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The Impossible Trinity on Steroids:
Inflation Targeting and Exchange Rate Management in Emerging Countries

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Abstract:
This paper contributes to the debate on macroeconomic management and capital account regulations in developing and emerging countries (DECs). It argues that the recommendation by neoclassical economists and international financial institutions (IFIs) to combine an inflation targeting regime with exchange rate management, whilst maintaining open capital accounts, is both impossible and potentially counterproductive. This, it shows with extensive semi-structured interviews with currency traders in Brazil and London, is due to the peculiar way such a regime shapes central bank interventions in the money and foreign exchange markets and the destabilising way these interventions interact with financial market expectations. The interview results also demonstrate that the guidelines issued by IFIs actually undermine, rather than aid, DEC central banks' initial attempt to manage excessive exchange rate movements. These results support the long-standing argument by heterodox economists and critical international political economists that DECs need to make the exchange rate an explicit instrument and goal of their macroeconomic policy and complement it with comprehensive capital account regulations to reduce the destabilising impact of international capital flows. The interview results also give some concrete suggestions on how to do so.

Keywords: Capital Flows; Exchange Rate Management; Inflation Targeting; Capital Account Regulations; Transparency; Carry Trade

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INTRODUCTION

Macroeconomic management in developing and emerging countries (DECs) is on the agenda again. Unprecedented amounts of foreign capital have led to large swings in exchange rates and domestic assets prices causing competitiveness and balance sheet concerns. This paper contributes to the ensuing debate on macroeconomic and capital account management (Gabor 2010, Gabor 2012, Gallagher, Griffith-Jones et al. 2012, Vernengo and Ford 2014, Chwieroth 2015, Grabel 2015). It argues that the institutional framework of an inflation targeting regime (ITR), recommended to these countries by neoclassical economists and International Financial Institutions (IFIs), left DECs no other option than to resort to renewed capital account regulations. This it illustrates with extensive semi-structured interviews with financial market participants, is due to the fact that an ITR makes any attempt to dampen the destabilising effects of international capital flows ineffective, and potentially counterproductive, effectively leaving DECs exposed to these flows with no means to counteract them (FitzGerald 2004).

ITRs have been subject to widespread criticisms due to their overzealous focus on price stability at the expense of unemployment and growth (anchored in the assumptions of the long-run neutrality of money and the natural rate of unemployment- or the non-accelerating inflation rate of unemployment (NAIRU))[1], their one-sided interpretation of inflation as demand pull phenomenon, and the problematic role of the short-term interest rate as main monetary policy instrument (Arestis and Sawyer 2003, FitzGerald 2004, Rochon and Rossi 2006, Argitis 2008-09, Epstein and Yeldan 2010, Gabor 2010). Given their distinct structural characteristics, in DECs an additional problem of conducting ITRs is the necessary subordination of the exchange rate as economic policy instrument (FitzGerald 2004, Cordero 2008, Galindo and Ros 2008, Vernengo 2008, Epstein and Yeldan 2010). Indeed, empirical

[11] The natural rate of unemployment, or its more general case the NAIRU, assume an underlying unemployment rate, deviations of which will cause inflationary pressures. In the neoclassical tradition this natural rate of unemployment is a purely supply side phenomenon, which means that demand side factors, and monetary policy for that matter, cannot impact employment in the long-term. Demand side policies can at best have temporary effects and will ultimately result in inflationary pressures. This means money neutrality holds in the long-run, there is no trade-off between output and inflation, and monetary policy should be solely concerned with the price level (Sawyer 1999, Arestis and Sawyer 2003). The NAIRU has been criticised extensively both on theoretical and empirical grounds due to, among other things, its lack of path dependency, knife-edge properties, and time-varying nature. For a more extensive critique see, for example, Galbraith (1997), Sawyer (1999), Sawyer (2002), Arestis and Sawyer (2003), Stockhammer (2006).

evidence shows that despite their official ITRs cum floating exchange rates, DEC central banks have been intervening heavily in their foreign exchange (FX) markets, both in times of appreciation and depreciation (Calvo and Reinhart 2000, McKinnon and Schnabl 2004, Levy-Yeyati and Sturzenegger 2007).

This continuing importance of the exchange rate, and the potential threat this might pose to the existing macroeconomic framework of inflation supremacy and free capital account convertibility, has not remained unacknowledged by neoclassical economists and IFIs. Several authors have proposed a certain degree of exchange rate management within an ITR (coming under a range of different names such as inflation targeting lite or flexible inflation targeting) (Mishkin and Savastano 2001, Goldstein 2002, Bofinger and Wollmershäuser 2003, Cavoli and Rajan 2003, Cavoli 2008). In these proposals inflation remains the main and overriding nominal anchor, but DECs are permitted to intervene in the FX market to smooth excess volatility. According to the IMF, these interventions should be conducted in the most systematic, transparent and market based manner possible. Moreover, DECs are recommended to further open their capital accounts to develop domestic financial markets and facilitate macroeconomic management (Roger, Garcia et al. 2009, Stone, Scott et al. 2009).[2] The accumulation of foreign exchange reserves should stabilize international capital flows (Aizenman and Riera-Crichton 2014).

This paper argues on the basis of 52 semi-structured interviews with foreign currency traders, that such a combination of ITRs and exchange rate management, while maintaining free capital account convertibility, is not only ineffective, but at times self-defeating. The interviews show that this is the result of the peculiar way an ITR shapes central bank operations in the money and FX markets and the destabilising way these operations interact with financial market expectations. This ineffectiveness does not only hold for attempts to target a certain exchange rate level, especially during speculatively driven appreciation pressure, but even efforts to smooth excess exchange rate volatility.

[2] Although the IMF has recently endorsed some degree of capital account management (at least in scholarship and rhetoric) (Güven 2012), capital account mobility is still considered desirable in the long-term (Vernengo and Ford 2014, Gabor 2015). In this vein, it is also important to differentiate between the positions taken in papers written by the research department, which is the case here, and the actual policies and recommendations by the IMF.

A small neoclassical literature, largely from central banks themselves, has noted the difficulty if not self-defeating nature of FX interventions in an ITR (Gersl and Holub 2006, Kamil 2008, Berganza and Broto 2012, BIS 2013). This literature, however, is limited to quantitative data which gives little insight into *why* this is the case. Although financial market expectations are identified as the key transmission channel, statements about these expectations remain speculative. This paper attempts to overcome this shortcoming by giving extensive insights into the behaviour of foreign exchange market participants, their expectations formation process, and interaction with central bank operations. It aims to shed light on the underlying reasons why, and mechanisms through which, an ITR makes the implementation of exchange rate management difficult. The results not only point to the peculiar interactions between central bank operations and financial market behaviour in an ITR, but also show that the recommendations to increase transparency and predictability, ensure the market-based nature of FX and monetary operations, and accumulate a "war-chest" of foreign exchange reserves, might have exacerbated rather than reduced this difficulty. Finally, the detailed insights into financial market behaviour and mechanisms allow us to formulate concrete policy recommendations as to how to manage DECs' financial integration more sustainably. [3]

Following this introduction, Section 2 gives an overview of the theoretical literature on ITRs and exchange rate management in DECs. Section 3 introduces the Brazilian context and Section 4 presents the links between an ITR, FX and money market interventions and financial sector behaviour. Section 5 presents our policy suggestions and Section 6 concludes.

