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**FOREIGN EXCHANGE DERIVATIVES, BANKING
COMPETITION AND FINANCIAL FRAGILITY IN BRAZIL**

*DERIVATIVOS DE CÂMBIO, COMPETIÇÃO BANCÁRIA E FRAGILIDADE
FINANCEIRA NO BRASIL*

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Introduction

Financial innovations have spread across Latin American and Asian economies since the 1990s, when these formerly called developing countries joined in the process of financial globalization, becoming emerging economies. Yet, due to domestic macroeconomic and institutional factors, this movement has been uneven and came out with different results.

While in Asia securitization has risen at a rapid pace¹, it has been quite the opposite in Latin America² which still trails on, unable to develop a liquid secondary market. In most emerging countries, financial derivatives are mostly traded in over the counter markets (OTC), while in Brazil a significant share is traded at the organized exchange, *Bolsa de Mercadorias e Futuros* (BM&FBovespa).

Despite their differences, these markets have an important common aspect : the importance of foreign exchange rate (FX) derivatives. This does not necessarily mean that these derivatives trade in higher volume than the ones linked to interest rates or stock indexes. This peculiarity of emerging economies stems from the position of their national currencies at the lower end of the international hierarchy of currencies.³ Foreign exchange rates have always been at the core of all emerging countries' crisis. Thus, FX derivatives have the potential to allow hedging risks, mitigating the crisis, or to exacerbate its depth due to leveraged bets that turn sour.

¹ Lejot et alii (2008) shows that, although securitization in the region is modest compared with Europe or North America, it "increased markedly in parts of Asia after 2000—notably in Hong Kong, China; Japan; Korea; and Malaysia—in each case with housing loans used as raw material, and in Singapore through transactions supported by commercial property. Critically, securitization became a strikingly valuable tool for Korea as part of extensive corporate and financial sector post-crisis restructuring, when new legislation allowed large volumes of NPLs and other impaired financial claims to be employed as collateral for new CDOs, a process of recycling defaulted claims instrumental in the recuperation of the wider Korean economy. At the same time, completed securitization volumes in the PRC, Indonesia, Philippines, and Thailand remain very limited".

² Scattigna and Tovar (2007) points out that "securitisation in Latin America has expanded rapidly in the last five years. However, the small average size of issues and their lack of secondary market liquidity suggest that the market for securitised assets remains in its infancy".

³See Fritz, Prates e Paula (2014) and Cohen (2009).

Furthermore, its paramount importance assert itself not only in times of crisis, but all along the cross-border finance cycles⁴. For instance, in the 2000s, the so-called derivatives carry trade has had a key role in the behavior of some EMEs' currencies, among which the Brazilian real (BRL). In FX derivatives markets, the carry trade expresses itself as a bet which results in a short position in the funding currency and a long position in the target currency (Gagnon and Chaboud 2007). Therefore, it is a different kind of currency speculation strategy from the canonical carry trade through spot market operations – that is, borrowing low-interest-rate currencies and lending high-interest-rate currencies (Burnside et al. 2006; Gagnon and Chaboud 2007; Kaltenbrunner 2010).

Brazil stands out among the emerging countries' FX derivatives market because the greater liquidity and depth (i.e, higher number of trades and turnover) of its organized segment (i.e, the foreign exchange futures market, called BM&FBovespa⁵) in comparison with both the foreign exchange spot market and the FX Over-the-counter market (OTC)⁶. This specific feature of the Brazilian FX derivatives market is linked to a set of regulatory, institutional and macroeconomic factors, which have reinforced each other since the mid of the 1990s⁷.

Concerning these previously mentioned factors, three attract special attention. Firstly, the institutional framework of the Brazilian currency market, wherein foreign currency accounts (bank deposits) are prohibited, with only a few exceptions⁸. Consequently, non-banks residents and nonresidents can't hold foreign exchange spot positions (positions in USD). Only banks authorized by the BCB to have foreign

⁴ Cross-border finance encompasses both capital flows – portfolio investment and bank loans which result in spot currency markets' operations - and operations with Foreign exchange (FX) derivatives.

⁵ The BM&F merged with Bovespa, the main Brazilian stock exchange on 25 March 2008.

⁶ According to Avdjiev, Upper and von Kleist (2010), the Brazilian real was the second-most traded currency worldwide in the organized derivatives markets in 2010, while the financial volume of FX derivatives traded onshore OTC markets were lower (USD18 billion in April 2010) than in other emerging markets, such as Korea.

⁷ However, it is worth noticing that according to the IMF (2002) Hong Kong, Singapore and South Africa have the most liquid currency OTC market, with average daily turnover significantly higher than the spot market

⁸ FX bank accounts are allowed only for embassies, multilateral institutions and assurances companies that deal with foreign trade. However, their use is very limited (<http://www.bcb.gov.br/?RMCCI>).



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Development and Strategies**

exchange portfolios can hold these positions. This same institutional feature underlies the non-deliverable character of the foreign exchange derivatives markets, namely, gains or losses in this market are settled in domestic (BRL). Precisely because these operations are settled in BRL, any agent can hold positions in the foreign exchange futures market as long as they fulfill minimum standards required by the Brazilian exchange. Secondly, institutional traits of the Brazilian financial system have also contributed to the growth of the FX derivatives market, among which the increase in banking internationalization in Brazil since the mid-1990s. After the banking crisis in 1995, the government fostered the entry of new foreign banks, which had expertise in derivatives trading. These banks contributed to the growth of the secondary government bond markets, shares (stock exchanges), and especially derivatives, acting as brokers (on behalf of clients) and on their own account. They also became the leader underwriters or intermediaries of offshore bond issuance by local banks and companies. Yet, their entry has not been accompanied by a deepening of the domestic capital market, be it securities or equities, as a source of business financing, unlike the trend observed in several emerging countries according to BIS (2003a and b). Thirdly, the unrestricted access of foreign investors to the foreign exchange futures market since January 2000.

With regards to macroeconomic factors, the adoption of a floating exchange rate regime in 1999 has increased the demand for foreign exchange hedge and the opportunities to earn arbitrage and speculative gains through foreign exchange derivatives. And, even after the price stabilization and the change in the exchange rate regime, the interest rate differential has remained high.

This specific feature of the FX derivatives in Brazil has reinforced their dual role (hedge and speculation) in distinct occasions, be it to smoothen the impact of a crisis as relevant agents had hedged their FX risks (as in 1999) or to enhance the impact of a crisis as a high number of agents hold a leveraged position that resulted in heavy losses (as in 2008). Yet, another specificity of the Brazilian derivatives market has contributed to the policy response aimed at mitigating this impact, namely, the obligation to register all derivatives operations carried out in the onshore market. More specifically, those conducted both in the organized (the BM&FBovespa) and the over-the-counter (OTC)

markets (which are registered in Cetip, a publicly held company that offers services related to registration, depository, trading and settlement of assets and securities).

Many studies have already shown that, due to its higher liquidity, the first dollar future contract (30 days between each settlement date) has become the locus of formation of the BRL/USD exchange rate. (Kaltenbrunner, 2010; Ventura and Garcia, 2012; Chamon and Garcia, 2013; Fritz and Prates, 2014; Prates, 2015 ; Rossi, 2012). Yet, unlike these authors, the focus of this background paper is not the central role of the FX derivatives market in the Brazilian exchange rate dynamic, but the relationship between this market, banking competition and financial fragility in Brazil from 1995 to 2014. The aim herein is to analyze how banking competition has intertwined with the aforementioned factors underlying the specificity of the country FX derivatives market since the mid-1990s.

Besides this introduction and the final remarks, the arguments are organized chronologically in three sections, as follows: (i) 1995-1999: banking competition and currency crisis; (ii) 1999 to mid-2008: new macroeconomic regime, further financial openness and the first cross-border finance cycle; (iii) Mid 2008 on: The contagion effect of the global financial crisis, the new cross-border finance cycle and the regulatory response.

I. Financial openness, banking competition and foreign exchange crisis

At the time of the adoption of the Real Plan, in July 1994, Brazil received high inflows of foreign capital, attracted by expectations of monetary stabilization and higher assets prices. In the following first months, the Brazilian Central Bank (BCB) fixed only the ceiling of the nominal exchange rate at BRL/USD 1,00, neglecting to set a floor. This “asymmetric free floating” alongside the surge in foreign capital resulted in the appreciation of the Brazilian currency in nominal and real terms.

In response to the contagion effect of the Mexican crisis a managed foreign exchange policy was instituted in March 1995. The monetary authority determined a narrow band with a floor and a ceiling, in which the exchange rate was allowed to float. Implicit in this policy was the engagement of the BCB to buy any amount offered at the floor price and sell any amount bided at the ceiling price.

Hence, from March 1995 to January 1999, the Brazilian version of the exchange rate anchor was not a radical fixing of the exchange rate (as was the case with neighboring Argentina), but rather a fixing of the nominal exchange rate within a crawling band. Ex post, devaluations of the crawling band appeared to be rather constant (0.7% p.m.), but were handled discretionarily

Yet, this policy did not prevent further currency appreciation in real terms due to inflation rate differentials that constantly outstripped nominal devaluation. Together with trade liberalization, this real appreciation turned around trade flows. After having shown a slight surplus for some years, the current account experienced sharply increased deficits between 1995 and 1999. Indeed, the mix of currency appreciation, restrictive monetary policy, financial openness and trade liberalization was at the heart of the Real Plan success in promoting the fall of inflation and maintaining it at low levels⁹.

