

Working Paper No. 07/2013

**Beyond capital controls: the regulation of foreign
currency derivatives markets in South Korea and Brazil
after the global financial crisis**

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October 2013

In cooperation with

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Abstract

Besides the management of capital flows, some emerging economies have been facing policy dilemmas related to foreign (nonresident) and domestic (residents) operations of Foreign Currency (FX) derivatives in the post-global crisis setting. In a context of abundant liquidity and historical low interest rates in the advanced economies, searching for yield foreign investors as well as domestic agents generally obtain huge profits, through these markets, from the interest rate differentials between advanced and emerging economies. Yet, the regulation of FX derivatives in the emerging economies has not received due attention both in the academic literature and in the international financial institutions, even though these could be crucial for the emerging economies with high degree of financial openness and liquid as well as deep FX derivatives markets, such as Brazil and South Korea. The paper aims at analyzing the Brazilian and Korean approach for FX derivatives regulation after the global financial crisis. Therefore, it seeks to contribute to the debate on financial regulation brought about by the global crisis. The two cases show the relevance of the institutional features of FX derivatives market for the drawing of the financial regulatory toolkit. In the case of Brazil we found that a third type of financial regulation, which we have labeled as FX derivative regulation, was needed to curb the currency appreciation trend, along with capital controls and traditional prudential financial regulations.

Keywords: Foreign Currency derivatives regulation, capital flows, capital controls, prudential regulation.

JEL codes: F3, F62, F65

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1. Introduction

Emerging economies¹ are coping with the problems of success. Not only do they boast the employment and growth rates that are the envy of OECD countries, but they also have recovered rapidly from the financial crisis sparked by the Lehman Brothers default in 2008. As a consequence, since mid-2009 emerging economies have experienced a new boom in capital inflows (which lost momentum after the second quarter of 2011 due to the euro crisis and the ‘double-dip’ threat). Many governments are becoming increasingly concerned about the downsides of such inflows. They perceive dependence on highly volatile capital flows as a threat not only to short-term financial stability but also, more generally, to their domestic policy space.

At the same time, the debate about capital controls, long discarded as anachronistic has returned to the political and scholarly agenda with a vengeance². Even the IMF (International Monetary Fund), which was long hostile to any kind of capital control regime, is engaging in a new debate on capital flow management (Gallagher, 2012, IMF, 2012, Fritz and Prates, 2012). However, this debate finds the international financial institutions ill prepared, as well as much of academia. As Rodrik (2010, p. 2) states:

“We currently do not know much about designing capital control regimes. The taboo that has [been] attached to capital controls has discouraged practical, policy-oriented work that would help to manage capital flows directly.”

Besides the management of capital flows, some emerging economies have also faced policy dilemmas related to foreign (nonresident) and domestic (residents) operations of Foreign Currency (FX) derivatives. In an environment of abundant liquidity and historical low interest rates in advanced economies, searching for yield foreign investors as well as domestic agents, often obtain huge profits from the interest rate differentials between advanced and emerging economies through these markets. Yet, the regulation of FX derivatives in emerging economies has not received due attention either in the academic literature or in the international financial institutions, even though these could be crucial for the emerging economies with high degree of financial openness and liquid as well as deep FX derivatives markets, such as Brazil and South Korea.

¹Emerging economies are defined here as those developing countries that have engaged in the process of financial globalization. This concept of emerging economies thus refers to a dynamic process as a growing number of countries have taken part in it since the 1990s. Therefore, we do not adopt herein the IMF definition, which classifies South Korea as Newly Advanced Economy.

²For instance, see Gallagher, Griffith-Jones and Ocampo (2012) and Jeanne, Subramanian and Williamson (2012).

As Mihaljek and Packer (2010, 51) have pointed out, Brazil and South Korea (hereafter, South Korea) have the largest FX derivatives markets among emerging economies. The combination of this feature with a hands-off approach to capital inflows and a macroeconomic regime based on a dirty floating³ along with an inflation target policy explain the strong contagion effect of the global financial crisis on the Brazilian and Korean currency and financial markets, in spite of their current-account surpluses until 2007 and their huge international reserves (see Prates; Cintra 2010).

Brazil and South Korea (such as other emerging economies) have learned lessons from the global crisis, which demonstrated that reserve accumulation could not cushion them against the adverse effects of volatile capital flows and speculative operations in the FX derivative markets. Since 2009, both countries have resorted to capital controls to deal with the new boom of capital flows⁴ to emerging economies as well as to regulatory tools to curb FX derivatives transactions of non-residents and/or resident agents.

The paper aims at analyzing the Brazilian and Korean approaches of FX derivatives regulation after the global financial crisis. Therefore, it seeks to contribute to the debate on financial regulation brought about by the global crisis. While there is a growing consensus regarding the need for a more systemic approach to macroeconomic, monetary and financial policies (Blanchard et al. 2010; Eichengreen et al. 2011), instead of one that prioritizes price-level stabilization alone, the debate on the regulation of international capital flows and, mainly, of FX derivatives in emerging economies is far from consolidated, both in theoretical terms and with regard to economic policy recommendations.

The arguments are organized as follows. In section two we present the conceptual and analytical approach which underlies the case studies. In section three we analyze the Korean and Brazilian experiences. The paper closes with some final remarks on the lessons that can be drawn from these two case studies.

³ In a system of floating exchange rates, the country's central bank occasionally intervenes in the currency market in order to reduce the volatility or to change the direction of the country's exchange rate.

⁴ Besides Brazil and Korea, the other countries that have been the main recipients of capital inflows in the post-crisis boom of capital flows are South Africa, Peru, Thailand, Indonesia and Turkey. For more details, see IMF (2011a).

2. A broad approach on financial regulation

The academic literature on capital flows regulation by emerging economies – in other words, external financial regulation – has flourished since the 1990s and gained further momentum after the global financial crisis, resulting in different typologies. In chronological order, Epstein, Grabel and Jomo (2004) name as ‘capital management techniques’ two complementary types of financial policies which affect capital flows and which are often overlapping. These are policies that govern international private capital flows, called “capital controls,” and those that enforce prudential management of domestic financial institutions. This is because some prudential financial regulation instruments function in practice as capital controls, while some of these controls contribute to reducing systemic financial risks. In turn, Ocampo (2012) and Gallagher, Griffith-Jones and Ocampo (2012) prefer to use the term “Capital Account Regulations (CAR)” to underscore the fact these regulations that reach capital flows belong to the broader family of financial regulations and should comprise not only inflows but also outflows and price-based and quantity-based instruments. On the other hand, Priewe (2011) brings forward the concept of Capital Account Management (CAM), which encompass all the forms through which authorities could influence (in)directly capital flows and capital accounts, that is: sovereign monetary and fiscal policy, exchange rate management, domestic financial sector regulations, FDI-related regulations, direct capital controls and international rules and coordination intervention to stabilize exchange rates⁵.

Despite the conceptual differences⁶, all of them acknowledge that: (i) the regulation of capital flows needs to encompass multi-faceted policies – capital controls and prudential regulations – since no single measure can achieve diverse objectives; (ii) a strict bifurcation between these policies often cannot be maintained in practice (Epstein, Grabel and Jomo, 2004, Ocampo, 2002, Schneider 2001); (iii) there is often a great deal of synergy and overlap between these measures. As Epstein, Grabel and Jomo (2004:6) pointed out, “the effectiveness of any single management technique magnifies the

⁵ Along with Priewe (2011), Gallagher, Griffith-Jones, and Ocampo (2012) as well as other authors (such as Rodrik 2010; Cordero and Montecino 2010; Nogueira 2012) support that measures taken by emerging economies to regulate capital flows should be complemented by capital flow management policies in the “source” countries of capital flows in order to distribute the burden of the volatility of global financial flows.