[3] The use of interviews raises the following questions. To what extent are agents' perceptions and expectations transformed into effective actions and can they explain the functioning of the economy? Two points can be raised in the context of this paper. First, rather than proving the difficulty of conducting exchange rate management within an ITR, which has been shown in the existing empirical literature, we are interested in investigating the reasons why this is the case and the detailed mechanisms through which this takes place. Given that the behaviour and perceptions of financial market players lies at the core of this issue, it is essential to investigate this behaviour in detail. Quantitative data can only do this to a limited extent. Second, interviewees often recount what they have actually observed in financial markets, rather than just giving their own perceptions, providing insights into the working of those markets which cannot be gained with quantitative data.

1. THE EXCHANGE RATE AND INFLATION TARGETIG IN THE LITERATURE

Following the collapse of their managed exchange rate regimes in the late 1990s/early 2000s, ITRs *cum* floating exchange rates have become the predominant macroeconomic framework in DECs – frequently at the behest of IFIs (Epstein and Yeldan 2008, Gabor 2010). This ascendancy of ITRs, at the expense of explicit exchange rate management, can be attributed to several reasons. First, it has to be seen in the context of the devastating financial crises of the late 1990s early 2000s, which were largely attributed to the failure of unsustainable exchange rate pegs acting as nominal anchor for the economy, and the inability of DEC governments to reach the 'right' exchange rate target. Government influence had to be removed from the FX market to allow floating exchange rates to equilibrate markets and restore balance of payments equilibrium. ITRs, which had started to be implemented across the globe, offered a rule-based nominal anchor which would allow monetary policy autonomy whilst at the same time constraining undue government discretion. The primacy of inflation as main policy objective was readily accepted in many DECs given their history of high inflation (indeed in many of these countries pegged exchange rate regimes were implemented in the context of exchange rate-based inflation stabilization programs). Finally, as we will see in more detail below, ITR regimes were thought to ensure DECs' continued integration into a global economy through apparently solving the impossible trinity, providing a homogenised institutional framework, and catering to the need arising from increasingly financialised markets (Frenkel 2006, Gabor 2010).[4]

An ITR comprises the institutional commitment to price stability as the primary goal of monetary policy, the public announcement of medium-term numerical targets for inflation,

[4] It is important to note though that not all DECs have replaced the exchange rate target with an ITR. According to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (IMF 2014), many less developed and financially closed countries, and those strongly tied to a regional economic space and oil exporting nations, maintain pegged exchange rate regimes. Among the financially open emerging economies, Singapore also maintains an exchange rate anchor. However, Singapore did not experience a crisis in 1997/98. It is an international creditor country and has a large international financial centre (the fourth largest in the world) with strong links to the US financial markets. The former makes the economy less vulnerable to externally induced exchange rate movements (Bénétrix, Lane et al. 2015, Kaltenbrunner and Painceira 2015). The latter renders exchange rate stability essential to avoid excessive revaluations of wealth and maintain confidence in the Singapore Dollar as stable store of wealth. In addition, Chow (2010) shows that given Singapore's small and open economy, the exchange rate is the more important transmission mechanism to inflation, whereas the economy is less sensitive to interest rates.

the short-term interest rate as the main policy instrument, monetary policy independence, and finally full policy transparency, credibility, and accountability to be assured by an independent central bank (Mishkin and Schmidt-Hebbel 2001, FitzGerald 2004, Epstein and Yeldan 2007). As such, ITRs follow strongly in the tradition of neoclassical policy design, whose methodological and ontological individualism calls for rule-based monetary policy and a reduced role for the state in the economy to avoid time-inconsistency problems and to "stabilise" market expectations (Best and Widmaier 2006, Vernengo 2008, Gabor 2010, Major 2012).

The implementation of ITRs in DECs has been subject to debate due to these countries' distinct structural characteristics. For some authors these refer to DECs' fragile institutions, weak fiscal balances and a general lack of domestic policy credibility (Masson, Savastano et al. 1997, Schaechter, Stone et al. 2000, Amato and Gerlach 2002, Fraga, Goldfajn et al. 2004, Mishkin 2004, Stiglitz 2008).[5] For Keynesian and Structuralist economists one of the biggest problems of implementing ITRs in these countries is the necessary subordination of the exchange rate as economic policy instrument (FitzGerald 2004, Cordero 2008, Galindo and Ros 2008, Vernengo 2008, Epstein and Yeldan 2010, Gabor 2010).[6] ITRs' emphasis on credibility, transparency and monetary independence implies that inflation control has to be the one and only goal of monetary policy which cannot be compromised at the expense of any other policy objective. This includes the explicit or implicit management of the exchange rate (Bernanke, Laubach et al. 1999).[7]

However, recent experience shows that DECs' distinct structural characteristics make it effectively impossible for them to leave exchange rate determination to (international) market forces (Gabor 2010). Domestically, a higher pass-through from the exchange rate to domestic prices and pervasive balance sheet weaknesses (DECs' "original sin") might make intervention necessary to avoid an excessive contraction of output (Eichengreen 2002, Jansen

[5] The main contentious point in this literature is then whether these institutional preconditions, or "good governance" (Vernengo and Ford 2014) should be given before the implementation of an ITR or whether the ITR itself would foster the necessary institutional development.

[6] Obviously, the neglect of output and employment as alternative monetary policy goals in an ITR is just as pertinent for DECs as for developed countries. However, in contrast to developed countries, given the structural characteristics of DECs, the exchange rate is a much more important economic instrument to achieve these other monetary policy objectives.

[7] For many neoclassical economists FX interventions would not be necessary as the exchange rate adjusts efficiently to clear markets and price stability is accompanied by exchange rate stability.

2003, Arestis, Rodrigues et al. 2008). This is exacerbated by the lack of other monetary policy instruments and weak transmission mechanisms which increase the exchange rate's importance as macroeconomic and development policy instrument (Barbosa-Filho 2008, Rodrik 2008). Externally, the need for intervention is exaggerated by DECs' trade dependence, thin financial markets, and their surging integration into a fragile and hierarchic international financial system (Palma and Ocampo 2008, Akyüz 2013, Prates and Andrade 2013). Indeed, a recent report by the Bank for International Settlements (BIS) shows that mitigating the destabilising impact of speculative capital flows has been the main reason for DEC central bank interventions over recent years (BIS 2013).

This continued importance of the exchange rate has prompted several authors to advocate some degree of explicit exchange rate management within an ITR (Mishkin and Savastano 2001, Goldstein 2002, Bofinger and Wollmershäuser 2003, Cavoli and Rajan 2003, Cavoli 2008, Roger, Garcia et al. 2009). 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 FX market from time to time to smooth excessive short-term fluctuations and/or to maintain market liquidity. Parrado (2004) and Yilmazkuday (2007) show that exchange rate management in an ITR reduces output and inflation volatility in the presence of a range of different shocks. According to the IMF (Roger, Garcia et al. 2009, Stone, Scott et al. 2009) this is particularly the case in financially vulnerable economies where both volatility smoothing and targeting a certain exchange rate level may improve macroeconomic performance.

