

# The impact of international financial integration on Mexican financial markets

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## Introduction

Over the last decade, market liberalisation and advances in information technology have eliminated barriers to capital mobility and reduced financial transaction costs. These developments, together with a favourable market environment characterised by abundant liquidity, have led to an unprecedented integration of domestic financial systems worldwide.

Mexico, as other emerging market economies, has taken advantage of this environment to implement structural policies and modernise regulation in order to strengthen its financial system. The purpose of this paper is to highlight the benefits of international integration for the money, bond and foreign exchange markets, which, in many ways, have been the flagship of international integration. Exposure to global financial competition has broadened the range of intermediaries and investors, leading to more transparent pricing, higher liquidity and lower transaction costs in the domestic markets. It has also enlarged the menu of investment alternatives and helped to attract more specialised and sophisticated participants. This has generated a virtuous cycle of increased integration, modernisation, competition and efficiency.

The development of a market-oriented financial system comes, in part, from the experience of successive macroeconomic crises exacerbated by a closed and overregulated financial system. The transition to the current stage of development has required both vision and consistency from the financial authorities to provide domestic markets with sound foundations. This has required specific actions to incorporate the best international practices in terms of both the regulatory framework and the infrastructure to conduct operations.

The structure of the paper is as follows. Section I presents the development of the Mexican financial system in its transition from a relatively closed system to its current state. Section II provides some evidence for and explores some of the benefits of increased integration in financial markets. Section III describes the implications of financial integration for monetary policy and is followed by conclusions.

## I. The institutional background

This section briefly describes the institutional background that has shaped the Mexican financial system since 1970.

At the beginning of the 1970s, Mexico was a relatively closed economy operating under a fixed exchange rate regime, in which foreign investment was severely curtailed and the financial system was overregulated. The central bank determined the interest rate levels of a small range of available saving instruments. On the asset side of banks, regulation imposed strict restrictions on lending by allocating a large share of the available deposits to specific activities.

During the 1970s, the government gradually abandoned the macroeconomic stability attained in the previous 20 years. Since most of the government deficit was financed directly by the central bank, monetary expansion brought about a consequent upward pressure on inflation. Even though inflation was on the rise, nominal interest rates remained constant, resulting in

financial disintermediation as people began withdrawing their bank deposits, discouraged by negative real returns and the foreseeable devaluation of the currency. After a significant speculative attack against the peso, the government was forced to devalue it in September 1976.

The 1976 crisis was resolved due to the availability of additional government revenues coming from the exploitation of massive oil fields; however, almost none of the structural problems that induced the crisis were properly addressed. In particular, the financial system remained highly regulated and, therefore, vulnerable to the prevailing macroeconomic imbalances. There were, however, two significant changes implemented during those years in the financial arena: the issuance of the first government debt securities denominated in pesos (Cetes); and the granting of permission to banks to offer different products under the same legal entity. Commercial banks became “multiple banks”. Although these changes were positive, they had limited effects on the workings of the system since most of the other regulations remained unchanged.

At the beginning of the 1980s, the economy again faced a huge government deficit, amounting to 15% of GDP by 1982, due to falling international oil prices. At the same time, the Federal Reserve implemented a restrictive monetary policy. To compensate for the drastic reduction in oil revenues, the Mexican government resorted intensively to short-term external credit from international banks. However, the combination of a rapidly increasing debt, lower oil prices, and higher interest rates abroad made the prevailing fixed exchange rate regime untenable. Once more, Mexico was forced to devalue its currency.

Macroeconomic instability followed the devaluation of 1982, led by a large fiscal deficit and an exchange policy that sought to achieve a competitive rate through devaluations. The inflation rate reached 180%. In the wake of the realisation that macroeconomic stability cannot be attained by imposing controls or through isolated and, most of the time, contradictory actions, there was an important policy shift. The new policy was based on the notion that effective integration with the rest of the world would provide the incentives needed for sustained growth. Consequently, in 1986, the government embarked on a comprehensive strategy to deal with the different problems it faced. Measures were taken to address the fiscal imbalance, the external debt was renegotiated, and to increase competitiveness, the economy was opened up to both merchandise and financial flows.

The new policy included several actions to relieve financial repression. Exchange controls began to be gradually dismantled and compulsory direct financing from commercial banks began to be replaced by liquidity requirements. The new requirements took the form of marketable debt instruments which provided banks with an incentive to foster the development of the government debt market. With the expansion of the securities market, banks were no longer needed to directly finance the public sector.

At the beginning of the 1990s, additional policies to further deregulate the financial sector were undertaken. In 1991, the government decided to re-privatise the banking system. This action was aimed at both modernising the industry and mending the inefficiencies brought about by 10 years of state ownership. Banks were allowed to freely determine deposit and lending rates as well, and all credit allocation directives were abolished. Perhaps one of the most important actions to open up the capital account was also taken: foreign residents were granted permission to hold positions in domestic fixed income securities and equities.

The efforts to stabilise the economy and modernise the financial system were shadowed by the inability of the inflexible exchange and interest rates to respond to the massive capital inflows that were entering the country at the time. The lack of flexibility in key relative prices contributed to a rising current account deficit, an accumulation of international reserves and the expansion of banking credit.

From 1990 to 1994, the central bank actively intervened in both money and foreign exchange markets with the purpose of keeping the exchange rate within a predetermined band. The limits to the band were set to achieve an inflation objective. This policy was effective in

bringing down inflation from levels of 30% in 1990 to 7% in 1994. Nevertheless, this strategy revealed several shortcomings. For example, a portion of the considerable capital inflows from 1991 to 1993 were intermediated by commercial banks, allowing them to rapidly expand their lending to the private sector. However, neither the recently privatised commercial banks nor the banking supervisory agency had the expertise to adequately manage the enlarged risk exposure intrinsic to such a huge credit expansion. Additionally, the deposit insurance framework, according to which all banks' liabilities were guaranteed, induced perverse moral hazard incentives which were exacerbated by inoperative regulation.

In 1994, both the macroeconomic environment and expectations changed dramatically, as the Federal Reserve aggressively implemented a restrictive monetary policy and Mexico suffered from political instability. As a consequence, there was a reversal of short-term capital inflows.

As in 1982, to avoid the impending devaluation of the peso, most of the international reserves were depleted through continuous interventions in the foreign exchange market. Additionally, in an attempt to restrain the demand for dollars that had severely stressed the foreign exchange market, the government placed massive amounts of tesobonos through operations in the primary and secondary markets.<sup>1</sup> However, after a series of speculative attacks, the peso was devalued in December 1994. As discussed in Sidaoui (2006), the overarching incentive structure of the Mexican financial system set the stage for the dual balance of payments and banking crises.

