



## Derivatives data at the Banco de México: Its structure and uses

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### Abstract

The last financial crisis unveiled weaknesses in the functioning of derivative markets and in the ability by financial authorities to identify and monitor risks undertaken in those markets, the big share of positions in OTC markets without central clearing mechanisms and the lack of information about these transactions and about the counterparties involved were factor that increased uncertainty. Several international initiatives are being implemented to tackle these risks. Regarding information, derivative transactions are being recently subject to reporting to trade repositories, giving access to financial authorities to important new data for indicators and statistics for risk monitoring and research. Some countries have a longer history of collecting data on transaction basis in these markets. Banco de México has been collecting this information for more than ten years. This paper describes briefly the structure of the central bank derivatives data and some of its most relevant uses. In particular, it is used for credit risk, capital and liquidity requirements analysis of financial institutions and for contagion network analysis. Recently, Banco de México released a broad new set of daily statistics of derivatives turnover by domestic banks and brokerage firms in OTC and exchange derivatives markets. These statistics provide a good description of recent developments in these markets.

**Keywords:** financial derivatives; information model; micro-data; financial stability.

### 1. Introduction

The last financial crisis unveiled weaknesses in the functioning of derivatives markets and in the ability by financial authorities to identify and monitor risks undertaken in those markets. During the crisis, in some countries, OTC markets instead of mitigating risks contributed to its propagation, by increasing uncertainty in a context of a large share of positions in OTC markets, without central clearing mechanisms, and the lack of sufficient information about these transactions and the counterparties involved. Some international initiatives, by G20, were undertaken to tackle these risks. Regarding information, OTC derivative transactions should be reported to trade repositories, providing financial authorities with a new set of data for risk monitoring and research.

Mexico has a history of data collection on these markets. In this paper we present the case of México, in the second section we describe the information model available at the central bank. In the third section we briefly describe its uses for credit risk analysis, regulatory compliance (capital requirements, liquidity and FX regimes) and contagion network analysis. In the fourth section we present some relevant information about a new set of daily statistics on derivatives turnover that describes the market and its evolution during the crisis.

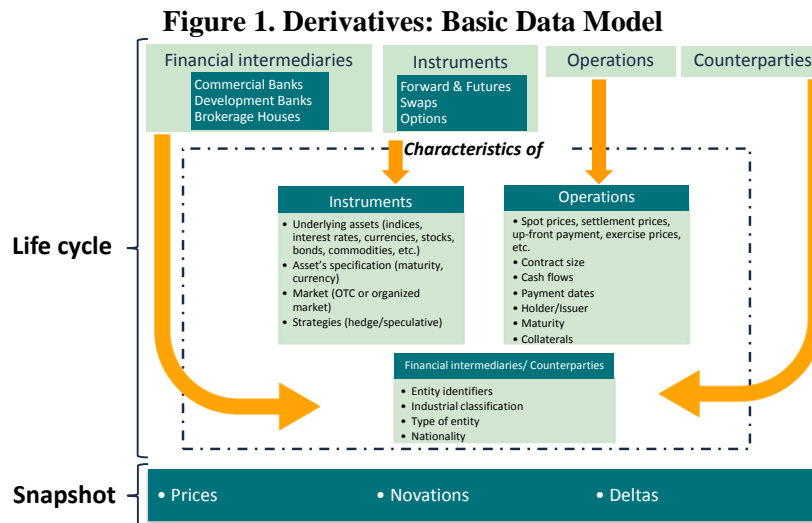
### 2. Derivatives market information at Banco de México

Gaytan (2014) describes the micro-data about market transactions in the information model of Banco de México and its uses. This information model has more than 10 years of daily information about all

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† The views and conclusions presented in this paper are exclusively the responsibility of the author and do not necessarily reflect those of Banco de México.

derivatives transactions traded by banks and brokerage houses in both exchanges and OTC markets.<sup>1</sup> Regarding the availability on OTC derivatives, information at Banco de México has a broad coverage in terms of parties, just missing trades of unregulated financial institutions and nonfinancial parties with foreign entities.<sup>2</sup> The information is collected in two parts, the first one is daily information on the life cycle of the transactions with the characteristics of the instrument, the operation and the counterparties and, the second collection is a snap-shot at the end of the month with information on valuation, novations and deltas of all the outstanding contracts (see Figure 1).