To make this possible, the IMF has issued several accompanying policy recommendations (Cavoli and Rajan 2003, Stone, Scott et al. 2009). First, a clear hierarchy between policy objectives has to be maintained, that is exchange rate management has to remain firmly subordinated to inflation control. Second, to reduce the potential conflict between the inflation and the exchange rate target, any intervention in the FX market has to be performed in the most systematic, predictable, and transparent manner. Third, monetary and exchange rate policy has to be implemented on market principles, that is, among other things, the short-term interest rate needs to remain the main monetary policy tool. Finally, DECs are recommended to further open their domestic financial markets to foreign investors to promote financial deepening and facilitate policy implementation.

FX interventions are not necessarily inconsistent with an ITR. On the contrary, in the moment of depreciation a high pass through from the exchange rate to inflation might warrant some interventions. The attempt to combine an ITR and exchange rate management, however, becomes very difficult, counterproductive even, in the case of appreciation pressures caused by short-term speculative capital flows.

A small literature, largely from (DEC) central banks themselves, shows the difficulty of accommodating exchange rate management within an ITR in the presence of free capital mobility (Gersl and Holub 2006, Kamil 2008, Berganza and Broto 2012, BIS 2013). For example, Berganza and Broto (2012) find for a panel of 37 countries that while an ITR seems to increase the effectiveness of FX interventions in times of depreciation, no such effect can be observed in times of appreciation. In a similar vein, Gersl and Holub (2006) present evidence that FX interventions during periods of strong capital inflows and the institutional framework of an ITR failed to halt the Czech Koruna's appreciation.[8] Finally, the BIS (2013) reports the experience of several DECs central banks that rather than dampening appreciation pressures, interventions might have actually contributed to accentuate exchange rate movements in the wrong direction (Miyajima and Montoro 2013). However, this literature's exclusive reliance on quantitative data severely restricts its insights into financial market behaviour and thus the reasons and underlying mechanisms, which explain the apparent ineffectiveness of FX interventions.[9] Moreover, it can offer very few positive suggestions as to how to design macroeconomic policy in DECs more effectively and sustainably. In what follows, this paper aims to offer both.

2. INFLATION TARGETING, FINANCIAL INTEGRATION AND EXCHANGE RATE MANAGEMENT IN BRAZIL

Brazil's ITR was implemented in the middle of 1999 as part of an IMF program after a FX crisis brought an end to its crawling peg managed exchange rate regime. Following the

[8] The same result is presented by Kamil (2008) for Colombia.
[9] This shortcoming is exacerbated by the dearth of quantitative data on FX interventions in DECs (Menkhoff 2012).

British example (Arestis, Rodrigues et al. 2008), the Brazilian Monetary National Council (CMN) defines an inflation target within a band of 2 per cent which the Brazilian Central Bank (BCB) has to reach each calendar year. The main policy instrument to do so is the short-term interest rate (the Selic rate). In line with the demand for transparency and credibility, each interest rate decision is accompanied by a detailed explanation for its reasons. Failure to hit the target has to be followed by an open letter to the Parliament.

Table 1 shows that, with a few exceptions, the BCB has achieved its inflation target. This was achieved by means of very high (real) interest rates. The interest rate differential between the Selic, and the Fed Fund rate stayed close to 10 per cent for most of the period under investigation. In addition to lowering aggregate demand, the high interest rates attracted large amounts of capital inflows (as can be seen in Figure 1 and will be discussed in more detail below), which appreciated the exchange rate and lowered the pressures from tradable goods prices into domestic consumer prices. Inflation control was also facilitated by muted wage developments. Real average wages were relatively stable until 2009, after which they assumed a slight upward trend (Barbosa and Pires 2014).

Insert Table 1 here

The ITR was accompanied by a floating exchange rate regime and further capital account liberalisation. The result was an unprecedented surge of (short-term) international capital flows. Figure 1 shows the current account, short-term portfolio flows (to the bond and equity market) and banking flows from the beginning of 1996 to the end of 2013.

Insert Figure 1 here

Cumulative 12-months short-term capital flows (portfolio flows plus banking flows) surged from an outflow of US$8bn at the beginning of 2000 to inflows of more than US$60bn and US$50bn at the end of 2007 and 2010 respectively. Moreover, these flows were subject to large swings and sudden contractions, predominantly driven by international market conditions (Akyüz 2013, Kaltenbrunner and Painceira 2015). Short-term capital flows picked up at the beginning of 2003 as liquidity returned to international financial markets, surged in the first stage of the international financial crisis when international investors "diversified" into high yielding and liquid DECs assets, and contracted dramatically as the failure of Lehman Brothers led to a global liquidity crunch. Similar patterns have repeated themselves during the Eurozone crisis, as initial uncertainty led to return chasing and diversification into DECs, followed by an abrupt contraction as conditions on developed markets worsened. These dynamics were exacerbated by extraordinary loose monetary conditions in the major developed countries, which pushed international investors to seek higher returns in alternative asset classes. The effects of these are particularly visible in the last capital flow cycle, as the first "tapering" announcements by the FED in May/June 2013 led to a renewed withdrawal of funds (Eichengreen and Gupta 2013, Fischer 2015).[10]

These capital flow dynamics exerted significant pressures on the Brazilian Real (BRL), which the BCB, despite its official floating exchange rate regime, tried hard to contain. Figure 2 shows the substantial FX interventions, both in the spot and derivatives markets and both during times of appreciation and depreciation.

Insert Figure 2 here

[10] It is important to mention though that particularly over more recent years, these dynamics were not entirely independent of domestic conditions as the introduction and removal of capital account regulations and the worsening domestic economic situation changed investors' perceptions of Brazilian assets.

Between the beginning of 2005 and September 2008, the first strong wave of capital inflows, the BCB bought around US$150bn through spot interventions, bringing FX reserves to more than US$200bn. Concurrent to subsequent inflow episodes reserves surged further to reach US$374bn in May 2012. The BCB's interventions during times of capital flow surges were complemented with ample provision of US$ liquidity during moments of retrenchment. Between September 2008 and the beginning of 2009, the worst months of portfolio adjustment following the failure of Lehman Brothers, the BCB sold around US$8bn of foreign reserves and provided US$32bn in FX swaps.

