

# Central banking intervention under a floating exchange rate regime: ten years of Mexican experience

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## 1. Introduction

From December 1994 to date, the Mexican peso/US dollar rate has been determined by market forces under a floating regime. During this time span the exchange rate has suffered severe shocks, coming both from the domestic economy (the 1995 crisis) and from the rest of the world (Asian, Russian and Brazilian crises, 11 September 2001 and the Iraqi war). The flexibility of the exchange rate has helped to soften the effects of these shocks. However, the main support of the exchange rate stems from the perceived soundness of Mexico's macroeconomic fundamentals and from the financial authorities' commitment to avoid discretionary interventions. In this regard, as will be shown in this document, in implementing foreign exchange policy Banco de México has adhered to two main principles: (1) not to interfere with the normal functioning of the market and (2) to foster the development of the market through the creation of new instruments and by encouraging the entrance of new participants.

The paper is organised in five sections. The first reviews the context under which the Mexican financial authorities decided to implement a floating exchange rate regime and discusses the general strategy of the policy decisions that provided a foundation to the regime. The second part describes Banco de México's foreign exchange intervention mechanisms that have been in place during the last ten years. The consistency of the operational procedures with the floating exchange rate regime is emphasised. The third describes the development of the foreign exchange markets in which the Mexican peso is traded, while the fourth section is focused on evaluating the macroeconomic performance of Mexico under the floating exchange regime and the compatibility of the regime with monetary policy under inflation targeting. Finally, some concluding remarks are advanced in the last section.

## 2. Setting up the foundations of a floating exchange rate regime

### 2.1 General strategy

The Mexican financial authorities were forced to let the peso float in December 1994 after it became evident that the pegged exchange rate against the US dollar (US\$), which had been in place since 1987, was untenable. Efforts to defend the pegged exchange rate had caused the depletion of net international reserves and the accumulation of large amounts of short-term liabilities denominated in foreign currencies. In that context, some economic analysts feared that a floating exchange rate would be an additional source of volatility and undermine the effectiveness of macroeconomic stabilisation policies.<sup>2</sup> However, Banco de México was convinced that the float had important advantages, such as discouraging short-term capital flows as well as being a useful indicator both of market perceptions and of inflationary pressures to guide monetary policy. Notwithstanding the skepticism about the floating exchange rate, from the onset of 1995 Banco de México started to implement a series of policy actions aimed at strengthening the foreign exchange market.

Foreign exchange policy in Mexico has indeed evolved in the course of the last decade. Nevertheless, from the initial discretionary interventions of 1995 to the current policy based on automatic

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<sup>1</sup> Deputy Governor, Banco de México. The views and conclusions presented here are exclusively those of the author and do not necessarily reflect those of Banco de México or of other board members.

<sup>2</sup> Most of the arguments against the floating regime are mentioned in Sidaoui (2003).

mechanisms, the overall strategy continues to stress the need to minimise interference with the foreign exchange market and to foster its development.<sup>3</sup> This strategy is based on the belief that a foreign exchange market that is able to function properly, that is, a deep and liquid market where prices are always provided, is the fundamental underpinning of a floating exchange regime. Without a well functioning market, a floating regime could indeed become a source of volatility and other distortions. It is under this basic philosophy that one can understand, for instance, the facilities established in 1995 to provide liquidity assistance in foreign currency to Mexican commercial banks and to pay off Tesobono-holders directly in US\$. The idea was to isolate these significant demands for foreign exchange in order to stabilise the market and to limit speculative opportunities that could distort the formation of prices. Hence, these windows allowed the foreign exchange market to be more competitive by providing a level playing field for all participants. A similar rationale lies behind the policy of keeping most foreign exchange operations of public sector entities out of the market.

Moreover, the sporadic episodes of direct intervention by Banco de México in the foreign exchange market in 1995 and 1998 can be better understood in the context of the latter strategy. In both instances the intervention was motivated by the belief of the financial authorities in the advisability of bursting speculative bubbles in the foreign exchange market. The objective of discouraging sharp speculative positions against the Mexican peso was not limited only to infrequent foreign exchange market intervention, but rather also was complemented by a restrictive monetary policy stance.

So it is clear, as is the case for any other country with a flexible exchange rate, that the float in Mexico has not implied that the monetary authorities refrain from intervening in the foreign exchange market. On the contrary, intervention has to be understood from the standpoint of a policy designed to improve, paradoxically, the operation of market forces in the determination of the exchange rate.

Strangely enough, one of the sources of speculation in the foreign exchange market (particularly during the early years of the floating regime) was the perceived reluctance of the central bank to intervene. This perception related to the reduced levels of international reserves at the time. Thus, in order to contain speculative pressures, the financial authorities pursued from 1996 to 2001 a policy of replenishing the stock of international reserves.

Foreign exchange intervention per se was not sufficient to foster the development of the foreign exchange market. In addition, a stable and sound macroeconomic environment was needed to reduce uncertainty and market turbulence. In fact, one of the immediate policy goals for 1995, ensuring the solvency of the government, was attained by securing an international financial assistance package, refinancing foreign liabilities, controlling expenditures and increasing fiscal revenues. Moreover, a policy of institutional reform of financial markets and a strategy of information disclosure were introduced in order to support market development.

To strengthen the floating exchange rate regime the central bank recognised the significance of improving the operation of the market. Thus, in 1995 the financial authorities pushed an additional deregulation effort focused on allowing new financial instruments.<sup>4</sup> Steps in this direction were taken with the futures and options markets. Specifically, in April 1995 Banco de México authorised: (1) the operation of foreign exchange markets dealing in US\$ derivatives involving Mexican pesos and (2) deposits in local currency with foreign financial institutions. The main rationale for this was that derivatives contribute to trade and hedge specific risk exposures, allowing the spread of risk among different players and hence mitigating the uncertainty regarding the exchange rate. Furthermore, exchange rate linked derivatives serve to complement the available money market instruments by providing a yield curve implicit in futures and forward contracts and therefore supports a consistent alignment of prices in financial markets.

Banco de México's authorisation to operate derivatives allowed the Chicago Mercantile Exchange (CME) to launch a Mexican peso futures contract, which was the first emerging market product of its

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<sup>3</sup> Foreign exchange policy in Mexico is set by the Foreign Exchange Commission, composed of three members of the Secretaría de Hacienda y Crédito Público (MoF) and three members of Banco de México. The MoF has control over the commission since the Secretary casts the deciding vote in case of a tie and any official decision must have the vote of at least one member of the MoF. Banco de México is responsible for implementing the foreign exchange policy.

<sup>4</sup> Since 1988 Banco de México embarked on an ambitious deregulation and modernisation process of the financial system. This process was focused on abolishing foreign exchange controls, allowing foreign investment in the equity and money markets, eliminating credit rationing and interest rate limits and easing legal reserve requirements.

kind to be traded on the Exchange. Once a solid volume for the Mexican peso futures was attained, the CME introduced options on futures contracts, thus widening the investment alternatives open to market participants. These choices were further expanded with the launching of the Mexican Market of Derivative Products (Mexder), which in December 1998 began the operation of a futures contract involving the Mexican peso against the US\$.

Banco de México also supported the development of foreign exchange derivatives through regulation and supervision of the over-the-counter forward market. In this regard, the central bank allowed banks which complied with a set of specific requirements - financial strength, evaluation and control of market and credit risks, as well as proper systems to monitor such risks - to carry out forward foreign exchange transactions. A further step in market development was the decision to modify in 1996 the computation of the Fix exchange rate, a quote published by the central bank that is widely used as a reference, to better reflect actual market conditions.

Banco de México also implemented a policy of information disclosure which indirectly contributed to the objective of developing the financial markets. Authorities acknowledged that timely information was a fundamental input for market participants in order to adequately evaluate the prevailing macroeconomic conditions and, specifically, the conduct of monetary policy. In this regard, from April 1995 on, Banco de México has been issuing a press release presenting, among other data, the main items of its balance sheet. In particular, the press release also includes a breakdown of the factors that explain the weekly flow of international reserves. This policy of transparency was in sharp contrast with the previous practice of reporting the stock of international reserves only thrice a year.

The final institutional reform that buttressed the floating exchange regime was the adoption of an inflation targeting framework in 2001. This decision made clear that Banco de México would conduct monetary policy aimed at achieving price stability, following an integral approach to the analysis of the determinants of inflation. Thus, the focal role that the exchange rate had enjoyed in the determination of the price level was further diminished, which in turn allowed monetary policy to concentrate on a broader set of fundamental factors affecting inflation. Moreover, the adoption of this framework included all the typical transparency and accountability elements that have become the international standard.

## **2.2 International reserve accumulation**

Banco de México accumulated US\$ 59.1 billion of net foreign assets in the period 1996-2003. As shown below, this substantial accumulation was achieved without causing severe distortions to the foreign exchange market or altering in any significant way the nature of the flexible exchange rate regime.

As pointed out in Sidaoui (2003), the Mexican financial authorities decided to build up international reserves after a careful assessment of the benefits and costs of this action, in the context of institutional constraints imposed by Banco de México's operational framework with public sector entities. The rationale behind reserve accumulation went beyond ensuring compliance with Mexico's foreign external obligations. In light of the skepticism regarding Mexico's ability to put its house in order, it focused on preventing the 1995 liquidity crisis from becoming a fully fledged solvency crisis. Reserve accumulation was also a signal to investors and international rating agencies that associate a higher level of international reserves with lower country risk. Consequently, a large stock of international reserves would be a positive externality, since all Mexican borrowers could gain access to foreign financing on better terms. A further argument in favour of holding a larger stock of international reserves emerged as the 1995 crisis unfolded, when the central bank was compelled to intervene in the market to put a lid on speculative pressures on the peso, which were fed by a perceived unwillingness to intervene given the low level of available reserves.

As argued by Sidaoui (2003), the accumulation of international reserves was not costless. On the one hand, it had implications for the implementation of open market operations aimed at regulating money market liquidity. As the central bank's international reserves went up, so did the amount of liquidity that had to be sterilised. By April 1997 international reserves, measured in pesos, were larger than the stock of base money. As the accumulation moved forward, the monetary authorities had to devise more effective means to nullify the monetary impact of its purchases of foreign currencies. On the other hand, reserve accumulation also entailed costs for the financial performance of Banco de México. First of all, given that domestic interest rates have been above international rates, the liabilities in pesos incurred by the central bank have an impact on interest costs in excess of the

returns obtained from investing the stock of international reserves. Furthermore, as the exchange rate fluctuates, so does the value in pesos of a given stock of international reserves, affecting the financial results of Banco de México adversely during periods of exchange rate appreciation.