The introduction of the real fostered the financial volume of derivatives traded at the BM & F. Futures contracts rose from a notional amount of USD 532 billion in 1993 to USD 1,576 billion in 1994, despite the adoption on December 1993 of measures aimed at limiting foreign investors' access to the domestic derivative markets. The Resolution n. 2634 of the National Monetary Council (CMN) of 12/17/1993 approved the creation of Fixed Income Funds to Foreign Capital (FRFCE). In a context in which the government sought to discourage the short-term inflows, the FRFCES were prohibited to invest in mutual funds and private bonds, as well as operations with options. Their operations in the futures market became restricted to hedging purpose (Prates, 2015).

In that same period, the first supervisory measures and regulations specific to OTC derivatives markets were taken. Hitherto, supervisory tasks were simpler as long as derivative operations were concentrated in organized markets. The growth of OTC markets was triggered by monetary stabilization and banks taking a bolder approach of these operations seen as a new source of revenue. Prudential measures were taken in early 1994 (CMN Resolution n. 2042) to enforce the register of swaps operations either at BM&F or at the Central Clearing and Depository of Private Securities (CETIP).

⁹ On the Real Plan, see Batista Jr. (1995), Kregel (2000) and Singh et al. (2005).



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These measures lead to the creation of a relatively organized OTC market, unusual in other financial centers (including those from developed countries). The advantages of registering OTC transactions are: a) from the participants' view point, it reduces the legal risk of the contract between counterparts; b) from the supervision's point of view, it is useful to follow the intricate web of relationships and commitments made between financial institutions in order to make it more transparent and increase the security of the whole system. Since then, at least with regard to the transparency of OTC markets, it can be said that the supervision and regulation of derivatives in Brazil have been more advanced than elsewhere.

The price stabilization had negative impacts on parts of the financial system. In 1995, a banking crisis unfolded, as some public and private banks were unable to balance their books in face of the end of inflationary revenues and of the sharply decrease of nominal interest rates (yet still high in real terms). This crisis was perceived as a threat to monetary stabilization and promptly led to government measures. In November 1995, the Program of Incentives to the Restructuring and Strengthening of the National Financial System (Proer) was launched. Through Proer, the Central Bank funded the acquisition of insolvent institutions, absorbing their non-performing loans while transferring liabilities and performing assets to the acquiring institutions. At the same time, with the aim of easing up the restructuring of the domestic banking system, the norms relating to the entry of foreign banks was loosened. In 1997, the Incentive Program for Reduction of the State Public Sector in Banking Activity (Proes) was established to promote privatization, extinction and/or restructuring of state and local public banks. Federal banks were kept out of this program.

The banking crisis and the measures adopted opened the way to a much higher internationalization of the Brazilian banking system as foreign banks entered the country through acquisitions within Proer and Proes or mergers with national banks. At the same time, despite their high cost (estimated at 9.7% of GDP), public and private banks programs reduced financial fragility and potential systemic risks. Their benefits were brought to light in 1999, when a foreign exchange crisis was not accompanied by a banking crisis, thus reducing its macroeconomic effects. Indeed, among the emerging countries that faced financial crisis in the 1990s, only Brazil did not have a "twin crisis"



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(foreign exchange and banking crisis). The design of these programs showed that the government intended to reduce the extremely elevated lending rates by introducing more competition in the banking system. Yet, it was only partially fulfilled. Competition was fierce on proprietary trading, but not on extending credit. Thus lending rates remained almost unchanged.

Foreign banks introduced innovations in big banks' portfolio management and proprietary trading, in particular the use of derivatives, be it for hedge or speculation purposes. Having acquired Brazilian banking institutions, they were legally considered "local banks" not subjected to the restrictions imposed on foreign capital in the derivative markets.

Until then, the major national banks had been very shy in the use of these instruments. Their mimetic reaction was extremely quick. The average daily volume of futures contracts trading on the BM&F rose from a notional amount of USD 23,658 billion to 75,163 billion, in January-August 1996 to January-August 1997. Many smaller banks and financial institutions also adopted the recently introduced kind of money management and leveraged their portfolios. With open interest equivalent of several times their equity, their risks were also multiplied and their losses could turn out to be higher than the equity.

In November 1996, the Brazil's Central Bank of (BCB) started to short the dollar/real future contracts – in other words, the BCB was selling dollars against real - in order to defend the managed foreign exchange policy it had adopted soon after the Real Plan. These contracts are "non-deliverable" due to the particularities of the Brazilian legislation (see Introduction). Hence, BCB is allowed to provide the equivalent of foreign currencies, without having to make use of international reserves to settle its operations. However, their financial results are reflected in government accounts, either as revenue when the Central Bank obtains profits in its operations, or as an expense when the result of BCB's operations in the futures markets is negative. The same legislation applies to the government bonds indexed to the foreign exchange rate. Those bonds were already issued and negotiated in large volumes before the monetary authority operations in the derivatives market.



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During the 1997 Asian crisis, Ibovespa stock index plunged, public bonds fell and capital flight built pressure on the exchange rate. BCB short position in forex future contracts swelled. The situation in FX derivatives markets signaled the occurrence of a speculative attack against the real. The daily average of forex futures contracts traded on the BM&F fell from 227,495 in September 1997, before the speculative attack on the stock exchange of Hong Kong and Korea crisis, to 172,955 in October, 123,691 in November and 67,489 in December. The reduction in volume revealed the vanishing of expectations' divergence required for the liquidity of these markets. It showed that most participants had no confidence in the possibility of exchange rate stability and therefore sought to have a long position and/or liquidate short positions in BRL. The exception was the BCB who continued to sell large volumes of futures contracts.

The differential between the spot exchange rate and the future (basis) increased suddenly and sharply, indicating expectations of exchange rate change in the future. In other words, the increase in the basis reveals that agents are embedding high expectations in future prices, greater than that indicated by the current interest rate on the money market for the period. The rise in interest rates during this speculative attack contributed to further boost the differential between the spot and future exchange rates. These high interest rates led to higher future values of all financial derivatives, including the exchange rate, causing losses to those with short position, among which the BCB, and increasing the buying pressure from those who wanted to cover their short positions.

In all periods of unusually high volatility, participants in derivatives markets know that while some won large sums, others lost the same consolidated amount. To the extent that the derivatives positions are not transparent to all the participants, rumors of financial stress came from the derivatives transactions previously made by such and such participants on the assumption that these are not covered by the opposite position in the spot market. In 1997, heavy losses of mutual funds managed by various banks were disclosed, with a leverage equal to up to twenty times their equity, heightening the turmoil. Assets prices fell by more than 30% in response to the Asian crisis, which means that it was sufficient to be leveraged in three times to lose all the equity. Insolvency fears of financial institutions rose further with a doubling of interest rates.



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The open positions in derivatives markets were very large and the margin calls to be paid after such abrupt change in monetary policy exceeded the value of the pledged collateral.

Rising interest rates and the adoption of a fiscal austerity program, in November 2007, allowed the authorities to tackle the first serious speculative attack against the real. As the impact of the Asian crisis started to wear off, the Central Bank made a profit on short positions in futures contracts on the BM&F. This was the first episode in which derivatives played an important part in the heightening of financial instability.

On the other hand, it is important to point that it also constituted a learning process (at least, for a while, as market participants' memory tend to be short lived). The leverage levels decreased and a Chinese wall, separating clearly the management of cash resources of financial institutions from the management of third party resources, was adopted. This Chinese wall was first introduced by foreign capital banks' and copied by the national ones. At the same time, discussions started about a more accurate and comprehensive regulation of the various types of mutual funds, that would bear fruits a few years later.

A short period of relative calm following the Asian crisis ensued. The privatization of the telephone system and the return of foreign capital flows contributed to the strengthening of foreign reserves. Then, in mid 2008, came the Russian crisis, which led to a more lasting negative perception of international investors towards emerging economies, causing impacts more severe than those recorded in the Mexican and Asian crises. International capital flows decreased significantly and capital flight, speculative attacks on currencies and bonds and stock prices decreases were more pronounced.

In face of the announcement of the Russian moratorium in August 1998, international investors panicked and carried out massive sell-off of emerging countries assets. Many of them had substantial losses, including German and American banks. In Brazil, markets tumbled once again. Pressures on foreign reserves by capital flight started to mount. The proximity of presidential elections and the perceived weakness of the exchange rate policy contributed to the deterioration of expectations. Risk aversion and the lessons from the previous crisis reduced leverage levels. Less and less agents

kept betting in the maintenance of the exchange rate regime, with the notable exception of the BCB. Information provided by the operators of these markets indicates that the Central Bank intervened towards the end of the session, to influence the settlement prices¹⁰. The number of contracts sold was determined by the amount needed for these prices to be within the parameters considered appropriate by the monetary authority.

The short positions in FX future contracts got more and more concentrated in the hands of the BCB, as it took a more aggressive stand to try to ensure the survival of the exchange rate policy. It is worth remembering that the non-deliverable status of Brazilian derivatives on foreign exchange provided an extremely flexible instrument to the BCB that allowed it to sell regardless of the country's foreign reserves.

An important vector of contagion was the exposure of major international banks to the economies in crisis. The Bank for International Settlements (BIS, 1999, pg 9) points out that "Available data provide evidence of an international credit squeeze for most emerging market borrowers in the third quarter of 1998. Reporting banks' claims on Asian countries declined for the fifth consecutive quarter (by \$23 billion), bringing the outstanding exposure to the region at end-September back to its end-1995 level. At the same time, banks began to retreat from Eastern Europe and Latin America, with credit flows to Russia and Brazil being particularly affected".

