

# Derivative market: the experience of Chile

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## 1. Introduction

The derivatives market has shown a significant development in recent years. According to ISDA, the industry has grown around 340% in the period 2002-2009. Chile is not the exception; the domestic market has also registered a significant growth, which has been focused mainly on currency derivatives. Indeed, the current composition of the derivatives market is explained in almost 74% for currency derivatives, 22% for interest rate derivatives, and only 4% for commodity derivatives<sup>2</sup>. For this reason, and considering the availability of information (see below), the analysis reported in this paper is based on FX derivatives.

According to Fernandez (2003), until early this decade the FX derivatives market in Chile was restricted because of two main reasons: the presence of portfolio management regulations to institutional investors – Pension Funds (PF) – and low market liquidity. Such constraints, however, have been relaxed through the time and also a floating exchange rate regime was implemented. Ahumada and Selaive (2007) point out that these elements, among others, have led to a higher level of activity at the FX derivatives market, which has tended to converge to levels consistent with its fundamentals in recent years.

The development of this market has significant benefits. In general terms, these benefits are associated as a step towards more complete markets and, therefore, agents can achieve a better risk diversification. Additionally, the dynamics of trade quantities and transaction prices in these markets provide useful information to the authorities to monitor the financial markets. In effect, both the monitoring and analysis of information on derivatives is a useful tool for financial stability purposes. Moreover, the significant restrictions on the availability type of information in other countries – given the predominance of OTC transactions – are not present in Chile. In fact, as described below, the Central Bank of Chile compiles updated and thorough information on currency derivatives contracts.

In this context, the goal of this document is to provide a description of foreign exchange derivatives market in Chile, to explain how the information on foreign exchange derivatives is collected, and to discuss the application of such information for financial stability analysis.

## 2. Characterization of foreign exchange derivatives market in Chile

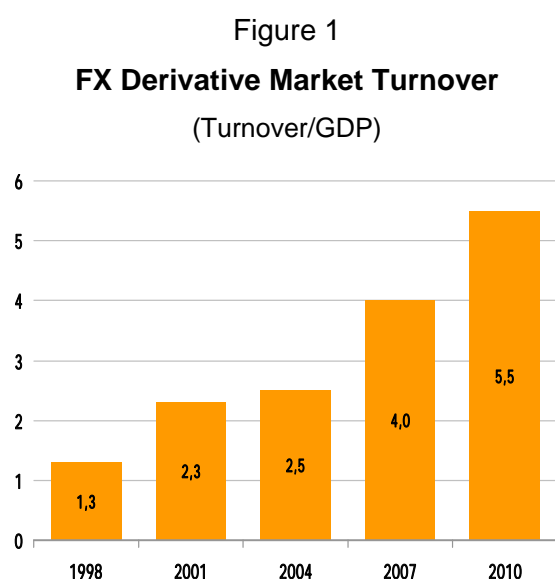
Chilean market has expanded rapidly in recent years. Indeed, foreign exchange derivatives market has grown about four times in the last twelve years (Figure 1). As explained above, this growth would be associated both with the existence of a floating exchange rate regime and with the increasing demand for foreign exchange derivatives of Pension Funds (Figure 2). In this regards, it is worth mentioning that PF are restricted simultaneously to maximum foreign investment limits and to maximum non-hedged of their foreign investment,

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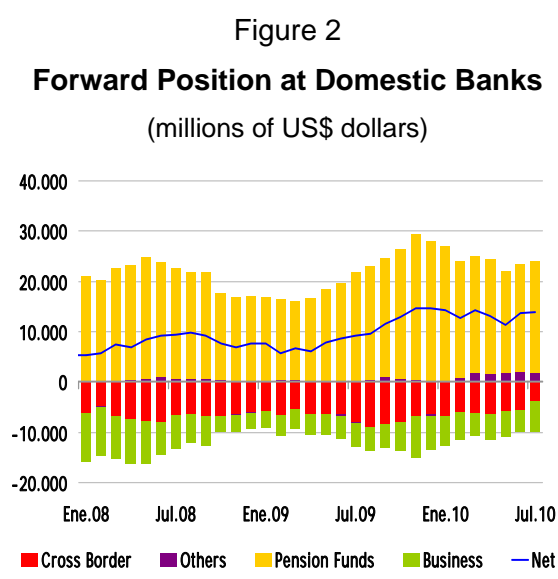
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<sup>2</sup> Market share is based on turnover.

and additionally, until last year PF, were only allowed to conduct the hedging activity in the Chilean formal exchange market, mainly domestic banks<sup>3</sup>.