In 2010 the Financial Stability Board delivered a Report “Implementing OTC Derivatives Market Reforms” where it sets 21 recommendations to improve the functioning, transparency and regulatory oversight of over-the-counter (OTC) derivatives markets. Concerning transparency the report recommends that the authorities must have full and timely access to the data on all OTC derivatives transactions, which must be reported to trade repositories (TRs). The comprehensive record of derivative transactions in Banco de México, in particular OTC transactions, was a key element to determine that the Central Bank would perform the information role of a trade repository. For that purpose it was necessary to update data requirements to accommodate new developments in the markets and instruments, include information recommended for TRs and to improve the management of data. In particular it was necessary to improve information on collaterals, netting agreements, platforms, standardization, and central counterparties.<sup>3</sup>

### 3. Uses of the information on derivatives

Micro-data in Banco de México, have different uses, mainly of supervision and financial stability, among others: i) monitoring the functioning of the market and compliance of regulation on derivatives; ii) detailed account of the operations involved in the regulatory framework of capital requirements, FX position, currency and maturity mismatches, FX liquidity and the liquidity coverage ratio; iii) analysis of counterparty

<sup>1</sup> Information on futures, forwards and options is available since September 1999, and information on swap transactions since November 2004.

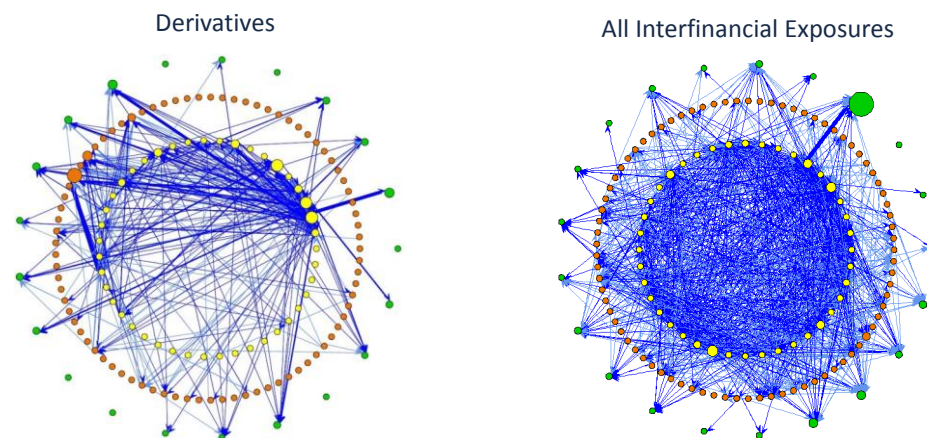
<sup>2</sup> Derivatives transactions by investment funds and pension funds are collected and shared by other financial authorities.

<sup>3</sup> The data templates were released at the end of 2014 and have been implemented during the first half of 2015.

risk, which considers all risk positions of a given financial institution with its counterparties; and iv) analysis of market risk of the portfolio of financial institutions by type of instrument.

In addition, the richness of daily transaction information in all financial markets information has allow developing models for analyzing systemic risk arising from the network of exposures. The network contagion model considers daily exposures of financial institutions in financial markets: derivatives, repos, securities, FX, and interbank loans and deposits. Figure 2, left side, includes full information on the network of exposures for a given day in the derivatives market by considering all outstanding contracts at that date. The inner circle are banks, in the second circle pension and investment funds and on the outer circle international banks (see Banco de México 2014). The right side network shows exposures in all markets. This network of exposures can be included in a model of macroeconomic shocks to study their effect on the financial system.<sup>4</sup>

