global investment is allocated evenly across regions.
2/ Regional investment determined by the rate of return on investment.
3/ Cumulative percent change.
4/ Equivalent variation, in US$ billions.
5/ Cumulative volume change, in percent.
6/ In billions of US$.

Improvement in Mexico's Manufacturing Productivity

37. **The fourth scenario simulates the impact of raising Mexico's manufacturing sector productivity relative to the rest of the world by 20 percent (Table 4, fourth column).** Such

an improvement could be brought about by reforms improving human capital and Mexico's infrastructure, or by policies attracting more inflows of foreign direct investment into manufacturing, or both. This shock was simulated under two alternative assumptions about international capital mobility, first, with capital inflows allocated evenly across all regions (no disproportionate capital inflows into Mexico despite the productivity improvement), and second, with capital inflows determined by the expected rate of return on investment (strong additional capital inflows into Mexico).

38. **While the two benchmark assumptions have essentially identical impacts on real GDP and welfare, they differ in their impact on the external balance.** Real GDP expands in both cases by more than 12 percent and welfare improves dramatically, by the equivalent of about 10-11 percent of GDP. Gains in manufacturing productivity trigger an expansion in all sectors except food, mining, and services as resources reallocate toward textiles, clothing, and other manufacturing industries.

39. I**n the first scenario, controlling additional capital inflows narrows the investment-saving gap and keeps the demand for imports low.** As a result, export growth outpaces that of imports by 9 percentage points, producing an improvement in the trade balance of more than 10 billion in 1997 US dollars or about 2½ percent of GDP, in spite of a deterioration in the terms of trade. This scenario illustrates the export potential of the Mexican economy, as long as the productivity gains are not offset by appreciation of the real exchange rate.

40. **In the second, more realistic scenario, capital inflows increase sharply as a result of higher returns on investment, the domestic currency appreciates in real terms, and imports expand.** Domestic saving only rise in line with GDP, however, leading to an increase in the investment-saving gap. The effect of increased capital inflows is reinforced by the rising prices of nontradable goods. As a result, imports grow faster than exports by about 15 percentage points, worsening the trade balance by about 14 billion in 1997 US dollars or about 3½ percent of GDP. This scenario illustrates the possibility of productivity gains in the tradable sector creating an investment and consumption boom and leading to a deterioration of the trade account.

Reductions in Mexico's Transportation Costs

41. **The fifth scenario evaluates the impact of improvements in Mexico's infrastructure that would translate into a 20 percent reduction in transportation cost on Mexican exports to the United States (Table 4, fifth column).** Overall, and contrary to anecdotal evidence, the impact is negligible, owing to the fact that transport costs for manufacturing exports to the United States account for just over 1 percent of the c.i.f. value, according to the GTAP database.[66] A possible explanation for these counterintuitive results is that the GTAP database

[66] The weights for food and mining exports are higher, but still less than 5 percent of the c.i.f. value.

may underestimate the cost of transportation and the associated activities. The implicit costs of poor infrastructure, such as those resulting from long waiting lines at the border, or fraud at the customs, is large and left out from the GTAP calculations.

Implications

42. **The GTAP simulations presented above assess the impact of various proposed trade arrangements and hypothetical changes in the performance of the Mexican economy.** Regarding the former, we find that the Central America free trade area could have either a neutral or small negative impact on Mexico, in terms of GDP growth and external developments, while the Mexico-Japan trade agreement would have small positive effects; the impact of MFA is more pronounced, but still manageable, as long the economy exhibits flexibility to adjust to the external shocks. In contrast, should Mexico proceed with structural reforms that would permanently increase its productivity and rate of growth, the positive trade and welfare impacts are likely to be much larger.

E. Conclusions

43. **The paper looks at factors that determine Mexico's exports and that would explain the recent loss of U.S. market share.** It finds that Mexico's exports remain closely tied to U.S. activity, with little evidence of export displacement by China. The link to the U.S. business cycle is stronger than in Mexico's competitors, as is the impact of changes in the composition of U.S. demand. Hence, the recent U.S. recovery, especially in industrial activity, may stop or perhaps even reverse the loss of Mexico's export share. Simulations using the Global Trade Analysis Project model suggest that elimination of tariffs and quotas under various agreements (CAFTA, MFA, or Mexico-Japan free trade area) are likely to have a relatively small impact on Mexico. In contrast, structural reforms that substantially raise productivity in manufacturing could have a profound impact on exports and growth.

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V. MEXICO—SUB-SOVEREIGN PUBLIC FINANCES AND DEBT[1]

Abstract

This paper analyzes the institutional framework for subnational debt, as well as its structure and financing sources. Total subnational debt has been gradually rising since 1995, although it remains low. As part of fiscal decentralization, the federal government implemented in 2000 a market-based approach to discipline the finances of states and municipalities. This approach promotes the pricing of credit to reflect its underlying risk, rewarding prudent behavior with lower interest costs. The framework has eased access to local capital markets, benefiting states and municipalities by increasing financing at relatively low domestic interest rates and widening the investor base (mainly institutional investors). States and municipalities have generally accessed the market through a master fund structure, however, pledging either federal transfers or own revenues to service debt, which results in a more rigid financial structure. States have been able to extend maturities, but measures to improve further their debt structure and management would be desirable.

A. Introduction

1. **Subnational levels of government in Mexico are progressing toward further autonomy, fiscal responsibility, and accountability**. Initiatives have been taken since the mid-1990s to decentralize spending responsibility and improve the framework for subnational borrowing. This chapter analyzes the institutional framework for the debt management of subnational entities, its implications in terms of diversifying financing sources, and the structure of subnational debt.

2. **Importantly, reforms in 2000 introduced a regulatory framework for debt management for states and municipalities, combining market discipline and new regulatory requirements**. The regulation disciplines fiscal finances of states and municipalities and eliminates bailouts by the federal government. The framework promotes investor assessment of the credit quality of states and municipalities when providing financing, and safeguards to ensure credit risks are covered adequately. The regulation also provides incentives for registration of the debt within the Ministry of Finance, and for enhanced transparency and publication of debt and fiscal statistics by states.

3. **The structure of this chapter is as follows**. Section B summarizes the 2000 regulatory framework for public finances of states and municipalities. Section C then analyzes the credit ratings of states. Section D considers how the framework has helped sub-sovereign governments access local capital markets for financing. Section E then looks at the structure of debt, taking also into account the structure of states' revenues and expenditures. Section F concludes.

[1] Prepared by M. Vera Martín (ICM).

B. Institutional Framework: Historical Background

4. **Subnational government borrowing is partly regulated by the National Constitution in Mexico**. The constitution states that subnational governments can borrow only in Mexico and from Mexican investors, and only for productive investments.[2] Nevertheless, federal development banks and other financial institutions can lend to subnational governments in pesos with funds obtained in foreign currencies from international financial institutions, typically hedging the exchange rate risk.

5. **Article 9 of the National Fiscal Coordination Law (NFCL), created in 1980, allowed states and the Federal District to use their federal transfers as collateral for loans**. The law stated that around 20 percent of federal tax income must be transferred to state and local governments, establishing Mexico's revenue-sharing system. Federal transfers have been the main revenue source for subnational governments. The article requires states to get authorization for new borrowing from the local congress, and debt can only be contracted for investment projects. In the preparation of the state budget, each state would propose debt levels, and the state congress would approve a ceiling (including debt levels for its municipalities). For federal transfers to be used as collateral, states only needed to register the debt with the Ministry of Finance (SHCP). In case of arrears or a threat of default, the federal government would deduct debt-service payments on registered debt from revenue-sharing transfers before the funds were sent to states on a monthly basis.