⁶ Concerned with the amount and volatility of these flows and their potentially damaging consequences for emerging economies, the IMF has been making a clear shift in its official position regarding the evaluation of capital controls (IMF 2010, 2011a, 2012b; Ostry et al. 2010, 2011), which resulted in a new institutional view endorsed by the IMF (IMF 2011a, IMF 2012b). In these recent papers, the menu of measures designed to influence capital inflows are called ‘Capital Flows Management Measures’, defined as the sum of the measures established to slow exchange rate appreciation and/or divert capital flows to other countries. It comprises measures distinguishing between residency statuses and between currency denominations, as well as other regulations such as minimum holding periods and taxes on specific investments that are typically applied in the nonfinancial sector (IMF 2011a, 6, see also p. 40f.). For a critical analysis of the new IMF approach see Fritz and Prates (2012) and Gallagher (2012).

effectiveness of other techniques, and enhances the efficacy of the entire regime of capital management. For example, certain prudential financial regulations magnify the effectiveness of capital controls (and vice versa). In this case, the stabilizing aspect of prudential regulation reduces the need for the most stringent form of capital control. Thus, a program of complementary capital management techniques reduces the necessary severity of any one technique, and magnifies the effectiveness of the regime of financial control"; (iv) there is also feedback loops between these two regulations (prudential financial ones and capital controls) and macroeconomic policy.

Moreover, in emerging economies with high degree of financial openness and sophisticated domestic financial markets, these markets and cross-border flows are deeply intertwined. In this setting, the traditional analytical division (generally adopted in the literature) between domestic and external financial regulation is no longer useful or even possible. Therefore, financial regulation in emerging economies with these features should be considered in a broader sense, without the internal and external dimensions being apart. Prudential financial regulations, capital controls and other regulatory measures (such as the regulation of derivatives markets) should be seen as an essential part of the financial regulatory toolkit that should govern residents and non-residents as well as financial and non-financial agents, with respect to their portfolio decisions in foreign and domestic currency in both spot and derivatives (forward settlement) markets.

This toolkit will be country-specific, as it will be shaped by the country features regarding the degree of financial openness, the financial system institutional framework and the policy goals of the financial regulation. In the case of emerging economies, the most important of these goals are the reduction of financial risks and the increase of the policy space to control key macroeconomic prices such as the exchange rate and the interest rate, mainly to enable the pursuit of countercyclical policies during booms and busts of capital flows and risk appetite of global investors. It is worth to highlight that there are important feedbacks between these two goals. For instance, currency appreciation stimulates speculative positions FX derivatives, threatening financial stability. Therefore, the capacity to maintain the exchange rate at a competitive level (second goal) contributes to financial stability (first goal).

As each regulatory tool is also specific in terms of the range of agents and markets that it can reach (see table 1), every country's regulatory toolkit could encompass a number of regulations, which will depend on its institutional specificities and policy goals. Therefore, it is important to define clearly each type of regulatory tool.

Prudential financial regulations refer to policies, such as capital-adequacy standards, reporting requirements, or restrictions on the ability and terms under which domestic financial institutions can provide capital to certain types of projects. They also refer to prudential rules on currency mismatching of balance sheets, or restrictions on issuing certain types of derivatives or forward contracts (Epstein, Grabel and Jomo, 2004). Therefore, these regulations reach only asset and liability positions of resident financial institutions.

Regarding capital controls, there is no unique, generally accepted legal definition. Therefore, we stick to the broadest and functional definition proposed by Neely (1999), according to which these controls refer to measures that manage the volume, composition, or allocation of international private capital flows⁷. Capital controls can target inflows or outflows, and generally concern particular flows (such as portfolio investment, based on their perceived risks and opportunities). Moreover, capital controls can be tax-based or quantitative. Financial taxes or reserve requirement against certain types of investments are examples of tax-based controls. Quantitative capital controls involve outright bans on certain investments (e.g. the purchase of equities by foreign investors), restrictions or quotas, or license requirements (Epstein, Grabel and Jomo, 2004). In other words, capital controls are a range of financial regulation tools that manage cross-border flows (both inflows and outflows) associated with foreign investors as well as resident companies and banks. Then, on the contrary of prudential financial regulations, they could influence portfolio decisions taken by resident non-financial institutions and nonresidents agents.

Besides prudential financial measures and capital controls, a third kind of regulation could be needed to curb financial risks and increase the policy space in Emerging Economies with open and sophisticated FX derivatives markets, depending on the institutional features of these markets. This is because, on one hand, prudential financial regulation may not be sufficient to reach FX derivatives operations as it only achieves financial institutions balance-sheets. Therefore, FX derivatives operations carried by nonresident investors and non-financial resident agents are outside the scope of this class of regulation. On the other hand, capital controls (as defined above) solely influence cross-border transactions and, thus, do not cover FX derivatives operations in the domestic market. Even in an operation carried by foreign investors, capital controls are not the most suited and effective type of regulation, as they would have only a small impact in the case of a

⁷Ostry et al. (2011a, 11) admit that there is no unique definition of capital controls, but stick to a juridical definition brought forward by the OECD in its Code of Liberalization of Capital Movements (2009) which considers capital controls to be subject to liberalization obligations only if they discriminate between residents and nonresidents. The following IMF papers on this subject have also adopted this definition.

capital inflow connected with paying for the cost of a derivative operation (such as margin requirements on futures contracts). It is worth reminding that one important specificity of all types of financial derivatives is its high level of leverage as it requires only a margin requirement (in the case of futures contracts) or the payment of a premium (such as in options contracts) to be carried out. This specific feature, in turn, makes FX derivatives a privileged instrument for currency speculation and for obtaining gains from interest rate differentials. Furthermore, these inflows may not take place, as in emerging economies with open financial markets foreign investors have investments in other financial assets that they could settle and transfer to meet this cost. This third class of regulation will be herein called “FX Derivatives Regulation” which aims at regulating resident and non-resident operations with this forward settlement instrument in the domestic market (see table 1).

Table 1: Financial regulation toolkit

Regulation		Agents		Market (spot vs. derivatives)
		Financial vs. non-financial	Resident vs. non-resident	
Prudential regulation		Financial institutions	Resident	Spot and derivatives
FX derivatives regulation		Both	Both	Derivatives
Capital controls	Portfolio and FDI	Both	Non-resident	Spot
	Foreign loans	Both	Resident	Spot

Source: Author’s elaboration.

3. Case studies

Since 2008, the global economy has been marked by financial turmoil and sharp recessions or low growth in most advanced economies, while most emerging economies and some developing countries have been faring much better in financial and economic terms (Ocampo 2012; Canuto and Giugale 2010; Canuto and Leipziger 2012).

