

## **Mexico: Selected Issues**

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MEXICO

**Selected Issues**

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Approved by the Western Hemisphere Department

October 20, 2005

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## I. OVERVIEW

1. **For the 2005 Article IV Consultation with Mexico, the IMF mission team has prepared four background studies.** Drafts of these papers were discussed with the Mexican authorities during the July 2005 mission, an interaction which provided valuable suggestions, and essential further information, used in the completion of the papers.

2. **The first paper considers the “informal sector.”** In Mexico and many other countries, the informal sector represents a large share of total employment. However, there has yet to emerge a definitive view in the literature as to the causes and consequences of informality (perhaps because the informal sector is inherently difficult to study, because of data problems). In recent years, the traditional view of the informal sector as arising from labor market rigidities (a “dualistic” labor market) has been complemented by broader analyses linking voluntary decisions to participate in the informal sector to a range of structural and governance problems affecting the business environment of the formal sector. This paper argues that the presence of externalities means that having a large informal sector can entail significant losses to an economy as a whole, even if each informal firm operates efficiently at the firm level. Negative externalities from operating informally can arise from the impact on infrastructure and public service, governance, information, and the legal system. Following a survey of the literature on informality, with special focus on findings for Mexico, the paper develops a theoretical model that highlights the importance of externalities and the distortion associated with the informal sector. The analysis also provides insight into the kinds of policy measures that might sustainably reduce the size of the informal sector: while heightened administrative efforts to push individual firms into the formal sector would have a temporary effect, lasting results would come from structural reforms that address the causes of informality.

3. **The three other papers focus on financial saving in Mexico: one at the aggregate level of the country’s private saving rate, another on the bank lending market, and the last on the securities market.**

4. **Although the rate of private saving has been somewhat lower in Mexico than elsewhere, the second paper finds that saving in Mexico is higher than would be predicted, after controlling for the factors that past studies have found to be associated with saving.** The analysis is based on a cross-sectional analysis of other OECD and emerging market countries. In looking at how the Mexican saving rate has evolved over time, it seems that the stabilization of the economy and the rapid development of financial intermediation have not yet translated into higher saving (such a result is not necessarily surprising, since economic theory suggests that these developments could each have offsetting effects on saving behavior). The paper shows that changes in both public saving and external saving—the current account deficit—in Mexico have tended to be associated with offsetting changes in private saving. The causal interpretation of these negative correlations is not clear, but one part of the story is the fact that aggregate investment in Mexico has been relatively stable and insensitive to the business cycle, at least in comparison to some other countries. Although the evidence is not definitive, the paper suggests that

Mexico's overall level of investment may now be more constrained by structural factors affecting the profitability of real investment expenditure, rather than by the private sector's rate of financial saving. Such a view adds priority to making progress on Mexico's structural reform agenda.

5. **The financial sector is an area in which Mexico has advanced notably in the last decade.** Ongoing reforms and development of the banking sector and securities market have been profound. Aside from the possible effect of these changes on the country's aggregate saving rate, greater efficiency and dynamism in these two markets would be expected to improve the prospects for faster economic growth, and continued stability, in Mexico.

6. **The third chapter examines bank lending and profitability in Mexico since 1998, a period of extensive reforms and structural change, including in bank balance sheets.** After years of relative stagnation, bank lending in Mexico has very recently become more dynamic. The analysis is done in two parts. First is a review of bank reforms and other factors which may have influenced bank behavior in recent years, with attention to the sequencing of those reforms. Second, the paper applies regression analysis to bank-level data, to link both bank profitability and bank lending to the private sector to bank balance sheet indicators. The regression results confirm the importance of sound balance sheets as a basis for bank lending growth, while not finding evidence that bank credit to the public sector, mostly notes extended to banks in exchange for their non-performing assets after the 1994–95 crisis, has crowded out lending to the private sector in recent years. The estimated relationships cannot explain the fast rebound of commercial bank lending to the private sector seen since end-2003—at an annualized rate of 26 percent in real terms. Factors not captured in the regression analysis, related to both structural reforms and demand forces, likely have been at play in the recent lending recovery. The paper briefly reviews the experiences of Chile and Korea, to illustrate the range of factors that could drive a recovery of credit, as well as the potential benefits and risks.

7. **The final paper examines the significant steps Mexico has taken to develop its government securities market in the context of broadening and deepening its local capital market.** It presents a framework of how Mexico has approached this task through building up both the demand and the supply sides of the securities market, while simultaneously strengthening the necessary infrastructure. The paper focuses on the legal, regulatory, and institutional aspects of the Mexican experience, and outlines its implications so far, as well as identifying pending areas for broader capital market development, including the stock market. Specific issues that may be of particular interest going forward, such as the benefits and risks associated with foreign participation in the local market, and the factors affecting the asset allocation of the pension funds, are also discussed.

## II. THE MEXICAN INFORMAL SECTOR AND ITS IMPLICATIONS<sup>1</sup>

### *Abstract*

*In Mexico and many other countries, the “informal sector” represents a large share of total employment—but what are the causes and consequences of informality? This paper argues that the presence of externalities means that having a large informal sector can entail significant losses to the economy as a whole, even if each firm operates efficiently at the micro firm level. Negative (and positive) externalities from operating informally (formally) arise from the impact on infrastructure and public service, governance, information, the legal system, and so on. Following a survey of the literature on informality, with special focus on Mexico, the paper develops a theoretical model that highlights the importance of externalities and the distortion associated with the informal sector, and provides insight for the kinds of policy changes that might sustainably reduce the size of the informal sector.*

### A. Introduction

1. **Although the informal sector—defined as small-scale, semi-legal enterprises—encompasses more than a third of economic activity in many developing countries, and an even larger share of employment (Schneider and Enste (2002)), the causes of “informality” and particularly the implications for economic development are still not well understood.**
2. **A traditional view of informality considers it to be a consequence of a distorted, segmented labor market.** According to that view, labor market rigidities (including rigidities arising from regulation) lead to a rationing of jobs in the formal sector, forcing some workers into the inferior informal sector while waiting for a job in the formal sector, i.e., a “dualistic” labor market (Harris and Todaro (1970)). The informal sector is thus essentially a residual comprised of disadvantaged workers who have been rationed out of “good jobs.” According to the more modern view of the informal sector, however, most participants in the informal sector have chosen voluntarily to pursue an entrepreneurial informal sector job. In this view, the informal sector can be seen as the unregulated, semi-legal developing country analogue of the voluntary entrepreneur small firm sector found in advanced economies (Maloney (2005)).
3. **Indeed, Maloney (2005) provides compelling arguments to question the traditional view of a dualistic labor market, and in support of the voluntary entrepreneur view of the informal sector.** First, in interviews with informal sector

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<sup>1</sup> Prepared by Gil Mehrez ([gmehrez@imf.org](mailto:gmehrez@imf.org)). The author is indebted to the Mexican authorities at the Bank of Mexico and the Ministry of Finance for valuable suggestions on an earlier draft of this paper.

employees in Mexico, more than 60 percent responded that they left their previous job and entered the informal sector voluntarily because of greater independence or higher pay (Maloney (2005)). Second, using data on micro enterprise firms in Mexico, Fajnzylber, Maloney, and Montes (2003) find that labor mobility between the formal and informal sector is high and is similar to the transition patterns observed in the U.S. They argue that this similarity suggests that “informal micro firms in developing countries should be viewed first as standard firms that offer job opportunities relative to the salaried sector that are comparable to those in the industrialized country.” Furthermore, they report that transition into self employment is similar to the one observed in the U.S—workers tend to start their own business after being employed as salaried workers for 4–6 years. Third, Fiess, Fugazza, and Maloney (2002) document substantial periods of expansion of employment in the informal sector during economic upturns, suggesting that at least part of the sector is voluntary. However, they also find episodes when employment in the informal sector expands during recessions, suggesting that some part of informal sector employment, at least during a downturn, does reflect rigidities in the formal sector.

4. **Looking beyond the traditional dualistic explanation of informality has led to consideration of a wide range of other factors that may contribute to informality.** Indeed, if the problem is not limited to a lack of market-clearing wages in the formal sector, and at least some participation in the informal sector is voluntary, then the natural question is what are the various factors—costs and benefits—that govern an individual’s decision to participate in the informal sector. This is the approach of the more recent literature.

5. **Recent theories of informality focus on the costs to the individual firm, arguing that operating informally entails certain costs associated with the firm’s loss of access to productive public goods, infrastructure and legal framework (Azuma and Grossman (2002), Loyaza (1996), and Marcouiller and Young (1995)) and limited access to financial services (Straub 2005)).** In these models, a firm weighs the gains from becoming formal against the costs to a firm of operating in the formal sector—in particular costs associated with compliance with tax and regulatory requirements. Indeed the empirical literature finds that the size of the informal sector is correlated with the tax burden (Giles and Tedds (2002), Dabla-Norris, Gradstein and Inchauste (2005)), entry costs (Auriol and Walters (2005)), and the quality of the legal system and financial market developments (Leaven and Woodruff (2004)).

6. **Although potentially the loss of output to each individual informal firm from being informal may be significant, several observations suggest that the losses to an individual informal firm in practice are limited.** First, Levenson and Maloney (1998) find that being informal usually does not imply loss of access to all formal services, but rather that firms, to some extent, can choose the level of formality according to their size and development. That is, many informal firms can still enjoy some form of formality that fits their activity. If a firm chooses not to register and enjoy legal protection, it is often because the benefits from legal protection to this firm are small. Indeed, using data set from Mexico (the 1992 National Micro Enterprises Survey) they document that many informal firms do

participate also in various formal activity. Second, McKenzie and Woodruff (2005) find, using a similar data source for Mexico, that informal firms require low start-up costs and that access to capital does not appear to determine the ultimate size of an informal enterprise.

7. **This chapter develops a theoretical framework that captures the existence and importance of positive (negative) externalities arising from firms' decision to operate in the formal (informal) sector.** In this model, the equilibrium size of an economy's formal and informal sector is determined according to the benefits from having better access to formal goods and services compared with the various costs associated with being formal, as well as the transition costs of exiting the informal sector and becoming formal. The existence of externalities implies that regardless of the sources of the informal sector (the dualistic view or the "voluntary decision" view) and the extent of losses to the individual firm from informality, the impact of informality on the economy as a whole can be significant because of externalities.

8. **Positive externalities from producing in the formal sector could arise through several channels.** The most obvious one is through the beneficial impact of having more firms on the level of public goods, such as infrastructure, or the average tax rate, assuming that the distortion associated with taxes is nonlinear. However, other channels could be just as important. Having a larger formal sector could improve the information set of both the private sector and policy makers and thus raise the amount and quality of financing and investment, the process of matching between firms and suppliers, customers, and workers and improve policymaking. Likewise, a larger formal sector could act to enhance the legal system, property rights and governance as a whole, either by exerting larger political pressure in support of these or by enhancing transparency. Indeed, Kaufman, Mehrez and Gurgur (2002) argue, in the context of public sector management, that transparency, corruption and public service delivery are determined simultaneously. Using governance micro-survey data of public officials in Bolivia, they find that raising transparency would decrease bribery and improve service quality. Likewise, Laeven and Woodruff (2004) argue that one needs to use instrumental variables for the quality of legal system when estimating its impact on firm size, since "there may also be a direct connection between the presence of larger firms and the development of a more effective judicial system, in that larger firms may demand a better judicial system." Finally, if firms operating in the formal sector tend to use more capital and advanced technology, they may create more learning by doing and innovation, factors emphasized by endogenous growth models.

9. **Looked at from the other side, negative externalities from operating informally may arise because informality weakens the public sector, dilutes the information set, reduces transparency, and hampers governance and the legal system.** These linkages between the informal sector and public finances are well recognized. For example, Schneider and Enste (2000) claim that "An increase in the shadow economy leads to a decreased state revenue, which in turn reduces the quality and quantity of publicly provided goods and services. Ultimately, this can lead to increased tax rates in the official sector, often combined with deterioration in the quality of public goods (such as public infrastructure) and of the

administration, with the consequences of even stronger incentives to participate in the shadow economy.” (See also OECD Employment Outlook 2004, Box 5.2).

10. **This chapter offers several contributions to the theoretical analyses of the informal sector.** First, it highlights the potentially significant adverse effect on economic development of having a large informal sector. Second, it emphasizes the importance of externalities and the resulting market failure. Finally, it suggests that econometric analysis should estimate the size of the informal sector, and the economic fundamentals such as the level of infrastructure, the rule of law and governance simultaneously.

11. **The rest of the chapter is structured as follows.** The next section provides an overview of the informal sector in developing countries with a particular focus on the case of Mexico. Section 3 develops the theoretical model. Section 4 concludes.

### **B. Aspects of the Informal Sector in Developing Countries and Mexico**

12. **The “informal economy” is defined here as the unregulated, semi-legal enterprises that rarely comply with all regulations, tax payments, conditions of employment and operating licenses.** This sector tends to be characterized by low entry requirements in terms of capital, qualifications, and procedures, and typically consists of small-scale labor-intensive operations. Informal activity is concentrated mainly in commerce and services, but can also be significant in manufacturing. Interestingly, as mentioned in the introduction, this distribution of small but informal firms in Mexico is broadly similar to the distribution in the U.S. of small (but formal) firms, especially for owner-only firms, although the frequency of firms with 10 or more employees is higher in the U.S.

Table 1. Microenterprise size (in percent)  
Mexico and the United States (2000)

	<u>Mexico</u>	<u>United States</u>
Owner only	62.5	67.8
1-4 employees	31.9	12.5
5-9	2.8	4.8
10 more	2.8	15.7

Source: Fajnzylber, Malone, and Montes, 2003.

13. **The informal sector is inherently difficult to measure accurately.** Various methods to measure the sector include surveys, national accounts (by reconciling income, expenditure and output estimates) the demand for bank notes, and electricity consumption. For example, Schneider (2002), estimates, based on demand for electricity, that the informal sector in Latin America amounts, on average, to about 40 percent of total output.

14. **Detailed data for Mexico is available through the Encuesta Nacional de Empleo survey of employees and of small firms.** This reveals that most workers in Mexico, whether they are employed at a formal or informal firm, do not participate in (i.e., do not contribute to

or receive benefits from) social protection systems. In a population of over 100 million persons, out of about 42 million workers, only about 15 million receive social security and other benefits. Regarding income, those employed in the informal sector overall earn less, have lower education, and are younger than those in the formal sector Verdu (2004). However, Maloney (1999) using data on transition between sectors, shows that those workers who move from formal jobs to become self-employed in the informal sector experience an increase in their earnings and are older than the formal workers.

15. **With regard to firm distribution, analysis by Leaven and Woodruff (2004), based on 1998 Mexican census of firms from INEGI, the national statistical institute, implies that most establishments in Mexico have less than 9 employees and those establishments account for close to 40 percent of total employment in Mexico.**

Table 2. Share in Total Number of Employees  
By Size Category

Size Category	All firms		Manufacturing firms	
	Mexico	U.S.	Mexico	U.S.
0 to 9 employees	38.5	11.4	18.5	3.5
10 to 19 employees	6.4	7.4	4.5	3.8
20 to 49 employees	8.9	10.4	7.4	7.8
50 to 99 employees	6.9	7.5	6.5	7.3
100 to 499 employees	18.4	14.9	28.2	17.3
More than 500	20.9	48.5	34.9	60.3

Source: Leaven and Woodruff (2004).

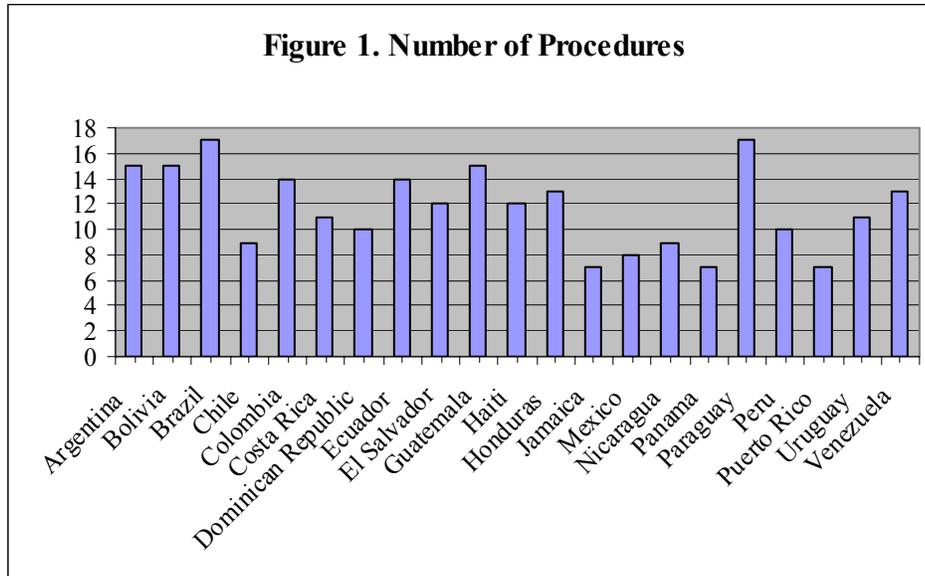
16. **Furthermore, Leaven and Woodruff (2004) document that the share of firms with corporate ownership is small in Mexico compared to the U.S. (8.1 percent compared with 21 percent in the U.S.), while the share of proprietorships is large (89 percent compared to 72.6 percent in the U.S.).** Looking within Mexico, they find that Mexican states with more effective legal systems have larger firms, and the impact is larger in sectors in which proprietorships dominates.

### C. Factors Affecting Firms' Choice to be Informal

17. **Key to the existence of the informal sector are the obstacles and costs associated with becoming formal.** These obstacles include costs to the firm of registration and government regulations, and, of course, taxes. Indeed, across countries there is a negative correlation between the extent of regulations and share of informality in the economy.

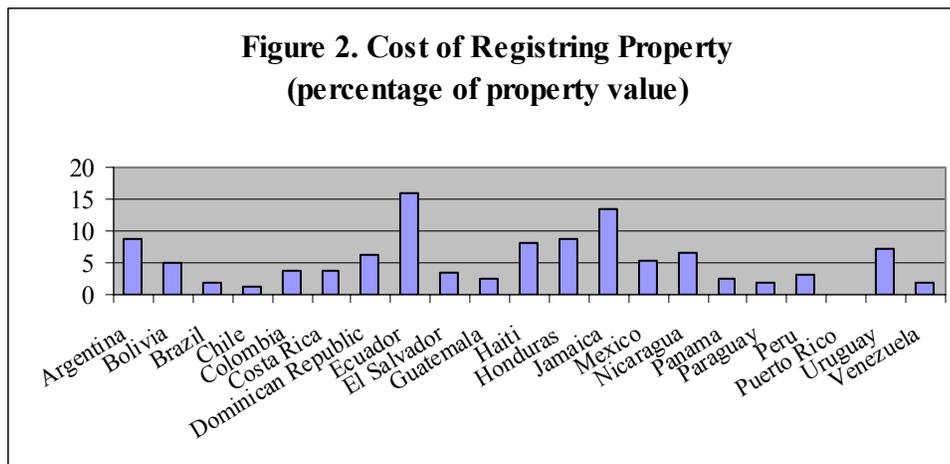
18. **Obstacles to starting a business vary greatly across countries.** For example, World Bank data indicate that starting a business in Australia requires 2 procedures and 2 days, compared with 19 procedures in Chad and 203 days in Haiti. In terms of costs of starting a business, these vary from zero in Denmark to US\$1,663 in Sierra Leone. As for Mexico, obstacles to starting a business are somewhat higher than in other OECD countries,

but are somewhat lower than the average in Latin America. It requires 8 procedures and 58 days to start a business in Mexico.



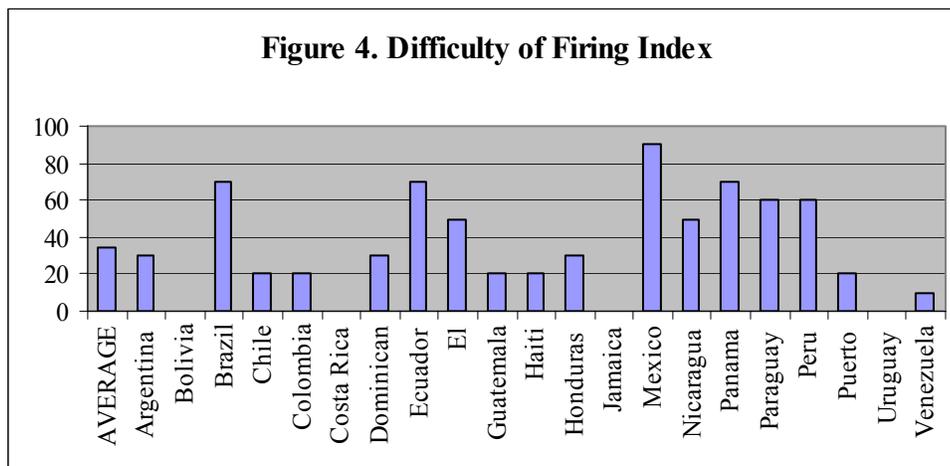
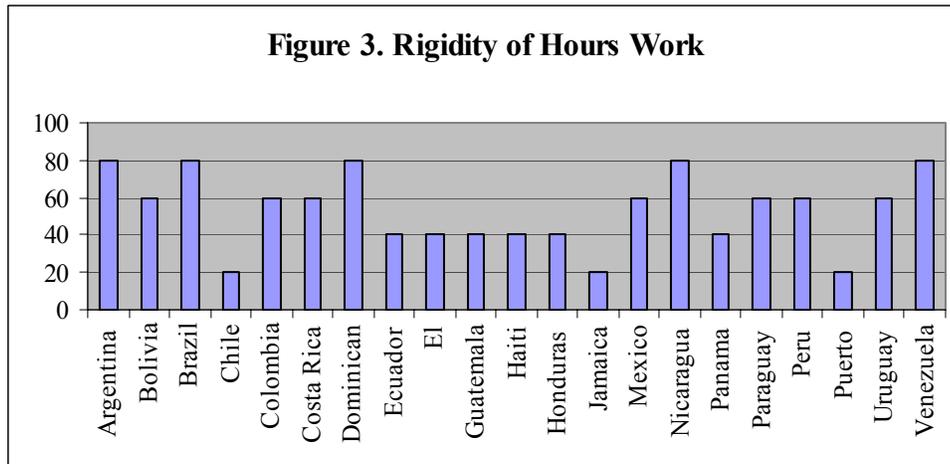
Source: World Bank, Doing Business in 2005.

19. Likewise, registering a property involves large costs that in Mexico amount to 5.3 percent of the property value, and requires 5 procedures and 74 days.



Source: World Bank, Doing Business in 2005.

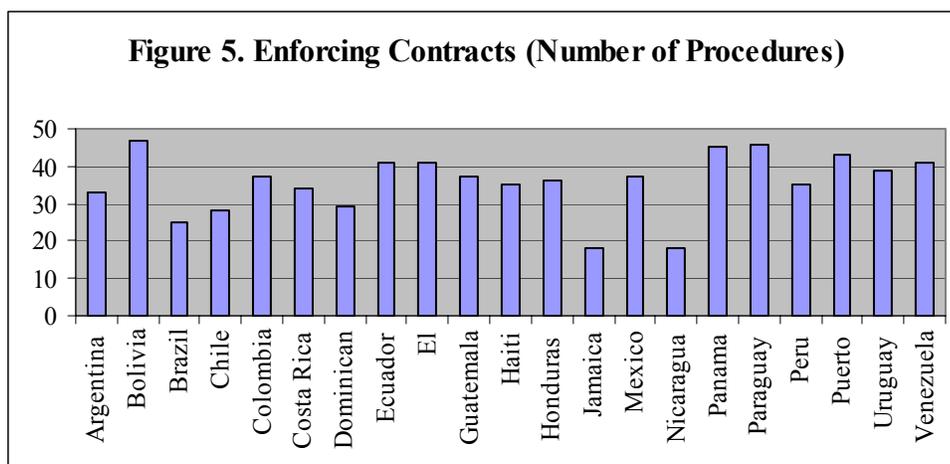
20. Labor market rigidities do appear to be high in Mexico. According to the World Bank's "Doing Business" data, the difficulty of hiring and firing is large in Mexico, even compared to other Latin America countries.



Source: World Bank, Doing Business in 2005.

21. **Labor legislation in Mexico is very detailed and complicated, and appears to be outdated.** The main labor regulations date back to 1917 (Article 123 of the Constitution), and to 1970 (the federal labor law). In addition to setting regulations regarding the minimum wage, length of working day, overtime pay and creating large firing costs, Mexico has a law that prohibits nominal wage reduction. It is important to note, however, that because of the relatively high inflation in the past, real wages have been quite flexible. Moreover, nominal wages in Mexico exhibit little downward rigidity when compared to the U.S., Canada, or Australia (Castellanos, 2003, Castellanos, Garcia-Verdu and Kaplan, 2004), although the minimum wage does impact many workers.

22. **Likewise, the gains from becoming formal also may vary significantly among countries, depending on the efficiency and effectiveness of public services.** For example, enforcing a contract in Mexico requires 37 procedures and 421 days.



#### D. Informality and Externalities: A Basic Framework

Having obstacles to becoming formal might cause many firms to operate informally, while at the same time not necessarily implying large losses to the individual firm. Informal firms may often be able to choose the *degree* of formality that fits their characteristics or to circumvent the lack of credit of public services by using “own funds” (retained earnings) and informal networks (e.g., obtaining funds from family members or other associates). Nevertheless, even if the losses to each firm may be small, it may not follow that the losses to the economy as a whole are small as well. As argued in Section I, the existence of externalities could imply significant losses to the economy as a whole along the channels of externalities. To provide further insight and understanding of the operation of the economy and the role of externalities, and to identify empirical and policy implications, the chapter develops a theoretical framework with formal and informal sector where externalities play a major role. To focus on the externalities and the underlying framework of the model, the chapter presents a simple model, which is then extended in various dimensions to highlight various elements and dynamics.

#### The Model

23. **Consider an economy composed of two sectors, a formal sector with  $n$  firms<sup>2</sup> and an informal sector.<sup>3</sup>** Firms in both sectors use labor to produce an identical final good.

<sup>2</sup> The number of firms will be derived endogenously later, according to the costs and benefits of entering the formal sector.

<sup>3</sup> The number of firms in the informal sector is not of importance here, because the sector is assumed to exhibit constant returns to scale (that is, from the point of view of an individual firm, overlooking externalities that in fact mean diminishing returns to scale).

However, the production function that each firm faces differs between the two sectors reflecting the benefits (costs) of being formal (informal) associated with access to public goods and infrastructure, credit, legal rights, protection of property rights, and so on, as well as the positive and negative externalities discussed above. Mobility of labor between the two sectors implies equalization of (after-tax) wages.

24. Specifically, let the production function in the formal and informal sectors be given, respectively, by

$$y = \theta_F l^\alpha \left( \frac{L_F}{n} \right)^{1-\alpha} \quad 0 < \alpha < 1 \quad (1)$$

$$y = \theta_I l \left( \frac{L_F}{L_I} \right)^\chi \quad 0 < \chi < 1 \quad (2)$$

25. **Where  $F$  represents the formal sector and  $I$  the informal sector,  $y$  represents output,  $\theta$  is a productivity parameter (which is derived endogenously later),  $l$  represents the number of workers employed by the firm and  $L_F$ , ( $L_I$ ) is total employment in the formal (informal) sector.**<sup>4</sup>

26. **The production functions differ between the two sectors in two ways, capturing the benefits of being formal and—more importantly—the externalities.** First, productivity differs between the two sectors reflecting the higher capital intensity in the formal sector (which is derived endogenously below), the better access to information, public goods and so on. Second, and more importantly, the production functions in the two sectors embody assumed externalities—positive externalities in the formal sector and negative in the informal sector. As discussed above, the positive externality occurs through several channels—higher infrastructure and public goods due to higher taxes and tax base, enhanced information, a positive impact on the quality of governance and legal rights, or learning by doing. On the other hand, the negative externalities in the informal sector reflect the adverse effect of the informal sector on infrastructure and public goods, information, quality of governance, legal rights and so on. To focus the discussion on the role of externalities, the model is kept simple, and the derivation of externalities from micro foundations is left for further research.

27. **The solution of the model is defined as the relative size of each sector such that the (after-tax) wage is equal in both sectors and labor demand is equal to labor supply, which for simplicity is assumed constant.** Note that each firm, when deciding on its wage and employment, takes the size of each sector as given (i.e., ignores the externality by which

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<sup>4</sup> The results do not depend on the exact functional form. Only the existence of positive and negative externalities is important.

its own decision affects others). Thus, firms in the informal sector view their production function as exhibiting constant returns to scale, although the production function of the sector as a whole exhibits decreasing returns to scale, while firms in the formal sector view their production function as having decreasing returns to scale, but the sector exhibits constant returns to scale.

The demand for labor by each firm in the formal sector is given by

$$w_F = \alpha \theta_F l^{\alpha-1} \left( \frac{L_F}{n} \right)^{1-\alpha} \quad (3)$$

Using the fact that all firms in the formal sector are identical and hence  $l=L_F/n$ , one derives the wage in the formal sector as

$$w_F = \alpha \theta_F \quad (4)$$

Note that because the firm ignores the positive externalities, the wage is below the socially optimal level for the formal sector.

Likewise, the wage in the informal sector is given by

$$w_I = \theta_I \left( \frac{L_F}{L_I} \right)^\chi \quad (5)$$

which is above the socially optimal level for the sector, because of the externalities.

Equalization of wages across sectors yields the relative size of the two sectors,

$$\frac{L_I}{L_F} = \left( \frac{\theta_I}{\alpha \theta_F} \right)^{\frac{1}{\chi}} \quad (6)$$

**28. That is, the smaller the productivity gap (i.e., smaller gains from formality), the larger is the informal sector; the smaller the positive externality in the formal sector,  $(1-\alpha)$ , the smaller is the informal sector, and the larger the negative externality in the informal sector,  $\chi$ , the smaller the informal sector.**

**29. It is obvious that this equilibrium is inefficient and that the informal sector is too large. For example, in the extreme case when  $\chi=1$  the optimal level of the informal sector is zero because the socially marginal productivity of an informal firm is zero.** In other words, the existence of externalities causes firms in the formal sector to pay wages below the optimal level for that sector (a fraction  $\alpha$  of the socially optimal wage) and likewise, the wage in the informal sector is above the social optimum. Note that the inefficiency of the market equilibrium increases once one considers that taxes are borne mainly by workers in the formal sector.

### Dynamics—Movement Across Sectors

30. **To investigate the importance of various costs of entering the formal sector and derive the size of each sector endogenously the model is extended to the case in which the movement between sectors is not frictionless.** It is likely that a move between the two sectors, particularly from the informal to the formal sector entails transition costs, perhaps substantial costs. A firm will move from the informal sector to the formal sector when the increment in the present value of its profits is greater than the costs of becoming formal. Thus, firms will move to the formal sector until the number of firms in the formal sector,  $n$ , is such that the benefits of being a formal firm equal the costs of transfer.

31. **Specifically, assume that firms can move between the informal and formal sector every period, but the move from the informal sector to the formal sector entails a one-time, fixed cost, denoted  $C$ .** In addition, assume that each period every formal firm faces a probability,  $\delta$ , of getting out of the formal sector because of change in demand, external competition, bad luck, or management mistakes.<sup>5</sup>

32. **Recall that in the model because each firm faces decreasing returns to scale (or rising marginal cost), the wage (which is determined by marginal productivity) is below the average productivity.** In other words, the aggregate production function is linear with constant marginal productivity equal to  $\theta$ , but firms ignore the externalities and pay only  $\alpha\theta$ , resulting in profits per workers of  $(1 - \alpha)\theta$ . As a result, the profits of every formal firm is equal to

$$(1 - \alpha)\theta_F \frac{L_F}{n} . \quad (7)$$

33. **Firms then will enter the formal sector as long as the net present value (NPV) of profits (which depend on the number of firms in the sector), is greater than the moving cost  $C$ .** Specifically, ignoring the discount rate, firms will enter the formal sector until

$$(1 - \alpha)\theta_F \frac{L_F}{n} + (1 - \delta)(1 - \alpha)\theta_F \frac{L_F}{n} + (1 - \delta)^2 (1 - \alpha)\theta_F \frac{L_F}{n} + \dots = C \quad (8)$$

Or

$$\frac{1}{\delta}(1 - \alpha)\theta_F \frac{L_F}{n} = C \quad (9)$$

Finally, to solve for  $L_F$ , use equation (6)

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<sup>5</sup> This assumption introduces some dynamics at the equilibrium (some formal firms disappear and some informal firms become formal and replace them), but is inconsequential to the equilibrium solution of the model.

$$\frac{L_I}{L_F} = \left( \frac{\theta_I}{\alpha\theta_F} \right)^{\frac{1}{\zeta}} \quad (10)$$

and the fact that labor in the formal and the informal sector has to sum up to total labor supply  $L_F + L_I = L$  to derive

$$L_F = \frac{L}{1+A} \quad \text{where } A = \left( \frac{\theta_I}{\alpha\theta_F} \right)^{\frac{1}{\zeta}} \quad (11)$$

After substituting  $L_F$  in equation (9), we get that the number of formal firms is

$$n = \frac{1}{\delta C} (1-\alpha)\theta_F \frac{L}{1+A}. \quad (12)$$

34. **The number of firms depends on the cost of entering the formal sector and the probability of staying in it.** The larger the costs, the fewer firms are in the sector and the profits of each firm are higher. Likewise, the larger the probability of getting out of the formal sector,  $\delta$ , the smaller the number of firms in the formal sector.

35. **Note that the fact that the number of firms does not affect the size of each sector is not a general property of the model.** For example, if one assumes that the positive externalities in the formal sector depend on total output in the formal sector (or that the positive externalities in the informal sector depend on the output per formal firm) this would mean that having more formal firms would raise the size of the formal sector and output.