The Role of the Federal Government in Subnational Debt: 1995–98

6. **Subnational debt grew significantly in the years before the Tequila crisis**. During 1988–93, state debt rose at an annual rate of 62 percent (Gamboa, 1994). Despite low levels of subnational debt in terms of state GDP (Figure 1.1), debt represented a fiscal problem for the majority of states partly because of the low disposable income[3] available to service debt, and the states' limited capacity to raise additional revenue. During 1994, states' debt stood at 65 percent of the *participaciones,* the nonearmarked federal transfers and the main source of disposable income (Figure 1.2). The most indebted state was Sonora, with debt averaging around 250 percent of its *participaciones*.

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[2] Productive investments are not defined.

[3] Disposable income is measured as the sum of own revenues and the nonearmarked component of federal transfers to states (*participaciones*, excluding transfers to municipalities), which is the main source of revenues for the states. See Section F for a more detailed analysis on the revenue structure of states.

Figure 1. Mexico: Subnational Debt by States, 1994

Figure 1.1: Subnational Debt as a Share of State GDP by State

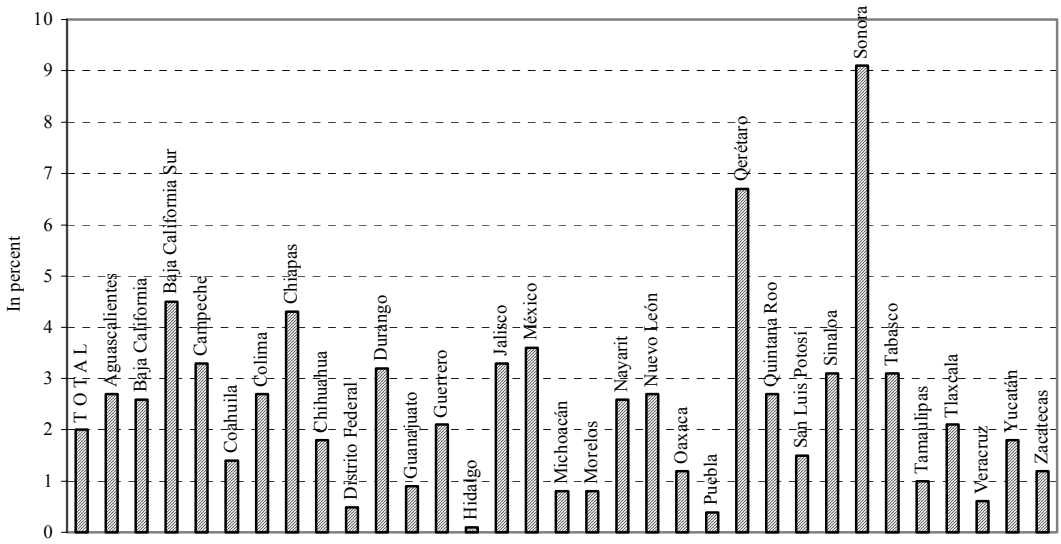
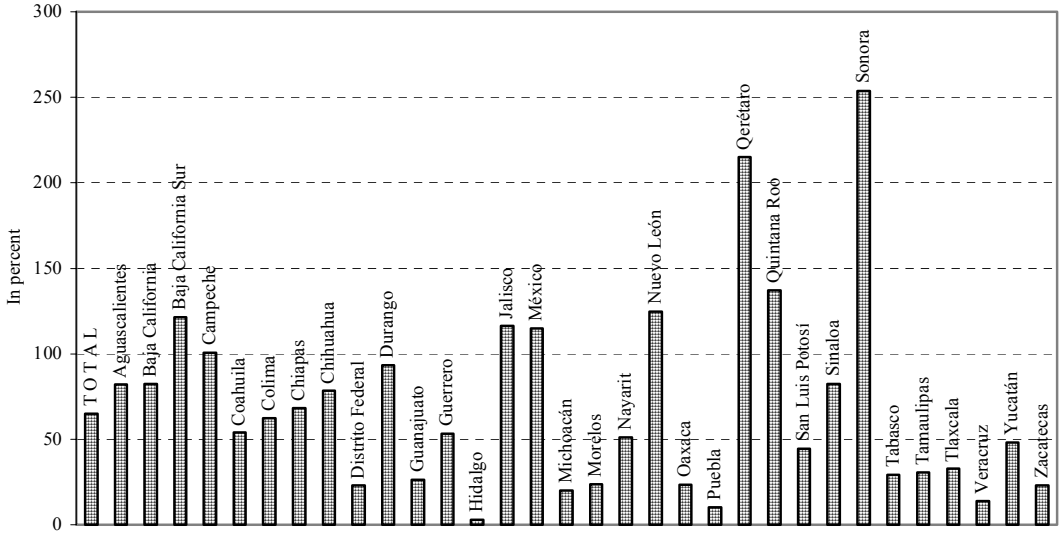


Figure 1.2. Ratio of Subnational Debt to Non-earmarked Federal Transfers, by State



Source: SHCP

7. **The federal government took over the debt of the states after the Tequila crisis, leading to a restructuring of subnational debt**. Subnational debt doubled during 1994–95 to MXN$40 billion (around 2.2 percent of national GDP) due to the 1995 financial crisis and the rise in the interest rate. With the one-month cetes rate rising from 14 percent in November 1994 to 75 percent in April 1995, states were not able to service their debt, and the federal government came under pressure to take over responsibility of their debt. [4] The Fund for Strengthening State Finances (*Programa de Fortalecimiento Financiero de los Estados*) provided for extraordinary cash transfers and was set within Ramo 23 (a federal government budgetary item), with a cost of around MXN$7 billion in 1995 (about ½ percent of GDP). This represented around 17 percent of the *participaciones* for the year (or about 10 percent of subnational debt), and continued at that level in real terms until 1998. States were required to restructure their debts in *Udis*, a new unit of account indexed to inflation. For those states joining the program voluntarily, the maturity of their debt was extended by 10 or 15 years starting in 1995, with a two-year grace period. The federal government also granted a discount depending on the fiscal condition of each state.

8. **In return for the debt takeover, the states were required to agree on a fiscal adjustment program with the SHCP**. States needed to commit themselves to balance their budgets, to reduce debt ratios, to present their financial accounts in an uniform way, and to update and publish a state debt law to regulate and limit debt. By the end of 1995, all states had signed letters of intent with the federal government, although there was no mechanism in place to enforce them once the extraordinary transfers were provided. In 1998–99, as the fiscal agreements phased out, the fund ended, with the residual going to a national disaster relief fund.

9. **To induce further fiscal discipline, Article 9 of the NFCL was reformed in 1997 to place new restrictions on state and local governments**. The SHCP continued to play a part in ensuring debt service for defaulting states after 1994–95, so that creditors had no need to take account of credit risk in their lending to states. The 1997 modifications aimed at forcing states to exercise financial discipline, and banks to analyze project risk when providing financing. Subnational governments could still issue debt to finance investment projects, and use their federal transfers as collateral. However, banks could not ask the SHCP to discount the corresponding debt-service amount from a defaulting state's federal transfer. Designation of collateral and repayment mechanisms needed to be established according to state debt laws and with the agreement by both parties. States would also be forced to present financial statements when seeking credit.

10. **However, after modifying Article 9 in 1997, subnational governments faced constraints in accessing credit**, **especially from commercial banks, leading to a temporary scheme of "mandates."** The temporary scheme suspended the reform, and allowed states to give the federal government an authorization (or "mandate") to deduct debt-service payments from

[4] The inability to service debt was not due to short maturities. Average maturity of subnational debt stood at 6.5 years by end-1994, with San Luis de Potosi being the state with lowest average maturity (at 2.7 years).

revenue sharing. The federal government therefore acted as a trustee in servicing state debt that had been collateralized with the *participaciones*.[5] In practice, the mandates became a precondition for states to access the credit market, not only because of the collateral, but also because they were perceived as a guarantee by the federal government. Consequently, commercial banks allocated zero credit risk to these loans, evading the need to develop risk-assessment capacity.