Source: Bank for International Settlements.



Source: Central Bank of Chile

Despite of the important role of PF in the development of the derivatives market, it has also been accompanied by increased corporate activity in this market. Specifically, the use of FX derivatives by firms has grown across the spectrum of firms – small, medium and large. In 2009, approximately 50% of large firms used these instruments – a larger percentage compared with the figure of ten years before (lower than 20%) – while in the smallest firms, the utilization rate increased by about 10 percentage points during the same period (Figure 3).

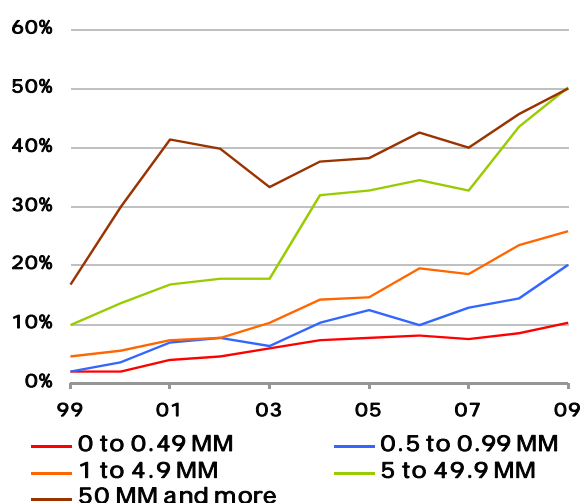
Based on Selaive and Ahumada (2007), this fast growth would be linked to the convergence of hedging activity to its equilibrium values. The authors estimate that the predicted turnover in 1998 was approximately 50% higher than the level consistent with factors such as exchange rate volatility and trade integration, among others. However, this difference was substantially reduced to levels of around 20% during the period 2001-2004 (Figure 4).

<sup>3</sup> Based on BIS (2007), IMF estimates show that the share of foreign dealers in the currency trading activity for 2007 was low respect to international levels. For instance, the average share in advanced and emerging economies was 56.6 and 42.4%, respectively, whereas in Chile this share was only 22.8%.

Figure 3

**Use of Derivatives by Size of Exports**

(percentage of companies)

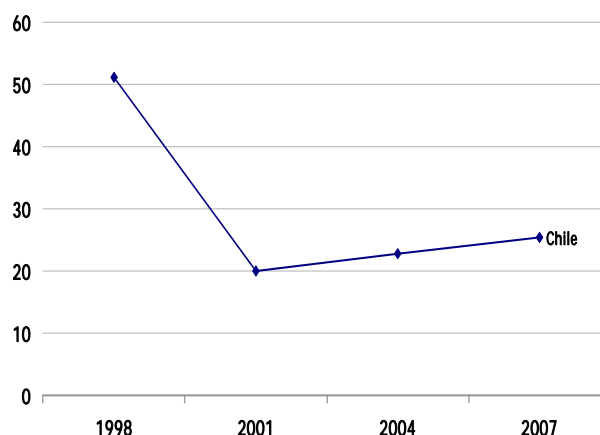


Source: Central Bank of Chile.

Figure 4

**Predicted Turnover – Observed Turnover**

(percentage)



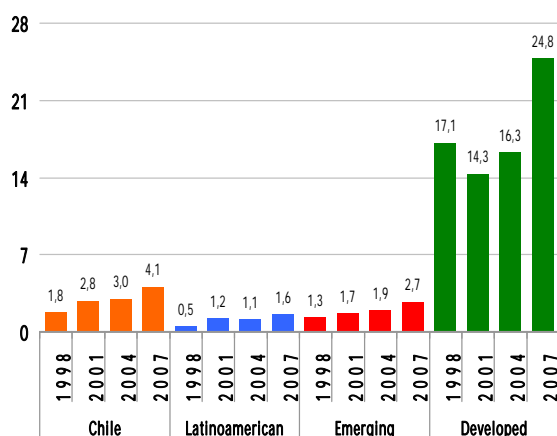
Source: Own calculations based on Ahumada and Selaive (2007).

Moreover, this growth has allowed the Chilean market size to be considered relatively high compared to other emerging economies. In 2007, the Chilean market turnover was 4.1 times the GDP, whereas the average figures for Latin America and emerging economies were 1.6 and 2.7, respectively (Figure 5). Nonetheless, the domestic derivatives market is still smaller than other developed economies. If spot transactions are considered, the relative size of the Chilean market is bigger, but the previous comparisons remain (Figure 6).

