

# **Emerging Countries and Inconsistencies in Macroeconomic Policy: The Inflation Targeting Regime and Exchange Rate Management**

**Annina Kaltenbrunner (University of Leeds and SOAS)**

**Juan Pablo Paineira (Brazilian Central Bank and SOAS)**

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## **Abstract:**

This paper presents a critical analysis of inflation targeting cum floating exchange rates in emerging markets. It shows that, in contrary to what would be advocated by economic theory, inflation targeting emerging countries have intervened heavily in the foreign exchange market, both in times of appreciation and in times of depreciation, to manage their exchange rates. This has induced several academics to propose an inflation targeting *cum* managed exchange rate for emerging markets. This paper, however, argues that this combination is inconsistent if not self-defeating, particularly in the recent context of increased financial integration. It shows, at the example of Brazil, how the foreign exchange operations by the Brazilian central bank were not only ineffective but also counter-productive in managing the exchange rate under the existing institutional framework of an inflation targeting regime. To do so, it employs a mixed-method study, combining quantitative with qualitative data from 52 semi-structured interviews with currency traders both in Brazil and international financial markets. Quantitative data are used to analyse the monetary policy operations by the central bank and the resulting exchange rate dynamics. The interviews, in turn, allow an in-depth understanding of the interaction between these central bank operations and financial sector agents and shed some light on the ineffectiveness of monetary policy in Brazil. The paper concludes with some policy implications, which advocate that - if emerging markets economies want to manage their exchange rates to support their domestic development path - they either have to abandon the existing inflation targeting regime or consider a reduction in the scale of their integration in international financial markets, i.e. resort to some form of capital control measures.

## **1. Introduction**

The implementation of monetary policy in emerging markets has been a long-standing issue of debate. As a consequence of the financial crisis of the late 1990s, the question of the appropriate exchange rate regime and monetary policy management in emerging markets came again to the fore. It was argued that intermediate exchange rate regimes were not credible anymore and countries had to switch either to a floating exchange rate or a permanently fixed currency, i.e. the move to “the two corners” (Fischer, 2001). Given the general demand for market based price determination, floating exchange rate regimes ended up being the dominant choice. Most frequently these were complemented with the institutional framework of an inflation targeting regime (e.g. independent central bank, transparent monetary policy, fiscal discipline.) which should not only control inflation credibly but also promote sustainable institutional reform in these countries (Mishkin, 2004; Mishkin and Savastano, 2001). Moreover, the floating exchange rate was thought to avoid any serious misalignments in the real exchange rate and thus external imbalances.

Several critiques have been raised against inflation targeting regimes (ITR). These include the single focus on inflation as economic policy goal, the problematic role of the short-term

interest rate as main monetary policy instrument, and the assumption of an independent central bank (Arestis and Sawyer, 2003). In emerging markets, the important role of the exchange rate adds another dimension to the assessment of the feasibility of this monetary policy. Indeed, empirical evidence shows that despite their official ITR *cum* floating exchange rates, emerging market central banks have been active operators in the foreign exchange markets in order to smooth exchange rate volatility, maintain financial stability or avoid a sustained misalignment of the exchange rate.

This continuing importance of the exchange rate for emerging markets has induced several commentators to propose a certain degree of exchange rate management within an ITR in developing and emerging markets (e.g. Goldstein, 2002; Stone et al. 2009). To reduce the conflicts between the inflation objective and other considerations this management should be conducted in the most systematic, transparent and market based manner possible (Stone et al., 2009). In addition, emerging markets are encouraged to develop their domestic money and financial markets to facilitate macroeconomic management.

This paper, however, argues that such a combination of ITR and exchange rate management – particularly if the central bank’s aim is to smooth exchange rate volatility and avoid exchange rate misalignment – is not only very difficult but also inconsistent and impossible in the presence of large return driven capital flows. Indeed, the paper shows that rather than smoothing volatility, central bank foreign exchange interventions in an ITR might exacerbate rather than reduce exchange rate fluctuations. The implication that exchange rate management in the presence of an open capital account becomes very difficult is the well known result of the impossible trinity. However, this article argues that the existence of the institutional framework of an ITR further exacerbates this impossible trinity and makes any attempt to manage the exchange rate even more difficult.

This is the result of the peculiar way an inflation targeting regime shapes the central bank’s operations in the money and the foreign exchange market and the way these operations interact with financial market actors’ expectations. Moreover, the paper argues that the call for predictable, transparent and credible foreign exchange interventions might, through its effect on financial system expectations, undermine rather than support the central bank’s initial aim to influence the exchange rate value. This is also the case for the use of the interest rate as main monetary policy instrument through its stimulating effect on yield-driven short-term capital flows. Finally, the paper shows that developed foreign exchange and money markets, the use of market based instruments and a sophisticated financial system could make macroeconomic management for the central bank more difficult rather than alleviating possible policy trade-offs.

The complex role of the exchange rate in an ITR in emerging markets, particularly in the presence of increased financial integration and large capital flows, has received some attention in the literature (Edwards, 2006; Stone et al. 2009). Most existing analysis, however, relies on quantitative data and/or economic and econometric modelling to analyse the link between emerging market central bank operations, financial system dynamics and the consequent success of the existing inflation targeting regime. This paper uses an innovative

mixed-method approach to gain further insights into these mechanisms and possibly derive some important policy implications for the conduct of monetary policy in emerging markets. The paper combines quantitative data on monetary policy operations and exchange rate dynamics with qualitative insights from 52 semi-structured interviews with currency traders both in Brazil and in international financial markets. The focus on the expectations and operations of financial market participants and their interaction with central bank operations is particularly justified by Brazil's rising financial integration and the constraints this integration imposed on central bank operations. The interviews allow important insights into financial system behaviour and show why pursuing exchange rate goals within an ITR and in the presence of large capital flows might not only be ineffective but could also turn out to be counterproductive.

This result has potentially important policy implications. It shows that if emerging markets want to maintain some influence on the value of their exchange rate this will not be feasible within an ITR and the presence of large capital flows. The impossible trinity has come back at a vengeance, exacerbated by the peculiar features of an inflation targeting regime. Thus, once again, emerging markets face the stark choice of high exchange rate volatility and exchange rate misalignment – and consequent negative effects on their economies – or the active pursuit of an alternative monetary policy framework and/or some degree of capital management. The recent imposition of capital controls in several emerging markets, including Brazil, shows that these countries have indeed gone this latter way. However, rising capital control measures in emerging markets could have potentially important implications for the international mobility of capital and the international financial system more generally. This, as will be discussed in more detail in the concluding section, might have substantial implications on the economies of Europe, particularly through the operations of their banks.

Following this introduction, Section 2 gives a short overview of the theoretical literature on ITR in emerging markets, with a particular focus on the role of the exchange rate. Section 3 gives an overview of capital flows and exchange rate dynamics in the Brazilian context. Section 4 discusses the ITR in Brazil with a particular focus on the implementation, conduct and success of operations by the Brazilian central bank in Brazil's money and foreign exchange market. It presents several hypotheses on why these operations have shown limited success in reducing exchange rate volatility in the Brazilian market. Section 5 presents the results from the semi-structured currency trader interviews. Section 6 concludes with some implications for the appropriate monetary policy framework in emerging markets and potential repercussions on European economies.

## **2. Financial Integration, Inflation Targeting and the Exchange Rate**

There is extensive literature on the design, operation and institutional framework of ITRs in developed countries (Mishkin, 2001; Heenan et al., 2006). An increasing number of authors have also discussed the appropriateness and feasibility of this regime in developing and

emerging countries (Masson, Savastano and Sharma, 1997). This literature points to several structural characteristics, including fragile institutions, weaker financial systems, lack of credibility and vulnerability to external shocks, which could complicate the implementation of an ITR in these countries. These failures, in turn, include repeated failures to hit the inflation target (with further knock-on effects on the country's credibility), higher and more variable interest rates and ultimately higher output costs if the inflation target is sustained at all cost.

However, probably one of the most peculiar features of developing and emerging countries which could complicate the conduct and success of an ITR is the important role of the exchange rate, both as macroeconomic policy instrument and relative price whose dynamics can have crucial repercussions on the development path of an economy. In principle, in an ITR the primacy of the inflation as monetary policy goal requires the subordination of all other policy objectives. This also includes the exchange rate. Indeed, in the original conception of the ITR the exchange rate does not enter the central bank's objective function (represented by a Taylor rule) and if it does so only indirectly through its effect on inflation (or output in extended models). In more recent open economy ITR models the exchange rate is incorporated explicitly into the monetary policy objective function, but only if it affects inflation negatively and/or might undermine the central bank's inflation target. Moreover, despite these recent extensions, Edwards (2006) argues that ultimately the exchange rate remains mostly ignored in the literature on inflation targeting even when considering open economies.

Empirical evidence, however, shows that the exchange rate has played an important role for monetary policy operations in developing and emerging countries despite the existence of an officially floating exchange rate regime. Indeed, an extended literature, also known as "fear of floating", has evidenced that developing and emerging market central banks have intervened heavily in their foreign exchange markets, both in times of depreciation as well as in times of appreciation.