As mentioned above, whereas FX interventions in times of depreciation are in principle consistent with ITRs, there should be no interventions in times of appreciation. This incentive for asymmetric FX interventions arises because exchange rate depreciation might add upward pressures on domestic prices which would have to be contained in an ITR. Exchange rate appreciation, on the other hand, lowers tradable goods prices thus potentially helping to control. Yet, the BCB intervened heavily during both periods indicating the importance of the exchange rate as separate policy target. In principle, interventions during periods of capital inflows could also be motivated by attempts to accumulate FX reserves. This, however, does not explain the BCB's substantial derivatives interventions through the issuance of reverse FX swaps.[11] Between 2005 and August 2008 the BCB´s FX swap position moved from an US$11bn short position to US$22bn long position to contain the Brazilian Real (BRL) appreciation. In a similar vein, the BCB cleared all its FX swap positions during the first months of 2009 (as the first signs of the Eurozone crisis emerged) and resumed its reverse FX swap operations in the beginning of 2011. In 2013 the BCB entered the market with a huge FX swap intervention to contain the effect of the US tapering announcements.

However, despite these heavy interventions, the BRL has been one of the world's most volatile emerging market currencies over the period (Kaltenbrunner and Painceira 2015). Figure 2 shows that the BRL appreciated from nearly 4/US$ in 2003 to 1.5/US$ in August 2008 to then lose around 60 per cent within 3 months as the failure of Lehman Brothers sent shockwaves through the international financial system. Similar dynamics were repeated

[11] An 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 (US$) plus the internal dollar yield rate (cupom cambial). In reverse FX swaps, the BCB takes a long position in foreign currency.

during the Eurozone crisis and recent tapering announcements: the BRL appreciated from nearly 2.4/US$ at the end of 2008 to 1.6/US$ in the summer of 2011 to depreciate 30 per cent until the next summer, and another 15 per cent until December 2013. This apparent policy impotence, the next section shows, was due to the peculiar way Brazil's ITR shaped financial sector expectations.[12]

3. THE IMPOSSIBLE TRINITY ON STEROIDS: ITR, CENTRAL BANK OPERATIONS AND FINANCIAL MARKET EXPECTATIONS

Financial market expectations were investigated using 52 semi-structured interviews with currency traders in Brazil (onshore: 31 interviewees) and London (offshore: 21 interviewees) conducted between April 2008 and December 2010. Four main areas were covered: interviewees' general perceptions of DEC central bank operations and the feedback of these operations on their own position making; the specific way an ITR shaped their portfolio decisions; their interaction with central bank operations in the international financial crisis of 2008; and finally, their views of an appropriate and preferred exchange rate regime.[13] All questions were formulated open ended to uncover the perceptions and priorities of the financial market actors. A set of core questions was posed to all interviewees. Follow up questions and clarifications depended on availability. Questions to onshore traders (and offshore traders familiar with the Brazilian market) focused particularly on the specific operations by the BCB. Offshore traders with a more diversified DEC currency portfolio gave more general and comparative insights.

In addition to its focus on DEC currency markets and central bank operations, the empirical study distinguishes itself from existing investigations into FX market behaviour, both in Economics and other Social Sciences in two ways (e.g. Frankel and Froot 1987, Allen and Taylor 1992, Cheung and Chinn 2001, Cetina and Bruegger 2002, Oberlechner, Slunecko et al. 2004, Wansleben 2013). First, it concentrates explicitly on market actors which take directional (speculative) FX decisions and thus exert a non-inconsequential impact on the

[12] One difficulty of assessing the effectiveness of FX interventions is that we are frequently dealing with a counterfactual. However, if the BCB's aim was to smooth the volatility of the Brazilian Real in the face of strong capital movements (Tombini 2013), the success of its interventions is doubtful.

[13] Appendix A presents the relevant questions, the number of responses and main results for each question.

exchange rate. In DEC currencies, these include proprietary traders in banks, hedge funds, and fund managers with a more medium to long-term horizon ("real money investors") (Kaltenbrunner 2011, McCauley and Scatigna 2011). Second, it is sensitive to the heterogeneous expectation formation processes, trading strategies and perceptions of different market actors. Although the emphasis is on the general mechanisms which hamper exchange rate management in an ITR, these differences are pointed out when important for analytical and policy reasons.

Before discussing the results in detail it is important to mention that all interviewees considered the BCB, and DEC central banks more generally, a crucial factor for their portfolio decisions (in particular when compared to G7 currencies). More concretely, the interviews identified four broad channels through which this impact took place: (1) the actual FX interventions and liquidity provision to the market (including the stock of FX reserves); (2) the predictability, transparency, credibility and consistency of these FX interventions and the macroeconomic regime more generally; (3) monetary policy, particularly interest rate decisions; and finally (4) recent capital account regulations in Brazil and other DECs. As shown below, all these channels, bare the latter, were distinctly shaped by the existence of an ITR.

(1) Asymmetric Intervention and Exchange Rate Speculation

As to the first channel, as mentioned above, the institutional framework of an ITR incentivises the central bank to an asymmetric pattern of FX interventions, introducing an appreciation bias into the exchange rate (FitzGerald 2004, Epstein and Yeldan 2007, Barbosa-Filho 2008, Galindo and Ros 2008, Vernengo 2008, Benlialper and Cömert 2015). Whereas interventions during appreciation pressures are inconsistent with an ITR (exchange rate appreciation can even help to contain inflationary pressures through lowering tradable goods prices), interventions during moments of depreciation might be necessary to avoid negative pass through effects into domestic prices.[14] In other words, in ITRs the exchange

[14] Although the pass-through from the exchange rate to domestic prices has decreased in Brazil over recent years, it still remains higher than in developed countries and a concern to policy makers (BCB 2016, Caselli and Roitman 2016). In this vein, Caselli and Roitman (2016) also show that in DECs the pass-through is stronger in times of depreciations than in times of appreciations. Moreover, the effect is non-linear, meaning that large

rate might become another policy tool to meet the inflation target, resulting in a tendency for appreciated exchange rates to exert downward pressure on domestic prices.[15] At the same time, deprecations are avoided to reduce inflationary pressures. This is particularly the case in DECs where less developed financial markets impair the interest rate monetary policy transmission mechanism, making the exchange rate an even more important monetary policy tool (Bogdanski, Tombini et al. 2000).

The interviews showed that this asymmetry was strongly perceived by market participants and fundamentally shaped their FX operations. According to the interviewees, the BCB did not, should not and indeed could not target a certain exchange rate level or even influence the exchange rate trend. Its only job was to smooth volatility. For some, this was ideologically motivated, as the central bank should not intervene in market forces and/or was considered unable to hit the "right" exchange rate value. For many, this was due to the existing ITR which meant that the BCB could not make the exchange rate another target of its operations. As one onshore trader at a foreign commercial bank summarized:

"it [defending a certain exchange rate value] *is not their job, their main function is first to make the inflation target smooth, second, to protect the country' reserves,* [third] *to take as much as they can the volatility out of the market, whole market, does not matter which.....if the market wants to move up they have to let the market move up, but not from one day to the other but let's say in six months"*

Importantly though, this perception was limited to the moment of appreciation. When it came to the operations of the BCB during the international financial crisis, there was a strong expectation, in particular among offshore respondents, that the central bank should and would intervene to halt the depreciation of the BRL (several interviewees even contacted the BCB and told it to do so). Moreover, according to some interviewees, the interventions differed markedly in the two periods. Whereas in the appreciation period interventions were predictable and never larger than the actual FX inflows, in times of depreciation the BCB

depreciations have a stronger and faster impact on domestic prices than small depreciations. Both pieces of evidence support the asymmetric concern and nature of the BCB's FX interventions.