Figure 5

**Turnover in the derivatives market**

(times GDP)

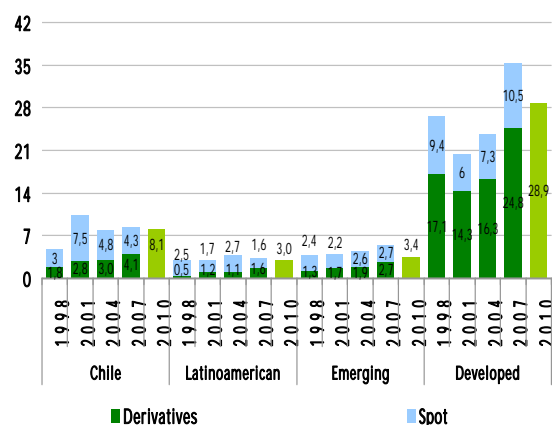


Source: Rodriguez and Villena (2009).

Figure 6

**Turnover in the derivatives and spot market**

(times GDP)



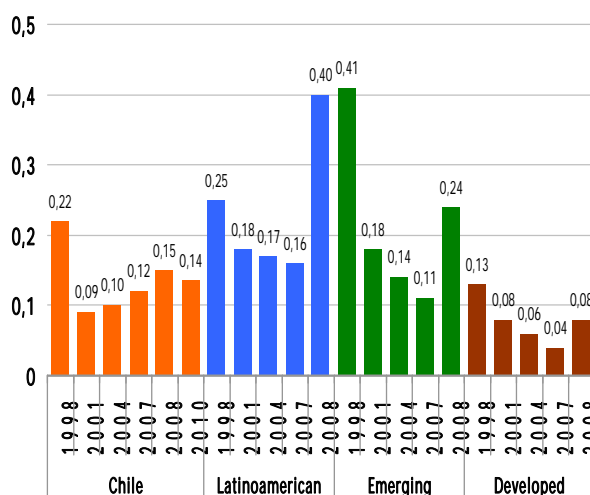
Note: 2010 data includes spot and derivatives.

Source: Rodriguez and Villena (2009) and BIS (2010).

Finally, another interesting comparison is related to the spread of foreign exchange derivatives transactions, this is the difference between bid and ask prices. The spread is a measure that includes transaction costs; liquidity costs and the costs of maintain open

positions. Based on this metric, the Chilean market also compares favorably with the average of emerging economies. In fact, using the spread of forward transactions to 30 days, the indicator for Chile is lesser than the average for Latin American and emerging economies (Figure 7).

Figure 7  
Average Spread Forward 30 days  
(Percentage)



Note: difference between bid and ask divided by the average between these prices.

Source: Bloomberg.

### 3. Data collecting process<sup>4</sup>

The Central Bank collects virtually all FX derivatives transactions in Chile. This is possible because the Basic Constitutional Act of the Central Bank permits to request statistical data from agents that participate in the spot and FX derivatives market. Concretely, the Central Bank request information from all transactions conducted through the formal market – it mainly includes domestic banks and other financial institutions – and also those transactions of residents with a non-resident counterparty. Transactions reported through these procedures represent approximately 96% of total FX derivatives transactions in Chile<sup>5</sup>. Therefore, the information collected covers roughly the total market transactions.

Figure 8 exhibits a diagram showing all potential market transactions and identifying those reported to the Central Bank. The solid lines represent the reported transactions, while the dotted lines reflect those operations that are not informed. Among the latter, it is possible to distinguish direct transactions between non-financial firms without a formal market intermediary – for example, transactions between an exporter and an importer –, transactions between participants in the informal market – for example, the sale between securities brokers non-registered in the formal market –, transactions between nonresidents