### E. Policy Implications and Conclusions

36. **The analysis above and the theoretical framework yield several important conclusions with potential implications for policy.** First, the theoretical framework suggests that the informal sector could have significant implications for economic growth regardless of whether it represents a dualistic labor market or a developing market analogue of small sector enterprise in industrial countries. That is, positive and negative externalities could result in significant market failure, multiplying the impact of any distortion on output of the economy. In this sense, having a large informal sector is detrimental to economic activity and governance, the rule of law and infrastructure.

37. **The theoretical model suggests that because the size of each sector is determined in equilibrium, new policy efforts that simply forced some existing informal firms to comply with legal obligations and become formal might have only a temporary effect on the size of the informal sector.** Such a policy intervention could raise profitability of the informal sector, inducing resources to flow from the formal to the informal sector, until the earlier equilibrium was restored. Instead, reducing the costs of operating formally—including costs associated with regulations and taxes, and increasing the benefits from becoming

formal including improving the quality of infrastructure, rule of law, access to credit, and governance—would increase voluntary participation in the formal economy and could raise activity considerably. This, in turn, would improve governance, transparency, and the rule of law, which would increase the formal sector and economic activity further.

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### III. PRIVATE SAVING IN MEXICO—LONG-TERM TRENDS AND SHORT-TERM CHANGES<sup>1</sup>

#### *Abstract*

*Although the private saving rate has been somewhat lower in Mexico than elsewhere, it is found to be higher than would be predicted, based on a standard cross-sectional analysis of other OECD and emerging market countries. In looking at how the Mexican saving rate has evolved over time, it seems that the stabilization of the economy and the rapid development of financial intermediation have not yet translated into higher saving. Finally, changes in both public saving and external saving (the current account deficit) are found to have been associated with offsetting changes in private saving. The causal interpretation of these negative correlations is not clear, but part of the story is the fact that aggregate investment in Mexico has been comparatively stable and insensitive to the business cycle.*

#### A. Introduction

1. **It has been argued that Latin America’s relatively low long-term growth—compared to East Asian or new EU accession transition countries—is related to low investment, which in turn stems from low private saving and limited ability to attract foreign saving.** Is Mexico saving less than comparable countries? How have two decades of financial and other structural reforms affected private saving?

2. **A fresh look at the determinants of saving—both from a cross-sectional and time-series perspective—is warranted.** First, most of the related literature was based on samples that ended in the mid-to-late 1990s (see, for example, Edwards, 1996; Masson et al, 1998; or Burnside, 1998). Second, there have been several important structural developments in Mexico during the last decade that could have affected saving behavior. These include the move to a more stable macroeconomic environment, with low inflation and a floating exchange rate; more credible fiscal and monetary policies; reform and development of the domestic financial market, and easier access to foreign saving.<sup>2</sup> While some of these developments could have boosted private saving, others may have lowered the need for saving.

3. **Mexico’s level of private saving is not out of line with fundamentals, after controlling for the standard set of explanatory variables.** The cross-sectional results show that Mexico is saving somewhat more than predicted by the model, while the time series analysis indicates that saving is predicted well by the explanatory variables. Confirming the

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<sup>1</sup> Prepared by Aleš Bulíř ([abulir@imf.org](mailto:abulir@imf.org)) and Andrew Swiston ([aswiston@imf.org](mailto:aswiston@imf.org)). The paper benefited from comments by Caroline Atkinson, Tam Bayoumi, Javier Hamann, Russell Kincaid, Steven Phillips, and seminar participants. The authors are indebted to the Mexican authorities at the Bank of Mexico and Ministry of Finance for valuable suggestions on an earlier draft of this paper.

<sup>2</sup> External saving is defined as the deficit on the external current account.

results of earlier studies (Bank of Mexico, 2002), we do not detect a clear effect of financial reforms on the level of private saving, either because the overall impact is ambiguous or because it is still too soon to assess the impact of reform.

## **B. Saving-Investment Balances in an Emerging Market Economy**

4. **While a common presumption of causality is from higher private saving to higher investment, and then to higher economic growth, this is not necessarily the case.**<sup>3</sup>

It is far from clear that the level of private saving is acting as a constraint on the level of investment. Indeed, some evidence points to causality in the opposite direction, with higher/lower desired investment leading to higher/lower private saving (International Monetary Fund, 2005). In Mexico, for example, it has been argued that various factors have limited growth prospects, translating into a lower return on private investment and providing an explanation of why private saving is not higher (Faal, 2005).<sup>4</sup> In essence, a scarcity of private investment opportunities may be limiting the demand for saving.

5. **This paper proceeds on the assumption that the optimal level of investment is chosen first and its financing components—private, public, and external saving—are determined subsequently.** In such an economy, households save and invest in order to smooth consumption. Under this assumption, household saving and investment are related to overall economic volatility and households' aversion to fluctuations in consumption.

6. **In such a setting, the direction of the impact of financial reforms and macroeconomic and political stability on saving decisions is ambiguous.** The substitution and income effects work in opposite directions: although an increase in the return to saving increases saving through the former, additional financial income lowers saving through the latter. If households expect an increase in future income as a result of financial reforms, current saving may decrease. Similarly, a more stable economic environment may result in lower private saving as households would need less investment (a smaller capital stock) to maintain a smooth consumption pattern.

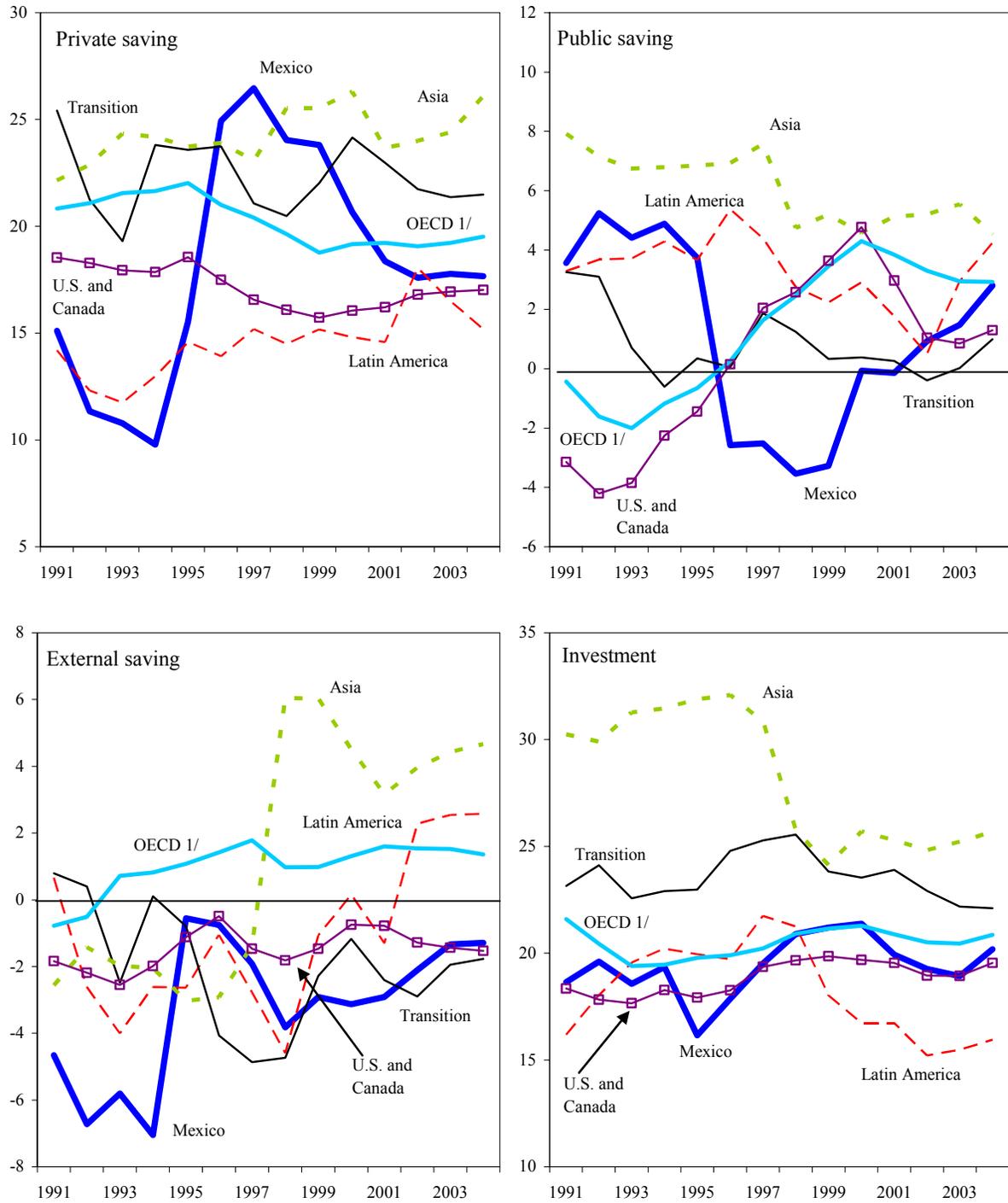
7. **Some stylized facts support the hypothesis of investment-to-saving causality in Mexico.** The rate of investment has been less volatile in Mexico than in other emerging markets, while public and private saving have been more volatile (Figure 1), supporting the idea that the components of saving have adjusted as needed to achieve the desired level of investment. The downward trend in investment can be explained by the stabilization of the

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<sup>3</sup> Alternatively, no causal link exists between investment and national saving, as they are determined separately, with foreign saving adjusting freely to fill any gap. This is akin to the hypothesis that Feldstein and Horioka (1980) tested and rejected. Analyses of more recent data, however, suggest that the once-strong correlation between national saving and investment rates has diminished.

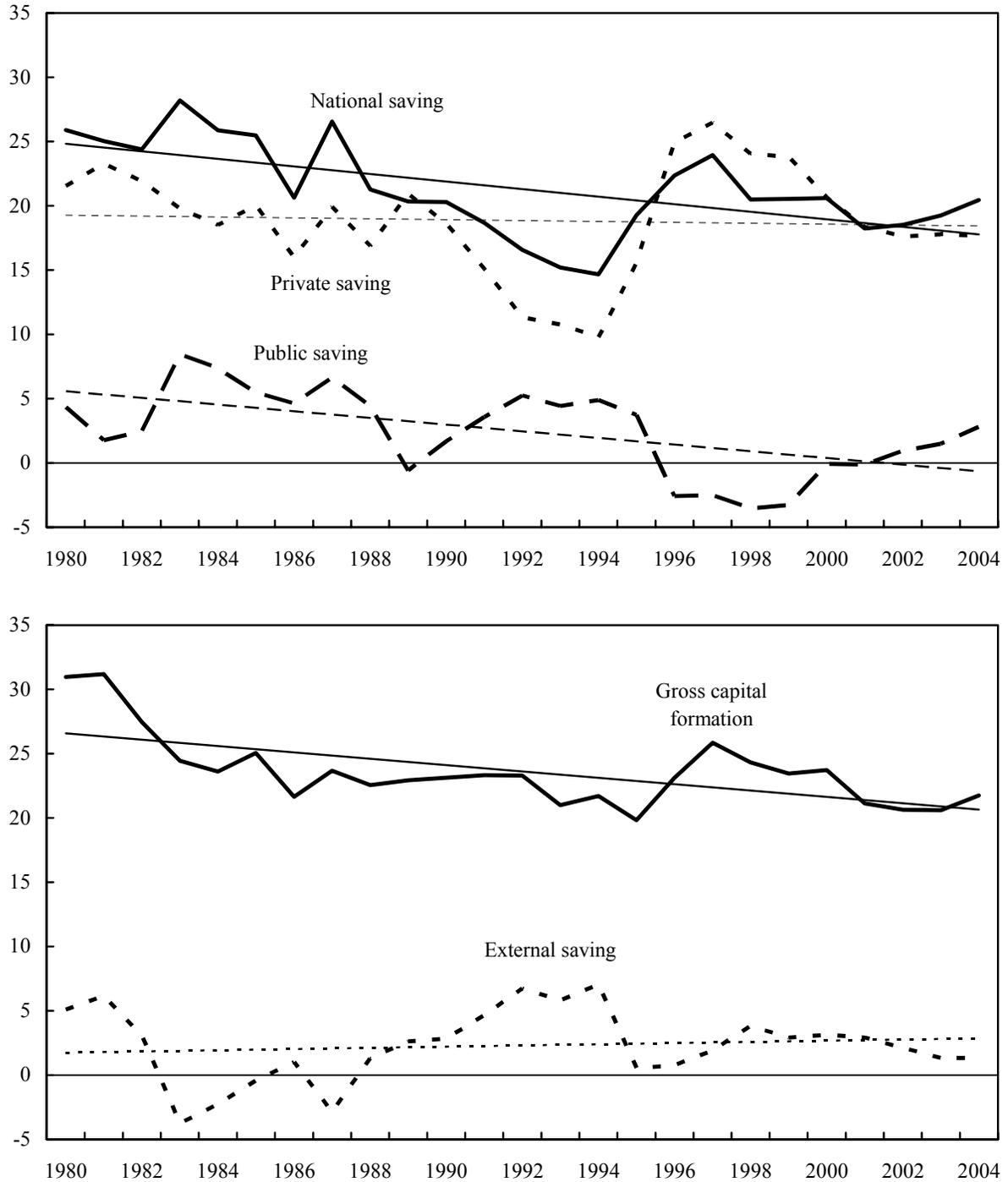
<sup>4</sup> Faal estimated that in Mexico total factor productivity growth was negative on average during 1980-2003, and though positive since 1995, was still very low.

Figure 1. Selected Countries: Saving and Investment, 1991–2004  
(In percent of GDP)



Source: *World Economic Outlook*. Regional numbers are unweighted averages.  
1/ OECD countries excluding Mexico, U.S., Canada, Asian, and transition countries.

Figure 2. Mexico: Saving and Investment Balances, 1980–2004  
(In percent of GDP)



Source: *World Economic Outlook*.

domestic economy following the crises of the 1980s and 1990s, as less investment was needed to deliver the required consumption path (Figure 2). Therefore, even though bank privatization in the late 1990s and foreign bank entry in the early 2000s increased returns to financial saving as measured by real interest rates (Bank of Mexico, 2002), private saving declined. Meanwhile fiscal consolidation since the 1990s crisis has raised public saving. With investment and external saving relatively stable in the last decade, the data necessarily show public and private saving moving in opposite directions.<sup>5</sup>

### C. Empirical Evidence on Saving

8. **The empirical sections assess Mexico's saving behavior from both the cross-country and time-series perspectives.** First, we examine the determinants of the private saving rate across a wide sample of OECD countries and major emerging market economies. In the time series analysis, we build an error correction model to examine the relative importance of the various determinants of private saving for Mexico over time.

#### Measurement problems and data

9. **Measurement problems associated with saving are significant.** The quality of data differs widely, and many countries, including Mexico, do not publish official data on the composition of saving. Instead, private saving must be calculated as the “residual of a residual,” in two steps: (i) National Saving = Gross Investment – External Saving; and (ii) Private Saving = National Saving – Public Saving.<sup>6</sup> Our data sources and definitions are summarized in the Table A1.

10. **Empirical investigation of saving is further complicated by the fact that one part of an accounting identity (private saving) is regressed on other parts of the same identity (public and external saving).** Clearly, any source of error in measuring either external saving or public saving will induce an equal and opposite error in the residually-measured value of private saving, potentially introducing some degree of spurious negative correlation between private saving and each of these two variables. Furthermore, spurious relationships between the individual components of the identity could also be driven by another variable, such as international oil prices.<sup>7</sup>

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<sup>5</sup> External saving may have been constrained by the reluctance of financial markets to provide financing of the magnitude seen prior to the two large crises.

<sup>6</sup> Gross investment could be prone to substantial measurement error due to difficulties in measuring inventories. For example, the Bank of Mexico observed historic discrepancies between the estimates of gross fixed capital formation in nominal and real terms as large as 3 percentage points of GDP. We are indebted to Jesús Cervantes for this observation.

<sup>7</sup> Changes in oil prices have had a substantial impact on Mexico's economy, including in the period after 1995, through their effect on export receipts and fiscal revenues.

11. **One example of measurement problems is the impact of inflation on measured private and public saving.** The erosion of the purchasing power of money provides a source of revenue for the government, reducing true private saving (Box 1). While this has been less of a problem for Mexico in the last decade, it could compromise the pre-1990 data.

12. **The measurement problems are further complicated if one or more of the variables are targeted by agents within the economy.** If financial markets have a view on a maximum sustainable level of external saving or public saving, they will adjust their lending strategies in order to meet these notional targets. Given the relative stability of investment in Mexico, if external saving is stable, a change in public saving would be offset by an opposite change in private saving. These concerns will be attenuated in the cross-sectional empirical results that are based on long-term averages, but they may affect the time-series results, creating spurious relationships. We will address these issues in the Mexico case study.

### **Cross-country evidence**

#### *Bivariate relationships*

13. **Basic cross-country comparisons of private saving and its usual determinants suggest that Mexico does not stand out as an atypical case (Figure 3).**<sup>8</sup> In these bi-variate relationships Mexico is very close to the linear regression line, while there are larger divergences for most other Latin American countries. We note, however, that for Mexico the values of three of the explanatory variables differ from the typical country—Mexico's average current account deficit and its dependency ratio have been comparatively high and its private credit-to-GDP ratio has been comparatively low. However, this bi-variate analysis may hide more complex relationships, and these charts do not give an indication of the relative importance of individual variables in determining private saving.

#### *Cross-section regression results*

14. **Using a sample of 44 countries (Table A2), private saving was found to be positively related to real GDP growth and the level of private sector credit.** In contrast, private saving was found to be negatively related to public saving, external saving, the level of development (GDP per capita in purchasing power parity terms), and the dependency ratio.

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<sup>8</sup> Figure 3 is based on 15-year averages (1991–2004) for all variables. These bivariate relationships do not change materially when we split the sample into shorter periods used in cross-country regressions. The only exception is the relationship involving the current account-to-GDP ratio, the level of which narrows in the cross-sectional average from almost 4 percent in the 1990s to slightly more than 2 percent in the 2000s.

**Box 1. Measurement Problem: Private Saving and the Inflation Tax**

**The erosion of the purchasing power of money taxes the private sector and provides a source of revenue for the government.** When inflation is high, unadjusted national accounts could substantially overstate private saving and understate public saving (Hamann, 1993).

**The inflation tax on the private sector can be approximated by several measures. Here we use (i) the erosion of the purchasing power of currency in circulation and (ii) the decline in net debt due to higher prices.**

The money-based inflation tax,  $\tau^M$ , can be written (in percent of GDP) as:

$\tau_t^M = \pi_t * M_{t-1} / Y_t$ , where  $\pi$  is the inflation rate,  $M_{t-1}$  is the supply of currency in circulation and other nonremunerated central bank liabilities at the end of the previous year, and  $Y$  is GDP. The debt-based inflation tax,  $\tau^D$ ,

can be written (in percent of GDP) as:  $\tau_t^D = \delta_t * \pi_t / Y_t$ , where  $\delta$  is the stock of nonindexed domestic public debt.



**The impact of inflation tax on the measurement of Mexico’s private saving varied considerably over time and between our definitions of the tax.** The money-based inflation tax peaked at more than 10 percent of GDP in the early 1980s. As inflation remained high, currency holdings as a share of GDP declined, causing a reduction in the inflation tax. In contrast, the debt-based inflation tax peaked in the late 1980s, essentially transferring most private saving to the government. Adjusting the estimates of private saving for the inflation tax shows a significantly lower private savings rate in the 1980s. Our estimates of adjusted private (public) saving are lower (higher) by 3–20 percentage points of GDP as compared to the unadjusted measures.

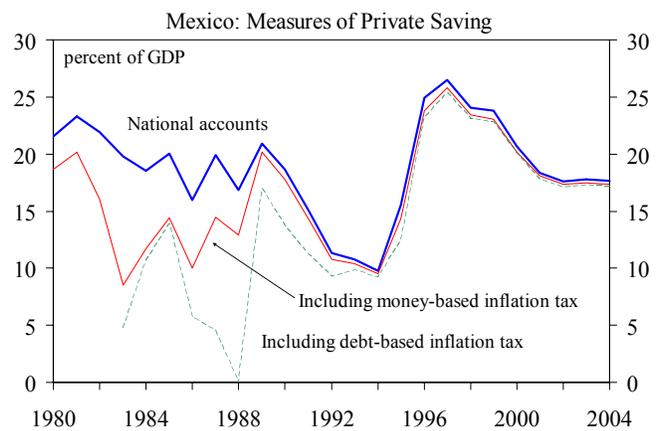
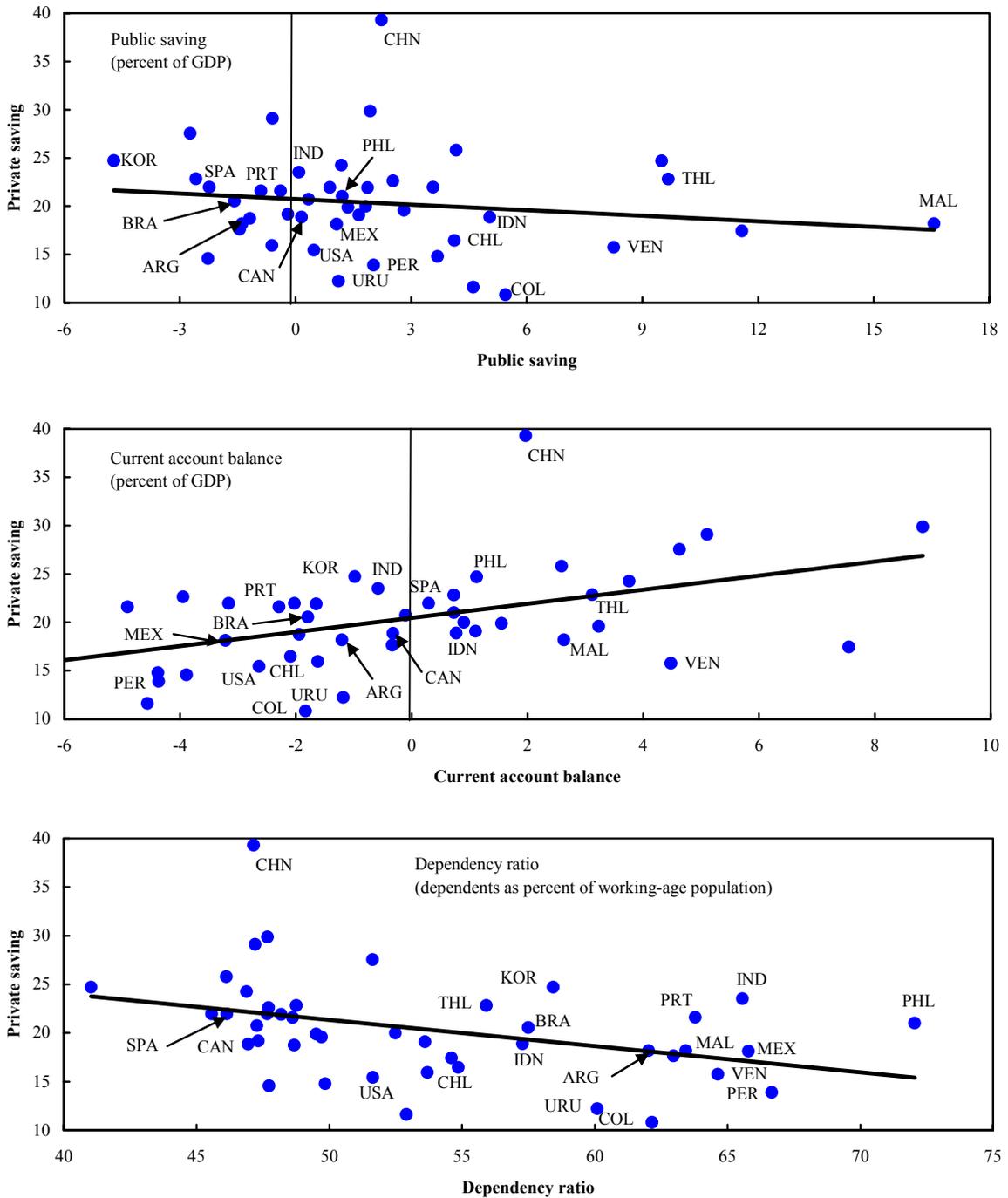
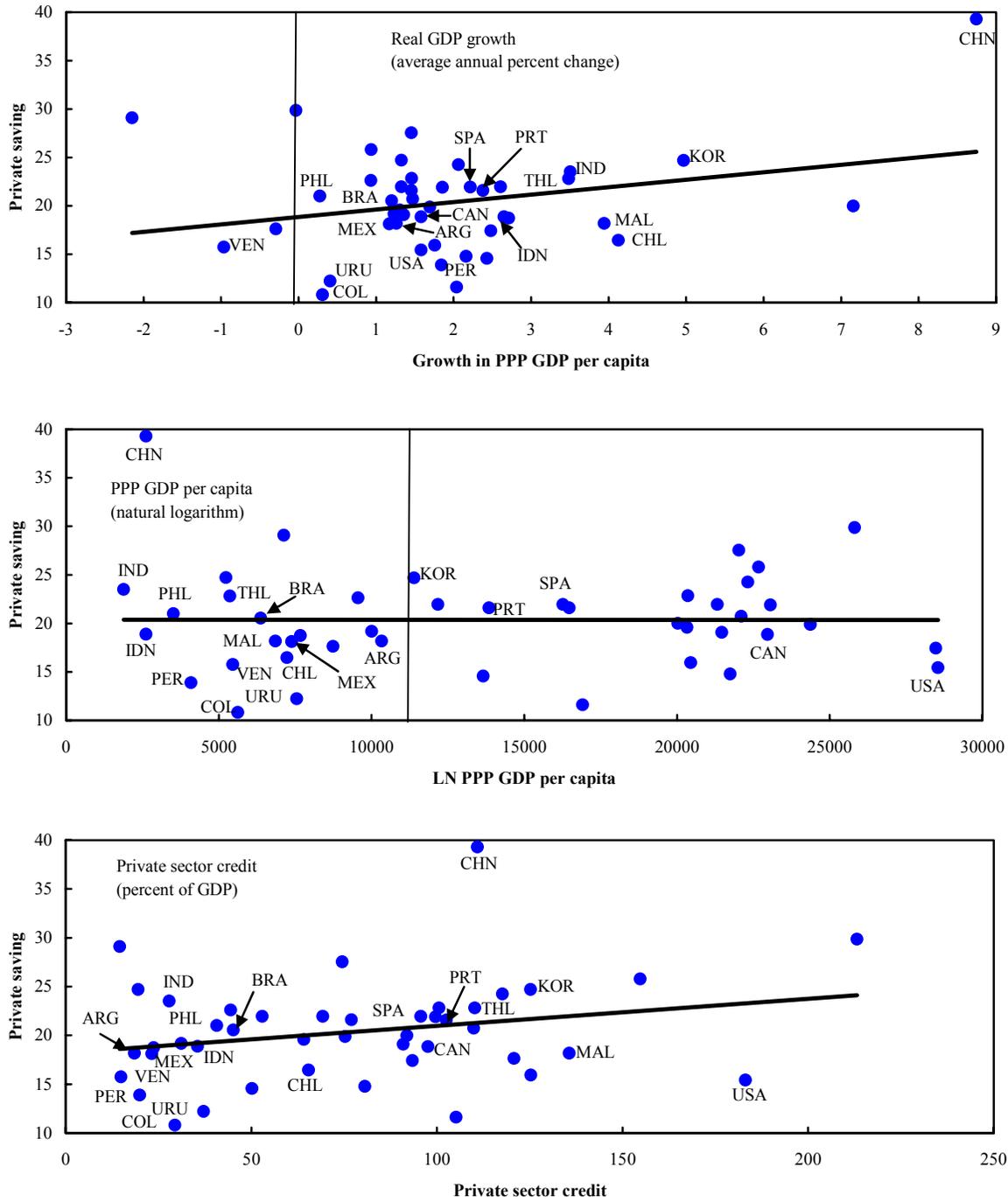


Figure 3. Private Saving and Explanatory Variables, Average 1991–2004



Sources: *World Economic Outlook*; UN, *World Population Prospects* database; Haver Analytics; and Fund staff calculations.

Figure 3. Private Saving and Explanatory Variables, Average 1991–2004 (Concluded)



Sources: *World Economic Outlook*; IMF, *International Financial Statistics*; World Bank, *World Development Indicators*; and Fund staff calculations.

15. **The regressions are estimated by ordinary least squares (OLS), with heteroskedasticity-consistent standard errors, and the ratio of private saving to GDP as the dependent variable.**<sup>9</sup> Results are reported for 1991–1999 and for the post-Asian/Russian crisis period of 2000–2004 (Table 1). All variables are period averages for the period under consideration. To assess the robustness of our results, we estimated regressions for the whole sample and for industrial countries only.

16. **The results for 1991–1999 confirm earlier findings (Edwards, 1996; Masson et al., 1998, Loayza et al., 2000, IMF, 2005), but the 2000–2004 results differ from the earlier period in three respects.** First, the offset ratio between public and private saving increased from the usual 40–60 percent to more than 90 percent. Second, the impact of aging has become more pronounced in the group of industrial countries, but not in the full sample. Finally, while Latin American countries previously saved on average less than predicted by the model, in 2000–04 they saved essentially as predicted by the model. East Asian countries continue to save more than predicted by the model. Overall, the regression estimates reported in Table 1 are statistically significant, and the regressions are able to explain between two-thirds and three-fourths of the cross-country variance of the private saving rate. The other summary statistics are also broadly satisfactory.

17. **The economic interpretation of these results is in line with the usual economic assumptions and previous research:**<sup>10</sup>

- First, we observe that an improvement in public saving by 1 percentage point of GDP was offset by a decline in private saving by about 0.4–0.5 percentage point of GDP during 1991–1999 in both the full and industrial country samples. However, this estimate increased to -0.9 percentage point of GDP during 2000–2004 for the full sample and to -0.7 percentage point of GDP in the sample of industrial countries.
- Thus, while for the initial period we find the usual outcome of higher public saving being associated with higher total national saving (Masson et al., 1998; International Monetary Fund, 2005), in the latest period we find that private agents offset most of the increase in public saving with lower private saving, keeping national saving unchanged (so-called Ricardian equivalence).

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<sup>9</sup> Given the possibility of measurement errors in the key variables discussed earlier, we also re-estimated the equation using two-stage least squares (instrumental variables, IV) and generalized method of moments (GMM). Some of the instruments used included the trade balance, terms of trade, and logs of the dependent variables. Aside from the usual bias toward zero in instrumented variables, the IV results were not materially different from OLS results.

<sup>10</sup> We failed—as have other authors—to detect any robust impact of real interest rates on private saving. See Table A2 for a summary of the statistical significance of all the regression variables analyzed in this study.

Table 1. Selected Countries: Cross-Section Results for Private Saving <sup>1/</sup>  
(Dependent variable: Private saving as a percent of GDP, t-statistics in parentheses)

Explanatory Variables	1991–1999				2000–2004			
	Full sample		Industrial countries		Full sample		Industrial countries	
Public saving 2/	-0.38*** (3.20)	-0.51*** (3.80)	-0.27** (2.11)	-0.39** (2.63)	-0.95*** (7.59)	-0.99*** (7.24)	-0.87*** (7.49)	-0.65*** (3.24)
External saving 2/	-1.06*** (4.91)	-0.97*** (4.56)	-1.16*** (4.98)	-1.10*** (5.68)	-0.91*** (6.34)	-0.83*** (6.88)	-0.88*** (5.65)	-0.85*** (6.71)
Real GDP growth 3/	0.10 (0.56)	0.70 (0.52)	0.14 (0.70)	-0.07 (0.49)	0.60* (1.94)	0.45* (1.88)	0.60 (1.79)	0.11 (0.36)
GDP per capita 3/	-0.48*** (4.16)	-0.34*** (2.77)	-0.37*** (3.28)	-0.278 (0.89)	-0.23*** (2.03)	-0.10 (1.26)	-0.16* (1.97)	-0.15 (0.95)
Private sector credit 2/	0.04*** (2.65)	0.03 (1.53)		0.03** (2.12)	0.03 (1.30)	0.01 (1.12)		0.01 (0.80)
Dependency ratio 4/	-0.26*** (2.75)	-0.30*** (3.82)	-0.26*** (2.80)	-0.41*** (2.96)	-0.29*** (2.83)	-0.31*** (3.25)	-0.27*** (2.68)	-0.63*** (3.27)
Latin American dummy 5/	-3.05* (1.88)		-3.99** (2.53)		-0.37 (0.19)		-1.32 (0.78)	
Asia dummy 6/		4.04** (2.04)				4.08** (2.04)		
Adjusted R <sup>2</sup>	0.63	0.64	0.59	0.65	0.62	0.68	0.60	0.73
F(6,34)	11.4***	11.9***	11.4***	7.3***	11.1***	13.9***	11.7***	10.2***
Log-likelihood	-111.5	-110.9	-114.1	-47.6	-110.6	-107.0	-112.5	-41.6
ARCH Test (F)	1.17	0.79	0.97	0.46	0.01	0.02	0.02	0.76
Durbin-Watson	1.94	1.90	1.91	1.55	2.53	2.45	2.63	2.23
Number of observations	44	44	44	21	44	44	44	21

1/ All variables are averages for 1991-1999 and 2000-2004, respectively. Estimation is by OLS, with robust standard errors adjusted for heteroskedasticity. Statistical significance at the 10, 5, and 1 percent levels is denoted by \*, \*\*, and \*\*\*, respectively.

2/ In percent of GDP.

3/ In thousand of constant U.S. dollars, purchasing power parity (PPP).

4/ Dependents to working-age population, in percent.

5/ Dummy equal to 1 if the country is in Latin America, 0 otherwise.

6/ Dummy equal to 1 if the country is in Asia, 0 otherwise.

- Second, we also detected another offsetting relationship: a negative, approximately one-to-one relationship between private and external saving in both periods (Edwards, 1996, and Masson et al., 1998 found negative coefficients close to minus one, but smaller in absolute value).
- Third, private saving was found to be positively correlated with the rate of growth of real GDP. However, this variable was statistically insignificant in most regressions.
- Fourth, richer countries tend to save less, presumably because their capital stock is large enough or their economies are stable enough, or both, to deliver the desired consumption path. Other things being equal, an additional US\$1,000 of per capita GDP was associated with a loss of private saving equivalent to 0.2 to 0.4 percentage points of GDP.

