FINANCIAL SECTOR ASSESSMENT PROGRAM UPDATE

MEXICO

TECHNICAL NOTE ON DERIVATIVES MARKET: OVERVIEW AND POTENTIAL VULNERABILITIES

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I. Overview and Potential Vulnerabilities[1]

1. This technical note provides an overview of Mexico's derivatives markets, describes concisely the derivatives regulatory framework and risk management practices in financial institutions active in these markets, and concludes by presenting a number of recommendations aimed at improving the functioning of derivatives markets.

2. **The most important derivatives market in Mexico is the over-the-counter (OTC) derivatives market,** which is fully integrated with the global derivatives market. The origin of the OTC derivatives market can be traced back to the 1994 Mexican crisis that forced Mexico to abandon its fixed exchange rate regime. Foreign exchange derivatives, especially currency forwards, started trading to satisfy the hedging needs of end-users and investors. Foreign exchange derivatives remain the most important segment of the OTC derivatives market, followed by interest rate derivatives.

3. **The exchange-traded derivatives (ETD) market in Mexico, MexDer, offers a number of futures and options.** MexDer offers futures on individual equities, equity indices, foreign currencies, and government bonds, as well as options on equities, equity indices, and on exchange-traded funds. MexDer is about half the size of the OTC market (Table 1). The figures, however, underestimate the size of the OTC market since they only take into account OTC contracts written through financial institutions based in Mexico. The derivatives exchange has been growing rapidly: from 2001 to 2004 the number of trades went up eight-fold to 109,000 in 2004, and the notional outstanding went up eleven-fold to Mex$1,817 billion. Volume fell to half in 2005 when one major market maker shifted its operations to the OTC market.

4. **Market participants appear to use derivatives mainly for arbitrage and speculation rather than for investment or hedging purposes.**[2] Both foreign and domestic banks are important players, which may explain why eight out of ten contracts are held for trading purposes (see Table 1). Long and short positions in futures and options are roughly balanced both in the OTC and ETD markets. The positions held by domestic users are often offset by positions held by foreign investors, for instance in the case of domestic interest rate swaps and offshore OTC currency options. Other domestic players in the market are brokers and security firms.

5. **Going forward, domestic institutional investors are expected to become important players in the derivatives market.** Recent regulatory changes authorize pension funds to use foreign exchange and interest rate derivatives for hedging and investment

[1] Prepared by Jorge A. Chan-Lau.

[2] Arbitrage refers to the use of derivatives for locking in perceived mispricings across different instruments and/or markets. For instance, taking positions on domestic and foreign money markets in order to arbitrage away interest rate differentials implied from forward prices. Speculation is mostly associated to taking positions based on directional views on an asset class or security price. Hedging using derivatives implies taking a position on derivatives such that its profit/loss offsets either the profit/loss of one security, portfolio, cash position, or future receivables (or payables) of a firm.

purposes, and to invest in equities through equity-linked structured notes. Insurance companies are authorized to use derivatives as long as they are listed in organized exchanges. Similarly, soon-to-be implemented changes to the investment regulations affecting mutual funds will allow them to participate fully in the derivatives market.

Table 1. Notional Amounts by Underlying Exposures as of December 2005
(In billion of pesos)

Notional Amounts 1/	Interest rate contracts	Foreign exchange and gold contracts 2/	Equity-linked contracts
OTC contracts			
Forwards	38.8	88.8	1.0
Swaps	3,954.3	9.4	
Purchased options	16,209.6	13.2	1.8
Written options	16,572.8	13.0	2.0
Exchange-traded contracts			
Futures – long positions	8,680.3	3. 1	11.5
Futures – short positions	9,645.5	4.6	14.4
Purchased options			2.8
Written options			2.4
Total contracts held for trading 3/	43,597.5	131. 5	33.3
Total contracts held for other than Trading	11,503.8	0.7	2.7

Source: Bank of Mexico.

A. The Over-the-Counter Derivatives Market

6. **Mexico's onshore and offshore OTC derivatives markets are fully integrated**. As a result, participants in these markets can benefit from lower costs and greater liquidity and price transparency relative to the local exchange-traded market. Investors and end-users have access to a wide variety of foreign exchange and interest rate contracts, among which the most important ones are currency options, currency forwards, cross-currency swaps, and interest rate swaps. There is also an incipient market for structured notes, with coupons payments linked to currency, interest rates, and equity price movements. Credit derivatives referencing Mexican issuers are exclusively traded offshore but regulated Mexican institutions are not allowed to use these instruments. Transactions in the OTC market can be conducted either with a domestic or foreign bank in Mexico, or directly with an offshore dealer. Foreign investors prefer trading offshore since they feel more comfortable with documentation and the credit quality of offshore counterparties. Counterparty risk to end users in these markets is relatively low since the major derivatives dealers are investment-grade institutions. Among domestic corporates and investors, access to the OTC derivatives market is generally limited to those with high credit ratings and conducting relatively large transactions. Lower-rated domestic institutions or users interested in small transactions tend

to conduct transactions in domestic markets. However, at least one major bank operating in Mexico reported they would deal with small clients in the OTC market.