The importance of the exchange rate in ITRs in emerging markets has been acknowledged in the literature (Stone et al. 2009; Edwards, 2006; Fitzgerald, 2004). In addition, foreign exchange interventions, at least in the face of depreciation pressures, are not inconsistent with an ITR. For example, the pass through from the exchange rate to inflation has been found higher in developing and emerging countries which could justify exchange rate intervention to avoid excessive interest rate movements (Ho and McCauley, 2003). In addition, foreign exchange interventions could be related to financial stability reasons, particularly against the impact of potential depreciation on balance sheets with currency or maturity mismatches, a phenomenon which has been found to be more prevalent in developing and emerging countries.

However, as has been shown in the literature and will be discussed in detail in this paper for the case of Brazil, developing and emerging market central banks have not only been intervening in times of depreciation but have also been active players in times of appreciation pressures. Foreign exchange intervention to contain exchange rate appreciation is, however,

inconsistent with an ITR. Quite to the contrary, exchange rate appreciation could help to mitigate inflation pressures, particularly in developing and emerging economies with less efficient monetary policy transmission mechanisms as pointed out above.<sup>1</sup> These interventions show the important role the exchange rate plays in those economies beyond the control of inflation but to maintain export competitiveness, stabilize and stimulate growth in output and indeed to affect the structure of the domestic economy in the more medium term.

For example, Johnson, Ostry and Subramanian (2007) find that avoiding prolonged periods of exchange rate overvaluation helps sustain growth. In a similar vein, Rodrik (2008) asserts that there is asymmetric relationship between growth and undervaluation for emerging and developing economies. And indeed, Levy-Yeyati and Sturzenegger (2007) find that in recent years, exchange rate intervention has been asymmetrically aimed at stemming appreciation and that depreciation benefits economic growth.

The apparent importance of the exchange rate for emerging markets has led several commentators to advocate some form of exchange rate management within an ITR (Mishkin and Savastano 2001; Goldstein 2002). For example, in Goldstein's (2002) "managed floating plus", the nominal and overriding anchor is given by an inflation target, however, the authorities are allowed to intervene in the foreign exchange market from time to time to "smooth" excessive short-term fluctuations in the exchange rate and/or to maintain market liquidity. Importantly, no explicit exchange rate target or deviations from an "equilibrium rate" are allowed to be considered. In a similar vein, Stone et al. (2009) find that financially vulnerable countries might benefit from including the exchange rate in the reaction function. Indeed, the authors show, using a small open economy model that in the emerging economy putting some weight on the *level* of the exchange rate and avoiding significant exchange rate misalignment may improve macroeconomic performance.

The authors go further on to argue that any conflict of policy objectives which could arise from a more active role for the exchange rate in an open economy, ITR could be alleviated by a well designed implementation framework by allowing the central bank to put less weight on the exchange rate and more on the inflation target. More concretely, they conclude their report with the following words:

"The case studies suggest that a systematic, transparent, and market based policy implementation approach can help reduce conflicts between the inflation objective and other considerations in an inflation targeting framework. Use of the interest rate as the main monetary policy tool to influence inflation is crucial for maintain the clarity of the commitment to the inflation target. As a general rule, implementation should be as transparent as possible, recognizing that there are delicate trade-offs for emerging economies created by their vulnerability to large shocks and financial stability concerns, especially in the context of exchange rate based inflation targeting regimes. Developed foreign exchange and

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<sup>1</sup> One reason for emerging markets to intervene in times of exchange rate appreciation which could in theory be consistent with an ITR is the attempt to build foreign exchange reserves and to mitigate consequently the potential effects of a sudden stop in capital flows on the exchange rate (which in turn could feed into the inflation). However, as will be shown below, reserve accumulation has only been one reason for the Brazilian central bank to intervene in the foreign exchange market.

domestic money markets improve policy implementation by reducing exchange rate volatility and facilitating foreign exchange risk transfer. Developed markets also foster the signalling channel of intervention, which fits well within the inflation targeting framework” (Stone et al. 2009: 40).

As outlined above, this paper in turn argues that, due to peculiar features of an ITR and its interaction with financial system behaviour, managing the exchange rate within an ITR in the presence of large capital flows is very difficult, if not impossible. More than that, it aims to show that all the features recommended by Stone et al. – predictability and credibility, the interest rate as main policy variable, market based intervention and indeed a developed financial system – might increase rather than mitigate the complications of exchange rate management in an inflation targeting regime.

### **3. Financial Integration, Capital Flows and Exchange Rate Dynamics**

Brazil’s integration in international financial markets has proceeded rapidly over the last decade. On the one hand, the country has seen a substantial surge in the overall level and size of foreign investors’ participation in Brazilian assets, both onshore through massive inflows of foreign capital and offshore through increased activity on international over-the-counter markets (BIS, 2010). On the other hand, the financial channels and instruments through which foreign investors have operated in emerging markets have changed and become more complex. In the case of Brazil, this particularly refers to two phenomena. Firstly, foreign investors have become exposed increasingly to domestic currency denominated assets, both in the domestic bond and equity markets, and the domestic currency as asset class per se. Secondly, foreign investors have become increasingly active in Brazil’s very deep and liquid derivatives market.

Figure 1 shows the current account, portfolio flows and the exchange rate in Brazil from the end of 2002 to the end of 2010.

Figure 1: Portfolio and Current Account Flows and Exchange Rate – US\$ million



Source: BCB (2011)

One can observe the large and volatile short-term capital flows to Brazil. Several distinct periods can be observed. First, after hovering around zero at the beginning of the period, short-term financial flows picked up markedly in the beginning of 2006. On the one hand, this was due to internal reasons, as Brazil terminated its debt repayments to the International Monetary Fund (IMF) at this date. On the other hand, it was mainly due to external reasons as international market conditions changed. Indeed, the start of the housing bubble in the US and the general increase in commodity prices is located around the same time. One hypothesis is that the inversion of the Treasuries yield curve in the US contributed to the turn to alternative asset classes. Arbitrage operations along the yield curve (borrow short and led long) represent a core business of banks, which had to turn to alternative sources of income as the curve inverted.<sup>2</sup> Second, one can observe the further acceleration of short-term capital flows at the beginning of 2007, when the first signs of the international financial crisis emerged in developed financial markets and international investors sought high-yielding and “safe” assets outside developed financial markets spurred by the reigning decoupling hypothesis. This last surge in short-term capital flows to Brazil was followed by massive

<sup>2</sup> As of yet, little empirical research analyses the simultaneous increase in the price of several “alternative” asset classes at the end of 2005 and beginning of 2006. The hypothesis that this common increase was mainly due to the interest rate yield structure in developed financial markets, primarily the US, will be investigated in future research.

adjustment as the international financial crisis finally burst in the third quarter of 2008 with the collapse of Lehman Brothers.

Figure 1 further shows that very similar patterns have been repeated more recently during the Euro zone crisis. In the end of 2009, when the second phase of global crisis epitomised by the first signs of the Eurozone crisis emerged, short-term capital flows to Brazil saw a renewed surge as international investors sought to “diversify” their assets from increasingly fragile looking developed financial assets. This dynamic continued during the first months of 2010 as concerns about peripheral Eurozone debt increased. Thus, similarly to the first stages of the international financial crisis as international investors sought high-yielding and “safer” assets in developing and emerging countries, the turmoil in European financial markets led to huge flows of foreign capital flows to Brazil. The renewed reversal of capital flows at the end of 2010 (which indeed accelerated substantially in 2011 which is not shown in this paper) was mainly due to a worsening of the Eurozone crisis and resulting international portfolio adjustment.<sup>3</sup> The main channels between Eurozone crisis and Brazil were stock and bond markets as can be seen through the decrease in portfolio flows in figure 1, and the trade finance to Brazilian companies as European banks are the major players in the trading finance market.

As pointed out above, not only did the overall level of foreign participation in the Brazilian market increase substantially over the last decade, but also the nature and type of this integration changed fundamentally. Foreign investors have become increasingly exposed to domestic currency denominated assets and complex financial instruments, particularly on Brazil’s deep and liquid derivatives market. Table 1 shows the share of foreign investors in the main domestic currency instruments in the Brazilian market: Brazilian stocks, domestic currency bonds and US\$ futures as the ultimate and most liquid form of domestic currency trading. One can see the rising share of foreigners in these instruments, particularly in US\$ futures on the derivatives market.