Within the context of abundant liquidity and lower interest rates in advanced economies (consequences of the quantitative easing policies launched in response to the crisis), there has been a new boom in capital flows to emerging economies since the second quarter of 2009. This new boom – the fourth in the post-Bretton Woods era – has been driven by the post-crisis circumstances. After a brief interruption in the fourth quarter of 2008 and early 2009, capital flows returned to emerging economies, chasing yields in the context of abundant liquidity and historically low

interest rates in advanced economies as a consequence of the countercyclical monetary policies launched in response to the crisis. Even though these flows have lost some momentum more recently, especially since the third quarter of 2011, due to the worsening of the euro crisis and another double-dip threat, we assume that the emerging markets will experience an extended period of high capital inflows (Akyüz 2011; BIS 2010; Canuto and Leipziger 2012).

As before the crisis, the currencies and assets of several emerging countries have become, again, the target of carry trade activities – due to the interest rate differentials – and other kinds of capital flows. The resulting combination of high growth rates, accelerating inflation (also associated with a renewed commodity prices boom), excessive currency appreciation and/or asset price overshooting have confronted the emerging economies with policy dilemmas (Akyüz 2011; BIS 2010). In this scenario, the adoption of a restrictive monetary policy would help to contain growth and inflationary pressures, but it would encourage further capital inflows, which, in turn, would foster the asset price boom and exchange rate misalignment, aggravating the risk of future sudden stops and subsequent financial crises. To deal with these dilemmas, many emerging economies have called on different set of measures, encompassing capital controls and financial prudential regulations. Thereby, unlike the case in the pre-crisis context, many of these countries are now unwilling to adopt a hands-off approach to capital inflows.

Yet, country experiences prior to (as many comparative case studies in the past have demonstrated; see for instance Ariyoshi et al. 2000; Herr and Priewe 2006; Magud et al. 2011) or post global financial crisis (see, for instance, Klein 2012, IMF 2011a, Chaboud and Garcia 2013, Fritz and Prates 2012; Baumann and Gallagher, 2012 and 2013) indicate that designing the financial regulatory toolkit is a highly complex process, as it depends on a set of macroeconomic, institutional and structural factors, such as the degree of financial openness, the composition of capital flows, the features of financial and currency markets and the policy goals.

The experiences of Brazil and the Republic of South Korea, the two countries selected for the case studies in this paper, exemplify this. These countries' strategies in managing capital flows during the period 2003–2007 have been very similar, with an over-investment in the costly strategy of reserve accumulation and under-investment in capital account management policies, as Rodrik (2006,12) has pointed out. However, as other emerging economies, Brazilian and Korean policy makers have learned lessons from the global financial crisis, which demonstrated that this strategy could not cushion them against the harmful effects of excessive risk taking by domestic financial institutions and/or currency over-appreciation, caused by capital flows as well as FX derivatives operations.

In the face of the renewed risk appetite of global investors for emerging economies' assets and currencies since 2009, these two countries have also adopted a number of regulatory measures in order to deal with the policy dilemmas and avoid the reemergence of these imbalances. Although, besides regulations aimed at curbing capital flows, they had to adopt specific regulations targeting FX derivatives operations due to their central influence in the exchange rate trend and/or in the financial situation of banks and corporations in both economies. The following two sections detail the set of regulations launched by Brazil and Korea to curb risk-taking strategies through FX derivatives operations, which has varied in each country due to the different institutional features of their FX derivatives markets⁸.

3.1. Korea

After the 1997's crisis, the Korean government decided to increase the country's financial openness. As Kim and Yang (2010) point out, it dismantled most capital flow restrictions and, as was the case in Brazil as well, capital inflows and outflows became market-determined.⁹ During the capital flow boom of 2003–2007 Korea adopted the strategy of reserve accumulation and accelerated the relaxation of outward investment controls in order to stem appreciation pressures; this resulted in the elimination of most of the controls by 2007 (Baba and Kokenyne 2011).

The resumption of inflows following the global financial crisis was led by portfolio flows into debt and equity markets and was driven by both external (the post-crisis circumstances) and internal factors (Korea's quick economic recovery and sound macroeconomic situation). Short-term bank debt, however, remained lower than in the pre-crisis period (Fritz and Prates, 2012) due to the financial regulation strategy launched by Korean authorities since November 2009 to deal with the new boom in capital flows (see table 2). This strategy, in turn, had been shaped by the huge contagion effect that the global financial crisis had in the Korean banking system.¹⁰

⁸ As the focus of our analysis is the FX derivatives operations, the regulation of capital flows will be not detailed in this paper. For a detailed analysis of this regulation in Brazil and Korea after the global financial crisis, see IMF (2001a) and Fritz and Prates (2012). For the Brazilian case, see Chaboud and Garcia (2013) and Baumann and Gallagher (2012). For the Korean case, see Baumann and Gallagher (2013).

⁹For details on Korea's capital account liberalization since the 1980s, see Kim and Yang (2010).

¹⁰ In 2009, the government initiated a US\$130-billion rescue plan to stabilize the domestic financial market, especially the foreign exchange market, because of the huge foreign currency liabilities of its banks. It also adopted other policies intended to alleviate the harmful effects of the crisis on the domestic financial system (Prates and Cintra 2010).

Similar to Brazil, the sharp devaluation of the Korean currency (won) was associated with companies' operations with exchange derivatives. The overshooting of the won–USD exchange rate (see chart 1) between August 2007 and October 2008 was the result of the relationship between FX derivatives operations carried out in the onshore Over the Counter (OTC) derivatives market and the large short-term debt contracted by the country's banks. This link was related to two institutional features of Korea's FX derivatives market. Firstly, in OTC derivatives markets, banks perform the role of counterparts of their clients. Secondly, the gains or losses are settled in US dollars (i.e. they are deliverable), as it is the case in most countries, though not in Brazil.

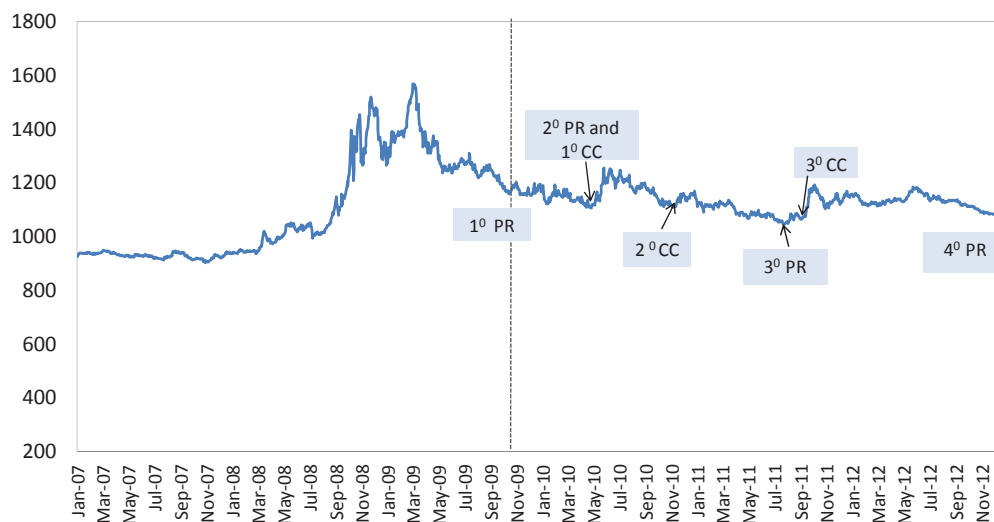
Table 2: Korea: Financial Regulatory Toolkit