To deal with the 1994–95 crisis, an emergency stabilisation programme to ensure the solvency of the economy was implemented by assembling an international financial assistance package that allowed the substitution of short-term tesobonos with long-term liabilities.<sup>2</sup> Once this package was obtained, the government implemented the second step of the stabilisation programme aimed at inducing a rapid macroeconomic adjustment, mainly by enlarging domestic savings and eliminating, for good, fiscal dominance by curtailing expenditures and broadening tax revenues.<sup>3</sup>

Even in the midst of the crisis, the government reasserted its commitment to market policies and implemented several actions to promote the modernisation of the financial sector, allowing both exchange and interest rates to be determined by supply and demand only, and undertaking a far-reaching reform to change the private pension system from a pay-as-you-go mechanism to an individual capitalisation scheme.

In addition to these reforms, several legal and regulatory actions were implemented to improve the workings of markets and promote their consolidation. Among the legal reforms, worth mentioning is the elimination of restrictions on foreign investment in the financial system, which brought fresh capital and technical expertise to the financial industry; the introduction of an explicit and limited deposit insurance framework, which minimised moral hazard; a system of prompt corrective actions that set out immediate actions to be undertaken by banks and supervisors if their capital adequacy fell short of the required minimum; a better corporate resolution law; the improvement of creditors' rights, and the creation of credit bureaus to prevent adverse selection problems.

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<sup>1</sup> Tesobonos were zero coupon bills denominated in US dollars but payable in Mexican pesos, placed by the federal government at discount rates with 28-day to one-year terms to maturity.

<sup>2</sup> See Sidaoui (2005) for more details on the Mexican strategy of foreign currency intervention in dealing with the tesobono problem.

<sup>3</sup> Sidaoui (2006) gives a thorough description of the adjustment programme implemented to address the 1995 crisis.

The most important regulatory reforms were the adoption of international accounting standards for all financial companies, improvements in information disclosure and accountability, stricter capital adequacy regulation, and better corporate governance. Regulators also provided the derivatives markets with a sound framework. Furthermore, when markets required unbiased references for their workings and could not reach them by themselves, the central bank provided them with such references: for example, the daily fix-peso rate or the 28-day interbank interest rate (TIIE).

## II. Evidence of increased integration and some of its benefits

This section presents evidence of Mexican financial markets' increased integration into the international financial system. Recent developments in Mexico's money, bond and foreign exchange markets are analysed. Particular attention is given to the response of local players to the deeper integration of financial markets. The benefits of higher competition in each of these markets are also reviewed.

Increased financial integration has been particularly evident in the foreign exchange market. Full adherence to a floating exchange rate regime and the absence of capital controls has paved the way for a peso-dollar market that has grown above expectations, in terms of both volume traded and number of participants. As reported in the recent editions of the BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity, the volume of peso-dollar transactions doubled in 2004–07 and has increased more than fourfold since 2001 (BIS (2004, 2007)). Like other emerging market currencies in the survey, the increase in daily volume traded for the peso in 2004–07 was attributed almost entirely to transactions between intermediaries outside the country (Table 1).

Table 1  
**Offshore foreign exchange markets**  
 As a percentage of total value

	Offshore market	
	2004	2007
Mexican peso	28	61
Australian dollar	60	59
Canadian dollar	59	68
Czech koruna	64	42
Hong Kong dollar	19	14
New Zealand dollar	75	88
Polish zloty	34	68

A transaction is classified as "offshore" when neither of the trading parties is a local financial institution.

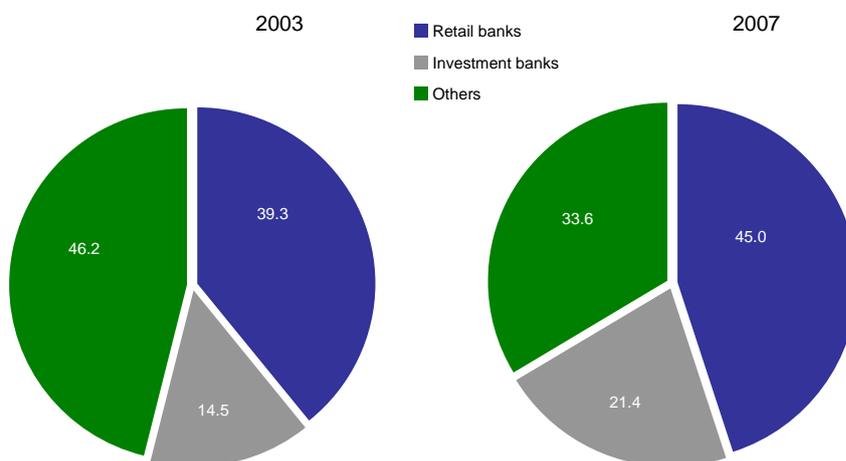
Source: Bank of Mexico calculations with data from the BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity and from the central banks of Australia, Canada, China, the Czech Republic, New Zealand and Poland.

Commercial banks account for most of the volume of foreign exchange transactions in the peso-dollar market. However, this dominance has been decreasing in favour of other participants, such as institutional investors (local and foreign), hedge funds, commodity trading advisers (CTAs), and model-based technical trading accounts (see BIS (2004, 2007)). In 2007, foreign exchange transactions among local and foreign banks accounted for 58% of the total volume traded locally as compared with 78% in 2004. Meanwhile, participation by other financial institutions, which include a large proportion of foreign institutions, rose from 19% in 2004 to 34% in 2007.

Increased integration is also evident in the fixed income market, mainly in the government bond segment. Intermediation in the primary and secondary markets continues to be carried out predominantly by traditional, large deposit-taking institutions. However, subsidiaries of foreign institutions, which have focused more on securities trading, have gained importance (Graph 1). These recent and more dynamic institutions represent a welcome counterbalance.

Higher integration with the global financial system has also led to a wider base of investors in the local bond and money markets. The period of low interest rates and “excess liquidity” from 2002 onwards brought about a sharp increase in foreign investors’ participation in these securities (Graph 2). In Mexico, this was especially evident in the fledgling market for peso-denominated government nominal bonds. Driven by a need to diversify their portfolios and to search for higher-yield instruments, foreign investors were attracted to local markets by the stable macroeconomic environment and the lack of restrictions on capital flows. By February 2008, foreign investors held peso-denominated government securities for a total of USD 25.2 billion (13% of total debt outstanding); 92% of these holdings were in long-term government bonds.

Graph 1  
**Bidders in primary auctions of government securities**  
 As a percentage of total offered

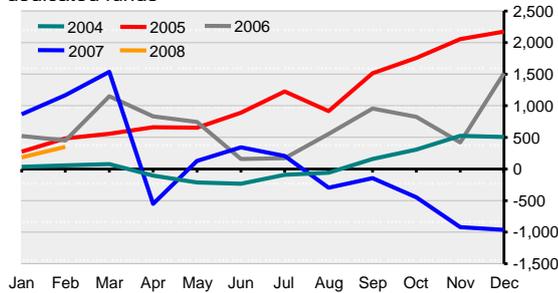


Retail banks include the three largest deposit-taking institutions (Banamex, Bancomer and Santander); investment banks include JPMorgan Chase, Bank of America, Deutsche Bank, Credit Suisse and Merrill Lynch.