11. **In 1999, Ramo 23—the source of discretionary federal transfers—was eliminated and with it, the perception that the federal government would bail out states**. As states and banks in Mexico had witnessed federal bailouts in the past, states came to expect them, making borrowing a means to obtain extra federal resources. Also, banking regulatory limits to single customer exposure did not apply to loans to subnational governments (an exceptional regime granted to states and municipalities),[6] increasing the attractiveness to creditors of subnational lending. Discretionary federal transfers were also budgeted in a special and often large line item to be allocated at the executive's discretion in Ramo 23. The cases of Nuevo León and Chihuahua in 1998–99 showed the power of states to demand ad hoc resource transfers. This practice changed in 1999 when Ramo 23 virtually disappeared as a source of discretionary transfers.

Reform in 2000

12. **In April 2000, Mexico introduced a new regulatory framework for debt management[7] by states and municipalities that combined market discipline and rules-based mechanisms.** The provisions focused mainly on: imposing hard budget constraints on federal resources provided to states and municipalities; reducing moral hazard in subnational borrowing; and increasing the transparency, efficiency, and accountability of subnational fiscal management. The new framework contained the following six elements:

- A renunciation and ensuing removal from the federal budget for 2000 of the executive's power for discretionary transfers, indicating that no federal bail-outs would be made.

- Second, the abolition of the "mandates," leaving states and their creditors to make their own trust arrangements for collateralization, if required.

- Third, the elimination of the "exceptional regime" for single-customer exposure ceilings, limiting the extent of financial damage that one state can cause, and signaling that state credit quality must be evaluated.

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[5] When *participaciones* are used as collateral, all transfers received through Ramo 28 are considered, including the 20 percent of the federal revenues (Recaudación Federal Participable, RFP), 2.1 percent of RFP for economic incentives, and 1 percent of RFP for coordination rights.

[6] According to bank regulation, the exceptional regime implied that all subnational lending was exempted from normal provisioning requirements and exposure concentration limits.

[7] The internal structure of the Secretary of Finance was modified for its coordination unit with federal entities (UCEF) to act as the only window for states and municipalities, and to take over the registry of subnational debt.

- Fourth, the establishment of a link between the capital risk weighting of bank loans to subnational governments and those governments' credit ratings, consistent with the Basle Committee's recommendations of June 1999. States and municipalities must hold two current, public, global-scale, local currency credit ratings from at least two international credit rating agencies, to be used by regulators to assign capital risk weights (between 20 and 115 percent).

- Fifth, loan registration with the federal government would be conditional on the borrowing entity being current on all its debt service obligations with development banks and on its publication of debt statistics. To make registration appealing, unregistered loans would be automatically risk-weighted at 150 percent.

- Finally, development banks would lend to states and municipalities only when the loan qualifies for registration and its corresponding capital risk weight is less than 100 percent. Lending to a subnational with higher risk weights is permitted if the loan contains a technical assistance component funded by an international development bank or multilateral creditors, so that origination and supervision are subject to a neutral and independent party.

C. Credit Quality Of States

13. **To date, states and municipalities have complied with the requirement of holding credit ratings**. All states, with the exception of Campeche[8], have obtained at least two credit ratings from international credit rating agencies (Table 1). Credit ratings are concentrated at the local-scale level of A/A+ (A1/A2 in Moody's scale), indicating a medium-to-high credit quality. The Federal District has the highest credit rating among states, as it enjoys the same local-scale credit rating as the federal government. This is due to the solidarity principle that applies to the federal government regarding debt contracted by the Federal District.[9] Fitch, an international credit rating agency, indicates that the credit rating of the Federal District would be BBB+(mex) if the implicit guarantee did not apply.

14. **The State of Mexico holds the lowest credit rating**. The State of Mexico is the only state with a rating below A according to the local scale. Credit rating agencies indicate that the rating is motivated by: (i) high debt indicators and financing deficits that weaken the state's liquidity position; (ii) the high ratio of debt service to the state savings rate; and (iii) high infrastructure investment requirements. At present, and despite improvements in the state's own-source revenues, the state is reliant on access to new borrowing to fund its budget, albeit such access is limited. Furthermore, all nonearmarked federal transfers allocated to the State of Mexico are devoted to servicing debt from the 1990s restructurings, which have a senior category.

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[8] The state of Campeche received an A local-scale rating from Standards&Poors on September 23, 2004.

[9] Debt contracted by the Federal District needs approval from the federal government and is incorporated in the annual budget.

Table 1. Mexico: Credit Rating of Mexican States, National Scale, Jun-04

States	Fitch	Moody's	S&P
Aguascalientes	AA (mex)		mxAA
Baja California		A1.mx	mxAA-
Baja California Sur	A- (mex)		mxA-
Campeche			mxA [1/]
Coahuila	AA (mex)		mxAA
Colima	A (mex)		mxA
Chiapas		A3.mx	mxBBB+
Chihuahua	A+ (mex)	A2.mx	mxA
Distrito Federal	AAA (mex)	Aaa.mx	mxAAA
Durango		A2.mx	mxA-
Guanajuato		Aa1.mx	mxAA
Guerrero	A- (mex)	A2.mx	mxBBB+
Hidalgo	A+ (mex)		mxA-
Jalisco	A (mex)		mxA
México	BB (mex)	Ba3.mx	mxBB-
Michoacán	A+ (mex)	A1.mx	mxA
Morelos	A (mex)	A2.mx	
Nayarit		Aa3.mx	mxBBB+
Nuevo León	A (mex)	A3.mx	mxA-
Oaxaca		A3.mx	mxBBB-
Puebla	A+ (mex)	Aa3.mx	mxA+
Qerétaro	A+ (mex)		mxA+
Quintana Roo	A- (mex)	A2.mx	
San Luis Potosí	A- (mex)	Baa2.mx	
Sinaloa	A- (mex)	A3.mx	mxA-
Sonora	A (mex)	Baa1.mx	mxA
Tabasco	A+ (mex)	Aa3.mx	
Tamaulipas		Aa2.mx	mxAA
Tlaxcala		Aa3.mx	mxA-
Veracruz	A+ (mex)	A1.mx	mxA+
Yucatán		A3.mx	mxA
Zacatecas		A2.mx	mxA

1/ Assigned on September 23, 2004.
Source: Fitch, Moody's, and S&P.

15. **Credit ratings have introduced discipline in the debt management of states and municipalities**. First, credit rating agencies issue monthly reports on the evolution of credit ratings, indicating possible changes in the credit outlook, and, in particular, any downgrades and upgrades in credit quality. Second, credit ratings have improved the transparency of financial information and financial coordination at the state level. Third, credit ratings help discriminate the cost of capital for states and municipalities. The credit rating is a signaling device on the states' ability to pay their obligations when seeking financing. As credit ratings improve, the cost of financing is reduced, not only for the debtor, but also for the creditor through lower capital provisions. Finally, credit ratings have boosted access to local capital markets, helping to deepen the domestic debt market (through the issuance of bonds, the so-called *certificados bursátiles)*.

D. Local Capital Markets as a Financing Source

16. **The 2001 stock market reform, together with the 2000 reform, has helped states and municipalities benefit from the development of the domestic bond market**. With the stock market reform in July 2001, the regulatory framework for the use of bond financing was clarified, allowing states and municipalities to access local capital markets. The reform introduced an instrument, the *certificados bursátiles*, which developed the local debt market.