**Figure 2. The Network Contagion Model**



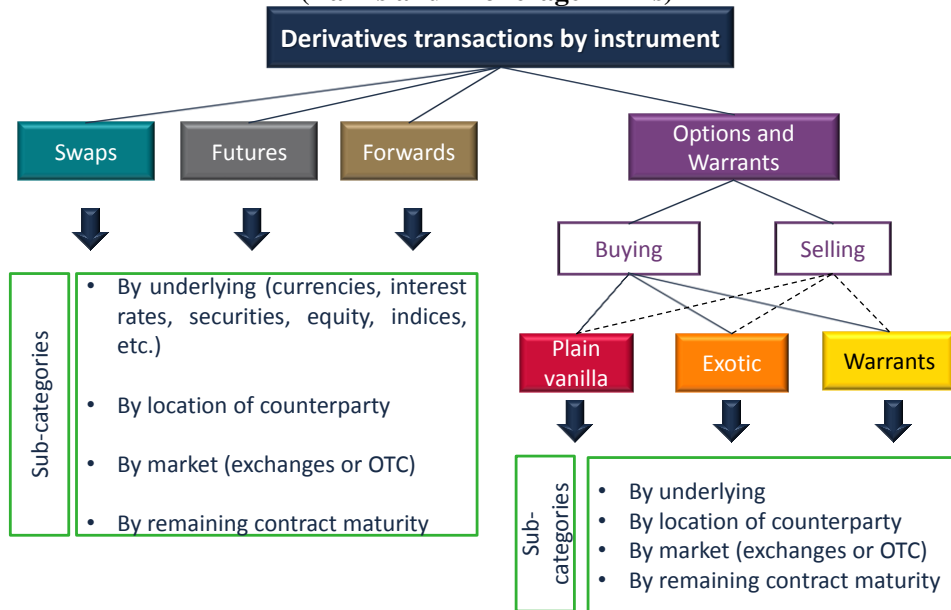
Inside circle (●) Banks; middle circle (●) Pension and Investment Funds; outside circle (●) International Banks.  
Arrows represents exposures between institutions.

#### 4. New Statistics on Derivatives

Demand for information of financial institutions and markets has greatly increased since the recent financial crisis. In the case of derivatives this demand has increased even more in part as a consequence of the shrinkage of these markets after the crisis and its recent recovery, and as a consequence of the international initiatives of standardization and central counterparty. The information demanded is not only at the transaction level to identify counterparties, aggregated statistics can provide important inputs for analysis and research. Micro-data provides flexibility to generate a broad set of aggregated statistics. In the second quarter of 2015 a new set of statistics on derivatives turnover was released. In a second phase in the last quarter of 2015, statistics on open positions will be released.

<sup>4</sup> Martinez et.al. (2013) provide an analysis of contagion risk triggered by macroeconomic shocks to the network. This analysis includes full information on exposures and daily data frequency and concludes that contagion risk is underestimated when only partial exposures are included.

**Figure 3. Structure of the New Statistics of Derivatives Turnover (Banks and Brokerage Firms)**



➤ **By instrument and underlying**

Underlying	Swaps	Futures	Forwards	Options (plain vanilla)	Exotic Options	Warrants
Interest rates	✓	✓	✓	✓	✓	✓
Equity or Indices		✓	✓	✓		
Debt securities		✓	✓	✓		
Currencies		✓	✓	✓		
Commodities		✓	✓	✓		
Other derivatives					✓	
Others	✓	✓	✓	✓	✓	✓

➤ **By location of counterparty and Market**

- **Counterparties with Mexico residence**
  - Financial entities
  - Non-financial entities
- **Counterparties with foreign residence**
  - Financial entities
  - Non-financial entities

➤ **By remaining contract maturity**

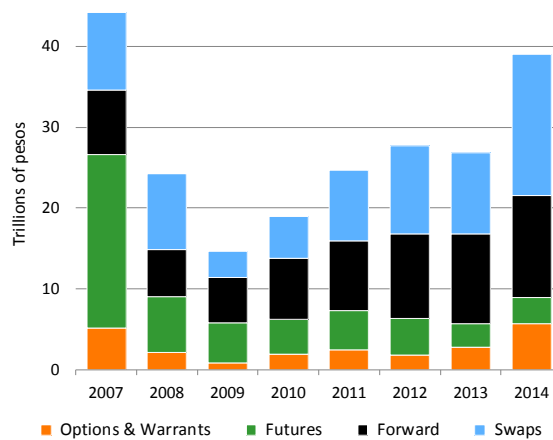
In days	
From 1 to 7	From 1,097 to 1,461
From 8 to 31	From 1,462 to 1,827
From 32 to 92	From 1,828 to 2,557
From 93 to 184	From 2,558 to 3,653
From 185 to 366	From 3,654 to 5,479
From 367 to 731	From 5,480 to 7,305
From 732 to 1096	More than 7,306