Source: Bank of Mexico.

Graph 2  
**Foreign flows to debt markets**  
 In millions of US dollars

Cumulative flows to bonds from Latin America dedicated funds



Source: Emerging Portfolio Fund Research.

Mexico: Government securities holdings by foreigners



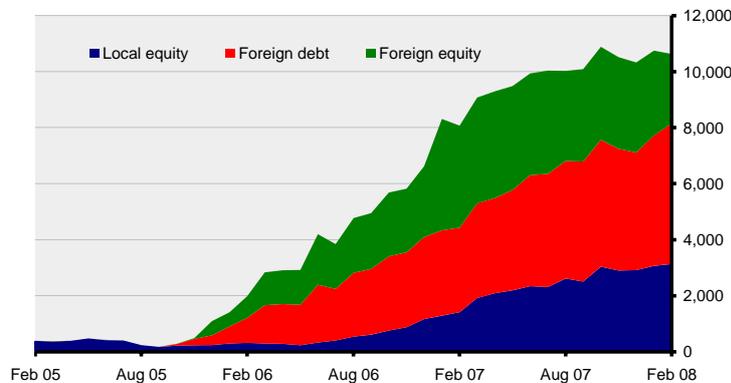
Source: Bank of Mexico.

Evidence reveals higher levels of integration into the global financial system also by Mexican institutional investors. Nowadays, local pension funds (Afores) have around 9% of their assets invested in foreign assets (Graph 3). The stronger links to foreign markets and the regulatory changes to their investment regimes have provided local investors with a wider set of instruments and investment opportunities.

Financial integration has also allowed foreign entities to issue peso-denominated debt and to take advantage of the demand for highly rated non-government peso-denominated bonds. Worth mentioning is the amount of euro-peso securities outstanding, which has almost equalled the level of non-bank Mexican corporate peso-denominated debt (Graph 4).

Several factors have contributed to the expansion of the euro-peso market, in particular the ability of foreign issuers to efficiently manage their currency exposures in a liquid foreign exchange forward peso market. Another relevant factor has been the development of the government debt yield curve. By extending the maturity of bonds to 30 years since 2006, issuers and investors have been able to price these securities according to the reference rates (Graph 5).

Graph 3  
**Pension funds' investment in equity and foreign securities**  
 In millions of US dollars

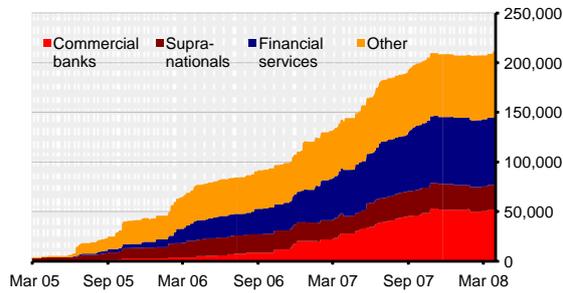


Source: Pension Funds Supervisory Commission (Comisión Nacional del Sistema de Ahorro para el Retiro, CONSAR).

Graph 4  
Domestic debt markets

Euro-peso debt by sector

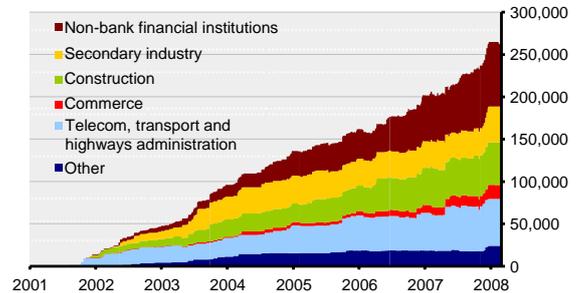
Amount outstanding in millions of pesos



Sources: Bank of Mexico; Bloomberg.

Non-bank Mexican corporate debt by sector

Amount outstanding in millions of pesos



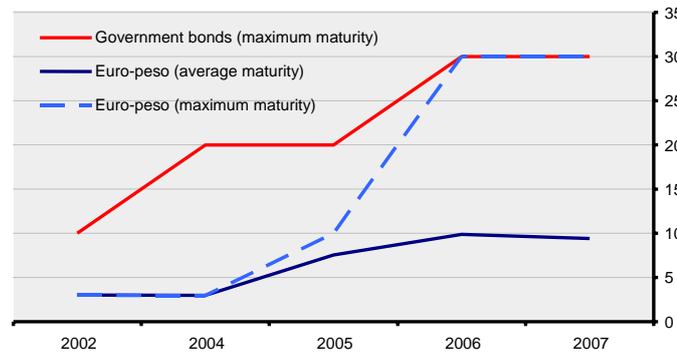
Source: Bank of Mexico.

Graph 5

Euro-peso maturity

Maturity of euro-peso and government bonds at issuance

Years



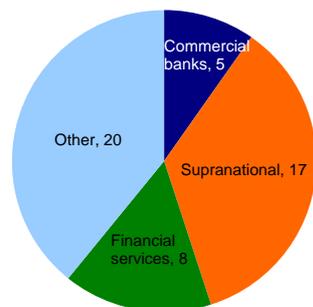
Sources: Bank of Mexico; Bloomberg.

Entities tapping into this market include international financial institutions, such as the Inter-American Development Bank and the World Bank, quasi-sovereign entities like the KfW banking group, and a large number of foreign financial institutions. The number of institutions issuing euro-peso debt has increased almost threefold in the last two years (Graph 6).

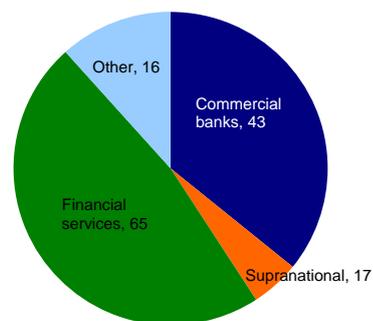
Graph 6

Euro-peso debt issuance

Euro-peso debt issuers, 2005



Euro-peso debt issuers, 2007



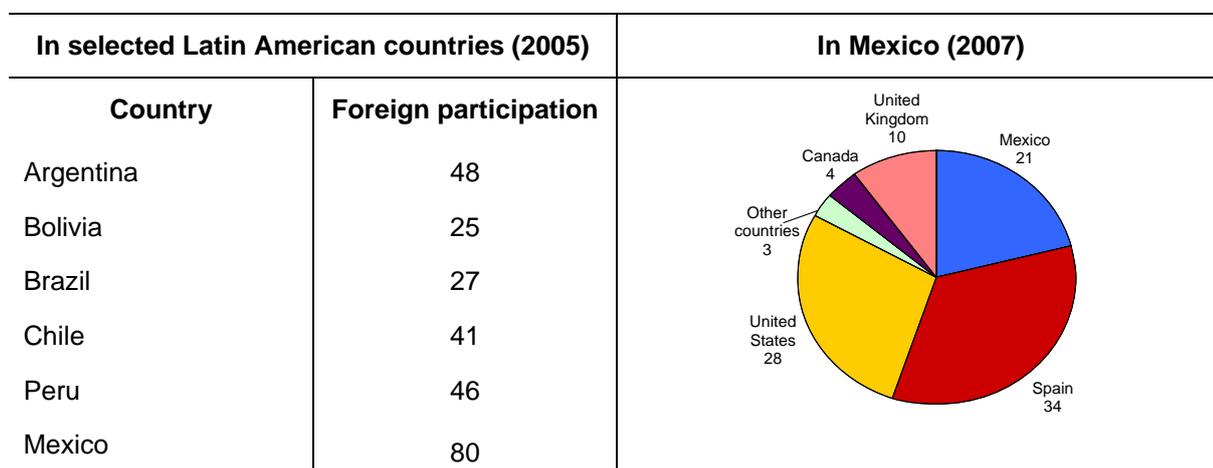
The shaded areas represent the number of issuers in each sector.