Table 1: Foreign Investors participation in Brazilian domestic assets - %

<b>Markets</b>	<b>2005</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Financial Derivatives (US dollar futures)	20.0	23.0	24.5	32.0	34.0
Domestic Public Debt	-	3.1	5.0	7.1	10.3
Stock Market Exchange (IPOs)	48.0	76.0	48.0	67.0	26.2

Source: BM&FBovespa (2011) and BCB (2011a)

Figure 1 also shows movements of the nominal exchange rate, i.e. the Brazilian Real to the US\$, over the period. Concurrent to dynamics in short-term capital flows, Brazil’s nominal exchange rate has been characterised by large swings, high volatility and sudden and very sharp depreciations, particularly in 2008 - when Lehman Brothers collapsed - but also more recently as a result of international portfolio adjustment in the course of the Euro zone crisis. These large and sudden swings, largely unrelated to domestic economic conditions, shows the

<sup>3</sup> In addition, Brazil strengthened its capital flow measures at this time which made a few investors wary about Brazil’s future stance towards financial integration.



high risk and vulnerability of emerging markets as a result of increased financial integration and exposure to short-term international capital flows<sup>4</sup>. This vulnerability becomes further exacerbated in the presence of a large share of foreign investors' exposure to domestic currency assets, particularly when this exposure has been funded in international financial markets. In this case, any change in international funding conditions, or increased demand for the US\$, can lead to an immediate sell off of domestic assets unrelated to domestic conditions (or fundamentals). In addition, foreign investments in domestic currency denominated assets imply an inherent currency mismatch for international investors. As a result, any need to adjust portfolios will not only affect asset prices, but will also have an immediate effect on the exchange rate. In this sense, Kaltenbrunner and Paineira (2009) argue that Brazil has become subject to a new form of external vulnerability, which is characterised by a high share of foreign investors in short-term domestic currency assets and manifests itself in large and sudden swings in the exchange rate largely independent of domestic economic conditions.

As will be shown in the next section, these adverse exchange rate movements have occurred despite substantial foreign exchange intervention by the Brazilian central bank (BCB), both in the spot and the derivatives market.

#### **4. Inflation Targeting and Monetary Policy in Brazil**

In very general terms, an inflation targeting regime comprises: (i) the public announcement of medium-term numerical targets for inflation (or a band around it); (ii) the institutional commitment to price stability as the primary goal of monetary policy; (iii) the interest rate as main policy instrument; and finally (iv) the independence of the central bank. The inflation targeting regime in Brazil was implemented in the middle of 1999 as a consequence of its foreign exchange crisis in the end of 1998-9 by which the country abandoned the fixed exchange rate regime. In the Brazilian targeting regime, the Monetary National Council (CMN) defines an inflation target within a band of 2%, and the BCB has to use the basic interest rate (Selic) as the main monetary policy instrument to reach this target in the calendar year. Although not independent by law, the central bank has been operationally independent in the monetary policy management. If the BCB misses the target, it is necessary to issue an open letter explaining the reasons for it. In addition, after each interest rate decision the BCB publishes a detailed explanation of the factors explaining its monetary policy decisions to increase the transparency of its operations.

Table 2 shows that apart from the beginning of the decade and the period of domestic turmoil around the election of President Lula in 2002, the BCB has not missed its inflation target once.

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<sup>4</sup> The strong effect of foreign positions on the exchange rate is partly due to the large absolute size of positions taken by foreign market players, which trade on very large budgets and can assume higher leverage. In addition, positions by foreign investors are very often directional and can signal future currency movements which prompt other financial market participants, including domestic players, to jump on the bandwagon.

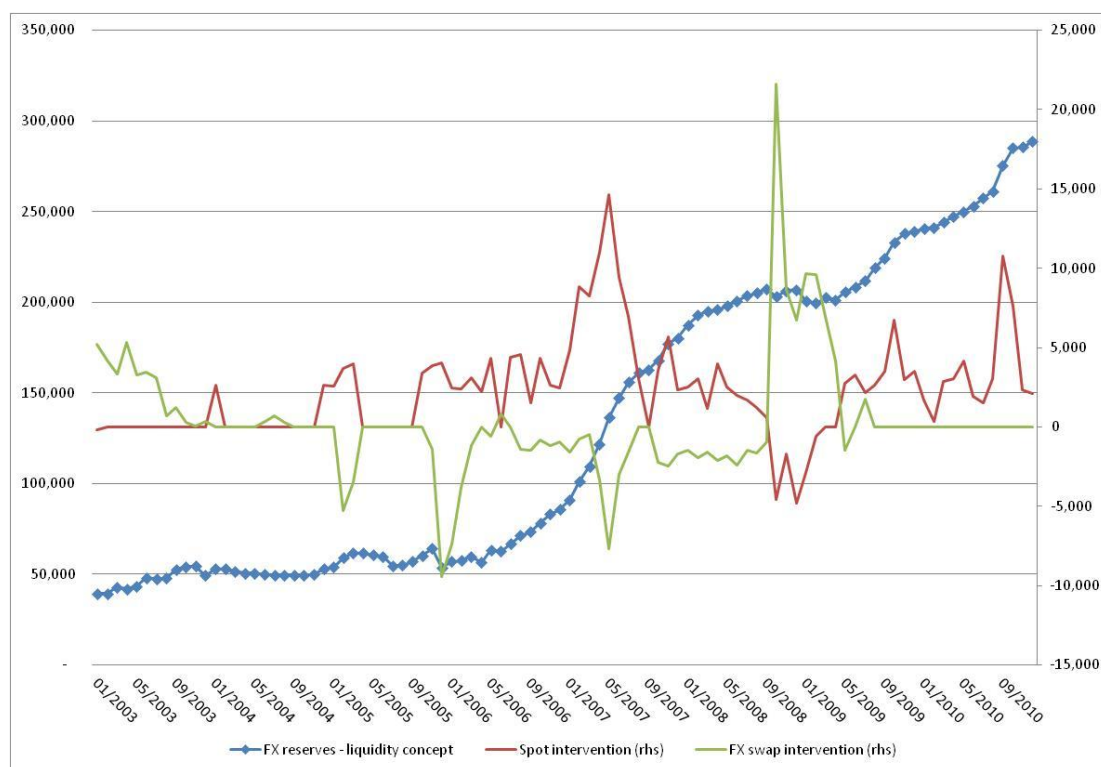
Table 2: Selected Economic Indicators

	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Inflation Indicators (%)</b>									
Effective Inflation Rate	12.5	9.3	7.6	5.7	3.1	4.5	5.9	4.3	5.9
Inflation Target	3.5	4.0	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Revised target		8.5		5.1					
Target met (within band of 2%)?	NO	NO	YES	YES	YES	YES	YES	YES	YES
<b>Return Indicators</b>									
Domestic short-term Interest Rate (Selic)	19.1	23.3	16.2	19.1	15.3	12.0	12.4	10.0	10.8
US short-term term Interest Rate (FedFund)	1.7	1.1	1.4	3.2	5.0	5.0	1.9	0.2	0.2
Emerging Market Bond Index (EMBI) Brazil	1372.4	836.5	541.8	399.0	235.0	180.6	300.8	306.0	189.0
Annual Exchange Rate Variation	53.2%	-18.5%	-7.9%	-12.4%	-8.5%	-16.6%	31.0%	-25.2%	-2.4%
<b>Fiscal Indicators (%GDP)</b>									
Primary fiscal balance	3.2	3.3	3.8	3.9	3.2	3.4	3.5	2.1	3.1
Nominal fiscal balance	-9.6	-3.8	-2.6	-3.2	-3.5	-2.6	-2.0	-3.2	-2.5
<b>GDP Growth (%)</b>	2.7	1.1	5.7	3.2	4.0	6.1	5.1	-0.2	7.5

Source: Ipeadata (2011)

As discussed in Section 2, in theory the exchange rate should not enter the central bank’s objective function in an ITR and if it does so only when it adversely affects the central bank’s inflation target. However, as can be seen from Figure 2, the BCB has been an active operator in the foreign exchange market, both in the spot and in the derivatives markets and both in times of appreciation and depreciation.

Figure 2: International Reserves and Central bank foreign exchange interventions  
(US\$ million)



Source:

BCB (2011a, 2011b)

Figure 2 shows the rise in foreign exchange reserves as a result of the BCB’s US dollar spot purchases between 2003 and 2010. After small and sustained rises after 2003, foreign exchange reserves surged between the beginning of 2006 and August 2008. Over this period,

the BCB bought more than US\$150 billion from the banking sector, leading to a stock of foreign exchange reserves of more than US\$200 billion in September 2008 before the international financial crisis hit Brazil. During the crisis, the BCB sold around \$8 billion of foreign reserves. However the BCB's liquidity provision to the private sector in the international financial crisis went far beyond that. Considering spot sales, repos (short-term government bonds) and trade loans the total stock of foreign exchange liquidity supplied to the market between September 2008 and the beginning of 2009 reached US\$26 billion. Since then foreign exchange reserves continued to rise and, mainly as a result of the large short-term capital inflows reached around \$289 billion at the end of 2010.