International market participants sought to designate the next country or region to fall in crisis. The choice was easy. The same BIS report (1999, pg 10) highlights that "The repercussions of developments in Russia on international banking flows to other emerging market economies were particularly severe for Brazil, which accounted for virtually all of the \$8 billion reduction in outstanding claims on Latin America. Brazil's vulnerability to a new round of risk reassessment in the international market had been exacerbated by its rapid accumulation of short-term debt and, in the period under review, by uncertainty surrounding the policy stance before the October elections and discussions concerning the IMF-led support package. The series of measures adopted by the authorities in August to protect the country's foreign exchange reserves did not

¹⁰ Besides being used in the calculation of daily margins, the settlement price is often considered as a representative of the movement of the day.



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prevent international banks from scaling back their credit lines. This, together with some evidence of capital flight, resulted in significant drops in the country's official reserves.”

Upcoming presidential elections and the sudden stop of capital inflows made imperative an agreement with the IMF that provided resources for the continuity of the pegged foreign exchange rate. In late September 2008, international reserves had lost \$ 24.4 billion and financial flows remained negative. The agreement with the IMF took place in November. It included an adjustment program in exchange for an international aid of USD 41,5 billion from the IMF, IBRD, the BID and a set of industrialized nations articulated by the BIS.

The crisis, which began with the Russian default, had profound effect on the Brazilian economy. Even when the international scenario brightened, especially with the cuts in US interest rates in November 17 1998, Brazil remained immersed in a situation of severe financial instability, with agents demanding securities indexed to the exchange rate and seeking to transform their holdings in BRL to USD.

As soon as the perception that the crisis had acquired national features, instead of reflecting other emerging countries problems, became dominant, the daily average of contracts traded on the BM & F waned. This decrease revealed both the risk aversion of agents and a convergence of expectations incompatible with a high liquidity in the derivatives markets. Sharp falls in open interest indicated that the agents were not rolling their positions as their contracts reached settlement day. For the whole year of 1998, the daily average of contracts traded on the BM&F fell 26.6% in 1998 and trading volume declined by 12.3%. The most significant fall was recorded by exchange rate derivatives contracts: -51.5%, while the interest rate derivatives saw a much lower reduction: -2.7%.

On the other hand, futures contracts traded on the International Monetary Market (IMM) of the Chicago Mercantile Exchange (CME) had a sharp and sudden increase in volume, as of August 1998. Not getting massive sale orders from Brazil's Central Bank, the quotes of the BRL exchange rate contract in Chicago were higher than those on the BMF. By acquiring liquidity and signaling higher devaluation than in the Brazilian market, operations in Chicago aroused interest of those who wanted to bet in a FX

regime change who, without the BCB interventions, could more easily take positions, those who believed that the exchange rate policy would be maintained that could have potential higher profits due to higher prices than in the BM&F, and of those who performed arbitrage operations between the two markets by buying contracts on the BM&F and selling them on the CME. Foreign capital Brazilian banks' had the upper hand in these arbitrage operations as their international network is much more extended than the national capital banks.

Transactions amounted also in international markets of OTC derivatives through the nondeliverable forwards market (NDF). This market is not transparent and it is impossible to obtain accurate information about it. Business journals reported that at the beginning of September 1998, the premium paid to those who accepted the risk of a devaluation of the BRL reached 20%, after trading at 2% before the Russian crisis¹¹.

In all of those markets, the most outstanding participants were financial institutions with a very specific profile - large international banks with major operations in Brazil and in New York. Moreover, most non-financial companies sought protection from currency devaluation, through operations on the derivatives market. They can be distinguished in two categories: those who had liabilities in foreign currencies and were actually hedging their exposure and those without liabilities in foreign currency that were objectively taking a speculative position to profit from a currency's regime change.

At the time of the Russian crisis, the general atmosphere of tension was given by international events but contrary to previous crisis, Brazilian financial markets were mostly driven by internal uncertainties. In other words, the financial instability following the Russian default quickly acquired its own dynamics, dictated by internal factors. This dynamic included a higher deleveraging of financial institutions and a

¹¹ The NDF is conceptually similar to a simple forward transaction in which the parties agree to a principal amount (or notional) a settlement date and a future exchange rate. The difference is there is no delivery at settlement by transfer of the principal. The difference between the exchange rate initially determined and the one effectively verified on the due date is paid in US \$ or other fully convertible currency. See Ma et al. (2004) and Lipscomb (2005) ,



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much higher percentage of agents that sought hedge of their foreign exposure or “the maintenance of their international buying power”.

If at the microeconomic level, these movements were logical and rational, its macroeconomic impact was a huge increase in the demand for foreign currencies or assets linked to the exchange rate that culminated in the currency crisis. In the managed exchange rate regime in force, all the spot market demand had to be met by the foreign currencies reserves that were depleted in few months after the Russian crisis.

The level of the adjusted net foreign reserves (i.e, non-borrowed reserves) was \$34.497 billion on 31 December 1998. More than USD 5 billion left the country in the first two weeks of January 1999. The reserves level was well below the floor of USD\$ 33.2 billion, established in the agreement with the IMF. By the agreed mechanism, it should trigger a compensatory monetary tightening.

As the macroeconomic situation continued to deteriorate, the government's room for maneuver became extremely narrow. Apply the terms of the agreement with the IMF and raise interest rates in a context already frankly recessive, could be politically disastrous and possibly contribute to the formation of even more negative expectations, as it would show that monetary policy had lost efficiency against speculative attacks. Do not apply the terms of the agreement with the IMF, would, at best, cause another massive outflow of dollars and, in the worst case, the need to renegotiate the agreement.

In middle January 1999, soon after the inauguration of the recently reelected government, a new foreign exchange policy was adopted. The process was tumultuous, characterized by great nervousness, intense fluctuations in the exchange rate, pricing difficulties for government bonds and pressures on interest rates. The devaluation of 62% in two weeks was a typical case of overshooting in a speculative attack, in which speculators accentuate their pressure, taking advantage of the reluctance of other financial agents to sell the hard currency or anticipate their purchases for fear of additional pressure on the rate.

These factors were not the only ones responsible for the magnitude of the devaluation of the real during the January. On one hand, the BCB 's actions were perceived as shy and insecure by the financial markets. The BCB avoided, in its meeting of 01/18, to raise aggressively the interest rate, as expected by the market and



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Development and Strategies**

recommended by the IMF, as this measure was supposed to stimulate the repatriation of foreign exchange and reduce inflationary pressures arising from the devaluation. But, most of all, its operations in the foreign currencies market (be it spot or derivative markets) stalled.

On the other hand, news and rumors about losses incurred by financial institutions, investment funds and companies with debt in foreign currency played a role in the overshooting. For fear of systemic risk, the BCB rescued some of these financial institutions. They were small but maintained highly leveraged short positions in FX futures contracts. The lack of liquidity in the derivatives market, locked at the allowed upper limit of prices fluctuation, made their situation desperate. With no liquidity at all, it was impossible for them to cover their position and to measure their losses. The BCB provided that much needed liquidity in derivatives to avoid having those institutions demanding spot dollars. This decision eventually led to the resignation of the new BCB's president and the installation of a Congress inquiry.

From the Russian crisis to the adoption of the floating rate policy, the BCB's short position grew rapidly. On the eve of the change in foreign exchange rate policy, its position (taken through the account of the Banco do Brasil Investment Bank) was around 59% of total open interest of the foreign currencies contract at the BM&F. After rescuing the above mentioned institutions, this participation rose to around 70% of total open interest.

Those short positions in derivatives resulted in a loss superior to USD 1,30 billion to the BCB. Some pointed out that the BCB was the "loser of last resort" in the foreign exchange derivatives market. Others considered that it "acted as guarantor of private profitability" while others spoke of a gigantic "socialization of losses" (see Brazilian Senate Final Report, 1999), causing a sharp increase in domestic public debt and its relation to the Gross Domestic Product (GDP). Their counterpart reaped solid benefits. Numbers provided by the report of the Congress Inquiry of 1999 show that banks had a profit of USD 3.323 billion in the first quarter, three times the USD 1.87 billion achieved in 1998. Of the ten banks that profited more in the quarter, the four largest Brazilian banks registered losses in the dollar's value of their assets. Even though they had hedged their FX risks, their profits in normal banking operations were



**Multidisciplinary Institute for
Development and Strategies**

more than enough to register a consolidated profit in that period. The six others most profitable in the quarter were all foreign capital banks'. Their equity gains ranged from the extraordinary 231.52% of JP Morgan, 99.74% of Chase Manhattan and 41.03% of the Morgan Guaranty Trust to modest 8.33% of Citibank NA and 1.95% of BBA Creditanstalt.

But the currency crisis of January 1999 did not cause a financial crisis or an economic recession of major proportions, unlike other countries that went through similar crisis. In the first year after the adoption of floating exchange rate policy, South Korea, Thailand and Mexico respectively suffered a contraction of their GDP of 5,8%, 8% and 6,2; while Brazilian GDP grew by 0,7%.