7. **OTC interest rate contracts tend to have longer maturities than foreign exchange and equity-linked contracts.** While around 86 percent of the contracts have maturities of one year or less, the majority of interest rate contracts excluding options have maturities of one year and above: the maturity of half the contracts ranges from one year to five years, and the maturity of one out of seven contracts exceeds five years (Table 2). The widespread use of interest rate swaps to hedge or transform the cash flows of Mexican peso-denominated bonds may explain the longer maturity of interest rate contracts. Longer maturity instruments are also used actively by investors to extend the duration of short-term portfolios.

Table 2. OTC Derivative Contracts' Notional Amounts by Time Interval as of December 2005
(In billions of pesos)

OTC Contracts 1/	One year or less	Over one year through five years	Over five years
Interest rate contracts	1,449.1	2,013.0	531.0
Purchased options	15,916.7	202.6	90.3
Foreign exchange and gold contracts 2/	76.3	21.7	0.2
Purchased options	4.9	1.0	--
Precious metals (other than gold) contracts			
Purchased options	--	--	--
Other commodity contracts			
Purchased options	--	--	--
Equity-linked contracts	1.0	--	--
Purchased options	0.8	0.3	--

Source: Bank of Mexico.

1/ While included in this table's aggregate information, supervisors may be also obtaining separate information on certain categories of higher risk derivative instruments or summary information on new forms of derivatives (e.g., credit derivatives). In this case further desegregation by type of instrument might be possible.

2/ Excluding spot foreign exchange.

Foreign exchange contracts

8. **The foreign exchange spot market in Mexico is very liquid**, with daily transactions amounting to Mex$8–9 billion. The typical transaction size is of Mex$5 million, and up to Mex$10 million in the interbank market. Bid-ask spreads are relatively tight at 0.005 pesos per dollar. The fixing exchange rate is based on 3 daily surveys conducted by the Bank of Mexico (BOM) and is the reference rate to settle nondeliverable forward contracts.

9. **The offshore OTC foreign exchange derivatives market is a two-way market,** where the most used instruments include currency options, forwards, and cross-currency swaps. Reportedly, offshore and onshore OTC derivatives dealers can match without major difficulty the hedging needs of local corporates, who demand long dollar positions, with the demand of long Mexican peso positions from U.S. corporates with outsourcing operations in Mexico, and foreign investors including pension funds and leveraged investors (hedge funds). The preferred contract maturities are two to three years for corporate end-users, one to two years for institutional investors, and one year and below for leveraged investors.

10. **Recently, the OTC foreign exchange derivatives market has grown on the back of increased issuance of Mexican peso-denominated debt.** According to the Bank for International Settlements (BIS), the notional amount of foreign exchange derivatives contracts more than doubled to Mex$460 billion, amounting to 86 percent of the OTC derivatives market.[3] During the past three years, the combination of global liquidity and investors' perceptions of strong economic fundamentals has enabled some emerging market countries, including Mexico, to issue local currency-denominated debt offshore. As a result, conditions were ripe both for foreign and domestic institutions to issue Mexican peso denominated debt in international markets. Some of the issuers, in turn, hedge their Mexican peso obligations using OTC derivatives to replicate a synthetic dollar-denominated liability at a lower funding cost than in the cash market.

11. **Currency options are the most important OTC foreign exchange derivative contract in terms of outstanding notional amounts,** according to the BIS. While it is difficult to size the offshore foreign exchange OTC market, the increasing popularity of currency options can be gauged from figures reported by the BIS on foreign exchange derivatives transacted through financial institutions based in Mexico.[4] By mid-2005, the notional outstanding amount of currency options rose to Mex$230 billion, or 50 percent of the OTC foreign exchange derivatives market, up from 12 percent of the market in mid-2002. Transaction sizes range from Mex$25 million to Mex$100 million, with a daily trading volume of about Mex$2 billion. Most of the options contracts refer to the U.S. dollar but activity in Euro options has started to pick up recently due to hedging transactions executed by European banks active in Mexico. European banks typically conduct large transactions involving buying Euro calls against selling Euro puts.

12. **Mexican corporates tend to hedge long-term currency exposures with exotic options and currency-linked structured notes, exposing derivatives dealers to counterparty risk.** Typically, Mexican corporates want to hedge long-term risks on the liability side of their balance sheet arising from large currency movements using currency-linked structured notes. Deals are designed so that the notes, which usually have a three-year maturity, can be rolled over to enable the Mexican corporate to hedge currency risk for a period as long as 10 years. The long maturity of the contract together with the fact that the