During the past four years, after receiving an investment grade status from major rating agencies and given the steady improvement of the external debt profile for both the public and private sectors, it has been evident that the costs of holding an increasing stock of international reserves are rising faster than the benefits. Taking this into account, the Mexican financial authorities decided in May 2003 to implement foreign exchange policy actions aimed at slowing the pace of accumulation. Those actions have followed the same intention of not interfering with the normal functioning of the market, while mitigating the costs stemming from marginal increments in international reserves. Nonetheless, no targeted level for international reserves has been specified by the Mexican financial authorities. Even though policy in practice follows the principle that “the more, the better”, it does not pursue as fast a pace of accumulation as it did between 2000 and 2002.

### **3. Foreign exchange intervention under a floating regime**

Intervention by Banco de México has almost exclusively relied on either indirect means (foreign exchange operations with public sector entities and the special US\$ facilities opened in 1995) or automatic schemes (intervention oriented to stabilising markets and to managing the stock of international reserves). The former has mostly taken the form of keeping large public sector players away from the market in order to achieve a more competitive outcome. Regarding direct intervention in the foreign exchange market, it has almost solely been based on rules which are announced ex-ante. The only exceptions have been the discretionary interventions decreed by the Foreign Exchange Commission in 1995 and 1998, which were promptly acknowledged by the financial authorities. These rare instances of direct discretionary intervention on the foreign exchange market have taken place only when it appears to be unavoidable, given market conditions of heavy speculation against the currency. Furthermore, with view to consolidating market credibility, the authorities’ commitment to the floating regime has been frequently emphasised, as has their decision to conduct monetary and exchange rate policies transparently.

#### **3.1 Modalities of discretionary intervention**

##### **3.1.1 Foreign exchange operations with public sector entities**

Acting as its financial agent, Banco de México conducts foreign exchange transactions with the federal government, while it also operates with Pemex, the state-owned oil enterprise.<sup>5</sup> Given the large size and, very often, predictable timing of the foreign currency operations of these two entities, the Foreign Exchange Commission deemed it advisable to prevent them from taking place directly in the foreign exchange market and cause unwarranted volatility. Thus, by removing the operations of the largest public sector entities from the market (and being transparent about it), the authorities minimise the suspicion of carrying out foreign exchange operations with the aim of attaining certain exchange rate objectives, while allowing a more competitive functioning of the foreign exchange market. Moreover, the two entities have opposite foreign exchange positions so it is natural and easier to manage them outside the market.

The specific strategy that Banco de México applies when dealing with public sector entities relies on the use of international reserves as a buffer stock. Hence, Pemex’s net foreign exchange receipts (from oil exports and external financing) have been partially used to finance the federal government’s foreign exchange requirements to service its external debt. Since Pemex’s receipts have usually exceeded the federal government’s external debt servicing needs, the central bank has ended up with a larger stock of international reserves. Operations with these two entities are undertaken in market

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<sup>5</sup> In fact, the central bank maintains exchange controls over Pemex, the only public sector enterprise deemed large enough to merit them after the liberalisation that started in 1988.

terms, with previous notice for foreign exchange transactions and at rates very similar to the Fix exchange rate.

Foreign exchange operations conducted by Banco de México with public sector entities over the course of several years have been the most significant source of international reserve accumulation (Table 1).

Table 1  
**Flows of net foreign assets: decomposition by source, 1996-2004**

Billions of US dollars

|      | <b>Total</b> | <b>Pemex</b> | <b>Federal government</b> | <b>Market operations</b> | <b>Others<sup>1</sup></b> |
|------|--------------|--------------|---------------------------|--------------------------|---------------------------|
| 1996 | 6.3          | 9.0          | -2.7                      | 0.9                      | -0.9                      |
| 1997 | 13.5         | 8.5          | 0.9                       | 3.8                      | 0.4                       |
| 1998 | 3.7          | 5.4          | -3.3                      | 0.3                      | 1.2                       |
| 1999 | 3.9          | 7.4          | -6.5                      | 1.8                      | 1.2                       |
| 2000 | 8.2          | 11.2         | -6.8                      | 1.8                      | 2.1                       |
| 2001 | 9.2          | 8.9          | -2.4                      | 1.4                      | 1.4                       |
| 2002 | 5.9          | 10.0         | -6.2                      | 0.0                      | 2.1                       |
| 2003 | 8.3          | 15.4         | -5.8                      | -3.2                     | 2.0                       |
| 2004 | 5.2          | 13.8         | -3.2                      | -6.7                     | 1.3                       |

<sup>1</sup> Includes net income generated by investing Banco de México's international assets.

Source: Banco de México.

### **3.1.2 Creation of temporary US dollar facilities in 1995**

As mentioned above, during the first months of 1995 Banco de México took a series of policy actions intended to strengthen the floating exchange rate regime. In this regard the central bank decided to deal directly with two important sources of foreign currency demand which might have exacerbated the speculative pressures against the Mexican peso: (1) the closing of credit lines to Mexican commercial banks and (2) the amortisation of Tesobonos (US\$-indexed government securities). The early interventions of 1995 were oriented towards stabilising the foreign exchange market and easing speculation against the peso, in order to limit undue volatility during the resolution of the crisis.

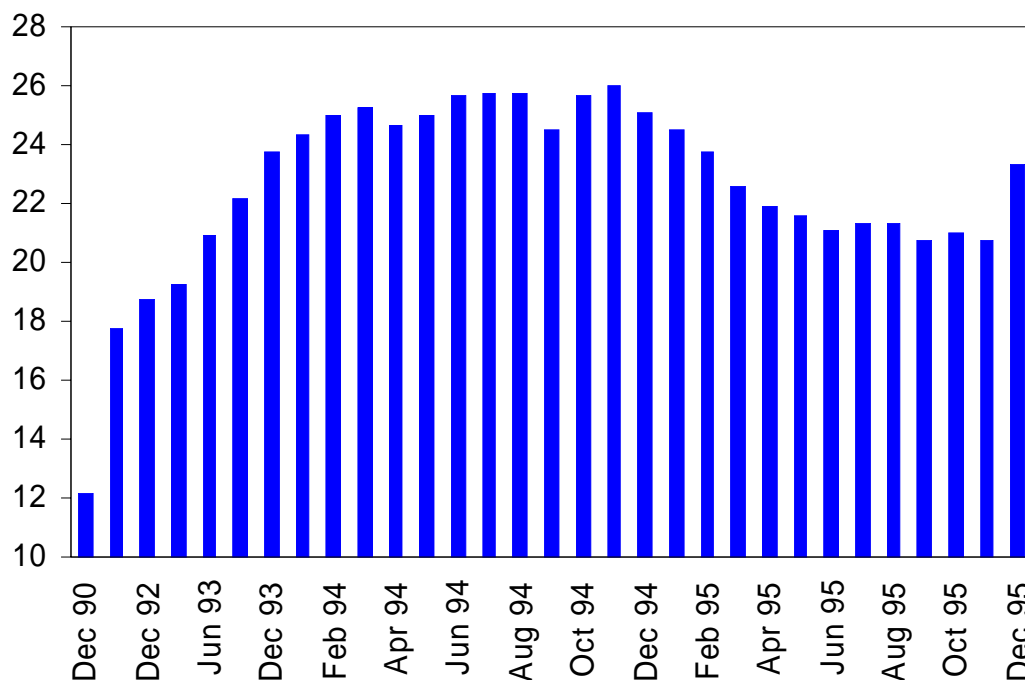
The main trigger of the 1994-95 crisis was a sudden interruption and later reversion of the foreign capital inflows which had come to Mexico after the external debt renegotiation and financial liberalisation of 1990. In particular, the Mexican commercial banks' foreign liabilities followed a similar pattern to other types of financial capital flows. The outstanding stock of such liabilities more than doubled from 1990 until July 1994 and remained relatively stable during the second semester of that year (Graph 1). However, following the elimination of the pegged exchange regime, most Mexican commercial banks faced great difficulties in rolling over their foreign liabilities because their credit lines with foreign financial institutions were suspended. This situation was evidenced by the reduction of around US\$ 5.1 billion in the stock of foreign liabilities at the end on 1995, which represented a fall of more than 20% from the level observed the previous year.

The liquidity problem faced by the Mexican commercial banks during the first months of 1995 differed from the common textbook case of a central bank acting as a lender last resort. Banks required foreign currency, not pesos. By definition a central bank has a limited stock of international assets which may be used to intervene in the foreign exchange market to deal with temporary balance of payments strains. Consequently, establishing an emergency liquidity facility in US\$ was a risky decision, specially when considering the size of the stock of banks' foreign liabilities relative to the stock of the international reserves (US\$ 6.2 billion at the end of December 1994). On the other hand, it was difficult to satisfy the banks' demand for US\$ in the foreign exchange market without compounding the

depreciation pressures faced at that time. To cope with this dollar liquidity problem, an emergency facility was designed to stop and eventually reverse the run on the external liabilities of commercial banks. To this end, Banco de México implemented a mechanism of US\$ loans granted to the deposit insurance fund (FOBAPROA), which in turn allocated the funds to the commercial banks that requested assistance. Commercial banks pledged assets as collateral on the credits obtained through this facility. Loans carried high interest rates to prevent a moral hazard bias, since banks had the incentive to pay back such liabilities as soon as possible. In the event, 17 banks obtained assistance through this facility. At its peak, in April 1995 the outstanding loans granted by Banco de México amounted to US\$ 3.9 billion (Graph 2). This facility was successful and short-lived, since debtor banks paid off their debts in full by September 1995 (the window was to remain open for only nine months).