Source: Bloomberg.

Many of these issuers have taken advantage of the high demand for highly rated peso-denominated debt. In some cases, this situation has presented them with arbitrage opportunities when they swap the peso exposure, thus resulting in lower funding costs as compared with issuing directly in their local currencies.<sup>4</sup> On the demand side, euro-peso debt allows local and foreign institutional investors to maintain a peso exposure and diversify the credit risk of their portfolios away from traditional domestic issuers, namely the federal government and large Mexican corporations. As previously mentioned, regulatory changes to the investment guidelines of local pension funds have increased the demand for these bonds.

Further evidence of increased financial integration in Mexico is the ownership structure of financial companies. Throughout the sector, foreigners own a significant share of the industry. For example, in the banking system, subsidiaries of foreign institutions account for almost 80% of total assets (Figure 1).

Figure 1  
Share of foreign-owned bank assets  
In per cent



Source: Bank of Mexico.

The financial system as a whole has benefited from this ownership structure, especially in terms of an efficient transfer of human and technological capital. The financial system has increased its exposure to innovative tools and sophisticated risk management practices, which has led to greater specialisation.

According to recent analysis by the Bank of Mexico, the increase in foreign participation also corresponds to a period of greater competition among commercial banks when measured in terms of overall income, lending activity in the mortgage market and consumer credit.<sup>5</sup> Greater competition and financial innovation, together with macroeconomic stability and improvements in regulatory and supervisory frameworks, have allowed for a gradual restoration of credit by commercial banks and other intermediaries. These conditions have increased the effectiveness of the credit transmission channel of monetary policy.

<sup>4</sup> See Annex A for a detailed example of these transactions.

<sup>5</sup> For further details see Bank of Mexico (2006).

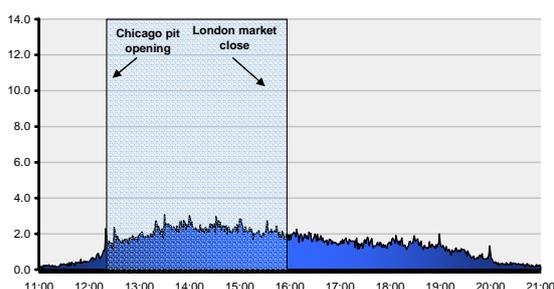
Integration has diversified the base of market participants. It has also led to the specialisation of intermediaries, issuers and institutional investors, giving rise to new and more sophisticated instruments. Markets have therefore become more competitive and more efficient, attracting more participants, further integrating domestic markets into the global financial system and generating more competition, thus creating a virtuous cycle.

In the foreign exchange market, increased competition has led to an extension of active trading hours to other time zones and to a significant reduction in bid-ask spreads. As participation in the foreign exchange market has extended to time zones outside the United States, the hours in which the peso is traded more actively have shifted accordingly.<sup>6</sup> Data provided by Reuters show that the distribution of trading activity has shifted considerably, with the highest levels of market activity occurring when Mexico, New York and London are simultaneously open (Graph 7). Another very important change has been the reduction in the bid-ask spread for peso-dollar transactions, which has declined during the most active trading hours by more than 30% in the last two years.

**Graph 7**  
**Intraday trading activity in the foreign exchange market**

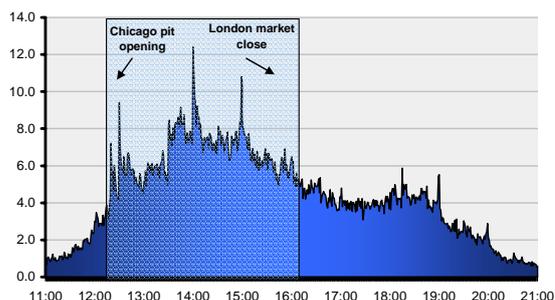
Trading time frame in the US dollar-Mexican peso foreign exchange market

Average number of trades per minute in 2004, GMT



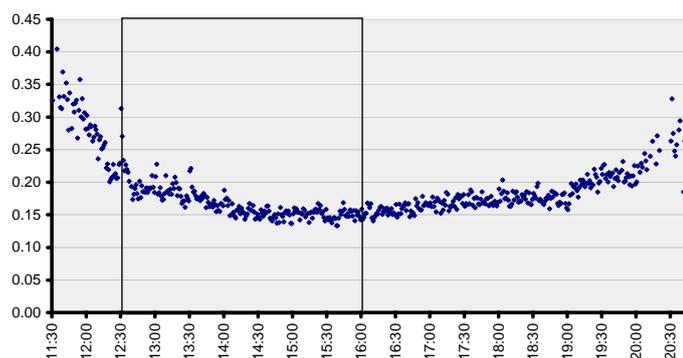
Trading time frame in the US dollar-Mexican peso foreign exchange market

Average number of trades per minute in 2007, GMT



Average US dollar-Mexican peso bid-ask spread in 2007

Mexican peso cents, GMT



Source: Reuters.

<sup>6</sup> A statistical test of the distribution of day trading shows that the average distribution during 2007 shifted relative to the average distribution prevailing in 2005. For further details, see Annex B.

The wider use of electronic trading platforms has attracted more global players and increased the effective trading day for the peso.<sup>7</sup> In this context, the Bank of Mexico recently presented an initiative to incorporate the peso as a member currency of CLS Bank. This measure will help to eliminate the settlement risk of peso-dollar transactions and develop a 24-hour market for the Mexican peso.