17. **All issuances of *certificados bursátiles* by subnational entities have been done through a master fund structure, allowing states to leverage resources, while providing a high legal certainty to the creditor**. Under the master fund, a third party (the trustee) manages some of the states' revenues devoted to service debt.[76] The revenues are directly deposited in a trust fund according to a percentage defined at issuance (Figure 2). When pledging *participaciones,* the state provides an irrevocable instruction to the federal government to deposit a percentage of these federal transfers in the master fund account. When pledging state revenues to the master fund, banks and government agencies (who are usually receiving the payments) make regular deposits to the trust fund. The trustee is responsible for managing the funds, the payments (interest and principal), and the reserve deposits.[77] In case of over-provision, the trustee must return the funds to the state.

18. **Credit risks under a master fund structure depend on the extent of guarantee, the financial terms and conditions, and other debt acceleration clauses**.[78] The master fund works as a shield for the revenues devoted to service the debt considered in its structure. Consequently, the master fund structure does not allow acceleration clauses to be exercised when the debtor fails to comply with debt obligations that are not included in the trust fund. In general, the risk of

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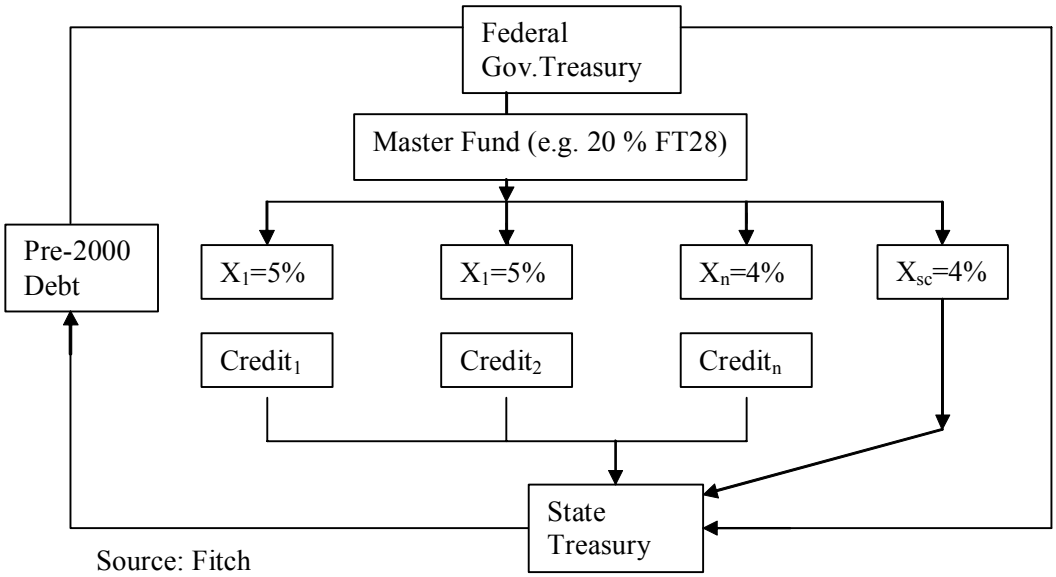
[76] In pledging resources to the master fund, some states have defined a percentage of its revenues to be allocated for an specific issuance. Other states have allocated that percentage to the master fund, without assigning a particular percentage to each financing instrument.

[77] The reserve account can be called on if the principal and interest accounts do not hold sufficient funds.

[78] An acceleration clause is a provision in the bond that typically allows the bondholders to declare the full amount due and payable immediately upon occurrence of some event of default as described in the bond's features.

Figure 2. Mexico: Structure of the Master Fund



Source: Fitch

1.

default would depend on the credit quality of the issuer, the volatility of the revenues devoted to the fund, and the level of debt contracted before April 2000 (as the federal government still holds the mandate to deduct payments due before transferring federal transfer to states' accounts). Revenues devoted to the master fund are distributed pari-passu according to a predefined percentage for each instrument, and not according to outstanding principal. In case of default, intercreditor equity holds among creditors within the trust fund, while the debt is subordinate to that contracted prior to April 2000.

19. **States and municipalities have improved the credit rating of their debt instruments through the master fund structure** (Table 2). For example, the state of Hidalgo has been able to place two bonds with the maximum local-scale credit rating (AAA(mex)), well above its credit rating (A+(mex)). States and municipalities have pledged *participaciones* amounting to MXN$7.5 billion in the trust fund, while twelve issues (with total value of MXN$9.2 billion) have pledged own resources, mainly payroll taxes.

20. **States and municipalities have diversified their financing sources and extended the maturity of their debt, in part by accessing local debt markets**. The financial characteristics of the bond issuances are as follows:

- States and municipalities have taken advantage of low domestic interest rates and accessed local debt markets on 13 occasions since August 2001. Issuances in 2004, however, have come to a halt due to higher interest rates. Discussion with market participants indicate it is now cheaper to access banking financing.

- Issuance by states and municipalities accounts for around 5 percent of total issuance in the local debt market. Chihuahua (2002) and the Federal District (2002) had the largest issuances for MXN$2.5 billion each.

- About 30 percent of issuance has been for liability management purposes, to improve the debt service profile and to profit from lower domestic interest rates.

- While most states and municipalities have issued bonds with nominal interest rates, 30 percent has been inflation-indexed.

Table 2. Mexico: Improving Credit Ratings through the Master Fund Structure

Year		Issuer	Credit rating (local scale)	
			Debt Issued under Master Fund Structure	Issuer
Issuances with Pledging *Participaciones*				
2001	1	Morelos	AA+	A
	2	Aguascalientes	AAA	AA+
2002	3	San Pedro, NL	AAA	AA
	4	Monterrey, NL	AAA	AA
	5	Zapopan Jal.	AAA	AA
	6	Guadalajara, Jal.	AAA	AA-pcp
2003	7	Guerrero	AA+	A-
	8	San Pedro, NL	AA	AA
	9	Guerrero	AA+	A-
	10	Hidalgo	AAA	A+
	11	Hidalgo	AAA	A+
	12	Aguascalientes	AAA	AA+
	13	Federal District	AAA	AAA
2004	14	Sinaloa	AA+	A-
Issuances with Pledge on Own Revenues				
2002	1	Chihuahua	AAA	AA
	2	State of México	AA	BBpcn
	3	State of México	AA	BBpcn
	4	State of México	AA	BBpcn
	5	State of México	AA	BBpcn
	6	Chihuahua	AAA	AA
2003	7	State of México	AA	BBpcn
	8	State of México	AA	BBpcn
	9	Tlalnepantla	AA	AA
	10	Nuevo León	AAA	A
	11	Veracruz	AA	A+
	12	Nuevo León	AAA	A

Source: SHCP

- Most bonds were issued with a variable coupon, with reference mainly to the 182-day Cetes rate. Spreads ranged from as low as 75 basis points (Federal District, 2003) to 300 basis points (State of Mexico in several issuances).

- States and municipalities have been able to issue at relatively long terms. All issuances, except for Veracruz (2003), have had an original maturity of at least five years. Nuevo León issued in 2003 with an original maturity of nearly 12 years.

- Subnational governments have pledged future flows of federal *participaciones* (for 45 percent of the total amount issued), and with respect to own revenues, payroll taxes have been pledged to about 25 percent of the total amount issued. Chihuahua has issued by pledging toll road revenues.

21. **Despite good credit ratings, states and municipalities have not yet issued unsecured debt instruments**. The master fund structure is requested by creditors under the clear understanding that federal government would not rescue troubled states and, therefore, creditors demand guarantees for payment. On the other hand, states and municipalities could prefer secured instruments in order to minimize financing costs. The collateralization however differs from issuances in the corporate sector, which have been mostly unsecured.