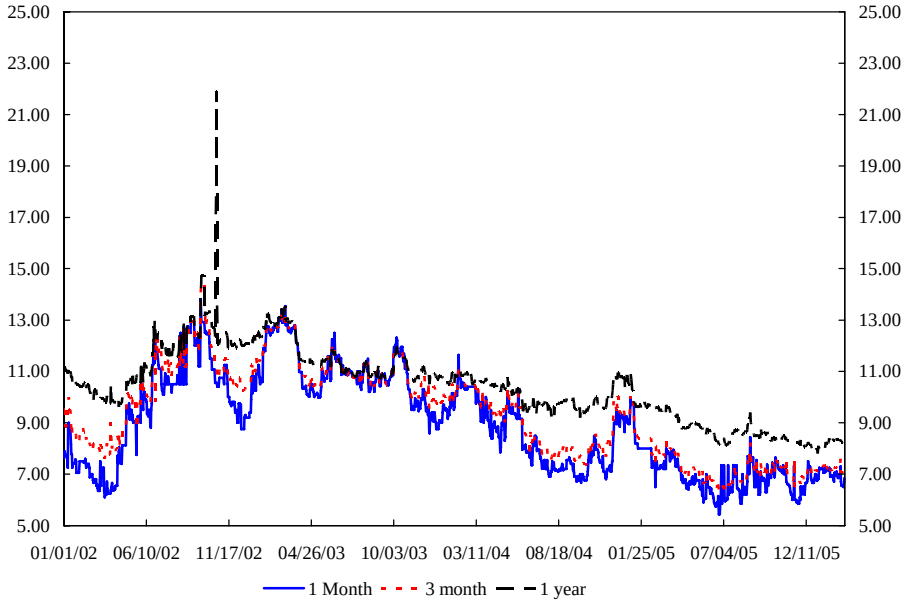
[3] *BIS Quarterly Report*, December 2005 (Basel).

[4] *BIS Quarterly Report*, December 2005 (Basel).

Mexican corporate typically has a lower credit rating than the derivatives dealer exposes the latter to counterparty risk.

13. **Low volatility has made currency options popular among U.S.-based foreign investors looking to gain exposure to the Mexican peso.** The low realized volatility of the Mexican peso has driven implied volatility down, cheapening the price of Mexican peso options (Figure 1). Low volatility has also contributed to drive bid-ask spread of Mexican peso options to levels comparable to those of other major currencies. Currently, derivatives dealers report that the bid-ask spread for a Mex$300 million contract, measured in units of volatility (vols), is around 1 bps for 1-month contracts, 3–4 bps for 3-month contracts, and around 10 bps for 1-year contracts for an investment-grade counterparty.

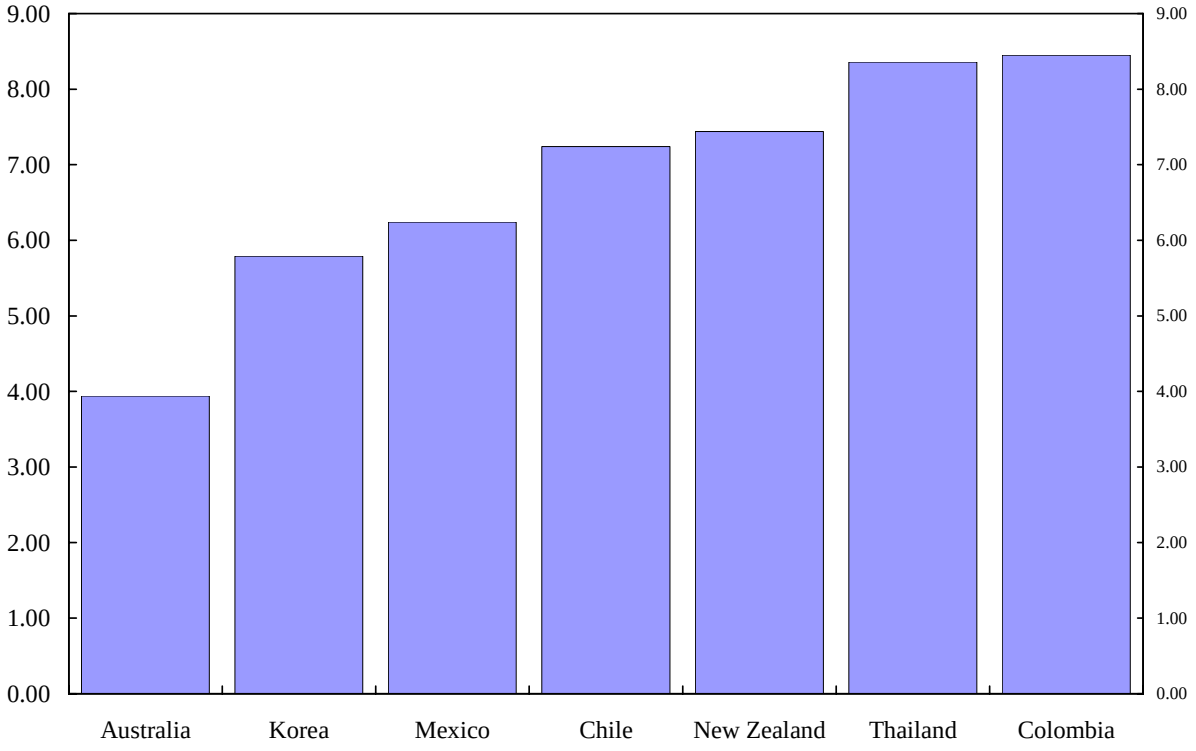
Figure 1. Implied Volatility, Mexican Peso–U.S. Dollar Options with Different Maturities



Source: Bloomberg LP.