Table 2  
**Volume in the foreign exchange market**  
Daily average

	2004	2007
<b>Foreign exchange global volumes<sup>1</sup></b>		
Peso global volume (in millions of US dollars)	20,311	39,221
Peso volume completely operated abroad (as a percentage of total)	28	61
<b>Foreign exchange derivatives volumes<sup>2</sup></b>		
Over-the-counter markets		
Peso derivatives volume (in millions of US dollars)	9,978	28,981
Peso derivatives volume completely operated abroad (as a percentage of total)	55	63
1. Volume in outright forwards (in millions of US dollars)	1,716	4,594
<i>operated abroad (as a percentage of total)</i>	39	91
2. Volume in foreign exchange swaps (in millions of US dollars)	7,171	19,958
<i>operated abroad (as a percentage of total)</i>	56	49
3. Volume in options (in millions of US dollars)	708	4,185
<i>operated abroad (as a percentage of total)</i>	67	97
4. Volume in other derivatives (in millions of US dollars)	383	244
<i>operated abroad (as a percentage of total)</i>	95	95
Exchange markets		
Daily average volume in Mexder (in millions of US dollars)	104	101
Daily average volume in the Chicago Mercantile Exchange (in millions of US dollars)	399	546

<sup>1</sup> Includes spot transactions, forwards and foreign exchange swaps. <sup>2</sup> Includes forwards, foreign exchange swaps, options, currency swaps and other derivatives.

Sources: BIS, Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity; Bank of Mexico; Mexder.

<sup>7</sup> Data from the 2007 Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity show that 75% of volume in the peso-dollar market goes through electronic platforms and the rest via intra-dealer voice brokers.

Non-commercial players have become more interested in the liquidity and depth of markets for swap and forward transactions referenced to the Mexican peso (both over-the-counter and standardised markets). Technically driven strategies depend heavily on their executor's ability to open and close positions promptly at low transaction costs, and the Mexican peso has been particularly appealing for such purposes. According to a recent study, funds that base their decisions on technical models (mainly CTAs) represent approximately 45% of the Mexican peso volume generated on the Chicago Mercantile Exchange. In contrast, purely fundamental decisions are taken by only 10% of these funds. Hybrid models that incorporate technical and macroeconomic indicators make up for the rest of the volume generated.<sup>8</sup>

Other instruments, particularly options, are mostly booked in offshore centres with local intermediaries acting as third parties between investors and foreign banks (mostly parent banks) that take on risk. This arrangement is the result of efficiency gains obtained by consolidating global risks in one book and having technical expertise in managing global portfolios usually located at banks' headquarters (Table 2).

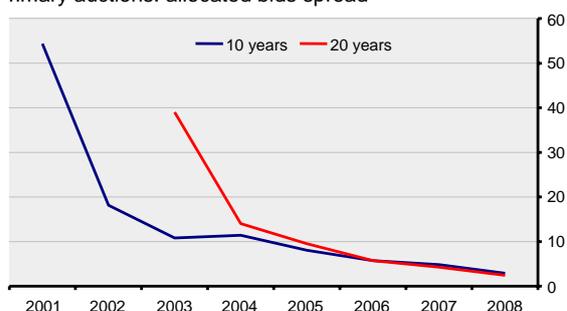
Global integration has also contributed to the expansion of execution vehicles. In the local foreign exchange market, the emergence of prime brokerage has allowed commercial and investment banks to provide credit lines, facilitating the entry of international funds to the dollar-peso market.

Increased competition in the securities market has also had a positive impact by reducing debt trading transaction costs. This benefit is evident in the compression of assigned bids in primary auctions of government securities. Bid-offer spreads for bonds in the secondary market have fallen significantly and are currently between 1 and 2 basis points for the most relevant reference points on the curve (Graph 8). Lower transaction costs facilitate the price discovery process and the reduction of the government's cost of funding.

**Graph 8**  
**Transaction costs in government debt markets**

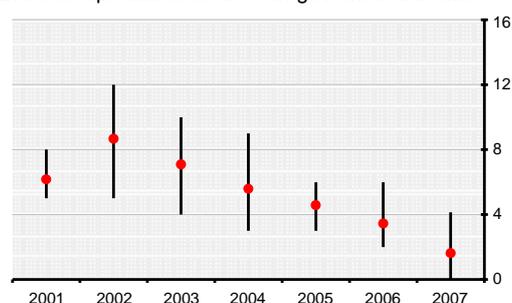
In basis points

Primary auctions: allocated bids spread



Source: Bank of Mexico.

Bid-offer spreads of on-the-run government bonds



Source: Remate Electrónico.

Foreign holders of peso-denominated debt have been key players in the development of the secondary market. In the early stages of development of the government yield curve, foreign investors were particularly interested in long-term bonds (Graph 9). Their holdings of these bonds (bonos) were relatively stable even in times of market stress, especially compared to the demand from local institutional players. Graph 9 shows the divergent behaviour between Afores and foreign investors during the first half of 2006.

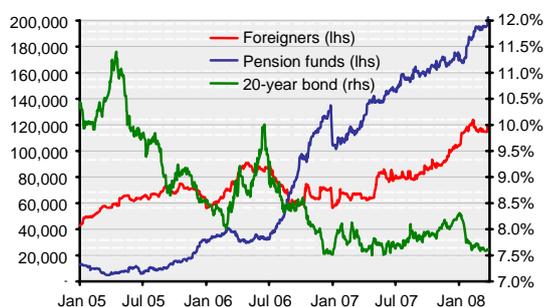
<sup>8</sup> Anderson (2003).

Graph 9

### Holdings of government debt

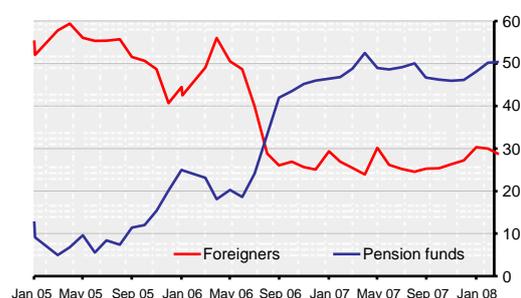
Long-term holdings

In millions of pesos, yield in per cent



Long-term holdings of bonos, > 7 years

In per cent



Source: Bank of Mexico.

Competition from foreign investors has been an important factor influencing the change in investment strategies of local pension funds. The opportunity cost to Afores of holding short-term portfolios and following short-term strategies became patent when compared to the investment strategies followed by foreign players. Since the second half of 2006, Afores have focused more on long-term investment strategies and adopted investment benchmarks. Consequently, the duration and diversification of their portfolios as well as their resilience to short-term market volatility have increased considerably, thus representing a positive externality of increased financial integration with the Mexican bond market.

The emergence of investors and issuers with different needs and risk profiles has also increased the demand for hedging vehicles. As a result, interest rate derivative products have developed rapidly (Graph 10). The growth of a local interest rate swap market confirmed that the innovation process was under way. Virtually non-existent in the late 1990s, exposure to Mexican interest rates is now possible with liquid swaps up to 10 years, and transactions up to 30 years becoming more common. Many foreign participants favour this market over the cash market because of its high liquidity and flexibility. The swap market, known as the TIIE market, is also actively used to express relative value views and exploit apparent inconsistencies or arbitrages among markets. Various types of risks can now be hedged at Mexder, the local futures exchange. TIIE contracts with maturities up to 10 years are among the futures contracts with the highest global trading volume. Government bond contracts and other instruments have also gained relevance.