22. **The growing pool of domestic institutional investors has played an significant role in providing funds for long-term financing**. The pension reform in 1999 originated a growing pool of institutional investors (the *AFORES*), that have played a crucial role in the development of local capital markets. In this regard, pension funds demand long-term investments in order to reduce maturity mismatches in their balance sheet. Pension funds are allowed to invest up to 35 percent of their portfolio in state and municipal debt above a certain minimum rating (AA-/aa3 local scale) with concentration limits of 5 percent of the portfolio on a single debtor. As of May 2004, CONSAR, the AFORES' supervisory body, reports that private pension funds hold nearly MXN$4 billion of subnational debt, although this represents only a low share of their portfolios (around 1 percent of total assets).

23. **Going forward, financing through domestic capital markets for states and municipalities may be facilitated by**:

- Pooling states/municipalities in accessing debt markets, as done in the United States with the municipal bond banks and state revolving funds. These instruments allow different entities to issue jointly, sharing the fixed costs of borrowing.

- Introducing regulation on homogenizing accounting systems, and promoting consistent debt management regulation across states.

- Investigating measures to facilitate partial guarantees in issuances and to ensure adequate risk management for states and municipalities.

E. Structure of States' Debt

24. **Before analyzing the debt structure at the state level, this section first discusses the federal transfer system, and the structure of state revenues**. Understanding the federal transfer system helps define the flexibility of states to devote funds to service debt. The section then analyzes debt levels, debt to the relevant ratios of revenues and disposable income, and the financial terms of the states' debt.

The Federal Transfers System

25. **Under the Fiscal Coordination Law approved in 1980, major taxes are collected by the federal government, while states and municipalities levy taxes mostly on real estate and payrolls**. Table 3 describes the structure of federal and local governments' expenditures and taxes. States have been gradually given increasing expenditure responsibilities and now spend close to half as much as the federal government. The decentralization process has not resulted so far in improved revenue capacity for subnational governments. Expenditures at the state level are mainly financed with transfers from the federal government.

26. **Decentralization has been enabled by an increase in the number and variety of transfers.** Transfers to states are made via transparent, nondiscretionary and publicly-known formulas. In 2001, federal transfers accounted for 85 percent of total states' revenues. Tabasco is the state most reliant on federal transfers (97 percent of the state net revenues), while federal transfers for the Federal District represent 51 percent of its total revenue. Two main categories of transfers are the *participaciones* and the *aportaciones*. *Participaciones* were originally subnational revenues whose collection had been delegated to the federal government in the Fiscal Pact in 1980, mainly because of tax efficiency reasons. *Participaciones* are set at 20 percent of tax revenue and oil royalties of the federal government, mostly under Ramo 28. They were around 3½ times higher than own revenues in 2001. *Aportaciones,* in contrast, are conceived as federal money earmarked to pay for federal commitments, including for expenditures in health, education, social infrastructure, and institutional strengthening. These funds go under Ramo 33, and were almost 4½ times as large as states' own revenues in 2001. States receive considerably more earmarked sources than freely disposable funding. Earmarked transfers accounted for 60 percent of total federal transfers in 2002.

27. **States own revenues account only for around 11 percent of their total revenues**. At the aggregate level, own revenues constitute around 11 percent of total net revenues of all the states (Table 4). Tax revenues account for around 45 percent of total own-state revenues in 2001, followed by rights (35 percent). The capacity to generate own revenues varies significantly across states. On average, states are able to collect 7 percent of their total revenue through own sources.The Federal District is the state with the highest capacity for own revenue collection, which accounts for almost 41 percent of total revenues because of the property tax; while Tabasco has the lowest capacity in this regard, at below 3 percent. The State of Mexico is only able to raise 7 percent of its revenues through own sources.

Table 3: Mexico: Structure of Federal and Local Government Expenditure and Taxes

Federal Government Taxes	*Federal Government Expenditures*
Personal and Corporate income tax	Federal Administration
Tax on assets of enterprises	Service of domestic and foreign debt
Value-added tax (VAT)	Defense
Duty on oil extraction (royalties)	Post and Telecommunications
Oil export tax	External affairs
Tax on Production and services (excises)	Irrigation
Tax on new cars	Foreign trade
Tax on the ownership or use of vehicles	Railways, highways, airways, and shipping
Import duties	Federal and border police
Others	
Shared Taxes	*Shared Expenditures*
Income taxes	Health
VAT	Education
Excises	Specific purpose grant program
Oil export duties	Single development agreements (*Convenios Unicos de*
Import duties	Special Police
Tax on the ownership or use of vehicles	National Parks
Tax on new cars	
State Government Taxes	*State Government Expenditures*
State payroll tax	State Administration
Real state Transfer Tax	State Infrastructure
Tax on motor vehicles older than 10 years	State public order and safety
Tax on the use of land	Sanitation and water supply
Education tax	Service of domestic debt
Indirect taxes on industry and commerce	Public Libraries
Fees and licenses for some public services	
Municipal Government Taxes	*Municipal Government Expenditures*
Local Property Tax	Local Administration
Real State Transfer Tax	Local Public Order and Safety
Water Fees	Local Transportation
Other local fees and licenses	Local Infrastructure including water supply and
Indirect taxes on agriculture, industry and	Local Transit
Residential development	Waste Disposal and Street Lighting
	Slaughterhouses, cemeteries, and parks
Source: Ter-Minassian (1997).	

Table 4. Mexico: Net Revenue Structure for States, 2001
(as a share of total revenue, unless otherwise specified)

			State-Federal Revenues	
	Total Revenue (in billion of MXN)	State-own Revenues	Total Federal Transfers	Of which *Participaciones*
T O T A L	**514.1**	**10.6**	**84.8**	**38.3**
Aguascalientes	5.3	4.1	93.2	42.3
Baja California	14.0	10.4	86.7	38.1
Baja California Sur	3.6	5.2	91.3	35.3
Campeche	6.6	7.2	80.8	33.6
Coahuila	12.7	9.0	91.0	38.8
Colima	3.6	3.6	94.8	40.4
Chiapas	20.8	4.0	96.1	36.4
Chihuahua	16.8	17.7	81.3	36.8
Distrito Federal	62.2	40.5	51.1	41.5
Durango	8.7	4.7	92.1	32.6
Guanajuato	19.6	6.2	86.2	39.5
Guerrero	17.1	2.6	95.3	24.3
Hidalgo	11.2	2.3	94.6	32.4
Jalisco	29.3	8.0	86.1	40.5
México	49.8	6.7	88.7	43.6
Michoacán	17.9	4.3	95.1	32.9
Morelos	8.3	3.0	90.8	37.6
Nayarit	6.6	4.5	86.1	30.0
Nuevo León	24.2	12.1	74.2	37.1
Oaxaca	17.5	3.1	94.4	27.3
Puebla	22.2	6.2	86.6	34.7
Qerétaro	8.0	5.3	94.2	40.0
Quintana Roo	6.1	8.8	84.0	34.2
San Luis Potosí	10.7	3.4	95.5	35.5
Sinaloa	12.5	7.6	91.2	42.2
Sonora	13.5	6.5	88.3	44.1
Tabasco	15.8	2.8	97.3	60.0
Tamaulipas	15.6	9.0	90.8	36.7
Tlaxcala	5.3	5.1	87.6	36.0
Veracruz	33.0	4.1	91.3	37.5
Yucatán	8.6	6.0	87.9	35.1
Zacatecas	7.3	4.5	94.2	36.2

Source: INEGI.