Four main factors can be pointed to explain this phenomenon which contradicted the expectations of many economists. The first lies in the financial system reorganization, which started in 1995, thus avoiding a concomitant banking crisis (the so-called twin crisis). The second stems from the anticipation of a change in the exchange rate policy by the most relevant private agents, who had taken preventive measures. The third is a certain persistence of liquidity in the FX derivatives market, due to the BCB continued willingness of selling dollars unlike the vast majority of others agents. The fourth is linked to the non-deliverable status of these contracts that allowed the BCB to settle its losses in the Brazilian currency that it is able to issue.

Assets indexed to foreign exchange and FX derivatives provided hedging and speculative instruments that significantly contributed to form a barrier that strongly attenuated the transmission of financial instability to the economy as a whole. The Brazilian currency crisis of January 1999 made clear the importance of agents' hedging operations. When the crisis breaks out suddenly and unexpectedly, few risks would be covered and agents bear the cost of their improvidence or speculative spirit. Under these conditions, a crisis started by financial instability could spread quickly to the financial and productive sector. In contrast, when the process leading to the crisis is slow, the higher the share of agents anticipating its outbreak, the greater the demand for hedging and the lower would be the danger of financial instability spreading to other sectors of the economy.

II. 1999 to mid- 2008: new macroeconomic regime, further financial openness and the first optimistic wave

In line with the dominant trend among leading emerging economies, the Brazilian government responded to its 1999 currency crisis by the adoption of a new set of economic policies based on an inflation targeting policy, a (dirty) floating exchange rate regime and a target for primary budget surplus.¹² This set of policies, implemented under Fernando Henrique Cardoso's (FHC) second term, has come to be known as the New Macroeconomics Consensus (Cunha, Prates and Ferrari, 2012).

This change in the macroeconomic regime was accompanied by a deepening of the process of financial openness in January 2000. All the former regulations were removed and a new resolution (Resolution CMN n. 2689) allowed the unrestricted access of nonresident (i.e., foreign) investors to all segments of the domestic financial market, including the derivatives market (where since 1995 they had been limited to hedging their positions in spot markets as pointed out in the previous section). All kinds of entrance taxes, minimum stay periods, etc. were withdrawn, as domestic and international investors were guaranteed equal treatment.

Therefore, two determinant factors of the liquidity and depth of the FX futures market – the dirty floating regime and the unrestricted access of nonresident investors to the domestic derivatives market – took place in FHC's second term. Yet, these factors have interplayed with banking competition fostered by foreign banks' strategies in the first term of Luis Inácio Lula da Silva (hereafter Lula), who took office on January 2003 and kept the same macroeconomic policy framework.

Contrary to the period of 1999-2002, featured by a shortage of external capital flows and a high risk aversion of global investors¹³, from 2003 to the threshold of the global financial crisis of 2008, the new macroeconomic regime was implemented in an exceptionally favourable international setting, with rising commodity prices and a boom of capital flows to emerging countries (Prates, 2015, Ocampo, 2007)¹⁴. Moreover, both

¹² For a detailed analysis of the similarities and specificities of emerging economies currency crises in the 1990s, see: Kregel (1998 and 2000).

¹³ See Akyuz (2010).

¹⁴ For an overview of this context, see Ocampo (2007)

the process of financial openness and of FX market liberalization was further deepened. The Brazilian economy became fully open to capital inflows and outflows in 2005, when residents' capital exports were fully liberalized.

Regarding the FX market, three measures stand out. Firstly, the unification of the commercial (*livre*) and tourism (*flutuante*) foreign exchange market and the abolition of the *Conta de Nao-residentes* (non resident accounts, CC5), which removed all limits on the amount of domestic currency that physical and juridical entities could convert into US Dollars (Resolution n. 3,265). For the first time, domestic entities were permitted to buy unlimited foreign currency directly from banks, which could then be invested abroad. In addition, return on such investments did not have to be repatriated to Brazil but could be re-invested overseas. Secondly, the removal of the cap on banks' short FX positions in the spot market in January 2006. Thirdly, the end of the so-called FX coverage on exports on March 2009 (Resolution n. 3,548), allowing exporters to keep 100% of their export receipts overseas (Prates, 2015)¹⁵.

Nevertheless, despite this broad liberalization, one key institutional feature of the Brazilian currency market, pointed out in the Introduction, has remained untouched, namely, the prohibition of foreign currency accounts by residents and nonresidents, with only a few exceptions (see Introduction), established by the International Exchange and Capital Market Regulation (RMCCI)¹⁶. It is worth mentioning that this feature stemmed to a great extent from the process of high inflation with widespread indexation especially in the financial sector over the 1980s and the first half of the 1990s. Indexation prevented the dollarization of domestic financial operations and the banking disintermediation, on the contrary of what happened in Argentina. In this context, the financial sector engaged in sophisticated trading operations. Financial sophistication was further fostered by the competition between domestic and foreign banks. Moreover, the inflationary process in the country also stimulated the development of the

¹⁵ Another important measure, which did not change the FX market institutional framework, was launched on February 2006. The Lula administration exempted foreign investment in public bonds and venture capital funds from income.

¹⁶ See: <http://www.bcb.gov.br/?RMCCI>.



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Development and Strategies

derivatives exchange (the organized derivatives market,), where FX futures contracts are traded.

As FX bank deposits are prohibited, only a few banks which have been accorded the “Authorised Dealer” status from the BCB have access to short term external credit lines in the international interbank market and can hold spot FX positions (in Brazil, positions in USD).¹⁷ From 2003 to mid-2008, the BCB granted this status to a total of 17 banks. Although the list of dealers changed, it had two common features over this period: foreign banks accounted for more or less half of the list; and some Brazilian and foreign banks were always in the list. For example, the two Tables that follow show the list for December 2003 and July 2008.

¹⁷ Most of the spot FX transactions are settled by transfers of funds between residents foreign accounts. The exception is the purchases and sells of foreign currencies related with international travels. In this case, the physical flow is allowed (<http://www.bcb.gov.br/?RMCCI>).

Table 1. Dealer's Banks in the FX Market (December 2003)

Bank	Capital control
01 BANCO ABN AMRO REAL S.A.	Foreign
02 BANCO FIBRA S.A.	Brazilian
03 BANCO ITAUBANK S.A.	Brazilian
04 BANCO MIZUHO DO BRASIL S.A.	Foreign
05 BANCO SANTANDER BRASIL S.A.	Foreign
06 BANCO DO BRASIL S.A.	Brazilian
07 BANCO BNP PARIBAS BRASIL S.A.	Foreign
08 BANCO BRADESCO S.A.	Brazilian
09 BANCO CITIBANK S.A.	Foreign
10 DRESDNER LATEINAMERIKA AKTIENGESELLSCHAFT	Foreign
11 HSBC BANK BRASIL S.A. - BANCO MULTIPLO	Foreign
12 ITAÚ UNIBANCO S.A.	Brazilian
13 BANCO J.P. MORGAN S.A.	Foreign
14 BANCO BTG PACTUAL S.A.	Brazilian
15 BANCO SAFRA S.A.	Brazilian
16 UNIBANCO - UNIÃO DE BANCOS BRASILEIROS S.A.	Brazilian
17 BANCO VOTORANTIM S.A.	Brazilian

Source: BCB. Available at:

<http://www4.bcb.gov.br/pec/dealers/principal.asp>

Table 2. Dealer's Banks in the FX Market (July 2008)

Banks	Capital control
01 BANCO ABN AMRO REAL S.A.	Foreign
02 BANCO BBM S/A	Brazilian
03 BANCO DE TOKYO-MITSUBISHI UFJ BRASIL S.A.	Foreign
04 BANCO DO BRASIL S.A.	Brazilian
05 BANCO BNP PARIBAS BRASIL S.A.	Foreign

06	BANCO BRADESCO S.A.	Brazilian
07	BANCO CITIBANK S.A.	Foreign
08	BANCO DE INVESTIMENTOS CREDIT SUISSE S.A.	Foreign
09	GOLDMAN SACHS DO BRASIL BANCO MULTIPLO	Foreign
10	HSBC BANK BRASIL S.A. - BANCO MULTIPLO	Foreign
11	ITAÚ S.A.	Brazilian
12	BANCO J.P. MORGAN S.A.	Foreign
13	BANK OF AMERICA MERRILL LYNCH BANCO MÚLTIPLO	Foreign
14	BANCO BTG PACTUAL S.A.	Brazilian
15	BANCO SANTANDER (BRASIL) S.A.	Foreign
16	UNIBANCO - UNIÃO DE BANCOS BRASILEIROS S.A.	Brazilian
17	BANCO VOTORANTIM S.A.	Brazilian