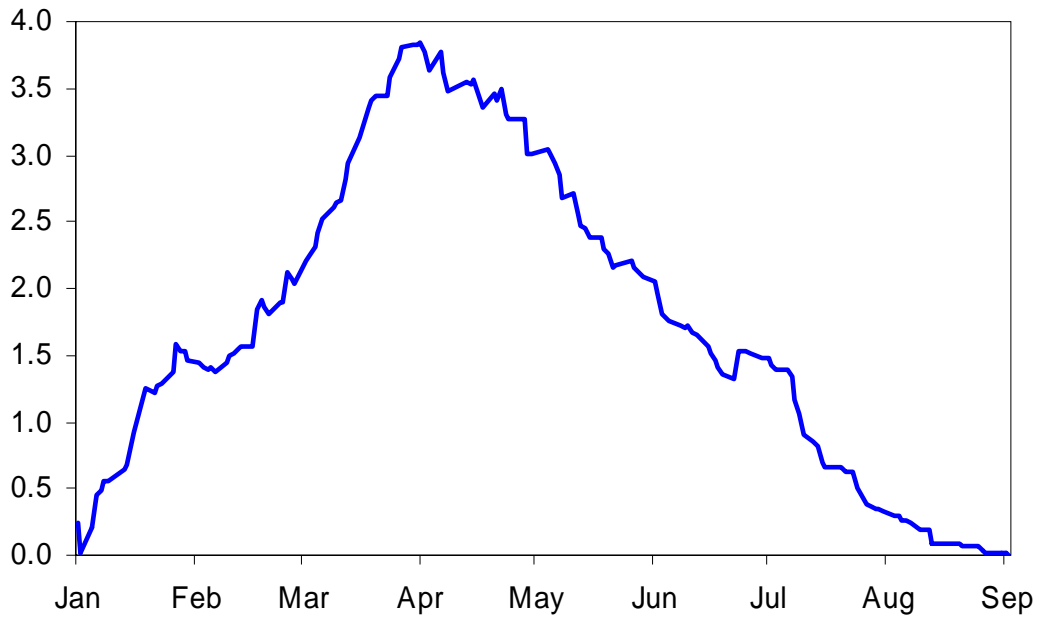
Regarding the second source of foreign currency demand, the most severe financial problem faced by the Mexican economy during the 1994-95 crisis was the amortisation of Tesobonos, amounting to US\$ 29.2 billion, which took place during 1995. Tesobonos were zero-coupon bonds issued by the Mexican government which paid the amount of pesos required to buy a fixed quantity of US\$, as specified in the face value of the instrument. By their risk profile, Tesobonos were equivalent to a US\$ denominated instrument, even though payment flows were settled in Mexican pesos. In particular such payments introduced an important source of instability to the foreign exchange market, since bondholders became indifferent to any peso depreciation induced by their demand for US\$. Given that a significant stock of Tesobonos matured each week, it was perceived that their amortisation would generate persistent depreciation pressures. To cope with this Banco de México was initially forced to intervene in the foreign exchange market, selling almost half of the US\$ demanded for the amortisation payments from January to March 1995 (Graph 3).

Graph 1  
**Foreign liabilities of commercial banks, 1990-95**  
 Stocks in billions of US dollars



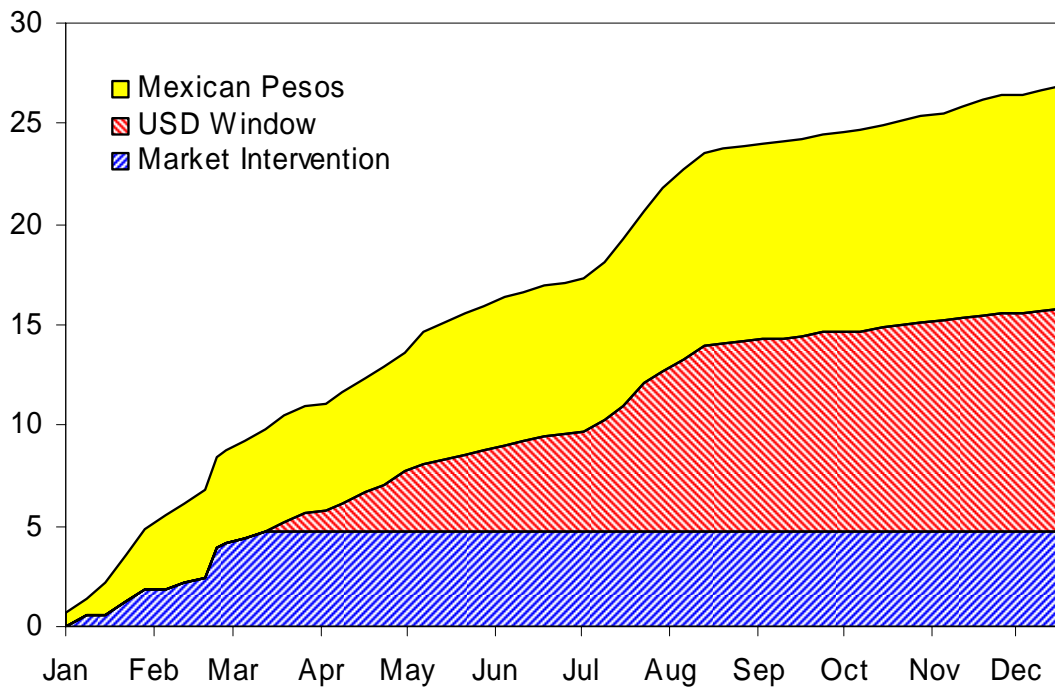
Source: Banco de México.

Graph 2  
**Banco de México's emergency liquidity assistance in US dollars, 1995**  
 Stocks in billions of US dollars



Source: Banco de México.

Graph 3  
**Payment sources for the amortisation of tesobonos, 1995**  
 Cumulative flows in billions of US dollars



Source: Banco de México.

However, in the process of carrying out these interventions the central bank induced some distortions which, to the extent that some market participants took advantage of them, caused the foreign exchange market to respond mainly to speculative behaviour. In order to deal with this problem, in March 1995 Banco de México decided to: (1) refrain from intervening in the foreign exchange market and (2) open a special facility for amortising Tesobonos at the holder's request. This facility was successful since it eliminated an important source of uncertainty in financial markets. During the lifetime of this facility, close to 65% of the Tesobonos' nominal value was paid off directly in US\$.

### **3.1.3 Discretionary intervention in the foreign exchange market**

In the midst of severe speculation against the peso, the Foreign Exchange Commission instructed Banco de México to undertake discretionary sales of US\$. Interventions were carried out through market procedures on four occasions between November and December 1995 and on one day in September 1998. Furthermore, in the spirit of enhanced transparency, the precise amounts of the foreign exchange intervention were revealed by Banco de México at the end of the day.

As for the factors that caused the interventions of 1995, from the onset of the fourth quarter market participants were concerned about whether or not the Mexican economy would be capable of attaining in future a recovery pace similar in magnitude and intensity to the real contraction experienced during 1995 (annual GDP variation of -7%). Furthermore, uncertainty was fuelled by the perception that Banco de México had no degrees of freedom to offset any severe US\$ demand pressure, because its stock of international reserves (US\$ 14.7 billion as of September 1995) was significantly smaller than the central bank's foreign liabilities with the IMF and the financial authorities of the United States and Canada (US\$ 16.9 billion). Under these circumstances the foreign exchange market tended to respond mainly to speculative factors, so that agents leaned towards long US\$ positions. The magnitude of these speculative positions was reflected in an almost continuous weakening of the Mexican peso. By mid-November 1995 the depreciation added up to more than 25% with respect to end-September.

In this context and notwithstanding the relative scarcity of international reserves, as well as the intention to refrain from discrete interventions, the financial authorities decided that the most suitable use of the stock of international assets under a floating exchange regime was to offset a speculative bias like the one then being experienced. In particular, during the last two months of 1995 Banco de México intervened four times, selling a total of US\$ 0.5 billion. These interventions were accompanied by a more restrictive monetary policy stance which induced a rise of 10 percentage points in the interbank interest rate between the first and second halves of the fourth quarter of 1995. The tighter monetary policy stance was intended to make the funding of long US\$ speculative positions more expensive, and force market participants to face the consequences of their market risk exposure measured in Mexican pesos.

Another bout of speculation moved Banco de México to implement its only discrete intervention after 1995, which took place on 10 September 1998, and involved sales of US\$ 0.3 billion. This intervention was also carried out on the instructions of the Foreign Exchange Commission in the light of the volatility in financial markets during the Russian and Long Term Capital Management (LTCM) crises. During this episode, market participants engaged in (imperfect) hedging positions in the Brazilian real with the Mexican peso. As in the previous episode, intervention was coupled with a restrictive monetary policy stance that induced interest rates to go up some 12 percentage points between July and September 1998.

## **3.2 Automatic mechanisms<sup>6</sup>**

There are three discernible stages in this type of intervention: the first was a time for inducing stability in foreign exchange markets and facilitating the accumulation of reserves (1995-2001), the second a period of non-intervention (2001-03) and the third a phase of slowing down the pace of reserve accumulation (2003 to the present).

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<sup>6</sup> The automatic mechanisms are described in more detail in Sidaoui (2003).



### **3.2.1 *Inducing stability and facilitating reserves accumulation (1995-2001)***

In 1996 the financial authorities stressed the need to build up the stock of international reserves. To this end, in August 1996 the Foreign Exchange Commission announced the implementation of a scheme to buy US\$ through put options, which gave commercial banks the right to sell US\$ to Banco de México, provided certain conditions were satisfied. The objective was to accumulate international reserves beyond the flows obtained through foreign exchange operations conducted with public sector entities.

The options strategy enabled the central bank to increase international reserves without exerting undue pressure on the foreign exchange market or sending equivocal signals that could interfere with the proper functioning of the floating exchange rate regime. The aim was to purchase US\$ when the supply was relatively plentiful and to refrain from doing so when the exchange rate was under depreciating pressures.

The put options programme successfully attained its objectives. From August 1996 to June 2001 Banco de México accumulated US\$ 12.2 billion of international reserves through this mechanism, an amount equivalent to 75% of the total options auctioned. Put options contributed almost one third of the increase in international reserves during the aforementioned period.