28. **The bulk of state government expenditure is concentrated on current expenditures, mainly transfers, followed by wages and salaries** (Table 5). In 2001, states' expenditures on transfers, reflecting mainly the distribution of subsidies and grants, represented 37 percent, followed by wages at almost 26 percent of total net state government expenditure. State expenditure in infrastructure and public works accounted for about 7 percent of total net expenditure, while revenue transfers to municipalities exceeded 15 percent. The fact that main expenditures are current would make more difficult to implement cuts if states come under financial difficulties.

Debt Profile of States

29. **Subnational debt has risen gradually in relation to GDP since 1993, although the level remains modest, at 1.8 percent of GDP in 2003**. The debt stock does not provide a complete picture of states' financial health, however. First, the relatively small size of subnational debt does not reflect capitalization of past fiscal deficits, as the federal government has repeatedly supported the states through extraordinary and discretionary transfers, by taking over indebtness. Second, federal government transfers reflected the existence of soft budget constraints for states. Third, access to local capital markets has been restricted by their limited borrowing capacity, although this changed in 2001 when states and municipalities started issuing debt instruments in local capital markets.

30. **Subnational government debt is concentrated in a few states**. During 1993–2003, out of the nation's 32 states, the Federal District, State of Mexico, Nuevo León, and Sonora represented, on average, 65 percent of total subnational government debt. Among these, the most indebted states are the State of Mexico and the Federal District with shares of total subnational debt of 25 and 34 percent respectively, by end-2003 (Figure 3). The same concentration pattern is observed when considering subnational debt as a ratio to GDP or federal transfers. The Federal District and the State of Mexico's debt represent 3 and 5 percent of state GDP, respectively. Despite total subnational debt being around 54 percent of total federal transfers, the Federal District and the State of Mexico's debt levels reached 149 and 115 percent of federal transfers in 2003, followed by Nuevo Leon with a share of 80 percent.

31. **There is large dispersion in indebtedness among Mexican states when considering the ratio of debt to different measures of revenues**. Some financial vulnerabilities can be observed due to the limited fiscal autonomy of the states. Debt to total revenues varied from a maximum of 54 percent (State of Mexico) to a minimum of 0.2 percent (Zacaletas) in 2001. The

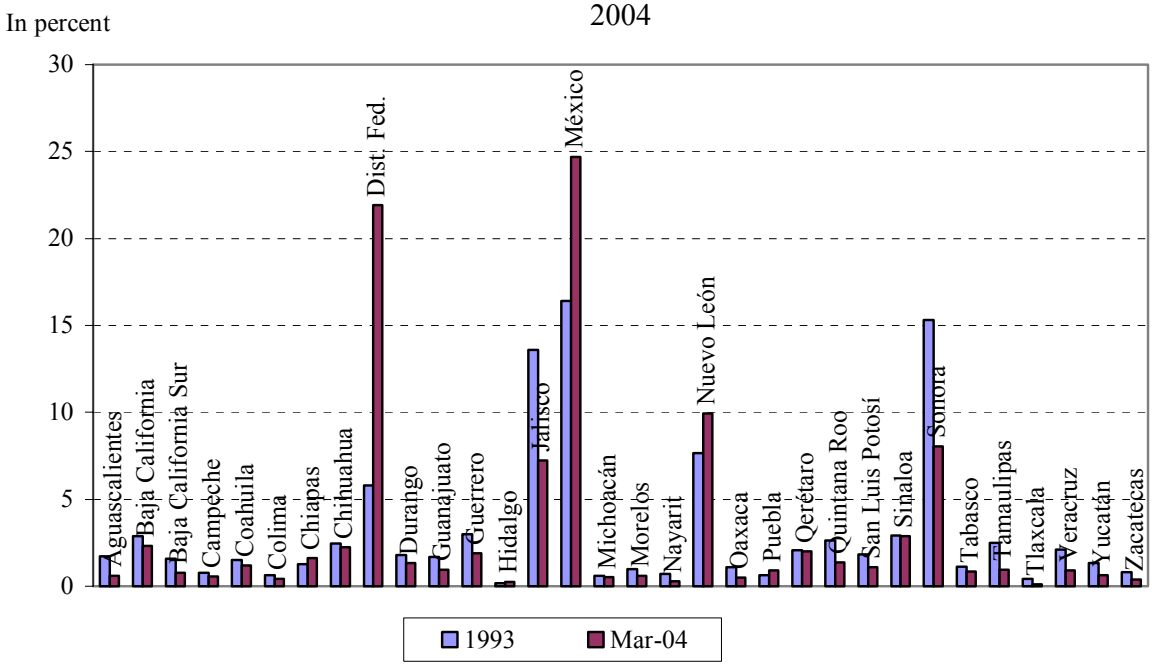
Table 5. Mexico: Net Expenditure Structure for States, 2001

(as a share of total net expenditure, unless otherwise specified)

	Total Expenditure (in billion of MXN)	Wages and Salaries	Transfers (subsidies and grants)	Transfers to Municipalities	Public Works and Social Activities
T O T A L	**514.1**	**25.7**	**37.4**	**15.2**	**7.4**
Aguascalientes	5.3	8.4	59.7	16.9	11.2
Baja California	14.0	26.2	50.2	13.4	3.9
Baja California Sur	3.6	8.7	66.0	12.4	1.7
Campeche	6.6	29.4	25.3	16.0	11.8
Coahuila	12.7	52.4	12.8	13.0	11.0
Colima	3.6	12.8	59.1	15.9	5.9
Chiapas	20.8	18.6	42.9	19.6	3.5
Chihuahua	16.8	15.9	50.5	14.0	17.1
Distrito Federal	62.2	36.3	10.5	0.0	6.7
Durango	8.7	17.4	55.1	15.6	6.1
Guanajuato	19.6	12.7	51.0	18.9	3.9
Guerrero	17.1	9.7	58.4	17.3	7.0
Hidalgo	11.2	5.7	62.6	20.1	8.4
Jalisco	29.3	38.9	30.2	19.0	2.0
México	49.8	27.4	34.3	18.1	8.5
Michoacán	17.9	49.2	14.9	18.4	10.2
Morelos	8.3	6.1	55.5	19.5	9.8
Nayarit	6.6	10.6	56.5	13.0	9.7
Nuevo León	24.2	32.7	23.8	13.9	6.5
Oaxaca	17.5	8.2	58.5	19.8	9.3
Puebla	22.2	37.3	22.3	19.6	7.5
Qerétaro	8.0	10.6	53.8	17.7	12.5
Quintana Roo	6.1	8.8	52.8	15.4	10.2
San Luis Potosí	10.7	14.4	56.7	19.0	4.5
Sinaloa	12.5	16.4	55.6	15.0	5.8
Sonora	13.5	21.5	44.2	15.5	8.0
Tabasco	15.8	21.2	43.0	17.6	4.8
Tamaulipas	15.6	12.7	51.5	14.5	12.6
Tlaxcala	5.3	13.0	56.9	16.5	2.6
Veracruz	33.0	45.0	22.4	18.1	7.7
Yucatán	8.6	17.6	50.6	19.3	6.9
Zacatecas	7.3	7.1	63.0	19.0	6.3

Source: INEGI.

Figure 3: Mexico: Subnational Debt as a Share in Total, by States, 1993-2004



Source: SHCP

Federal District reports the second largest debt level in terms of total revenues (53 percent). However, this measure does not fully indicate the burden of debt since most transfers are earmarked. Disposable income needs to consider only non-earmarked revenues (*participaciones* and own revenues). As described in Table 6, total subnational debt in terms of *participaciones* has declined in the last decade, but continues to be high (above 50 percent). The State of Mexico and Federal District are the only states with debt levels above 100 percent. The State of Mexico, generates only around 7 percent of total revenues through own sources, while the Federal District's own revenues account for 40 percent of its total revenues.