[15] Benlialper and Cömert (2015), using the example of Turkey, go so far as to call this situation an "implicit asymmetric exchange rate peg" in DECs.

entered the market decisively in several relatively surprising interventions, swamping the market with liquidity. As one interviewee put it:

'If I needed money, if I needed cash, I went to Brazil, because that is where the liquidity was' (commercial bank; onshore).

Interventions of a large size beyond the "flow" can incur substantial losses on speculative positions through at least temporarily reversing the exchange rate trend.

This understanding of central bank operations, and the knowledge that the BCB was bound institutionally to them through its ITR, fundamentally shaped respondents' operations and further fuelled speculative positions in the BRL. More than half of all onshore respondents, and 4 offshore actors most familiar with the Brazilian market, thought that the nature of FX operation by the BCB allowed them to build speculative positions. Financial market actors knew that despite the BCB's interventions, the appreciation trend would continue, securing them gains on the exchange rate and making them even more eager to buy the Brazilian currency. More than that, given that exchange rate appreciations were postponed, rather than avoided, the BCB's interventions gave them time to build even larger positions. As one onshore trader from a commercial bank noted:

'…The appreciation of the currency tends to be less volatile than the depreciation, so when you have central bank buying dollars you can go against him because you have time and flows to unwind your position if you need…you can believe that the central bank is not there to stop the appreciation…just there to smooth the movement, so you can go against him…'

At the same time, traders knew that the central bank would intervene in the moment of depreciation to avoid upward pressures on prices. Thus, they could be confident that excessive losses in the case of depreciation pressures would be mitigated, reducing the risk of their domestic currency investments and further stimulating capital inflows. This further stimulus, however, directly undermined the central banks' initial attempt to halt the appreciation trend. According to one interviewee:

*'…one thing what the central bank made is was make the volatility go to very low levels…if it hadn't intervened maybe the real would have gone to 2.1, 2.3, 2.7, 2,6, and a lot of people which built positions in Brazil would not have built positions….for example, I doubt that the Japanese flows would have come if Brazil was trading up and down every day…for example, South Africa did not have so much intervention…..and it did not appreciate so much more than Brazil, because it was very volatile all the time' (*Commercial bank; onshore).

More than that, by increasing the stock of externally funded speculative capital in the Brazilian economy, the BCB' asymmetric nature of FX intervention contributed to the large depreciations when international market conditions changed – effectively undermining its initial goal of smoothing exchange rate volatility.

The attractiveness of such an (asymmetrically) smoothed exchange rate for FX market participants was also confirmed by the set of questions which inquired explicitly into their ideal type of exchange rate regime. Surprisingly, more than half of all respondents preferred some form of managed or dirty float over a purely floating exchange rate regime. In line with the results above, respondents noted that such a regime avoided large and sudden exchange rate movements, giving them confidence that excessive losses would be avoided, while at the same time not changing the course of exchange rate movements allowing them to build even larger speculative positions. Some heterogeneity could be observed among the respondents. Whereas very short-term oriented proprietary traders and real money investors tended to favour a floating exchange rate regime, more medium-term traders and hedge funds seemed to prefer a managed exchange rate. Whereas high frequency traders generate most of their income from short-term exchange rate fluctuations and "long-term" investors are largely unaffected by them, exchange rate volatility poses a severe risk for medium term positions in domestic asset markets (e.g. for carry trade operations).

Finally, the interviews pointed to three more channels through which the BCB's FX interventions affected financial market behaviour and complicated its attempt to dampen exchange rate movements.[16] Although not specific to an ITR, these channels show the extreme difficulty of managing the exchange rate in the presence of large and volatile short-

[16] These channels were not directly related to one specific question but emerged in the interviews.

term capital flows. First, through its regular interventions the BCB acted as counterparty to speculative operations in one-sided markets, which further fuelled capital flows. As one respondent put it:

'…if the central bank fights against the market, in the end what happens is that the market wants to sell more because there is somebody putting a price where they can buy and assuming everybody wants to sell that guy gives you liquidity for you to sell' (investment bank; onshore)

This counterparty role became particularly important during depreciation times where the ample provision of liquidity ensured investors that anybody who wanted to leave Brazil could do so quickly and at very low cost.

Second, the interviews showed that even the BCB's sustained accumulation of FX reserves was a double-edge sword. On the one hand, a substantial portion of interviewees agreed that the large FX buffer meant that they speculated less against the central bank in the moment of crisis.[17] On the other hand, though, it was this same large buffer which increased their confidence to build large speculative positions in the first place. Investors' knew that sufficient international liquidity was available in case they wanted to revert their positions and for the BCB to contain sharp exchange rate movements.

Finally, this security was further bolstered by a signalling effect of the BCB's FX interventions. For many financial operators, particularly those who do not have access to clients themselves such as hedge fund, the BCB's operations in the FX market were an indicator of the size and direction of capital flows, providing them with information for their directional position taking.

According to one interviewee *'….it is interesting because on the way down when central bank started intervening it did not scare the players at all… it was actually the market*

[17] 19 of 22 onshore actors thought this was the case (offshore actors did not respond to this question). Paradoxically though, several traders also pointed out that the BCB should not use these reserves in the moment of crisis to avoid them falling below a critical threshold. This result echoes arguments by Akyüz (2014) and Fischer (2015) that large parts of DECs reserves are effectively "borrowed" which makes central banks reluctant to use them.

thought if they are buying they should be seeing some inflows to the country, through trade balance, financial accounts…that's good for the country, that's good for the BRL...so people started buying even more BRL.' (investment bank; onshore).

(2) The Limits to Transparency and Credibility Paradox

The second channel through which, according to the interviewees, an ITR impacts on the effectiveness of FX interventions is through its credibility and predictability. For the architects of ITRs, these features should stabilize markets through removing distortionary and discretionary government actions and eliminating market imperfections in the form of "technical" ambiguities or information asymmetries (FitzGerald 2004, Best 2005, Arestis, Rodrigues et al. 2008, Vernengo 2008). Price stability is accompanied by financial and exchange rate stability as private agents remain undisturbed in their efficient allocation of resources (Gabor 2010). This view of economic dynamics is also reflected in the IMF's suggestion that the potential conflict between an ITR and exchange rate management can be reduced through increasing the credibility and transparency of monetary and exchange rate operations and signalling to the market that at no point the IT would be superseded by another policy objective.