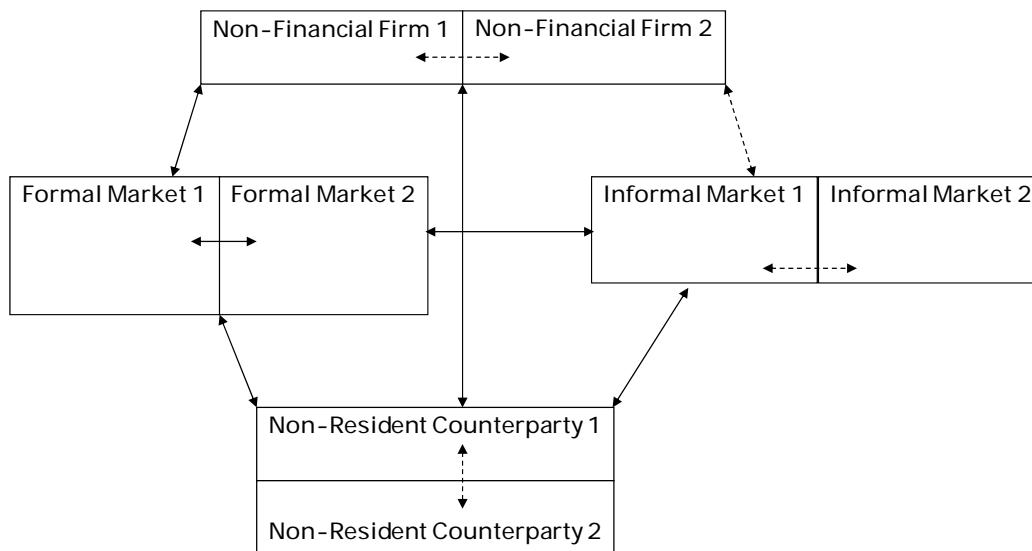
<sup>4</sup> This section is mainly based on Orellana and Rodriguez (2008).

<sup>5</sup> Figure based on the annual survey conducted by the Division of Statistics, Central Bank of Chile.

and, finally, transactions between non-financial firms and financial intermediaries who are not registered in the formal market.

Figure 8

**FX Transactions and Data Collected by the Central Bank**



- - - = non-reported data to the Central Bank

\_\_\_ = reported data to the Central Bank

Source: Alarcón et al (2004)

The information required for each transaction covers virtually every single detail of FX derivative contracts. This information includes the transaction date, the forward rate, the transaction amount, the buyer and seller identification, and the settlement currency, among others. This information is contained in the terms of the contract, and therefore it is easy to report. In this sense, the practice suggests that ask for information which is not included in the contracts is not effective. For instance, some years ago, the Central Bank requested information related to the economic sector of the buyer and seller – which is not included in standard contracts – and, therefore, it had to be filled out specifically for reporting purposes to the Bank; however, subsequent validations suggested that this information was not properly reported.

The number of reporting agents is relatively limited. In the case of the formal market transactions, there are 29 reporting institutions which are composed of 22 banks and 7 securities brokers. They must report daily all contracts of the previous day at 11:00 AM<sup>6</sup>. The current daily volume of reported contracts is around 500 operations – for instance, transactions reported on 16<sup>th</sup> January were 440. On the other hand, transactions of residents with non-residents should be reported by the resident agent not later than the 10th of the following month. On February, 6 resident agents reported transactions, adding up to 1,162 transactions in January, 2011.

Although the number of reporting agents is relatively limited, it has systematically grown. In fact, as mentioned above, the number of non-financial companies using FX derivatives has grown steadily over time, from 353 to 2,239 in the period 1998-2009. While other categories

<sup>6</sup> Information is reported to the Central Bank in an Internet based platform.

of agents have increased to a lesser extent; in particular, the number of banks being counterparty of FX derivatives contracts has remained constant (Table 1).

Finally, it should be noted that the availability of information on foreign exchange derivatives is highly abundant respect to other derivatives. In particular, information on interest rate derivatives reported to the Central Bank is quite limited and corresponds to the price of interest rate swaps obtained through a daily survey to two traders<sup>7</sup>. Currently, the Central Bank is working with the Superintendence of Banks and Financial Institutions in order to collect more information on this subject.

Table 1  
Number of Counterparties in FX Derivatives Contracts

Year	Local				Cross-Border
	Institutional Sector *	Financial Sector excluding banks	Non Financial Sector	Banks	
1998	14	40	353	22	24
1999	16	39	323	25	23
2000	21	38	402	24	28
2001	34	41	704	25	30
2002	33	42	809	24	26
2003	35	42	995	24	34
2004	36	42	1.356	24	36
2005	43	48	1.709	24	39
2006	46	49	1.811	24	40
2007	43	53	2.150	23	40
2008	44	44	2.924	23	43
2009	37	37	2.239	22	41

Note: \* = includes PF's, mutual funds and insurance companies.

Source: Central Bank of Chile.

#### 4. An Application: On-Shore Rate

The on-shore rate is defined as the implicit cost in dollars derived from the Covered Interest Parity, which is made using the bid-ask information of the derivatives<sup>8</sup>. Under perfect arbitrage conditions, this rate can not be greater than the cost of borrowing at the international markets – i.e., Libor + risk premium + taxes + others –, and it can not be lower than the return from investing abroad – i.e., Libor – transaction costs<sup>9</sup>. These limits form a so-called non-arbitrage area. If the on-shore rate exceeds or falls below the upper and lower limits of the band, this would be an indication of potential sources of tension in the foreign currency money market – i.e., the arbitrage of the interest rate is not possible to achieve. Figure 8 shows the evolution of the on-shore rate and the arbitrage band.