Graph 10

### Interest rate derivatives

Mexico: 10-year swap spread

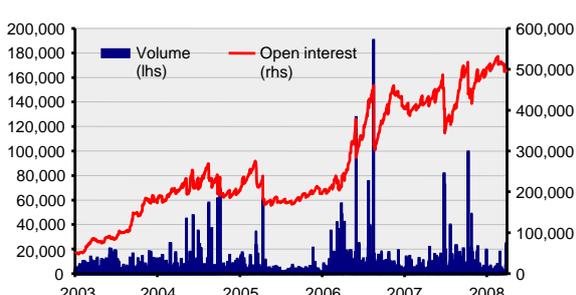
In basis points



Source: Bloomberg.

28-day TIIE futures traded at Mexder

In millions of US dollars



Source: Mexder.

The growing presence of international players has increased the demand for innovative instruments. An example is the federal government's management of liabilities through the use of debt exchange warrants and swaps.<sup>9</sup>

### III. Implications of financial integration for monetary policy

After the 1994 devaluation of the peso, monetary policy became the nominal anchor of the economy. Since then, the central bank has committed to steer monetary policy towards an inflation objective. In the years following the crisis, the inflation objective was referred to the prevailing year-end annual percentage change of the consumer price index (CPI). In 2000, the central bank started publishing quarterly inflation reports and introduced the core component of the CPI to identify the trend for inflation. The transition towards an inflation targeting framework was completed in 2002 with the specification of a long-term inflation target of 3% for annual CPI inflation, with a variability interval of  $\pm 1$  percentage points.

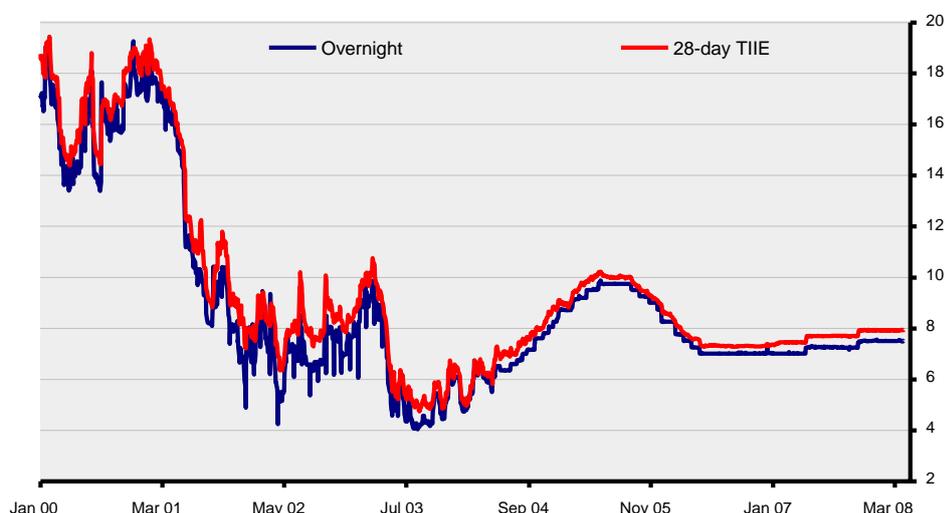
As a result of adopting the inflation targeting framework, monetary policy implementation has become more transparent, open to public scrutiny, and easier to understand and anticipate for market participants (Graph 11). Since 2003, monetary policy announcements have been made public at predetermined dates, together with a press release. This has improved the Bank of Mexico's accountability and helped anchor inflation expectations, thereby reinforcing the transmission channel of monetary policy.

Graph 11

#### Monetary policy and short-term rates

Overnight and one-month funding rates

In per cent



Source: Bank of Mexico.

<sup>9</sup> For further details, see Annex C.

To some extent, the integration with global markets and the presence of foreign investors in the domestic market have facilitated improvements in both the implementation and communication of monetary policy. Indeed, the transition to an inflation targeting framework took place very smoothly as foreigners regarded it as the best practice in developed markets, which, in turn, helped to explain it to domestic market participants; ie foreigners provided a positive demonstration effect on domestic investors. The presence of foreign investors has also improved research and central bank watching.

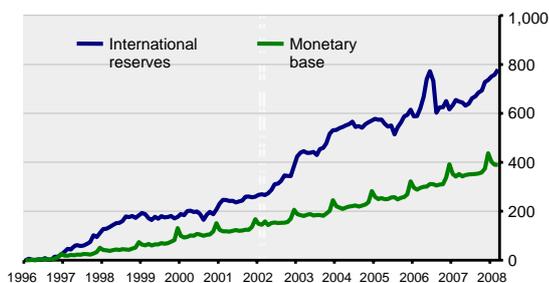
Financial integration has contributed to the development of deeper and more liquid capital markets. The central bank has therefore been able to execute monetary policy without having undesirable effects on the functioning of markets. In conducting its operations, the Bank of Mexico has tried to rely mostly on marketable instruments, further promoting market development.

An example of the aforementioned is illustrated during the period from January 2000 to December 2006, when the central bank decided to accumulate a considerable amount of international reserves (USD 42 billion). Such an accumulation implied an expansion of liquidity of a large magnitude in the financial system. The Bank of Mexico was forced to increase its peso-denominated liabilities in order to sterilise the excess liquidity. More than half of the sterilisation was carried out via the placement of debt securities in the open market. During that period, the central bank issued debt instruments that float daily with the overnight rate and pay coupons every 28 days. These instruments are fully marketable and relatively liquid in secondary markets. The central bank relied only on compulsory deposits whenever the forecasted liquidity expansion was likely to outrun the steady sterilisation coming from the placement of debt securities. Compulsory deposits are remunerated at the overnight funding rate (Graph 12).

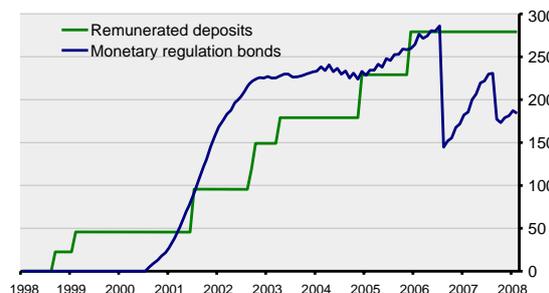
Graph 12

**Bank of Mexico's liquidity management**

Reserve accumulation and monetary base growth  
Cumulative flows in billions of pesos



Monetary regulation bonds and remunerated deposits  
Amount outstanding in billions of pesos



Source: Bank of Mexico.