- Fifth, financial depth, as measured by bank credit to the private sector as a percentage of GDP, was associated with higher private saving—an increase of 10 percentage points in credit to GDP was related to a rise in private saving by about 0.3 percentage points of GDP.<sup>11</sup> However, the positive impact diminished in 2000–2004. These findings could reflect what Schmidt-Hebbel and Servén (2002) called the “ambiguous impact of financial liberalization on private saving.”
- Sixth, a higher dependency ratio places a significant drag on private savings (the so-called life cycle hypothesis): an increase in the dependency ratio by 1 percentage point is related to a reduction in private saving by about 0.3 percentage points of GDP. This effect is larger, and seems to be increasing, in industrial countries.
- Finally, and similarly to Edwards (1996), we find that Latin American countries save less than predicted by the model (we employed a dummy variable equal to 1 for countries located in Latin America and 0 otherwise). But while the difference was large—between 3 and 4 percentage points of GDP—and statistically significant in 1991-1999, it was much smaller and statistically insignificant in 2000-2004.

18. **What may explain the apparent strengthening of the private-to-public saving offset?** It would be premature to conclude that fiscal policy has lost any impact on national saving. Firmly establishing causal relationships is beyond the scope of this study. It is possible that the finding for recent years is a temporary anomaly that will reverse itself eventually. One hypothesis is that a combination of easy global liquidity conditions and excess saving in a few countries during 2000–2004 could have led to a glut in global saving that depressed private saving in the rest of the world, while public saving increased as a result of global growth conditions (Bernanke, 2005, JP Morgan, 2005, IMF, 2005). These are issues for further research.

19. **How much of the variance in the private saving variable is accounted for by the individual explanatory variables?** We calculated the products of the individual, full-sample coefficients from Table 1 and standard deviations of the respective variables (Table 2). The interpretation of these results is straightforward: for example, if a country has a public saving ratio one standard deviation above the cross-country mean in 2000-2004, the model projects that its private saving ratio would be lower by 4¼ percentage points of GDP. Fluctuations in public and external saving, the level of development and the dependency ratio seem to be the most potent.

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<sup>11</sup> Unfortunately, more complex measures of financial reforms—such as the six-variable index in Abiad and Mody (2003)—are available only for a limited number of countries.

Table 2. The Relative Contribution to Private Saving of Explanatory Variables 1/  
(In percentage points of GDP, two standard errors in parentheses)

	1991–1999	2000–2004
Public saving	-1.7 (1.1)	-4.3 (1.1)
External saving	-2.9 (1.2)	-4.7 (1.5)
Real GDP growth	0.5 (1.6)	1.6 (1.6)
GDP per capita	-3.7 (1.8)	-2.1 (2.0)
Private sector credit	1.6 (1.2)	1.3 (2.0)
Dependency ratio	-2.1 (1.5)	-1.9 (1.3)

1/ Products of the full-sample regression coefficients from Table 1 and standard deviations of the respective variables.

*Mexico's private saving in a cross-country context*

20. **Mexico has been saving somewhat more than predicted by the cross-section model and has stood out compared to most other Latin American countries.** This is apparent from the estimated residuals from the two cross-section regressions (Figure 4 and Table 3). While the eight Latin American countries as a group on average saved less than predicted, by 2½ percentage points of GDP and ¾ percentage point of GDP during 1991-1999 and 2000–2004, respectively, Mexico was saving more than predicted. The positive residuals for Mexico were 4¼ percentage points of GDP and 2¾ percentage points of GDP for these two periods, respectively. (Of course, the decline between the two periods does not necessarily imply that Mexico has started to save less, it only indicates that Mexico's positive residual relative to the rest of the sample declined in 2000–2004.)

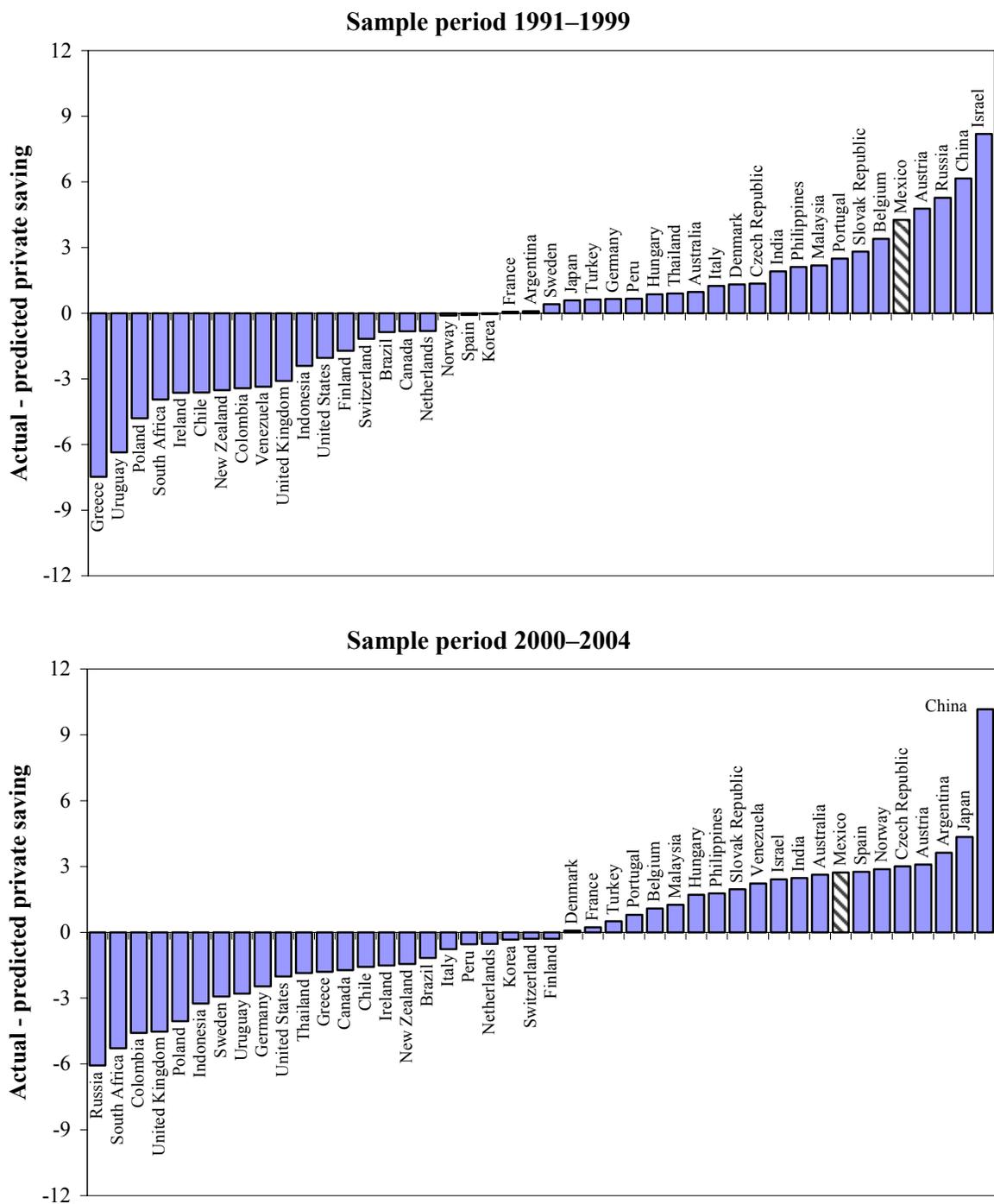
Table 3. Mexico and Other Countries: Saving More or Less than Predicted?  
(In percent of GDP)

Country 1/	1991–1999				2000–2004			
	Residuals	Private saving	External saving	Fixed investment	Residuals	Private saving	External saving	Fixed investment
Argentina	0.1	15.4	3.2	18.0	3.6	23.1	-2.3	15.3
Brazil	-0.9	19.9	2.0	19.4	-1.2	21.7	1.5	18.7
Chile	-3.6	16.0	2.8	24.6	-1.6	17.4	0.7	21.0
Colombia	-3.4	12.2	2.3	18.7	-4.6	8.3	0.9	13.4
<b>Mexico</b>	<b>4.3</b>	<b>18.0</b>	<b>3.8</b>	<b>19.1</b>	<b>2.7</b>	<b>18.4</b>	<b>2.2</b>	<b>19.9</b>
Peru	0.7	12.9	5.8	20.9	-0.5	15.7	1.8	18.5
Uruguay	-6.4	13.2	1.4	14.3	-2.8	10.4	0.8	11.2
Venezuela, Rep. Bol.	-3.4	13.4	-1.7	19.8	2.2	20.0	-9.4	16.7
Latin America excl. Mexico	-2.4	14.7	2.3	19.4	-0.7	16.7	-0.9	16.4
East Asia (incl. Japan)	1.4	23.9	0.4	29.7	1.8	24.9	-4.1	25.3
Transition Countries	1.1	22.3	2.0	23.9	-0.7	22.3	2.0	22.9
Industrial (excl. Japan)	-0.5	20.6	-0.3	20.4	-0.3	18.9	-0.7	20.9
Full sample	0.0	20.4	0.7	22.4	0.0	20.2	-0.8	20.9

Source: Estimated residuals from a regression that excludes regional dummies.

1/ Regional totals are unweighted averages.

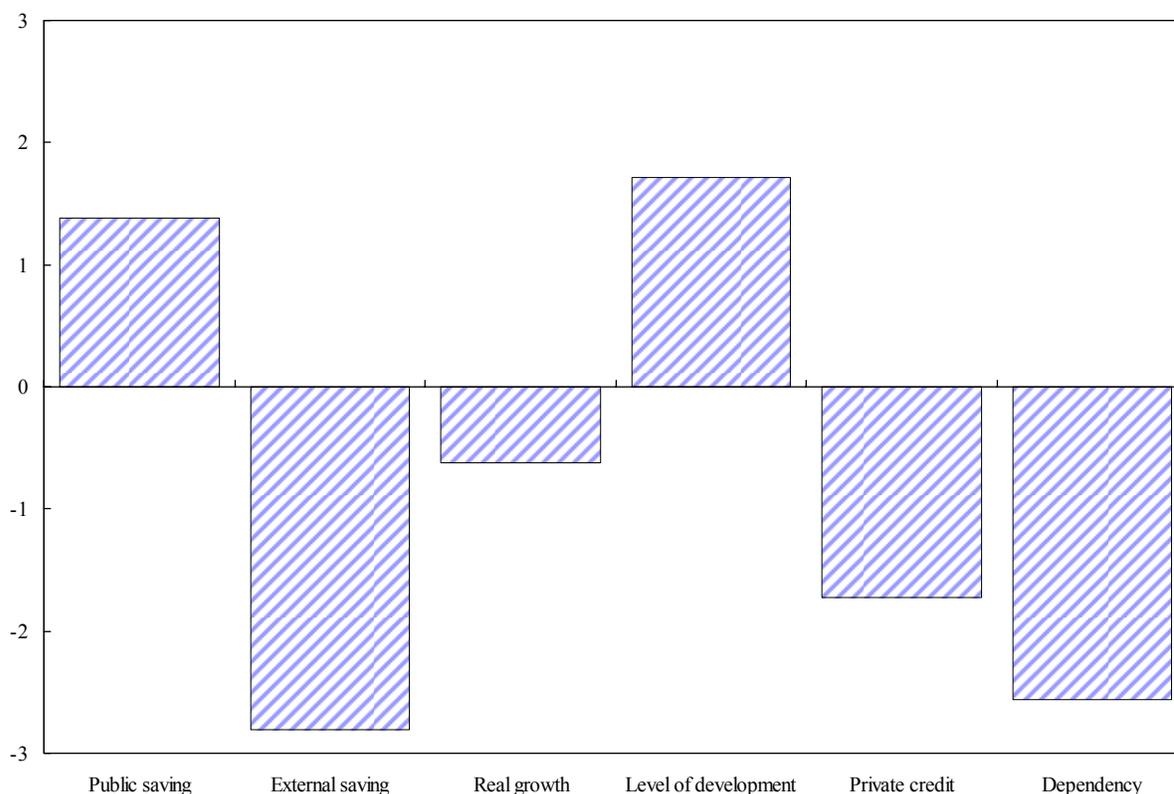
Figure 4. Actual Minus Predicted Private Saving Rates 1/  
(In percent of GDP)



Source: Fund staff calculations.

1/ Residuals from regressions of private saving on public and external saving, real growth, the level of development, private sector credit, and the dependency ratio. No regional dummies.

Figure 5. What Is Holding Back Mexico's Private Saving?<sup>1/</sup>  
(Contribution of explanatory variables, in percent of GDP)



1/ Products of the point estimates and differences between Mexico's explanatory variables and the sample means of those variables.

Source: Authors' calculations.

21. **Still, Mexico's private saving rate (on average 18.4 percent of GDP during 2000–2004) was lower than the sample mean by 1.8 percentage points of GDP.** The main drags were Mexico's higher level of external saving (larger current account deficits compared to the sample mean), lower ratio of private sector credit to GDP, higher dependency ratio, and low growth (Figure 5). In contrast, lower than average public saving and comparatively low GDP per capita boosted the estimated level of private saving.

### Time-series evidence for Mexico

22. **The cross-country results provide a point of departure for time-series analysis.** We note, however, that several factors make it difficult to draw firm conclusions from the time-series evidence. First, during the period under consideration Mexico underwent significant financial sector reforms (Bank of Mexico, 2002; Moissinac, 2005; Soueid, 2005). Second, historical data are available for only a short period and are dominated by the impact of the 1982 and 1994 financial crises. Third, as noted, measurement errors are more likely to

be problematic in a time-series analysis. Finally, we suspect that some of the apparent relationships in the Mexican data—the offset between private and public saving, in particular—may result from external saving and investment being constrained over time, effectively collapsing the saving-investment relationship into the private-public saving identity discussed earlier.

### *Cointegration*

23. **We estimated a dynamic model with annual data for the period 1980–2004<sup>12</sup> and found that almost all the relationships observed for the broad sample of developed and emerging countries also hold for Mexico in time-series regressions.** Specifically, we found a long-term, cointegrating relationship among private, public, and external saving, and the old-age dependency ratio, while public and external saving, and real income were also a part of the short-term dynamics.

24. **We built the model according to the general-to-specific procedure.** First, we observed that the variables in question appear to be nonstationary, but that first-differencing them produces stationary series. Second, we tested for the presence of cointegrating vectors in first-order vector autoregressions (VAR) using the Johansen-Juselius procedure.

25. **As in the cross-section regressions, we observed strong offsets between private and public saving, and between private and external saving, and a negative impact of aging on private saving.** In addition, the analysis of adjustment coefficients suggested that the variables used in the cointegrating vector are weakly exogenous and, hence, that we can proceed toward an error-correction model. We are aware, however, that the saving process is likely to involve many endogenous, mutually dependent economic and political processes, and that the time-series analysis is highly stylized.

### *An error-correction model*

26. **In the next step we simplified the system of equations (VAR) into a parsimonious error-correction model (ECM) estimated by nonlinear OLS (Table 4):**

$$\Delta y_t = c + \sum_{i,j=0}^{k,m} \alpha_i \Delta x_{t-j} + \gamma \left( y_{t-1} - \sum_{i=0}^n \beta_i x_{t-1} \right) + u_t,$$

where  $\alpha$ s,  $\beta$ s, and  $\gamma$  stand for the short-term dynamics, long-term dynamics, and error-correction coefficients, respectively. We denote first differences with  $\Delta$  and regression residuals with  $u_t$ . We estimated this equation with both officially-reported and inflation-adjusted private and public saving. The results are not materially different.

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<sup>12</sup> Recall that the earlier cross-section analysis used a (time-averaged) sample of 1991–2004.

Table 4. Mexico: Error-Correction Model of Private Saving, 1980–2004 1/  
(Dependent variable = Private saving in percent of GDP, t-statistics in parentheses)

	Model I (Official definition of saving)	Model II (Saving adjusted for the money- based inflation tax)
Public saving, 1st difference 2/	-1.074 *** (16.10)	-1.031 *** (19.80)
External saving, 1st difference 2/	-1.379 *** (17.41)	-1.367 *** (13.65)
Real income, 1st difference 3/	3.463 *** (9.58)	3.396 *** (8.82)
Error correction term	-0.316 *** (6.20)	-0.320 *** (5.28)
Public saving, lagged one period 2/	-0.851 *** (3.24)	-0.944 *** (4.73)
External saving, lagged one period 2/	-1.556 *** (6.08)	-1.509 *** (4.92)
Old-age dependency ratio, lagged one period	-2.419 ** (2.54)	-2.654 * (1.92)
Adjusted R-squared	0.95	0.96
Sum squared residuals	12.8	13.7
Log likelihood	-26.5	-27.3
Durbin-Watson stat	2.34	2.12
Number of observations	24	24

1/ Estimation is by nonlinear OLS, with robust standard errors (Newey-West). Statistical significance at the 1, 5, and 10 percent level is denoted by \*, \*\*, and \*\*\*, respectively.

2/ In percent of GDP.

3/ Real GDP per capita.

27. **The estimated error correction coefficient implies that one-third of the deviation from the long-run equilibrium is corrected within one year.** The estimated relationship is as follows:

- First, an increase in public saving by 1 percentage point corresponded to a long-run decrease in the level of private saving by about 0.9 percentage points of GDP. Statistically, the point estimate is not significantly different from 1. This is not a unique finding in Mexico's data: Burnside (1998) reported offset coefficients between 0.8 and 1.0 for the 1980–1995 period. Moreover, we find a strong reaction to short-term fluctuations in public saving.
- Second, the negative unitary relationship between external saving and private saving was similar to that found in the cross-section regressions.

- Third, the old-age dependency ratio enters with the expected negative sign: an increase in the ratio by 1 percentage point is associated with a reduction in private saving of about 2 ½ percentage points of GDP. Greater young-age dependency has a positive impact on private saving, but the effect is statistically insignificant (see Box 2 for a more in-depth discussion of the dependency ratio).
- Fourth, we find strong evidence of the short-term income-to-saving relationship—an increase in annual real GDP per capita by US\$100 (measured on a PPP basis) corresponds to an increase in private saving of ⅓ of one percentage point of GDP. This result is comparable to the cross-sectional finding for the GDP growth rate variable.
- Finally, we found little evidence that financial wealth—whether measured by real stock prices, housing prices, household deposits, and financial deepening—has had a statistically significant impact on private saving. We suspect, however, that this finding may change in the not-so-distant future as the Mexican economy becomes more capitalized (stock prices increased by almost 90 percent from 2001 to 2004) and monetized (the M2-to-GDP ratio increased by almost 20 percent during the same period).

28. **Overall, the regression estimates reported in Table 4 are highly statistically significant and explain about 95 percent of the variance of annual changes in the private saving rate.**<sup>13</sup> Individually, all variables but the dependency ratio are statistically significant at the 1 percent significance level and robust to inclusion of additional variables. The models provide a very good fit of changes in private saving (Figure 6). We also checked the stability of individual parameters in recursive regressions, confirming the stability of our dynamic model. Figure 7 plots the recursive coefficients of public and external saving.

#### **D. Mexico's Saving: Which Way Does the Causality Go?**

29. **The good overall fit and high public-to-private saving offset obtained in the above dynamic model raise the question of whether these results could be biased due to a wrongly specified model of the data generating process of private saving.** For example, if both investment and external saving were targeted by the financial markets, the parameter on the public saving variable would be biased toward one in our regressions in Table 4. Similarly, the impact of oil prices on both public and external saving might play a part in the relationship. In this section we will explore the data for any indication that one or more of the relevant variables were target variables. We acknowledge, however, that the misspecification issues cannot be addressed fully here.

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<sup>13</sup> All experiments with either intercept or slope dummies to capture any impact of the two crisis periods yielded statistically insignificant results.

### Box 2. Mexico and Population Aging

**The Mexican population is on average much younger than its counterparts in other countries.** At present, only about 5 percent of the current population is 65 years or older, compared to 15 percent in advanced countries. However, it is projected to age more rapidly than in other countries in coming decades. Around 2020, the percentage of the population comprised of elderly people will quickly increase, closing the gap with other emerging markets in the 2040s. By 2050, 21 percent of the population is projected to be over the age of 65. Thus, this trend would argue for raising the rate of private saving in order to create a sufficient nest egg for tomorrow's pensioners. There is little evidence of such a change, yet.

However, as argued by Espinosa-Vega and Sinha (2000), the current pension reform is largely a transition from one type of pay-as-you-go system to another, and not a change to a true fully-funded system. Thus the impact on national saving will be gradual at best.

**The effect of aging, however, appears to be partly offset by a high birth rate, and the overall ratio of dependents to working people is not expected to change significantly over time.** It seems reasonable to assume that the Mexican public interprets the low and stable overall dependency ratio as a low claim on future payroll taxes and lowers the private saving ratio accordingly. In other words, this behavior would be consistent with sizable intergenerational transfers within the current families.

Population Aging, 1990 - 2050

Country/Region 1/	Percent of Population 65 years old or more			
	1990	2005	2050	Change 2005 to 2050
Mexico	3.9	5.3	21.1	15.8
Latin America excl. Mexico	6.1	7.6	18.8	11.3
Emerging Markets excl. Mexico	6.7	8.3	20.5	12.1
Advanced 2/	13.4	15.5	27.6	12.2
All Countries excl. Mexico	10.1	12.0	24.1	12.1

Sources: U.N.'s *World Population Prospects*; and Haver Analytics.

1/ Figures for regions are unweighted averages.

2/ Includes Korea.

Dependency Ratios, 1990 - 2050

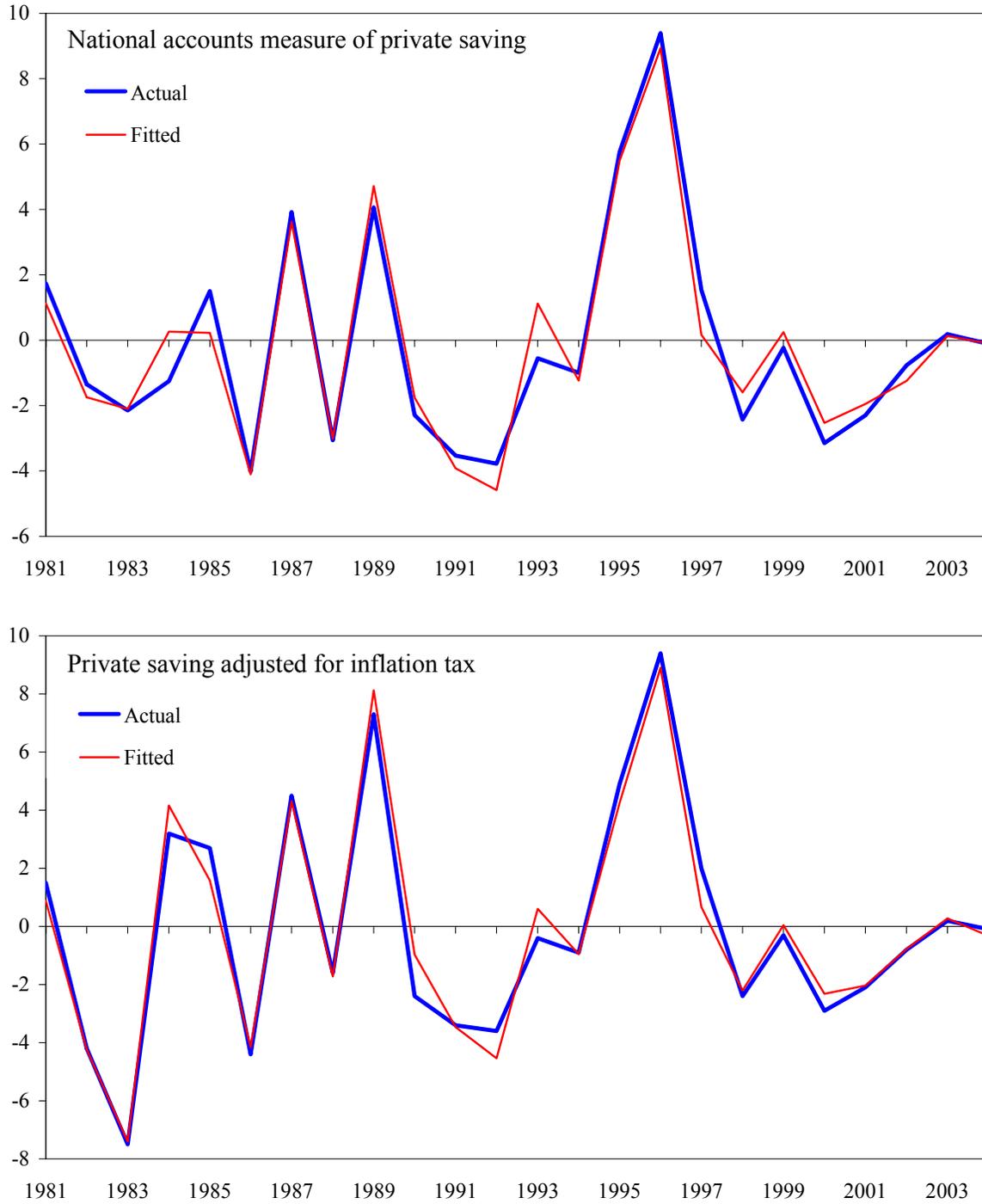
Country/Region 1/	Dependents as percent of working age population			
	1990	2005	2050	Change 2005 to 2050
Mexico	75.9	57.0	60.9	3.8
Latin America excl. Mexico	65.7	56.0	57.8	1.9
Emerging Markets excl. Mexico	62.5	51.9	60.7	8.8
Advanced 2/	49.7	49.0	75.3	26.3
All Countries excl. Mexico	55.9	50.4	68.2	17.7

Sources: U.N.'s *World Population Prospects*; and Haver Analytics.

1/ Figures for regions are unweighted averages.

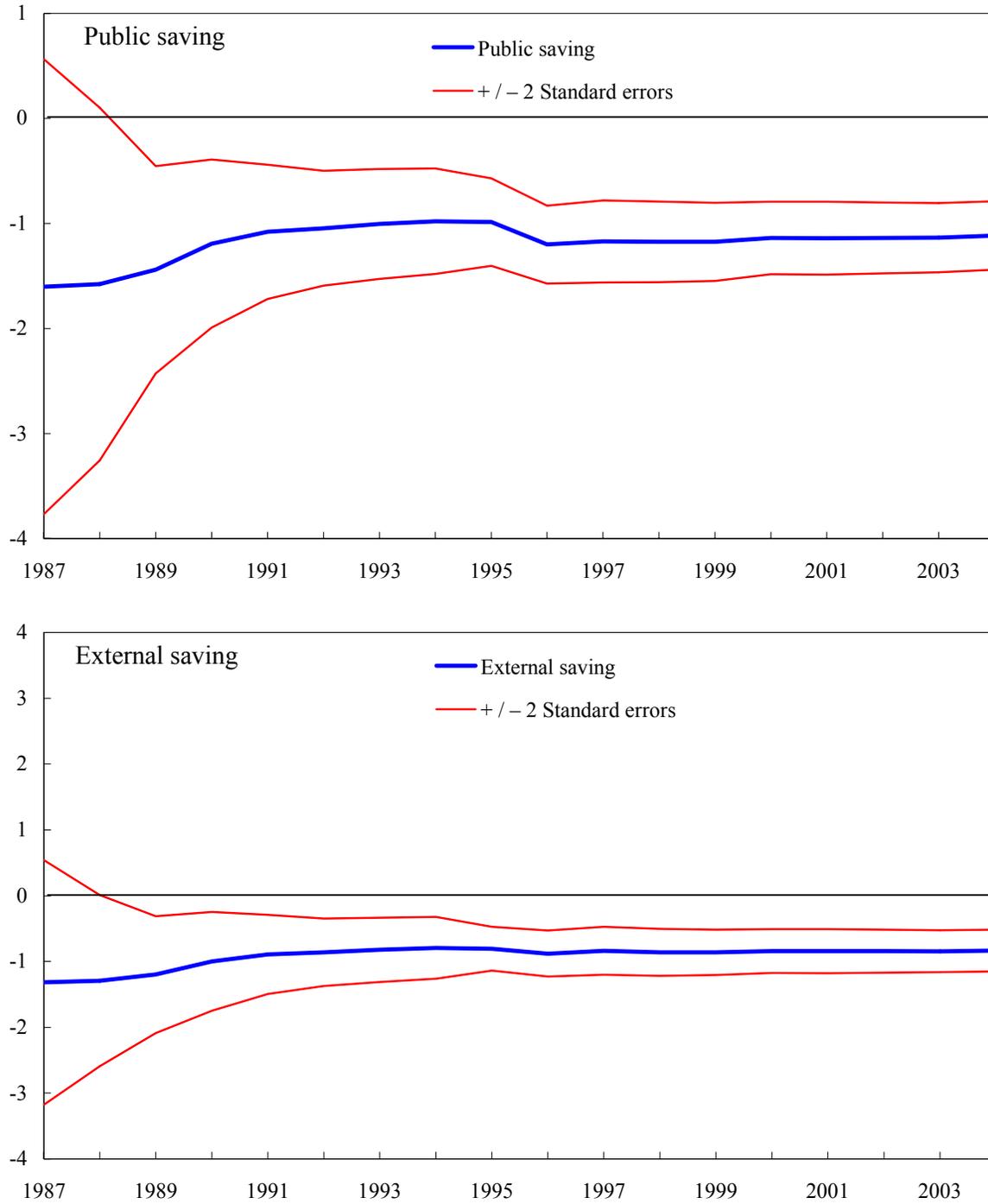
2/ Includes Korea.

Figure 6. Mexico: Actual and Fitted Values of Private Saving, 1981–2004  
(First difference, in percent of GDP)



Source: Fund staff calculations.

Figure 7. Mexico: Recursive Coefficients of Public and External Saving 1/  
(Coefficient on independent variable with private saving as the dependent variable)



Source: Fund staff calculations.

1/ The sample begins at 1980 and the first recursive coefficient is calculated for 1987.

Table 5. Volatility of Key Variables, 1980–2004 1/  
(In percent)

	GDP	Investment	External saving	Private saving	Public saving	National saving
<b>Mexico</b>						
full sample	6	16	78	37	915	10
excluding crises	4	13	81	25	3496	9
Latin America excl. Mexico 2/	7	31	106	28	149	14
OECD excl. emerging mkts.	2	10	120	9	308	8
Emerging Asia	5	19	346	11	319	7
Emerging markets excl. Mexico	6	25	198	20	217	10

Source: Authors' calculations.

1/ Standard deviation of the Hodrick-Prescott filtered series, in percent of the mean of the unfiltered series.

2/ Regions are unweighted averages of included countries.

**30. Business-cycle properties of the relevant variables suggest that both investment and external saving have been more stable in Mexico than in most other emerging market countries (Table 5 and Figure 2).**

- First, Mexico's investment did not show as much evidence of the cyclical fluctuations typical for emerging market countries. The standard deviation of cyclical fluctuations was comparable to industrial countries and was substantially lower than in other emerging market countries. Moreover, investment fluctuations were only weakly related to output fluctuations. While the typical correlation coefficient between detrended investment and output was close to unity in most OECD countries, in Mexico it was only between 0.4 and 0.6.
- Similarly, the variation of external saving in Mexico was lower than in other countries. External saving rarely exceeded 3 percent of GDP—the only two instances of this preceded the 1982 and 1995 crises—and has been relatively stable since 1995.
- Finally, consistent with our hypotheses of offsetting movements in public and private saving, volatility of both private and public saving was found to be a multiple of that of other countries in our sample. Moreover, the negative correlation between those two variables in levels was uniquely high in Mexico.

**31. The statistical properties of investment and external saving suggest that the Richardian equivalence observed in the data results from features of the saving-investment identity, without having a clear causal interpretation.** Given the low volatility of investment and external saving, it appears that the saving-investment identity in Mexico has been balanced mainly through changes in the components of national saving. This could give rise to the unusually high offsets between private and public saving, as well as between private and external saving, found in the data. Such a pattern does not necessarily imply that

public saving is causing private saving. Indeed, our estimates of Granger causality suggest that no unique unidirectional causality exists.<sup>14</sup>

## E. Conclusions

32. **This paper looks at factors that determine Mexico's private saving and examines why saving has not increased in recent years despite improved macroeconomic stability and financial sector reforms.** Without claiming to have sorted out all questions of causality, the paper updates and extends earlier research. It finds that private saving in Mexico is higher than would be predicted by the cross-sectional model, once the usual variables, such as the level of development, financial deepening, or aging, are controlled for. The time-series results are in line with the cross-sectional findings. The paper fails to detect a measurable and statistically significant impact of financial reforms on private saving, whether through a significant impact of real interest rates or a structural break representing an autonomous saving increase. Moreover, the time-series results of private saving developments appear to be biased, owing to the relative stability of external saving and overall investment in Mexico, and possibly also to problems of measurement of private saving.

33. **Looking ahead, while Mexico's level of private saving may increase somewhat, it is unlikely to increase substantially from the current level in the years ahead.** Faster economic growth, financial sector reforms, and the still-young population can be expected to boost private (and national saving). However, higher GDP will push in the opposite direction. The impact of two other factors that may influence private saving—external and public saving—is ambiguous, partly because of the uncertainty over causal role of those variables, but also because it is not clear that these variables themselves will be moving significantly in the coming years. Overall, our findings seem consistent with the hypothesis that for a sustained increase in private saving, Mexico needs to create an environment with more favorable business and investment opportunities.

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<sup>14</sup> Evidence on the business environment may also support the idea that the causality runs from investment to saving. In surveys of investment attractiveness, Mexico scores below the level of Central European or Southeast Asian countries, and the OECD (2005) enumerates obstacles to setting up and running a business and obtaining credit. The perception of the business environment by foreign investors may also be reflected in Mexico's level of foreign direct investment. For example, during 1995–2004, Mexico's average FDI-to-GDP ratio of 2.9 percent of GDP was about one-half of that in the group of the new EU accession countries, and it also lagged behind the average of Argentina, Brazil, Chile, Colombia, and Venezuela.