As discussed in Section 3 foreign investors have become increasingly active on Brazil's liquid derivatives market.<sup>5</sup> This has undermined the BCB's effectiveness of spot intervention and forced it to also intervene on the derivatives market through (reverse) FX swap instruments.<sup>6</sup> As can be seen in Figure 2 (a minus sign indicates intervention with reverse FX swaps) the BCB has complemented its spot market operations with FX swaps to contain exchange rate depreciations around the beginning of 2000 and during the global financial crisis in 2008-9. The BCB intervened with reverse FX swaps to contain the appreciation between the end of 2005 and September 2008 just before the global financial crisis hit Brazil. These dynamics were repeated when the first signs of the Eurozone crisis emerged and capital flows experience a renewed surge to Brazil. In addition to substantial spot operations during this period to contain the appreciation pressures, the BCB cleared all its FX swap positions during the first months of 2009 (the BCB FX swap position went to 0 in Figure 2), and indeed resumed its reverse FX swap operations in the beginning of 2011.

However, while foreign exchange interventions in times of depreciation are in principle consistent with an ITR, in theory there should be no interventions in times of exchange rate appreciation. The BCB's interventions in the presence of large capital inflows and appreciation pressures were, on the one hand, directed at building a war-chest of foreign exchange reserves against possible speculative attacks or sudden stops in capital flows. On the other hand, these interventions were targeted at smoothing the volatility of the exchange, i.e. to avoid an overshooting of the exchange rate in both directions. The view that the BCB's foreign exchange operations were partly targeted at influencing the Real's level, including in the times of appreciation, is evidenced by its frequent operations on the derivatives market through reverse FX swaps. In contrast to spot foreign exchange purchases/sales, derivative interventions do not affect the overall level of foreign exchange reserves.

However, as discussed above, despite these large interventions by the BCB the Brazilian Real has been characterised by large swings and high volatility. This has been due to the peculiar

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<sup>5</sup> According to data from the BCB, the US\$ futures market is now around 6 times larger than the underlying spot market which has led many market commentators to argue that it is the derivatives rather than the spot market where price formation takes place in the Brazilian market.

<sup>6</sup> The FX swap is a financial derivative through which one agent (BCB) takes a long position in the interest rate and a short position in foreign currency plus internal dollar yield rate and the other agent takes an opposite position in both assets. In the reverse FX swap, the BCB takes a long position in US dollar plus the internal dollar yield rate and a short position in the interest rate.

institutional features of an ITR, the way it shaped central bank operations, both in the foreign exchange and money market, and the effect these operations had on financial sector expectations and consequently short-term capital flows.

First, on the institutional side, the main policy instrument in an ITR is the short-term interest rate. Academic literature has pointed to several shortcomings on making the money market interest rate the main monetary policy instrument, such as the uncertain link between the short-term and long-term interest rate (which is the ultimately important rate for private sector decisions), and the unpredictability of transmission mechanisms into the real economy. In the context of emerging markets, which are exposed to a large surge of short-term (interest-rate) driven capital flows and face strong appreciation pressures of their currencies, the primacy of the interest rate can complicate macroeconomic management significantly through attracting more capital inflows and thus further exacerbating the exchange rate appreciation trend.

This effect of an ITR on the interest rate and consequently financial system behaviour operates through two potential channels: firstly, this regime might create a bias towards a higher interest rate to contain inflationary pressures of which investors looking for short-term return can take advantage of. This could be particularly the case in developing and emerging countries where weaker transmission mechanisms require a higher interest rate level to control inflation successfully. Secondly, any deviation of the inflation rate from its target should result in an interest rate response. Thus, an ITR creates predictable changes in interest rate movements of which forward looking investors can take advantage of. Indeed, as can be seen in Table 2, the interest rate differential between the Brazilian short-term interest rate, the Selic, and the Fed Fund rate stayed comfortably above 10% over the last decade (except in 2007 where it temporarily reduced to 9.8%). This differential is one of the largest in the world. In addition, as has been pointed out above, since 2003 the BCB has not missed its inflation target once signalling its commitment to domestic and international financial market. The difficulty of using the interest rate as main monetary policy instrument in the face of strong capital inflows is also reflected in the BCB's recent change in monetary policy operations. Since 2010 the BCB puts a stronger emphasis on macro-prudential measures, such as reserve requirements, to influence domestic monetary operations. Strictly speaking, however, these measures are not consistent with an inflation targeting regime given the lack of transparency and predictability of these measures with regards to interest rate movements.

Second, this institutional point is closely connected to another important link between an inflation targeting framework, investor behaviour and exchange rate dynamics. As discussed in the theoretical section, several authors have argued that the conflict between an ITR and emerging market central banks' attempt to manage the exchange rate can be reduced through increased predictability, transparency and credibility. This paper, in turn, would argue against this call for transparency and predictability as it further complicates exchange rate management in the presence of large capital inflows. The provision of certainty, credibility and predictability increases the attractiveness of country's assets to the investors community, which further exacerbates capital (in)flows and thus undermines any attempt by the central bank to contain the appreciation pressures. More than that, this paper would argue that an

ITR can be understood as an institutional device to homogenise macroeconomic policies around the globe, which promotes an equal set of macroeconomic policies and institutional arrangements across countries. This homogenisation can in turn be beneficial to international capital flows, as it tends to facilitate capital inflows and outflows by increasing the transparency and predictability of the macroeconomic policy decisions and variables across a wide range of different countries.

Third, in addition to these institutional characteristics of an ITR, the specific way this regime shapes the central bank's operations in the money and foreign exchange markets – and subsequently financial system behaviour – further complicates the attempt to combine it with a management of the exchange rate, especially in times of appreciation caused by large capital inflows.

As to the central bank's operations in the foreign exchange market, an ITR ties the central bank to asymmetric interventions. On the one hand exchange rate appreciation can be an important tool to control inflation, particularly in developing and emerging markets with less efficient alternative monetary policy transmission mechanisms. Barbosa-Filho (2008), for example, argues that an ITR introduces an appreciation bias in the exchange rate which becomes an important monetary policy tool to control inflation. On the other hand, exchange rate depreciations might affect inflation negatively through the pass through effect on inflation and might force the central bank to intervene. Thus, an ITR guarantees international investors sustained gains on exchange rate appreciation with the simultaneous promise that excessive risks through exchange rate depreciations will be avoided. Indeed, in its communications to the financial market, the BCB was always very clear that it would not attempt to influence the exchange rate level, but was primarily interested in smoothing exchange rate volatility. Thus, foreign and domestic investors knew that despite the BCB's interventions, the appreciation trend would continue, making them even more eager to buy domestic currency. At the same time, however, they were also guaranteed that the central bank would have to intervene in the case of depreciation, which substantially reduced the risk of their domestic currency investments and further stimulated capital flows. This asymmetry was also reflected in and exacerbated by the specific nature the BCB conducted its interventions. While during the appreciation interventions were predictable and of small size, in the times of depreciation the central bank entered the market suddenly and with a large volume, thus exerting a much stronger pressure on the value of the exchange rate.

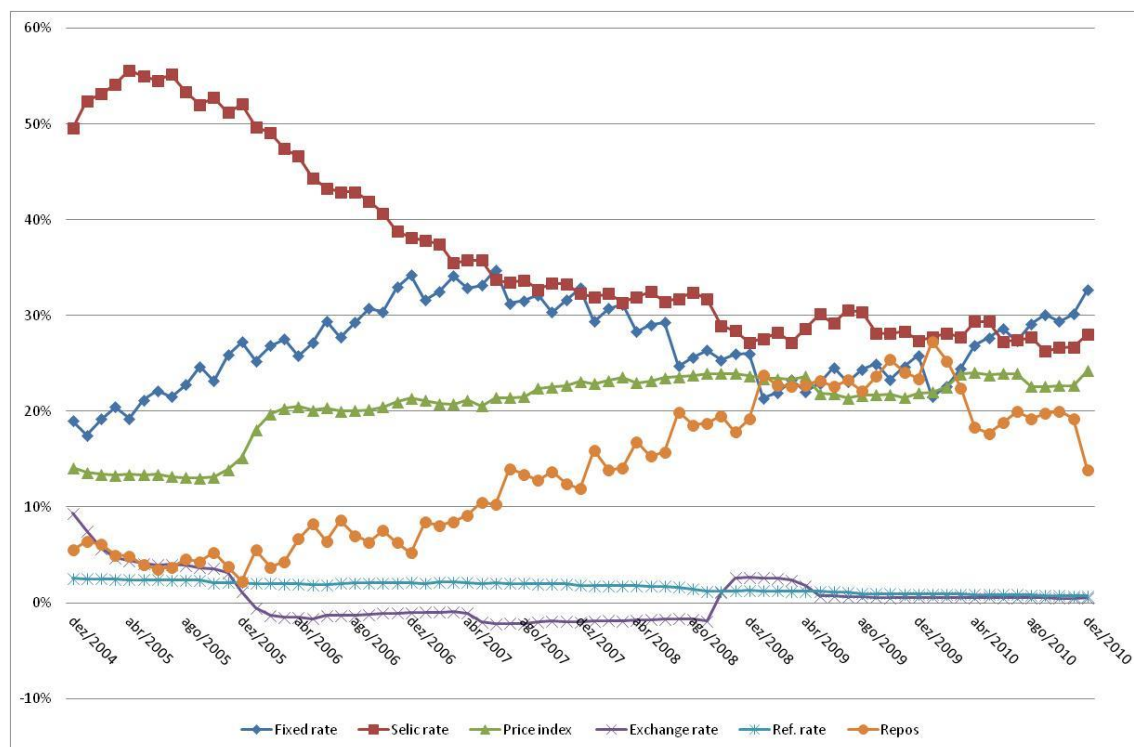
In addition to this specific nature of foreign exchange interventions in an ITR, the BCB's active operations in the foreign exchange market in the presence of large capital inflows had a further, indirect stimulating effect on this flows. This indirect effect operated through two channels. Firstly, the large stock of foreign exchange reserves at the BCB increased protection against speculative attacks by assuring investors that sufficient liquidity in foreign currency was available. The security that the BCB could exchange a large amount of domestic into foreign currency and thus provide liquidity to the market at any time acted like a security pillow for international investors and substantially increased the attractiveness of Brazilian assets, stimulated further capital inflows and increased appreciation pressures. Secondly, through its regular foreign exchange interventions, the BCB acted as counterparty to many of the financial operations and thus assured (foreign) investors that they would find a buyer in a market which was mainly dominated by sellers during times of strong (expected) exchange rate appreciation. In the derivatives interventions, for example, it has happened because foreign investors were aware of the existence (predictability) of a buyer of last resort