In order to minimise the impact of the options scheme on the foreign exchange market, an opposite kind of intervention was designed to endow the process with some degree of symmetry. Thus, in February 1997 the Foreign Exchange Commission authorised Banco de México to undertake daily sales of up to US\$ 0.2 billion to market participants through auctions. This mechanism was aimed at mitigating the volatility in the foreign exchange market by providing liquidity during days when uncertainty prevailed, thus discouraging some participants from engaging in speculative strategies.

Resort to the auction facility to sell US\$ to participants in the foreign exchange market was infrequent. This was so because only under fairly atypical conditions does the exchange rate depreciate by at least 2% in a single day, the minimum depreciation to kickin the auction. In fact, the sales facility was activated on only 14 days during its lifetime. Furthermore, almost 60% of total sales took place from August 1998 to January 1999, which was a period characterised by very high volatility in international financial markets. Because liquidity was provided to the foreign exchange market in a timely way during episodes of turbulence, it can be said that this strategy was also successful.

The net accumulation of international reserves obtained through the use of automatic mechanisms is presented in Table 1. In particular, it is important to underline that nearly 16% of the US\$ acquired by Banco de México through the exercise of put options was recycled to the foreign exchange market via the auctioned sales.

### **3.2.2 *Non-intervention (2001-03) and slowing the pace of reserves accumulation (2003-to date).***

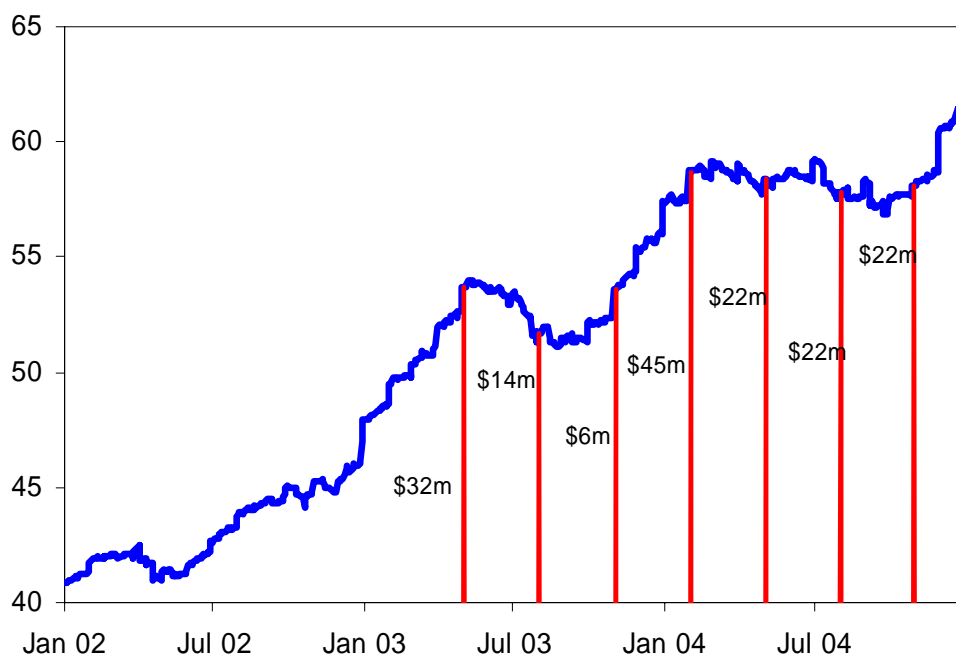
Through its policy of international reserve accumulation Banco de México purchased more than US\$ 38 billion up to March 2001. However, the trend of such purchases and the implications of funding the corresponding peso balances motivated an analysis of the benefits and costs of continuing with the strategy. The results of such an appraisal indicated that the benefits of holding an ever larger amount of international reserves were not as compelling as before. This was mainly because Mexico had just obtained an investment grade status from all major credit rating agencies and the external debt profile of both the public and private sectors had persistently improved during the previous years. Cost considerations became more relevant, not just those stemming from the sterilisation policy itself but also the opportunity costs of the foreign resources accumulated as international reserves. Therefore, the Foreign Exchange Commission decided to suspend both the put option and the sale of US\$ schemes, effective June and July 2001, respectively, thereby leaving the exchange rate essentially free to float.

Nonetheless, international reserves continued rising, reaching US\$ 48 billion bUSD by December 2002 and clearly indicating that terminating the put option mechanism to slow the pace of accumulation was insufficient. As explained in Sidaoui (2003), this result was mainly associated with the constraints imposed by the institutional arrangement for the foreign exchange operations of Banco de México with Pemex. In particular, starting in 1999, Pemex has obtained foreign financing for PIDIREGAS, investment projects that have special off-budget treatment because of their long-term horizon and high rate of return.

Taking into account the projected international reserve flows to be derived mainly from transactions with Pemex, relevance was added to arguments stressing that the marginal costs of additional accumulation were now rising faster than the corresponding marginal benefits. Consequently, the Foreign Exchange Commission moved to implement an automatic mechanism in the foreign exchange market, starting May 2003, with the aim of further dampening the pace of international reserve accumulation. It is important to stress that by introducing this mechanism the Mexican financial authorities neither adopted a target nor defined an optimal level for international reserves. Instead, the objective was to return a fraction of the marginal accumulation of reserves to the market in order to contain the financial and opportunity costs of additional foreign currency holdings.

The objective of slowing the pace of accumulation has been pursued by Banco de México by selling, through daily auctions, a fixed amount of US\$ in the foreign exchange market. The selling mechanism is based on a transparent procedure designed to prevent additional uncertainty in the financial markets and to minimise discretionary actions by the financial authorities. The amount auctioned in any given quarter is determined on the basis of reserves accumulated during the previous period, net of the foreign exchange sales. The mechanism is activated only when there is a net measured accumulation of international reserves of at least US\$ 250 million. Regarding the effectiveness of the sales mechanism, a significant easing of the pace of international reserve accumulation has been observed and there has been no evident impact of the daily auctions on the functioning of the foreign exchange market. Nevertheless, the mechanism caused some uncertainty among market participants, because of the difficulties in estimating precisely the amount of US\$ that Banco de México would sell in the near future. For this reason, as of May 2004, the authorities decided to smooth out the amount of foreign exchange to be auctioned by averaging the net accumulation over a four-quarter period. The adjustment has been effective in view of the daily amount sold, which has been constant at US\$ 22 million during the last three selling periods (Graph 4). Moreover, it should be noticed that the stock of international reserves has remained relatively stable throughout 2004.

Graph 4  
**Net international reserves and daily sales through the new mechanism, 2002-04**  
 Billions of US dollars



Source: Banco de México.

## 4. The foreign exchange market and economic performance

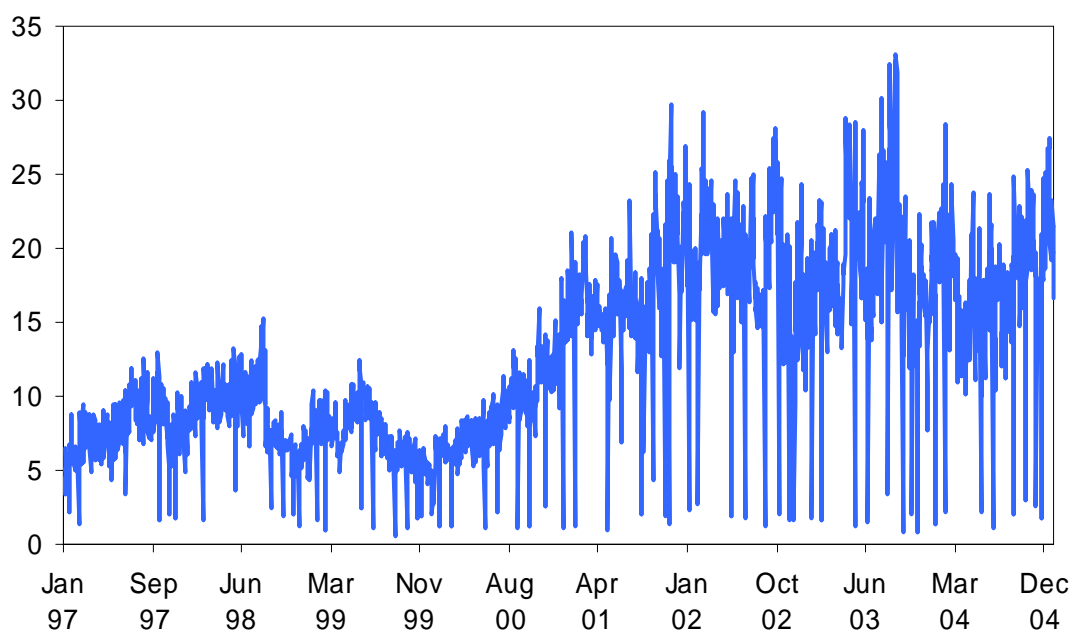
### 4.1 The development of the foreign exchange market

The institutional reforms and policies undertaken since 1995 - including intervention by the monetary authorities - have all worked mostly as intended, fostering the development of the Mexican peso exchange market. Several indicators point in this direction. First, the volume of operations in the domestic market has more than doubled during 2002-04 compared to 1997-99 (Graph 5). A similar picture emerges from the triennial central bank survey of foreign exchange market activity undertaken by the BIS. The latest issue shows that the daily average market turnover in Mexico was US\$ 15 billion April 2004 in contrast to US\$ 9 billion in 1998. Mexico's market share of the global turnover moved from 0.5% to 0.6% in the period. Moreover, the turnover in the Mexican foreign exchange market, according to the same BIS survey, is now similar in volume to that in Austria, Luxembourg, Norway and Spain.