14. **Both deliverable and non-deliverable currency forward contracts are available in the OTC foreign exchange derivatives market.** Currency forwards amounted to 38 percent of the OTC market in 2005, of which most contracts were deliverable forwards. These contracts, with liquid maturities up to five years, are preferred by most investors since the fixing risk is absent. Average transaction sizes have increased substantially during the past two years, partly because of increased hedging needs of large corporations and foreign investors. The average transaction size is Mex$100 million for 1 to 3-month contracts, Mex$10 million for 6 to 12-month contracts, and Mex$10–15 million for contracts with maturities of one year and above. The average daily volume, as of early 2005, amounted to Mex$4–5 billion.

Figure 2. Average One-Month Forward Bid-Ask Spread as Percent of the Ask Price in 2005



Source: Bloomberg LLP and staff calculations.

15. **Increased hedging activity contributed to increased depth and liquidity in the cross-currency swap market,** which by mid-2005 rose to Mex$53 billion or 12 percent of the outstanding notional amount in the OTC foreign exchange derivatives market in 2005. Coupon payments of peso-denominated bonds are better hedged using cross-currency swaps rather than forwards, futures, or interest rate swaps. Not surprisingly, then, increased peso-denominated issuance in local and external markets has driven cross-currency swap volumes up. The majority of these contracts, that are custom-made to suit investors' needs, require exchanging the principal either at the inception or the end of the contract. A typical contract is the UMS (United Mexican States foreign currency-denominated debt) asset swap, which requires exchanging the dollar coupons for peso-denominated coupons.

16. **There is also a small market of currency-linked notes aimed at mutual funds and wealthy individuals.** The coupon payments of the notes are linked to the behavior of the exchange rate of the Mexican peso vis-à-vis the dollar. As with other structured notes traded in Mexico, the notes are principal-protected only at maturity. Hence, the risks typically associated to dynamic hedging of principal-protected structures are absent. Most sellers of currency-linked notes hedge their exposure by entering back-to-back transactions.

Interest rate contracts

17. **The TIIE swap is the most important contract in the OTC interest rate derivatives market.** The interest rate segment of the Mexican OTC derivatives market amounted to 14 percent of the market by mid-2005 (BIS, 2005). The TIIE swap is a fixed-

floating interest rate swap with a typical notional of 100 million Mexican pesos. The floating leg of the swap is indexed to the 28-day interbank rate, known as the *tasa de interés interbancaria de equilibrio* or TIIE, which is determined from a daily survey among banks conducted by the BOM. The 28-day TIIE serves as the benchmark rate for corporate issuance. Periodic payments on the TIIE swap are based on a 28-day period. Hence, a one year swap is quoted as 13 by 1 (13 x 1) since there are 13 payments during the life of the contract. While TIIE swaps are available for maturities from 3 months to 30 years, the most liquid tenors are in the range from 2 to 10 years.

18. **The TIIE swap market facilitates the funding operations of Mexican corporates but it may have also created the risk of a currency mismatch.** Mexican corporates use TIIE swaps to swap floating rate debt into fixed rate debt. In addition, for the past three years a number of Mexican corporates issuing peso-denominated debt externally have used TIIE swaps together with cross-currency swaps to obtain cheap U.S. dollar financing, taking advantage of the illiquidity in the repo market (see next paragraph). These corporates issued fixed rate peso-denominated debt, swapping the fixed rate coupons into TIIE payments using the TIIE swap. Afterwards, a cross-currency swap was used to swap the TIIE swap payments into U.S. dollar floating rate payments. Finally, a fixed-for-floating interest rate swap was used to transform the payments into fixed U.S. dollar coupons.

19. **The repo and securities lending markets remain underdeveloped, driving a wedge between the local swap curve and the government bond curve.** The only institutions that can borrow securities from the BOM are those classified as primary dealers. Furthermore, only 4 percent of the securities borrowed from the BOM can be shorted in the market. Market participants reported that the cost of repo operations in Mexico is high, with repo rates in the order of 50 basis points. Since shorting government securities is restricted, the local swap curve trades at a considerable spread relative to the government bond curve. The current spread is around 100–150 bps. Taxation also contributes to widen swaps spreads against the peso-government curve. Only repo contracts for maturities of three days or below are exempted from taxes. Recently, large issuance of peso-denominated bonds by the IADB, the World Bank, and a number of large foreign corporations, together with increased securities lending by hedge funds with long positions on long-term bonds have contributed to compress the TIIE swap spread in the long end of the curve. Arbitrage opportunities, however, persist for the medium segment of the curve.