Date	Number and Kind ⁽¹⁾	Measure
Nov. 2009	1 ⁰ PR	(i) Higher foreign currency liquidity standards to reduce the maturity mismatch of banks' foreign currency assets and liabilities and to improve the quality of their liquid assets. (ii) A 125 percent cap (relative to underlying export revenues) on forward foreign exchange contracts between banks and exporters.
June 2010	2 ⁰ PR	(i) A ceiling on resident banks' FX derivatives contracts of no more than 50 percent and for foreign bank branches of no more than 250 percent of their capital in the previous month. (ii) A limit on banks allowing them to provide only 100 percent of underlying transactions for forward contracts with exporters (previously 125 percent). (iii) A stipulation that resident banks' FX loans and held-to-maturity securities (equal to or more than one-year maturity) must be covered by at least 100 percent of FX borrowing with maturity of more than one year.
June 2010	1 ⁰ CC	A limitation of foreign currency financing to overseas use only, with some exceptions for SME manufacturers.
Jan. 2011	2 ⁰ CC	Reintroduction of a 14 percent withholding tax on nonresidents' purchases of treasury and monetary stabilization bonds, bringing the tax back in line with the tax on the residents' bond purchases. Foreign corporations and nonresidents are subject to the withholding tax, but those based in countries that have double taxation treaties with Korea and official investors are exempt.
Jun. 2011	3 ⁰ PR	Limits on bank's FX derivatives tightened
Aug. 2011	3 ⁰ CC	Levy on FX liabilities
Nov. 2012 ⁽²⁾	4 ⁰ PR	Limits on bank's FX derivatives tightened

Source: IMF (2011a); Pradhan et al. (2011); Korean Central Bank website; Reuters.

Notes: (1) CC = Capital Control; PR = Prudential Regulation; FXDR = Foreign Exchange Derivatives Regulation; (2) Announcement date. The measure has been effective since January 2013.

Chart 1: Won–USD Exchange Rate and Financial Regulation Measures



Source: Bloomberg, Authors' compilation.
Note: PR = Prudential Regulation; CC = Capital Control

Before the crisis, the banks sold so-called “knock-in-knock-out” (KIKO) foreign exchange options, an exotic OTC derivative for hedging against the appreciation of the local currency in relation to the dollar, to exporter companies (mainly shipbuilders). As Dodd (2009) explains, this option allowed firms to sell dollars at a fixed won–dollar exchange rate (which is the price of US dollars) in the event that the exchange rate fluctuated within a range pre-stipulated in the contract, providing a long position in the local currency. The potential gains of the companies on the transactions (in case the won appreciated as they were long in this currency) were capped or limited while the losses (in case the won depreciated) were not limited and indeed were geared so that losses would occur at a faster rate (usually twice the rate) for a given change in the underlying exchange rate.¹¹

These companies began to hedge their foreign exchange exposure in 2004 and increased their hedging ratio in anticipation of continued won appreciation. In addition, banks – mainly the local branches of foreign banks, which were subject only to risk management standards and not to the liquidity ratios or other direct regulations applicable to Korean banks – engaged in interest rate arbitrage operations, borrowing dollars on a short-term basis, selling these dollars for won on the spot market, then buying certificates of deposit or other domestic bonds and selling the won forward for dollars. It was against this backdrop of strong capital inflows that authorities progressively liberalized capital outflows (Baba and Kokenyne 2011; IMF 2011a).

¹¹ According to Dodd (2009), who provides further details on these derivatives, similar exotic derivatives were traded in other emerging economies, such as Mexico, India, Sri Lanka, Malaysia, Indonesia, China and Brazil.

To make operations in the OTC derivatives market possible and profitable, Korean and locally based foreign banks borrowed in US dollars to sustain their positions in this market. With the outbreak of the crisis and the credit crunch in international financial markets, these banks were unable to roll over their maturing short-term external liabilities as global banks cut credit lines in order to shore up liquidity. Consequently, the former started buying dollars to liquidate their external liabilities, thus exerting devaluating pressure on the won. This depreciation led to losses on the part of those companies that relied on the currency's appreciation and forced them to hand over the corresponding dollars, some of which had to be obtained on the spot foreign exchange market, to the banks. This put further depreciation pressure on the won. Around 520 small and medium-sized export companies that had purchased KIKO options lost an estimated USD 2 billion, being on the verge of insolvency. Several local Korean banks suffered when their customers sued or became bankrupt (IMF 2011a; Kim and Yang 2010; Dodd 2009).

The contagion effect of the global financial crisis thus illuminated the high vulnerability of the Korean banking system to changes in global funding conditions due to its large levels of short-term external debt and related FX derivatives as well as the impact of these spot and derivatives operations on the exchange rate. The financial regulation toolkit adopted by the Korean government since 2009 have therefore aimed at reducing the financial risks and the exchange rate changes arising from capital flows and FX derivatives operations (see table 2).

As the main targets of the financial regulation were banks' spot and forward foreign exchange exposures, Korean authorities launched a set of prudential financial regulatory measures since November 2009 (see table 2) with the goal of strengthening banks' foreign exchange liquidity management and limiting banks' short-term debt and forward contracts to sustainable levels. The measures for reaching these FX forward positions indirectly aim at reducing external borrowing by the banking sector, inasmuch as before the crisis. Korean and locally based foreign banks borrowed in US dollars to sustain their positions in OTC derivatives market.

Therefore, prudential financial regulation measures, which only addressed banks' asset and liability positions in both spot and forward markets (see table 2), helped to prevent the external debt from returning to pre-crisis levels and to limit onshore FX derivatives operations. This is because both the issues were closely linked with the banks' portfolio decisions. Hence, it can be said that these measures contributed to the protection of the exchange rate from appreciation pressures resulting

from banks' short-term external debt¹². Since the adoption of these first prudential financial regulation measure, the won–USD nominal exchange rate has been nominally stable (the won has appreciated only 0.9 percent; see chart 1).As Pradhan et al. (2011) have stated, the decline in demand for currency forwards – especially from shipbuilders, due to a smaller order book in the post-crisis period – has also contributed to stem the won-USD nominal exchange rate appreciation. Yet, in face of the renewed appreciation pressures in the last quarter of 2012 due to Japan's ultra expansionary monetary policy, Korean authorities have tightened the limits on bank's FX derivatives in November 2012¹³ (see table 2).

Finally, it is worth mentioning that, although prudential financial measures have been the main regulatory tool used by Korean policy maker, Korea has also adopted capital controls to counter the undesirable effect of capital flows. Concerning capital controls, the main measure was the withholding tax on foreign holdings of government bonds and central bank securities, which brings the tax back in line with the tax on residents' bond purchases. This price-based capital control was re-imposed in January 2011 due to the strong increase in debt portfolio inflows that reached record levels (IMF 2011a)¹⁴.

3.2 Brazil

The Brazilian government responded to the 1999 currency crisis with the adoption of a new set of economic policies based on an inflation target system and a dirty floating exchange rate. This change in the macroeconomic regime was accompanied by a process of financial opening that had begun in 1990 and gained momentum in January 2000, when 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. Moreover, in 2005, residents' capital exports were fully liberalized. Thereby, the Brazil economy became fully open to capital inflows and outflows.

In this context of high capital mobility, the post-global-crisis scenario combined with domestic factors (mainly the resumption of economic growth and very high interest rates by international

¹² The measures to limit forward contracts between banks and exporters apply only to onshore entities, which allow these agents to engage in contracts offshore using non-deliverable forward contracts (NDFs) (Pradhan et al., 2011).