Another important element in conducting monetary policy is the possibility to extract information from financial markets. Today, domestic markets are a good indicator of expectations regarding future policy actions and these can be tracked down continuously through prices for interest rate futures and swaps. The foreign exchange options market allows the central bank to monitor expectations regarding potential movements in the value of the peso.<sup>10</sup>

<sup>10</sup> Exchange rate dynamics used to be very important for policy formulation given the high pass-through of exchange rate depreciation to inflation. However, this pass-through has declined significantly due partly to the

## Conclusions

After more than a decade of consistent efforts, Mexico has consolidated a stable macroeconomic environment and established a new regulatory framework – which includes the adoption of best practices – for financial markets. These, together with a commitment to free and flexible markets, have allowed the economy to take advantage of the opportunities of global integration.

Financial integration, mainly reflected in increased competition in domestic markets, has contributed to a more developed and sounder local financial system. Exposure to global capital markets has increased competition as well as the number of intermediaries and investors, leading to more transparent pricing and lower transaction costs. As shown in Section II, foreign players' involvement in local markets has changed trading patterns by promoting the use of more sophisticated instruments, thus contributing to the adoption of the best international market practices.

The use of more complex instruments, such as derivatives, has led to more efficient risk management by banks and other private entities. Arbitrage opportunities have increased, resulting in more efficient market pricing.

Establishing and updating an appropriate regulatory framework has therefore become necessary. Financial authorities have been active in adapting legal and regulatory policies to the rapid developments in local markets.

A sound financial market has benefited the Mexican economy by allowing both individuals and institutions to gain access to more favourable terms of financing. The liquid and deep local financial markets have shielded the economy during the recent periods of market turbulence. Throughout these episodes, local markets have remained remarkably resilient to external shocks.

Financial integration has also driven forward the adoption of actions aimed at improving understanding of monetary policy decisions. These developments, together with deepening credit markets, have strengthened the expectations and credit transmission channels of monetary policy.

Nevertheless, exposure to global markets has also shed light on some shortcomings in the money and bond markets:

- The process for determining the interbank reference interest rate. Since this rate is a reference for a large proportion of commercial bank assets and commercial banks also participate in its fixing, there is an incentive to quote high levels. The same may happen with futures contracts and interest rate swaps. In order to minimise manipulation, the central bank has constantly revised and strengthened the fixing procedure.
- Underdeveloped securities lending and long-term repo markets. Even though open and standard regulation has been in place since 2004, only a very small number of operations are carried out. Financial authorities continue to revise all regulations on a permanent basis to provide the missing building blocks for these markets to function efficiently.
- Fiscal distortions. The fiscal regime for foreign investors has been adapted to encourage their participation in financial markets. Often, the withholding tax regime on interest rate income needs to be updated.

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strong commitment of the government and the central bank to a flexible exchange rate regime (see Sidaoui and Ramos-Francia (2008)).

- Absence of credit derivatives for peso-denominated securities. Regulation needs to be improved to allow local institutional investors to access this type of instrument. Currently, only interbank operations are permitted. As a result, the market has not developed.

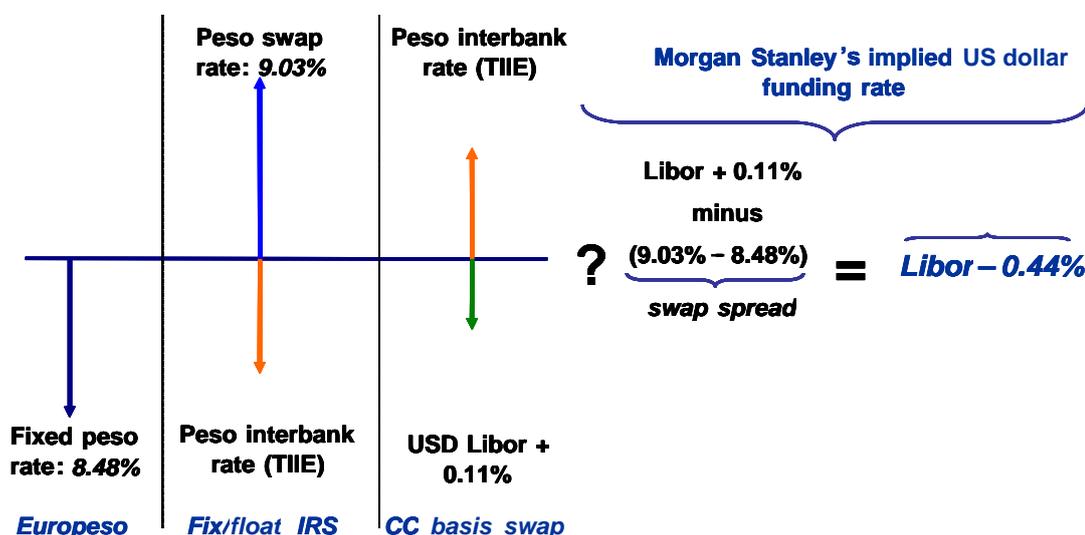
The aforementioned deficiencies bring to the fore the need to constantly improve upon the workings of local markets.

In sum, financial integration has given access to world capital markets to more people, providing for a better allocation of savings and investment as well as more and sophisticated instruments to better manage risks. At the same time, however, it has also brought new global challenges. Mexico must be prepared to face them by acting in two dimensions: on the internal side, by strengthening its macroeconomic fundamentals and continually revising its legal and regulatory frameworks; and, on the external side, by adopting a more active role within the global community of central banks, regulators and other authorities to improve the international financial architecture.

## Annex A: Example of funding through a euro-peso issue

### Recent debt issuance by Morgan Stanley of a fixed coupon 20-year maturity bond for a nominal amount of MXN 350 million

The issue date was 12 September 2007 and the yield was 8.48% per annum (67 basis points above the yield of the corresponding federal government bond). If Morgan Stanley were to have swapped the coupons from fixed to floating (TIIE) and then carried out a cross-currency swap from TIIE to Libor, the corresponding US dollar funding rate would be in Libor minus 44 basis points, a rate significantly lower than the interest rate at which Morgan Stanley can borrow directly in US dollars.<sup>11</sup>



According to market sources, Morgan Stanley's US dollar funding rate at the time was approximately 100 basis points higher than Libor.

Source: Bloomberg.

<sup>11</sup> Another way to assess the advantage cost for Morgan Stanley is to compute the US dollar implied yield if all the bond's cash flows were to have been swapped back into US dollars. The implied US dollar yield to maturity, using market prices of forward peso-dollar exchange rates, would be 5.41% per annum, 112 basis points lower than the yield to maturity of a bond issued by Morgan Stanley in US dollars maturing on June 2027.

## Annex B: Statistical analysis to test the shift in the distribution of trading hours in the peso-dollar market

A series of statistical tests were conducted using the average distribution of daily trading for two different periods. The first period includes data for the whole of 2004 while the second includes data from January 2007 to date. Distributions are referred to as  $F_{2004}$  and  $F_{2007}$ , respectively (Graph B1).

The Kolmogorov-Smirnov test was used as follows:

$$KS = \max\{|F_{2007}(x) - F_{2004}(x)|\}$$

where  $x$  denotes a specific minute during the day.