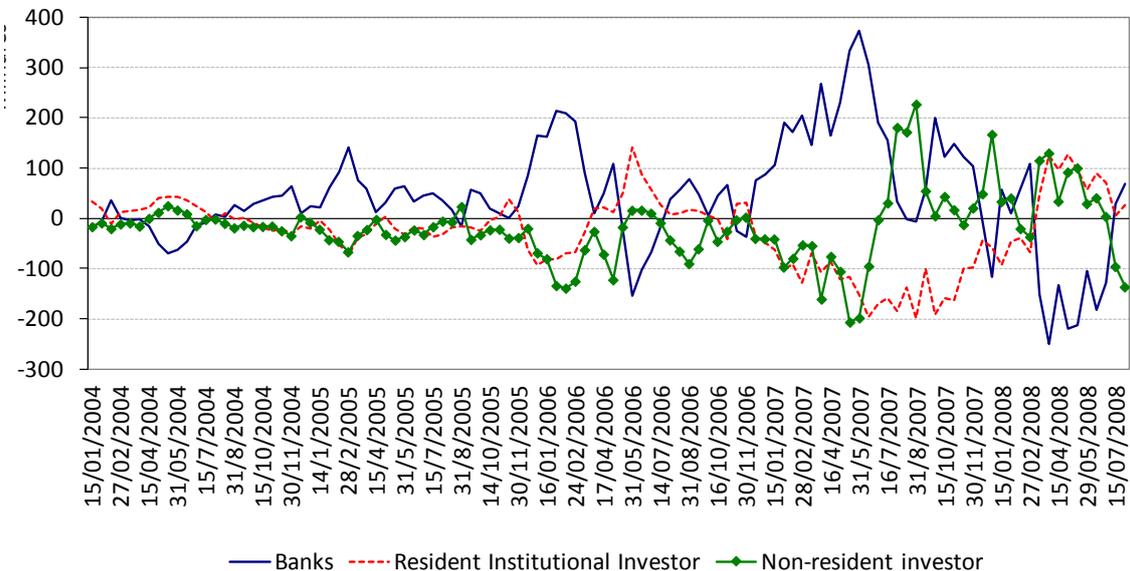
Source: BCB. Available at:

<http://www4.bcb.gov.br/pec/dealers/principal.asp>

The “other side of the coin” of the ban of FX currency accounts is the obligation to settle all transactions in the domestic currency (the BRL). Consequently, the Brazilian FX derivatives (futures and OTC) market is non-deliverable, i.e, gains or losses in these operations are liquidated in BRL. Precisely for this reason, they are outside the scope of the FX market regulation (the aforementioned RMCCI) and there are no limits to banks and other agents’ positions in the FX derivatives market as long as they fulfill the minimum standards required by the Brazilian exchange (BM&FBovespa) (Ventura and Garcia 2010; Kaltenbrunner 2010).

In the case of FX futures market, the main agents have been resident banks (whether Brazilian or foreign-owned), resident institutional investors, nonfinancial resident companies and nonresident investors (figure 1). The wide range of participants has ensured both a greater trade volume and a larger diversity of opinions which have underlain the liquidity and depth of this market.

Figure 1. Investor's net positions in foreign exchange futures (USD million contracts¹)



Source: BMFBovespa. Authors' elaboration.
(Nota: (1) Notional amount = USD 50,000)

Yet, as Kaltenbrunner (2010) and Rossi (2012) pointed out, between 2003 and mid-2008, foreign institutional investors, primarily hedge funds, were the most important investor group in the Brazilian FX futures market, fostering an currency appreciation trend through derivative carry trade. This is a different kind of currency speculation strategy from the canonical carry trade through spot market operations – that is, borrowing low-interest-rate currencies and lending high-interest-rate currencies. In FX derivatives markets, the carry trade expresses itself as a bet which results in a short position in the funding currency and a long position in the target currency (Burnside et al. 2006; Gagnon and Chaboud 2007).

Under the very favorable international context, which resulted in the fall of the country-risk, this strategy was stimulated by the Brazilian high policy rate as well as by the (dirty) floating exchange rate, which has increased not only the demand for hedging currency risk, but also opportunities for speculating through bets on exchange rate changes. Due to the huge differential between the internal and external interest rates, foreign investors made one-way bets on the appreciation of the Brazilian currency through short positions in the FX futures market (selling US dollars and buying BRL –

see figure 1), which resulted in downward pressure on the USD price and, thus, upward pressure on the BRL price (Prates, 2015).

The derivatives carry trade turns out to be even more attractive in Brazil due to the non-deliverable feature of the FX derivatives market. Foreign and domestic agents can engage in it without disbursing one single USD. Until October 2010, furthermore, this carry trade strategy could also be performed without the expenditure of one single BRL because investors could meet their margin requirements in BRL via domestic borrowed securities or guarantees from local banks (see section III). Despite the predominance of foreign investors, profit-seeking domestic agents such as institutional investors and companies have also engaged in it.

Consequently, the macroeconomic setting has reinforced the liquidity and depth of the Brazilian FX futures market (see Table 3). According to Johnson (2007), in the first quarter of 2007, “BM&Fs U.S. Dollar contract led the sector (i.e. the foreign currency sector) for the second year in a row with a 51.4% increase to 10.97 million contracts. It was followed by CMEs Euro FX contract which rose 22% to 6.73 million contracts”.

Moreover, the outstanding performance of the BRL futures market has contributed to the increased trading of the Brazilian currency on foreign OTC markets through Non-Deliverable Forward (NDF) contracts.¹⁸ This is because the existence of a deep futures market has made it possible for banks that have an account with the local exchange to sell BRL abroad (meeting the demand of international investors who were betting on the BRL appreciation) and simultaneously hedge their BRL exposure in the onshore future market. Although Brazilian banks with foreign branches have also participated in this class of operation, foreign banks have been the most active, standing out as foreign investors’ counterparts (Kaltenbrunner 2010). The growth of the NDF market for the Brazilian real, in turn, has enhanced even more the liquidity and depth of the Brazilian futures market. In this setting, some international investors began to use the BRL futures contracts as a proxy for other emerging currencies’ derivatives which have been highly correlated with the Brazilian real (such as the Turkish lira and the

¹⁸ On the NDF market of emerging economy currencies, see Ma, Ho and McCauley (2010).

South-African rand) but do not have deep and liquid derivatives markets, which further increased the trading of BRL futures contracts (Prates, 2015).

Table 3. Brazilian FX market

	Daily averages (USD milhões)				Change (%)	
	2001	2004	2007	2010	2007/04	2010/07
Spot⁽¹⁾	3,461	2,568	4,754	5,508	185.1	115.9
Primary	1,665	1,845	3,390	3,906	183.8	115.2
Interbank	1,796	723	1,364	1,602	188.6	117.5
Derivatives	2,463	2,670	8,844	23,286	331.2	263.3
Local ⁽²⁾	1,916	1,674	3,390	7,313	202.5	215.7
Cross- Border ⁽³⁾	547	996	5,454	15,973	547.6	292.9

Fonte: BIS. *Triennial central bank survey of foreign exchange and derivatives market activity*, 2010 e 2013. Disponível em: www.bis.org.

Notas:

(1) The sum of the daily averages overestimate the value traded due to double counting.

(2) Future and OTC contracts.

(3) Non Deliverable Forwards (NDF).

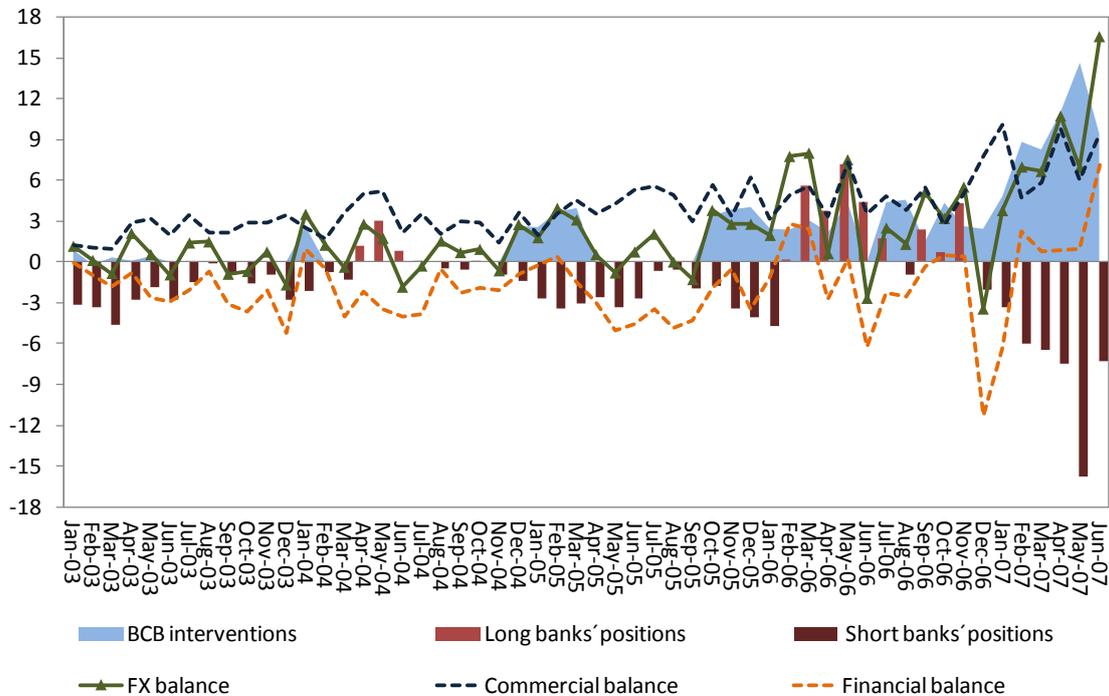
In the domestic FX market, FX futures and spot markets are linked by arbitrage that is carried out exclusively by banks' dealers, which are the sole agents who can hold FX spot position. In general, these agents took the opposite position of foreign investors in the FX futures market (long position in USD and short in BRL), buying USD in this market and selling them in the spot market (see figure 2). With this strategy, banks earned arbitrage profits and, at the same time, generated additional pressure on the USD spot price, which meant a drop in the BRL–USD spot exchange rate and an appreciation of the Brazilian currency.