20. **Domestic and foreign investors express their views on interest rates through the TIIE swap rather than through repo or securities lending operations.** Although regulations aimed at developing the repo market and securities lending were implemented in 2004 and 2005 respectively, domestic and foreign investors still prefer to use the TIIE swap to express bets on the direction of interest rates. For instance, investors bullish on local interest rates may express their views by buying the TIIE swap, that is, receiving the fixed rate. Offshore derivatives dealers report that foreign hedge funds have been active participants in the TIIE swap market, typically taking fixed rate receiving positions. Arbitrage between swaps and currency forwards markets ensure the convergence of currency forwards-implied interest rates with domestic interest rates.

21. **There is a small market for forward rate agreements (FRAs) and interest rate options.** The FRAs, which reference the 28-day TIIE rate, are traded mainly among domestic investors and financial institutions. While these contracts were very popular in the early and mid-1990s, this market has lost liquidity against the TIIE swap market and the exchange traded TIIE futures markets. The contracts have maturities ranging from one month to five years. Interest rate options, which are traded mainly offshore, include swaptions, caps, floors as well as spread products. Offshore dealers indicate that the interest rate options market is still very thin, and used mainly by leveraged investors.

22. **A number of banks also offer fully or partially principal protected range accrual notes.** These notes are custom made by banks according to customer needs, or embedded into principal protected notes aimed at mutual funds and wealthy individuals. Structuring banks hedge their exposure using call spreads. The interest rate options market, however, is very thin, forcing banks to issue a limited number of notes. In some instances, the banks first acquire the needed options to hedge the range accrual note before marketing it to clients. In other instances, the banks remain naked since their treasuries are comfortable holding the position in their investment portfolios. One large bank reported plans to start offering structured products at the retail level.

Equity-linked contracts

23. **There is sizable potential demand for equity-linked structured notes.** Pension funds have been authorized recently to invest in equity indices through equity-linked principal protected structured notes. Mutual funds are also authorized to invest in principal protected structured notes. As of February 2006, only six pension funds have obtained authorization to invest in derivatives securities and among them, only three are active in this market.

24. **Pension funds prefer to structure the notes in-house.** Pension funds structure the notes by first stripping coupons from a government bond they already own to create a zero coupon bond, and pairing the resulting zero coupon bond with a plain vanilla exchange-traded equity derivative, usually a forward or futures contract.

25. **The secondary market for strips is not yet liquid.** In principle, the strip should be sold to finance the purchase of the equity derivatives, that is, the note should be self-funded. In the absence of a liquid secondary market for strips, new inflows into pension funds are used to buy the equity derivatives. The principal protected notes, hence, are not self-funded.

26. **Pension fund managers pointed out that listed derivatives were preferred to OTC products despite their higher cost** because of more transparency on the cost of the product, lower counterparty risk, easier market risk monitoring, and the use of less complicated legal structures. Therefore, banks have increased their participation in exchange-traded markets to meet pension funds' demand for equity derivatives. As a result, liquidity in exchange-traded equity derivatives has increased recently.

27. **Reportedly, issuers of principal protected equity-linked notes sold to mutual funds hedge most of their exposure in the local equity and exchange-traded derivatives**

market. Low transaction volumes in principal protected equity-linked notes relative to the local equity and exchange-traded derivatives market have facilitated the hedging operations of note issuers. However, as the structured note market expands, there remains the question of whether the increased hedging needs of structured note issuers could be accommodated in the underlying local stock and organized derivatives markets.

Credit derivatives

28. **Credit derivatives referencing Mexican foreign currency-denominated external debt are traded exclusively offshore.** Emerging market credit derivatives account for 10–15 percent of the outstanding notional amount in the global credit derivatives market, which top Mex$5 trillion in the third quarter of 2005. Among these contracts, credit default swaps (CDS) referencing Mexico sovereign risk are among the most liquid contracts reflecting the liquidity of the underlying U.S. dollar-denominated Mexican bond market. Furthermore, the reduced supply of bonds resulting from the government repurchase plan has pushed investors into the CDS market, increasing its liquidity substantially. Only foreign investors and institutions are active in these markets since regulations do not allow domestic investors and institutions to trade credit derivatives.

29. **Credit derivatives contracts referencing quasi-governmental corporations and large Mexican corporates are also available.** Trading volume on these contracts, however, is very thin. Liquidity in credit derivatives referencing emerging market corporates could increase if the upward trend on emerging market collateralized debt obligations (CDOs) continues. In 2005, 21 CDOs backed up by loans and fixed income securities issued by sovereign and corporate emerging market borrowers were launched, up from seven a year earlier.

30. **A limited number of pension funds have used asset swaps to get synthetic exposure to a credit derivative referencing Mexico's sovereign risk.** The asset swap is structured by buying Mexican dollar-denominated sovereign debt, swapping it into pesos using a TIIE-dollar cross-currency swap, and swapping the TIIE coupon payments into fixed rate. Under the International Swaps and Derivatives Association (ISDA) convention, the cross-currency swap is terminated in case of default. Hence, the risks and payoffs of the asset swap are equivalent to that of a credit derivative.