Table A1. Variables Used in the Regressions

Series	Source	Cross-section regressions	Time-series regressions
<b>Private saving</b> (As a percentage of GDP)	<i>WEO</i>	Dependent variable	Dependent variable
<b>Public saving</b> (As a percentage of GDP)	<i>WEO</i>	Significant, point estimates close to minus unity	Significant, point estimates close to minus unity
<b>Social spending</b> (As a percentage of GDP)	<i>WEO</i>	Insignificant	Insignificant
<b>External saving</b> (Current account deficit as a percentage of GDP)	<i>WEO</i>	Significant, point estimates close to minus unity	Significant, point estimates between -1.3 and -1.5
<b>Dependency ratio</b> (Dependents as a percentage of working-age population)	<i>Haver</i>	Significant, points estimates between -0.3 and -0.6	Insignificant
<b>Old-age dependency ratio</b> (old-age dependents as a percentage of working-age population)	<i>Haver</i>	Not available for all countries	Significant, points estimates around -2.5
<b>Inflation</b> (annual percent change in CPI)	<i>WEO</i>	Insignificant	Insignificant
<b>Gross domestic product in purchasing power parity terms</b>	<i>WDI</i>	Marginally significant, point estimates between -0.1 and -0.5	Not applicable
<b>Rate of economic growth</b> (Gross domestic product in purchasing power parity terms)	<i>WDI, OECD</i>	Marginally significant, point estimates between 0.1 and 0.6	Significant, point estimates around 3.4
<b>Urban population</b> (As a percentage of total population)	<i>WDI</i>	Insignificant	Insignificant
<b>Private sector credit</b> (As a percentage of GDP)	<i>IFS</i>	Marginally significant, point estimates between -0.2 and -0.5	Insignificant
<b>Broad money</b> (As a percentage of GDP)	<i>IFS</i>	Insignificant	Insignificant
<b>Real interest rate</b> (Deposit rate deflated by annual percent change in consumer prices)	<i>IFS</i>	Insignificant	Insignificant
<b>Real interest rate on private and government paper</b> (90-day CD and 3-month Cetes rate deflated by annual percent change in consumer prices)	<i>IFS, Haver</i>	Insignificant	Insignificant

Series	Source	Cross-section regressions	Time-series regressions
<b>Income inequality</b> (Gini coefficient)	<i>WDI</i>	Insignificant	Insignificant
<b>Political risk</b>	<i>ICRG</i>	Insignificant	Insignificant
<b>Corruption</b>	<i>ICRG</i>	Insignificant	Insignificant
<b>Real stock prices</b> (deflated by CPI)	<i>Haver</i>	Not applicable	Insignificant
<b>Stock market capitalization</b> , (deflated by consumer price index)	<i>S&amp;P</i>	Not applicable	Insignificant
<b>Real housing prices</b> (deflated by CPI)	<i>Haver</i>	Not applicable	Insignificant
<b>Terms of trade</b>	<i>WEO</i>	Insignificant	Insignificant
<b>Net foreign assets</b> (Excluding foreign exchange reserves, as a percentage of GDP)	<i>L&amp;M-F</i>	Insignificant	Insignificant

The following abbreviations are used: *WEO* is IMF's *World Economic Outlook* database; *IFS* stands for the IMF's *International Financial Statistics* database; *WDI* is the World Bank's *World Development Indicators* database; *Haver* stands for the databases in Haver Analytics,; *OECD* is the OECD's *National Accounts of OECD Countries: Volume I* database; *ICRG* is the *International Country Risk Guide*, *S&P* stands for the Standard and Poors' *Emerging Stock Markets Factbook*, various issues; *L&M-F* stands for Lane and Milesi-Ferretti (2005).

Table A2. Countries Included in Cross-Section Analysis

Argentina	Hungary	Poland
Australia	India	Portugal
Austria	Indonesia	Russia
Belgium	Ireland	Slovak Republic
Brazil	Israel	South Africa
Canada	Italy	Spain
Chile	Japan	Sweden
China,P.R.: Mainland	Korea	Switzerland
Colombia	Malaysia	Thailand
Czech Republic	Mexico	Turkey
Denmark	Netherlands	United Kingdom
Finland	New Zealand	United States
France	Norway	Uruguay
Germany	Peru	Venezuela, Rep. Bol.
Greece	Philippines	

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#### IV. MEXICAN BANKS: LENDING AND PROFITABILITY IN THE CONTEXT OF REFORMS, 1998–2004<sup>1</sup>

##### *Abstract*

*This chapter characterizes bank lending and profitability in Mexico since 1998, a period of extensive reforms and structural change, including in bank balance sheets. This is done in two parts. First, we review bank reforms and other factors which may have influenced bank behavior in recent years. In particular, the nature and sequencing of reforms are described. Second, we estimate bank-level regressions which link bank lending to the private sector and profitability with balance sheet indicators for commercial banks. These regressions confirm the importance of sound balance sheets as a basis for bank lending growth, while refuting the hypothesis that bank credit to the public sector, mostly FOBAPROA notes extended to banks in exchange for their non-performing assets after the 1994–95 crisis, has crowded out private sector lending in recent years. However, the estimated relationships cannot explain the fast rebound of commercial bank lending to the private sector seen since end-2003—at an annualized rate of 26 percent in real terms. Other determinants not captured in the regressions, most likely resulting from both structural reforms and demand forces, are at play. The chapter briefly reviews the experiences of Chile and Korea, to illustrate the range of factors that could drive a recovery of credit, as well as the potential benefits and risks involved.*

##### **A. Background and Motivation**

- 1. The banking sector in Mexico has experienced tremendous changes in the past 15 years.** In the early 1990s, the sector was quickly privatized and liberalized, and financial intermediation grew at a fast pace. The 1994 financial crisis caused massive losses for banks and the government put in place a rescue package over several years, with a cumulative cost in the order of US\$ 64 billion, or 13 percent of 1999's GDP (Gil Diaz (2000)). At the same time as banks were rescued through recapitalization and debtor and depositor support programs, extensive reforms began. Since 1996, reforms have been steadily implemented, improving most aspects of how banks operate and compete in Mexico.
- 2. Notwithstanding these reforms, the banking sector in Mexico has not yet regained a large financial intermediation role.** The 1994 financial crisis abruptly reversed the fast expansion of bank credit that had followed the first liberalization of the sector. What followed was a protracted contraction of banking domestic assets and private sector bank financing—defined as including loans, security investments, and other forms of financing

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<sup>1</sup> Prepared by Vincent Moissinac ([vmoissinac@imf.org](mailto:vmoissinac@imf.org)). The author is indebted to the Mexican authorities at the Bank of Mexico, the National Banking and Securities Commission, and the Ministry of Finance for their helpful suggestions on an earlier draft of this paper.

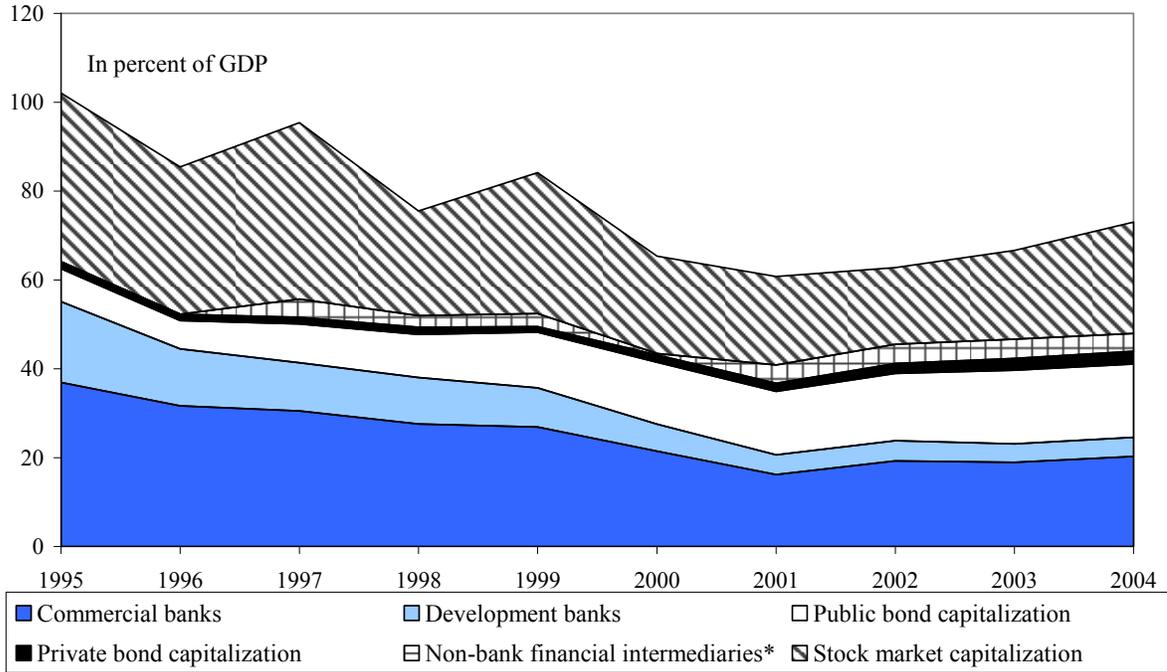
like changes in nonperforming private sector assets. This contraction was experienced across financial intermediaries (Figures 1 and 2), leading the non-bank private sector to turn to alternative financing sources such as supplier credits and foreign financing. The diminished role of Mexico's banking sector is confirmed by looking at other country cases (Figure 3). Even as of March 2005, total commercial bank lending in Mexico as a share of GDP was less than half the Latin American average.

3. **That said, Mexico's financial sector—including banks and non-banks—has shown signs of increasing vibrancy recently.** While Figure 2 shows that private sector bank financing slightly declined in 2003–2004, measured as a share of GDP, this figure is affected by the fast write-off of bad loans. Looking more closely at commercial bank lending to the nonfinancial private sector, there is an important turning point at the end of 2003 (Figure 4). From then through mid-2005, commercial bank private lending increased at an annualized rate of about 26 percent, compared to an annual growth rate of 8½ percent in 2000–2003 (both in real terms). In addition, financing by other financial intermediaries, mainly specialized non-bank intermediaries—known as *Sofoles*—and pension funds (through the purchase of commercial paper), expanded at a fast pace.

4. **The objective of this chapter is to analyze the behavior and performance of Mexican commercial banks in recent years, in light of the reforms that have taken place and other developments that may influence bank behavior.** First, the chapter documents recent banking reforms and other factors likely to influence bank behavior, such as the recapitalization of banks after the 1994 crisis, and lays out preliminary hypotheses regarding the effects of these factors on banks. The overall direction and timing of these effects are in principle uncertain, motivating an empirical investigation. Second, the chapter seeks to characterize bank behavior over the past 7 years (1998–2004), documenting the evolution of the sector's structure, consolidated balance sheets, lending portfolio, and overall profitability. The chapter then reports on bank-level panel regressions trying to relate bank lending and profitability to balance sheet indicators and other variables.

5. **The regression analysis confirms the positive link between bank lending and basic balance sheet indicators of capital adequacy and credit quality, and finds a diminishing influence of bank size and capital adequacy on bank profitability.** The regression analysis does not find evidence of a crowding out of private lending by public sector borrowing during the period studied. Statistical tests are also conducted finding evidence of significant changes of the estimated relationship during the period, including the significance of capital adequacy and interest rate level in explaining the growth of lending to the private sector.

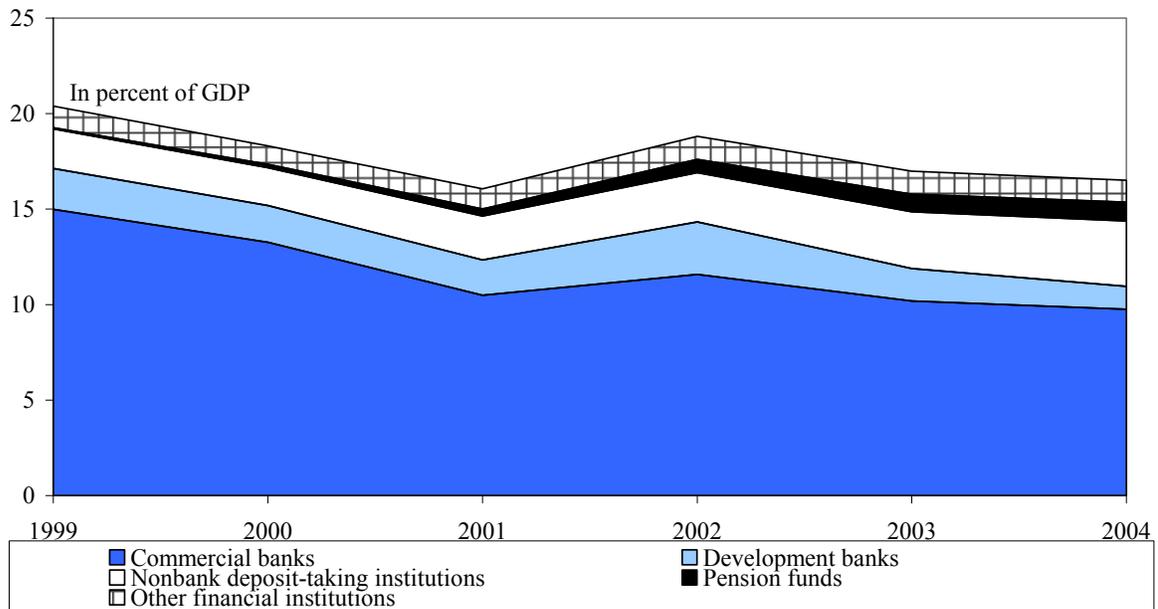
Figure 1. Mexico: Consolidated Financial Sector Assets, 1995—2004



Source: Staff calculations based on IFS methodology; covers the entire financial sector.

\*: Calculated as financial survey assets net of banking sector assets

Figure 2. Mexico: Nonfinancial Private Sector Financing from Consolidated Financial Sector, 1999—2004



Source: Staff calculations based on IFS methodology; includes all forms of financing (e.g., lending, current and overdue, security holdings) provided by the entire financial sector.

Figure 3. Commercial Banking Loans, as of March 2005

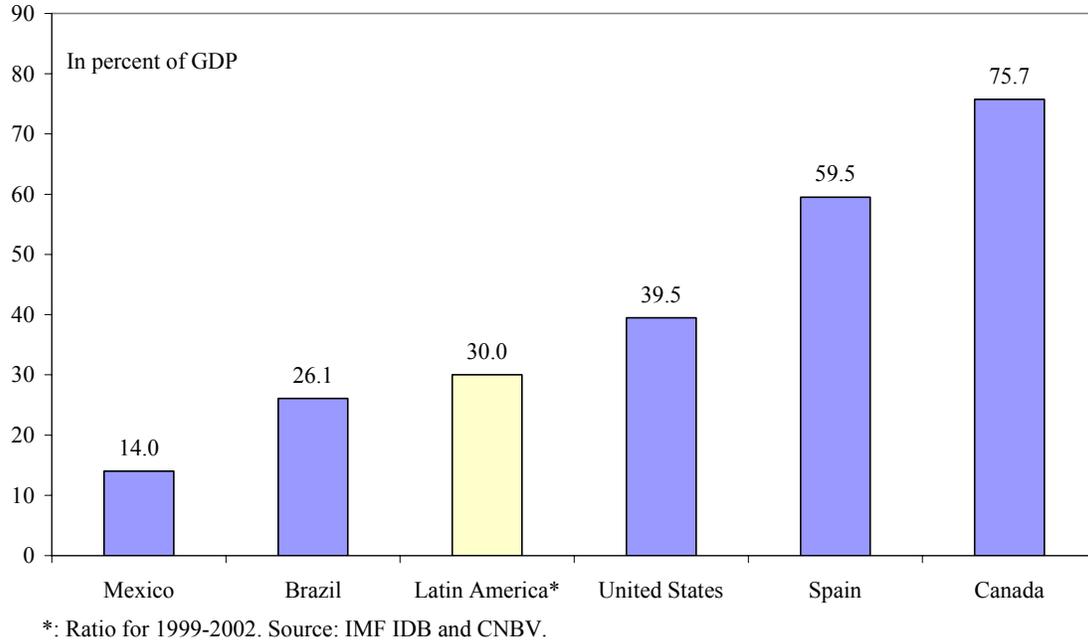
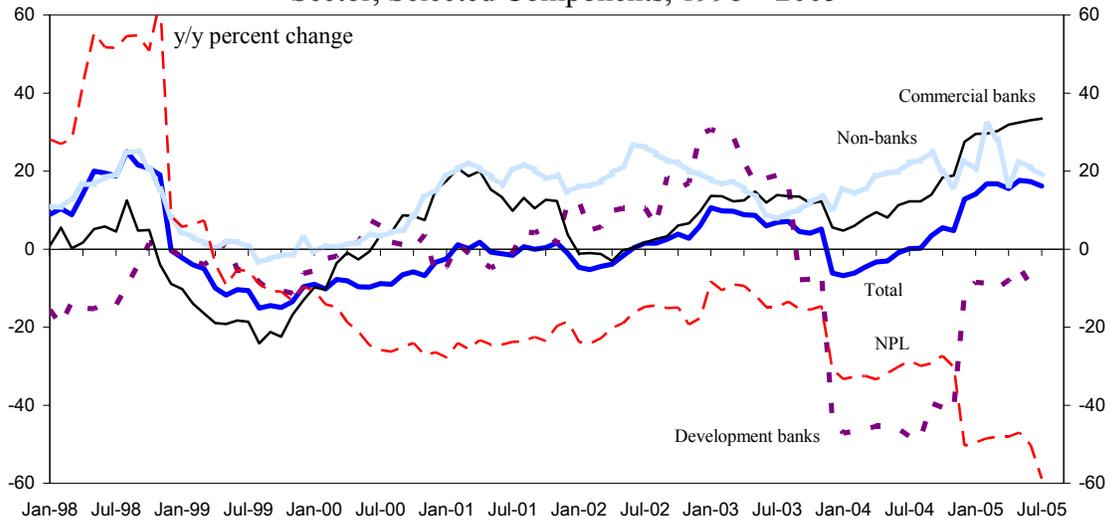


Figure 4. Nonfinancial Private Sector Financing from Consolidated Financial Sector, Selected Components, 1998—2005



6. **However, balance sheet characteristics are found to explain only a small part of bank behavior including the expansion of bank lending since 2003.** The relationships between balance sheets and bank lending estimated in the chapter cannot fully explain the very fast expansion of bank lending since 2003. This motivates the discussion of two country examples that suggest various lessons. The case of Chile shows that bank credit can indeed expand steadily, without an abrupt reversal, following comprehensive banking reforms that were broadly similar to those implemented in Mexico. On the other hand, the case of Korea suggests bank credit may remain particularly volatile, even in the context of reforms. These two country examples are briefly described with a view to highlighting the value of ongoing scrutiny of the determinants of the present credit growth in Mexico.

7. **The rest of the chapter is organized as follows.** Part B reviews bank reforms in Mexico and discusses the factors generally thought to influence bank behavior. Part C presents stylized facts on the consolidated balance sheet and performance of the commercial banking sector, and the results of panel regressions seeking to explain bank behavior. Part D looks for lessons in the evolution of bank lending in the context of reforms in Chile and Korea, and Part E concludes.

## **B. Bank Reforms in Mexico and Key Influences on Bank Behavior**

8. **Factors likely to have influenced bank behavior in Mexico over the last decade are banking sector reforms, placement of government debt with banks, and the improvement of the macroeconomic environment.** Bank reforms since 1995 have touched most aspects of banking operations. Reforms have strengthened bank supervision, promoted competition from other intermediaries, and reduced credit-related information asymmetries. The recapitalization of banks with government notes (FOBAPROA notes) following the 1994–95 crisis had a major impact on the structure of banks. The stabilization of macro-financial conditions led to a sharp decline in inflation expectations, risk premia, and real interest rates with a significant impact on banks' financial results. This section describes these factors and presents hypotheses regarding their effects on banks, including through a selective review of the literature.

### **Bank reforms I: stronger oversight and risk management**

9. **The collapse of bank credit in the mid-1990s has been seen in retrospect not only as a product of the 1994–95 macro-financial crisis but also as the bursting of a credit bubble.** The fast credit expansion during 1988–94<sup>2</sup> coincided with a string of financial liberalization reforms, which consisted of financial deregulation, liberalization of the external capital account, and the privatization of most government-owned commercial banks.

Gil Diaz (2000) explains that a vast problem of nonperforming lending developed

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<sup>2</sup> During 1988–94, bank credit grew with at an annual average growth rate of 25 percent in real terms, with the result that bank financing to the private sector increased from 11 percent of GDP to 43 percent of GDP (Bank of Mexico (2003)).

during that time, reflecting weak bank management before and after hasty privatizations, encouragement of excessive risk-taking by the unlimited government backing of bank liabilities and thin capitalization; the lack of proper credit evaluation skills compounded by the absence of a consumer loan credit bureau and the limited use of the business bureau that was available; inadequate bank supervision, unable to prevent the improper capitalization of privatized banks through cross-lending between banks as well as wholly fraudulent transactions; and improper accounting practices, which for instance defined nonperforming loans as the amount of overdue payments rather than the full value of the loans.

10. **The first set of banking reforms following the crisis was designed to strengthen regulatory and supervisory frameworks and reduce sources of excessive risk-taking.** Most of the reforms in these areas were implemented during 1995–2000, although regulations since then have been further revised and enhanced. The key changes compared to the pre-crisis framework are as follows:

- Safeguards have been put in place to monitor and limit related-party lending. Disclosure requirements have been strengthened regarding loans to shareholders and related parties; and the ceiling on such operations has been tightened in terms of its base of computation, eligible credit operations, and percentage level (IMF (2001)).
- Accounting rules were brought closer to best international practices, including by upgrading methods to classify loans and investments and to create loan-loss reserves and by aligning the accounting treatment of non-performing loans with generally-accepted standards.
- Stricter capital adequacy requirements have been adopted. A new capital adequacy ratio, incorporating market risks, was adopted in 1996. The definition of regulatory capital was then improved in 1998 and was gradually implemented until 2003. Basic capital now has to account for more than 50 percent of net capital; deferred taxes can only account for 20 percent of basic capital (with some exceptions allowing for up to 30 percent); and rules for counting subordinated debt as capital conform to Basel principles.
- Banks have been required to upgrade their risk management practices. This started with the new requirement for banks to have risk-management units which report daily to the Bank of Mexico (BoM). Banks also have been required to check with the credit bureau the credit score of potential borrowers before extending new loans.
- Government insurance of bank liabilities has been overhauled. From 1999 to 2004, the coverage of that insurance was reduced, in yearly stages, from a broad range of bank liabilities to bank deposits, and the coverage of deposit insurance was reduced on a per depositor basis, from an unlimited amount to the equivalent of US\$120,700 on a per depositor basis (in inflation-indexed terms).

11. **The effects of these reforms on bank performance can be expected to change over time.** In the short-term, the reforms create new constraints for supplying bank credit while shifting credit risk back to banks and this is likely to cause an increase in banks' operating costs (e.g., through the need to back a given stock of loans with additional equity). In the longer-term, the restoration of safe balance sheets, together with proper credit screening and risk monitoring mechanisms, should help raise and sustain bank lending growth and profits while enabling a more efficient mediation of savings to investment.

### **Bank reform II: further liberalization and competition**

12. **A second group of reforms broadened competition, both within the banking sector and between the banking sector and other financial intermediaries.** The latter reforms started in 1996 and still continue today, as legislative and regulatory improvements governing development banks, nonbank intermediaries, and capital markets are still being undertaken. Key measures so far include:

- All restrictions on foreign ownership of Mexican banks were lifted by 1997. The participation of foreign banks has increased steadily ever since, reaching more than 80 percent of all banking assets in 2004. Haber (2004) finds evidence that foreign bank entry in Mexico has played a key role in recapitalizing the banking sector and has improved its overall profitability.
- The role of state-owned banks has been streamlined. Regulatory frameworks for several public development banks have been strengthened, with a view to preventing forbearance and regulating them increasingly like private banks. A prominent example has been the rationalization of government trust funds for housing into a development bank, Sociedad Hipotecaria Federal, which is being supervised by the CNBV based on the same principles as for private commercial banks.
- Banks have met greater competition on the asset side as a result of the development of domestic capital markets. This has enabled large businesses to finance themselves through issuing bonds. Although still relatively small compared to bank commercial credits, the stock of private bond capitalization increased at double digit rates annually during 2001–03. Reforms have also taken place allowing specialized non-bank financial intermediaries (Sofoles) to enter aggressively the business of consumer and housing loans.
- Competition on the liability side has intensified more recently. The regulations of mutual funds and saving and loan institutions have been clarified and simplified, making them more attractive as investment vehicles. Further reforms are underway to grant them greater regulatory certainty and operational flexibility (i.e. proposals to allow them a broader range of activities or investments).

13. **In Mexico's context, these reforms can be expected to reduce profits and encourage new lending.** A priori, greater competition within the financial sector can be

expected to reduce banks' profits, if it does not lead to further consolidation—the scope for which is small given Mexico's relatively concentrated banking sector. And whereas the development of alternative financing vehicles may reduce at the margin the demand for bank credit, the level of credit is currently so low that the incentives for expanding lending as a result of reduced profit margins are likely to dominate.

### **Bank reform III: better control of ex-ante and ex-post credit risk**

14. **Lack of information about borrowers and weak contract enforceability have been perceived as major constraints on bank credit supply.** A lack of effective infrastructure to follow debtors' history and the uncertainties created by the 1994–95 crisis have exacerbated information asymmetries between lenders and borrowers. Weak contract enforceability is not only the result of poor legislation for repossessing collateral but is also related to aspects of a judicial system that has been perceived as ineffective, slow, and lacking reliability in terms of expected rulings. Difficulty in loan recovery may also have reflected a culture of non-repayment in the years following the 1994–95 crisis and subsequent rescue.

15. **A third group of reforms has thus sought to improve creditor information availability and reduce the cost of resolving non-performing loans.** Credit bureaus, bankruptcy procedures, and provisions for secured—backed with collateral—lending have been the main focus of these reforms:

- The use of credit bureaus has been greatly expanded and their rules of operation enhanced. Risk management requirements set out by the government after 1995 gave incentives to use credit bureaus more proactively. The first credit bureau that monitored consumer lending was created in 1996. A new credit bureau law enacted in 2002 enhanced the coverage and quality of the credit information available, including by enhancing borrowers' rights to access and rectify errors in their credit records. While most lending institutions are involved in Mexico's two private Credit Bureaus (one for individuals and one for businesses), a number of limitations remain, such as the unavailability of Infonavit<sup>3</sup> credit records and other information typically used in advanced economies, such as utility payment or tax payment records. Consistent with the low level of bank lending in Mexico compared to other countries, Credit Bureaus cover a smaller population share than other emerging market countries (Table 1).
- A new bankruptcy law enacted in 2000 rebalanced bargaining power between creditors and debtors in case of loan default. Before the reform, bankruptcy procedures were widely viewed as excessively long and cumbersome and the likelihood of repossessing collateral for unpaid loans was low. The new law limits the

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<sup>3</sup> Infonavit is a special public fund which finances housing development. Using a fixed share of social security contributions, it grants loans to housing developers and mortgages to workers registered with the social security system. It has been most active in low-income housing.

Table 1. Contract Enforceability and Access to Credit in Mexico and Comparator Countries, as of 2004

	Mexico	Chile	Korea	Latin America & Caribbean	East Asia & Pacific	OECD high income
<b>Enforcing Contracts</b>						
Number of procedures	37	28	29	35	27	19
Time (in days)	421	305	75	462	316	229
Cost (% of debt)	20.0	10.4	5.4	23.3	56.9	10.7
<b>Registering Property</b>						
Number of procedures	5	6	7	6	4	4
Time (in days)	74	31	11	56	51	34
Cost (% of property value)	5.3	1.4	6.3	5.6	4.3	4.8
<b>Obtaining Credit</b>						
Cost to Create Collateral (% of income per capita)	25.7	5.3	8.1	19.4	2.0	5.2
Legal Rights Index 1/	2	4	6	3	5	6
Credit Information Index 2/	6	6	5	4	1	5
Public Credit Registry Coverage (borrowers per 1000 adults)	0	290	0	85	33	76
Private Bureau Coverage (borrowers per 1000 adults)	382	220	1000	325	67	577

Source: World Bank Doing Business database.

1/ The Legal Rights Index ranges from 0-10, with higher scores indicating that those laws are better designed to expand access to credit.

2/ The Credit Information Index measures the scope, access and quality of credit information available through public registries or private bureaus. It ranges from 0-6, with higher values indicating that more credit information is available from a public registry or private bureau.

time for good faith negotiations, after which liquidation has to start; allows for greater flexibility and value maximization in deciding possible reorganization plans; and clarifies the ordering of creditors in case of liquidation. However, the impact of the new law has likely been limited by the fact that businesses with debt below a certain threshold are not required to follow the new bankruptcy procedures and may then continue to rely on less efficient and certain mechanisms (Zuniga-Villasenor (2005)).

- The legal framework for secured lending has been improved in 2000 and 2003. Hills (2004) explains that new legislation expands the scope for secured lending schemes while strengthening creditors' rights in these schemes. It establishes clear rules for the pledging of collateral without actual transfer of possession to the creditor—something new—and for the use of trusts as a vehicle of secured lending. In particular, it clarifies secured lenders' first preferences against the pledged collateral and sets forth clear provisions for nonjudicial foreclosure in the use of trust agreements.
- Other steps have been taken to improve creditor rights, outside the court system. Creditor rights may have remained weak in practice as a result of inefficient state courts and public registries. Moody's (2004) documents the wide heterogeneity of contract enforceability across Mexican states in terms of institutional quality, duration of judicial proceedings, quality and quantity of human and material resources, and efficiency in the enforcement of resolutions.<sup>4</sup> The lack of efficiency of the judicial system in several states has encouraged the use of special arrangements that sidestep the court system. For instance, the reform of mortgage contracts in 2001 replaced liens on property with bilateral trusts, while lease-to-own contracts in automobile financing effectively place assets used as collateral outside an individual's bankruptcy estate (Haber 2004).

16. **Everything else equal, these reforms are expected to boost bank credit supply while reducing the cost of financial intermediation.** Sound borrowers should become more easily identifiable and the recovery of nonperforming loans should become less costly. With credit risk easier to manage ex-ante as well as ex-post, private lending should become more profitable for banks, translating at the same time in higher average returns and additional private lending.

17. **However, the adequacy of the above legal reforms without a broader overhaul of the judicial and enforcement system remains unclear.** For instance, Haber (2004) interprets the current pattern of credit growth, with considerably faster growth for consumer credit than commercial credit, as evidence that these reforms have not been sufficient. He notes that when contract enforceability remains as a generalized problem, lending which is backed by assets that are easier to assign to creditors, such as consumer lending, would be

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<sup>4</sup> The study is based on perceptions of litigation attorneys practicing in each of the states.

expected to expand faster than other (more difficult to enforce) lending. It is important, however, to underscore alternative explanations for this lending pattern, including the higher profitability of consumer loans over business loans and the fact that fast growth of consumer lending is a worldwide phenomenon.

### **The placement of FOBAPROA notes with banks**

18. **The placement of government notes (FOBAPROA notes) following the 1994–95 crisis recapitalized distressed banks, and these notes remained a key feature of the balance sheet of the largest banks.**<sup>5</sup> The FOBAPROA notes were long-term nontradable bonds (most had a 10-year maturity) which the government issued to recapitalize distressed banks and thereby protect depositors. Because most bank liabilities were government-backed and the bank rescue process lasted several years, the amount of FOBAPROA notes issued was large, estimated at about 13 percent of 1999's GDP. Partly as a result of bank mergers, all these notes ended up in the balance sheets of the six largest banks, which together managed more than 90 percent of total bank assets at the end of the 1990s.

19. **While serving to restore a viable banking sector, the rescue operation may have at the same time affected bank lending behavior negatively.** On the one hand, the recapitalization of distressed banks should have helped the resumption of bank lending to the private sector at the same time as restoring viable bank balance sheets. On the other hand, Gonzales-Anaya (2002) argues that banks with large holdings of FOBAPROA notes have had a disincentive to grant new loans to the private sector. First, FOBAPROA notes secure a better risk-return profile than loans to the private sector, with rates of returns indexed to short-term interest rates at a small risk and at virtually no cost.<sup>6</sup> Second, the dominant presence of such assets in a bank balance sheets may in certain cases increase the marginal cost of new funding above the marginal return of new lending.<sup>7</sup> Using bank-level data for 1998 to mid-2002, he finds evidence of a negative relationship between banks' private lending and their FOBAPROA-related revenues.<sup>8 9</sup>

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<sup>5</sup> In 2005, the FOBAPROA notes were exchanged for notes issued by IPAB, the deposit protection agency, as a result of an agreement reached in July 2004.

<sup>6</sup> While guaranteed by the government, these notes were priced at a small discount to government debt. Costs were low because no capital requirement applied, and there was no need for credit screening, risk measurement, and monitoring.

<sup>7</sup> Gonzales-Anaya adds that this crowding out risk was exacerbated by the open-ended nature of the government rescue operation, which encouraged banks to obtain additional bonds by using related lending to artificially generate more bad loans.

<sup>8</sup> All existing empirical work on Mexican banks use the same data source, that is the quarterly bank reports of the CNBV.

<sup>9</sup> Gonzales-Anaya (2002) regresses the level of bank credit on the size of banks' deposits, the size of banks' assets, the value of banks' capital, an indicator of banks' profitability, a measure of banks' income derived from FOBAPROA notes, inflation, and Mexico's global index of economic activity (most variables in logarithms and with appropriate lags). Using a similar specification, however, we found significant problems of residuals' autocorrelation, suggesting bias in the regression coefficients, and we eventually opted for a different specification (see section C).