of this type of flow, which given the importance of this market to the exchange rate determination, was a decisive factor to exchange rate dynamic. In other words, foreign operators, seeking to sell the US\$ forward, could do so to the BCB which was prepared to assume the counterparty to these operations through its reverse FX swap operations.

Finally, the BCB's foreign exchange interventions within its ITR have had important implications for its operations in the money market, which further undermined its initial attempt to smooth excessive exchange rate movements. Any attempt by the central bank to dampen the appreciation of the domestic currency through purchases of foreign currency from domestic banks leads to an expansion of the money supply, thus exerting an upward pressure on prices. More important, the increase in banking reserves in the economy might lead to a reduction in the interest rate in the money market which might induce banks to increase their lending operations to the private sector (credit expansion), which could further exert upward pressure on prices. Within the institutional framework of an ITR, the central bank is consequently required to engage in monetary sterilization operations (reverse repos), i.e. sell governmental bonds to the banking sector with a repurchase agreement. However, the need to sell domestic bonds to the private (mainly banking) sector maintains interest rates high which in turn attract further capital inflows. Thus, similar to the argument presented above, the central bank finds its initial foreign exchange interventions undermined by the effect higher interest rates have on short-term capital flows and thus appreciation pressures. Moreover, and also similar to the argument presented above, in an ITR, the financial market players know that the central bank will have to conduct the sterilization operations and thus that interest rates have to stay high in the future.

Figures 3 and 4 below show the relation between the rise in international reserves, monetary sterilisation operations and the dynamic of domestic public debt management. Figure 3 shows that the recent trend in Brazilian public debt has been largely driven by the rise in central bank repos.

Figure 3 – Share of the public securities in the domestic public debt, including repos (%)

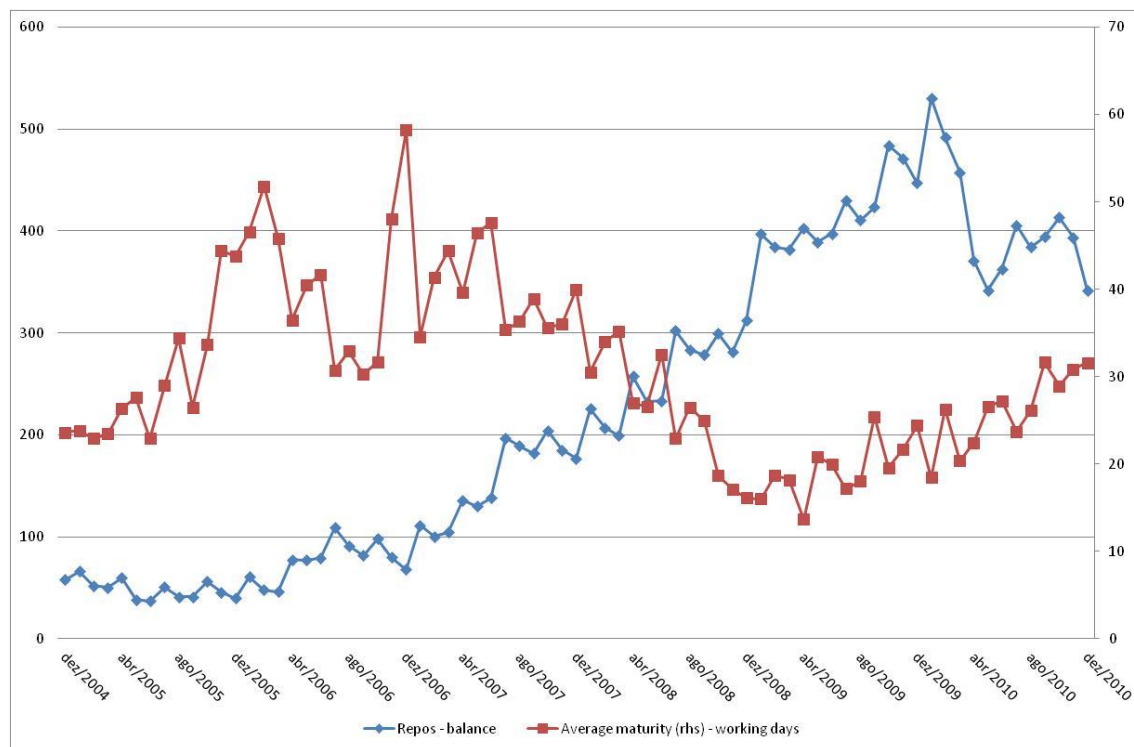


Source: BCB (2011b)

Indeed, the share of repos in total domestic public debt has increased since 2006 up to the end of the 2009, passing from 5.5% to 27.2%. As a consequence, the proportion of domestic public debt to GDP rose from 48% in 2006 to 56.4% in December 2009 (BCB, 2011b). The reversal in this trend in 2010 was primarily related to domestic macroeconomic conditions such as the rising interest rate which shifted the composition towards fixed rate debt. In addition, as will be discussed in more detail below, the changing composition of Brazil's public debt in 2010 was strongly related to the inherent limits which the BCB's monetary policy sterilization had reached at this stage.

Figure 4 shows that the rise in the amount of repos has been concomitant to the increase in foreign reserves, starting in 2006. Figure 4 also shows that the repos' maturity has followed the capital flows dynamic, rising in capital inflows' time and dropping in crisis' time as in the end of 2008.

Figure 4: Central Bank Repos – (R\$ billion)



Source: BCB (2011b)

The supply of short-term assets in the form of central bank repos (short-term government debt) to the domestic banking system, however, further complicated the BCB’s ability to manage the exchange rate successfully. On the one hand, an increase in their short-term assets allowed banks to also increase their liabilities, including foreign ones. Thus, the expansion of banks’ balance sheets driven by the asset side as a result of the BCB’s monetary sterilization operations allowed them to capture increased foreign resources, i.e. foreign capital inflows. Second, the large share of short-term assets in their balance sheets allowed banks to “take position against” the central bank in the moment of crisis, i.e. sell short-term assets to the central bank to acquire foreign exchange. This further exacerbated exchange rate dynamics in the international financial crisis and contributed to the large depreciation of the Brazilian Real. More generally, the ability of domestic banks to quickly divest themselves of these short-term repos (and or diversify into other assets for that matter) has important implications for macroeconomic and fiscal management as the central bank is increasingly exposed to the banking sectors’ decision to roll over the debt or not. Thus, rather than fears that the fiscal side could dominate the monetary side, it is the monetary side which dominates the fiscal side in the Brazilian inflation targeting regime.

This section has shown the limits of the BCB’s foreign exchange and monetary operations to manage the exchange rate within an ITR. As can be seen in figure 3, by the end of the 2009, repos operations reached the highest level of participation (27.2%) in the total domestic



public debt, causing problems to the management of this debt in terms of profile (high proportion of short-term debt) combined with high monetary sterilisation costs of their repos. The fact that the BCB had reached its limit with market-based macroeconomic management is also reflected in the recent imposition of capital controls. Due to its inability to deal with the large amount of capital flows and their negative effect on the exchange rate, the Brazilian government introduced a tax on foreign investment (Tax on Financial Operations – IOF) of 2% on equity and fixed income securities in October 2009. This tax was further extended to 6% for fixed income investments in October 2010.

Similarly, the implementation of non-market based monetary instruments (e.g. rise in reserve requirements) to complement market-based interest rate policy can also be understood in terms of the limits of monetary policy in the context of an ITR and shows the substantial problems in combining monetary policy operations and exchange rate management in the context of an ITR.