The interviews show that this is not the case. On the contrary, it was exactly this call for credibility and transparency which further complicated the BCB's initial attempt to manage the exchange rate through further exacerbating appreciation pressures (and then the depreciation when market conditions changed).[18] For many respondents, a consistent, credible, and most importantly predictable macroeconomic framework was one of the most significant elements for building their speculative FX positions. As indicated above, it was

[18] This "paradox of credibility" has also been highlighted by the BIS. Borio, English et al. (2003), among others, point out that highly credible monetary policy can reduce the degree of uncertainty people feel about the future, thus increasing their willingness to borrow and financial fragility. On a more theoretical level, these results echo those of critical scholars in the tradition of Keynes and Minsky who argue that private financial markets are inherently unstable and prone to boom and bust cycles. For these authors, financial markets are not driven by objective realities but inter-subjective processes of price formation and ambiguities (e.g. Grabel 1996, Felix 1998, Best 2005, Izurieta 2009, Kregel 2009, Palma 2012). The provision of extensive information will not eliminate these. More than that, providing predictable macroeconomic conditions might exacerbate them as "stability breeds instability" (Minsky 1986).

exactly through these features that ITRs shaped investors' expectations and increased the attractiveness of DECs currencies. As one respondent from an offshore investment bank put it very clearly:

'*…well, you want transparency…what you want from a central bank is transparency and credibility and predictability…and inflation targeting regime is giving you this…what you want is clear rules and the inflation targeting gives you that.'*

The interviewees showed some heterogeneity as to what this heightened credibility and predictability referred to. Whereas onshore respondents, in particular those in banks, were concerned with the BCB's commitment to control inflation and the predictability of its FX interventions, offshore operators and those in onshore hedge funds referred primarily to the increased predictability of monetary policy and interest rate decisions. Again, this variation can be partly explained by the respondents' different trading strategies. Onshore operators with a short trading horizon are largely interested in the FX gain rather than the return on the underlying asset as in the case of more medium-term operators. Moreover, on a very short horizon, an ITR does not make a significant difference as "noise" from domestic and political factors gain more weight and the expected basic interest rate is normally already priced in.

As discussed below, at a more medium term horizon, however, an ITR has a considerable impact on both the level and the pattern of the interest rate trajectory. In this sense, the interviews also showed that an ITR act as a powerful global homogenisation device which institutionalises a similar set of monetary policies across a wide range of DECs. This is particularly important for offshore operators, who trade a broad portfolio of currencies and do not have the time and ability to consider a wide range of specific economic factors and news. This result echoes contributions who argued that rather than involving less governmental involvement, an ITR is in effect a highly interventionist strategy which imposes a new set of monolithic neoliberal norms and institutions on a wide range of different countries (Best 2005, Epstein and Yeldan 2007, Gabor 2010).

(3) The Institutionalisation of Carry Trade Operations

The final channel through which central bank operations affected the market participants' expectations formation was through its monetary policy decisions, first and foremost its interest rate setting. The market-based principle of an ITR makes the short-term interest rate the only legitimate monetary policy instrument. The interviews showed that this primacy of the short-term interest rate complicates exchange rate management for two reasons. First, as reflected in the actors' responses in the previous section, an ITR creates high predictability with regards to interest rate changes. As one interviewee put it:

'....the market can see that the government will have a parameter… that the central bank will do everything… that the central bank will control inflation….sign to the population that the central bank will raise interest rates as soon as inflation goes beyond target.' (onshore; commercial bank).

This, in turn, facilitates the profitability of speculative operations and increases the attractiveness of ITR currencies.

Second, as even acknowledged by the IMF, ITRs can lead to structurally high and procyclical interest rates, as countries "lean against the wind" in pursuit of their inflation target (Carvalho Filho 2010). The interviews showed that interest rates were considered the second most important fundamental for DEC currencies[19]. However, while for the IMF this reduces financial instability (through hindering the onset of a lending boom and discouraging investments in "dubious" high yielding foreign assets), the opposite might be true for DECs where these interest rate dynamics translate into large and procyclical capital flows, which destabilise the exchange rate and lead to an expansion of domestic money supply. In other words, ITRs effectively transforms DECs currencies into carry trade currencies, resulting in the adverse exchange rate dynamics observed (La Marca 2012).[20]

Moreover, in such a framework any attempt by the central bank to smooth the perilous effect on the exchange rate will be undermined by its institutional requirement to control inflation. In an ITR, the central bank is required to sterilize any FX purchases to avoid an excess of

[19] After "flows", which effectively refer to short-term capital flows.
[20] Carvalho Filho himself shows that the currencies which suffered the largest real depreciations six months into the international financial crisis (irrespective of FX interventions and sovereign risk spreads) were all ITR currencies, which he attributes to the preponderance of carry trade operations.

banking reserves, a consequent fall in money market interest rates, and thus a potential increase in credit operations and inflation pressures. These monetary sterilisation operations, that is the sale of short-term public bonds to the financial sector (often with a repurchase agreement), however, maintain structural upward pressures on the interest rate, further attracting capital flows and thus undermining the central bank's initial attempt to manage the exchange rate.

Finally, Painceira (2012) points to another - more indirect but no less important - mechanism through which the BCB's FX interventions undermined its initial attempt to manage the exchange rate. He shows that the increase in banks' very short-term and low risk financial assets from the BCB's sterilisation operations allowed them to expand their liabilities (and their assets through credit operations)[21] and to capture even more foreign resources. Moreover, Brazilian banks could quickly divest themselves of these assets in the moment of crisis further contributing to the exchange rate pressures.

4. POLICY IMPLICATIONS

The previous sections showed that combining exchange rate management with an ITR, whilst maintaining capital account openness, might not only be ineffective but potentially counterproductive in the face of large speculative capital flows. This holds true both for attempts to hit a certain exchange rate target and to smooth exchange rate volatility. The difficulty of combining independent monetary policy and exchange rate management in the presence of an open capital account is the well-known impossible trinity. Our results show that an ITR exacerbates this impossible trinity through the peculiar way it interacts with financial market expectations, exposing the economy to exogenous capital account shocks with no feasible means of countering them (FitzGerald 2004). Thus, DECs concerned about adverse exchange rate movements had no other choice than to resort to capital account regulations. Brazil's recent experience illustrates this. After years of sizable (and costly) FX interventions, the Brazilian government introduced a series of capital account regulation

[21] Gadanecz, Mehrotra et al. (2014) find similar result in a panel study of selected emerging economies. Moreover, they show that the expansion of banking lending depends on the capital position of the bank.

measures to regain control over its exchange rate (Baumann and Gallagher 2012, Fritz and Prates 2013).

Moreover, our detailed insights into FX market behaviour showed that the IMF's recommendation to "solve" the impossible trinity by maintaining a clear and transparent hierarchy between the inflation and exchange rate objectives further undermined rather than facilitated such an attempt. Foreign exchange market participants knew that ultimately the BCB would not halt the appreciation trend and speculated against it. More generally, it became clear that rather than acting as a stabilizer, a high degree of predictability and credibility further complicated macroeconomic management through creating a sense of security and encouraging speculative one-side bets.

As one onshore hedge fund put it bluntly:

'…You should never allow the market to understand your decisions – they will speculate against you'.