## The macroeconomic environment

20. **Changes in interest rates have immediate effects on bank profits and bank strategies to manage their assets and liabilities.** These effects are well documented by Aguilar, Cabal, and De la Llera (2005) for the period 2000–2004. Using Mexican bank level data, they decompose annual changes in banks' total net interest margin between the effects of interest rate changes, the growth of earning assets, changes in the structure of earning assets, and changes in funding sources. The results reveal that Mexican banks have broadly preserved their overall level of net interest margin over the past four years, despite a sharp decline in interest rates, thanks to the growth of earning assets and the steady restructuring of their asset-liability structure.

21. **Quite naturally, banks also have responded to return and funding cost differentials.** The average share of consumer credits in earning assets jumped from 2.3 percent at end-2000 to 6.9 percent at end-2004, while the share of commercial credits fell almost 3 percentage points, down to less than 13 percent, over the same period. This partly reflects a remarkable difference in returns between the two types of loans (31.2 percent for consumer loans versus 6.8 percent for commercial loans at end-2004). Similarly, the liability structure of banks has steadily shifted toward less expensive retail deposits, and away from money market funding and foreign currency deposits.

### C. Bank Lending and Profitability, 1998–2004

22. **The various mechanisms driving bank lending and profits described in the previous section are challenging to detect precisely with empirical methods.** Helpfully for the purposes of empirical investigation, there is evidence that credit supply has remained constrained for most of the period since the mid-1990s (see Gonzales-Anaya (2002)). This ensures that the evolution of bank lending has generally reflected changes in credit supply rather than demand. Unfortunately, there are no simple quantitative indicators available to directly capture most of the structural changes that we described.

23. **We choose therefore to document bank behavior in the past seven years focusing on available balance sheet and financial results information.** Despite the limitation of this focus, this exercise allows us to better understand bank behavior in general, and also to detect the role of bank reforms, the government rescue of banks, and changes in macro-conditions in connection with bank balance sheets. By testing for structural changes during the period, we obtain some partial indication of whether bank behavior has structurally changed over the past seven years.

### Consolidated banking sector

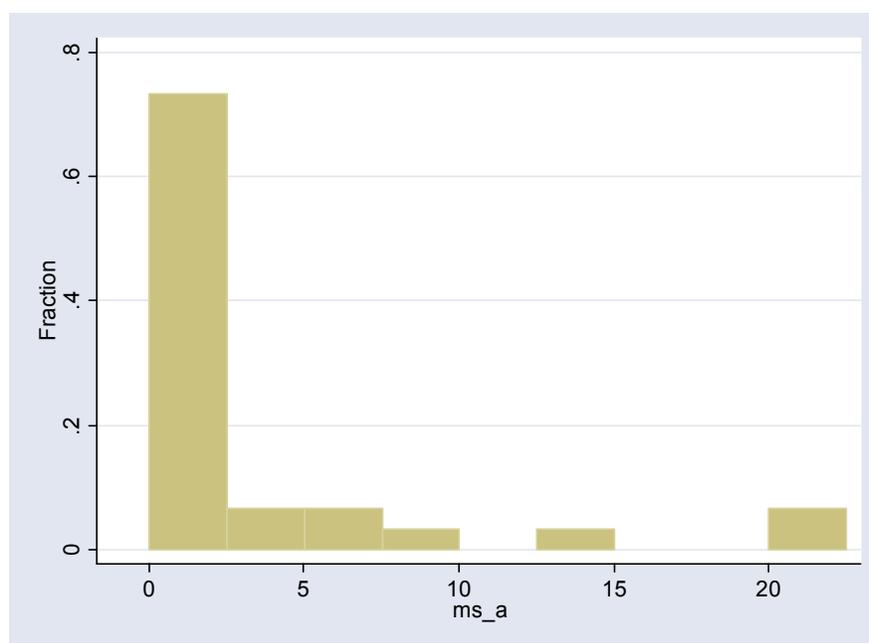
24. **We first document stylized facts about the consolidated commercial banking sector, using CNBV quarterly bank-level data.** Based on these data, the banking sector remained relatively concentrated throughout the period (Table 2 and Figure 5). In particular, the two largest commercial banks have consistently managed about half of the sector's total assets.

Table 2. Mexico: Distribution Among Commercial Banks of Banking Assets, Deposits, and Private Sector Lending

	1998Q4	2001Q4	2004Q4
Bank assets	(in percentage shares)		
50% percentile	0.2	0.4	0.4
95% percentile	20.1	23.1	22.4
Bank deposits			
50% percentile	0.2	0.3	0.3
95% percentile	19.4	22.8	20.9
Private sector lending			
50% percentile	0.4	0.4	0.5
95% percentile	24.6	27.2	21.3
Number of commercial banks	30	30	30

Source: staff calculations based on CNBV data.

Figure 5. Mexico: Distribution of banks' asset shares at end-1998



25. **The main trends concerning bank performance and balance sheets are the following:**

- The level of commercial bank lending to the private sector declined steadily from 1998 to early 2000, when it bottomed out at around 7 percent of GDP. It started recovering significantly in 2003 (excluding non-performing loans, Figure 6). At end-2004, it reached a level equivalent to 8½ percent of GDP<sup>10</sup> and 33 percent of commercial bank assets, still significantly lower than the level observed in 1998. Looking at bank-level data, the amount of lending provided by individual commercial banks was generally volatile throughout the period, reflecting the short-term structure of most lending and the small size of most banks' loan portfolios.
- Bank profitability, as measured by pre-tax revenues divided by assets, edged up at the end of 2003 after being stable around 1 percent per annum since 2000. The main components of bank incomes and costs changed significantly (Figure 7): the gradual decline in net interest margins was more than offset by growing commissions and fees and a decline in administrative costs.
- The consolidated balance sheet of commercial banks strengthened through improved capital adequacy and declining past-due loans. The ratio of bank capital to assets, the simplest proxy for capital adequacy, increased steadily from 7¾ percent to above 11 percent during the period studied (Figure 8). Loan loss reserves came down in tandem with past-due loans, liberating resources for additional lending or placements (Figure 10).
- While its composition between loans and securities changed, credit to the public sector remained high throughout the period, at about 35 percent of combined commercial bank assets.<sup>11</sup> Securities were gradually substituted for bank lending as a means of public sector financing (Figure 10). As a result, the share of loans to the public sector in banks' total loan portfolio has steadily declined (Figure 12).
- Against declining real interest rates, the liquidity of banks' balance sheets is believed to have stayed broadly unchanged. Although recorded bank liquid assets rose, this would reflect a rise in regulatory deposits with the central bank and other frozen deposits, such as those associated with FOBAPROA liabilities (Figure 9) according to the BoM. Banks' voluntary holdings of liquid assets would not have changed dramatically.

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<sup>10</sup> This compares to total commercial bank credit of 9.8 percent of GDP. The difference reflects credit vehicles other than lending (mainly outstanding past due loans and securities).

<sup>11</sup> We calculate bank credit to the public sector as the sum of bank lending to the government sector and bank holdings of public sector securities—including securities of the federal and local governments and of IPAB, the deposit insurance agency.

Figure 6. Commercial Banks' Private Lending and Returns on Average Assets

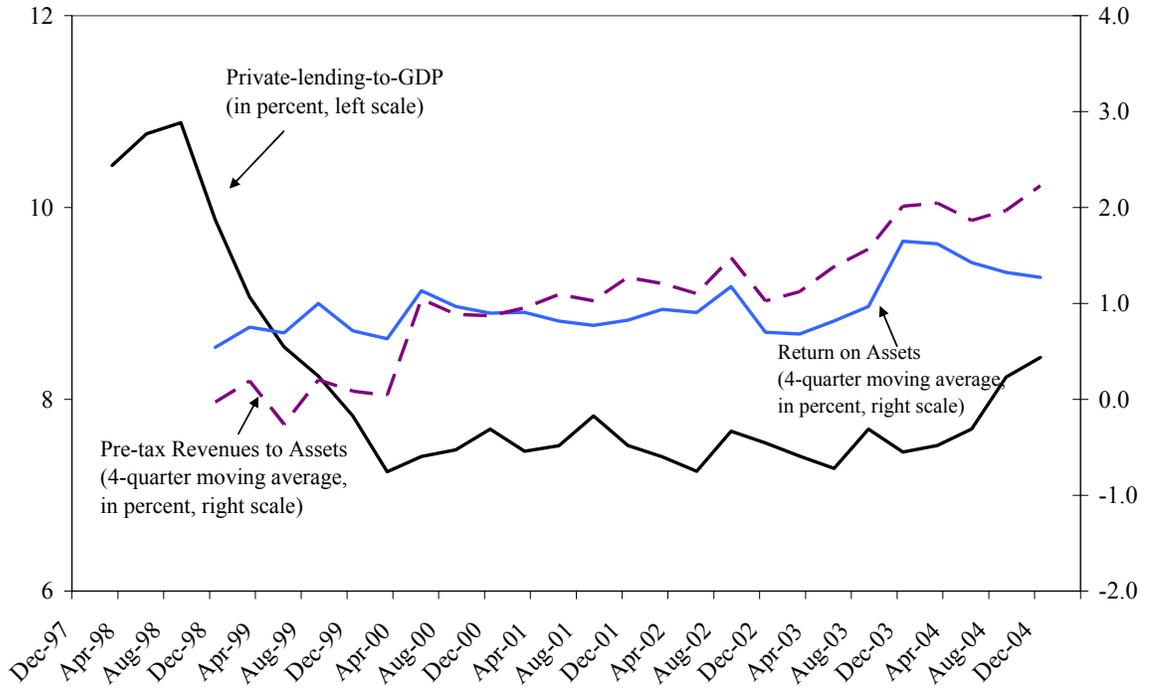


Figure 7. Commercial Banks' Profitability and Efficiency (1-year moving averages)

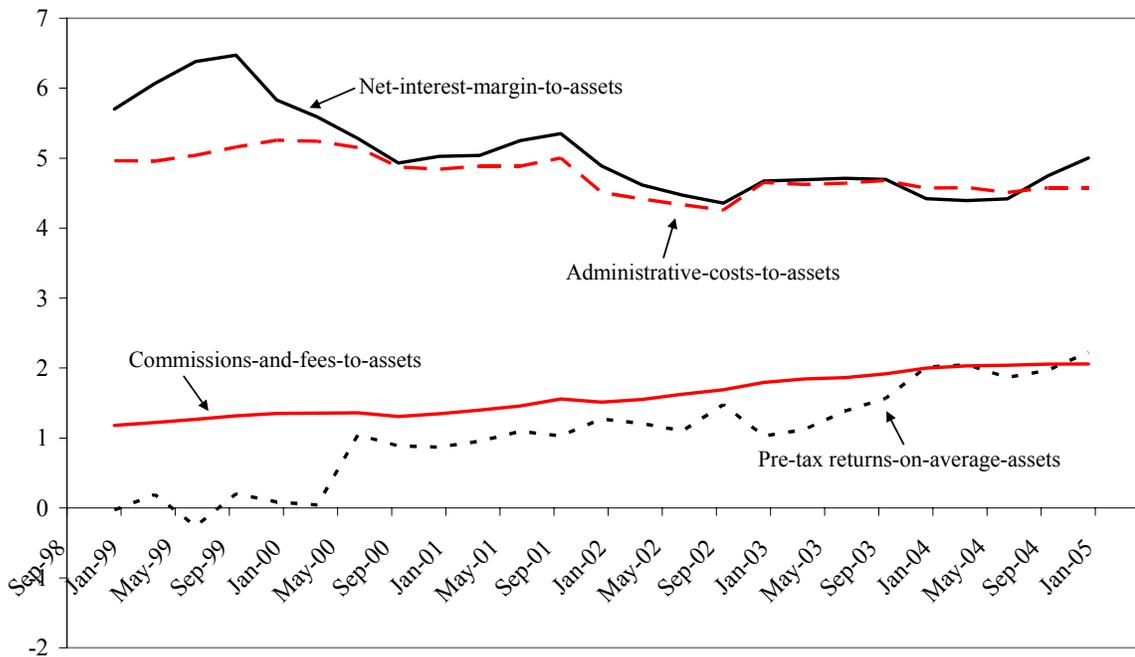


Figure 8. Commercial Banks' Capital Adequacy, Credit to the Public Sector, and Lending to the Private Sector

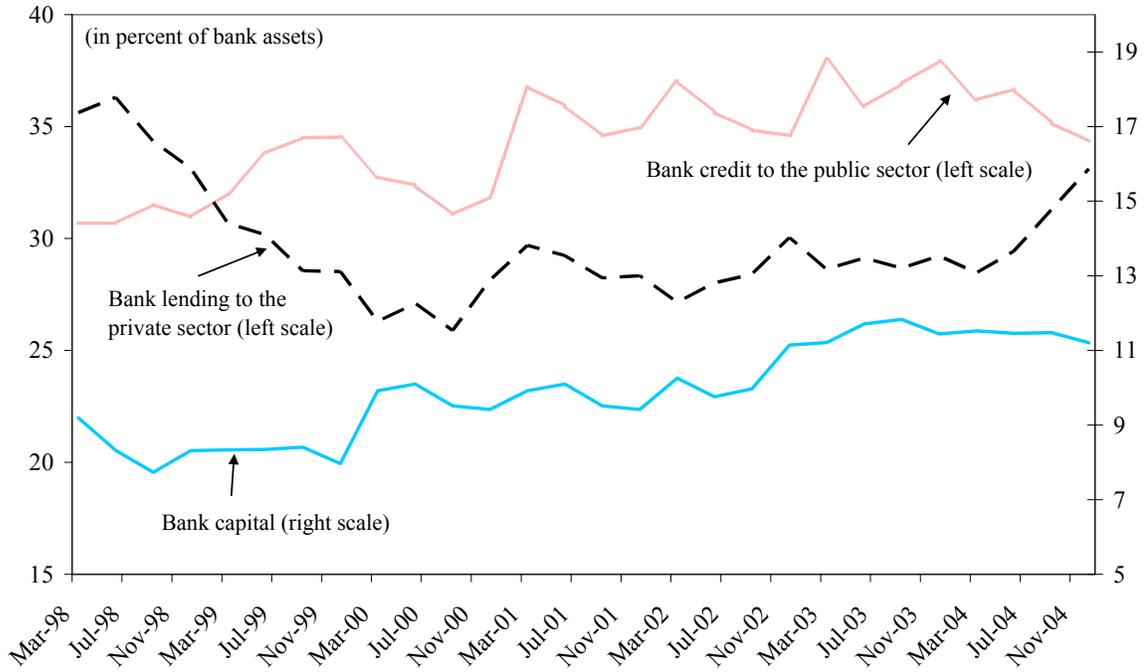


Figure 9. Commercial Bank Liquidity, Deposits, and Real Short-Term Rates

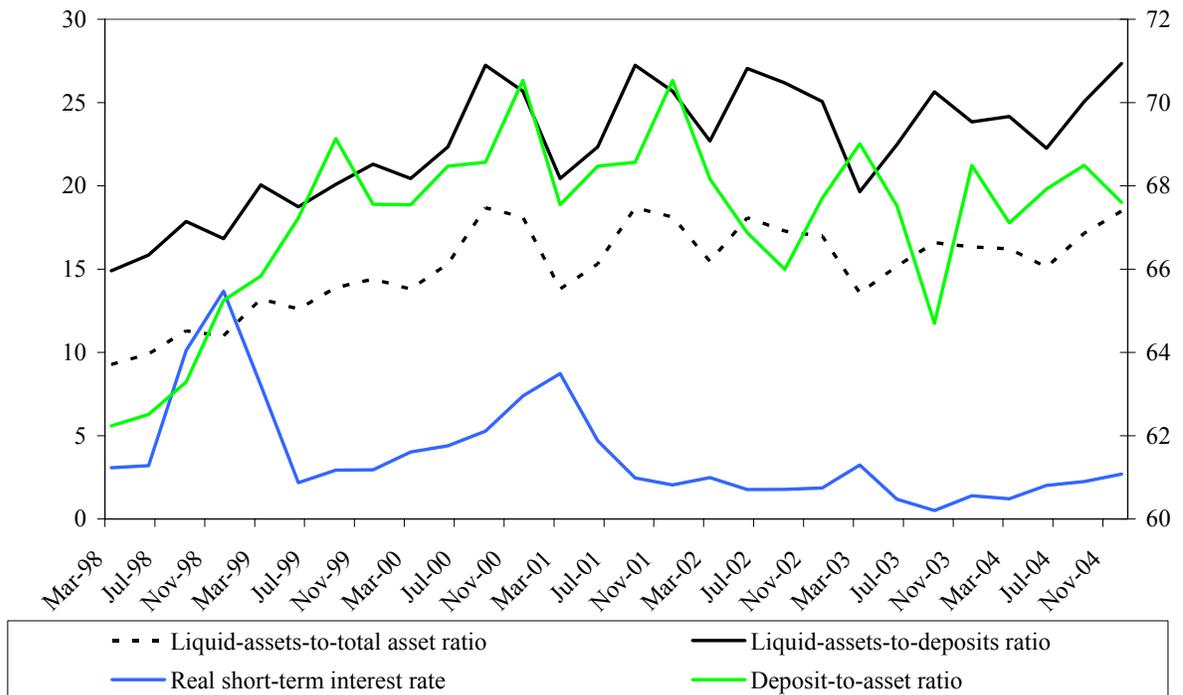
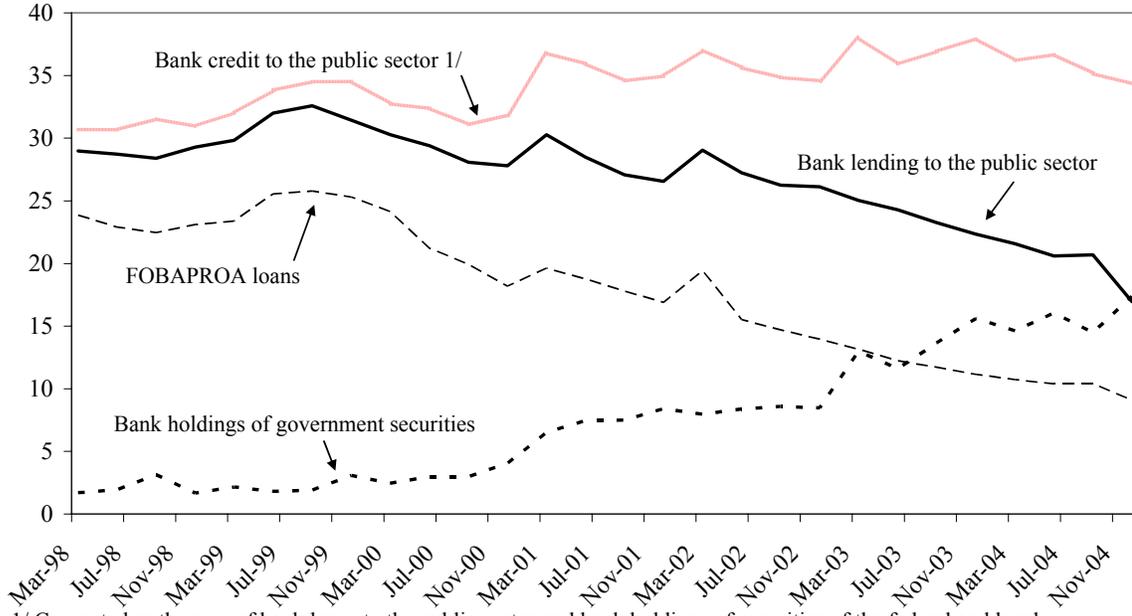
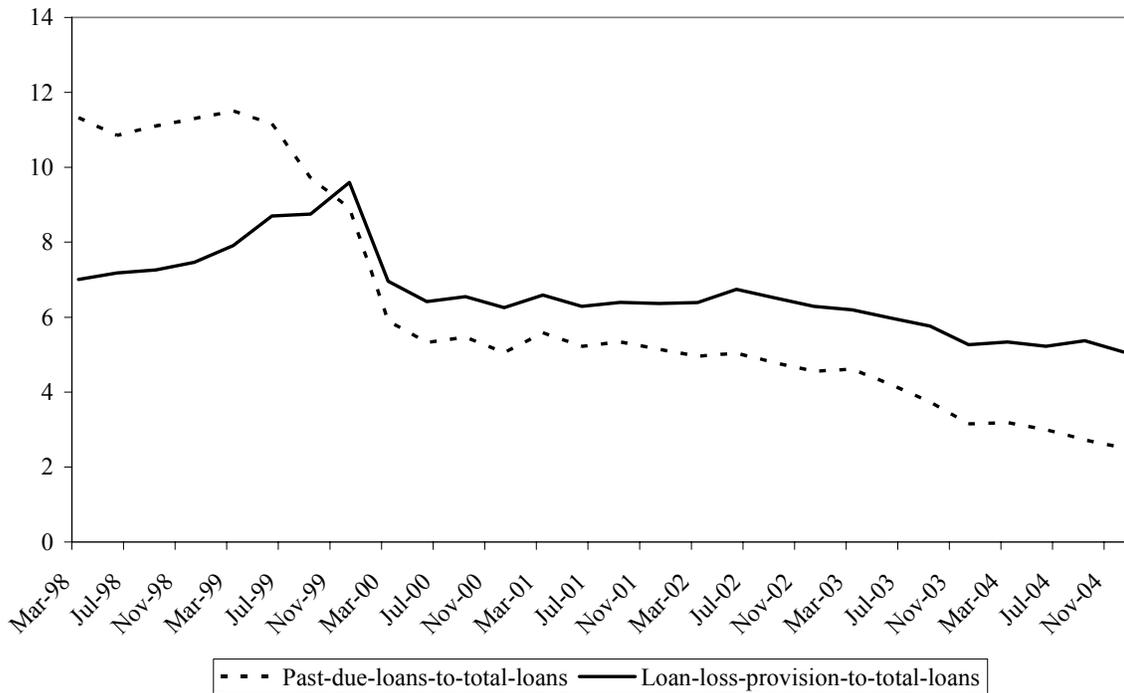


Figure 10. Composition of Commercial Bank Credit to the Public Sector  
(in percent of bank assets)



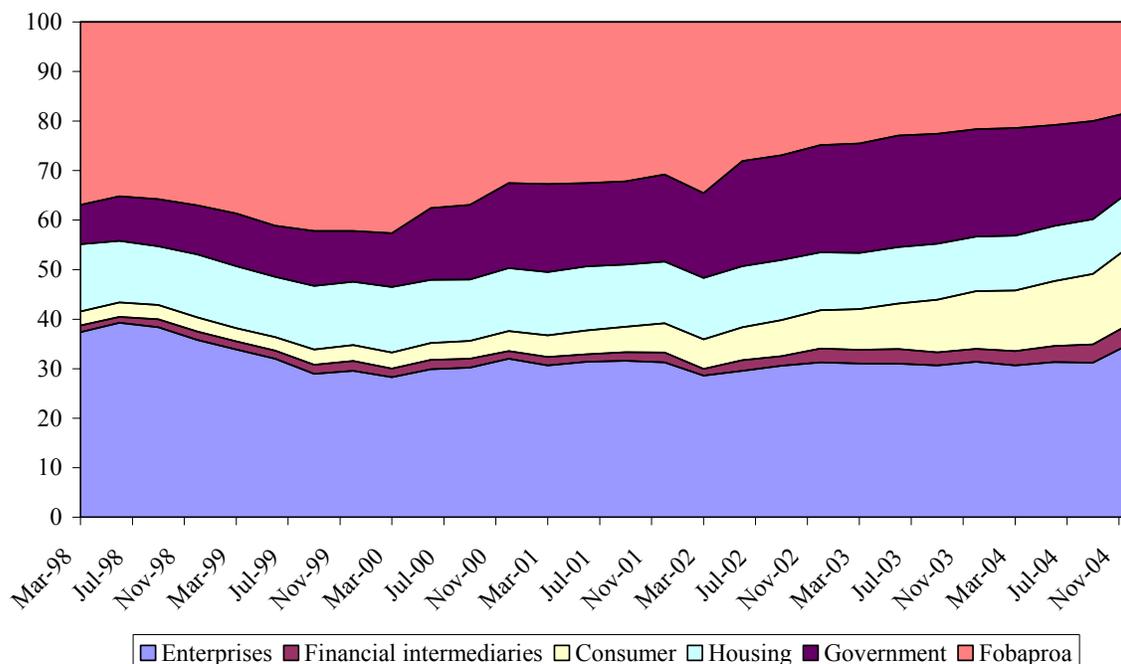
1/ Computed as the sum of bank loans to the public sector and bank holdings of securities of the federal and local governments and IPAB.

Figure 11. Commercial Bank Loan Portfolio Quality



--- Past-due-loans-to-total-loans    — Loan-loss-provision-to-total-loans

Figure 12. Commercial Banks' Loan Portfolio Composition  
(in percent of portfolio of current loans)



26. **These trends are broadly consistent with the intuitions expressed earlier about the effects of bank reforms, possible lending disincentives associated with FOBAPROA loans, and declining interest rates.** The rebound of bank lending to the private sector (as a share of banking assets) coincides with a decline in non-performing loans (partly financed through FOBAPROA programs), the gradual retirement of the FOBAPROA debt, improved capital adequacy, and interest rate reductions. The following econometric investigation enables to measure the role of each of these factors with respect to the recovery of bank lending to the private sector.

### Panel data regressions

27. **We conduct a series of panel regressions using individual bank data,** with the goal of linking growth of bank private lending, and also bank profitability, with balance sheet structures, changes in macroeconomic conditions, and (perhaps) banks' holdings of FOBAPROA and other public lending.

### Source data

28. **We use the CNBV quarterly database on commercial banks, from 1998 to 2004.** The sample covers 34 different banks but, as some disappeared or merged during the period, there are 30 in most periods. The structure of the database may create some small statistical biases. First, while the data cover most of the banks that operated during the period, some of

the banks which were intervened by the CNBV or simply ceased their commercial banking operations during the period (e.g., Societe Generale) are not in the database. However, the missing banks are small. Second, the accounting of bank mergers is not uniform. In most cases, banks which merged generally appear to be accounted separately before and after the merger. In other cases, the database accounts for merged banks as a single entity throughout the period. This may bias the results—for instance by underestimating the role of capital adequacy if one bank had excess capital while the other did not.

**29. We focus on the growth of bank lending to the private sector (excluding non-performing loans) and pre-tax financial revenues (scaled by their assets) as two summary indicators of bank performance to be explained empirically.** Explanatory variables are the ratio of capital to assets (unweighted) as a measure of capital adequacy; the ratio of past-due loans to total current and past-due loans as a measure of credit quality; the ratio of FOBAPROA lending and the sum of all bank credit to the public sector (banking loans to the public sector plus all government domestic securities) as measures of crowding out risks; the ratio of a bank's assets to total banking assets as a measure of bank size; and real short-term interest rates, year-on-year inflation, and real GDP growth to capture macroeconomic conditions.

*Econometric method*

$$P_{it} = \alpha_i + \beta_t + \gamma B_{it-1} + \varepsilon_{it} \quad (1)$$

**30. Our econometric approach is inspired by the recent work of Baqir (2004) on commercial banks in the Philippines.** We estimate panel regressions based on the specification of equation (1), where  $P_{it}$  is an indicator of the performance of bank  $i$  at time  $t$ —either private lending growth or returns on average assets.  $B_{it-1}$  is the matrix of bank balance sheet and macro variables, lagged by one quarter to try to reduce endogeneity problems. In some specifications, we allow for bank fixed effects (the  $\alpha_i$  term) and time effects (the  $\beta_t$  term). Time effects consist either of quarterly dummies to take account of seasonality, or a complete set of time dummies for the full period. We estimate each equation using ordinary least squares (OLS), and fixed and random effects panel models. We run additional specifications (to explore the robustness of the results) using a fixed or random effects specification on the basis of the Hausman test.

**31. We then seek evidence of structural breaks in the relationships estimated.** Linkages between bank lending behavior and profitability, and balance sheet structures and macroeconomic variables, may have changed as a result of bank reforms. For instance, bank reforms, by producing a more secure environment for lending, may have weakened the relationship between bank capital and private lending growth. Also, the relationship between interest rates and bank lending may change as credit supply catches up with unmet demand. To establish whether these various relationships have changed, we test the robustness of estimated coefficients and re-estimate the same regressions for sub-periods.

*Results*

**32. The regressions explaining bank's lending to the private sector confirm the intuitive links between bank lending and balance sheet indicators, while finding no evidence of crowding out by FOBAPROA lending or bank credit to the public sector.** More specifically, Table 3 shows that:

- Capital adequacy has a significant influence on private lending growth. This finding is robust across econometric specifications. Looking at estimations made for half-periods, the significance of this linkages lessens after mid-2001. While this evolution is consistent with the idea mentioned earlier that less insurance might be required following thorough banking reforms, it could also reflect the shortcoming of the capital adequacy indicator used (which is not risk-weighted).
- Nonperforming loans tend to reduce private lending growth, with stronger evidence in the second half of the period. While the sign and magnitude of the effect are broadly the same across specifications, we do not obtain significance levels better than 15-20 percent for regressions covering the full period. We obtain significance at the 5 percent level for the second half of the period.
- The amount of FOBAPROA loans or total credit to the public sector does not have a significant influence on banks' private lending, refuting the possibility of a crowding out of private lending by bank rescue programs or high government financing needs. Hence, the positive effect of bank rescues following the 1996 crisis—through the absorption of banks' non-performing loans—likely outweighs any possible negative effects. This contrasts with the result of Gonzales-Anaya (2002), which found evidence of a negative correlation between bank FOBAPROA-related revenues and bank lending to the private sector. While the difference may be attributed to different statistical specifications (see footnote 7), we have also been able to use a longer time period.
- Real short-term interest rates are found to be positively correlated with increases in bank lending to the private sector, although this relationship ceases to be significant in the second half of the period. One possible interpretation of this result is the presence of credit supply shortages and their gradual lessening over time. Based on standard models of credit rationing (Stiglitz and Weiss (1981)), credit can be expected to increase with rising

Table 3. Mexico: Regressions for Bank Private Lending Growth

Model 1/	OLS	OLS	OLS	OLS	OLS	FE	RE	RE	RE	RE
Time effects	Quarterly dummies	Quarterly dummies	Quarterly dummies	Quarterly dummies	Quarterly dummies	No	No	Yes	No	No
Period	Full	Full	Full	1998Q1 - 2000Q4	2003Q3 - 2000Q4	Full	Full	Full	1998Q1 - 2000Q2	2003Q3 - 2000Q4
Capital-to-asset ratio, lagged	6.7 *** (2.7)	6.5 *** (2.7)	6.0 *** (2.7)	9.6 * (5.2)	2.5 *** (1.4)	5.8 * (4.0)	6.8 *** (2.8)	6.6 *** (2.8)	9.6 ** (5.2)	1.9 (1.7)
Non-performing-loans-to-total-loans, lagged	-6.5 * (4.8)	-6.2 * (4.8)	-6.1 * (4.8)	-2.2 (12.3)	-4.8 *** (2.0)	-7.0 (6.6)	-6.7 * (4.9)	-6.3 * (4.9)	-2.2 (12.3)	-6.1 *** (2.2)
Public-sector-credit-to-assets, lagged 2/	1.2 (2.0)	1.1 (2.0)		1.5 (3.8)	0.7 (0.9)	0.7 (3.9)	1.2 (2.1)	1.1 (2.1)	1.5 (3.8)	-0.1 (1.2)
FOBAPROA-notes-to-asset ratio, lagged			-0.1 (2.7)							
Real short-term interest rate, lagged	31.8 *** (14.4)		31.5 *** (14.4)	49.8 ** (27.7)	-27.2 (40.3)	30.2 *** (14.4)	31.6 *** (14.4)	76.7 *** (22.1)	49.8 ** (27.6)	-27.1 (38.4)
Real GDP y-o-y growth, lagged	-13.6 (15.0)	-14.9 (14.9)	-13 (14.8)	20.7 (46.9)	5.8 (9.1)	-14.1 (15.0)	-13.7 (14.9)	-15.0 (14.9)	20.7 (46.9)	5.6 (8.7)
CPI y-o-y inflation, lagged	-0.4 (9.4)	10.7 * (7.9)	-0.3 (9.4)	17.7 (20.6)	47.5 (53.4)	-1.92 (9.5)	-0.6 (9.4)	10.4 * (7.9)	17.7 (20.6)	49.2 (50.9)
Observations	777	777	780	387	390	777	777	777	387	390
R-squared	0.021	0.145	0.021	0.030	0.027	...	...	...	...	...
Hausman test (prob>chi2)	...	...	...	...	...	0.97	0.97	...	...	...