## **5. Central Bank Operations and Financial System Expectations**

Above section has discussed the inherent inconsistencies of exchange rate management within an ITR. It also presented some hypotheses as to why this is the case. In particular, it referred to the interaction between the operations of the central bank and financial market players, which have become increasingly important in the context of financial integration and whose operations have complicated the macroeconomic management of the central bank. This section offers some additional insight into this interaction, and indirect testing of above hypotheses through the lens of financial market players.

The results are based on 52 interviews with currency traders both in Brazil and London. 31 onshore (Brazilian) and 21 offshore (international) traders were interviewed. Emphasis was placed on proprietary traders, i.e. traders which take directional positions, in both banks and institutional investors (e.g. real money funds and hedge funds) (a detailed description of the interviewees is presented in Appendix A). The interviews were conducted in a semi-structured manner. This means questions were formulated open ended and while a certain structure was followed, transgressions and additional information were allowed for. The aim of this type of method was to uncover the perceptions, opinions and priorities of the financial market actors themselves. It was aimed at uncovering the mechanisms, processes and factors which shaped financial market participants' behaviour and thus capital flows. Particular emphasis was placed on actors' perceptions of the monetary and foreign exchange operations of the Brazilian central bank (emerging market central banks) within the institutional framework of an ITR and their interaction with these operations<sup>7</sup>.

Four main questions were posed to all interviewees. Sub-questions were asked if allowed for by time and the interviewees themselves (the exact interview sheets are available upon request). The first question aimed at generating a general understanding of how central bank operations affect financial market behaviour, including the factors financial actors take into consideration; the time-frame and types of operations considered and the feedback of these operations on their own position making. The second question dealt more explicitly with the

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<sup>7</sup> Not all foreign interview partners were sufficiently familiar with the Brazilian case. In this situation, the interview question was extended to other (inflation targeting) emerging markets central banks.

way an inflation targeting regime shapes financial system decisions. The third question inquired into the banks' operations in the international financial crisis. The last and final question aimed at exploring which type of exchange rate regime was preferred by the investor community. This question was considered important to further explore how specific central bank operations in the foreign exchange market affected financial market decisions and consequently formulate possible recommendations for exchange rate management in emerging markets based on these results.

### *Question 1: Central Bank Behaviour and Foreign Exchange Market Decisions*

For this question a total of 22 responses by onshore operators and 17 by offshore operators were collected. Answers varied distinctly between the two; while onshore respondents were primarily concerned with the actual foreign exchange interventions of the BCB, offshore respondents adopted a more "macro" view when assessing central bank operations. This is consistent with their portfolio characteristics: while Brazilian traders trade primarily the Brazilian Real, offshore traders have a much wider portfolio of emerging market currencies.

All onshore operators agreed that the BCB is a very active and important player in the foreign exchange market. Three aspects of importance were distinguished. Firstly, the intraday or day-to-day trading environment: for intraday operations the BCB was identified as the most important player in the market whose positions are bigger than those of any other operator. "Going against" the central bank in the intraday trading was considered a risky strategy with large possible losses. Secondly, the moment of crisis which is discussed in more detail below. Finally, the exchange rate trend or level: there was a clear perception among the onshore respondents that the BCB did not, and indeed could not as discussed below, target a certain exchange rate level or even influence the exchange rate trend. In line with the literature discussed above and reflecting the BCB's own rhetoric in the existing inflation targeting regime, a large part of the respondents pointed out that the regular interventions by the BCB were not aimed at influencing the exchange rate level or trend, but to smooth, i.e. reduce the volatility, of exchange rate movements. This was particular evident in times of appreciation. According to several interviewees, in spite of its foreign exchange purchases in the presence of large short-term capital flows, the BCB never bought more than the actual foreign exchange inflow, which smoothed the exchange rate appreciation but was never intended to halt or even reverse it.<sup>8</sup>

In line with the argument presented in the preceding section, according to more than half of all the onshore and several offshore respondents which were familiar with the Brazilian market, this type and nature of the BCB's operations contributed to, rather than quelled the speculative directional positions of domestic and foreign operators in the Brazilian Real. On the one hand, through its regular interventions in the foreign exchange market to absorb the large foreign exchange inflows, the BCB provided liquidity, i.e. acted as a buyer, to those who wanted to sell the foreign exchange. On the other hand, operators knew that the BCB would not try to halt the appreciation, "guaranteeing" gains on the exchange rate appreciation. For example, domestic and foreign speculators could buy the Brazilian Real from the BCB for 2.00/US\$, knowing that in a week it would reach 1.95, generating a secure profit. This security was further exacerbated by a signalling effect of the BCB's foreign exchange intervention. For many financial operators, particularly those who do not have access to flow information themselves such as hedge funds, the BCB's purchases in the

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<sup>8</sup> As will be discussed in more detail below on the international financial crisis, interventions of a large size beyond the "flow" can incur substantial losses on speculative positions, through at least temporarily reversing the exchange rate trend, and might thus deter speculative positions.

foreign exchange market were a sign of continuing foreign exchange inflows, which further stimulated their speculative foreign exchange positions.

Thus, the BCB’s foreign exchange interventions to smooth exchange rate volatility and slow the appreciation trend—and the particular way these operations were conducted—further stimulated speculative short-term capital inflows. Indeed, as will be shown below, the kind of “managed” float the BCB conducted is most preferable for speculative foreign exchange operators. However, these short-term capital inflows did not only undermine the BCB’s initial attempt to slow the appreciation trend but also built the large stock of short-term foreign exchange positions in Brazil which ultimately led to one of the largest exchange rate depreciations, i.e. exchange rate volatility, in the international financial crisis in the end of 2008.

Offshore respondents had a more “macro” view of central bank operations in Brazil/emerging markets. Table 3 shows the results. Responses from onshore interviewees which adopted a broader view are also included.

Table 3: How do Operations of the Central Bank affect your Trading Decisions?

<b>Concepts</b>	<b>Onshore</b>	<b>Offshore</b>	<b>Total</b>
Liquidity	4	3	7
Reserves	2	3	5
Predictability+Transparency	1	4	5
Monetary Policy (Interest Rates)	0	4	4
Capital Controls	0	3	3
Credibility	0	3	3
Consistency	0	2	2

Notes: Total number of responses: onshore: 22; offshore: 17; responses reflect frequency of mentioning and are not exclusive.

The responses reflect strongly the parameters of central bank intervention introduced in Section 4. Twelve respondents thought that liquidity provision and the stock of foreign exchange reserves accumulated by the central bank were the most important central bank operations which affected their (speculative) foreign exchange positions. These parameters were closely followed by factors such as predictability and transparency, credibility and consistency which are important elements of inflation targeting regime. Indeed, for many offshore respondents a credible, consistent and most importantly predictable macroeconomic framework was one of the most important elements for building their foreign exchange positions. In this context, several interviewees mentioned that the regular and predictable foreign exchange interventions by the Brazilian central bank in the appreciation period made Brazil particularly attractive over other emerging market destinations. It is interesting to note that monetary policy, and thus interest rate decisions, were considered particularly important by offshore investors, reflecting the importance of carry trade considerations for these operators. Finally, capital controls found frequent mention among offshore investors. The importance of capital controls for different types of foreign exchange market participants will be discussed in more detail in Question 4. It is important to mention here though that the mentioning of capital controls by offshore, and not onshore investors, is largely due to the fact that these interviews were conducted later (in the second half of 2010) when Brazil increased its IOF tax.

*Question 2: Inflation Targeting and Foreign Exchange Market Decisions*

As seen above, predictability, credibility and transparency are important elements of central bank operations for currency traders. It has been argued in section 4 that an ITR provides exactly this predictability and credibility. Table 4 shows the view of selected onshore and offshore respondents.

Table 4: How does the Existence of an Inflation Targeting Regime affect your Trading Decisions?

Concept	Onshore	Offshore	Total
Predictability	8	3	11
Credibility	3	5	8
Critique	0	4	4
Pass Through	4	0	4
Transparency	0	3	3

Notes: Total number of responses, onshore: 15; offshore: 11; responses reflect frequency of mentioning and are not exclusive.

The answers confirm the importance of predictability and credibility, and to a bit lesser extent transparency, for both, onshore and offshore respondents. There are, however, important differences between different respondents both between different types of traders as between onshore and offshore respondents. First, onshore traders in banks were generally more concerned with the central bank's commitment to control inflation. This is also reflected in these operators' concern with the potential pass-through from the exchange rate to inflation. For these respondents, an ITR did not necessarily facilitate speculation on future interest rate movements. Offshore operators, and operators in domestic hedge funds, in contrast, did mention particularly the increased predictability with respect to interest rate decisions as a result of an ITR. Interestingly, several offshore respondents also raised critiques against inflation targeting regimes in emerging markets. Although providing predictability and credibility, there was a notion that too strong a fixation on inflation, rather than the exchange rate for example, could lead to higher volatility and negative effects on growth.