31. **There are a number of barriers to the development of a local credit derivatives market.** While the market is still awaiting BOM regulations affecting credit derivatives, a number of problems remain related to the legal and information infrastructure supporting a credit derivatives market. Foremost among them are the scarcity of quality information for valuing credit derivatives contracts, differences across jurisdictions and states regarding the time of recovery, and uncertainties on the recovery rate arising from inefficiencies in the public property registry (*Registro Público de la Propiedad*). In addition, market participants report that there is insufficient knowledge of credit derivatives among domestic investors.

B. The Exchange-Traded Derivatives (ETD) Market

32. **Exchange-traded derivatives contracts are traded in the Mexican Derivatives Exchange (MexDer),** with domestic banks and local subsidiaries of foreign banks accounting for most of the trading activity. There are fourteen market makers active in the exchange, of which the four largest ones are Banamex Citigroup, BBVA-Bancomer, Scotiabank Inverlat, and Santander. Banks accounted for around 80 percent of total trading volume in the first half of 2005. In addition, there are end-users who find more advantageous to conduct transactions in the domestic ETD market rather than offshore markets. These users may be interested in small transactions, may not have credit ratings high enough to access OTC markets at reasonable costs, or as some pension funds reported, may find it easier to monitor the risks of their positions and unwind them in the ETD market. Reportedly, a limited number of hedge funds also take positions in MexDer. While the ETD market remains small compared to the OTC market, the growth of the ETD market has been impressive at an annualized rate of 50 percent from 2001 to 2004 (in terms of notional outstanding amounts). In 2005, however, notional outstanding amount fell by almost 45 percent when one of the largest market-maker moved its operations to the OTC market (Table 3).

Table 3. MexDer Activities
(Monthly average)

	2001	2002	2003	2004	2005
Number of trades	1,160	4,351	8,979	9,079	6,423
Volume (number of contracts traded)	1,501,357	7,022,915	14,485,079	17,010,873	8,999,094
Notional outstanding amount 1/	13,787	64,693	133,532	150,351	83,738
Open interest 2/	1,475,338	5,397,109	20,487,211	23,025,824	21,368,530

Source: MexDer.

1/ In millions of dollars.

2/ At end of period.

33. **MexDer offers a number of fixed income, foreign exchange, and equity-linked derivatives products.** The exchange offers listed derivatives contracts including futures contracts on U.S. dollars, the Mexican stock exchange index (IPC), government bonds, interest rates, and individual stocks. MexDer also offers options on the IPC, individual domestic stocks, and exchange traded funds (ETFs) tracking the Nasdaq 100 and S&P 500 indices in the United States (Table 4). The average number of daily trades for futures contracts in 2005 was 302, down from 424 in 2004, and for options, 2 and 10 respectively.

Table 4. Derivatives Contracts Listed in MexDer

Equity Futures	America Movil, Cemex, Femsa, Grupo Carso, and Telmex
Equity index futures	Mexican Stock Exchange Equity Index (IPC)
Currency futures	US dollar, Euro
Interest rate futures	28-day TIIE
Bond futures	91-day CETES, 3-year government bond (M3), 10-year bond (M10)
Inflation futures	Inflation-index UDI
Equity options	America Movil
Index Options	IPC
Exchange-traded funds options	NAFTRAC02 (IPC tracker), QQQ (Nasdaq 100 tracker), and IVV (S&P500 tracker)

34. **The relaxation of investment regulations affecting pension funds is driving innovation in exchange-traded products.** Pension funds started using fixed income derivatives in January 2004 and equities and equity derivatives in January 2005 through principal protected notes. In consequence, MexDer has introduced instruments targeted to pension funds investment and risk management needs. For instance, the exchange has introduced five-year interest rate and U.S. dollar futures contracts to facilitate the management of asset-liability mismatches in pension funds portfolios. Similarly, increased limits on domestic and foreign equity investment has contributed to the deepening of equity-linked contracts in the exchange. Reportedly, MexDer is planning to introduce exchange-traded funds tracking Asian and European indices aimed at pension funds interested in increasing their foreign equity exposure. In addition to offering listed derivatives contracts, MexDer has also plans to become a major provider of trading, clearing, and settlement services in the derivatives and fixed income OTC market.

Interest rate contracts

35. **The most important futures contract in the MexDer is the 28-day TIIE futures contract**. The MexDer offers 28-day TIIE futures with a face value of Mex$100,000 and maturities up to 10 years. In 2005, the number of traded contracts was approximately 100 million, or 93 percent of the total trading volume in the MexDer. In terms of open interest, there were slightly more than 21 million contracts outstanding, or 99 percent of MexDer total open interest. The average daily trading volume, however, fell sharply in 2005 to 391,494 contracts from 776,460 in 2004.

36. **Trading volume and open interest in other futures contracts is relatively low.** Other interest rate futures contracts available in MexDer are the 91-day Cetes futures contract, and bond futures for the M3 and M10 government bonds, and the inflation-protected Udibonos bonds. More recently, MexDer has introduced the *Engrapado*, or chain of futures designed to replicate a TIIE swap.