Hence, although nonresidents investors have had a central role in the deepening of the domestic FX derivatives markets over this period, as many authors pointed out (Kaltenbrunner, 2010; Rossi, 2012), this role could only be performed because banks, mainly the foreign ones, took the contrary positions, be it in the NDF market or be it the FX future market, ensuring the diversity of opinion that underlies the liquidity in financial markets, among which the FX market. Yet, as brought to light by the contagion effect of the global financial crisis (see next section), banks also took the contrary position of non-financial companies both in the NDF contracts and the

domestic OTC market (Cetip), which contributed as well to boost the liquidity of the future market.

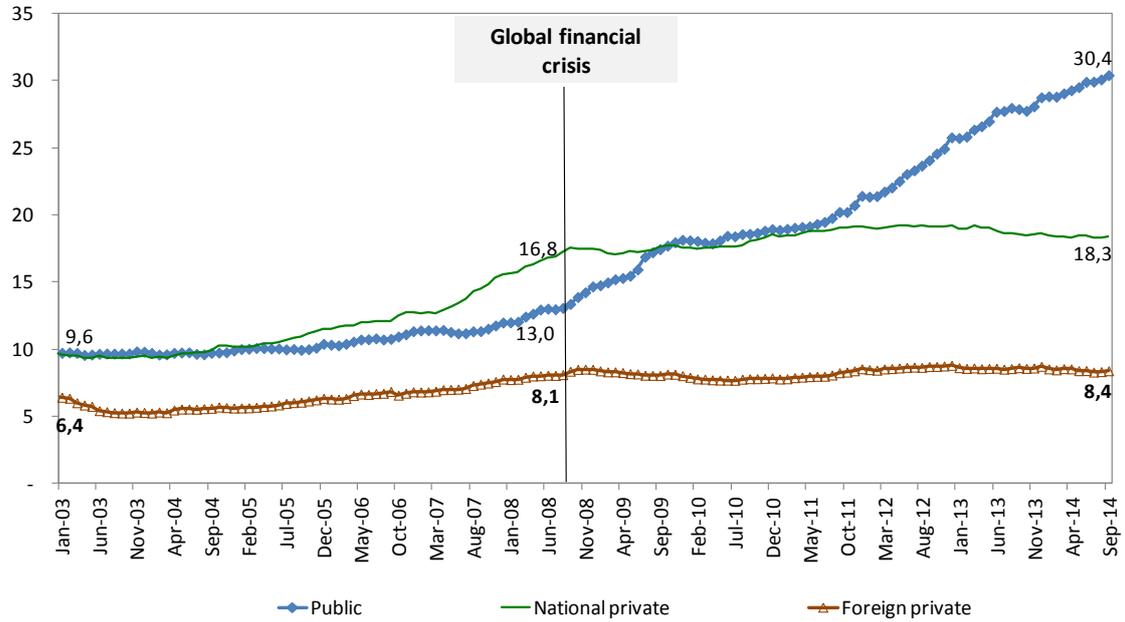
On the other side, foreign banks participation in the domestic credit market has remained small. Their share in the outstanding credit to the private sector grew from 6.4% in January 2003 to 8.1% of the total in Mid-2008. In the period after the global financial crisis, analyzed in the following section, this share has stayed on this low level (see figure).

Figure 2. FX spot market (USD billion)



Source: BCB. Authors' elaboration.

Figure 3. Outstanding credit to the private sector according to the capital control (as percentage of the total)



Source: Authors' elaboration from BCB database.

III. The contagion effect of the global financial crisis, the new cross-border finance cycle and the regulatory response

The financial crisis, which started in mid-2007 with soaring insolvencies and the devaluation of real estate and assets related to high-risk (subprime) mortgages in the United States, turned out to be a global financial crisis in the second half of 2008, following the bankruptcy of Lehman Brothers on 15 September 2008). This crisis led to a strong appreciation of the dollar and, simultaneously, a huge depreciation of some emerging economies' currencies, which had appreciated since 2007. Directly hit by a new sudden stop of capital flows, the assets prices and the exchange rates of those economies, mostly commodities exporters, became important targets of the global deleveraging and "flight to quality" (Prates and Cintra, 2010).

In this context, enormous financial losses of important companies of emerging economies with heavy short positions in the foreign exchange derivatives markets came to light. Apparently in the first semester of 2008, they decided to bet in the continued appreciation of their currencies against the dollar, as the dollar intense depreciation had contributed to the strong increase in commodities international prices. . Many of them did so by means of exotic derivatives proposed by international banks. The deepening of the crisis generated a burst in commodity prices and a new trend of dollar appreciation, resulting in huge losses in such derivatives bets (Farhi & Borghi, 2009).

Dodd (2009) estimates that "the direct cost to non-financial firms of these derivatives losses, based on the sum of national estimates, is \$530 billion. Possibly 50,000 firms in at least 12 economies have suffered derivatives losses". Many of those companies were exporters, who suffer more intensely the impact of an appreciation of their national currency. From a microeconomic point of view, it was understandable that those companies searched to hedge against such appreciation¹⁹. However, the value of their operations, a double digit multiple of their annual exports, revealed that they had also assumed a speculative posture. In spite of the overlapping of hedge and speculation postures, they could be distinguished as follows: the hedge one stretches up to the estimated value of the company's exports within a given period, and the speculative one

¹⁹ "One important way firms may have cut the exposure to currency risk has been the growing reliance on financial derivatives to hedge currency risk" (IMF, 2008, p. 55)

would be the difference between the total value of the FX derivatives contract and such exports. Dodd (2009), although emphasizing the use of financial derivatives for hedging purposes, also points out its speculative use by Brazilian and Mexican companies along with others from China, South Korea, India and Hong Kong.

In Brazil, Sadia, Aracruz and Votorantim were the first companies whose losses with FX derivatives were made public. Sadia had a short position of USD 8.4 billion and recorded in the third quarter of 2008 a loss of USD 370 millions²⁰. Aracruz, one of the most exposed Brazilian companies to those derivatives, recorded losses of USD 2.13 billion and the Votorantim Group's of USD 1 billion. In late October 2008, the director of Cetip²¹, Jorge Sant'Anna, informed that there were over five hundred companies involved in the FX derivatives. (Chiarini, 2008). According to a survey held by Agência Estado (2008), in the first semester of 2008, 37 of 50 non-financial companies of Ibovespa maintained short positions in FX derivatives.

Furthermore, foreign investment banks, rapidly mimicked by private national banks, also began to offer loans tied to FX derivatives, which contributed to keep corporate credit growth between March and August 2008. The launch of this financial innovation was stimulated by the upswing moment of the Brazilian economy (and, therefore, higher demand for working capital) as well as by the rise in the borrowing cost both in the domestic capital and the international markets due to the subprime crisis deepening (Prates, 2010).

This new kind of corporate credit²² resulted in a lower lending rate if the BRL/USD exchange rate was lower than that stipulated in the derivatives contract (usually 2 Brazilian real per dollar). For the banks, these operations provided an

²⁰ On September 30, 2008, after having liquidated a significant portion of its positions, Sadia still presented a short liquid position was of USD 2.37 billion. In December 2008, the foreign exchange exposure of the company with pending contracts decreased to USD 678 million, which were equivalent to less than three months of export (Barbieri, 2008).

²¹ Created by the financial institutions and the Central Bank, Cetip S.A. – *Balcão Organizado de Ativos e Derivativos* (Organized Counter of Assets and Derivatives) - began its operations in 1986. It is an association for the administration of organized over-the-counter markets, that is, of platforms for negotiation and registration of securities, public and private bonds and over-the-counter derivatives.

²² For detailed description of these contracts and their role as one of the main transmission channel of the global crisis in Brazil, see Farhi and Borghi (2009), Farhi (2010), Kregel (2011), and Prates and Cintra (2010).

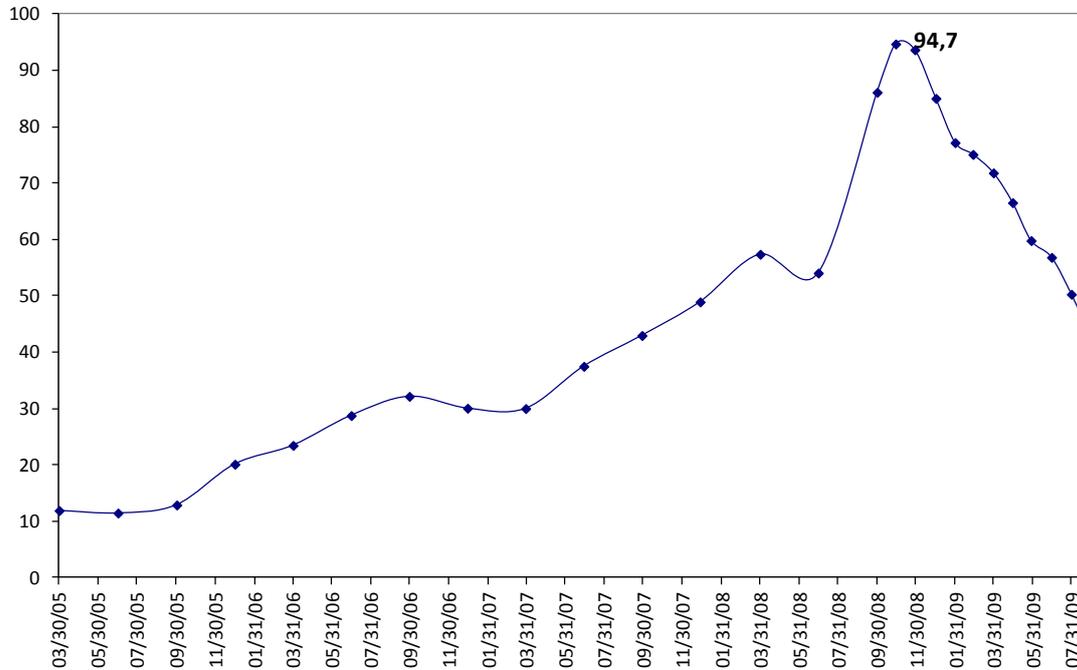


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insurance against exchange rate depreciation (which historically led to macroeconomic instability, with negative effects on the borrowing cost and the debtors ability to pay), assessed as increasingly likely due to the worsening of the international crisis. However, the debtor would have to pay a much higher rate if the market rate was higher. The downward trend of the BRL/USD exchange rate since 2003 had led banks and companies to underestimate the risk of these operations. Several other medium size companies - in the industrial, construction and commerce sectors along with medium size banks - with a primary focus on the domestic market also engaged in it due to their lower interest rates, although at smaller volumes. As Kregel (2011) points out, the expectation of a sustained appreciation of the Brazilian currency had fostered investments banks to sell Over-the-Counter (OTC) market derivatives to export firms who were interested not only in hedging the estimated exports but also in obtaining speculative gains in order to offset the competitiveness loss due to the currency appreciation.