The new set of statistics of turnover derivatives by banks and brokerage houses is a set of daily statistics for the period January 2007 to 2015 (previous month). The structure of this statistics was designed according with two criteria: it had to be comprehensive of the market and respond to the most frequent information demanded by users. Figure 3 presents the structure of this data set. All statistics are organized first by instrument (swaps, futures, forwards and options and warrants) and then it opens in different branches of

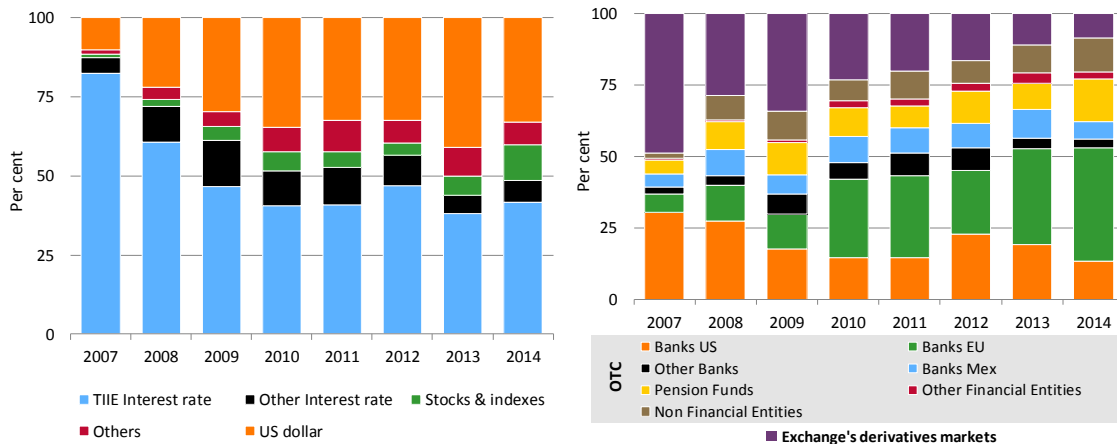
underlying assets, characteristics of the counterparty, type of market and maturity, this basic structure with the corresponding elements identified result in a set of 600 time series of daily information.

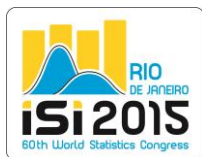
This set of statistics is expected to be very useful to describe the evolution of the market. Figures 4 present an example of the information aggregated by year to identify some of the changes that took place after the 2008-2009 global crisis. Figure 4a provides information on the level of derivatives by instrument. We can notice that after the crisis there was a shrinkage in the turnover, mainly as a reduction of exchange traded derivatives (Figure 4c), and the main reduction was observed in futures contracts. The structure of the information by underlying assets 4b shows a reduction in TIIE (the interbank equilibrium interest rate) and a large increase in USD. Derivatives with underlying TIIE were in 2007 basically futures and exchange traded options. On the other hand the increase of USD are related to FX swaps. While in 2007 approximately half of the derivatives were exchange traded, in 2014 this turnover only represented 8.5 percent (see Mihaljek and Packer, 2010). Another development worth mentioning is the large increase in turnover of Banks and brokerage firms with European Union banks and the reduction of turnover with US banks.

Figure 4. Derivatives Turnover  
a) by instrument



b) by type of underlying c) by type of counterparty





## 5. Conclusions

Transactional information on derivatives and other financial instruments provides flexibility to generate the information required for different uses in the central bank. In the case of Mexico complete information on exposures of financial institutions to all markets allows the development of innovative network analysis. Derivatives statistics can also improve the knowledge and monitoring of the OTC market and exposures of institutions using an aggregate approach. With the establishment of TRs in the main economies, information on derivatives will become widely available, reducing risks and improving the analytical capabilities of central banks and other financial authorities.

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