Foreign exchange contracts

37. **Dollar futures contracts remain the most traded listed foreign exchange derivatives contract.** The contracts have a face value of Mex$10,000 and are available for maturities up to three years. Reportedly, liquidity is concentrated in contracts with maturities of one year or less. The average daily trading volume, in number of contracts, increased

twofold to 11,508 in 2005 from 5,449 in 2004. Similarly, the maximum open interest rose to 211,692 contracts in 2005, up from 133,797 contracts in 2004. The other currency future contract is the Euro future but trading volume is minimal.

Equity-linked contracts

38. **Futures and options on individual stocks and on domestic and international stock indices are listed on MexDer.** There are individual stock futures on five blue chip Mexican corporates (América Móvil, Cemex, Femsa, Grupo Carso, and Telmex), and on the Mexican stock exchange equity index (IPC). MexDer also has options on one stock (América Móvil) and on three exchange traded funds (NAFTRAC02, which tracks the IPC; the QQQ, which tracks the Nasdaq 100 index; and the IVV, which tracks the S&P 500). Average trading daily volume, in number of contracts, increased in 2005 relative to 2004—to 1,610 from 1,357 for futures and to 680 from 199 for options.

39. **In the case of futures on the IPC, contract expiration dates are characterized by heavy trading and high volatility.** The fixing price of the contract at expiration is determined as the average weighted price corresponding to the last ten minutes of the trading day. Participants unwind their positions during the fixing price period in an effort to influence the fixing price.

40. **In addition, the stock market lists a number of warrants.** The warrants give holders the right to buy a specific number of shares of the firm over a specific period in the future at an agreed fixed price. These instruments were very popular among investors prior to the Mexican crisis, with the number of warrants exceeding the number of companies listed in the stock exchange. Since the crisis, only a few institutions, including banks, continue to issue warrants. Market participants note that issuing a warrant is a costly and time consuming process. Issuers must follow the same procedure required to list shares in the stock exchange, and the issuing process can take up to three months. Therefore, many banks prefer issuing principal protected bank notes.

C. Current Regulation and Supervision of Risks Associated to Derivatives Activities

41. **Financial institutions interested in operating in derivatives markets must get authorization from the BOM and satisfy several provisions enacted by the National Banking and Securities Commission (CNBV).** An external independent consultancy firm, approved by the BOM, must evaluate whether the institution requesting authorization has the required technical capabilities, including technology infrastructure and know-how to manage risks arising from derivatives transactions as specified by the BOM regulation. Financial institutions authorized to conduct derivatives transactions are evaluated in-situ every year. The BOM regulation is complemented by several provisions enacted by the CNBV. These provisions, aimed at strengthening risk management practices, require among others the existence of an independent internal risk management committee, the appointment of a compliance officer, and regulations concerning IT infrastructure and valuation technology.

42. **The supervision of derivatives activities follows international standards and good practices.** Although different institutions active in derivatives markets are supervised

by different authorities (pension funds by the Pension Fund Commission—Consar, insurance companies by the National Insurance and Sureties Commission—CNSF, and banks, securities firms, exchanges, and mutual funds by the CNBV), the authorities follow a risk-based approach that requires institutions to be well capitalized relative to the risks they are taking in their portfolios. Specifically, an institution's capital should cover at least ninety percent of its market and credit risk. All financial institutions must report the mark-to-market value, value-at-risk (VaR), and the composition of their trading and investment portfolios periodically to their supervisory authorities. In addition, all financial institutions must report every day the composition of their trading portfolios to the BOM. The supervisory authorities also conduct periodic on-site inspections of financial institutions jointly with the BOM. In the case of the CNBV, in-house risk management systems are used to monitor the risk of individual institutions under its watch off-site. If there are substantial differences between VaR figures reported by an institution and the CNBV's own estimates, an on-site inspection takes place.

D. Derivatives Risk Management in Financial Institutions

43. **Risk management of derivatives books in financial institutions operating in the Mexican derivatives market appears to be up to international standards.** Although the mission did not conduct an in-depth assessment of risk management systems and practices, discussions with supervisors and market participants suggest that financial institutions have in place the required information technology infrastructure, know-how to manage risks in derivatives books, and appropriate internal controls. Internal regulations require setting appropriate risk limits reflecting the investment views of top management in close consultation with independent risk management committees. There is a clear separation between risk management units and the rest of the firm. In the case of banks and investment houses, internal regulations require marking-to-market and estimating the value-at-risk (VaR) of derivatives portfolios on a daily basis, and stress testing the portfolios on a monthly basis. The impact of derivatives positions on the institution's overall portfolio is also assessed. Counterparty risk and credit risk is handled primarily through credit lines and collateral. The credit line caps the maximum derivatives exposure with the counterparty. In addition, the counterparty must post collateral, typically in the range of 4–8 percent of the notional outstanding amount of the contract.