32. **On the structure of subnational debt, the main features are**:

- As mentioned in the first section, subnational debt is not exposed to exchange rate risks.

- About 44 percent of total debt with commercial and development banks is indexed to inflation, i.e. in Udis-denominated instruments (Table 7). Banobras, the public development bank, has provided around 58 percent of its credit in udis-denominated instruments; while 34 percent of total portfolio from commercial banks is denominated in udis.[79]

[79] There is not sufficient data available to analyze interest rate risks on subnational debt.

Table 6. Mexico: Public State Debt as a Ratio of *Participaciones* , 1994-2004.

(In percent)

Entidad	1994	2001	2002	2003	2004 1/
T O T A L	**64.9**	**50.3**	**56.8**	**53.5**	**50.7**
Aguascalientes	81.8	9.2	14.7	26.2	24
Baja California	82.1	31.7	35.7	38.1	40.9
Baja California Sur	121.4	54.8	52.3	39.5	40.9
Campeche	100.7	3.6	0.9	0	0
Coahuila	53.8	14.4	12.6	4.7	4.4
Colima	62.3	15.3	22.6	28.2	25.6
Chiapas	68.4	12.5	11.7	10.2	9.6
Chihuahua	78.1	23.3	26.1	20.4	21
Distrito Federal	22.9	127.6	146.6	148.8	140.5
Durango	93.4	47	48.1	56.5	55.3
Guanajuato	26.3	8	8.5	13.6	13.5
Guerrero	53.2	37.1	35.5	40.3	34.7
Hidalgo	3	12.6	19.1	30.8	29.1
Jalisco	116.3	41.7	47.8	40.1	38
México	114.9	123.8	136.5	115	108.8
Michoacán	20.2	3.1	2.6	23.2	22.2
Morelos	23.7	16	16.2	23.8	22.1
Nayarit	51	6.6	4.9	4.2	10.8
Nuevo León	124.9	95.9	93.1	80.6	78.3
Oaxaca	23.5	4.8	6.5	10	9.7
Puebla	10.1	13.1	12.8	30.4	25.4
Qerétaro	215.2	44.1	42.7	37.6	35.8
Quintana Roo	136.8	47	62.4	58.4	58.1
San Luis Potosí	44.5	21.2	37.9	27.4	27.3
Sinaloa	82.5	56.3	64.8	55.7	53.4
Sonora	253.7	82.9	82.4	77.4	71.2
Tabasco	29	6.2	6	4.6	4.4
Tamaulipas	30.7	10.9	6.9	10.5	9.5
Tlaxcala	32.8	0	0	0	0
Veracruz	13.8	9	23.1	13.6	11.2
Yucatán	48.1	4.1	18.5	23.2	23.4
Zacatecas	23.2	0.4	8.1	12.9	11.8

Source: SHCP.

1/ As of March 2004

Table 7: Subnational Debt with Commercial and Development Banks, by States, March 2004
(in million of MXN)

		As a percent of total debt		As a percent of total debt	
State	Total Debt	Udis-denominated Debt	Peso-Denominated Debt	Commecial Banks	Development Banks
T O T A L	**122,851**	**44.1**	**55.9**	**56.8**	**43.2**
Aguascalientes	690	0.0	100.0	87.3	12.7
Baja California	2,874	23.6	76.4	32.9	67.1
Baja California Sur	667	47.2	52.8	61.3	38.7
Campeche	0	na	na	na	na
Coahuila	254	0.0	100.0	47.4	52.6
Colima	493	6.6	93.4	72.1	27.9
Chiapas	904	98.0	2.0	98.0	2.0
Chihuahua	1,532	81.5	18.5	60.7	39.3
Distrito Federal	40,971	9.6	90.4	57.6	42.4
Durango	1,802	52.5	47.5	47.2	52.8
Guanajuato	1,227	41.8	58.2	41.3	58.7
Guerrero	1,812	6.8	93.2	84.1	15.9
Hidalgo	1,316	0.0	100.0	91.2	8.8
Jalisco	5,610	63.9	36.1	74.6	25.4
México	31,309	84.3	15.7	52.4	47.6
Michoacán	1,579	7.1	92.9	91.4	1.8
Morelos	826	0.0	100.0	88.7	11.3
Nayarit	265	0.0	100.0	17.1	82.9
Nuevo León	8,613	87.7	12.3	28.6	71.4
Oaxaca	579	0.0	100.0	48.9	51.1
Puebla	2,532	8.5	91.5	76.7	23.3
Qerétaro	1,505	9.1	90.9	13.7	86.3
Quintana Roo	1,615	60.9	39.1	41.0	59.0
San Luis Potosí	1,251	22.0	78.0	71.9	28.1
Sinaloa	3,172	21.5	78.5	78.2	21.8
Sonora	5,318	94.1	5.9	55.5	44.5
Tabasco	529	86.7	13.3	86.7	13.3
Tamaulipas	725	15.9	84.1	58.8	41.2
Tlaxcala	0	na	na	na	na
Veracruz	1,601	0.0	100.0	68.1	31.9
Yucatán	916	1.1	98.9	90.8	9.2
Zacatecas	365	0.0	100.0	86.2	13.8

Source: SHCP

- Subnational governments have borrowed mainly from development and commercial banks (Table 7). Around 57 percent of total subnational bank debt is with commercial banks. Of this, 60 percent accounts for credit to the State of Mexico and the Federal District. Development banks' portfolio is allocated mainly in three states (State of Mexico (33 percent); Federal District (28 percent) and Nuevo León (12 percent)).

- Overall, states have increased the average maturity of debt by 3 years since 1994 (Table 8).

F. Improvements In States' Debt Management and Contingent Liabilities

33. **Although the framework put in place in 1999–2000 has moved Mexico toward a market-driven approach to state borrowing, further work is required to improve debt management practices across states.** The federal government, for instance, has an important role to play in motivating and facilitating improved accounting standards and public disclosure for states and municipalities, and to promote financially prudent behavior by creditors and debtors. This section briefly discusses needed measures in debt management for states, mainly through further accounting harmonization across states and disclosure of information, and accountability of contingent liabilities.

Debt Management at the State Level

34. **Despite improvements in debt management, obstacles remain in comparing and analyzing states' public finances.** The major issues are: the lack of harmonization between the concepts for revenues, expenditures and debt across states; the absence of accounting standards; and weak coordination across states in the way the information is reported to local congress and the public in general. Although all state laws require state congress approval of debt operations, the regulation across state laws varies. Some states have introduced regulation limiting the debt contraction levels in a year, while others have introduced limits to the overall degree of indebtedness. Most indebted states do not contain such restrictions in their state debt laws.

35. **Registration of state debt with the SHCP could improve monitoring of indebtedness.** Despite incentives to register debt contracted by states, registration with the SHCP is done on a voluntary basis and serves only for information. Subnational debt statistics at the SHCP refer to debt contracted with commercial and development banks, without incorporating debt issuance in local capital markets. It is also unclear whether adequate mechanisms are put in place to ensure that debt flows are devoted to finance infrastructure projects as prescribed. Finally, when additional federal transfers are available during the fiscal year (e.g. due to higher-than-budgeted oil prices), states receive the added transfer upon presentation of the infrastructure project where the sources are going to be committed to. However, this investment is not necessarily in addition to that envisaged in the annual state budget, so the additional transfer could ultimately be financing current expenditures.