Source: Fund staff estimates  
 1/ FE indicates fixed effects and RE random effects. All models specified with constant. Standard errors are indicated in parenthesis.  
 2/ Public sector credit comprises all bank loans to the government sector, including FOBAPROA notes, and all government sector securities, including IPAB securities.  
 \*\*\* significance at the 5 percent level  
 \*\* significance at the 10 percent level  
 \* significance at the 20 percent level

Table 4. Mexico: Regressions for Return on Average Assets

Model 1/	OLS	OLS	OLS	OLS	FE	FE	FE	FE	FE	FE	RE
Time effects	Quarterly dummies	Quarterly dummies	Quarterly dummies	Quarterly dummies	No	No	Yes	No	No	No	No
Period	Full	Full	1998Q1 - 20001Q2	2003Q3 - 20004Q4	Full	Full	Full	1998Q1 - 20001Q2	2003Q3 - 20004Q4	Full	Full
Share of total banking assets	0.06 * (0.05)	0.07 ** (0.05)	0.04 (0.07)	0.06 (0.07)	-0.5 *** (0.2)	-0.43 *** (0.19)	-0.45 *** (0.19)	-0.8 *** (0.3)	-0.11 (0.48)	-0.01 (0.1)	
Capital-to-asset ratio, lagged	0.02 (0.02)	0.01 (0.02)	-0.04 ** (0.02)	0.1 *** (0.03)	-0.07 *** (0.2)	-0.07 *** (0.02)	-0.07 *** (0.02)	-0.05 * (0.04)	-0.01 (0.04)	-0.05 *** (0.02)	
Liquid-to-total assets, lagged						0.01 (0.02)					
Non-performing-loans-to-total-loans, lagged	-0.14 *** (0.03)	-0.14 *** (0.03)	-0.14 *** (0.06)	-0.19 *** (0.03)	-0.21 *** (0.03)	-0.22 *** (0.03)	-0.22 *** (0.03)	-0.19 *** (0.07)	-0.24 *** (0.03)	-0.19 *** (0.03)	
Public-sector-credit-to-assets, lagged 2/		-0.02 (0.02)			-0.03 (0.03)						
FOBAPROA-notes-to-asset ratio, lagged	0.04 ** (0.02)	0.06 *** (0.03)	0.03 (0.02)	0.07 * (0.06)	-0.16 *** (0.03)	-0.16 *** (0.03)	-0.16 *** (0.03)	-0.24 *** (0.05)	0.07 (0.07)	-0.13 *** (0.03)	
Real short-term interest rate, lagged	0.02 (0.1)	0.03 (0.1)	-0.18 * (0.14)	-1.0 (0.9)	0.01 (0.08)	0.01 (0.08)	-0.10 (0.12)	-0.19 ** (0.1)	-1.2 *** (0.6)	0.02 (0.08)	
Real GDP y-o-y growth, lagged	-0.11 (0.10)	-0.12 (0.10)	-0.7 *** (0.2)	0.04 (0.2)	-0.1 (0.1)	-0.09 (0.08)	-0.21 * (0.11)	-0.64 *** (0.19)	0.07 (0.15)	-0.1 (0.1)	
CPI y-o-y inflation, lagged	-0.07 (0.06)	-0.07 (0.06)	-0.18 ** (0.10)	0.57 (1.2)	0.01 (0.05)	-0.01 (0.05)	0.26 *** (0.11)	-0.12 * (0.08)	0.77 (0.85)	0.01 (0.05)	
Observations	784	781	388	396	784	781	784	388	393	784	
R-squared	0.046	0.047	0.055	0.100	...	...	...	...	...	...	
Hausman test (prob>chi2)	...	...	...	...	0.00	...	...	...	...	...	

Source: Fund staff estimates  
 1/ FE indicates fixed effects and RE random effects. All models specified with constant. Standard errors are indicated in parenthesis.  
 2/ Public sector credit comprises all bank loans to the government sector, including FOBAPROA notes, and all government sector securities, including IPAB securities.  
 \*\*\* significance at the 5 percent level  
 \*\* significance at the 10 percent level  
 \* significance at the 20 percent level

interest rates below a certain threshold. This interpretation would also explain why activity variables do not appear to influence significantly bank lending. While this result may also reflect endogeneity between credit and interest rate variables, the result remains when longer lags are used for interest rates.

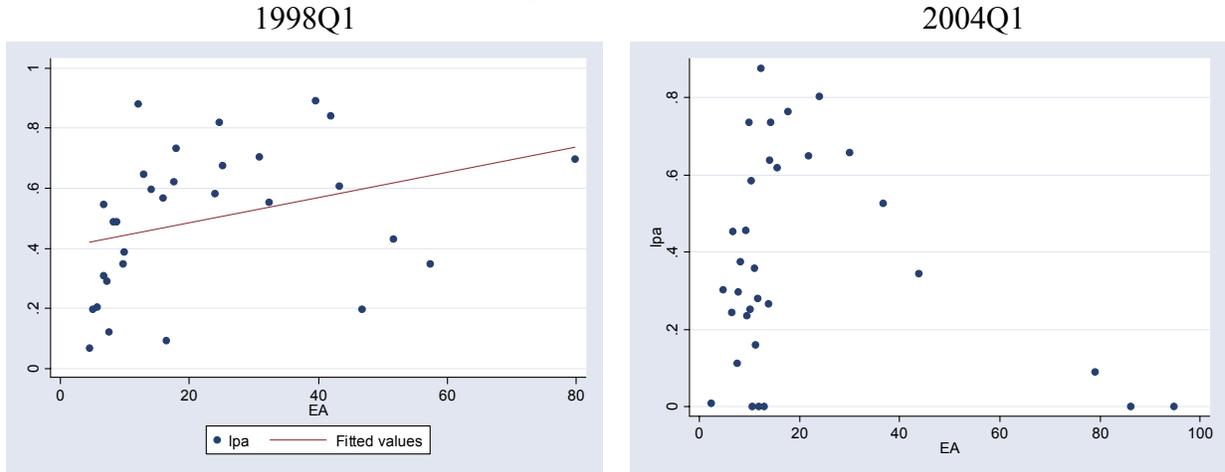
**33. The regressions focusing on bank's pre-tax revenues point to the negative impact of bank size, non-performing loans, and FOBAPROA lending.** More specifically, Table 4 shows that:

- The relative size of a bank's assets weighs negatively on bank net revenues, although this effect loses significance in the second half of the period. This suggests that possible benefits from controlling large market shares, e.g., possible economies of scales or pricing power, are outweighed by greater inefficiencies in large banks compared to smaller ones.
- Bank capital tends to lower bank profitability, although this effect was not found across statistical specifications. This suggests the cost of capital might have been higher than that of other bank liabilities.
- A negative impact of non-performing loans is found, confirming the intuitive linkage between credit quality and bank profitability. While we do not find any significant effect of credit to the public sector as a whole, bank holdings of FOBAPROA loans have tended to reduce profitability. The latter finding may reflect the lower returns of these riskless loans or specific features of banks that required more assistance than others following the 1994 crisis, including for instance the restructuring costs not borne by the banks themselves, persistent operational weaknesses, or a lower appetite for risk.
- No significant relationship is found between macro-variables and bank profitability across statistical specifications.

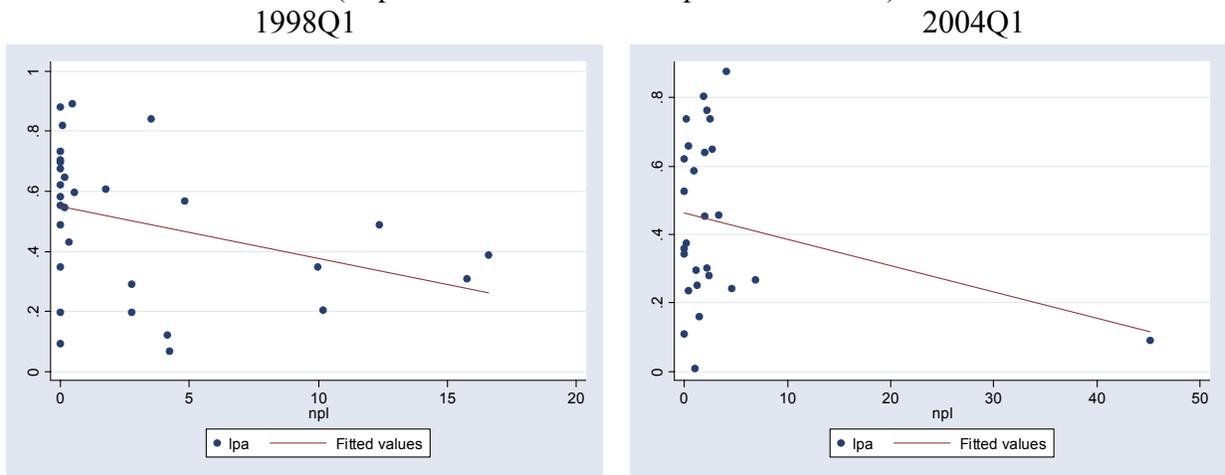
**34. We find evidence that the relationships between bank lending and profitability on the one hand and balance sheet structure and interest rates on the other have changed with time.** Statistical tests indicate significant changes in coefficient values before and after mid-2001 (the middle of the period) and before and after mid-2003 (Table 5). Separate estimations for each sub-period indicate a smaller role for capital adequacy and a greater role for past-due loans in explaining bank lending to the private sector after 2001. As mentioned earlier, the lessening of the positive correlation between the level of real interest rate and lending growth, also observed across the two sub-periods, is consistent with the phasing out of credit supply shortages. Turning to bank's net results, bank size, capital adequacy, and holdings of FOBAPROA loans all stop having significant measurable effects in the period after mid-2001, whereas the estimated impact of outstanding past-due loans on net results increases.

### Box 1. Mexico: Bank Private Lending and Balance Sheet Indicators in 1998Q1 and 2004Q1

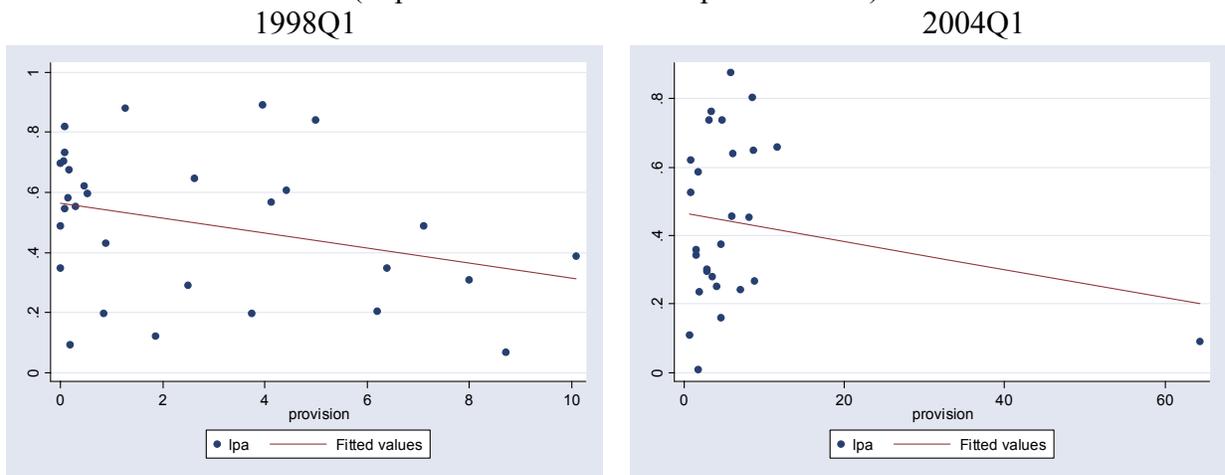
Private lending versus capital ratio  
(in percent of assets)



Private lending versus past-due loans  
(in percent of assets and in percent of loans)



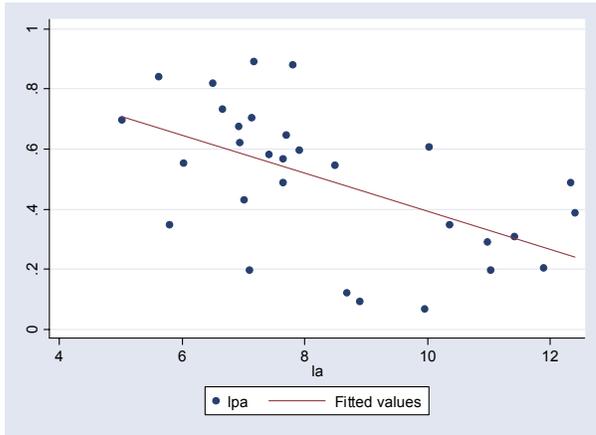
Private lending versus loan loss reserves  
(in percent of assets and in percent loans)



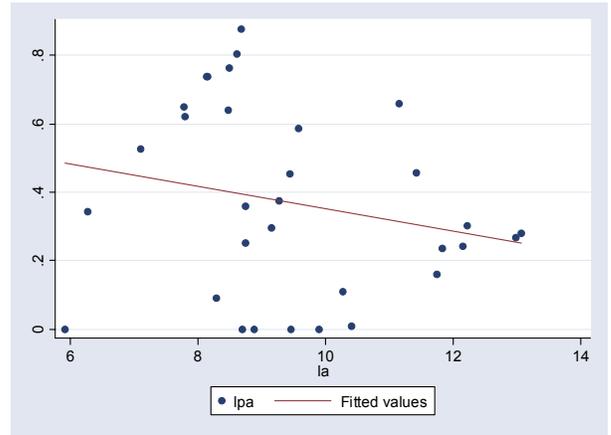
### Box 1 (continued). Mexico: Bank Private Lending and Balance Sheet Indicators in 1998Q1 and 2004Q1

Private lending versus bank size  
(in percent of assets and as logarithm of assets)

1998Q1

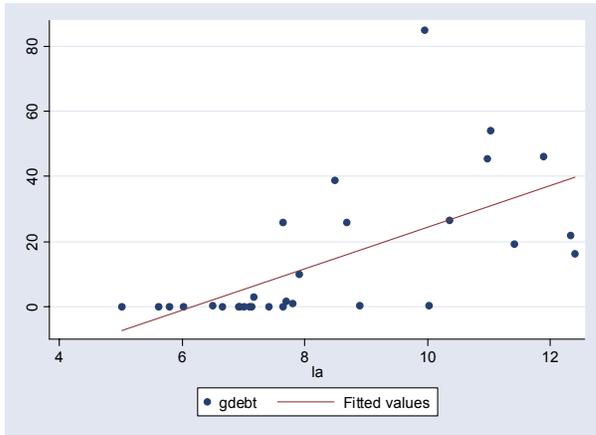


2004Q1



Bank lending to the public sector versus bank size,  
(in percent of assets and logarithm of assets)

1998Q1



2004Q1

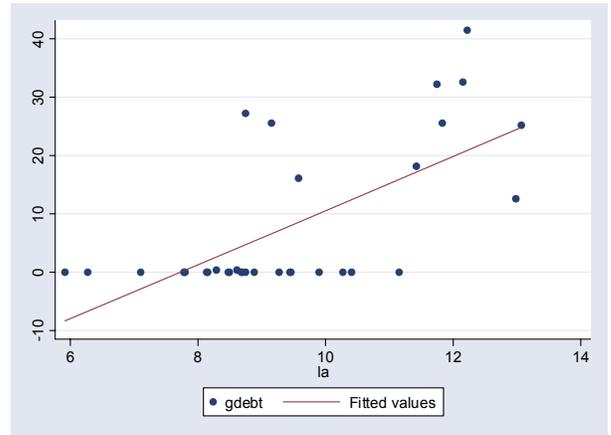


Table 5(a). Mexico: Wald Tests for Structural Break in Banks' Lending

Cut-off date	Null hypothesis of no break
2001Q2	rejected at 58 percent level
2003Q2	rejected at 93 percent level

Table 5(b). Mexico: Wald Tests for Structural Break in Banks' Adjusted Results

Cut-off date	Null hypothesis of no break
2001Q2	rejected at 99 percent level
2003Q2	rejected at 100 percent level

Source: Fund staff estimates

35. **Overall, these results provide some indirect inference about the effects of banking reforms.** First, banking reforms, insofar as they restored adequate levels of capital and brought a decline in past-due loans, supported the growth of bank lending to the private sector. While the evidence suggests that the role of better capitalization may have diminished—consistent with a more secure lending environment—the amount of remaining past-due loans discriminates even more between bank lending and profitability in the recent period than earlier. Second, the lessening of the positive relation between bank lending growth and real interest rates lends support to the idea that banking reforms alleviated credit rationing problems that have been diagnosed in the past. Third, the lesser negative influence of bank size and holdings of FOBAPROA loans on profitability in the second half of the period studied could indicate that banks that are large or have been rescued have restructured effectively. Finally, our findings do not find evidence that the bank rescue package implemented after the 1994 crisis, or the large domestic borrowing needs to the public sector, have discouraged banks from lending.

#### D. Post-Reform Credit Growth: Chile and Korea

36. **The relationships between balance sheets and bank lending estimated in the chapter cannot explain fully the strong acceleration of bank lending that has been ongoing in Mexico since 2003.** The latter must reflect other factors difficult to capture in a regression model. We therefore turn to two country cases, Chile and Korea, which both

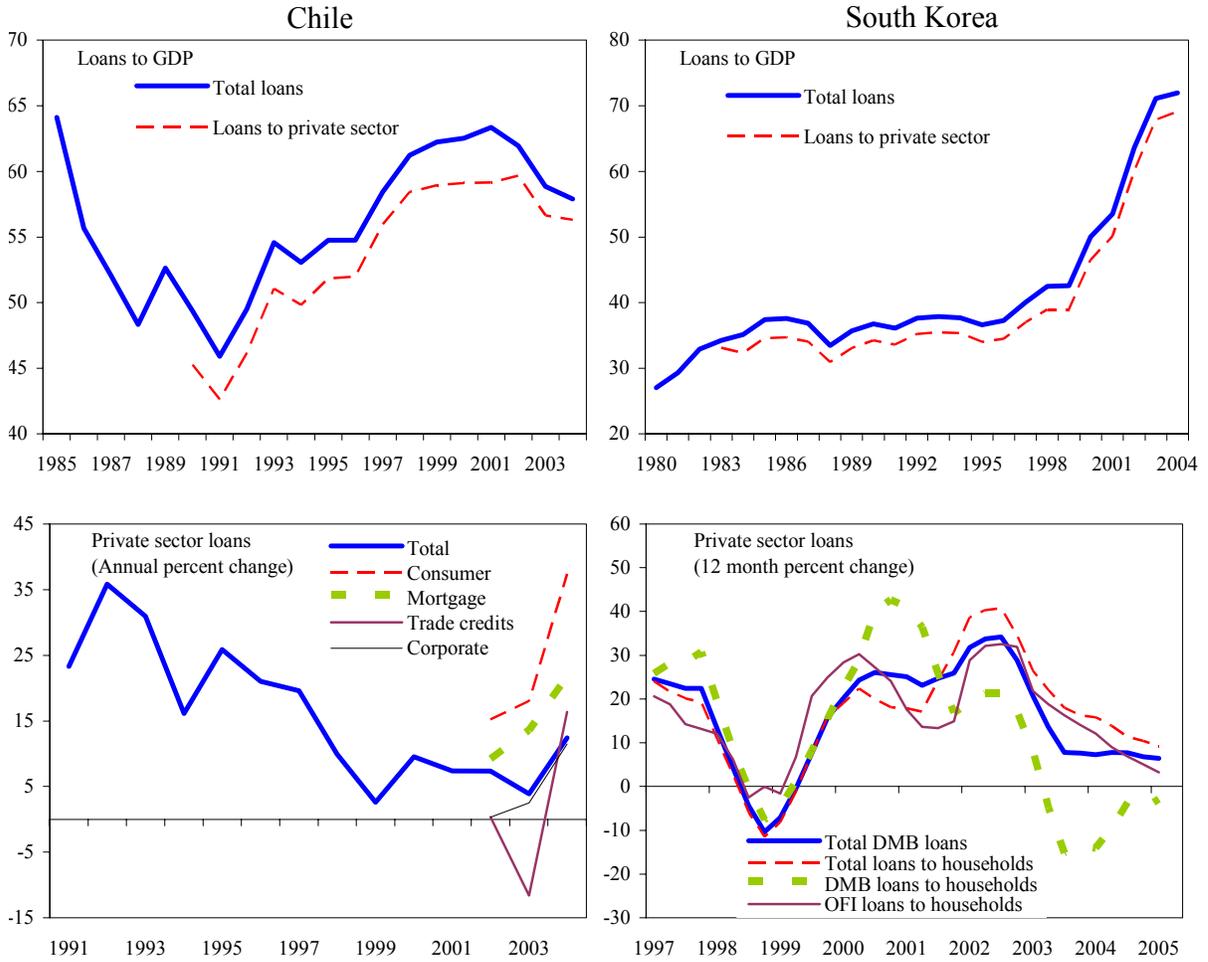
implemented banking reforms that were similar to Mexico's post-1995 reforms following their own banking crises. These cases serve to illustrate the range of possible trajectories for bank credit in Mexico as well as potential risks.

37. **Reforms in Chile and Korea following banking crises (respectively in the early 1980s and 1997–98) shared the same focus as post-1994 Mexican banking reforms, on limiting risk-taking, strengthening accounting and transparency, and further establishing market discipline.** The milestone of post-crisis banking reforms in Chile was the enactment of a new banking law in 1986 that restrained related lending, strengthened capital adequacy rules, and required banks to rate the quality of their investments. Market discipline was also strengthened by establishing strong disclosure requirements, clarifying procedures for the resolution of bank insolvencies, rationalizing the deposit-insurance system, and prohibiting the use of last-lender-facilities to bail out banks (IMF (2004)). In Korea, legislation has been adopted starting in 1997 to expedite the resolution of insolvent financial institutions and corrective action with fragile ones, while gradually rationalizing the deposit-insurance system. Also, accounting, public disclosure, and corporate governance standards have been brought in line with generally observed international practices; and supervisory frameworks have been adjusted to Basel definitions, thus strengthening capital adequacy and loss provisioning requirements (Kim (2003)).

38. **The evolution of bank lending following these wide-ranging reforms was very different in the two countries.** As shown in Figure 13, bank lending in Chile continued to decline, as a share of GDP, for about four years after the start of the reforms before picking up and growing strongly over the next 10 years. In contrast, bank lending has grown faster as a share of GDP in Korea following its 1997–98 crisis and the above-mentioned reforms, and indeed Korea's total level of credit is currently higher than Chile's by more than 10 percentage points of GDP. Another difference is the significantly higher volatility of bank lending in Korea than Chile in recent years, largely on account of the recent boom-bust cycle of consumer lending in Korea.

39. **These different bank credit trajectories in Chile and Korea, against the backdrop of financial sector reforms with broadly similar objectives, point to the quality of reform implementation and the wide range of other determinants of credit growth.** The unsustainable boom of consumer lending in Korea has been attributed to remaining shortcomings of credit screening methods of banks and non-banks, the deficiencies in the information made available by credit bureaus in terms of general quality and coverage, as well as government incentive schemes. As Mexico experiments with new guarantee schemes through development banks to encourage lending to special types of borrowers (e.g., small businesses), Korea's experience, while it took place against a backdrop of a much higher level of bank lending, could suggest caution. Of course, the differences between Chile and Korea are also an evident reminder of the variety of credit determinants aside from policy reforms.

Figure 13. Behavior of Bank Lending in Chile and South Korea, 1980-2004



Sources: Central Bank of Chile and Bank of Korea.

## E. Conclusions

40. **Mexico has undertaken a very broad banking reform effort which is still being pursued further.** The latest initiatives, which focus on procedures for bank resolution and bank liquidation, will be essential to ensure fast and efficient bank interventions and minimize the cost of any bank rescues in the future.

41. **This chapter has provided indirect evidence of the benefits of bank reforms since 1995,** by linking the strengthening of banks' balance sheets with lending growth and increasing profitability. We do detect evidence of structural change in bank behavior consistent with a more secure lending environment and, possibly, signs of diminishing credit rationing.

42. **The recent fast growth of bank credit cannot be explained by stronger balance sheets alone.** But the examples of Korea and Chile show that such an expansion may reflect factors other than bank reforms, some of which can carry risks. This underscores the need for further study of the determinants of the present credit growth in Mexico.

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## V. DEVELOPMENT OF GOVERNMENT SECURITIES AND LOCAL CAPITAL MARKETS IN MEXICO<sup>1</sup>

### *Abstract*

*This chapter examines the significant steps Mexico has taken to develop its government securities market in the context of broadening and deepening its local capital market. The chapter presents a framework of how Mexico has approached this task through building up both the demand and the supply for these securities, while simultaneously strengthening the necessary infrastructure. The chapter focuses on the legal, regulatory and institutional aspects of the Mexican experience, and outlines its implications as well as pending areas for broader capital market development. Issues that may be of particular interest going forward, such as the benefits and risks associated with foreign participation in the local market, and the factors affecting the asset allocation of the AFORES, are also discussed.*

### A. Introduction

1. **A well-developed government securities market can play a crucial role in macroeconomic and financial stability.** A government securities market facilitates the domestic funding of public sector financing needs, thereby reducing the need for direct monetary financing or the build-up of foreign currency-denominated debt. As a result, and coupled with sound debt management, it reduces exposure to global interest rate and currency fluctuations.
2. **An advanced government securities market can also establish the conditions for the development of non-bank financing for the private sector, facilitating the diversification of financial intermediation.** An optimal capital market structure is likely to be one with balance among various channels of intermediation, thereby enabling the various channels of financial intermediation to compensate for each other during times of stress.<sup>2</sup>
3. **By contributing to the conditions needed for a well-functioning financial system, a deep and liquid government securities market can also contribute to more efficient**

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<sup>1</sup> Prepared by Mazen Soueid (ICM). The author is indebted to the Mexican authorities at the Bank of Mexico and Ministry of Finance for valuable suggestions on an earlier draft of this paper.

<sup>2</sup> Various episodes in financial history attest to this. The United States bond market helped substitute for bank intermediation in the credit crunch of the late 1980s. Also, the banking system played the back-up role when the bond market weakened in the wake of the LTCM crisis of 1998. Another example is the Korean bond market, which played a vital role in carrying on financial intermediation after the 1997 financial crisis, which had impaired the banks. In contrast, the less developed bond markets in other countries in East Asia failed to provide this backup function.

**intermediation and hence economic growth.** A well-developed securities market enables the development of financial products, including money market instruments, repurchase agreements (repos) or secured lending in general, structured finance, and derivatives, all of which can improve risk management. These financial instruments play a crucial role in promoting an efficient allocation of capital, and can contribute to productivity growth by improving management and transfer of risk. Risk transfer is essential as it helps facilitate the type of entrepreneurial activity that generates new technologies and new ways of doing business.<sup>3</sup>

4. **The development of Mexico's government securities markets, and its positive impact on the rest of the financial sector, has been rapid in recent years.** The country boasts an extended yield curve in the local government debt market, with maturities up to 20 years issued at a fixed rate (see Figure). Although the size of the local bond market is still smaller (in relation to GDP) than in some other emerging markets, the liquidity of the debt market (public and private), as indicated by a high turnover ratio (695 percent in 2004, see Table), also reflects the important role these instruments play in the functioning of the Mexican financial market, as opposed to a much lower turnover in countries where they act mainly as a safe investment vehicle for the local banks.

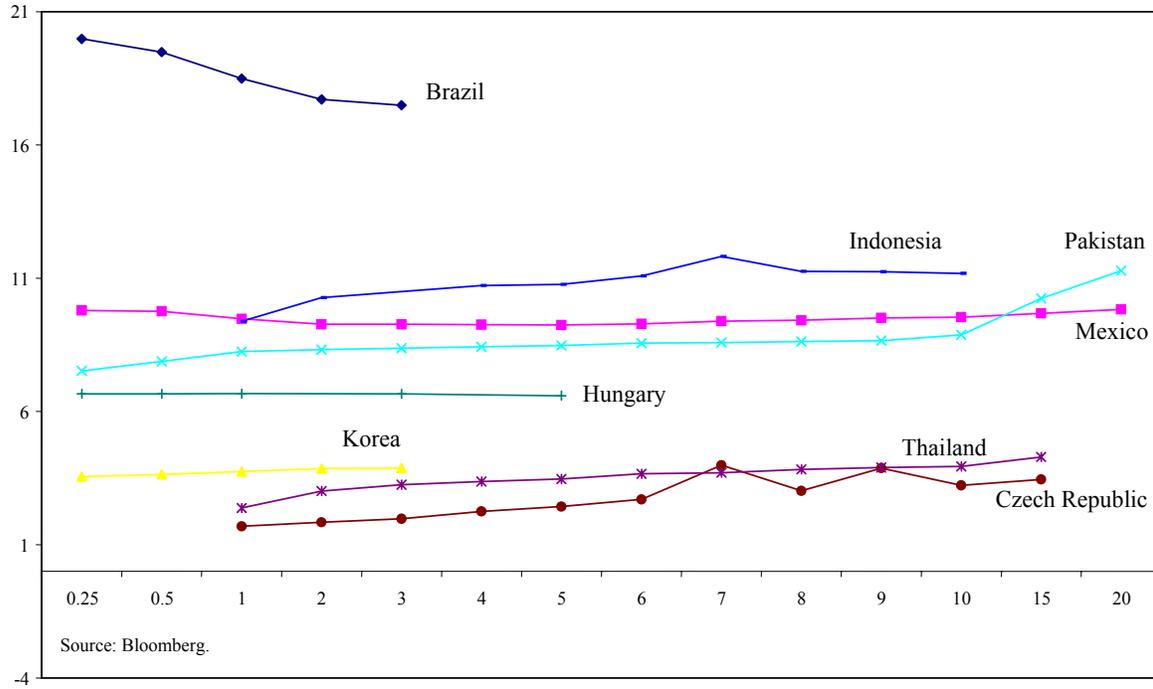
Selected Emerging Markets Economies  
Bond Market Size and Turnover (End-2004)

	Market Size in percent of GDP	Turnover in percent
Korea	90.6	12
Chile	71.6	67
South Africa	68.2	148
Singapore	65.5	153
Brazil	62.7	26
Hungary	56.9	103
India	37.8	16
Poland	32.3	162
Hong Kong	28.4	167
Mexico	23.1	695

Source: BIS.

<sup>3</sup> This is evident for instance in the increasing role of venture capital in developed capital markets, notably the United States.

Selected Emerging Markets Local Yield Curves (July 2005)



5. **The development of the government securities market in Mexico was the product of concerted efforts.** The initial efforts started in 1978 (see below), as the government attempted to move from central bank financing of its deficit to direct market financing. Subsequently, the experience of 1994–95 crisis had profound implications for the government's approach to deficit financing and debt management, since the fact that most of the debt had to be issued at a floating rate or as dollar-indexed debt was a central aspect of that crisis. Since then, the authorities have taken advantage of the opening of the financial sector under NAFTA, which was phased in gradually to maintain a balance between the benefits of increased access to global financial markets and the need to guard against potential threats to financial stability, with significant effort devoted to developing the government securities market (G-20 Conference, Mexico Case Study (2003)).

6. **This chapter reviews the experience of Mexico in developing the government securities market, outlines its impact on the economy, and discusses some issues going forward.** Section B reviews the main factors that have helped develop the *demand* for government securities, outlines their impact, and discusses some issues going forward. Section C reviews the main factors that have shaped the *supply* of these securities, outlines their impact, and discusses some issues going forward. Section D reviews the measures that have improved the supporting financial *infrastructure*. Section E discusses the impacts of the development of the government debt market on the *broader capital market*, including the corporate bond market, the stock market, and derivative markets (including securitized products). Section F concludes.

## B. The Demand Side

### Financial liberalization

7. **Financial liberalization in Mexico, aimed at removing legal and regulatory impediments and widening investment opportunities, has had important implications for the development of the demand for local debt instruments.** The Mexican authorities have defined four phases of institution building in the financial sector, spanning the last three decades (G-20 Mexico Case Study (2003)): (i) early reforms<sup>4</sup> (the early 1970s to 1988); (ii) fortifying financial institutions (1988–1994); (iii) revamping the financial sector in the aftermath of the crisis (1995–2000); and (iv) recent institutional reforms (2001–2003).

8. **The second of these phases was characterized by a radical transformation of the financial sector.** In this context, significant reform measures were taken. These actions included freeing deposit interest rates, abolishing reserve requirements, removing credit controls and lending restrictions, privatizing (again) the banking system, starting to dismantle restrictions on foreign investment in Mexican financial and non-financial assets, and granting autonomy to the central bank. In the context of financial liberalization and deregulation, emphasis on prudential supervision also began to increase. During this period, several actions were of great importance in terms of their impact on the demand for local securities:

- **Deregulation of the financial sector:** in 1988, banks were allowed to invest freely subject to maintaining a liquidity ratio of 30 percent in the form of government debt instruments and interest-bearing deposits at the BoM. Banks were also authorized to participate in CETES auctions, bidding either on their own account or on behalf of third parties. Indeed, banks' holdings of CETES played an important role in the early development of the yield curve, particularly at the shorter end of the curve. The 30 percent liquidity coefficient was eliminated in September 1991.
- **Internationalization of the financial sector:** in 1990, the restrictions on the purchase by non-residents of fixed income securities, especially on government securities<sup>5</sup>, were abolished.

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<sup>4</sup> A significant action taken by the authorities during this period was the adoption in 1977 of a single reserve requirement ratio for the liabilities in domestic currency of banks. The introduction of Treasury Certificates (CETES) in 1978 complemented measures adopted on legal reserve requirements.

<sup>5</sup> Foreign investors who are residents of countries with which Mexico has double taxation agreements are exempted from any withholding tax on their investment in government securities.

## Financial deepening

9. **Following the 1994–95 crisis, the Mexican authorities initiated actions to deepen the financial liberalization process.** A main objective was to develop a diverse investor base as a way to reduce the cost of borrowing and promote market stability and efficiency. A diversified investor base was crucial to enhance the liquidity of the local securities market and ensure a stable demand for fixed-income securities. In this light, the authorities' efforts focused on creating the conditions for greater participation of both domestic institutional investors and foreign investors in the government securities market, especially at the long-end of the curve. The participation of foreign investors was viewed as critical not only to promote financial innovation, but also to contribute to the liquidity and maturity extension of government securities.

10. **In this context, Mexico took a number of far-reaching measures.** In so doing, Mexico made efforts both to provide incentives to different investors to buy, hold and trade government securities, and to put in place structural reforms designed to attract different investors. These included:

- **Pension sector reforms:** in 1992, a private pension system based on an individual capitalization scheme began operating, though at first the individual accounts were placed at the central bank. Since 1997, the contributions made by employees, employers, and the government have been deposited and registered in personal accounts owned by the employees, but administered by financial entities called Administrators of Retirement Funds (AFORES). In 2002, amendments and additions to the retirement savings system law opened the possibility for more workers to access the benefits of the new pension system. The amendments also eliminated the restrictions to invest in foreign securities, allowing retirement fund managers to invest up to 20 percent of their total assets in these instruments.
- **Bankruptcy procedures:** in 2000, the bankruptcy and security lending legislation was passed. The new law permitted holders of repo collateral to terminate in advance their repo operations by netting their rights and obligations with the defaulting counterparty.<sup>6</sup> This was necessary to provide more certainty for counterparties' operations in case of bank defaults, as repos were not protected by IPAB, the deposit insurance agency.
- **Mutual fund reforms:** the mutual fund law of 2001 required that management of mutual fund firms be independent. This law has led to the establishment of new entities, which has broadened the field of domestic institutional investors. As credit institutions and brokerage houses can no longer operate directly as mutual fund

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<sup>6</sup> Prior bankruptcy laws required market participants to first settle their obligations and then collect their rights out of bankruptcy proceeds.