Thus, our results would suggest that (DEC) policy makers should maintain a certain degree of opaqueness and uncertainty, both with regards to their policy priorities and the instruments used to achieve them. This would not only avoid destabilising speculation, but might also give them more operational freedom in case policy objectives are inconsistent.[22]

The same holds true for the recommendation to maintain the market-based nature of monetary policy, which operated like a straightjacket and left DECs no ways to deal with the large capital flows. The interviews showed the severe dilemma the primacy of the short-term interest rates created for the BCB in the face of large speculative capital flows. At the same time, the emphasis on market-based FX interventions, and consequent sterilisation operations, swelled domestic public debt in Brazil from 48 per cent of GDP in 2006 to 56.4 per cent in 2009. The high debt level caused substantial problems for macroeconomic management, both in terms of cost (given Brazil's high interest rates) and profile.[23] These

[22] The BIS (2005, 2013) shows that many successful DEC central banks kept their FX interventions secret.
[23] As shown above, the very short-term nature of this debt meant that banks' could sell it anytime, making the central bank increasingly exposed to banks' decision to roll over its debt. Arguably, rather than the fiscal side

limitations of market-based measures show the need to fundamentally extend DECs' macroeconomic toolbox to confront the pressures created by financial integration, including non-market based measures such as capital account regulations (Palma and Ocampo 2008, Izurieta 2009, Gallagher, Griffith-Jones et al. 2012).

These general considerations aside, our results also have specific implications for the conduct of exchange rate management. They show that whilst it is important for DECs central banks to smooth the exchange rate path, it is also essential to maintain some residual risk for foreign exchange market participants to avoid large destabilising bets. Again, from an interview:

'....make the market more two way, and that would be an effective intervention, because then if you make the market more two way and more volatile it reduces the appeal... of short term carry investors to put a trade on, if you are telling everyone, yea it is an appreciating trade I am just slowing it down then you know it is great because then you know it is going to be one way and it is not going to be very volatile' (offshore; real money investor)

In more concrete terms, our results would support an exchange rate band with soft margins as suggested by John Williamson (2000), among others. Such a regime would stabilize the exchange rate but also leave room for substantial losses to deter speculative one-way bets. These losses could either stem from allowing short and sudden depreciations in the case of market pressures or, more actively, be created by the central bank by intervening strongly and unexpectedly. Prasad, Foda et al. (2014), for example, show that the sudden and large intervention by the Chinese central bank in 2014 incurred substantial losses on carry traders reducing the attractiveness of these speculative operations.

Finally, though, on a more fundamental level our results also confirm the extreme difficulty of conducting independent macroeconomic policy in the presence of an open capital account and large speculative capital flows (Jansen 2003). The interviews showed that, the ITR aside, through acting as counterparty and signalling to the market, the BCB inadvertently further stimulated capital flows to Brazil. Indeed, rather than facing an impossible trinity it is an impossible duality, independent macroeconomic policy (monetary and exchange rate) vs.

dominating the monetary side, as claimed by neoclassical economists, it is the monetary side dominating the fiscal side in Brazil's ITR.

open capital accounts, which besets DECs (Rey 2015). Moreover, the interviews showed that this duality can only be partly solved by reserve accumulation. While buffering some of the worst effects in the moment of crisis, a "war-chest" of foreign exchange reserves might further stimulate capital inflows, thus contributing to the large pressures on the exchange rate in the moment of crisis.

Interestingly, the interviewees themselves echoed this conclusion. When asked how they thought DECs central bank could credibly defend a certain exchange rate value, more than two third thought that this was not possible. Many mentioned the restrictions imposed by an ITR. For just as many though it was the sheer size of the market relative to the BCB's firepower, which no level of FX reserves could match. [24]

4. CONCLUSIONS

ITRs *cum* floating exchanges rates have become the new policy paradigm recommended to DECs following the devastating financial crises of the late 1990s/early 2000s. Floating exchange rates were thought to adjust efficiently to equilibrate markets and avoid macroeconomic imbalances, while the rule-based inflation target would provide a credible nominal anchor and remove discretionary and distortionary government action. This, in turn, would be facilitated by further capital account liberalisation to strengthen (international) market forces and exert discipline on governments. Recent evidence, however, has shown that very few DECs have left exchange rate determination to the market. Despite their officially floating exchange rate regimes, DEC central banks have been active operators in their FX markets, primarily to mitigate the destabilising influences of speculative capital flows. This evidence has prompted several authors to suggest a certain degree of exchange rate management within an ITR.

This paper argued that such a combination is not possible, and potentially counterproductive. This it showed using insights from extensive semi-structured interviews with FX market participants, is due to the peculiar way an ITR shapes central bank operations in the FX and

[24] Only one in seven respondents thought that reserve accumulation would be a credible support to an exchange rate target. Nearly a third mentioned that this was only possible with some restrictions on international capital movements.

money markets and the way these operations interact with speculative market expectations. This ineffectiveness does not only hold true for central banks' attempt to target a certain exchange rate level, but any effort to reduce excess volatility and smooth exchange rate movements. The interviews also demonstrated that rather than mitigating the problem, the policy recommendations to increase transparency and limit FX interventions to market-based instruments further undermined DECs' initial attempt to smooth exchange rate movements. The paper thus suggested that if DECs want to influence their exchange rates effectively, they have to abandon their ITR regimes and make the exchange rate an at least equivalent policy objective.

The interview results also gave some insights into how to do this effectively. They showed that a certain degree of ambiguity and opaqueness both in the communication of these policy objectives and the instruments used, could increase DECs central bank's operational freedom. Moreover, they showed the importance of allowing DECs a wide spectrum of policy instruments and gave some suggestions as to exchange rate policy design. On a more fundamental level, however, the interviews also testified to the extreme difficulty of conducting independent monetary and/or exchange rate policy in the presence of large, volatile and speculative capital flows. Even if DEC governments chose to make the exchange rate their main policy objective, exchange rate management will have to be accompanied with a comprehensive set of capital account regulations. As pointed out repeatedly in the critical literature (e.g. Palma and Ocampo 2008, Izurieta 2009, Gallagher, Griffith-Jones et al. 2012), rather than temporary crisis measures, these should be a standard part of the macroeconomic toolkit to regain autonomy over key domestic economic prices and support domestic economic development.