The tests performed were as follows:

a)  $H_0: F_{2004} = F_{2007}$  vs  $H_1: F_{2004} \neq F_{2007}$

The null hypothesis is rejected with a confidence of 95%.

The p-value of the  $KS$  statistic is 0.18%.

b)  $H_0: F_{2004} \geq F_{2007}$  vs  $H_1: F_{2004} < F_{2007}$

The null hypothesis is rejected with a confidence of 95%.

The p-value of the  $KS$  statistic is 0.09%.

c)  $H_0: F_{2004} \leq F_{2007}$  vs  $H_1: F_{2004} > F_{2007}$

The null hypothesis is not rejected with a confidence of 95%.

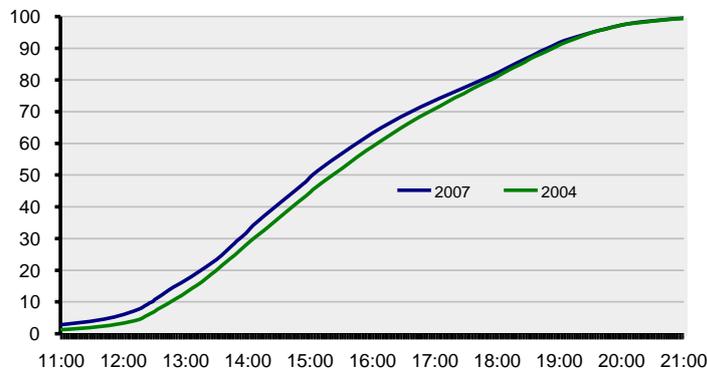
The p-value of the  $KS$  statistic is 99.96%.

The results suggest that the distribution of 2007 has shifted to the left relative to the one prevailing in 2004. This means that the peso-dollar market is more liquid earlier in the day, a condition that could be attributed to foreign participants.

Graph B1

Cumulative distribution functions of trading in the US dollar-Mexican peso market

Cumulative percentage per minute in 2004 and 2007, GMT



Source: Bank of Mexico.

## Annex C: Federal government debt management operations

### A. Debt exchange warrants

Under the terms of a transaction, a warrant is exercised if the yield spread between the debt in pesos and that in foreign currency decreases (Graph C1, left-hand panel). For investors, this “insurance” is appealing because they can sell UMS bonds (foreign currency denominated bonds) and purchase fixed rate peso bonds under favourable conditions. Meanwhile, the Ministry of Finance carries out large transactions to substitute foreign for local debt without adversely affecting the bond market. From November 2005 to October 2007 the federal government exchanged debt under this mechanism for a total of USD 4.4 billion.

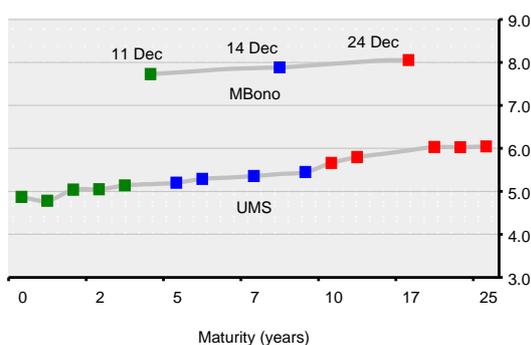
### B. Local debt swaps

A second example of the use of innovative instruments is the swapping of government bonds to smooth their maturity schedules (Graph C1, right-hand panel). This type of procedure has reduced the settlement of very large amounts of securities at similar dates, without diminishing the liquidity and depth obtained by maintaining large amounts in circulation for most of the bonds’ life. From September 2005 to July 2007 the government carried out 10 swap operations for a total of MXN 35.5 billion.

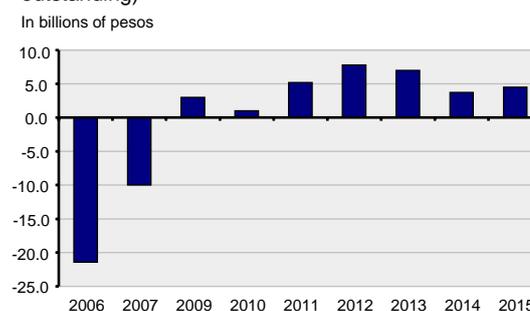
Graph C1

#### Debt exchange warrants and debt swaps

UMS and domestic bond yield curves  
Yield



Amounts swapped in 2006–07 (variation of amounts outstanding)  
In billions of pesos

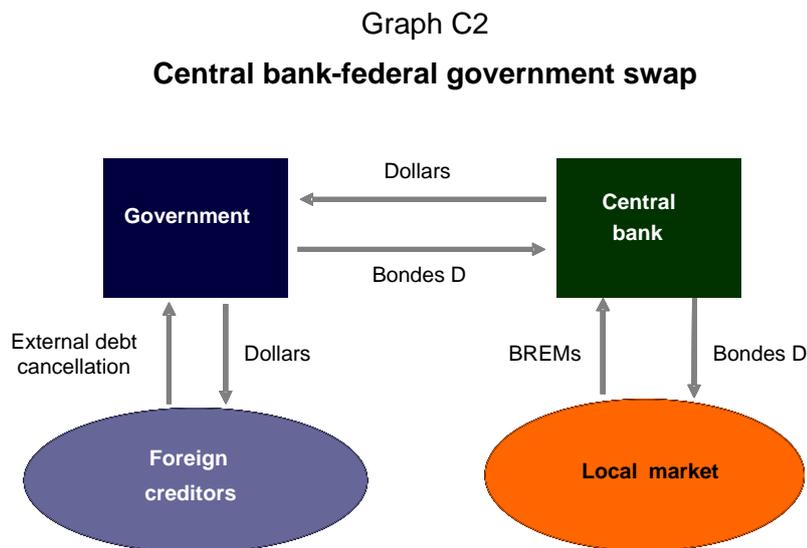


As of 9 November 2006. Colours in the left-hand panel show the eligible bonds to be swapped by warrant holders; for example, UMS with maturities between zero and five years could be swapped for the bond maturing in December 2011. This graph corresponds to the 2005 warrant.

Sources: Bank of Mexico; Ministry of Finance (Secretaria de Hacienda y Crédito Público, SHCP).

### C. Federal government-Bank of Mexico swap (Graph C2)

In 2006, the Ministry of Finance announced the prepayment of USD 12.4 billion of external debt. To finance the transaction, the Ministry issued domestic securities (Bondes D), with the same characteristics as BREMs.<sup>12</sup> Such sales were then used to purchase international reserves from the Bank of Mexico, which, in turn, used those Mexican pesos to buy back BREMs from the local bond market. All transactions were done through open auctions with previously disclosed and explained rules.



Source: SHCP.

<sup>12</sup> BREMs were adjustable coupon notes issued and placed by the Bank of Mexico from 2000 to 2006 to sterilise the excess liquidity in the money market originated by the accumulation of international reserves. BREMs maturity terms were one, three and five years. Their coupon was referred to the daily overnight interest rate, payable every 28 days.

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