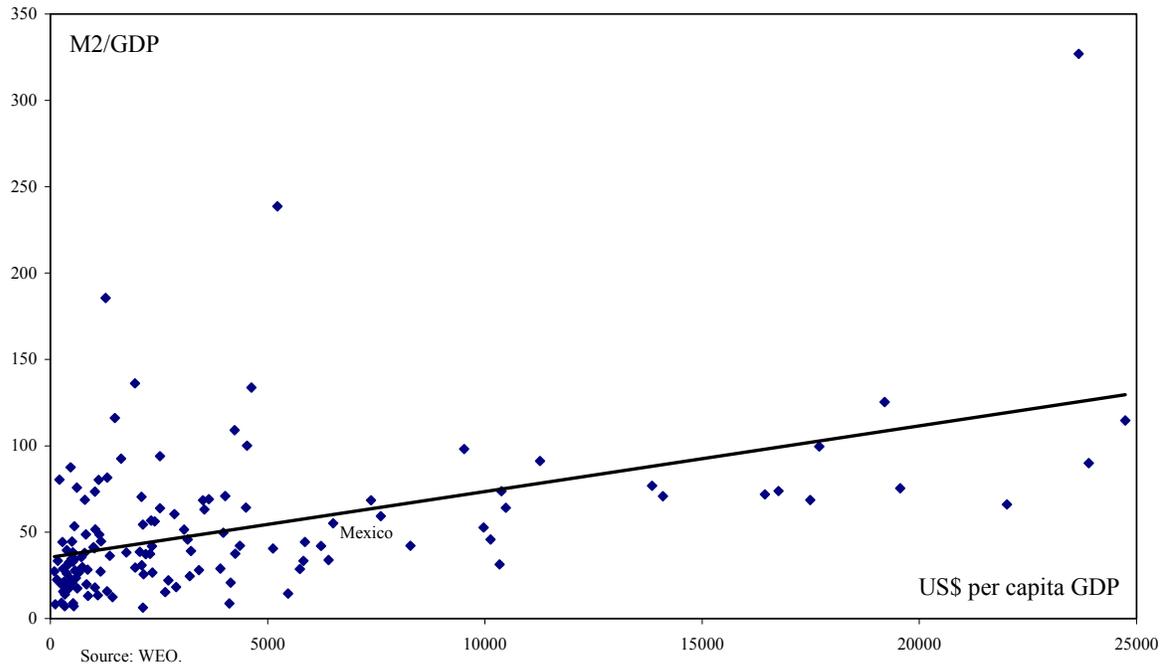
managers, they had to create independent subsidiaries with independent staff. Mutual fund management firms are, in effect, compelled to operate as independent business units with the sole purpose of managing and distributing mutual funds.

### Implications of demand policies

11. **Financial liberalization, coupled with broadening of the investor base, has allowed Mexico to open up its economy while reducing its vulnerability to external shocks.** In particular:

- **Financial intermediation has been enhanced.** In contrast to the earlier periods, total domestic financial savings as measured by M2 have increased, from 41 percent of GDP in 1995 to 53 percent of GDP in 2004. In comparison with the rest of the world, Mexico's level of M2/GDP at end-2004 seems to be broadly in line with its GDP per capita (in US\$ at market prices), though there is room for further improvement (see Figure).

**World Domestic Financial Savings  
and GDP Per Capita (End-2004)**



- **Public sector financing has become stable, with a reduced risk of funding problems.** The investor base in the government debt market is much more diversified. Different types of investors, including foreign investors, with different time horizons, risk preferences and trading motives buy, hold or trade all government securities, facilitating public sector financing (see Table).

Mexico: Actual Portfolio Composition of Institutional Investors by Type of Instrument  
(in percent, end-2004)

	Pension Funds	Mutual Funds	Insurance Companies
Government and CB Debt <sup>1/</sup>	83	55	70
Domestic Corporate bonds <sup>2/</sup>	10	10	17
Domestic Equity	n.a.	13	5
Investments Abroad	n.a.	...	...
Other <sup>3/</sup>	8	21	9

Footnotes:

1/ 'Government and CB debt'.

2/ 'Corporate bonds' include bonds (but not commercial paper) issued by non-financial firms and in some cases, asset-backed securities;

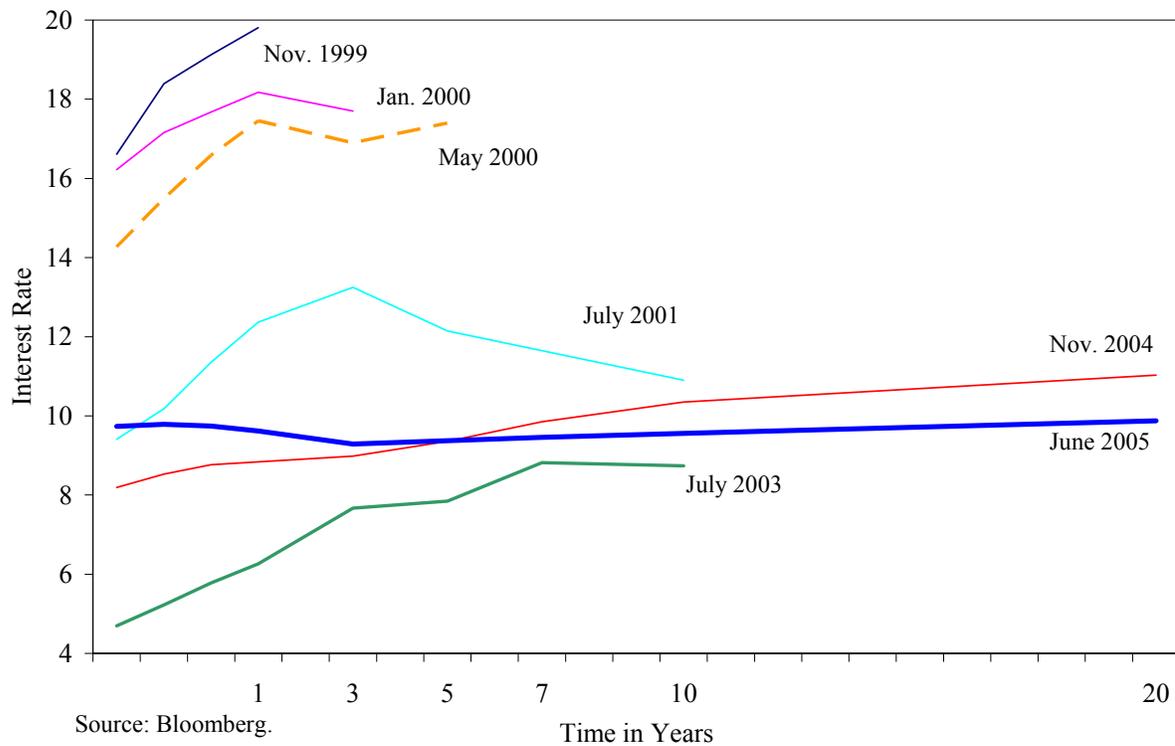
3/ 'Other' includes commercial paper, bank deposits and investments in local mutual funds;

"n.a." - not applicable/not allowed; "..." - no information

Sources: CNBV, CNSF, CONSAR

- The yield curve has been extended, and has shifted lower (see Figure).** The extension of the yield curve has been made possible as domestic institutional investors (and foreign investors, more recently) began to participate more actively in the domestic debt markets. Greater competition within a larger pool of investors has contributed to reducing the cost of borrowing.

Domestic Yield Curves

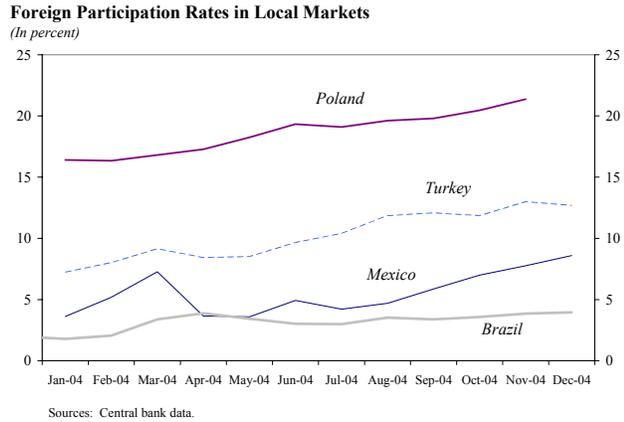


Source: Bloomberg.

Time in Years

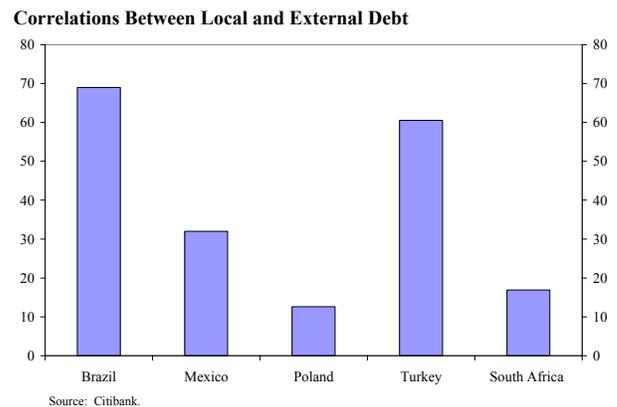
**Foreign participation**

12. **Foreign participation in local currency issues has been encouraged by many countries seeking to diversify their investor base and foster the development of their local capital markets.** Countries have sought to achieve this objective in various ways (see Box 1). Flows have been concentrated in the most liquid local-currency markets, including government bonds in Brazil, Mexico, Poland and Turkey. The proportion of government bonds held by foreign investors in these markets doubled over the past year, and ranges from a still small 4 percent in Brazil to one-fifth of the market in Poland (see Figure).



13. **Several factors have facilitated the higher participation of foreign investors in local markets.** The introduction of derivative instruments to hedge foreign exchange risk was a key factor. Another was the inclusion of local market bonds in global benchmark indices that are used by a wide range of investors. For instance, local currency bonds of selected investment grade emerging market countries (Chile, Czech Republic, Hungary, Mexico, Poland, Slovenia and South Africa) were recently included in the Lehman Global Aggregate Index. This has made it easier for investors that manage such benchmarks to add emerging market local-currency bonds to their portfolios, thus adding longer-term investors to the investor base.

14. **For investors, local-currency debt may also offer an opportunity for diversification.** This is especially true for debt from low-yielding investment grade countries such as Poland and Mexico, where the correlation between external and domestic debt returns has been low in 2004 (see Figure). For higher-yielding credits such as Brazil and Turkey, the country/credit risk premium is high and changes in the premium affect yields on dollar debt, the exchange rate, and yields on domestic debt at the same time, resulting in high correlations among the return on these assets, particularly in times of stress.



### **Box 1. An Alternative Foreign Exposure to Local Currency Bonds**

**Allowing foreign investor participation in local-currency bond markets provides an opportunity for a government to reduce its exposure to FX risk (so-called “original sin”) while helping to diversify the investor base and foster the development of their capital markets.** Different countries have sought to achieve this objective in different ways: some, like Mexico, have encouraged foreign participation in the local bond market, while others have taken the approach of issuing international bonds in local currency.

**Some sovereign (and private) issuers have ventured recently to issue international bonds in local currency.** Such issues have an ambiguous effect on local capital market development. On one hand, the international local currency issuance attracts foreign investment that might have otherwise bought the bond in the local market, thus depriving the latter of a source of liquidity. On the other hand, the international issues may help deepen the local market development by attracting investors that would not have invested in local bonds because of fears of convertibility or default risk.<sup>1/</sup> These issues also extend the investor base to investors that are interested in local currency, but unwilling to undergo the complicated procedures required to buy local securities in some countries.

**So far, the international bonds issued by EMs in their own local currencies have accounted for a small fraction of their total international bond issues.** From 1995-2005, the ratios of local currency bonds issued internationally to total international issues were only 0.8 percent (US\$1.2 billion) in Emerging Asia, 0.2 percent (US\$249 million) in Emerging Europe and 0.7 percent (US\$ 2.2 billion) in Latin America. However, such issuance is widening, as recently some EMs have issued international bonds in their own currencies for the first time. For example, the Colombian government issued a US\$375 million equivalent of 6-year international bonds denominated in local currency in November 2004, followed by another such issuance, in January 2005, for US\$124 million.

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1/ The investor will be protected against convertibility risk (in case the government imposed exchange controls), as interest and principal payments are payable in dollars at the spot exchange rate prevailing around the day when the payment falls due. In addition, because the bond is a global bond, investors may find the legal statutes that govern the bond more favorable than local laws in case of default.

15. **The implications of higher foreign participation in local government securities market for financial stability, however, may not be as clear cut.** Mexico's avoidance of double taxation and other tax and regulatory complexities<sup>7</sup> has encouraged foreign investors to participate in the local bond markets. This participation has potential benefits, but also could pose certain risks:

- **Foreign investors can bring several significant benefits to the local bond market.** They can play an important role in diversifying the investor base. Through their participation in the local bond market, arbitrage activities and diversification of portfolios, foreign investors can contribute to increasing the liquidity of the local bond market. In the context of macroeconomic stability, these activities may facilitate the extension of the maturity of bonds issued in the local bond market. This seems to be the case in Mexico, which extended its yield curve in 2003 by issuing a 20-year peso-denominated bond (see section C); as of early 2005, holding of this bond is thought to be dominated by foreign investors. Another example is Turkey, which issued a fixed rate three-year lira bond for the first time in October 2004, with strong interest from foreign investors. Foreign investors can also help speed up the pace of financial innovation, particularly through the use of both technology and services already available in international capital markets, giving rise to efficiency gains.
- **The participation of foreign investors in the local bond market, however, may not be a source of stability in all circumstances.** In principle, reducing exposure to external shocks is one of the main benefits of developing an efficient government bond market. However, some market participants have suggested that attracting foreign investment in a local securities market could end up importing the volatility that developing the domestic market tried to avoid (El-Erian (2005)). Foreign investors' views on the exchange rate will affect the way they value these securities, and they might be more prone to using them as a short-term speculative tool. A further consideration is that recently the demand for local currency government bonds has been whetted by the unprecedented decline of yields on all hard-currency-denominated credit instruments, including emerging market external bonds, which has pushed international investors to search for higher returns in local currency-denominated assets. For example, yields on a 2-year dollar-denominated Mexican global bond were recently (early 2005) only 30 bps above the comparable US treasury yields, while the equivalent peso-denominated bond was yielding 565 bps over US treasuries. An increase in mature markets interest rates might hence affect the appeal of these securities.

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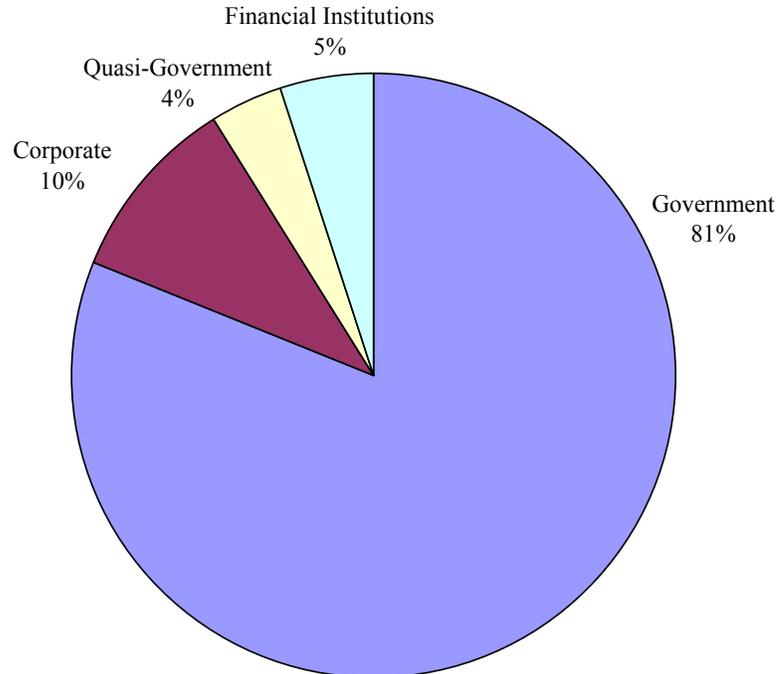
<sup>7</sup> As opposed to Brazil, for instance, where there are requirements to appoint a legal and tax representative in the country to conduct transactions, to register with the Brazilian Securities and Exchange Commission, to pay 15 percent income tax on capital gains and other income, to pay a tax of investments unwound less than 30 days after inception (at the rate of 1 percent per day less than 30 days), and a financial transaction tax of 0.38 percent on entering and exiting the country.

*AFORES asset allocation*

16. **The implications of a more developed local debt market are also relevant to the investment strategy of the AFORES.** While reforms in the pension fund industry have helped create a class of investors that may be interested in long-term fixed income instruments (long duration), it seems that recently the AFORES have not been investing significantly in longer-term government securities.

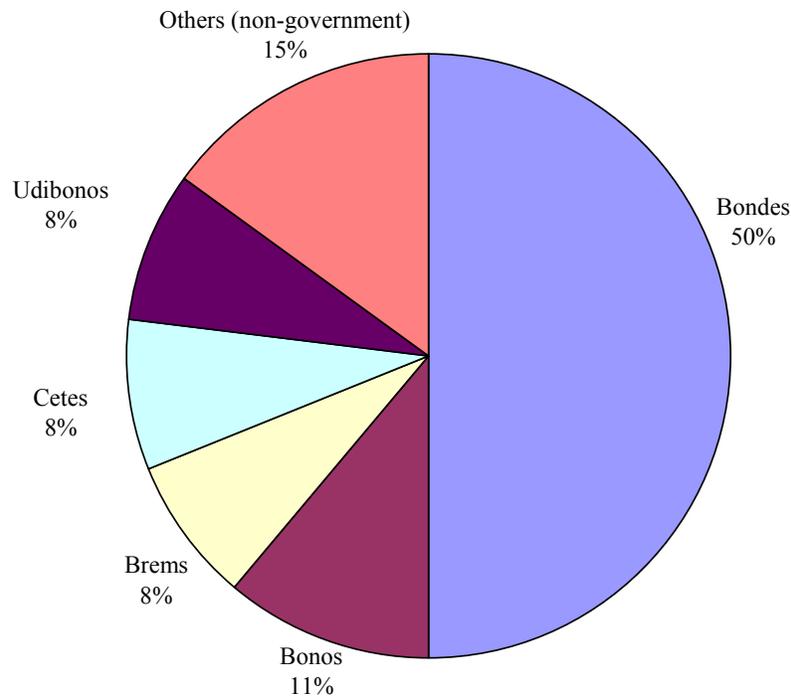
17. **Recent moves by the AFORES into shorter-term government chapter have raised some concern about the appropriateness of their portfolio decisions as pension funds.** Foreign investors stepped in at the long-end of the market, heading off what otherwise could have been an upward adjustment in rates at the long-end of the yield curve. Still, the AFORES' move underlined the powerful market impact their collective investment behavior could have. As of 1Q 2005, and despite recent liberalization of the investment regime (see Table below), AFORES hold 85 percent of their assets in government and quasi-government chapter (see pie charts). They hold 50 percent of their assets in one instrument, Bondes, the 7-year floating rate government bond, and much of the rest is in relatively short-term government debt. AFORES hold only 11 percent of their assets in fixed rate government securities (Bonos with maturities of 3, 5, 7, 10, and 20 years).

**Afores Asset Allocation by Sector (March 2005)**



Source: CONSAR.

### Afores Asset Allocation by Instrument (March 2005)



Source: CONSAR.

18. **A number of factors could have driven AFORES' asset allocation decisions and perhaps biased them against risk-taking.** AFORES derive the bulk of their income from fees on employers contributions, which are automatically deducted every two months from workers' payroll. The other fee, calculated as a percent of the value of assets under management, accounts for a much smaller portion of AFORES' income. Thus AFORES' income depends directly only on the number of contributors they enroll; returns on portfolio matter only insofar as they might induce contributors to switch AFORES. This system may have created a tendency among AFORES to mimic each other's investment allocation,<sup>8</sup> trying to avoid large deviations that could trigger moves by contributors.<sup>9</sup> Other regulatory issues might also have played a role in restraining risk taking, including high penalties on deviations from value-at-risk (VAR)-based restrictions.<sup>10</sup>

<sup>8</sup> AFORES reportedly shared among themselves their own investment allocations plans.

<sup>9</sup> Mobility of contributors across AFORES remains low, with only 1 million contributors recording any move since the system began.

<sup>10</sup> This factor is significantly less important given that most AFORES are operating at VAR levels way below their limits.

19. **Recently, consideration of how best to adjust AFORES' incentives to be closer in line with pension beneficiaries' long-term interests has led to a proposal of pension fund "benchmarking".** Under this proposal, AFORES would announce their model portfolio for a certain period (set initially at one year, but with intentions to extend it later). The model portfolio would spell the investment strategy of the Siefors, detailing the allocations among various sectors and instruments and, hence, producing a benchmark against which the performance of the Siefors could be measured and published. The idea is that benchmarking would help develop the risk culture, encouraging beneficiaries to choose AFORES according to their risk preferences, and providing incentives to AFORES to focus more on generating returns and meeting or beating their benchmark performance. Box 2 discusses the several factors driving the asset allocation of pension fund in OECD countries.

**Mexico: Investment Restrictions for Pension Funds (AFORES)**

*By Asset Class*

**Domestic Securities**

Government & Central Bank Debt	max 100%
Public and Private corporate bonds	max 100% in AAA bonds
Commercial Paper (less than 1 year) & Cash	max 25% in AA bonds, max 5% in A bonds
Equity	max 15%
Hedging Operations	..

**Foreign Securities**

max 20%

*Corporate Bond Investment Limits.*

<b>By Credit Rating:</b>	'A' (local scale) or above (the lowest of the 2 ratings from the private credit rating agencies)
<b>By Issuer</b>	max limits per issuer: 5% of the fund size for a AAA firm 3% of the fund size for a AA firm 1% of the fund size for a A firm
<b>By Issue</b>	max limit = 20% of the issue

Source: CONSAR

**C. The Supply Side**

20. **Mexico has sought to develop its government securities market not only to lower the cost and improve the structure of the public debt, but also to promote the development of private sector debt and derivatives markets.** To this end, Mexico has pursued supply-oriented policies, focusing on the consolidation of a benchmark yield curve to promote a deeper, more liquid government securities market and, therefore, to lower the cost of the public debt. The consolidation of the yield curve has also aimed at facilitating the

pricing of financial instruments issued by states, and public and private companies across a wide maturity span, a key element underpinning the actions of both borrowers and investors and the development of the local securities market. Mexico has also sought to improve transparency and predictability of its issuance program as a way to support the development of the local securities market, and reduce the information risk of investors.

### **Box 2. Factors Affecting Pension Fund Asset Allocation in OECD Countries<sup>1</sup>**

**Several factors influence the asset allocation of pension funds.** These include market characteristics, regulation, accounting, and implication of risk transfer to beneficiary.

**For several pension funds in OECD countries, the relative shortages of long-term and index-linked bonds have been an important constraint.** In fact, in most if not all mature markets, such long-term instruments remain small compared with the size of pension fund portfolios. Policy actions have been taken in many OECD countries to develop further the market for these instruments, partly through the development of securitization and structured credit markets, and through incentives for capital-intensive industries, such as utilities, financial services and housing to issue longer-dated instruments.

**Regulators, through setting minimum funding requirements and restricting certain investments or asset holdings, tend to influence investment behavior.** A very important factor is the choice of the discount rate for minimum funding requirement, which heavily influences pension fund asset allocation strategies. Pension fund managers wishing to limit the volatility of their regulatory funding ratio may hold a larger a larger allocation of assets with a high correlation to the discount rate used for liabilities.

**Accounting considerations are frequently cited as the most important factor affecting pension fund management, and the shift from defined benefits (DB) to defined contribution (DC) or hybrid schemes.** How pension assets and obligations are measured could potentially introduce volatility in the financial statement of the sponsor company or the pension fund. Indeed, many industry observers consider that a move to market-based, fair value accounting principles (mark-to-market) would not only increase the shift away from DB pension plans (as it inflates the present value of benefits), but also encourage short-term trading and investment styles.

**Educating households about the various investment strategies and how these should change according to the time horizon** is becoming more important with the growing shift to DC plans and the transfer of risk from sponsor to beneficiary. Financial consultants in OECD have been significantly more involved than in the past in providing this guidance. For instance, they typically advise individuals to hold relatively large allocations of higher risk instruments, such as equities, in pension savings when they are young, and gradually switch to assets with more stable values, such as bonds, as they approach retirement.

<sup>1</sup> The discussion is based on Groome et. al., “Risk Management and the Pension Fund Industry”, Chapter III of the September 2004 *Global Financial Stability Report*.

## Consolidation of a benchmark yield curve

21. **Mexico has sought to develop its government securities market through a continuous extension of the range of securities on offer.** The initial step was taken in 1978, when a peso-denominated fixed rate security, or Cetes, was issued. The first issue of a one-year zero coupon bonds took place in 1990. For many years subsequently, the government's domestic funding came from placing short-term zero coupon bills, floating rate notes, inflation-indexed, oil-indexed, and dollar-indexed bonds. Ten-year inflation-indexed bonds were issued for the first time in October 1999. Three-year fixed coupon bonds were introduced in January 2000, five-year fixed-coupon bonds were introduced in May 2000, ten-year fixed-coupon bonds were introduced in July 2001, and twenty-year fixed coupon bonds were introduced in October 2003. The two tables below show (1) the categories and amounts of the auctions in recent quarters, and (2) the total outstanding debt stock and its composition.

Government Security Auctions For the Last Year Amounts Offered on Each Auction (Millions of Pesos)					
Instrument	Periodicity	4Q 2004	1Q 2005	2Q 2005	3Q 2005
<b>Cetes</b>					
28 days	Weekly	4000	4000	4000	4000
91 days	Weekly	5500	5500	5500	5500
182 days	Weekly	3600	4300	4600	4600
364 days	4 Weeks	5000	5000	5000	5000
<b>Nominal Fixed Rate Bonds</b>					
Bono 3 years	4 Weeks	2300	2300	2300	2300
Bono 5 years	4 Weeks	2300	2100	2100	2100
Bono 7 years	4 Weeks	2300	2100	2100	2100
Bono 10 years	4 Weeks	2300	2300	2300	2300
Bono 20 years	4 Weeks	1500	1500	1750	2000
<b>Floating Rate Bonds</b>					
Bondes	2 Weeks	1000	1000	900	800
<b>Udibonos (Millions of Udis)*</b>					
Udibonos 10 years	4 Weeks	500	500	500	500

\* Inflation-linked bonds, 1 udi= 3.5 pesos aprox.

Source: SHCP.

Federal Government Domestic Debt Securities Billions of pesos, March 2005		
	Outstanding	Percent of Total
Cetes	254.	24
Bondes (floating-rate debt)	297.	28
Bonos (fixed-rate debt)	440.	41
<i>of which</i>		
3 years	159.	15
5 years	132.	12
7 years	63.9	6
10 years	66.1	6
20 years	19.0	2
Udibonos (inflation-linked)	74.5	7
<b>Total</b>	<b>1066.7</b>	<b>100</b>

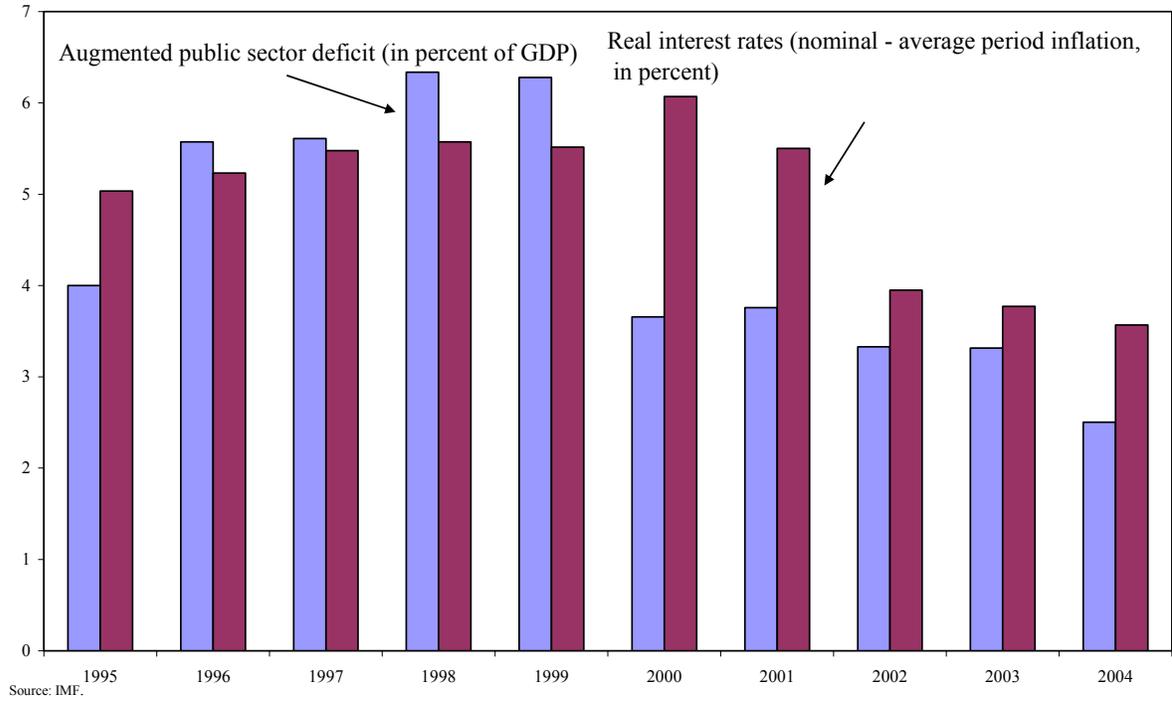
Source: SHCP, BM and Staff estimates.

22. **A consistent macroeconomic framework and more stable macroeconomic conditions have set the conditions for the authorities to expand further the range of securities on offer.** A record of fiscal prudence<sup>11</sup> has been key to lessen investors' perceptions of market and default risk and, therefore, has helped the government build credibility in its ability to honor its obligations—as reflected in credit rating upgrades and lower spreads on global bonds, for example. Overall debt service cost has declined as a result (see Figure). Meanwhile, the achievement of low and fairly stable inflation also has greatly facilitated the extension of the maturity profile of the domestic debt, as well as the increased issuance of peso-denominated fixed-coupon bonds (see Figure).<sup>12</sup>

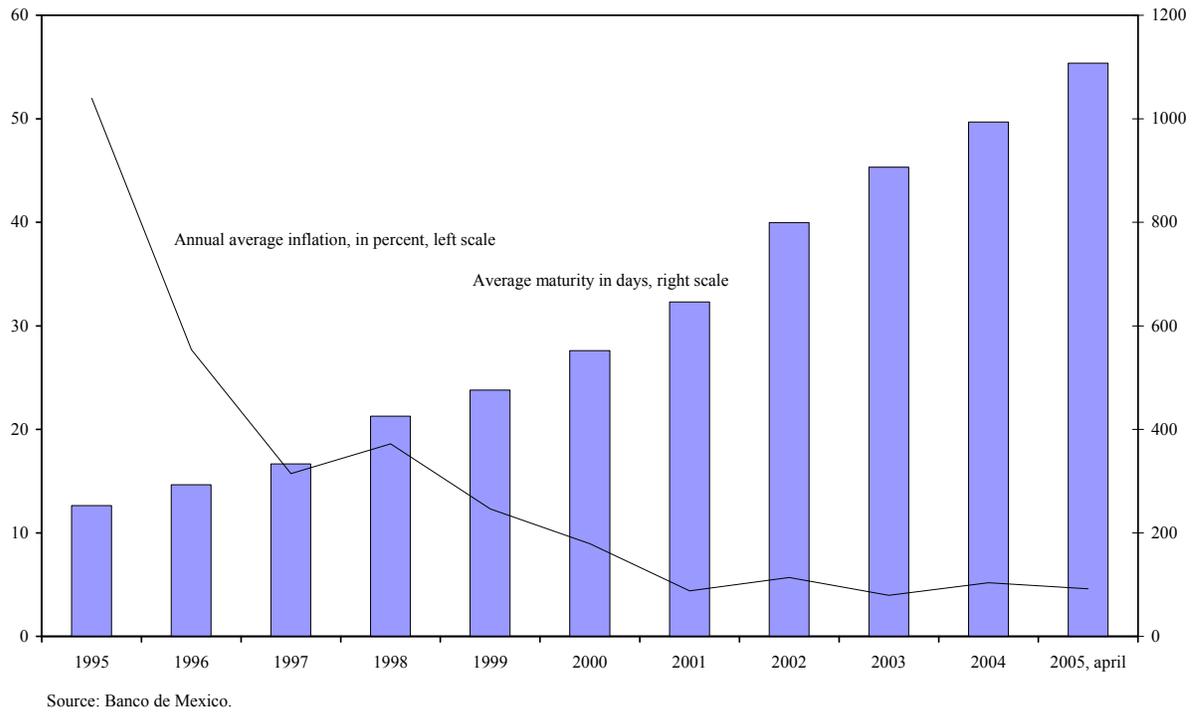
<sup>11</sup> The augmented fiscal deficit has declined since the late 1990s, and moreover has been adequate to contain the level of public debt (in relation to GDP).

<sup>12</sup> A volatile inflation rate would restrict the government's ability to extend the yield curve beyond very short maturities and render the nominal yield curve uninformative about the real cost of borrowing. While these difficulties could be partly overcome by the development of the market for inflation-linked bonds, few countries have used these instruments, for various reasons. In fact, inflation volatility in Brazil in 1999 and in Argentina in 2000/2001 was a major impediment to yield curve extension and the further development of local financial markets (del Valle (2002)).