Graph 5

#### Volume of the domestic foreign exchange market, 1997-2004

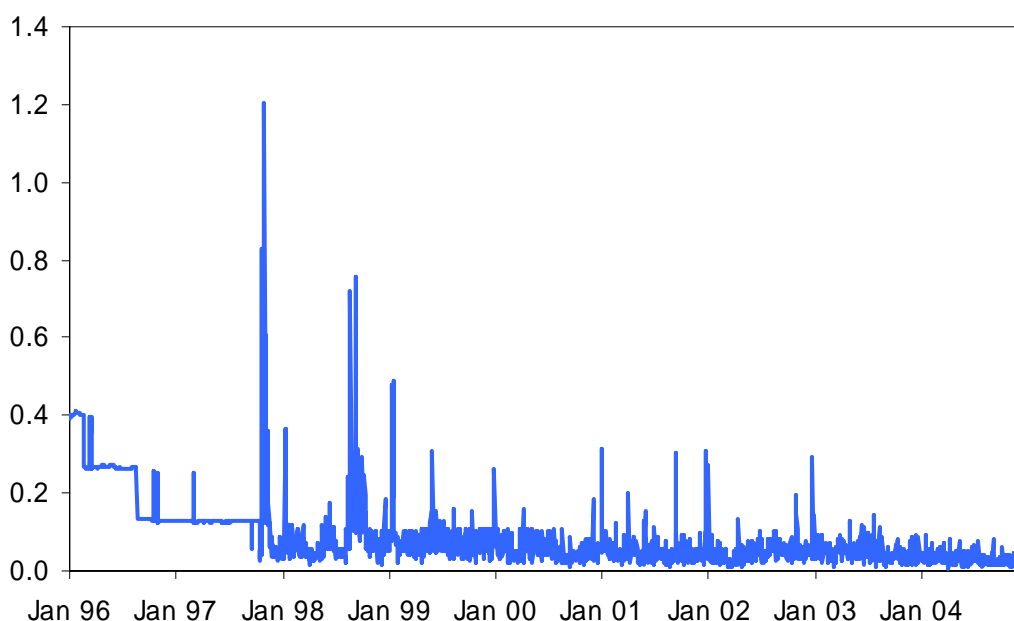
Billions of US dollars



Source: Banco de México.

Another symptom of the maturity of the domestic foreign exchange market is the improvement of its depth and liquidity. Graph 6 shows the dramatic narrowing of the bid-ask spread of the Mexican peso vis-à-vis the US\$ since 1999. Before 1998 it was not unusual to see spreads of the order of 0.5%, but they have not been observed since. In fact, the average spread was 0.05% during 2001-04 (with a very low variance around it) compared to an average of 0.2% during 1995-2000. These spreads are not very different from those associated to major currencies, such as the US\$/yen. This feature is remarkable since, as mentioned before, during this period there were some episodes of financial volatility that did not bring forth a dramatic reduction of market liquidity, as proxied by the spreads.

Graph 6  
**Bid-ask spread for the Mexican peso/US dollar rate, 1996-2004**  
 In percent



Source: Banco de México.

The liberalisation measures described in the previous sections also allowed for movements towards completing markets by fostering the development of the hedging instruments needed to properly manage risk. The importance of these instruments is evidenced by the growth of the volume of peso futures in the Chicago Mercantile Exchange (Graph 7). This contract became one of the fastest growing currency products ever traded at the CME and by May 1995 the average daily volume in peso futures topped 3,200 contracts.<sup>7</sup> During 2004, the average volume traded is more than 12 million contracts a day.

A similar picture emerges from the expansion of the open interest on Mexican peso futures in the same Exchange, as well as in the domestic derivatives market, the Mexder. As a result, the open interest in the Mexican peso in the CME has reached levels similar to those for other currencies. As of 19 October 2004, open interest in the Mexican peso reached 69,840 contracts, compared to 49,694 for the Swiss franc or 66,763 contracts for the British pound sterling.

Another sign of the maturity of the foreign exchange market is the development of speculative positions on the Mexican peso. Graph 8 shows the evolution of non-commercial trades - usually speculative - in the International Money Market (IMM) of the CME. It is quite remarkable to observe how these positions have experienced large swings since 2002, moving from being short to being long on the peso in a rather brief period, a feature that is also present in the most widely traded currencies. Obviously, participation of a diverse set of traders (from funds based on fundamentals to the so-called Commodity Trading Advisors or CTAs) is one of the reasons for the improvement of the liquidity of the foreign exchange market.

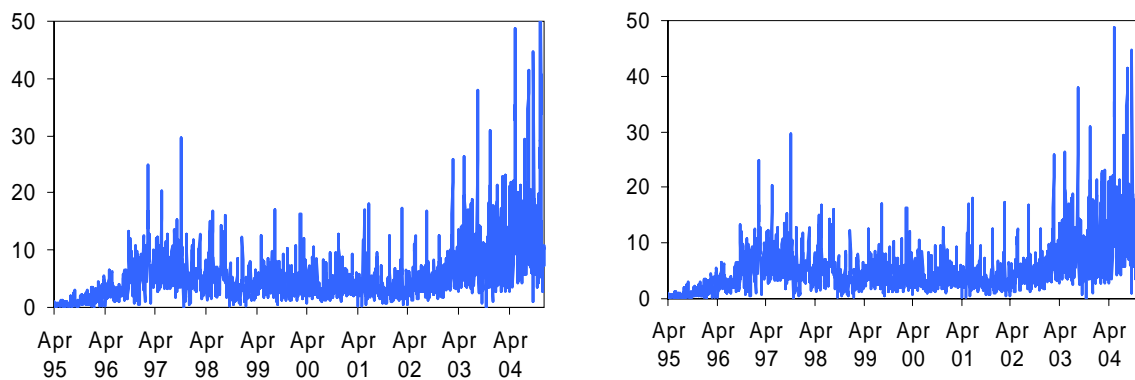
<sup>7</sup> The size of the Mexican peso futures contract is 0.5 millions of Mexican pesos.

Graph 7

**Mexican peso futures market in the Chicago mercantile exchange, 1995-2004**

**Volume of operations**  
Thousands of contracts

**Open interest**  
Thousands of outstanding contracts

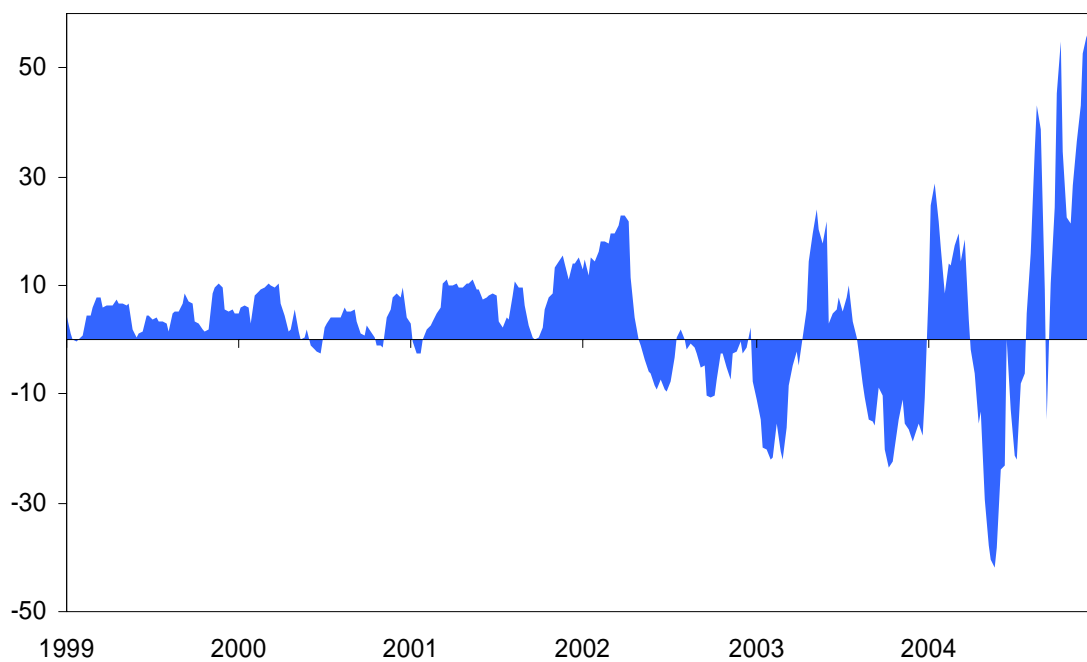


Source: Commodity Futures Trading Commission.

Graph 8

**Non-commercial net positions in Mexican pesos in the international money market, CME, 1999-2004**

Thousands of contracts



Source: Bloomberg.

In sum, institutional changes oriented to strengthening the foreign exchange market, together with sound macroeconomic policies and other structural reforms, seem to have created a virtuous circle. Once the market starts to grow, the reforms improve the liquidity and depth of the market, which in turn attracts more participants and encourages the birth of new instruments, thereby fostering a further development of the market.

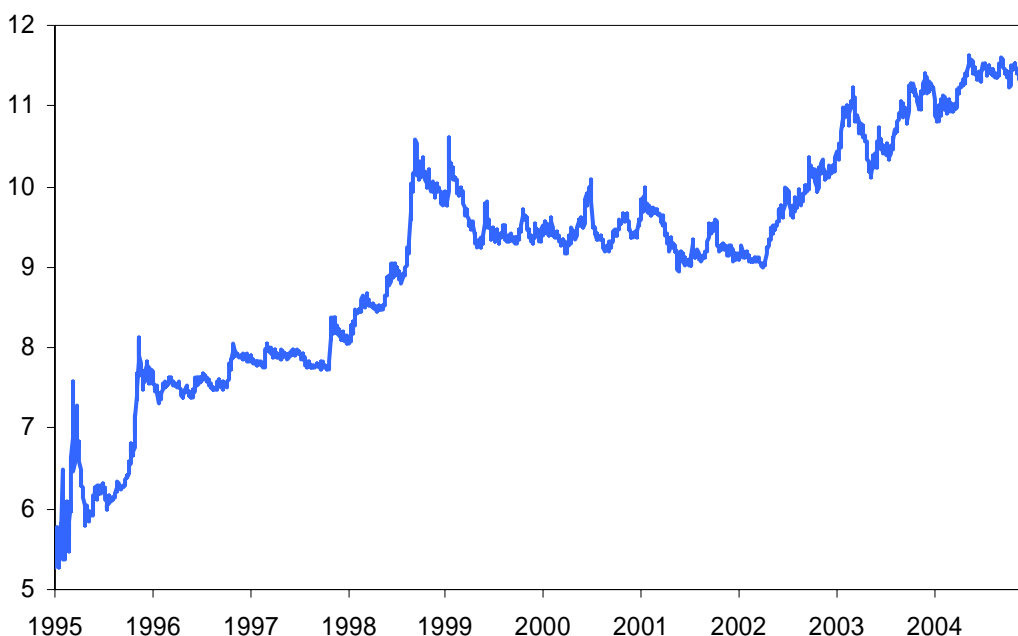
#### 4.2 Economic performance under the floating exchange rate regime

The flexible exchange rate regime has worked well for Mexico. Perhaps one of the benefits of the system is that it has allowed a rather swift adjustment of relative prices without accumulating imbalances that could otherwise become a full-blown balance-of-payments crisis. Moreover, over the course of the decade the floating rate has been consistent with the adoption of an inflation targeting framework for the conduct of monetary policy. In this section we review some indicators of economic performance under the floating regime.

Graph 9 shows the evolution of the Mexican peso/US dollar parity. The exchange rate has followed three paths since it started to float: a sharp depreciation and volatility in the aftermath of the Mexican crises, from December 1994 to January 1999; a mild appreciation and stability up to April 2002; and a steady depreciation from there on (coinciding with the general movement of the US\$ vis-à-vis other major currencies).

This changing behaviour of the exchange rate has meant a radically different environment for economic agents in Mexico. Whereas under the previous pegged exchange rate the only adjustments to the parity were major devaluations, nowadays the Mexican peso can move up or down on any given day. As it is well known, the exchange risk inherent to a flexible regime reduces the odds for one-side bets of the kind that Mexico experienced in the past.

Graph 9  
**Exchange rate, 1995-2004**  
Mexican pesos/US dollar

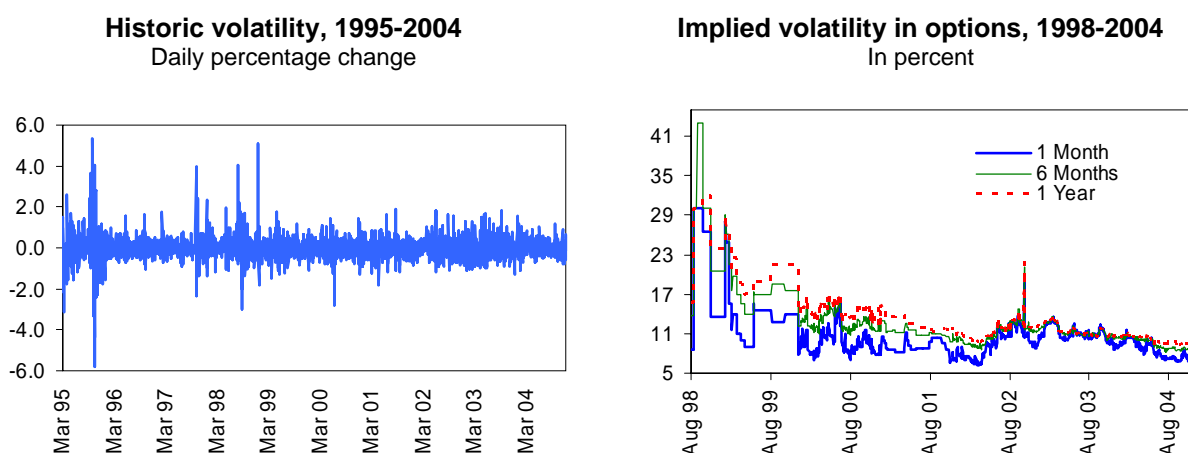


Source: Banco de México

The improved liquidity and depth of the foreign exchange market, together with better macroeconomic fundamentals after the Mexican crises, has led to a more stable exchange rate for the peso (Graph 10). The latter is true both in terms of the actual fluctuations of the peso/US\$ parity and of the implied volatility embedded in options on the rate. The reduction in volatility is quite remarkable given that: (1) during the reported period some important episodes of financial turbulence took place; and (2) the large swings in speculative positions that have occurred in the IMM of the CME (Graph 8).

Graph 10

**Volatility of the Mexican peso/US dollar rate**



Sources: Banco de México; Bloomberg.

Table 2 provides further evidence of the lessened volatility of the exchange rate of the Mexican peso and a comparison with the fluctuations observed in other currencies. The mean absolute daily percentage change (MADPC) of the Mexican peso was 0.61% in 1995-97. Thus, in the aftermath of the Mexican crises, the peso was the most volatile currency under this metric in our sample of countries. Volatility went down drastically thereafter and the MADPC has been merely 0.38% for the peso during 2001-04. The latter figure is the second lowest in the sample in the Table 2. Only the Canadian dollar posts a smaller MADPC than the Mexican peso, which in turn is less volatile than the British pound sterling, the Japanese yen, the Swiss franc and other, emerging market, currencies.

Perhaps a more interesting issue is whether or not foreign exchange market interventions by Banco de México in fact perturbed the market. We will take a cursory look at three instances of intervention: (1) the put options and the auctions of US\$ of 1996-2001; (2) the discretionary interventions to support the Mexican peso of 1995 and 1998; and (3) the more recent sales of US\$ intended to slow down the pace of international reserve accumulation. Although a more rigorous analysis is called for, the evidence suggests that foreign exchange intervention does not appear to have interfered with the “normal” or “desired” features of the foreign exchange market.

Graph 11 shows a measure of volatility of the peso/US\$ exchange rate (the daily percentage change) and the actual amounts involved in foreign exchange intervention in the market during 1996-2001. As mentioned before, during this period there was some degree of symmetry in the intervention, the put options and the sales of dollars being operations in the opposite direction. The chart shows that neither the exercise of the put options nor the sales of US\$ seem to have influenced the volatility of the exchange rate in any systemic way. However, it is important to recall that the US\$ sales auctions were triggered when the exchange rate depreciated more than 2% in a single day. Hence, it is not surprising that they took place precisely during periods of currency volatility.

Table 2

**Exchange rate volatility: different currencies against the US dollar, 1995-2004**

Mean absolute daily percentage change

| Currency                 | Average 1995-97 | Average 1998-2000   | Average 2001-04 |
|--------------------------|-----------------|---------------------|-----------------|
| South African rand (ZAR) | 0.265%          | 0.513%              | 0.862%          |
| Brazilian real (BRL)     | 0.103%          | 0.444%              | 0.788%          |
| New Zealand dollar (NZD) | 0.320%          | 0.603%              | 0.569%          |
| Australian dollar (AUD)  | 0.373%          | 0.556%              | 0.546%          |
| Swiss franc (CHF)        | 0.519%          | 0.513%              | 0.535%          |
| Euro (EUR)               | na              | 0.529% <sup>1</sup> | 0.500%          |
| Japanese yen (JPY)       | 0.512%          | 0.625%              | 0.455%          |
| Chilean peso (CLP)       | 0.213%          | 0.276%              | 0.447%          |
| British sterling (GBP)   | 0.352%          | 0.378%              | 0.398%          |
| Mexican peso (MXN)       | 0.605%          | 0.381%              | 0.370%          |
| Canadian dollar (CAD)    | 0.205%          | 0.270%              | 0.358%          |

<sup>1</sup> Average 1999-2000

Source: Author's calculations based on data from Bloomberg.

Turning now to the episodes of direct intervention on the foreign exchange market, Graph 12 shows the behaviour of the exchange rate during 1995, as well as the amounts of US\$ sold each day during this episode. Given its purpose of subduing speculation, the success of the intervention can be evidenced by the relatively stable path followed by the exchange rate immediately after the event. Furthermore, exchange rate stability together with higher interest rate levels were consistent with the policy intent of ensuring more restrictive monetary conditions.

Regarding the last episode of discretionary foreign market intervention undertaken on 10 September 1998 by Banco de México, Graph 13 shows the evolution of the exchange rate the day before and the day after (9 to 11 September 1998). At the time, financial markets were reeling from the Russian crises and the collapse of LTCM. The Mexican peso was under heavy speculation as market participants were trying to (imperfectly) hedge positions in the Brazilian real with pesos. Moreover, as shown in Graph 11, even though several automatic sales of US\$ had already been triggered, speculation went on. To the extent that the intervention interrupted an intraday depreciating trend on 10 September, it can be claimed as a success.

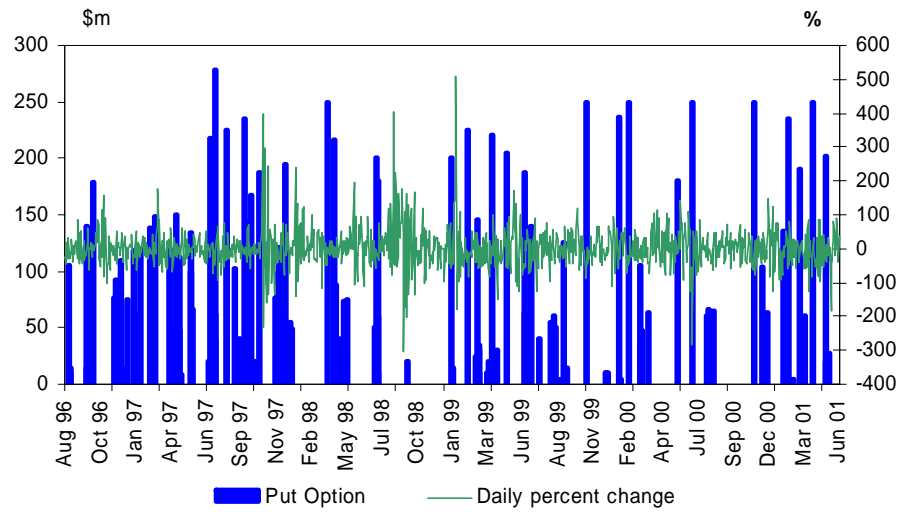
The final piece of evidence regarding the impact of intervention on the performance of the foreign exchange markets concerns the mechanism put in place to slow down the pace of international reserve accumulation. In this regard, it has been observed that the average price obtained in the sales auction remained relatively close to the Fix exchange rate, especially since the smoothing adopted in May 2004 (Graph 14). Moreover, the right-hand panel of Graph 14 shows the daily average bid-ask spread at different times of the day for two different periods: March-May and August-October 2004. The spreads are those quoted around 9:30 am, the time that the US\$ electronic auction took place. Visual inspection suggests that the current sales of US\$ do not seem to have altered intraday volatility in the foreign exchange market in any significant way.



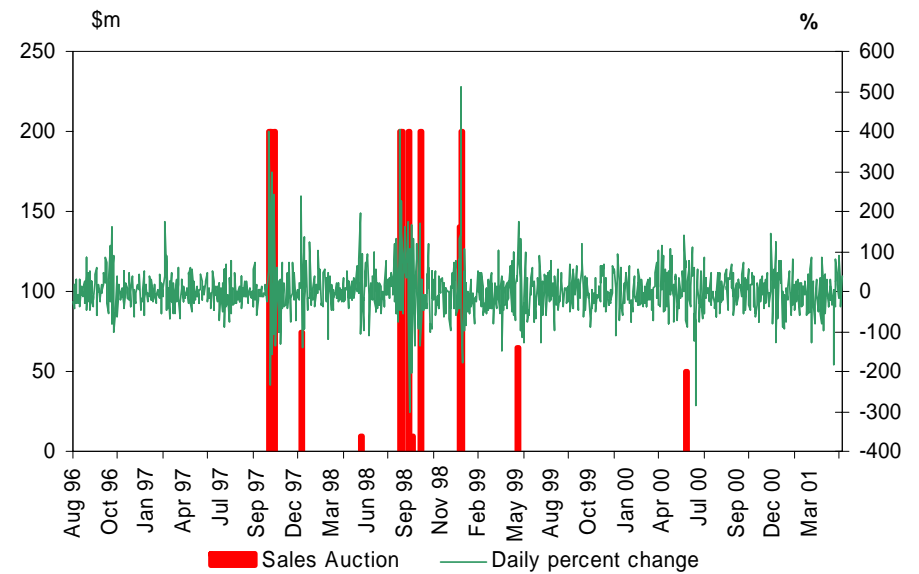
Graph 11

**Volatility of the exchange rate and foreign exchange market intervention, 1996-2001**

**Historic volatility and put options exercised**  
In millions of US dollars and percentage



**Historic volatility and sales of US dollars**  
In millions of US dollars and percentage

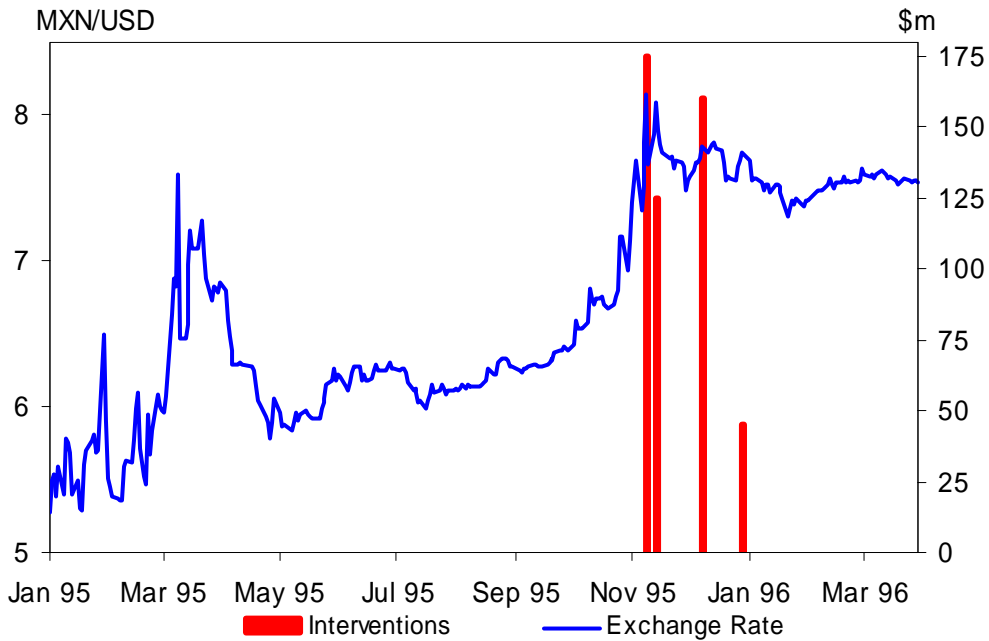


Source: Banco de México.

Graph 12

**Banco de México's discrete interventions and exchange rate behaviour, 1995-96**

Daily flows in millions of US dollars and Mexican pesos per US dollar

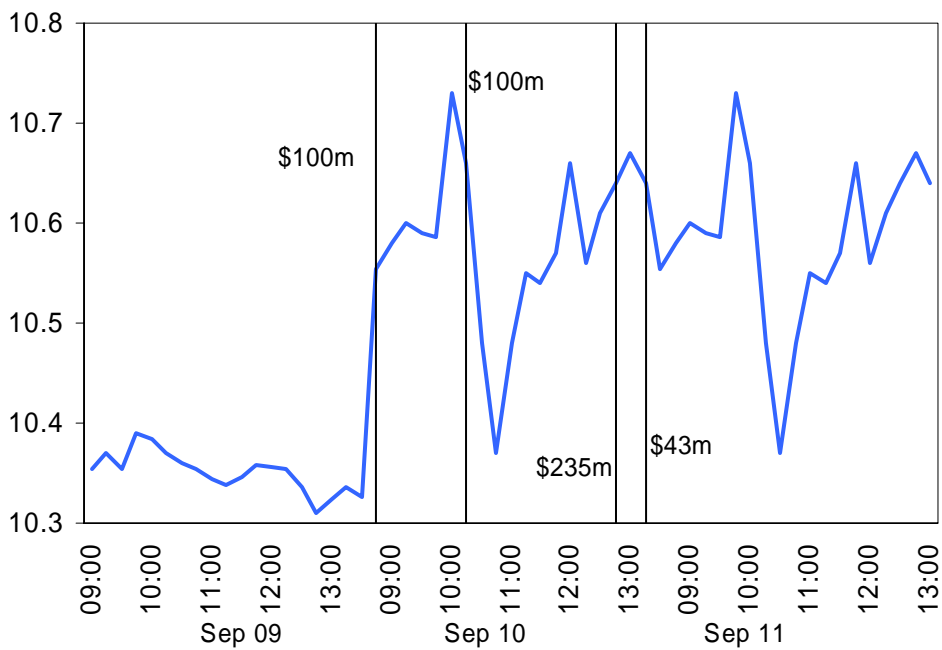


Source: Banco de México.

Graph 13

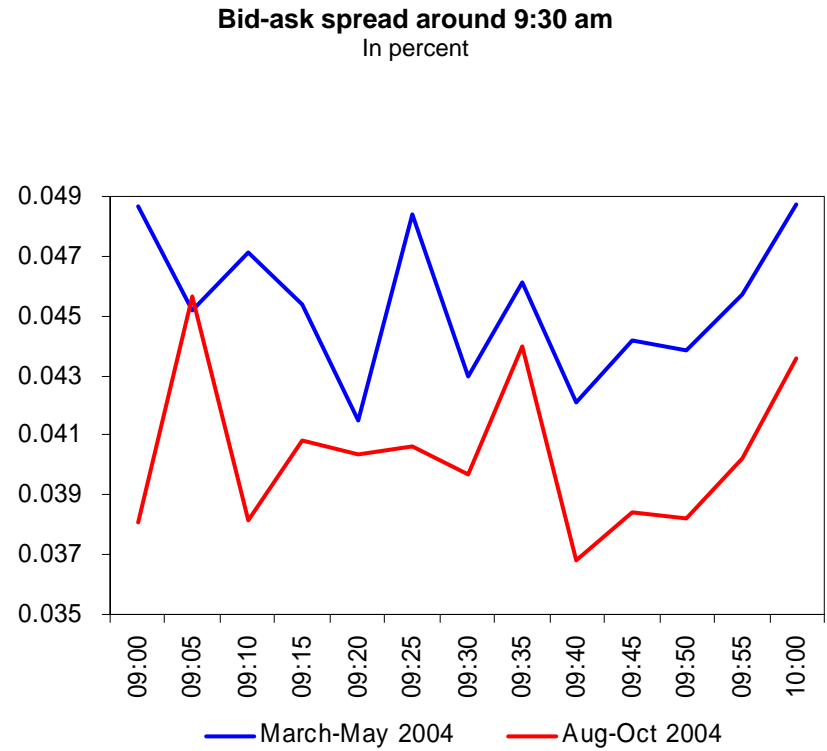
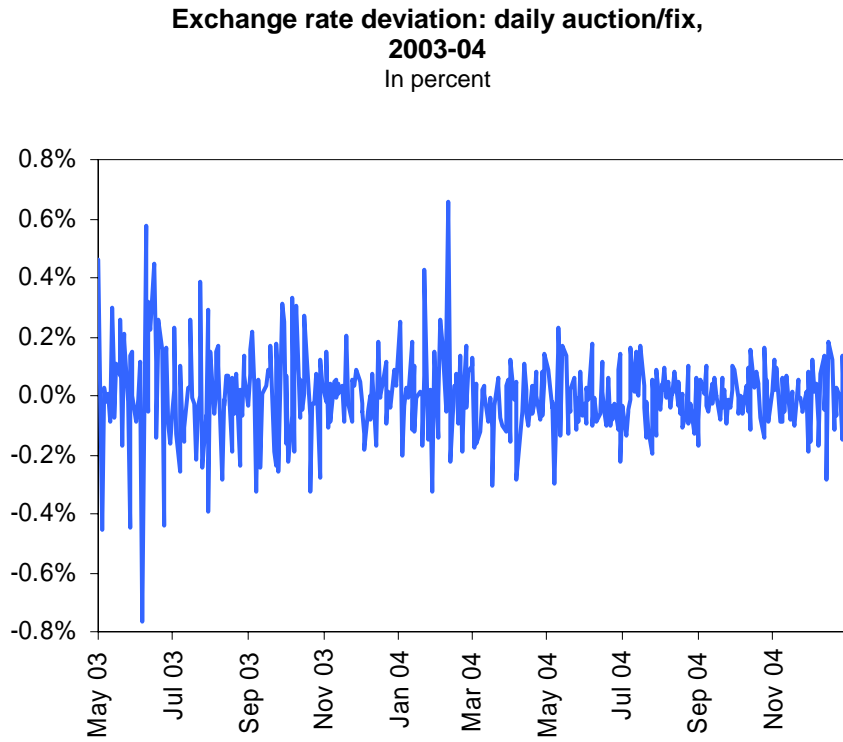
**Exchange rate and market intervention, 10 September 1998**

Mexican pesos/US dollar



Source: Banco de México.