44. **Local derivatives dealers hedge their risks both offshore and onshore.** Typically, risks associated with equity derivatives on domestic firms and indices are hedged in MexDer rather than in the domestic stock market. Derivatives dealers reported that hedging costs in MexDer (either static [back-to-back] or dynamic hedging) are lower than in the stock market since they can leverage their positions. Foreign exchange derivatives are hedged primarily in the Chicago Mercantile Exchange (CME) since it is more liquid and hence cheaper than the MexDer. Some hedging operations, though, are conducted in MexDer. In the case of interest rate derivatives, TIIE swaps are usually hedged with TIIE futures traded in MexDer. Offshore derivatives dealers hedge their exposures using mainly offshore OTC markets.

45. **MexDer manages risk through a clearing house, Asigna.** The clearing house uses the U.S. Options Clearing Corporation's Theoretical Intermarket Margin System to measure the risks arising from options and futures positions and determine the appropriate margins.

The credit quality of the client also determines the required margin. In addition, the exchange has access to contingent funds in case its own resources are insufficient to meet liquidity demands. Reportedly, backtesting of the system suggests that the system may withstand highly volatile environments.

E. Policy Recommendations Addressing Weaknesses in the Derivatives Market.

46. **Derivatives market in Mexico is well integrated into global financial markets, and appear well regulated and supervised.** There are, however, some weaknesses that once addressed by the authorities could foster the broadening and deepening of these markets.

47. **Potential currency mismatches in the corporate sector should be reduced by eliminating taxes on long-term repos and allowing other institutions besides primary dealers to borrow government securities from the BOM.** Only primary dealers can borrow government securities from the BOM. As a result, the TIIE swap curve trades at a wide spread above the Mexican peso yield beyond that justified by credit risk of the banking system. According to market participants, the lack of liquidity in the repo market partly impairs further development of the local government bond market and the corresponding benchmark yield curve. In addition, domestic corporate issuers have exploited this arbitrage opportunity to obtain cheap synthetic dollar funding using cross currency swaps, and domestic and foreign interest rate swaps. Increased synthethic dollar financing could potentially increase credit risk associated to currency mismatches in the corporate sector.

48. **Educating the public is necessary to prevent a backlash associated with the use of derivatives.** Inappropriate use of derivatives could lead to large losses in the portfolio value that may be realized if investors are forced to unwind positions. The ensuing public outcry could derail current policy efforts to increase the use of derivatives. CONSAR notes, though, that risk management of pension fund portfolios using VaR (which effectively limits the leverage of the portfolio) and the fact that investors are specialists (they have to pass a certification process to operate derivatives) could reduce the likelihood that pension funds would suffer a large loss using derivatives.

49. **Authorizing institutional investors to participate in derivatives markets through plain vanilla instruments could accelerate the deepening of the market.** The know-how required for using, pricing, and managing the risks of structured products exceeds that required for plain vanilla instruments. For instance, the benefits from using principal protected structures could have been achieved by simply authorizing pension funds to buy call options on indices. Similarly, mutual funds are authorized to invest in warrants and structured notes but barred from investing in equity options regardless of the fact that the risk profile of both instruments are similar.

50. **Insurance companies should be authorized to use OTC derivatives to hedge their risks.** Insurance companies and mortgage sofoles hold long duration portfolios, which could be efficiently hedged using TIIE swaps. However, current regulations prevent them from using derivatives other than those listed in organized exchanges. MexDer has recently introduced an interest rate swap-like product, the *engrapado* or *cadena de forwards*. The *engrapado*, however, is more expensive and less liquid than the TIIE swap.

51. **The tax law could be streamlined to facilitate the transferring of collateral in case of a counterparty default.** Unless a trust is established in connection to the transaction (*caución bursátil*), the transfer of collateral in case of a counterparty default is taxed. Establishing a trust, however, increases transaction costs for contracts written onshore and tilts investors towards the offshore market.

52. **Similarly, the withholding tax on OTC derivatives transactions should be eliminated.** Currently, changes in regulations state that the withholding tax does not apply to derivatives referencing TIIE rates and government bonds provided the instruments are listed in organized exchanges or recognized markets. This creates an uneven playing field between the OTC and exchange traded markets.

53. **Institutions should be allowed to use credit derivatives and the preconditions for the emergence of a local credit derivatives market should be put in place.** Credit derivatives enables investors to gain credit exposure to scarce free-floating corporate paper and bank loans, and to protect their portfolios against credit risk. In addition, it is desirable to foster the emergence of a local credit derivatives market. In particular, it is necessary to improve the availability and quality of credit information on corporates, and harmonize the legal framework governing the recovery process in case of default across jurisdictions and states.

54. **MexDer should continue its current efforts to attract more participants. A key measure is to reduce transaction costs.** MexDer is still vulnerable to the high concentration of trades among a limited number of participants since trading is dominated by the four largest market makers in MexDer. Hence, the withdrawal of one market maker could have a negative impact on liquidity and volatility. MexDer has introduced a number of measures aimed at attracting local institutional investors and foreign participants. However, market participants believe MexDer remains an expensive market, with costs 5–10 times higher than those in the OTC market.