### Public Sector Deficit and Real Interest Rates



### Inflation and Average Maturity of Federal Government Domestic Debt



23. **Developing the government securities market has required, however, more than a supportive macro framework.** Mexico has taken several steps, at the legal,<sup>13</sup> institutional, regulatory and market levels, to develop the stable supply of government securities. The following steps were particularly important:

- **Central bank autonomy:** in 1993, Congress granted autonomy to the central bank, the Bank of Mexico (BoM). This ended direct BoM financing of deficits, and underlined the government's commitment, among other things, to finance itself solely from market sources at market interest rates.
- **Commercial bank restructuring in the wake of 1994–95 crisis:** IPAB became operational in 1999. Its mandate included, among other things, managing the restructuring programs for banks that received official support. This in turn, required increased government borrowing and issuance.
- **Introduction of new instruments:** in June 2001, changes to the securities law have allowed the introduction of the new instruments, the “Certificados Bursátiles” (CB's) that can be issued by the private and public sectors, and are versatile, combining the speed and ease of issuance characteristics of Medium-Term Notes,<sup>14</sup> (MTNs) with the flexible amortization schedules of debentures, which makes them very attractive. Moreover, CB's can include covenants and legal restrictions, which is not possible with MTNs.

#### **Transparency and predictability**

24. **To provide more certainty to market participants, Mexico recently has changed the way it announces the debt management strategy and the auction system.** In 2004, Mexico made a commitment to announce a detailed and comprehensive domestic debt strategy for the entire year, as opposed to the previous quarterly basis. In line with the strategy in place since 2001, the authorities announce the type of securities to be auctioned, the minimum amount to be tendered, and the maximum nominal value of the total placement; since April 2004, target issuance amounts for particular securities are also announced.<sup>15</sup> The commitment to provide this information reflected a conscious decision by the authorities to

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<sup>13</sup> The 1975 a Securities Market Act established the legal framework for the expansion of securities operations. It also substantially strengthened the regulatory role of the National Securities Commission (CNV).

<sup>14</sup> MTNs are an instrument that can be issued in tenors from 1 to 7 years, in nominal pesos or inflation-linked. The main inconvenience of MTNs is that they can only be repaid at maturity (bullet payment) and cannot include covenants.

<sup>15</sup> The exact nominal amount and other technical characteristics of the instrument to be tendered are normally announced two working days prior to the auction.

forego discretion to “time” access to the market and potentially (and opportunistically) get better terms.

25. **The government’s commitment to a published debt issuance plan and to finance itself at market prices even during periods of stress has been essential to developing the primary market.** On the last point, the government has only very rarely made use of its right to reject bids at the primary auction. The last times bid results were rejected were in early 1995 during the Mexican crisis and in September 1998 at the peak of the Russian crisis.

26. **Mexico has also changed the auction schedule recently.** The objective of this change has been to allow market participants to rebalance their portfolios of government securities after the auction results are published, but before the market closes.

### **Implications of supply policies**

27. **The supply policies have played an important role in reducing both vulnerabilities and financing costs of the public debt.** The supply policies have contributed to (i) improve the debt amortization profile; (ii) reduce financing costs; (iii) reduce the vulnerability of the public debt to exchange rate and interest rate shocks; and (iv) lessen the effects of changes in international capital flows (IMF, 2004). In this context:

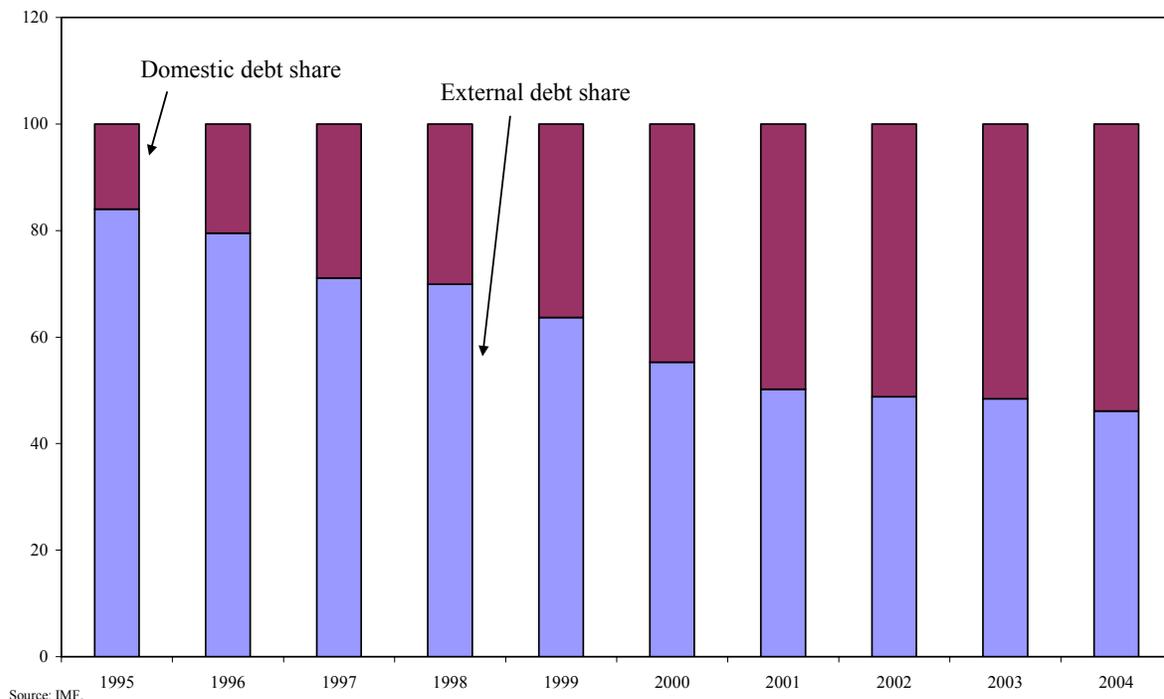
- The development of long-term, fixed-rate instruments and the lengthening of debt maturity of other instruments have resulted in smoothing of future amortizations, particularly of IPAB securities in 2005–06.
- The debt structure has improved because of the greater use of long-term fixed rate debt by the federal government (see Table above). The share of medium and long-term, fixed rate debt in the total debt of the federal government rose from nearly zero in 1998 to around 41 percent at 1Q 2005. This has allowed IPAB and FARAC<sup>16</sup> to focus on other instruments, with IPAB issuing 3 and 5-year Bondes (floating rate bonds adjusted every 28 and 91 days respectively), and FARAC issuing twenty and thirty year inflation-linked bonds.
- The average maturity of the domestic securities of the federal government more than doubled between 1998 and 2004, to 2.6 years. This relied to an important extent on the use of debt indexed to short-term rates initially, and fixed-rate bonds subsequently. Even though short-term debt measured on a residual maturity remains substantial and the average maturity of public debt remains less than three years.

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<sup>16</sup> FARAC is a government trust fund which was created to rescue private toll road operating companies after the 1994–95 financial crisis. As a result of the rescue operation, the trust fund acquired both the assets and the liabilities of the toll road operating companies.

- The achievement has been especially impressive in reducing the government's balance sheet exposure to the risk of peso depreciation, as the share of gross external debt has fallen from over 80 percent of total public debt in 1995 to around 40 percent of total public debt in 2004 (see Figure). Indeed, the government has now reached position in which its FX-denominated earnings (mainly related to oil income) exceed its FX-denominated interest payments.
- In turn, the government's ongoing effort to gradually reduce its external indebtedness may have helped facilitate Mexican firms' access to external debt markets on favorable terms.

### Gross Public Debt Composition



### D. The Infrastructure

28. **A government securities market cannot play a role in developing the broader capital markets unless it is supported by a solid and efficient infrastructure.** This infrastructure is essential to ensuring the liquidity of secondary market, the availability and dissemination of market-determined prices and yields, and safe clearing and settlement of transactions.

## Secondary market liquidity

29. **A liquid secondary market is of great importance to generating appetite for these securities and developing the broader domestic capital markets.** The Mexican authorities have taken several steps to improve liquidity in secondary market trading, including:

- **Market makers:** in 2000, the government introduced primary dealers or “market-makers,” with the objective of enhancing further liquidity in the secondary markets by making continuous bid-ask offers in exchange for certain privileges, such as bidding for additional securities at the auction average price results once they are known. This has increased liquidity and facilitated the participation of additional investors in the market.
- **Reopening policy:** the authorities must strike a difficult balance between issuing different maturities to provide the market with a benchmark yield curve, and issuing amounts of single maturities large enough to attract investors concerned with liquidity. Mexico has taken steps to promote the liquidity of the benchmark issues. In particular, Mexico has put in place a more aggressive reopening policy of benchmark issues. The objective of this policy has been to reduce the number of issues outstanding, increase the size of each of these issues, and allow Mexico to achieve the desirable size and the life cycle for benchmark issues, thereby promoting the liquidity in the secondary market. In this context, the government announced in its 2005 debt strategy that the issuance of fixed nominal interest rate bonds with maturities of 3, 5, 7, 10, and 20 years will be implemented by reopening existing securities instead of by issuing new ones. This policy will increase the liquidity of existing securities at the long end of the yield curve and reduce the number of benchmarks in the yield curve. Specifically, the strategy would aim at reopening regularly the 3 and 5 year bonds maturing in 2007 and 2009, which were issued originally as 5 and 7 year bonds in 2003. Additionally, new 7, 10, and 20-year bonds will be issued in 2005, and will be reopened regularly throughout the year (Ministry of Finance Report).
- **STRIPS market:** the government has initiated efforts to develop long-term zero coupon government securities (STRIPS). A STRIP market will allow institutions to purchase a stream of cash flow that matches liabilities, hence creating more demand for government securities.
- **Repo/securities lending:** the government is working on improving the regulatory framework of the repo and securities lending markets. In this context, BoM issued in 2003 a new regulation which among other things: (i) allows corporate bonds to be traded in the repo market; (ii) allows foreign participants to finance their positions in the repo market; (iii) requires standard contracts to be used and margin calls to be considered. In addition, repo regulation will be complemented with the new regulation for securities lending, which will integrate both markets with participation of institutional investors that are not allowed to offer their bonds in the repo market.

### Availability of market prices

- **BoM, through joint efforts with the Banking Commission and industry representative, led to the creation of “price vendors”** in 2003. These entities are in charge of compiling information from inter-market brokers and selling it to market participants. Currently, banks, brokerage houses, mutual funds, pension funds and insurance companies are required to obtain the services of a price vendor.
- **Since 1999, BoM has also published on a daily basis information on government securities prices** on its website, serving as a benchmark to evaluate the performance of price vendors.

### Payment, clearance, and settlement

30. **These efforts have been coupled with steps taken to ensure an efficient and safe financial infrastructure through reforms targeting the payment, settlement and clearance systems.** These reforms, listed below, strived to strike a balance between the objectives of reducing risks in the system and maintaining an adequate operational efficiency in financial markets.

- **In 1994 the BoM initiated a comprehensive reform of its payment systems in order to achieve a high degree of operational security and reliability.** A major component of this reform was the design and development of new payment systems with more stringent risk controls and real-time settlement procedures. The BoM first developed the Extended Electronic Payments System (SPEUA) to facilitate the settlement of payments transactions made by banks clients and also the Interactive System for Securities Deposits (SIDV) to support securities transactions through a delivery-versus-payment mechanism.
- **The new Securities Market Law of June 2001 enabled the creation of central counterparties for securities market transactions,** with the purpose of eliminating the risk of settlement default. Central counterparties have to determine and apply a strict system of financial safeguards to assure fulfillment of their obligations.
- **Efforts since 2001 have also focused on revamping the legal framework in order to ensure payment finality and to improve the execution of collateral and the oversight powers of BoM.** In line with its objectives of complying with the BIS Core Principles for Systemically Important Payment Systems, the BoM announced a sequence of measures that would be implemented within the following three years. The main measure, implemented in 2002, requires that any overdraft in the large value electronic payments system be settled in the same day by using bilateral credit lines provided by other banks.

## E. Implications for the Development of the Local Market

### Financial products

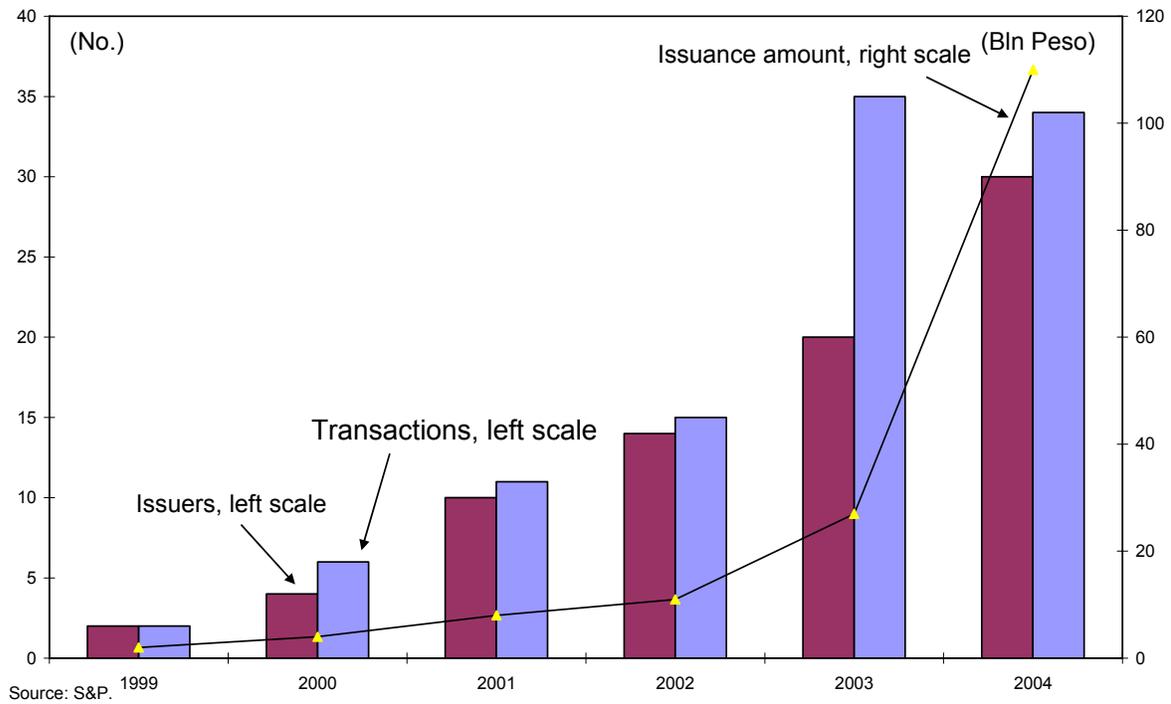
31. **The development of the government securities market is likely to have improved intermediation.** The availability of a benchmark has helped the pricing of credit and therefore facilitated the lending activity of the commercial banks. It has also enabled the development of financial products, including repurchase agreement (repos), derivatives, and securitized products.

32. **Asset securitizations and structured finance have increased in recent years.** In particular securitizations of tax revenues, construction bridge loans, residential and commercial mortgages, existing receivables, and future flows have taken off. Credit enhancements, such as full or partial “wraps” provided by banks or insurance companies, have been increasingly used by lower credit or less known issuers as means to push the rating of the issue higher. As a result, in 2004 there were 52 securitized bond offerings in Mexican domestic market totaling over US\$4 billion (Ilyina (2005)). Large recent securitizations included GMAC’s and Ford’s credit securitizations, and Banorte’s mortgage securitization.<sup>17</sup> In addition, a recent report by S&P showed that the impressive growth in Mexico’s structured finance established the country’s as the leading market in Latin America (see Figure).

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<sup>17</sup> Recent securitization took advantage of the flexible trustee structure of the CB’s, which have a trustee structure in which a bank (typically) acts as the fiduciary on behalf of bondholders. Fiduciary requirements include making interest and amortization payments to bondholders and organizing meetings to decide on indenture modifications or other types of restructuring. CB’s can be modified relatively easily, with two-thirds votes needed to modify indenture initially, and a 50 percent vote the second time an issue comes before bondholders.

### Structured Finance Development



33. **Derivatives products have also flourished.** Over the counter (OTC) market in interest rate swaps (IRS) and forward agreements (FRAs) have grown steadily and are currently as liquid as the underlying bond market. The exchange-traded interest-rate derivatives markets, which was almost non-existent prior to 2001, has picked up sharply, especially the TIIE-28<sup>18</sup> future contracts. In addition, foreign exchange (FX) derivatives markets are very liquid. According to market participants, in the past five to seven years most of FX trading activity was undertaken off-shore, with foreigners mainly using them to bet on their views on the exchange rate and interest rates. This however has been changing recently as MexDer (the local derivatives exchange) gained market share.

#### Corporate bonds

34. **In light of the success in the development of the government bond market, Mexico has made significant strides in the development of the corporate bond market.** The possibility of the corporate sector to finance itself through the issuance of bonds has potentially important benefits as it can (i) reduce stress on the banking sector by diversifying

<sup>18</sup> The standard floating peso reference rate is TIIE, “Tasa de Interes Interbancaria de Equilibrio,” which is the average inter-bank rate.

credit risk across the economy; (ii) supply funds for long-term investment needs;<sup>19</sup> and (iii) lead to the creation of financial products that meet the needs of both borrowers in the corporate sector and investors (World Bank and IMF (2001)).

35. **Mexico has taken a number of steps to bring about the development of a critical mass of investors, funds, and securities.** Not surprisingly, this process has benefited from the development of the government bond market itself. Steps to seek the diversification of the investor base in the government bond market, including mutual funds and AFORES, have served to develop an investor base the corporate bond market, as a great number of investors, who buy, trade and hold government bonds, and carry out the same activities with corporate bonds. Efforts to encourage the development of specialized financial intermediaries have also made it possible to build up and strengthen the institutional and operational infrastructure for the corporate bond market. In addition, as indicated above, the development of the benchmark yield curve has been critical for the pricing of corporate bonds across the yield curve in both the primary and secondary markets. Currently 62 percent of outstanding corporate bonds are floating rate, with future cash flows based on the CETES rate or the THIE rate.

36. **Mexico has adopted other measures to promote the development of the corporate bond market.** To promote the investor base and debt instruments with characteristics that matched the needs of borrowers and investors, Congress approved changes to the Securities Market Law and the Mutual Fund Law in 2001. These changes aimed at promoting the development of the corporate bond market by giving greater emphasis to transparency, efficiency, and liquidity. In particular, these changes called for increased transparency through an improved provision of timely information, and introduced additional protection for investors through the requirement of better corporate governance practices and establishment of explicit rights for minority stockholders. These changes also opened the way for the key introduction of “Certificados Bursátiles,” (see above). In addition, these changes were intended to help promote the growth and development of mutual funds, while requiring transparency in their operations and dissemination of information and providing for incentives of small investors to buy a broad range of savings instruments.

37. **In this context, the corporate bond market has shown promise (Ilyina (2005)):**

- **The diversification of the investor base has been critical for the development of the corporate bond market,** with AFORES, mutual funds, and insurance companies buying, holding, and trading the bulk of corporate bonds. Of all outstanding bonds as of end 2004, AFORES held approximately 35 percent, mutual funds 20–30 percent, and insurance companies 15–28 percent (see Table). Meanwhile, participation of local banks and retail investors was limited, and participation by foreign investors is

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<sup>19</sup> Financing through bank loans tends to be cost effective for short-term, small-scale, and recurring financing, while financing by issuing bonds is cost effective for long-term, large-scale, and opportunistic financing by companies, particularly those with a high credit rating.

all but non-existent, which is partly due to withholding tax on foreign holders of corporate bonds.

**Mexico: Local Institutional Investor Base for Corporate Bonds**  
**(in billions of US dollars, unless indicated otherwise)**

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**Private Debt Securities Outstanding (end-2004)**

Corporate Bonds 1/	12
of which held by	
Pension Funds	34%
Mutual Funds	30%
Insurance Companies	28%
Other Investors	8%

**AUM of Institutional Investors (end-2004) 2/**

Pensions Funds	42
Mutual Funds	35
Insurance Companies	20
Annuity Companies	10

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**Gross Domestic Product (end-2004)** 663

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**Total AUM of Institutional Investors in % of GDP** 16

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Footnotes: 1/ including securitizations; 2/ not including the banking sector.  
Sources: CNBV, CNSF and Staff Estimates

- **The specialized financial intermediaries have played an important role in the issuance of bonds.** More than 24 different entities, including brokerage house that are subsidiaries of local commercial banks, foreign commercial banks, and international investment banks, lead or co-lead corporate bond issues.
- **Corporates are allocating bond offerings through a Dutch auction** in light of past questions about the fairness in the distribution of corporate bonds through underwriting. This auction allows corporates to allocate the bonds at the cut-off price for the amount they want to allocate. In this context, investment banking fees have fallen significantly (to below 25 basis points for 5–10 year bonds and zero basis points for some issues).
- **Efforts to introduce a new financial instrument have succeeded** as the Certificados Bursátiles now account for 90 percent of all outstanding private bonds.
- **In this environment, corporate spreads have declined markedly**, with high-quality corporates, such as PEMEX, issuing at a spread close to or equal to the spreads on sovereign bonds. Even a troubled credit such as GMAC (rated “AA” locally) has been able to issue at a 150 basis points spread in the Mexican market, while a comparable spread in the US domestic market would have been in the range of 500–600 basis points).

38. **The corporate bond market could benefit, however, from further development (Ilyina (2005)):**

- **Most of the corporate issuers are quasi-sovereigns, and small and medium-size firms (SMEs) are absent from the market.** The biggest bond issuers are quasi-sovereign entities (PEMEX, CEF and Apoyo Vivienda) and large banks (Banorte and Banamex). The outstanding bonds issued by the largest private non-financial companies, CEMEX, America Móvil, Ford, Coca-Cola Femsa, and GMAC, account each for 3–4 percent of the total stock of private debt. Meanwhile, according to the BoM Credit Survey of end-2004, “other liabilities” accounted for less than 1 percent of total liabilities of SMEs, compared with 4 percent for large firms and 6.3 percent for the “AAA”-rated firms (see below).
- **The corporate bond market, despite its very fast growth in the last several years, is still relatively small.** As of end 2004, the bond issued by the corporates was US\$ 12 billion (or 1.8 percent of GDP), which is relatively small in international comparison. The further growth of this sector may well require the entry of new firms. The new Securities Law under consideration in Congress aims to promote the entry of small- and medium-sized enterprises.
- **Most issuers are investment grade.** While there are around 80 listed issuers, the number of “regular” issuers is close to 10. At end-March 2005, AAA rated bonds comprised 65.5 percent of all outstanding issues, AA+, AA, AA- rated bonds comprised 28.7 percent, A+, A, A- rated bonds comprised 3 percent while the rest 2.3 percent. An increase in institutional investors’ demand for lower rated instruments may require some relaxation of investment restrictions. At present, institutional investors are not allowed to invest in bonds that are rated below A, which limits the investable universe to 20–30 large firms with strong credit fundamentals.
- **As in many other countries (both industrial and emerging), the secondary market for corporate bonds is still illiquid.** Trading in fixed income securities takes place in the OTC market through electronic screens, but the pricing information is not publicly available. Financial institutions also have limited incentives to make markets in corporate bonds because of the lack of hedging opportunities. To address these problems, Mexico is making use of the so-called “price vendors,” who provide daily quotes for all securities, including those that are illiquid and not traded at all. However, according to the leading price vendor, only about 20 percent of corporate debt instruments tend to have either the last transactions price or a bid-ask spread on any given day. Mexico has also put in place a number of regulations aimed at promoting the market for STRIPS and security lending.

### **Stock market development**

39. **Despite registering strong growth in recent years, Mexico’s stock market remains relatively small and illiquid.** The stock market’s capitalization is little more than half the market capitalization of Brazil’s stock market, and, relative to GDP is it still

significantly below the market capitalization to GDP of Brazil or Chile (see Table). A notable trend over the past year has been the strong growth of foreign participation in the domestic stock market, though this remains well below levels in Brazil, for example.

Stock Exchange Indicators in Selected Latin American Countries

	Brazil	Chile	Mexico
	(April 2005)		
Market Capitalization			
(in million US\$)	334,715	117,371	169,839
(in percent of GDP)*	55.8	125.3	25.1
No. listed companies	355	239	140
Volume of transactions			
(million US\$ /month)	11,336	276	2,970

\* End-2004.

Sources: WEO, BMV, Banco de Mexico, BOVESPA, Bolsa de Valores de Santiago, and Fund staff calculations.

40. **A handful of companies account for the bulk of trades included in the stock exchange price index (IPC).** The transport and communications listings account for close to 40 percent of market capitalization and are dominated by two communications stocks: Teléfonos de México (Telmex) and América Móvil. According to Bank of Mexico data, the face value of the outstanding stock of domestically issued private-sector debt instruments grew by 21 percent in 2004, to around 5.2 percent of GDP. Short-term instruments, in the form of short term commercial paper, promissory notes and stock certificates, account for a little over 10 percent of the debt market.

Mexico: Selected Stock Market Indicators

	2001	2002	2003	2004
Stock market capitalization				
in million US dollars	126,620	104,652	122,546	170,142
in percent of GDP	19.9	17.2	20.0	25.1
Domestic debt instruments				
in million US dollars	15,660	15,636	18,720	22,691
in percent of GDP	3.1	3.5	4.5	5.2
annual rate of change	...	-0.1	19.7	21.2
Of which:				
Private (in percent)	63.4	65.1	58.3	54.1
Short term (in percent)		19.3	13.7	11.9
Domestic equities				
in million US dollars	3,351	1,702	3,886	4,506
annual rate of change	...	-49.2	128.4	15.9
in percent of GDP	0.5	0.3	0.6	0.7

Sources: WEO, Banco de Mexico, and Fund staff calculations

41. **Trading activity in the Stock Exchange is expected to deepen in the near future** following recent amendments in the Siefosres' (private pension fund administrators) investment regulation, which allows up to 15 percent of their assets to be invested in equities. In addition, a new stock market law, currently being discussed in congress, contains provisions to ease access to medium-sized enterprises which are expected to increase stock market capitalization and the share of domestically issued securities (see Box 3).

### **Box 3. Proposed Reforms to Mexico's Stock Market Law**

In the fall of 2005, the Mexican congress has resumed consideration of a proposed new stock exchange law. The new law, designed following closely the Sarbanes-Oxley law of the U.S. <sup>1/</sup>, is directed primarily to three main areas not considered in the reforms of 2001: (i) *strengthening rights of minority shareholders*, for example by requiring an executive board of directors and not allowing single administrators; (ii) *increasing transparency of issuing entities* so as to improve corporate governance practices (as in the SO); and (iii) *facilitating access to the stock market by medium-sized enterprises by selectively easing certain regulatory constraints* which, for example generate a high level of fees and costs required for the listing. For this last purpose, the proposed law creates a new type of entity, the "investment promotion company," through which medium-sized enterprises will be able to list their shares.

In addition, the new law is designed to strengthen and modernize the legal framework of agents participating in the stock market, in particular that of investment companies, by defining their organization, responsibilities, and structures, and also that of stock brokerage companies and participating financial institutions, by introducing greater flexibility in current regulations.

The new law also re-defines the functions and the powers of the different supervisory authorities in the financial markets, so as to avoid duplication in the processes of authorization, regulation and supervision of all entities participating in stock market operations. This is expected to reduce regulatory costs, and would leave the Ministry of the Economy in charge of coordination of the supervisory agencies and the Stock Market Supervisory Commission (CNVB) in charge of the operational aspects.

Many observers consider that the new law will adjust Mexico's stock market legislation to international standards and, thus, provide a basis for greater foreign participation in the Mexico Stock Exchange.

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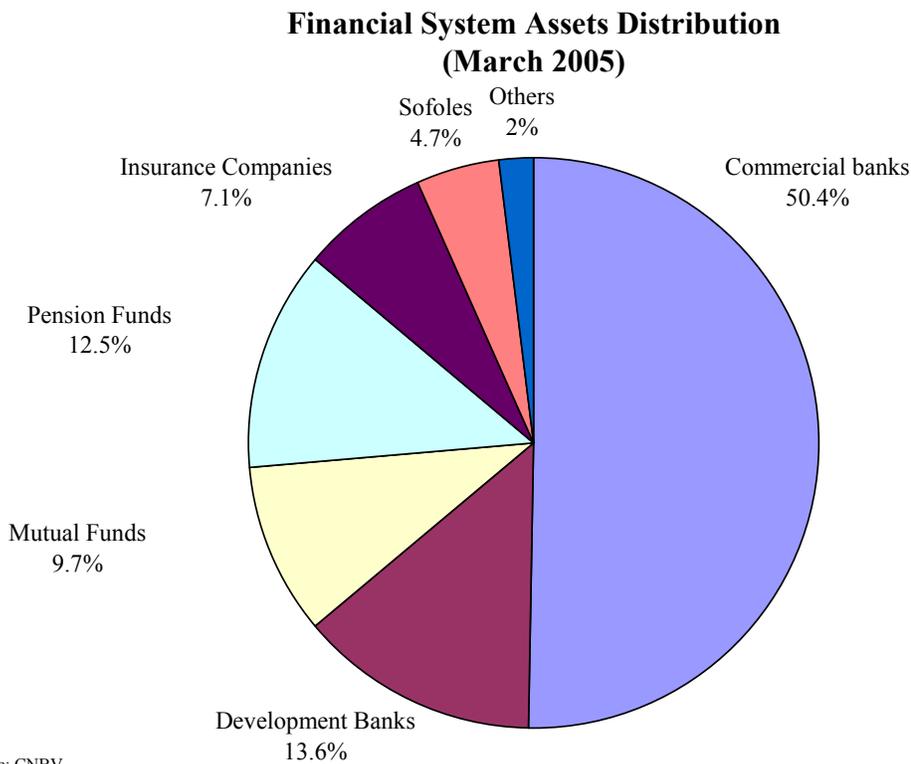
<sup>1/</sup> The United States' Sarbanes-Oxley Act of 2002 followed a wave of large corporate financial scandals. Effective in 2004, all publicly-traded companies are required by this law to submit an annual report of the effectiveness of their internal accounting controls to the U.S. Securities and Exchange Commission. The major provisions of the Sarbanes-Oxley Act include: (i) criminal and civil penalties for noncompliance violations; (ii) certification of internal auditing by external auditors; and (iii) increased disclosure regarding all financial statements.

## **F. Conclusion**

42. **The Mexican experience illustrates lessons to other countries wishing to use the government securities market as a catalyst for the development of the broader capital market.** In particular, it underlines the importance of a stable and consistent macro

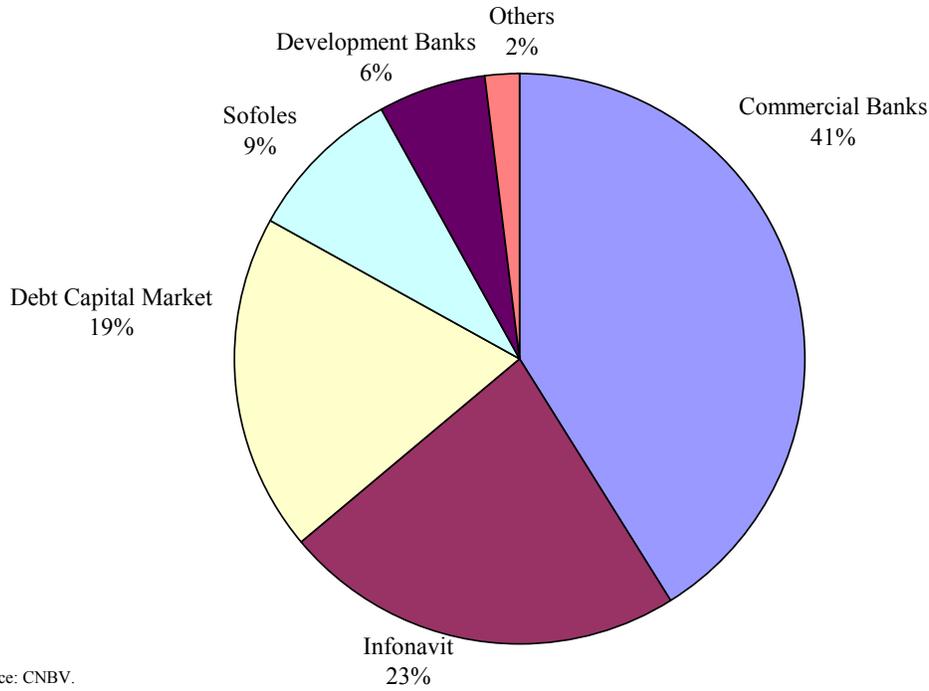
framework, key legal, institutional, and regulatory reforms, and safe and efficient financial infrastructure.

43. **Mexico indeed has come a long way in developing both its government securities market and the broader local capital market.** An extended, and moderately liquid and efficient, yield curve has helped the country achieve significant macro and micro benefits. In particular, the public debt now costs less, has a longer average maturity, and is less vulnerable to exchange rate and interest rate fluctuations. Meanwhile, financial intermediation improved as domestic financial savings, measured as M2 to GDP, have increased. The local capital markets broadened, with the introduction of new players, especially institutional investors, and deepened as new instruments and financial products blossomed (see Figure).



44. **Banks still dominate the system, and while commercial banking loans remain a relatively low 14 percent of GDP as banks recover from the 1995 crisis, the role of debt capital markets is increasing** (see Figure). This has been possible as institutional investors, fostered, through their large pool of assets under management, companies' ability to issue directly in the debt markets. Meanwhile, the deepening of the derivatives market and the growth of securitization and structured finance are providing key support for companies in debt capital markets financing.

**Private Sector Lending  
(December 2004)**



45. **Mexico has consolidated these achievements and is now looking forward to further reforms and the further natural development of the capital market.** The issuance of 10- and 20-year fixed rate bonds is a significant achievement, but such instruments are a relatively minor share of public debt, and there is still considerable room for shifting the distribution of total public debt into maturities of 5 years and longer. Greater volumes at such maturities would promote liquidity. In addition, as the development of the local debt market, in both its public and private side, was supported in part by regulations that had the effect of fostering a domestic investor base, the challenge will be to maintain this development while some relevant regulations are relaxed. In this context, changes to the legal and regulatory frameworks are now aimed at boosting liquidity, facilitating the participation of SMEs, and granting more flexibility to institutional investors.

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