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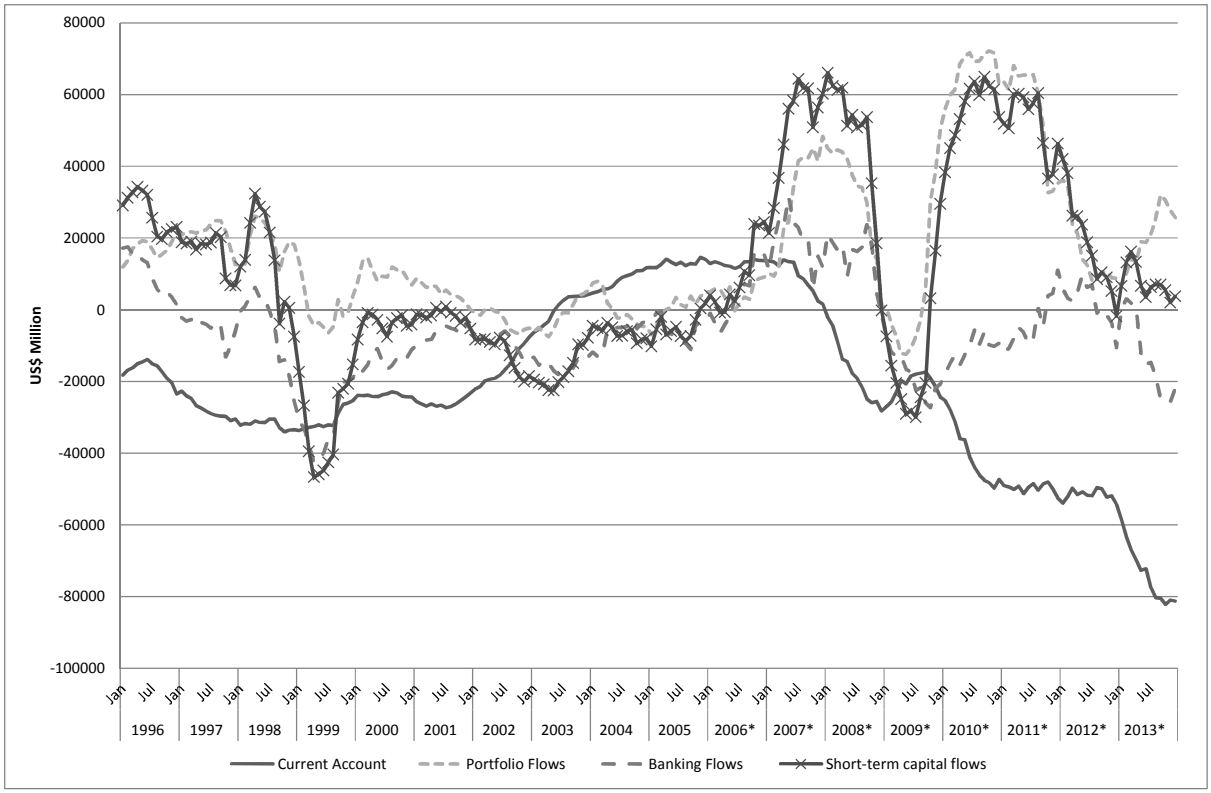
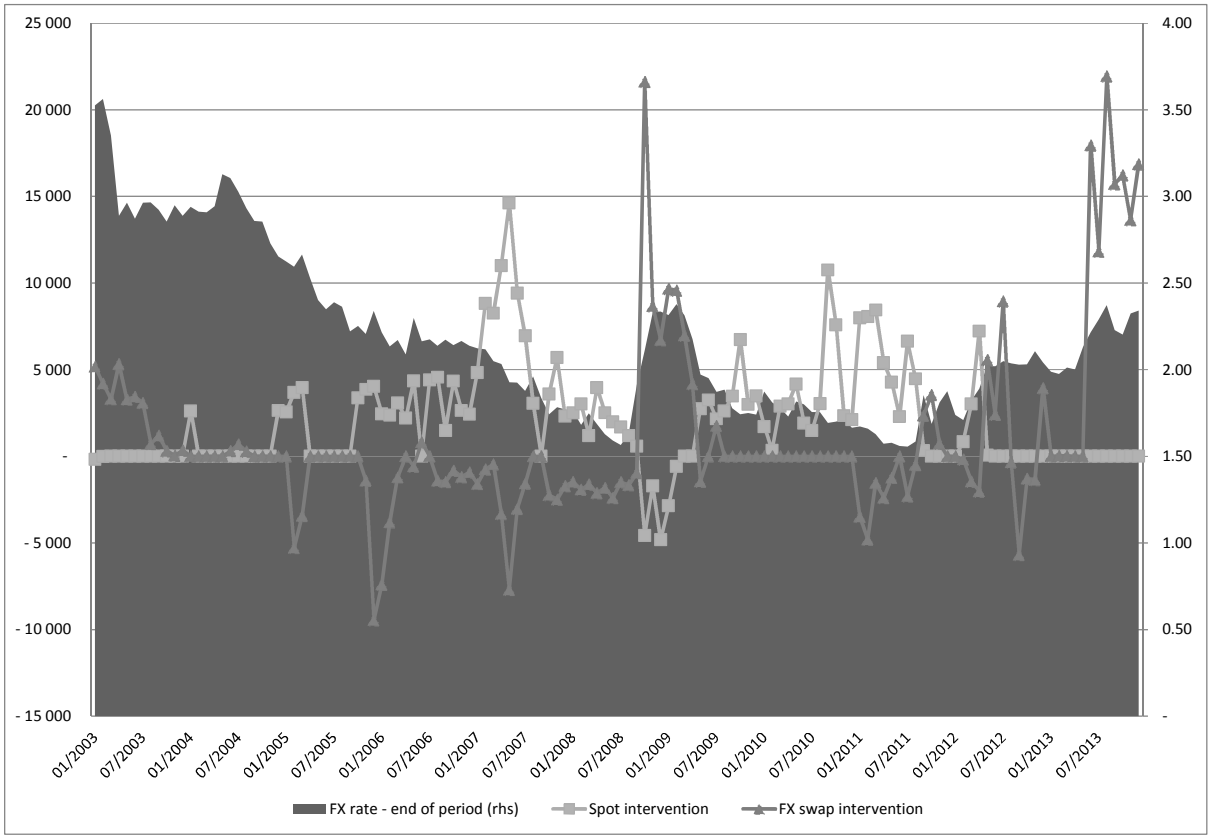


Source: BCB

Notes: Banking flows are calculated from the balance of payments "other investment" category excluding all official flows; Capital flows are presented net, that is including operations by foreign and Brazilian agents

Figure 2. Foreign exchange interventions (US$ million) and the Exchange Rate (BRL/USD)



Source: BCB

Notes: Positive (negative) values for spot interventions indicate US$ purchases (sales). The reverse is true for swap interventions.

Table 1: Selected Economic Indicators

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Inflation Indicators (%)												
Effective Inflation Rate	12,5	9,3	7,6	5,7	3,1	4,5	5,9	4,3	5,9	6,5	5,8	5,9
Inflation Target	3,5	4,0	5,5	4,5	4,5	4,5	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	YES	YES	YES
Return Indicators												
Domestic short-term Interest Rate (Selic target)	25,0	16,5	17,8	18,0	13,3	11,3	13,8	8,8	10,8	11,0	7,3	10,0
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	0,2	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	208,0	142,0	221,0
Annual FX Rate Change (+ deprecia/- apprec)	53,2%	-18,5%	-7,9%	-12,4%	-8,5%	-16,6%	31,0%	-25,2%	-2,4%	12,6%	8,9%	14,6%
Fiscal Indicators (%GDP)												
Primary fiscal balance	3,2	3,3	3,7	3,8	3,2	3,3	3,4	2,0	2,7	3,1	2,4	1,9
Nominal fiscal balance	-4,5	-5,2	-2,9	-3,6	-3,6	-2,8	-2,0	-3,3	-2,5	-2,6	-2,5	-3,3
GDP Growth (%)	2,7	1,1	5,7	3,2	4,0	6,1	5,2	-0,3	7,5	2,7	1,0	2,5

Source: Ipeadata and BCB (2014)