Table 8. Mexico: Maturity of Debt, by State

(In years)

State	Dec-94	Dic-2001	Dic-2002	Dic-2003	Mar-04	Absolute Variation
T O T A L	**6.6**	**11.5**	**10**	**9.7**	**9.6**	**3**
Aguascalientes	6.1	5.9	3.7	4.9	5.9	-0.2
Baja California	8.2	10.2	9.8	9.9	10.3	2.1
Baja California Su	6	8.5	8.2	6.2	5.7	-0.4
Campeche	5.5	5.5	8	0	0	-5.5
Coahuila	7.6	10.7	11	9.9	9.7	2.1
Colima	4.7	6.2	6.4	6.1	5.9	1.2
Chiapas	8.6	13.1	12.4	11.7	11.4	2.7
Chihuahua	4.4	11.4	11.5	11.2	10.1	5.8
Distrito Federal	6.4	10.3	8.9	9.7	9.6	3.2
Durango	3.8	13.4	13.1	11.1	10.8	7.1
Guanajuato	8.1	10.3	9.5	8.9	8.7	0.5
Guerrero	5.4	13.2	12	9.8	9.3	3.9
Hidalgo	3	3.1	2.1	7	6.9	3.9
Jalisco	7.7	13	11.6	11.2	11	3.4
México	5.3	12.6	11.4	10.6	10.4	5.1
Michoacán	7.8	8.2	7.9	10	9.9	2.1
Morelos	4.4	6.1	4.9	4.5	4.3	-0.1
Nayarit	4.1	6.1	5.2	4	4.1	0
Nuevo León	8.6	11.2	10.2	9.3	9	0.3
Oaxaca	7.2	4.8	4.5	9.9	9.7	2.5
Puebla	8.9	11.6	10.7	5.8	6.7	-2.2
Qerétaro	6	15.1	14.4	12.6	13.8	7.8
Quintana Roo	6.3	12.1	12.5	11.8	12	5.7
San Luis Potosí	2.7	5.6	6.9	8	7.7	5
Sinaloa	7.3	13.3	12.3	11.5	10.8	3.5
Sonora	8.4	12.8	12.1	10.7	10.7	2.3
Tabasco	3.1	11.9	9.3	8.8	8.6	5.6
Tamaulipas	5.7	5.9	7.5	5.9	5.7	0.1
Tlaxcala	0	0	0	0	0	0
Veracruz	3.9	20.4	1.6	0.9	0.7	-3.2
Yucatán	5.9	2.8	3.9	5.3	5	-0.9
Zacatecas	6.3	2.8	3.5	3.9	3.7	-2.6

Source: SHCP.

36. **The authorities, in the National Public Finance Convention, have identified some legal constraints on states' debt management at the three levels of government**.

- At the *federal level*, the authorities listed the following elements: (i) the absence of a constitutional chapter regulating public finance federalism, including revenues, expenditure, and debt at the three levels of government; and (ii) the lack of a macro-fiscal law ensuring sustainable federal debt paths (including direct and indirect debt, and contingent liabilities);.

- At the *state level*, the authorities have identified: (i) the lack of homogenous regulation across states; (ii) lack of common criteria in terms of transparency and public finance reporting; and (iii) the absence of a public finance coordination law that would substitute the current Fiscal Coordination Law to include regulation with respect to revenues, expenditures, and public debt.

- At the *municipal level*, the identified factors that constrain debt management are: (i) the lack of regulation in terms of municipal indebtedness; and (ii) the lack of normative measures on the supervision of the executive and local congress.

Accounting for Contingent Liabilities

37. **States and municipalities need to make explicit accounting of their contingent liabilities**. The analysis in the previous section indicated that debt levels do not threaten macroeconomic stability. However, the statistics do not give a sense of the real burden that states and municipalities could be facing. Contingent liabilities are important, due largely to under-funded state pension funds. State pension fund deficits may surpass debt levels. Most Mexican states have not made provisions for pension liabilities in line with financial stability over the medium term. The SHCP has reported the contingent liability of state pension funds, as of 1998, at around 25 percent of GDP. This contingent liability represents about half the actuarial deficit of the Social Security Institute.[80] Although the lack of a long-term vision has undermined allocations to state pension funds, some states have undertaken reforms to increase retirement age, employee contributions, and pension provisions to strengthen their system.

38. **Public enterprises and other state institutions also generate contingent liabilities**. States and municipalities have provided guarantees on loans to their respective decentralized agencies and public enterprises, as most public enterprises regularly report weak financial positions. Public enterprises usually charge prices below costs, usually without taking into consideration asset depreciation. In order to facilitate credit to these institutions, or to reduce financing costs, states have provided guarantees, although there is no indication about their extent.

[80] The study was prepared by Hewitt and Associates and refers to 29 states.

39. **The authorities have discussed the need to identify contingent liabilities for states and municipalities.** In the National Public Finance Convention, the following factors were identified as constraining an adequate planning for contingent liabilities: (i) the absence of a national pension system; (ii) the lack of uniform concepts and methodology across states to evaluate contingent liabilities; (iii) the lack of adequate incentives to face the problem; and finally, (iv) the need to find consensus to identify the problems and propose solutions.

G. Conclusions

40. **This chapter has analyzed the institutional framework for subnational debt contraction, its implications in terms of financing diversification, and the debt structure for states.** Since the crisis in 1995, Mexico has taken a proactive strategy in designing decentralization. In this sense, Mexico has been progressing toward more autonomy, fiscal responsibility, and accountability of subnational levels of government. After the government's takeover of state debt during the Tequila crisis, the federal government eliminated discretionary federal transfers, and in 2000 introduced a regulatory framework for debt management for states and municipalities that combined market discipline and rules-based mechanisms.

41. **The framework, while improving discipline in debt management and allowing subsovereign Mexico to diversify financing sources, results in a more rigid financial structure.** States and municipalities are complying with the requirement of holding credit ratings, which helps discriminate the cost of capital across states and municipalities in line with financial risks and costs. States and municipalities have accessed local debt markets, favored by low domestic interest rates, the 2001 stock market reform, and the development of a solid base of institutional investors after the 1999 pension reform. Capital market financing has allowed states and municipalities to diversify their financing sources and investor base, and to extend the maturity of their debt. However, all issuances have been done through a master fund structure, which pledges state revenues (mainly non-earmarked federal transfers). While this structure improves the credit quality of states' debt instruments, the finances of the states become more rigid as more future revenues are allocated to predetermined debt service. Despite good credit ratings, states and municipalities have not yet issued unsecured debt instruments.

42. **Mexico's subnational government debt has risen gradually since the end 1990s although it remains low and concentrated in a few states, while states continue to rely heavily on federal transfers as their main revenue source.** The debt stocks of Mexican states do not provide a complete picture of their financial health, as they do not include debt taken over, or financed by, the federal government through extraordinary and discretionary transfers. Despite increased decentralization, states continue to be reliant on federal transfers as their main source of revenue. Own revenues account only for 12 percent of their total revenues, and the bulk of state government expenditure is concentrated on current expenditures. Debt levels only reach 2 percent of national GDP, but subnational government debt is concentrated in a few states. The Federal District, State of Mexico, Nuevo León, and Sonora represent, on average, 65 percent of total subnational government debt.

43. **Although the framework put in place in 1999–2000 has moved Mexico toward a market-driven approach to state borrowing, further work is required to improve debt management practices across states.** First, obstacles remain to obtaining financial results from the analysis of states' public finances, mainly due to the absence of an harmonized framework for public finance accounting and disclosure of information. Registration of state debt within the SHCP could improve subsequent monitoring of indebtedness. Secondly, states and municipalities need to make an explicit accounting of their contingent liabilities. In this regard, the authorities have discussed proactively the need to identify the contingent liabilities for states and municipalities. States also need to identify the extent of their contingent liabilities in public enterprises and other state institutions.

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