<sup>7</sup> These traders represent a significant share of the interest rate derivatives market in Chile. The reported information contains the average bid-ask spread of transactions on the previous day. This report is made at mid- and closing-day (12:00 and 14:30 hrs, respectively).

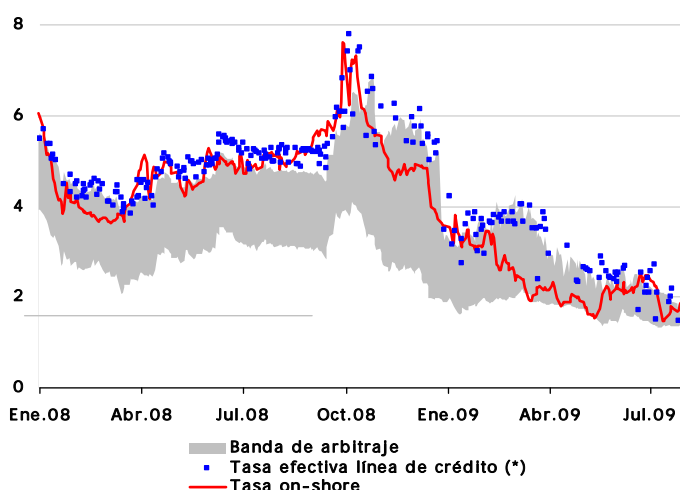
<sup>8</sup> Additionally, the on-shore rate calculation requires information on the domestic interest rate and the foreign exchange spot rate.

<sup>9</sup> For further details see Opazo and Ulloa (2009).

This indicator was monitored by the Central Bank on a daily basis during the onset of the subprime crisis. As shown in Figure 8, the on-shore rate increased significantly in early October-2008<sup>10</sup>. This indicator, along with other information, led to a series of measures in order to mitigate the effects that global money market turmoil could cause in Chile. In 29 September 2008, the international reserve accumulation program, initiated earlier this year, was canceled. The Central Bank implemented a 28-days dollar swap program for a period of one month for a total amount of U.S. \$ 2,000 million. Subsequently, on 10 October the Bank extended the program to six months and the swaps to 60 and 90 days. Lastly, on December 2009, the swaps were further extended to 180 days.

As shown in Figure 9, after the measures were implemented by the Central Bank, the on-shore rate began to fall to levels consistent with the absence of restrictions on the arbitrage. In other words, the on-shore rate achieved levels consistent with the absence of liquidity constraints. In this sense, the on-shore spread was a useful monitoring tool in two aspects: to assess tensions in the market – ie, sudden increase at the beginning of October – and to evaluate the result on the measures before described. In any case, it is necessary to emphasize that the monitoring by the Central Bank considers a larger set of instruments and mechanisms, and the role of the on-shore rate is specially highlighted given the goal of this paper.

Figure 9  
**Dollar Funding Rate: Actual and Theoretical (1)**  
 (percentage)



- (1) One year maturity
- (2) Dots indicate actual rates of banks using external funding credit lines.

Source: Central Bank of Chile.

## 5. Conclusions

The Central Bank has abundant information on FX derivatives market. The information covers virtually all aspects involved in FX derivative contracts and is collected with a

<sup>10</sup> At that time, the 90-days on-shore rate reached a historic maximum of 9.56%.

minimum lag of time. Therefore, and considering the depth that the market has reached, this information is a useful tool for monitoring the evolution of the money markets.

In practice, the information on FX derivatives contracts has allowed to include the on-shore rate as part of the set of indicators whose performance is evaluated regularly. The on-shore rate analysis played an important role in the evaluation and formulation of measures to mitigate the effects of subprime crisis on the domestic market. This is just one of the possible dimensions that can be analyzed with the information on FX derivatives. As an example, the analysis of purchases and sales of FX derivatives by some specific agents may help to get information about the expected trend in the foreign exchange rate.

Finally, it is important to note that the information contained in the derivatives must be evaluated with caution and complementarily with other data. Although the literature argues that derivatives contain better information than other financial instruments, it has raised that the valuation of these instruments is not perfect, specially in times of financial turbulences, aspect that emerges with particular force in the context of the subprime crisis – for example, the CDS tend to be traded more actively than the underlying bonds in times of crisis.

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