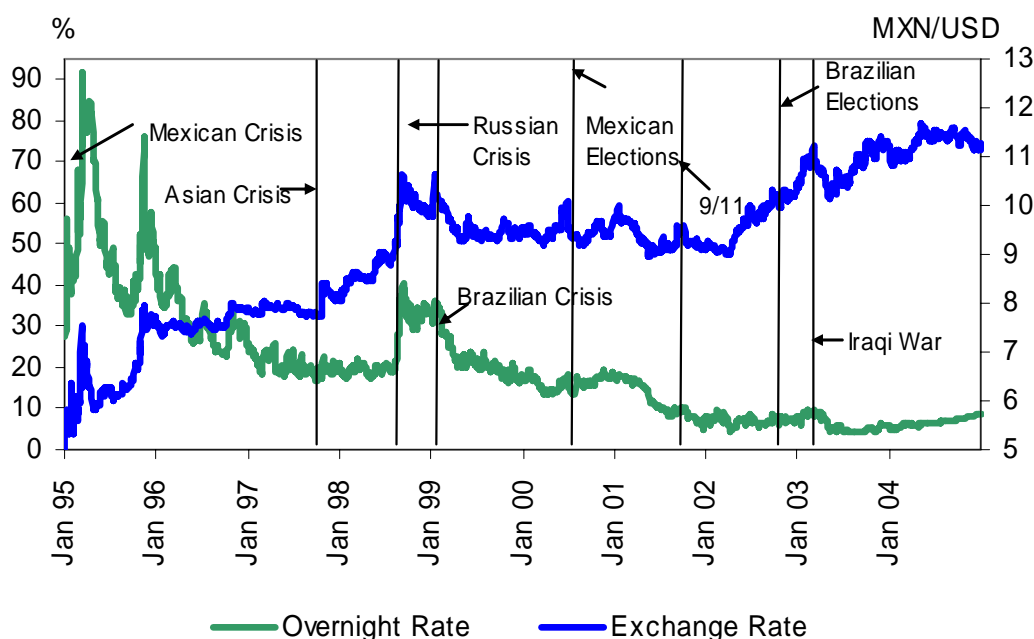
Graph 14  
Impact of auctions of US dollars



Source: Banco de México and Bloomberg.

Finally, it is appropriate to conclude the discussion of performance under a floating exchange rate regime with two important considerations. First, the float has been a useful vehicle to let asset prices adjust as needed in the face of exogenous disturbances. The exchange rate regime, coupled with the flexible short-term interest rates embedded in the operating instrument of monetary policy, has allowed the economy to accommodate numerous shocks: the Mexican, Asian, Russian and Brazilian crises, Presidential elections in Mexico and Brazil, 11 September 2001, the Iraqi war, etc (Graph 15). All of these events, to a different extent, have brought forth uncertainty and thus have affected volatility in financial markets. Moreover, under the current set-up in Mexico market forces determine the size of the adjustment and its proper distribution between the exchange rate and interest rates.

Graph 15  
**Overnight interest rate and exchange rate, 1995-2004**  
 In percent and Mexican peso/US dollar

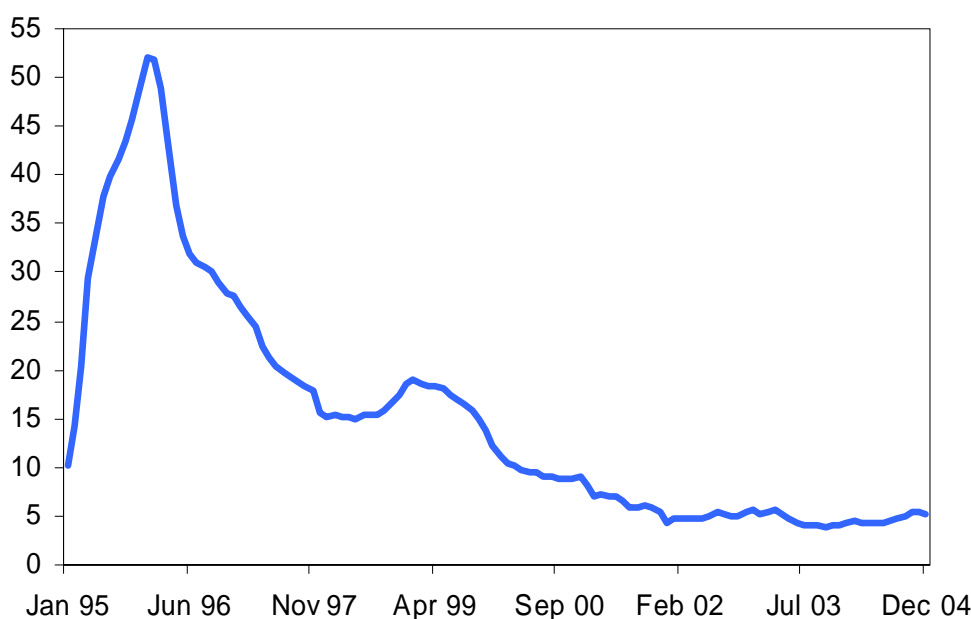


Source: Banco de México.

Second, and perhaps more important, the adoption of a flexible exchange rate has not prevented the authorities from achieving a significant disinflation during the last decade (Graph 16). One of the main fears surrounding the adoption of the floating regime was the possibility that the nominal anchor of the Mexican economy would be lost. In the event, monetary policy has been able to guide inflation expectations through the adoption of an inflation targeting scheme, a strategy that appears to be a suitable complement to the flexible exchange rate.

As a corollary to the latter issue, an important feature under the floating regime has been the considerable reduction in the pass-through from the exchange rate to the consumer price index. The fear that the stabilisation of prices would be nearly impossible in the context of a depreciation, given the sensitivity of prices to the exchange rate, has not been borne by the facts. Economic agents have come to realise that not all exchange rate movements are permanent and have subsequently not passed on all increases into prices. Thus, despite the exchange rate depreciation observed since 1995, and particularly since April 2002, inflation has been dramatically reduced.

Graph 16  
**Annual CPI inflation, 1995-2004**  
In percent



Source: Banco de México

## 5. Concluding remarks

The overall experience of Mexico with a floating exchange rate regime has been a positive one. During the last decade, the flexibility of the exchange rate has helped to soften the effects on the Mexican economy of numerous shocks arising from the domestic front as well as from the rest of the world. In this regard, the floating regime has been a useful vehicle to let asset prices adjust as needed in the face of exogenous disturbances, without accumulating imbalances that could lead to a balance of payments crisis. Moreover, the fears voiced by some analysts that adopting a flexible exchange rate would impede the accomplishment of the stabilisation efforts sought by the authorities, did not materialise. In contrast, the monetary authorities have achieved an important disinflation in the course of the last ten years. In fact, during this period and thanks to the float, the exchange rate became very useful for monetary policy as an indicator variable of market perceptions and inflationary pressures.

It therefore appears that, notwithstanding the short experience of Mexico with the floating regime, economic agents have learned quickly to live under the float. Contrary to the initial concern that a flexible exchange rate would increase volatility, the fact that the currency can depreciate or appreciate in any given period, and that these movements can be both reversed and/or hedged, has changed the behaviour of firms, workers and investors alike and induced a rather stable environment. In this context, one of the most important achievements of the floating regime has been to decouple to a large extent the pricing of goods and services from the exchange rate, with the resulting significant reduction in the pass-through of depreciation onto inflation.

A vast array of measures have contributed to the positive experience of Mexico with a floating rate. The creation of all the institutional infrastructure for the proper functioning, regulation and supervision of the foreign exchange market; the pursuit of sound macroeconomic policies; the policy of transparency and information disclosure; and the adoption of an inflation targeting framework have all played a part in supporting the floating regime. In particular, the latter framework has been an important factor in anchoring inflation expectations and complementing the floating exchange rate regime, providing impetus towards attaining the Banco de México's mandate of price stability.

Regarding the implementation of foreign exchange policy, Banco de México has adhered to two main principles: (1) not to interfere with the normal functioning of the market and (2) to foster the development of the market through the creation of new instruments and by encouraging the entrance of new participants. This strategy is based on the belief that a foreign exchange market that is able to function properly, that is a deep and liquid market where prices are always provided, is the fundamental underpinning of a floating exchange regime. Against this backdrop, intervention in the foreign exchange market has to be understood from the standpoint of a policy designed to improve the operation of market forces in the determination of the exchange rate. Thus, intervention has relied mostly on rules-based and transparent schemes, aiming to provide a level playing field for all market participants.

Banco de México has accumulated a considerable stock of international reserves. These assets were very useful at the beginning of the floating period to discourage speculation against the currency. Moreover, a large stock of reserves led to a reduction in the perception of country-risk, thereby improving the terms of access to financial markets. Nevertheless, these reserves entail costs, so the financial authorities have always evaluated their accumulation through a cost-benefit analysis. Hence, given that at current levels the marginal cost of additional reserves appears to be rising faster than the marginal benefit, the authorities have decided to reduce the pace of accumulation without specifying a target for the stock of international reserves. Defining with precision an optimal level of reserves is a difficult task, comprising important assumptions not only on the future path of several macroeconomic and financial variables but also about the likelihood of infrequent events that may require using foreign assets. Given this difficulty, it appears that the prudent course of action is to err on the side of caution and to continue accumulating reserves, if at a slower pace of increase.

The institutional reforms and policies undertaken since 1995 - including the intervention policies - have all worked mostly as intended, fostering the development of the Mexican peso exchange market. In sum, institutional changes oriented towards strengthening the foreign exchange market, together with sound macroeconomic policies and other structural reforms, seem to have set off a virtuous circle: development of markets, improved liquidity and depth, creation of new instruments, entry of new participants and further development of the market. In this circle, a strategy of central bank intervention that is as non-discretionary and transparent as possible, plays a central role.

## Reference

Sidaoui, J (2005): "Policies for international reserve accumulation under a floating exchange rate regime: the experience of Mexico (1995-2003)", in *Globalisation and monetary policy in emerging markets*, BIS Papers, no 23, May.