In the case of the larger Brazilian exporting companies, a higher number of the derivative contracts were performed in the offshore OTC market, making it impossible to evaluate their size and extension. The FX derivatives contracts performed in the Brazilian market were mostly OTC operations, registered at Cetip. Data from BM&F shows that the non-financial companies participation in the organized market was quite small in that period. In turn, the Cetip's information (see figure 4) shows USD 94.7 billion in non-deliverable forward contracts between banks and their non-financial counterparts in October 29, 2008,. They also underline two periods of remarkable increase of these contracts: the first in late 2005 and 2006; the second began in late 2007 and increased from August to September 2008.

Figure 4. Operations with FX derivatives in the domestic OTC market (USD billion)



Source: Cetip. Authors' elaboration.

Prior to the worsening of the crisis, the selling pressure of dollars by Brazilian non-financial companies in the OTC derivatives markets was conveyed through arbitrage to the spot exchange rate, causing further currency appreciation. At its height, the public disclosure of their losses had a dramatic effect. The size of the shock was directly linked to the unawareness of companies' exposure to short derivative bets in dollars. Since these are "out of balance sheet" operations, they are rather opaque. Even in the cases of publicly traded companies, whose quarterly results are published, the control and the normative structure required to disclose the results of such operations did not exist for non-financial companies. Lessa (2008) points out the urgent need to reform their regulation and supervision, "We cannot go to sleep one night thinking that Sadia, Aracruz, Votorantim and Vicunha are in a good situation, only to find out, the next morning, that they themselves do not know the extent of their losses."

Until the disclosure of the companies' losses, the reduction in foreign capital inflows, higher outflows and the deterioration of the trade balance were the main transmission channels of the international crisis to emerging economies. But,

uncertainty about the solvency of large industrial enterprises due to losses with FX derivatives played a crucial role to the emergence of confidence crisis almost similar to that prevailing in developed economies, putting additional pressure on the exchange rate. Moreover, companies started buying foreign currency, either to honor future contracts with suppliers of imported parts and raw materials or in an attempt to cover their losses in FX derivative markets, which triggered even more the Brazilian currency depreciation and worsened those losses. A process of loss of trust in the companies was observed, due to their operations performed in opaque markets. This meant larger difficulties in securing new loans or renewing old ones, not just because those companies lost credibility with the banks for making "unknown" operations, but also because they endangered, in a great measure, their future profits, destined to the payment of those debts.

On their side, banks were involved, be it as direct counterparts in FX OTC derivatives, be it in credit operations linked to FX derivatives, be it as creditors in regular loans. In those three cases, they faced a significant credit risk. For not knowing the degree of exposure of other banks to the risk of losses in these OTC operations²³, banks withdrew credit not only to companies and individuals but also to each other in the interbank market (Prates and Cintra, 2010). In other words, banks set in motion a movement of absolute risk aversion and liquidity preference.

Therefore, in the case of Brazilian economy, FX derivatives were the financial innovation that amplified the contagion effect of the crisis, increasing its financial fragility. As detailed above, institutional and macroeconomic features have reinforced the already key role of this class of derivatives in emerging countries, whose currencies are positioned at the lower end of the currency hierarchy. Hence, on the contrary of the epicenter of the crisis (the US) and other advanced economies, credit derivatives (i.e., Credit Default Swaps – CDS) were not important in Brazil. It's market was very thin and illiquid mainly because even though banks demanded protection against credit risks, very few agents were willing to sell this protection for a premium much lower than the interest rate paid by public bonds that carries an inferior risk.

²³ Unibanco, one of the major national private banks, incurred with large losses in FX derivatives operations and was acquired by Itaú in November 2008.

Yet, the financial fragility did not turn into a financial crisis because of the countercyclical measures launched by the Brazilian government²⁴, among which stands out the actions taken by the three major federal public banks (Banco do Brasil -BB, Caixa Econômica Federal - CEF and Banco Nacional de Desenvolvimento Econômico e Social - BNDES) that extended more credit to firms and families as private banks reduced their offer. It is worth mentioning the Provisionary Measure n. 443 of October 21, which authorized BB and CEF to acquire participation in financial institutions based in Brazil. On the basis of this measure, BB bought Votorantim Bank, avoiding its bankruptcy. Moreover, the government increased the capital of BNDES in order to boost its capacity to grant loans and announced a series of initiatives that together provided BRL 19 billion for various sectors through these banks, avoiding a sharp drop of credit operations and, consequently, of the economic activity in a context of high liquidity preference of private banks. Finally, BNDES performed a coordination role in the process of debt restructuring and/or rolling over of companies that incurred huge losses from FX derivatives (Prates, 2010). As Minsky (1993) points out, the fragility of an economy will also be determined by the institutions in place and by their ability to increase liquidity when needed.

The contagion effect of the global financial crisis also disclosed shortcomings in the FX derivatives regulation. On one hand, these losses could not have been previously assessed by their shareholders. On the other hand, banks faced credit risks because of loopholes in the regulations and lack of transparency due to the non-consolidation of each agent's derivative positions.

In order to fix these problems, at the end of 2008 the CVM issued statement 475/08 in combination with Resolution 566/08, both of which made the dissemination of data regarding derivatives more transparent and facilitated the analysis of firms' accounting exchange-rate exposure²⁵. New accounting rules were also adopted in Brazil, in accordance with the recommendations of the *Comissão de Valores Mobiliários - CVM* (Brazilian Securities and Exchange Commission), among which the

²⁴ On the Brazilian government response to the contagion effect of the global financial crisis, see Cunha, Prates & Ferrari (2012).

²⁵ For more information on these changes, see Rossi Júnior (2011).

one that deals with the financial instruments stands out; such instruments extend from the exotic derivatives to any receivables (Valenti, 2009). Under the new rule, issued in December 2008, the disclosure of the table of sensitivity analysis in three different scenarios, which used to be optional, as in the balance of the third quarter, became mandatory, in the annual balance of 2008 (Valenti & Fregoni, 2009). Moreover, in November 2009 the BCB established mandatory registration of financial derivatives linked to foreign loans (Circular 3.474). According to the director of relationships with participants of Cetip, Jorge Sant'Anna, the objective of the derivatives center is to disclose information about the companies' negotiations with derivatives, in such a way that the participants of the market could evaluate the consolidated risks (Pavini & Carvalho, 2009).

Nonetheless, important measures regarding the improvement of FX derivatives regulation were taken when the contagion effect had already been overcome and a new boom of capital flows to emerging economies arose. The very post-global-crisis scenario combined with domestic factors (mainly the resumption of economic growth, the depth and liquidity of capital and derivatives markets and still high interest rates by international standards) resulted in large capital inflows and strong appreciation pressures between 2009 and the third quarter of 2011. Indeed, Brazil became the main destination for capital flows in Latin America in this period (IMF, 2011; Fritz and Prates, 2014).

The first measure was, indeed, a private initiative. In December 2010, the Brazilian Bank Association (Febraban) established the Centre for Exposure in Derivatives (CED in the Portuguese acronym), which was the most important step to address the shortcoming in transparency in the domestic derivatives market (Prates, 2014).

The other ones were part of a set of measures launched between 2009 and 2011 aimed at curbing the appreciation pressures on the Brazilian currency caused by the resumption of canonical and derivatives carry trade operations over the aforementioned new boom of capital flows. As during the optimistic wave that took place before the global crisis (see section III), the FX derivatives market played a central role in the trajectory of the Brazilian currency during this boom. On the other side, on the contrary

of the pre-crisis boom, the Brazilian government, in tandem with many other emerging countries, chose to not adopt a hands-off approach to capital inflows. Although the FX derivatives regulations adopted over this period had a cyclical or macroeconomic aim (hinder the FX derivatives carry trade), they changed in a definitive or structural manner the FX derivatives institutional framework, as detailed in the following.