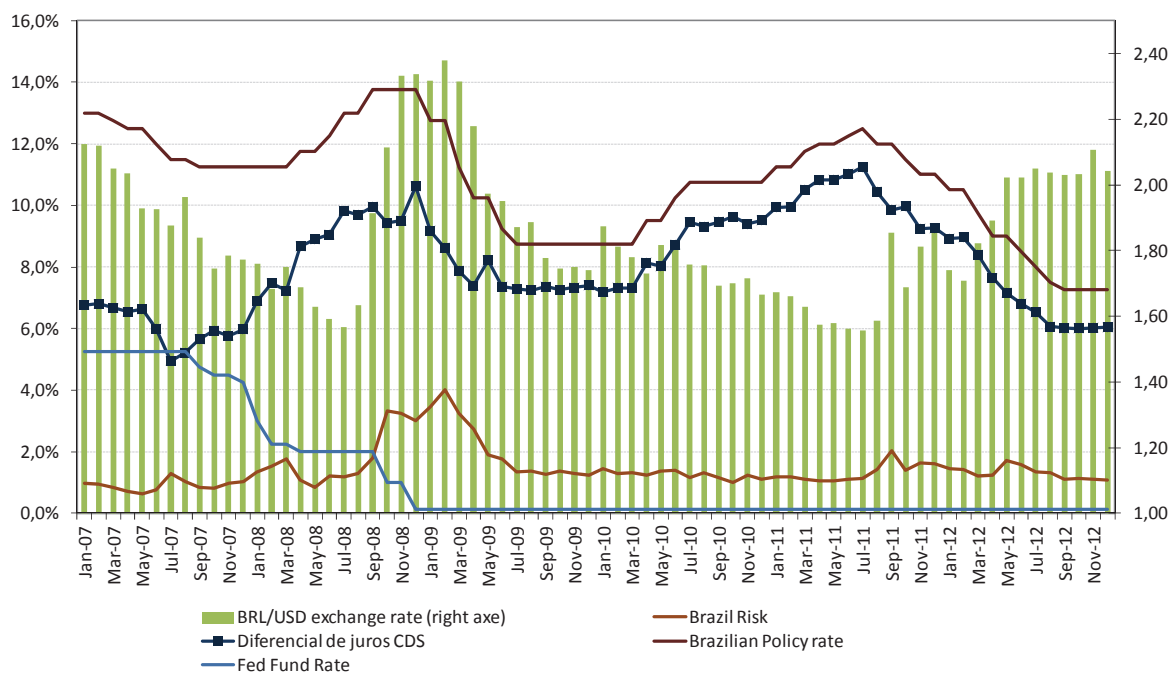
¹³ See Jun and Nam (2012).

¹⁴ According to Pradhan et al. (2011), the impact of this measure on portfolio inflows is likely to be marginal, for two reasons. Firstly, foreign corporations and nonresident investors based in countries that have double taxation treaties with Korea are exempt (and Korea has this kind of treaty with more than 70 countries. Secondly, this tax has not encompassed equity portfolio flows, which have also increased significantly since 2009.

standards until recently) resulted in large capital inflows¹⁵ and strong appreciation pressures between 2009 and mid 2011 (see chart 2 and table 1 in the Statistical Annex). Yet, two specific features of the Brazilian economy – related to macroeconomic and institutional factors – reinforced the economic policy dilemmas faced by Brazilian monetary authorities in terms of macroeconomic management and financial regulation in the post-crisis context.

With regard to the macroeconomic factor¹⁶, it is worth mentioning that the reserve accumulation strategy faces two important constraints: a significant amount of public debt concentrated in short term maturities and a very large differential between internal and external interest rates (which stem from the high domestic policy rate)¹⁷, which made the cost of sterilization operations excessively high, reducing the central bank’s policy space for exchange rate management (Prates, Cunha, and Lélis 2009).

Chart 2: Interest rate differential and nominal exchange rate



Source: Brazilian Central Bank. Author’s elaboration.

Note: (1) Brazilian Policy Rate plus Brazil Risk minus Fed Fund Rate

With respect to the institutional factor, which is the focus of this paper, both before and after the global financial crisis the FX derivatives market has played a central role in the trajectory of the

¹⁵Indeed, Brazil became the main destination for capital flows in Latin America in this period (IMF, 2011a).

¹⁶This factor is not the focus of this paper and is therefore not detailed here.

¹⁷ It goes beyond the scope of this paper to explain the underlying reasons of the very high Brazilian policy rate in comparison of the other emerging economies until 2011. Yet, it is worth to mention that this feature of the Brazilian economy in the 2000s has been related with the adoption of a very rigid inflation target regime. For more details, see Kaltenbrunner and Páncera (2012).

Brazilian currency (BRL), which has been predominantly an appreciation trend¹⁸. This has undermined both the monetary authority's capacity to influence the determination of the exchange rate (based on the conventional exchange rate interventions, such as intervention in the spot currency market) and the efficacy of capital controls and prudential financial regulations to stem the currency appreciation.

This central role of the FX derivatives market stems from the much higher number of trades and turnover of the FX futures market (i.e., the organized segment in the FX derivatives markets) in comparison with the FX spot market, which, in turn, makes the FX futures market deeper and more liquid than the spot one¹⁹. In this setting, the FX futures operations have a key influence in the BRL/USD exchange rate trend, as many studies have already pointed out (Farhi, 2010; Ventura and Garcia, 2010; Garcia e Urban, 2004; Prates, 2009; Rossi, 2012; Kaltenbrunner, 2010; Chamon and Garcia, 2013).

The most important determinant of the higher liquidity and depth of the FX futures market in comparison with the spot market is the prohibition of foreign currency accounts (bank deposits), with only a few exceptions.²⁰ In other words, if we stick to the concept of financial openness proposed by Akyüz (1993), the internal convertibility of the BRL is very limited as almost all transactions have to be settled in the domestic currency. On the other hand, the Brazilian currency has a fully external convertibility, as capital inflows and outflows have been totally liberalized since 2005.

It is worth mentioning that this distinguished feature of the Brazilian currency is associated with the traits of the process of high inflation during the 1980s and the first half of the 1990s, which was marked by a widespread indexation especially in the financial sector. Indexation prevented the dollarization of domestic financial operations and the disintermediation of the banking process. In this context, the financial sector engaged in sophisticated trading operations. Financial sophistication was further facilitated by the dominance of large domestic and foreign banks. Another institutional trait of the Brazilian financial system, also linked with the particular nature of the inflationary process in the country, is the existence since the 1980s of a developed derivatives

¹⁸In other words, a drop in the BRL–USD exchange rate, which is the price of US dollars.

¹⁹According to Avdjiev et al. (2010), the BRL was the second most traded currency worldwide in the organized derivatives markets in 2010, while the financial volume of FX derivatives traded in onshore OTC markets, was low (US\$18 billion in April 2010) relative to other emerging markets, such as Korea.

²⁰ According to chapter 14 of the International Capital and Foreign Exchange Market Regulation (BCB 2013), FX bank accounts are allowed only for embassies, multilateral institutions and assurances companies that deal with foreign trade. However, their use is very limited.

exchange (the organized derivatives market, called BM&F in the Portuguese acronym²¹), where FX futures contracts are traded.

The limited internal convertibility of the BRL is the main determinant of the distinguished features of the FX spot and derivatives markets in comparison with Korea as well as other Latin American Emerging Economies, such as Mexico, Chile and Colombia. As regard the FX spot market, residents and non-residents are not allowed to have FX accounts, they can't hold spot FX positions (in Brazil, positions in USD). Therefore, most of the spot FX transactions are settled by transfers of funds between FX accounts abroad²², that is, they do not result in currency flows, but has an impact on the asset and liability positions of non-residents and residents held abroad. Furthermore, all FX transactions shall be recorded under a FX contract. Only banks authorized by the BCB to have FX portfolios²³ can hold FX spot positions as they have access to short term external credit lines in the international interbank market (called clean lines). However, changes in these credit lines are not recorded under a FX contract as they lead only to changes in bank's asset and liability abroad.

Concerning the FX derivatives market (futures and OTC), the limited internal convertibility of the BRL also underlies its non-deliverable feature, namely, gains or losses in this market are settled in domestic (BRL) and not in the foreign currency (USD), which is normally the case in other countries. Precisely because these operations are settled in BRL, any agent can hold positions in the FX futures market as long as they fulfill minimum standards required by the Brazilian exchange (BM&FBovespa) (Ventura and Garcia 2010; Kaltenbrunner 2010). In the case of FX futures contracts, the main agents are resident banks (whether Brazilian or foreign-owned), resident institutional investors, non-financial resident companies and non-resident investors (who have unrestricted access to the derivatives market since January 2000)²⁴. Indeed, during the periods of low risk aversion both before (2003 to mid-2008) and after the global financial crisis (mainly, from mid-2009 and mid-2011), these investors (primarily hedge funds), have been the most important non-bank investor group in the Brazilian FX futures market, fostering a real appreciation trend through derivative carry trade. This is a different kind of currency speculation strategy from the

²¹ The BM&F merged with Bovespa, the main Brazilian stock exchange on 25 March 2008.

²² The exception is the purchases and sells of foreign currencies related with international travels. In this case, the physical flow is allowed (BCB 2013)

²³ In August 2012, only 14 banks held this status, see: <http://bit.ly/XOjIF9>.

²⁴ It is worth mentioning that the entry of new foreign banks (after banking crisis of 1995), who have expertise in derivatives trading, has also fostered trades of FX futures. This entry was stimulated by the Brazilian government with the aim of helping the banking system restructuration (Paula, 2011). According to Farhi (2001), the trade volume in FX future contracts started growing in the aftermath of this entry, during the second half of the 1990s. Some Brazilian banks, with less expertise in derivative trading, have begun to replicate the strategy of their foreign peers.

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). In 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).

In a macroeconomic environment feature by a “dirty” floating regime (adopted in January 1999) and one of the greatest interest rate differentials in comparison with other emerging economies²⁵ (see chart 2), foreign investors have 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)²⁶, which has resulted in a downward pressure on the USD price and, thus, upward pressure on the BRL price in the future market (Farhi 2010). Furthermore, the income tax on returns of government bonds owned by foreign investors, which stood until February 2006, also increased the advantages of the derivatives carry trade in comparison to the traditional one.

The derivatives carry trade turns out to be even more attractive in Brazil due to the non-deliverable characteristic of the FX derivatives market. This is because foreign and domestic agents can engage in derivatives carry trade without disbursing even a single US dollar. Until October 2010, furthermore, this carry trade strategy could also be executed without the expenditure of one single BRL because investors could meet their margin requirements in BRL via domestic borrowed securities or guarantees from the resident banks²⁷. Despite the predominance of foreign investors in the derivatives carry trade, profit-seeking domestic agents such as institutional investors and companies have also engaged in it²⁸.

²⁵See Prates, Cunha, and Lélis (2009)

²⁶ It is possible to profit from the appreciation of the BRL and the positive interest rate differential via onshore derivatives traded at BM&FBovespa. The most common trades are to short the US dollar futures contract, to short the contracts on the onshore dollar rate, or to short the onshore dollar rate combined with the ongoing long on the domestic interest rate futures (DI x Pre) (Ventura and Garcia, 2012).

²⁷The prohibition of these transactions in October 2010 was one of the FX derivatives regulation launched by the Brazilian government.

²⁸ It is worth mentioning that with the abrupt devaluation of the Brazilian real following the worsening of the crisis in mid-September 2008, around 220 companies (mostly exporters), which had performed high-risk operations in the FX derivative market, incurred major losses. These operations were performed in the context of an uninterrupted appreciation of the Brazilian real since 2003, with the aim of hedging or of obtaining speculative gains (if the value of the operation surpassed that of the exports), or of reducing the cost of bank loans (Prates and Cintra 2010). On FX derivatives operations by Brazilian and other emerging economies' corporations before the global financial crisis, see Farhi and Borghi (2009).

Moreover, the outstanding performance of the BRL futures market has contributed to the increased trading of the Brazilian currency on offshore OTC markets through Non-Deliverable Forward (NDF) contracts.²⁹ This is because the existence of a deep futures market has made it possible for the foreign banks with branches in Brazil to sell BRL offshore (meeting the demand of international investors who were betting on the BRL appreciation) and simultaneously hedge their BRL exposure in the onshore future market (Kaltenbrunner 2010). The growth of the NDF market for the Brazilian real, in turn, has enhanced the liquidity and depth of the Brazilian futures market even more. 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 South-African rand) but do not have deep and liquid derivatives markets, which further increased the trading of BRL futures contracts.

The wide ranges of participants ensure greater trade volume and turnover in the FX futures market compared to the FX spot market. As Garcia and Urban (2004) and Ventura and Garcia (2012) pointed out that in the face of the higher liquidity of the FX futures market, banks with FX portfolio has chosen to transfer operations typical of the spot FX market to the FX futures³⁰, increasing even more trades with FX futures. Indeed, as these authors uphold, due to its higher liquidity, the first dollar future contract (30 days for next settlement) has become the locus of formation of the BRL/USD exchange rate. The spot exchange rate come out by the arbitrage between the futures and spot exchange rates carried out by banks with FX portfolios. These agents enter the opposite position of non-banks investors (among which foreign investors stand out between 2009 and mid 2011) in the FX futures market (long position in US dollars and short in BRL), buying US dollars in this market and selling them in the spot market. With this strategy, banks have earned arbitrage profits and, at the same time, generated pressure on the USD spot price, which has meant a drop in the BRL–USD spot exchange rate and an appreciation of the Brazilian currency. Hence, in Brazil, as only banks can hold FX positions in the FX spot market, these have played a central role in conveying appreciation pressure through the carry trade in the futures market to the BRL–USD spot exchange rate³¹. Yet, it is important to highlight that this key role of the FX future in the BRL-USD exchange rate dynamic does not means that spot FX transactions do not influence this dynamic. The

²⁹ On the NDF market of emerging economy currencies, see Ho and McCauley (2010).

³⁰ The main operation (called in portuguese “diferencial” or “casado”) encompass an operation in the FX spot market linked with an FX future position in the same ammount (Garcia and Urban, 2004).

³¹ The role of FX derivatives in the exchange rate dynamics of advanced economies currencies in the financial globalization setting has already been pointed out by some authors, such as Burnside et al. (2006) and Klitgaard (2004). However, the theoretical analysis of the key influence of these instruments in exchange rate dynamics is far from consolidated. For a ground-breaking approach based on a Keynesian perspective, see Shulmeister (2006, 2008 and 2009).

arbitrage between the futures and spot rates only works if there is liquidity in the spot FX market, which depends on effective FX inflows and outflows, among which trade and capital ones.

Therefore, as in Brazil the main goal of capital controls and prudential financial regulations launched since October 2009 has been to curb the appreciation of the real³², the above features of the Brazilian currency market made Brazilian policy makers face greater challenges than those faced by their Korean counterparts. On one hand, as FX derivatives are non-deliverable, Brazilian authorities have had to address the low (or none) efficacy of capital controls in dealing with foreign investors' positions in these instruments (as explained in section two) as well as the possibility that these FX derivatives operations could simulate the impact of capital flows on the exchange rate without any effective foreign currency flows (and, until October 2010, without the expenditure of one single BRL). On the other hand, in the face of the predominance of FX futures, prudential financial regulation has also proved insufficient to reach FX derivatives operations as it does not encompass non-resident investors and non-bank resident agents. Yet, this regulation has been needed to reach bank's short dollar positions in the FX spot market which are outside the scope of capital controls that apply only to FX flows recorded in FX contracts.

The Brazilian regulatory authorities have recognized these constraints. Since October 2010 they have implemented, along with capital controls and prudential financial regulations, FX derivatives regulations which apply to the FX derivatives operations of all agents, be they nonresidents or residents, financial or nonfinancial actors (as already pointed out in section 2). This third class of regulation technique has been the key in restraining the BRL appreciation trend and, in turn, mitigating the Brazilian government's economic policy dilemma regarding how to contain the growth rate and inflationary pressures without reinforcing exchange rate misalignment (see table 1 in the Statistical Annex).

In October 2010, along with the strengthening of a price-based capital control (a financial tax on inflows called *Imposto de Operações Financeiras*, IOF) on portfolio investment, the Brazilian government launched the first FX derivatives regulation: the financial tax (IOF) on margin requirements for FX derivatives transactions was increased from 0.38 percent to 6 percent, and some loopholes for IOF on margin requirements were closed (see table 3). However, the first rounds of capital controls and FX derivatives regulation proved to be insufficient to halt the BRL/USD

³²On October 21, 2009 (the day after the first control was announced), Finance Minister Mantega stated that "We want to prevent an excessive appreciation of the real. When the real appreciates, it makes our exports more expensive and our imports cheaper, and we already have an expressive increase in imports while the exports are not growing as they should" (Chamon and Garcia, 2013, p. 7).

exchange rate down trend (i.e. BRL appreciation). This is because private agents found loopholes to circumvent these controls and the FX derivatives regulations were lightweight to stem the derivatives carry trade due to the latter's high degree of leverage (see chart 3). In fact, the IOF on portfolio inflows encouraged even more the build-up of long real/short dollar positions in the onshore derivatives market; that is, it fostered the derivatives carry trade supported by resident banks with FX portfolios which assume the contrary position of nonresident investors in the derivatives market (short real/long dollar positions). As these banks have to fulfill prudential rules regarding their FX positions, they increased their short dollar positions in the spot currency market with the aim of reducing or eliminating the currency risk³³.

Table 3: Brazilian Financial Regulation Toolkit

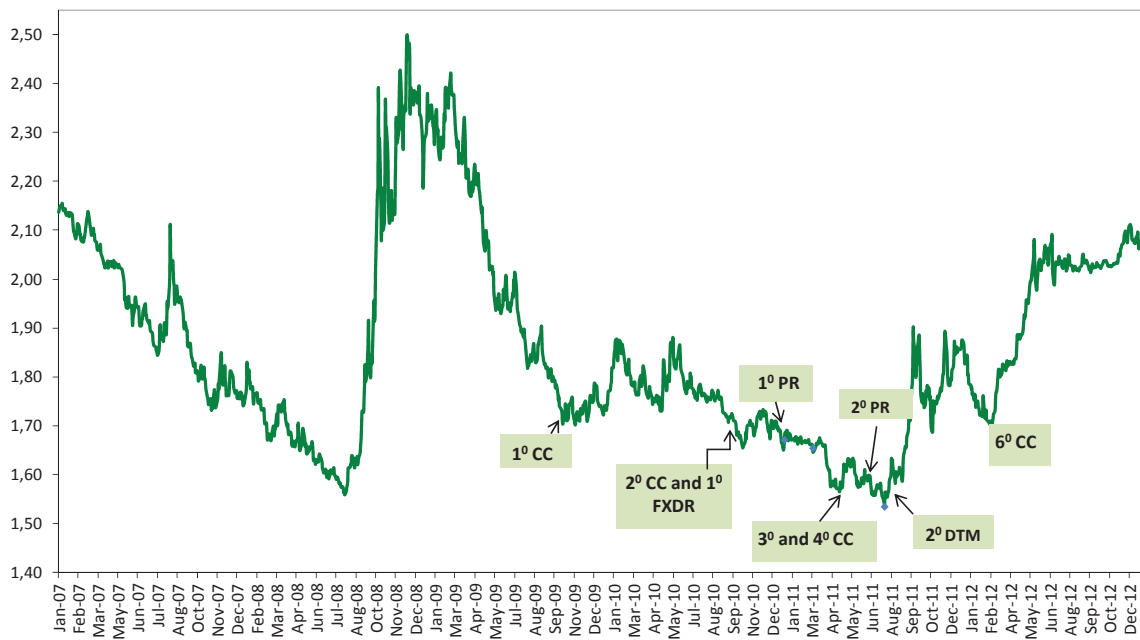
Data	Number and Kind ⁽¹⁾	Tighten or Loosen	Measure
Oct./2009	1 ⁰ CC	Tighten	The Ministry of Finance implemented a 2percent financial transaction tax (IOF) on non-resident equity and fixed income portfolio inflows
Oct./2010	2 ⁰ CC	Tighten	(i) IOF increased from 2 to 4 percent for fixed income portfolio investments and equity funds (ii) IOF increased to 6 percent for fixed income investments (iii) Limitations were also introduced on the ability of foreign investors to shift investment from equity to fixed income investment
Oct./2010	1 ⁰ FXDR	Tighten	(i) IOF on margin requirements on FX derivatives transactions increased from 0.38 percent to 6 per cent (ii) Loopholes for IOF on margin requirements were closed: foreign investors in the futures markets were no longer allowed to meet their margin requirements via locally borrowed securities or guarantees from local banks, which allowed them to avoid payment of the tax
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 US\$ 3 billion or their capital base, whichever is smaller (to be implemented over 90 days)
Mar./2011	3 ⁰ CC	Tighten	Increased to 6 percent the IOF on new foreign loans (banking loans and securities issued abroad) with maturities of up to a year. Companies and banks previously only paid a 5.38 percent IOF on loans up to 90 days
April/2011	4 ⁰ CC	Tighten	(i) 6 percent IOF extended for the renewal of foreign loans with maturities of up to 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	The non-interest reserve requirement became mandatory for amounts over USD 1 billion or their capital base (whichever is smaller)
July/2011	2 ⁰ FXDR	Tighten	Excessive long positions on BRL of all agents pay a financial tax of 1 percent. This tax can be increased up to 25 per cent
Dec/2011	5 ⁰ CC	Loosen	IOF on equity and fixed income (linked with infrastructure projects) portfolio inflows reduced to 0percent
Mar./2012	6 ⁰ CC	Tighten	(i) 6 percent IOF extended for both new and renewed foreign loans with maturities of up to 3 years; some days, extended again for both new and renewed foreign loans with maturities of up to 5 years (ii) Export advanced payment transactions with maturities of more than a year prohibited

³³For a detailed explanation, see IMF (2011a).