These differences in responses can be attributed to the respondents' differential trading strategies in the foreign exchange market and their different portfolio characteristics. First, onshore operators in domestic banks have a much shorter trading horizon than domestic hedge funds and offshore operators in institutional investors and offshore banks (Kaltenbrunner, 2011). However, while in the intra-day, in which many of the domestic traders operate, an inflation targeting regime might not make so much difference as "noise" from domestic and political factors gain more weight and/or the expected interest rate is already priced in, on a more medium-term horizon an ITR has a considerable effect on the interest rate trajectory. Moreover, offshore operators trading several emerging markets at the same time cannot and do not have the time to consider all domestic factors. As discussed in section 4, an ITR is a simple homogenisation device which standardizes monetary policy across the globe. And indeed, as seen above, monetary policy, and particularly interest rate decisions, are important elements of central bank operations for offshore operators driven by short-term carry trade motivations. Second, offshore traders have their portfolio's performance denominated in foreign currency in which domestic inflation plays a much lower role when compared to the onshore traders' portfolio. Onshore respondents' concern with the pass-through from inflation to the exchange rate also reflects the potential asymmetric behaviour an ITR imposes on central bank behaviour: while no intervention was expected on the appreciation trend, the potential effect of exchange rate depreciation on the inflation might call for central bank intervention in the foreign exchange market.

### *Question 3: Central Bank Operations in the International Financial Crisis*

As could be seen in Table 3, currency market operators considered liquidity provision as one of the most important tasks of the central bank. This liquidity provision became especially important during the international financial crisis. Given that the questions about the international financial crisis primarily concerned the specific operations of the BCB, the below discussion is largely based on the responses by onshore interviewees and selected offshore interviewees, which were very familiar with the Brazilian case.

Overall, respondents thought that the BCB operated very well during the international financial crisis. It provided as much liquidity to the market as it required, and indeed even more than some market participants had expected, but without reducing the existing level of foreign exchange reserves by a substantial amount (through intervening in the derivatives exchange), unlike Mexico for example. According to the respondents, the BCB's message to offer as much liquidity as needed anytime was an important factor in halting the depreciation. As one interviewee put it "if I needed money, if I needed cash, I went to Brazil, because that is where the liquidity was". Moreover, in contrast to its operations in the appreciation period, the BCB entered decisively in several – relatively surprising interventions – swamping the market with liquidity and thus even reversing the trend for a few days (and thus potentially hurting operators which had taken speculative positions against the Real).

Interestingly, the interviews showed that a large share of respondents (20 out of 21) expected the BCB to intervene in the crisis to prevent further depreciation. Thus, while there was no feeling that the central bank should or could stop the exchange rate appreciation, the operators thought that the central bank had an obligation to halt the exchange rate depreciation and avoid sharp and large exchange rate movements (some respondents even contacted the central bank and told them to do so). These expectations – and indeed nature of the actual operations of the BCB over the period under consideration - are entirely consistent with the asymmetric foreign exchange operations of a central bank in an ITR advocated in this paper. However, the operators' knowledge that the appreciation trend would not be contained significantly, while excessive risk in the depreciation period would be contained, lowered the risk on their open foreign exchange positions and induced them to take even larger positions.

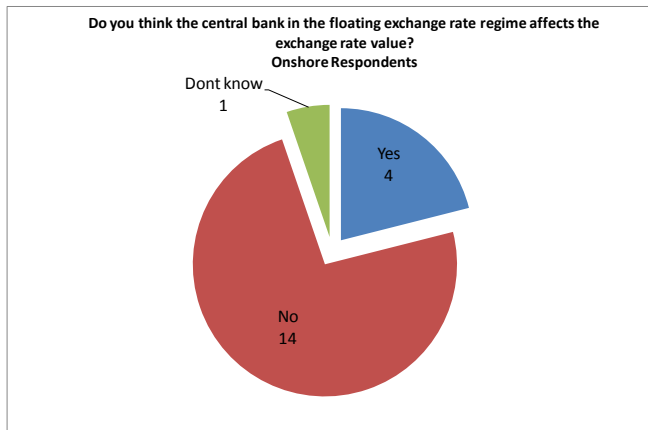
Finally, the majority of respondents (22 out of 23) thought that the large level of foreign exchange reserves at the BCB made an important difference in the crisis through providing confidence, actual liquidity and avoiding speculation against the Brazilian Real. However, very few of the respondents held that a large amount of foreign exchange reserves could ultimately protect the BCB from a run on the currency. In a similar vein, several respondents argued that rather than the actual level of reserves, it is the size and structure of outstanding liabilities, i.e. a country's net-short foreign obligations, which will determine the success and outcome of central bank interventions in the moment of crisis.

### *Question 4: The Question of Exchange Rate Management*

The final set of questions regarding central bank operations referred explicitly to the issue of exchange rate management. Three main questions were asked. Firstly, whether the interviewees believed that the operations of the BCB in an ITR cum floating exchange rate affected the value of the currency. Secondly, whether operators thought that if the Brazilian/emerging markets central bank(s) decided to manage the exchange rate, e.g. for a particular level or within a band, they could do so in a credible fashion and what would lend them credibility. And finally, whether they, as foreign exchange market operators, would

want central bank (s) to manage the exchange rate and if so how. Given the explicit focus on the operations of the BCB, the first question was primarily targeted towards onshore respondents; the two latter questions were formulated in a more general way for offshore respondents. Figure 5 shows the onshore interviewees' answers to the first question.

Figure 5:



Notes: Total number of responses: 19; responses are exclusive

In line with the results above, nearly three quarters of all Brazilian foreign exchange traders did not think that the BCB is or should be targeting the level of the exchange rate. These answers were partly ideologically motivated, as the central bank should not intervene with market forces, and partly motivated by the notion that give the existing ITR the BCB could not make the exchange rate another target for its operations. Those who did think that the BCB had an effect on the exchange rate primarily saw this as a by-product of the BCB accumulating foreign exchange reserves. According to the respondents, the only purpose of the central bank in an ITR is to smooth volatility (particularly in times of depreciation as seen above). Recurrent reference was made to the negative effect of exchange rate volatility on the real sector; interestingly, no such negative effect was assumed for sustained periods of exchange rate appreciation.

Figures 6 and 7 show the answers of onshore and offshore respondents to whether they thought the BCB/emerging market central banks' could credibly defend a certain exchange rate value in the current constellation of high capital mobility?

Figure 6

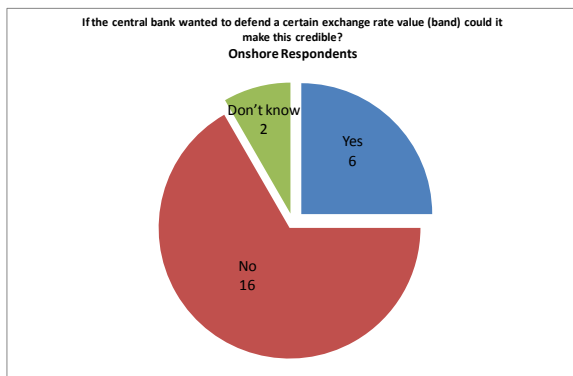
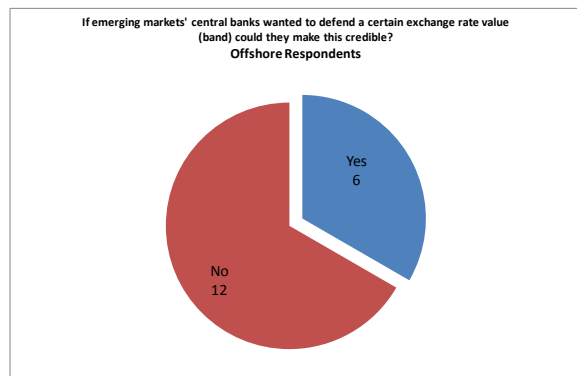


Figure 7



A majority of respondents did not think that the Brazilian/emerging market central bank(s) could manage their exchange rate(s) credibly. The institutional framework of an ITR aside, two reasons were most frequently mentioned: firstly, the size, liquidity and the amount of short-term capital flows entering these markets, which meant that central bank(s) did not have sufficient resources to control the exchange rate; secondly, the difficulty defining an appropriate exchange rate value. Several traders argued that they would attack the exchange rate immediately in the case of an apparent distortion in the real economy.

Those respondents who did think that a credibly managed exchange rate regime could be possible most commonly held the view that the central bank would have to make it its main strategic objective and policy target, i.e. abandon the ITR, and be very clear regarding its objectives and aims. This expresses the inconsistencies and indeed impossibility of combining an inflation targeting regime with some form of exchange rate management advocated in this paper.

Interestingly, in relative terms, offshore traders seemed to be slightly more likely to believe that such a credibly managed exchange rate regime was possible<sup>9</sup>. In general, respondents considered it more likely that the central bank could successfully manage the exchange rate in an appreciation rather than a depreciation period. Although very costly in Brazil, given the high sterilization costs in the presence of the high real interest rates, respondents argued that the central bank would just have to buy more than the arriving foreign exchange inflow to halt the (expected) exchange rate appreciation<sup>10</sup>. The task was acknowledged to be more difficult in the case of an (expected) depreciation. Few respondents believed that a large level of foreign exchange reserves would credibly protect the central bank against a speculative attack. Interestingly, the number of respondents who did think that the size of foreign exchange reserves could make a decisive difference in the case of depreciation was again higher among offshore (5) than onshore (1) respondents. In this respect it is important to note that a large share of respondents (12) mentioned that the only credible way of managing exchange rates in emerging markets would be with the support of capital controls. According to several interviewees, in the Brazilian case, this would involve restrictions on foreign, and indeed also domestic, operations on the liquid local derivatives exchange.