The institutional specificities of the Brazilian FX market have presented Brazilian policy makers with greater challenges than those faced by their counterparts in other economies with similarly large derivative markets, such as South Korea. Firstly, besides having had to address the low efficacy of capital controls in dealing with FX derivatives operations (due to their high degree of leverage as to be carried out it requires only a margin requirement), Brazilian authorities have also had to take into account the possibility that these operations could simulate the impact of capital flows on the exchange rate without any effective foreign currency flows. Secondly, prudential financial regulation is also insufficient in because it encompasses only financial institutions, not reaching corporations and foreign investors, who are also important agents (mainly the latter) in the FX Future market. It is worth mentioning that in Korea prudential regulation was sufficient to curb FX derivatives operations which are concentrated in the OTC market, where banks are the counterpart of corporations in the FX contracts, where gains or losses are liquidated in US dollars (i.e, deliverable). Thus, prudential financial regulation has been sufficient for curbing currency appreciation and financial fragility.²⁶

In this setting, the first two FX regulations were adopted along with the tightening of capital controls (see Table 3). The most important for the FX derivatives market institutional framework has been the second one, which prohibit agents to meet their margin requirements in BRL via domestic borrowed securities or guarantees from local banks. On their side, the IOF's increase had a macroeconomic aim, namely, to stem the derivatives carry trade. Yet, it had a low efficacy due to the latter's high degree of leverage as well as to the regulatory arbitrage set in motion by banks and nonresident investors to circumvent the tougher price-based capital control. Indeed, the higher IOF

²⁶ For a detail analysis of the Korean and Brazilian response to the post-crisis optimistic wave and the new approach of the IMF with regards to capital controls, see Fritz and Prates (2014).



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on capital inflows encouraged the derivatives carry trade (build-up of long BRL/short USD positions in the FX derivatives market) by nonresidents. But, this was only possible because resident dealers' banks assumed the contrary position of nonresident investors in the derivatives market (short BRL/long USD) and, simultaneously, increased their short positions in the spot market. It is worth remembering that banks need to fulfill prudential financial regulation requirement and are the sole institutions able to carry USD positions in the Brazilian spot currency market.

Table 3. Capital controls, prudential regulation and FX derivatives regulation

Date	Number and Kind⁽¹⁾	Tighten or Loosen	Measure
Oct./2009	1 ⁰ CC	Tighten	2 percent financial transaction tax (IOF in the Portuguese acronym) on non-resident equity and fixed income portfolio inflows.
Oct./2010	2 ⁰ and 3 ⁰ CC	Tighten	(i) IOF increased from 2 to 4 percent for fixed income portfolio investments and equity funds. (ii) IOF increased to 6 percent for fixed income investments.
Oct./2010	1 ⁰ and 2 ⁰ FXDR	Tighten	(i) IOF on margin requirements on FX derivatives transactions increased from 0.38 to 6 percent. (ii) Loopholes for IOF on margin requirements closed.
Jan./2011	1 ⁰ PR	Tighten	Non-interest reserve requirement equivalent to 60 percent of bank's short dollar positions in the FX spot market that exceed USD 3 billion or their capital base.
Mar./2011	4 ⁰ CC	Tighten	Increased to 6 percent the IOF on new foreign loans with maturities of up a year.
April/2011	5 ⁰ CC	Tighten	(i) 6 percent IOF extended for the renewal of foreign loans with maturities of up a year. (ii) 6 percent IOF extended for both new and renewed foreign loans with maturities of up to 2 years.
July/2011	2 ⁰ PR	Tighten	Non-interest reserve requirement mandatory for amounts over USD 1 billion or capital base (whichever is smaller).
July/2011	3 ⁰ FXDR	Tighten	(i) Appointment of the Monetary Council of the Brazilian Central Bank (CMN) as the agency responsible for regulating the derivatives market. (ii) Requirement that all FX must be priced according to the same method. (iii) Requirement that all FX derivatives must be registered in clearing houses. (iv) Requirement that FX exposure of all agents must be consolidated (liquid position). (v) Implementation of a 1 percent financial tax on all agents' excessively long positions on BRL. This tax can be increased to 25 percent.
Dec/2011	6 ⁰ CC	Loosen	IOF on equity and fixed income (linked with infrastructure projects) portfolio inflows reduced to 0 percent.
Mar./2012	7 ⁰ CC	Tighten	(i) 6 percent IOF extended for both new and renewed foreign loans with maturities of up to 3 and then to 5 years. (ii) Export advanced payment transactions with maturities of more than a year prohibited.
Mar./2012	4 ⁰ FXDR	Loosen	Exporters hedge operations exempted from the IOF.

June/2012	8 ^o CC	Loose n	6 percent IOF only for new and renewed foreign loans with maturities of up to 2 years.
Dec./2012	9 ^o CC	Loose n	(i) 6 percent IOF for foreign loans with maturities of up to 1 year (ii) Export advanced payment transactions maturity extended from 1 for 5 years.
Jun./2013	10 ^o CC	Loose n	IOF on fixed income portfolio inflows reduced to 0 percent.
Jun./2013	5 ^o FXDR	Loose n	IOF of 1 percent on excessive long net positions of FX derivatives of all agents reduced to 0 percent.
Jul./2013	3 ^o PR	Loose n	Non-interest reserve requirement on bank's short dollar positions in the FX spot market reduced from 60 percent to 0 percent

Source: Own elaboration based on Central Bank's and Minister of Finance's websites.

Note: (1) FX = Foreign exchange; CC = Capital Control; PR = Prudential Regulation; FXDR = Foreign Exchange Derivatives Regulation.

To close this loophole, the BCB imposed a noninterest reserve requirement, a prudential financial regulation tool, on bank short positions in the spot market in January 2010 (see table 3). Nevertheless, by switching to short-term foreign borrowing, companies and, mainly, banks were able to find another channel for regulatory arbitrage. As a regulatory response, the government imposed the IOF on short-term foreign borrowing in March 2011. However, as these private agents were able to make longer-term loans in the context of excess of liquidity and searching for yield in the international financial market, the government subsequently extended the IOF to these loans.

As the measure taken until April 2011 had only curbed the pace of currency appreciation, the Brazilian government launched a broader set of FX derivatives regulation at the end of July 2011. The government imposed a financial tax of 1 percent on excessively long positions on BRL in the FX derivatives market; at the same time, it adopted new rules to improve the market's transparency (see Table 3).

Final remarks

The optimistic period hid growing macroeconomic imbalances in Brazil. Those lingering problems started to assert themselves in May 2013, after the announcement of Ben Bernanke, president of the Federal Reserve (Fed), that the quantitative easing



**Multidisciplinary Institute for
Development and Strategies**

program would be progressively reduced till it ended (the so-called tapering). The effects of the expected change in the Fed monetary policy were felt around the world, but more acutely in emerging economies. Among them, Brazil experienced the sharpest devaluation of its currency.

Facing capital flight, Brazilian government suspended all the measures destined to reduce the inflow of foreign capital and curb the FX derivatives carry trade. Furthermore, it did not resort to any plain vanilla spot market auctions to ensure smoother variations of the exchange rate market but, rather, implemented a new program of currency swap contracts, that trade the FX variation (plus a local onshore USD interest rate) for the cumulative domestic interest rate (Kohlscheen and Andrade, 2013). It included daily auctions of swaps for the notional value of USD 500 million. The amount fell to \$ 200 million per day in January 2014.

This program was successful in stemming the currency depreciation for more than a year. In other words, this was a period in which banks that were buying those swaps from the monetary authority registered losses and the BCB earned revenues. But shortly before the presidential election of October 2014, market's participants risk aversion worsened both for political and economical reasons and the foreign exchange rate of the real plunged. From that moment on, BCB accumulated financial losses on its position in currency derivatives, that would, eventually, be translated in fiscal expenses.

The economic policy of the reelected government underwent major changes, taking a more orthodox approach with fiscal austerity at its center and a non-proclaimed aim of minimizing interventions through swaps in order to restore an almost purely floating exchange rate regime. The change has begun in January 2015, with the reduction of the daily supply of FX swaps to an amount varying between USD 50 million to USD 100 million per day. In March, the emission of new swaps was halted, although the renewal at maturity of the existent swaps was assured. At a hearing at the Senate, the president of the BCB, Alexandre Tombini, declared that he believed that "the total amount of USD 114 billion is sufficient to allow the private sector to survive and not going bankrupt because of the exchange rate" (Ribeiro and Marques, 2015). Then, in May, BCB announced that it would reduce by 20% the amount of these renewals.



**Multidisciplinary Institute for
Development and Strategies**

It seems that the president of the BCB is right. Up to now, the available information indicates that over the post-crisis boom of cross-border finance neither banks nor corporations engaged in high risk operations linked to FX derivatives, as happened in the pre-crisis one. Hence, the enhancement of the FX derivatives regulation framework after the global crisis was efficient in curbing the rise in the economy financial fragility, which is only brought to light when the burst comes.

However, it is worth to mention that the FX derivatives regulations launched over the new optimistic wave were ineffective to stem the currency depreciation when the cross-border finance cycle unwound. In a setting of flight to quality (i.e, to U.S Treasury bonds) and high risk aversion, the removal of the regulatory toolkit which only penalizes bets in favor of the BRL was virtually harmless to bring down the rise in the BRL/USD exchange rate. As during the boom, in the bust phase the changes in investors' positions in the foreign exchange future markets were the main determinant of the BRL trend. Indeed, the withdrawal of the IOF on long positions in June 2013 made easier the portfolio adjustment to short positions, which means bets on the BRL depreciation. Only a symmetrical financial tax on both excessive short positions (i.e, a foreign exchange derivatives regulation which penalize bets on the BRL depreciation) could restrain the volatility generated in the different phases of cross-border finance process.

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