Mar./2012	3 ^o FXDR	Loosen	Exporters' hedge operations (up to 2 times the exports of the previous year) exempted from the IOF.
June/2012	7 ^o CC	Loosen	6 percent IOF only for new and renewed foreign loans with maturities of up to 2 years (namely, the changes adopted in March were reversed)
Dec./2012	8 ^o CC	Loosen	(i) 6 percent IOF only for new and renewed foreign loans with maturities of up to 1 year (ii) Export advanced payment transactions maturity extended from 1 for 5 years

Source: Authors' elaboration based on BCB's and Minister of Finance's websites. (1): CC = Capital Control; PR = Prudential Regulation; FXDR = Foreign Exchange Derivatives Regulation.

Chart 3: Brazil: Real-USD Exchange Rate (nominal) and tighter regulations applied



Source: Central Bank of Brazil. Authors' elaboration.

To close this loophole, the Brazilian Central Bank imposed a noninterest reserve requirement (a prudential financial regulation) on these positions in January 2010 (see table 3). Nevertheless, by switching to short-term foreign borrowing, banks and companies were able to find another channel for circumvent the regulations. In response, the government imposed the IOF on short-term foreign borrowing in March 2011. However, 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. In April 2011 the government subsequently extended the IOF to these loans. Thus, until the first half of 2011, the financial regulatory toolkit mainly impacted the composition of inflows rather than their volume (Fritz and Prates, 2012; Baumann and Gallagher, 2012³⁴) and did not stop the BRL appreciation, its main policy goal.

³⁴Based on an econometric model (a GARCH regression), Baumann and Gallagher (2012) have found that the introduction of capital account regulations in Brazil between October 2009 and December 2012 was associated with a shift from short-term to longer-term inflows. They have also found that Brazil's measures had a lasting impact on the level and volatility of the exchange rate and modestly increased Brazilian monetary policy autonomy.

As regards to the currency appreciation trend, the turning point was July 2011, when a broader set of FX derivatives regulation was launched. On 29 July 2010, the Ministry of Finance adopted a financial tax of 1 percent on excessively long positions on BRL in the FX derivatives market (see table 3 and chart 3)³⁵. As this tax is calculated on the notional value of the FX derivatives operations, it has a major impact on the derivatives carry trade. As shown in chart 3, right after its entry in force, Brazilian currency started to depreciate, before the loosening of the monetary policy. From the end of August 2011, the depreciation trend has been fostered by the policy rate reductions (see chart 3) and the increase in the risk aversion of foreign agents due to the worsening of the Euro crisis in the second half of 2011. Moreover, as Chamon and Garcia (2013) also stressed, the regulations launched by the Brazilian government to stem the currency appreciation (among which the FX derivatives regulations stand out) may have amplified the effects of the policy rate drop between August 2011 and October 2012 on the BRL/USD exchange rate. The environment of a lower domestic interest rate, in turn, has allowed the loosening of capital controls since December 2012 (see table 3).

Finally, it is worth to mention that Klein (2012) – based on panel and cross-section estimates of the effects of capital controls on GDP growth, volatility, exchange rates, and financial variables across 44 countries over the period 1995–2010 – points out the Brazilian IOF as an episodic control on the capital inflows that did not temper the appreciation of the Brazilian currency. However, this finding is probably a result of the period covered (until 2010). As mentioned before, only through the adoption of broader FX derivatives regulation in July 2011 has the BRL appreciation trend been curbed. Moreover, neither Klein (2012) nor the other recent studies encompassing the Brazilian case (including the IMF papers) consider the regulation of FX derivatives as another kind of regulation distinct from capital controls and financial prudential regulation. This distinction is an important specificity of this paper's approach.

4. Final remarks

As emerging markets with open financial accounts and sophisticated FX derivatives markets, the case studies of Brazil and Korea exemplify that country-specific factors have to be taken into account in the designing of the financial regulatory toolkit aimed at curbing speculative strategies of

³⁵At the same time, new rules to improve the FX derivatives market's transparency were adopted.

searching for yield foreign and domestic agents. Both the cases show the relevance of the FX market institutional features, among which the FX derivatives market specificities, which have brought the need of a third type of financial regulation, which we have labeled FX derivative regulation. In Brazil, only when this class of regulation was added to the capital controls and prudential financial regulation, the policy effectiveness in terms of protecting the exchange rate from downward pressure increased. Additionally, the Brazilian case serves as an example that the effect of foreign investors' portfolio decisions on the exchange rate may be delinked from the volume of international capital flows. As derivative operations are settled in Brazilian currency (non-deliverable), they are likely to impact the exchange rate with very low or even without any international capital inflows or outflows taking place. In Korea, in turn, prudential financial regulations have been able to reach FX derivatives operations as they are mostly carried on OTC markets (where banks performed the role of counterparts in all transactions) and are deliverable (gains or losses are liquidated in US dollars). Thus, prudential financial regulation has been the key instrument for tackling the main causes of financial risks and currency appreciation before the global crisis.

Finally, it is important to mention that Brazil has been able to launch broad capital controls and FX derivatives regulations because the government has been very careful since the 1990 in avoiding to make any commitments under the General Agreement on Trade and Services (GATS) and signing any Bilateral Investment Treaties (BITs) or Foreign Trade Agreements (FTAs) that can reduce the country's policy space to implement these regulations at any moment (Paula and Prates 2012). Although most treaties which liberalize trade in services employ a 'positive list' approach with respect to trade in financial services, capital controls eventually can be inconsistent with the obligations if they intervene in cross-border movements of capital related to these services. The same concern can be applied to the FX derivatives regulation, as non-residents positions in the FX derivatives market involve guarantee margin and can result in gains that will be converted to USD and then will be transferred abroad. On its turn, Korea is the only OECD member that has adopted financial regulations aimed at capital flows and FX derivatives after the global financial crisis. Therefore, Korean authorities have been able to launch these measures despite of the constraints implied by this membership.

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Statistical Annex

Table 1: Brazil and Korea, selected macroeconomic data

Year	Policy rate (in percent)		FX reserves (billion USD)		Inflation (in percent)		Fiscal result (nominal and in % of GNP)	
	Brazil	Korea	Brazil	Korea	Brazil	Korea	Brazil	Korea
2003	23.55	3.96	48.844	154.509	17.05	3.5	-5.23	0.47
2004	16.38	3.6	52.458	198.175	6.29	3.6	-2.9	2.72
2005	19.14	3.33	53.216	209.968	5.77	2.8	-3.58	3.38
2006	15.32	4.23	85.148	238.388	3.27	2.2	-3.63	3.92
2007	12.05	4.73	179.431	261.771	4.08	2.5	-2.80	4.65
2008	12.44	4.73	192.842	200.479	6.57	4.7	-2.0	2.96
2009	10.16	2.04	231.888	265.202	5.06	2.8	-3.3	-1.14
2010	9.89	2.17	280.570	286.926	5.11	2.9	-2.5	-0.04
2011	11.76	3.1	343.384	298.233	6.6	4.0	n.a.	n.a.

Source: Authors' compilation using Oxford Economics, IFS/IMF, Brazil and Korea Statistics.

Publisher: Competence Center "Money, Finance, Trade and Development"
HTW-Berlin – Treskowallee 8, 10318 Berlin
Prof. Dr. Sebastian Dullien, Prof. Dr. Jan Priewe

<http://finance-and-trade.htw-berlin.de>

ISSN: 2192-7790

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