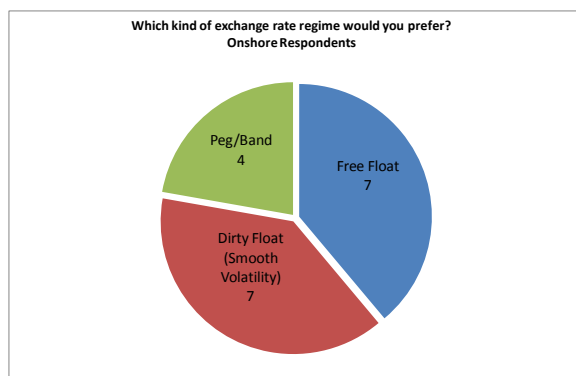
The final question aimed to gain a deeper insight into which form of exchange rate regime was most profitable and preferable for the foreign exchange operators themselves. This question was considered crucial as it (a) allowed further insights into the interaction between central bank operations and trader behaviour and (b) could have important implications for the design of exchange rate policy in emerging markets.

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<sup>9</sup> This could be due to the fact that some of them also traded Asian currencies. Some Asian countries have managed their exchange rates more or less successfully over recent years.

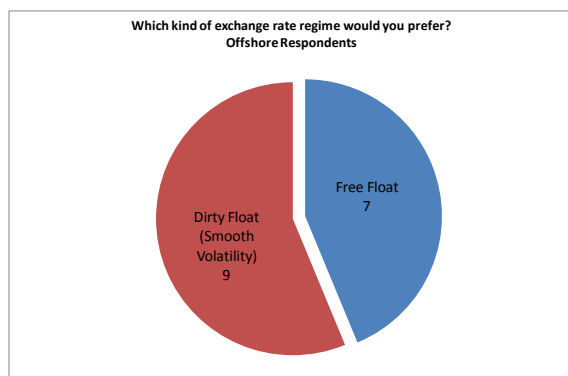
<sup>10</sup> It is important to note, however, that even when the BCB started to buy more than the foreign exchange flow in 2010 it found it very difficult to contain the appreciation trend. This was partly due the increasing importance of derivatives operations in the Brazilian market. In addition, the BCB's spot purchases allowed Brazilian banks to increase their short US\$ positions in the spot market which they counteracted with speculative long positions on the derivatives market.

Figure 8



Notes: Total number of responses: 18

Figure 9



Notes: Total number of responses: 16

Figures 8 and 9 show that more than half of all respondents would prefer some form of managed exchange rate regime over a pure float. The most preferred option seems to be something like a managed or dirty float. Although at first sight surprising, as one would expect foreign exchange market participants to favour exchange rate volatility to speculate on future exchange rate movements, above results have indeed shown that respondents were concerned about large and sudden exchange rate movements and did favour some form of volatility smoothing. As discussed above, a smoothed exchange rate or dirty float gives foreign exchange market operators confidence that excessive losses will be avoided while at the same time promising continuing profits on exchange rate appreciation. In addition, respondents stated that less volatile movements are often more sustainable and less likely to be reversed. This increases the Sharp ratio (risk premium) on their foreign currency investments and allows them to more effectively hedge their operations. Finally, according to the respondents, given that smoothed/managed exchange rates postpone, rather than avoid exchange rate appreciations, this type of exchange rate management gives time to build even larger speculative exchange rate positions.

Finally, although not very robust and consistent, some differences could be observed among the respondents. While intraday and high frequency traders and real money investors seemed to favour a floating exchange rate, proprietary traders of banks and hedge fund managers seemed to favour a slightly managed exchange rate. This could be explained by the fact that high frequency investors largely base their trading decisions on statistical models which require “random” exchange rate movements as in floating exchange rates. Real money investors are less affected by sudden and large exchange rate movements due to their longer trading horizon. Interestingly, these differences between respondents also held when it came to the role of capital controls or a Tobin tax to manage exchange rates. Although not specifically targeted in this research and a subject of future research, several real money investors mentioned that a short-term Tobin Tax or a tax on capital inflows did not pose a problem to their operations. Any forms of capital controls, in contrast, were categorically rejected by all other respondents.

These results, however, have potentially crucial implications for the question of exchange rate management in emerging markets exposed to large short-term and yield driven capital flows. They show that a regime of managed exchange rates or dirty floats, which is indeed currently the most prominent type of exchange rate regime in these countries, might severely undermine these countries’ attempt to manage their exchange rates through further attracting



capital flows motivated by short-term gains on the domestic currency and the interest rate differential. However, these capital flows do not only exacerbate appreciation pressures in “good” times, but might also cause large and sudden exchange rate depreciations in “bad” times when conditions on international financial markets change.

## 6. Conclusions

Inflation targeting regimes have become the macroeconomic regime *en vogue* for emerging markets exposed to large capital flows. After the devastating financial crisis of the turn of the millennium, and the apparent failure of intermediate exchange rate regimes, floating exchange rates accompanied by the institutional anchor of an inflation targeting have become the recommended choice for such countries. While the floating exchange rate was supposed to avoid sustained misalignment in the exchange rate and consequent macroeconomic disequilibria the inflation target should act as a nominal anchor to control inflation. Empirical evidence, however, has shown that few, if none, of the highly integrated emerging markets did indeed let their currencies float but were active operators in their respective foreign exchange markets to manage their exchange rates. The consequent recommendation of mainstream economic literature was some combination of an ITR and a managed exchange rate, obviously in the presence of continuing capital openness.

This paper has challenged the possibility of such a combination. At the example of Brazil, it has shown that the impossible trinity has come back at a vengeance. More than that, it has shown that, in contrast to what is argued in the literature, the existence of a credible, transparent and predictable ITR which uses the interest rate as its main policy variable, exacerbates rather than mitigates this impossible trinity through its interaction with financial system expectations and thus capital flow dynamics. Over recent years Brazil has become increasingly integrated in international financial markets and exposed to short-term capital flows, which has made movements of the exchange rate very volatile and increased its dependence on international market conditions. This volatility has taken place despite substantial foreign exchange intervention by the Brazilian central bank, which – given the importance of the exchange rate for the domestic economy – has attempted to smooth exchange rate volatility. This paper, however, has shown that these interventions in the presence of large capital flows and the institutional framework of an ITR were of little success if not counterproductive. It has shown that this is the result of the peculiar way an ITR shapes the central bank’s operations in both the foreign exchange and the money market and the way these operations interact with financial sector decisions.

The recent decision of the Brazilian central bank to impose capital controls (and reinforce non-market based monetary policy operations) has shown the limits of the ITR *cum* floating exchange rate in Brazil and has revealed how policy makers are trying to control the three sides of the impossible trinity. Indeed, if emerging markets want to regain some control over their exchange rates, which remain important policy instruments and relative prices in emerging markets, they will have to either abandon their inflation targeting regimes and/or reduce their extent of financial market integration. In fact, most discussion on

macroeconomic management in emerging markets has taken capital mobility to be an untouchable fact, i.e. the impossible trinity was assumed to hold. However, there is no reason why this has to be the case. Financial integration is not an irreversible process. History shows that many countries have adopted a diverse range of capital regulation measures (Boyer, Dehove et al. 2004; Ostry et al. 2010).

The imposition of capital controls in emerging markets to manage their macroeconomic trilemma, however, has potentially important implications for the international economic order, including Europe. For example, as European capital expansion during the 2000s has been based on capital flows export mainly through their banks (e.g. Kaltenbrunner et. al, 2010 and RMF, 2010), the spread of capital controls measures across emerging countries could harm the European recovery from its present crisis as European banks would see a drop in their lending and financing operations to these countries, consequently damaging their performance. As to portfolio flows, the same process would happen as this type of flows is also subject to capital controls as can be seen through the Brazilian experience. In this case, European institutional investors such as the pension funds would be more affected in their performance.

However, the restriction on European capital to flow to emerging countries could also have positive effect on European economies, particularly the productive sector. If European banks, and key institutional investors, become constrained in their cross border activities, their operations would necessarily have to become more Europe focused, which in turn could increase the finance available for European productive investments.

Lastly, the spread of capital controls measures across emerging countries would hit the process of reserve accumulation in those countries which in turn could have negative consequences for developed countries assets, including Europe. Indeed, over recent years, the reserve currency status and value of the US\$, and to a certain extent the Euro, has been sustained by the ongoing process of capital flows and reserve accumulation in emerging markets. The end of such a process could thus have potential implications for these currencies and the constellation of the international monetary system more generally.

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### Appendix A:

