

# Why Does the Real Exchange Rate Matter for Economic Development?

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## **Abstract**

A recent body of empirical work suggests the existence of a positive association between real exchange rate (RER) levels and economic growth, especially in developing countries. This relationship appears to be driven by cases of overvaluation hurting growth and undervaluation favoring growth. The literature has proposed different mechanisms to explain the observed behaviors. One of them emphasizes that higher and more stable RERs reduce macroeconomic volatility favoring capital accumulation and growth. Another one stresses that higher and more stable RERs stimulate capital accumulation in modern tradable activities, facilitating structural change and economic development. This paper supports the view that developing countries could target stable and competitive real exchange rate (SCRER) as a part of a development strategy that promotes the expansion of modern tradable activities. It reviews the empirical findings, discusses the channels through which a SCRER can stimulate economic growth, and describes the policies needed to pursue a development strategy based on a SCRER.

## Introduction

Recent research has shown persuasive evidence indicating that real exchange rate (RER) levels are positively associated with economic growth. Research has also documented that RER volatility affects growth negatively. Based on this and other more episodic evidence, some economists and analysts have started to advocate that developing countries should target a stable and competitive real exchange rate (SCRER) as a part of their growth strategy.

A SCRER policy is also important in terms of its impact on job creation. By accelerating economic growth, it supports a sustained generation of decent and productive jobs. A competitive exchange rate also supports employment growth through its impact on the composition of GDP growth. Since it enhances the profitability of labor-intensive tradable activities, a SCRER policy leads to more labor-intensive economic growth.

The purpose of this article is to take stock of the work that has addressed different aspects of the SCRER strategy for development. Section I reviews the empirical literature finding evidence that SCRER is positively associated with economic growth. Section II discusses the mechanisms that could explain such an association and their supporting evidence or lack of it. Section III goes through the theoretical and practical aspects of macroeconomic management in a framework that targets a SCRER, while attaining full employment, low inflation and balance of payments sustainability. Section IV closes with some final remarks.

Before moving on, some definitions are in order to help clarify the rest of the paper. The exchange rate is defined as the domestic price of a foreign currency. Consequently, a rise (fall) in the nominal/real exchange rate implies nominal/real depreciation (appreciation). The RER is the relative price between tradables and non-tradables. A competitive or undervalued RER level is one that is above its equilibrium level.<sup>2</sup> I refer to competitive or undervalued RER level as the one at which the modern tradable sector of a developing economy reaches a risk-adjusted profit rate equal to that of the same sector in a developed economy.<sup>3</sup> I use competitive or undervalued RER indistinctively.

## I. Empirical Evidence<sup>4</sup>

Most empirical work analyzing the association between RER levels and economic growth has been carried out through growth regressions. This literature has found substantial evidence showing that competitive and stable RER levels tend to be associated with higher GDP per capita growth rates. The association appears robust to changes in the estimation technique —cross-section OLS, panel data (fixed and random effects), dynamic panel data (GMM), non-linear panels and panel cointegration techniques—, the number of control variables and the data sources for both the dependent and independent variables.

An interesting result is that the RER-growth association seems to be especially strong in developing countries. Rodrik (2008) tests whether there is any significant difference between developed and

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<sup>2</sup> Equilibrium RER is a concept that generates no small amount of confusion and debate. For simplicity, I define it here as the one at which the economy is at macroeconomic equilibrium (i.e., full employment with low inflation and external balance). It depends on deep economic fundamentals (e.g., productivity), exogenous variables (e.g., international interest rate) and policy variables (e.g., public spending).

<sup>3</sup> See Bresser-Pereira (2010) for a similar definition.

<sup>4</sup> This section draws on Rapetti (2016).

developing countries as to how this association manifests itself. He uses a fixed-effects model for a panel of up to 184 countries between 1950 and 2004, and defines developing countries as those with a GDP per capita less than \$6,000 in constant dollars of 2005. He finds that the positive relationship between RER competitiveness and economic growth is stronger and more significant for developing than developed countries. Rapetti *et al.* (2012) replicate Rodrik's work and show that if the threshold is instead selected from anywhere in the \$9,000-\$15,000 range, the estimated effect of RER competitiveness on growth in developed countries is similar to the one estimated for developing countries. Given the fragility of Rodrik's result, they investigate the issue in more detail by developing a series of alternative developed/developing countries categories and conducting different empirical strategies. They find that the effect of currency undervaluation on growth is indeed larger and more robust for developing economies. Extending the analysis for a substantially longer period, Di Nino *et al.* (2011) also find supporting evidence that the relationship is strong in developing countries and weak in advanced countries during both the pre-and post-World War II period (1861-1939 vs. 1950-2009). Other studies, like Cottani *et al.* (1990), Dollar (1992) and Gala (2008), focus exclusively on developing countries, and find similar evidence of the positive effect of RER competitiveness on growth.

Since most studies have used RER misalignment indexes —i.e. an index that measures the distance between actual and equilibrium RER levels— as measures of RER levels, a valid concern is whether the results are driven only by cases of RER overvaluation decelerating economic growth. Stated differently, the positive relationship between RER levels and growth rates may result exclusively from low RER levels decelerating growth, which also implies a positive association between RER levels and growth rates. Several studies have addressed this concern explicitly.

Razin and Collins (1999) use a pooled sample of 93 developed and developing countries over 16 to 18 year periods since 1975, and find that RER overvaluation hurts, and undervaluation favors, growth. The effect of overvaluation appears stronger though. Aguirre and Calderón (2005) find that the estimated coefficients of their RER misalignment indexes are larger for cases of overvaluation than those of undervaluation, but here again the positive effect of undervaluation on growth is significant both statistically and economically. Rodrik (2008) finds that while overvaluation hurts growth and undervaluation favors growth there is no significant difference in terms of the size of each effect. Rapetti *et al.* (2012) find similar results to Rodrik's, although the effect of overvaluation is slightly higher in absolute terms than that of undervaluation. Bereau *et al.* (2012) use panel non-linear techniques —i.e., a Panel Smooth Transition Regression model— to capture whether there are asymmetries between RER undervaluation and overvaluation. They find robust evidence that undervaluation accelerates and overvaluation decelerates growth.

Other studies have tested whether the RER-growth association is robust to measurement errors in the dependent and independent variable. MacDonald and Vieira (2010) construct seven different indexes of RER misalignment, and use them alternatively on the right-hand side of the growth regressions. They find a significant and positive correlation between RER competitiveness and economic growth, which is stronger for developing and emerging countries. Razmi *et al.* (2012) use the rate of investment growth as the dependent variable and find a strong positive association with RER levels.

Many empirical studies have used Penn World Tables (PWT) data for the dependent variable (i.e., GDP per capita growth). Johnson *et al.* (2009) show that GDP estimates vary substantially across different versions of the PWT, and also show that the results of many published studies employing PWT growth rates — especially those using higher frequency— are fragile when changing from older versions of the PWT to newer ones. Libman (2014) addresses this issue using growth rates from data sources other than the PWT,

such as International Financial Statistics, World Development Indicators and Maddison Historical Statistics. He finds that the positive RER-growth association holds.

Other studies have used different empirical strategies, like case and episode studies or historical analyses, and also found supporting evidence that SCREs favor economic growth. Hausmann *et al.* (2005) identify and analyze determinants of 'growth episodes' in the latter half of the twentieth century and found that adjustments of RER toward more competitive levels tend to precede sustained growth spurts. Frenkel and Rapetti (2012) carry out a historical analysis of exchange rate regimes and economic performance in Latin America and find that countries have tended to grow faster when macroeconomic policies were aimed at maintaining SCREs. Regarding the role of RER stability, Cottani *et al.* (1990), Eichengreen (2008) and Rapetti *et al.* (2012) have found supportive evidence indicating that RER volatility is negatively associated with GDP growth.

## II. Mechanisms<sup>5</sup>

As discussed in the previous section, research has established a robust positive association between RER levels and economic growth. What about causality? Does the RER affect growth or is it the other way around? Although there might be room for debate, most scholars understand that the causality runs from RER levels to economic growth. The question is about the mechanism explaining why undervalued (overvalued) RER levels would favor (hurt) economic growth. The literature has identified two main channels that relate the RER to economic growth.

### II.1. The "Foreign Savings" Channel

The foreign savings channel departs from the observation that in many cases growth acceleration occurs with an increase in the rate of capital accumulation and a simultaneous improvement of the current account. A likely explanation is that higher current account surpluses (or lower deficits) and, consequently, higher stocks of net international assets reduce macroeconomic instability by lowering the vulnerability of the economy to sudden stops of capital inflows and the probability of crises. This mechanism highlights that international capital markets operate with many imperfections that can jeopardize long-term economic performance, particularly in developing countries. Consequently, these countries would need to establish safe linkages with international markets to minimize their reliance on foreign savings.

The "foreign savings" channel consists of three logical steps. First, higher RER levels lead to lower foreign savings and therefore to an increase in the stock of net international assets. Second, higher net foreign assets and current account surpluses (or lower current account deficits) reduce macroeconomic volatility and uncertainty. Third, lower macroeconomic volatility favors capital accumulation —i.e., a higher *aggregate* investment rate— and growth. There is supporting empirical evidence for each of these logical steps.

There is solid evidence regarding the first logical step. Polterovich and Popov (2003), Prasad *et al.* (2007), Levy-Yeyati *et al.* (2013), De la Torre and Ize (2015) and Kappler *et al.* (2013) are among those who found a positive association between RER levels and the current account and/or the stock of net international assets.

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<sup>5</sup> This section draws on Rapetti (2018).

A sizable body of evidence supports the second logical step. The literature of currency, banking and twin crises in developing countries has identified that capital inflows, current account deficits and RER overvaluation increase the probability of crises. One of the pioneer articles is by Kaminsky and Reinhart (1999), who examine the empirical regularities of 76 episodes of currency crises and 26 episodes of banking crises. They observe that crises occur following a prolonged boom in economic activity, which is fueled by credit and capital inflows, and accompanied by RER overvaluation. Several subsequent econometric studies have also found that RER overvaluation and current account deficits tend to precede crises episodes in developing countries. The more recent contributions include, among others, Agosin and Huaita (2012), Reinhart and Reinhart (2009), Joyce (2011), Caballero (2014) and Davis *et al.* (2016).

This pattern has also been observed in several country and comparative studies (e.g., Taylor, 1998; Frenkel and Rapetti, 2009). The list of episodes includes the Latin American and African crises of the early 1980s, Mexico (1994-95), the South East Asian crises (1997-98) and the crises of Russia (1998), Brazil (1998-99), Argentina (2001-02) and Uruguay (2002), among others. Furthermore, there is an emerging consensus among European economists who understand that the Eurozone crisis followed a similar pattern as other “sudden-stop” crises in developing countries (Baldwin and Giavazzi, 2015).

More recently, especially after the Asian crises, several studies have observed the opposite movement: developing countries reduce their demand for foreign finance, accumulate international reserves and keep their exchanges rates undervalued for precautionary motives. Aizenman J. and Lee J. (2007) obtain evidence suggesting that international reserve accumulation in emerging markets has been carried out during the 2000s as a self-insurance strategy to protect the economy from sudden stops. Rose and Spiegel (2011) find that countries with current account surpluses were better protected from the effects of the global financial crises of 2007-8. Similarly, Frankel and Saravelos (2012) find that insufficient international reserves at the central banks and RER overvaluation were the two leading indicators that had proven to be the most useful in explaining the crisis incidence across different countries during the 2008–09 global crisis. Fogli and Perri (2015) find significant evidence that countries, which face an increasing relative macroeconomic risk, tend to respond to it by running current account surpluses for a period of time. The authors argue that more macro risk translates into more saving and more saving leads to accumulation of foreign assets.

Finally, regarding the third logical step, a substantial body of literature suggests that macroeconomic volatility appears to be detrimental for investment and economic growth. There is robust evidence of the negative correlation between capital accumulation/economic growth and macroeconomic volatility. The latter has been measured through a variety of variance-based indicators of GDP growth, government revenue and spending, investment, exchange rate, unemployment and inflation. Ramey and Ramey (1995), Aizenman J. and Marion J. (1999), Martin and Rogers (2000), Aghion *et al.* (2009), Aghion *et al.* (2010), Alfonso and Furceri (2010) are among the influential studies.

Because developing countries need to demand less-than-equilibrium foreign finance to protect themselves from international capital markets failures, this channel would predict that an undervalued (overvalued) RER with respect to equilibrium enhances (hurts) economic growth in developing countries. The empirical evidence reviewed in the previous section supports this prediction, making the “foreign savings” channel a likely candidate to explain the evidence. By reducing uncertainty/volatility and the probability of crises, the level and stability of the RER would operate as a *macro-prudential policy*.

## II.2. The “Tradable-led Growth” Channel

The second proposed channel highlights the key role that modern tradable activities play in the process of economic development. Essentially, this mechanism conceives economic development as a process characterized by a rapid and intense structural transformation from lower-productivity to higher-productivity activities, which are tradable. Modern tradables have usually been associated with manufactures, but they also encompass some tradable services and knowledge-intensive agricultural activities. The “tradable-led growth” channel comprises three broad elements:

1. Modern tradable activities are intrinsically very productive and/or operate under some sort of increasing returns to scale.
2. Given this trait, the reallocation of (current and future) resources to these activities —i.e. structural change— accelerates GDP per capita growth.
3. Accumulation in these activities depends on their profitability, which in turn depends on the level and volatility of the RER. A sufficiently high and stable RER is an instrument to compensate for market failures and induce sustained capital accumulation.

Classical development theory, as well as some strands of new growth theory, emphasize that economic development does not occur “naturally”, because of the existence of different kinds of market failures that make modern activities unprofitable at “equilibrium” prices. Industrial policy is generally accepted as a way to deal with this problem. The goal of this type of policy is to provide transitory rents —or “above-equilibrium” profits— to induce capital accumulation in these key activities and promote structural change and economic development. The specificity of the “tradable-led growth” channel is that it sees tradable labor-intensive activities at the core of the group of modern activities and the RER as a key instrument within the industrial-policy toolkit.

A large number of specific mechanisms have been advanced to show that the RER is a key determinant of a tradable sector’s performance and economic growth. The negative effects of RER overvaluation on the tradable sector and economic growth have been analyzed extensively, the Dutch Disease being a prominent example. It has been shown, for instance, that tight monetary policy, capital inflows or foreign aid leading to temporary currency overvaluation can provoke de-industrialization and lower growth when tradable firms’ production is subject to some form of increasing returns to scale like learning-by-doing externalities (e.g., Van Wijnbergen, 1984; Krugman, 1987; Ros and Skott, 1998; and Ros, 2013).

More recently, in light of the empirical research surveyed in the previous section, the opposite association has also been modeled: a transitory currency undervaluation may spur a virtuous dynamic of capital accumulation in tradables and growth acceleration (Rodrik, 2008; Rapetti, 2013; and Korinek and Serven, 2016). This kind of relationship has also been studied in trade theory. Models of export-led growth have emphasized positive externalities that are not equally prevalent in non-export activities. Therefore, policies reallocating resources to export industries —like a competitive RER— promote higher growth (e.g. de Melo and Robinson, 1992). Similarly, the literature of “trade hysteresis” has made the case that transitory RER undervaluation (overvaluation) may generate permanent positive (negative) effects on trade if there are sunk entry-costs (Baldwin and Krugman, 1989; and Dixit, 1989).

Another explanation for how this channel operates emphasizes that the lack of FX may constrain economic growth in developing countries. This idea has a longstanding tradition in CEPAL’s structuralist economics (Ocampo, 2014) and the balance-of-payments-constrained growth literature initiated by Thirlwall (1979). It is a matter of debate, however, whether the RER can help alleviate the FX constraint and favor growth.

Under the “elasticity pessimism” view of the old structuralists, the level of the RER was unimportant. A similar view emerges from the Thirlwall-type of models. In such settings, long-run growth is demand constrained; i.e., constrained by foreign demand of domestic tradables (exports). The level of the RER is neutral on growth dynamics because only a continuous real depreciation can foster growth via substitution effects on a given rate of foreign demand growth.

These pessimistic views overlook the possibility that the FX constraint on growth may depend on supply-side factors. As emphasized above, the RER is a key determinant of the profitability of tradables, and therefore of capital accumulation. In other words, the level of RER is a key determinant of the long-run supply of domestic tradables. If foreign demand for (at least) some tradables is large at a given international price (i.e., highly or perfectly elastic), then a higher RER level would increase exports, relax the FX constraint and accelerate growth. Thus, the point under dispute is to what extent export growth depends on foreign demand growth *vis-à-vis* domestic tradable firms’ ability to profitably expand their supply at the given international prices. This has recently become an area of intense debate in certain circles.<sup>6</sup> Evidence seems to side on the view that the level of the RER does play an important role on the behavior of tradable supply and therefore relaxes the FX constraint on growth.

For instance, Freund and Pierola (2012) detect 92 episodes of sustained manufacturing export growth and show that they tend to be preceded by RER undervaluations. Their findings suggest that undervalued RERs help entry into new export products and new markets (i.e., extensive margin) in developing countries. Colacelli (2010) also finds strong evidence that the extensive margin of trade is very responsive to RER changes. Cimoli *et al.* (2013) work with a panel of 111 countries over 1962-2008 and find that higher RERs favor export diversification. Exports diversification in turn is associated with an upgrading in the technological intensity of exports and higher economic growth. McMillan and Rodrik (2011) use a panel data of nine sectors in 38 countries over the period of 1990 to 2005, and find that the level of the RER favors structural change in favor of modern tradables and the flow of labor from low-productivity to high-productivity tradable activities. Vaz and Baer (2013) analyze a data set of 22 manufacturing sectors in eight Latin American countries and 31 industrialized countries in the 1995–2008 period. They find that the RER is positively associated with manufacturing growth in Latin American countries (i.e., the developing-country group). Similarly, Eichengreen (2008) works with a panel of 28 industries for 40 emerging market countries covering the period 1985–2003, and finds that higher and more stable RER levels favor tradable employment growth. Using a methodology that exploits the variation within countries and across manufacturing sectors, Rajan and Subramanian (2011) find that aid inflows have systematic adverse effects on the growth rate of exportable industries. Similarly, Lartey *et al.* (2012) use an unbalanced panel data set comprising 109 developing and transition countries for the period 1990–2003, and find that remittances lead to RER appreciation, and resource movement effects that favor the non-tradable sector at the expense of tradable production. Ibarra (2015) studies the performance of manufacturing firms in Mexico between 1988 and 2013 and finds that higher RER levels tend to stimulate their investment. Employing a panel of 25 sectors between 1996 and 2010, Baltar *et al.* (2016) obtain a similar result with manufacturing firms’ investment in Brazil.

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<sup>6</sup> See, for instance, Razmi (2013), Cimoli *et al.* (2013) and Marques Ribeiro *et al.* (2014).

### III. The SCRER as a Target of Macroeconomic Policy<sup>7</sup>

From the strict point of view of conventional economic theory, managing a relative price —like the RER— sounds like a heresy. Because speeds of price adjustment vary from market to market, and therefore some prices are stickier than others, conventional economic theory could concede that managing a relative price would only be possible in the short run. But, if deviations from equilibrium are only transitory, what would the purpose of such an objective be?

Economists know that the real world is substantially more complex than any abstract representation of it, and that policymaking requires some degree of eclecticism. This pervades the conduct of macroeconomic policy. For instance, it is widely recognized that nominal exchange rates —like the price of any other financial asset— are highly volatile and frequently follow long swings. Thus, conventional wisdom on macroeconomic policy suggests that central banks should curb RER movements that are not associated with changes in economic fundamentals. Most central banks in developing countries —where exchange rate volatility is high— follow this recipe. They conduct *sui generis* inflation targeting regimes, in which exchange rates are managed through interventions in the FX market that seek to avoid this kind of non-fundamental volatility.<sup>8</sup>

A SCRER strategy challenges this view because its goal is not to manage the RER to avoid short-run misalignments, but to keep it undervalued in the medium run. As discussed in the previous section, a central assumption is that modern tradables operate under some form of increasing returns, making their expansion favorable for economic growth. Economic theory establishes that multiple equilibria arise in the presence of increasing returns to scale. Targeting a SCRER can thus be conceived as a strategy seeking to move the economy from one equilibrium to another. Because, in normal conditions, some of the gains from investing are hard to internalize by the firms, a RER higher than equilibrium gives proper incentives to invest. Sustained capital accumulation in the modern tradable sector puts the economy in a trajectory towards a better equilibrium in which the size of this sector is significantly larger. However, if incentives are weak and volatile, capital accumulation may not follow. RER competitiveness thus has to be stable and durable enough to induce investment. Such a goal may likely require managing the RER beyond the short run.

Targeting a SCRER beyond the short-run is a strategy that has a long-run goal —i.e., accelerate growth— but needs to be compatible with the conventional short-run goals of macroeconomic policy. In other words, macroeconomic policy under this regime needs to keep the RER stable and competitive while achieving full employment, low inflation (i.e., internal equilibrium) and current account sustainability (i.e., external balance). Addressing all these issues simultaneously is not an easy task. It requires the coordination of several policies.

#### III.1. SCRER and External Equilibrium

Attaining external equilibrium under a SCRER regime is probably the least controversial aspect. As discussed in Section I, because it stimulates the supply of and limits the demand for tradables, a SCRER strategy tends to be associated with current account surpluses, or low deficits, and the accumulation of international reserves by the central bank. Countries are in stronger positions to deal with negative external shocks, and reduce the chances of sudden stops of capital inflows. Moreover, a SCRER strategy makes it very unlikely

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<sup>7</sup> This section draws on Frenkel and Rapetti (2015).

<sup>8</sup> See, for instance, the analysis of Chang (2008) for the case of Latin American inflation targeters.

that the economy follows unsustainable trajectories regarding its international assets position. The most likely case is that the country would reduce its net foreign debt or increase its net asset position.

If anything, the concerns are whether accumulating foreign assets is optimal. Textbook treatments consider sustained current account deficits and surpluses as cases of external imbalances. This characterization misses an important distinction: a sustained current account deficit implies that domestic agents are continuously issuing foreign debt. In turn, a sustained current account surplus implies that domestic agents are postponing spending indefinitely. In the first case, the behavior is probably desirable but unsustainable. One would like to consume beyond one's means; the problem is to find someone willing to finance such a behavior. In the second case, the behavior is sustainable but arguably suboptimal. One can sustainably finance someone else's spending; the issue is whether there is a reason to do so.

In the case of a country following a SCRER strategy, it may be desirable to accumulate foreign assets, and therefore to finance other countries' spending if by doing so, the country manages to reach a higher level of development. For example, the discussions about the "global imbalance" have never pointed to China's inability to maintain its current account surplus, but to whether the U.S. could keep running current account deficits, or to the potential bubbles that such financing could cause on the U.S. and European financial markets. These considerations relate to the important issue of the global consequences of conducting a SCRER strategy, but are unrelated to specifics of how such a strategy is conducted at the national level.

### **III.2. SCRER and Internal Equilibrium<sup>9</sup>**

Internal equilibrium —full employment with low inflation—is usually tackled through monetary policy. In the case of a SCRER strategy, the central bank needs to, on the one hand, manage nominal exchange rate to achieve the targeted SCRER and, on the other, manage the interest rate to regulate the liquidity and influence the pace of aggregate demand. This immediately brings in the well-known policy trilemma, which establishes that it is impossible for a central bank to simultaneously control the exchange rate and the interest rate in an economy open to capital flows.

One way out of these difficulties is to use controls on capital inflows. Several countries have had successful experiences with capital controls. Evidence appears to suggest that they reduce the share of short-term inflows, and lower exchange rate volatility. Many scholars highlight the benefits of capital management techniques for macroeconomic management, especially in developing countries (Gallagher *et al.*, 2012). Even the IMF, who had fiercely opposed them in the past, now sees a role for them in the macroeconomic policy toolkit (IMF, 2010). Despite their increasing acceptance within the profession, it seems uncontroversial that they constitute an imperfect instrument to isolate domestic financial markets from the international capital market. If a central bank wants to use monetary and exchange rate policies simultaneously, it will surely need additional instruments.

Sterilized FX interventions can be useful in this regard. In a situation of excess supply of FX at the targeted exchange rate —a likely scenario in a country following a SCRER strategy that runs a current account surplus or a small deficit—the central bank can control both the prevailing exchange and the interest rate. It can purchase all the excess supply of international currency in the FX market and sterilize the monetary effect of such an intervention through the issuing of bonds in the money market. The central bank has two available instruments to perform its two targets: the intervention in the FX market to control the exchange rate and the sterilization in the money market to control the interest rate. Tinbergen's maxim is fulfilled.

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<sup>9</sup> This section draws on Frenkel and Rapetti (2008) and Rapetti (2013).

A fully sterilized intervention in a situation of excess supply of international currency at the targeted exchange rate can be thought of as a policy implemented in two steps. In the first one, the central bank's intervention in the FX market generates a monetary expansion. The resulting situation would show a higher amount of monetary base, the same amount of domestic bonds and an interest rate lower than the initial one. In the second step, the sterilization fully compensates for the change in the private portfolio that took place in the first step. The central bank absorbs the increment of the monetary base and issues an amount of domestic assets equal to the initial excess demand for domestic assets (the excess supply of international currency) turning the domestic interest rate to its previous level.

Notice that the excess supply of international currency at the targeted exchange rate is tantamount to an excess demand of domestic assets. If the central bank can supply such an asset, the trilemma would be invalid.<sup>10</sup> Certainly, in a situation of excess demand of FX at the targeted exchange rate, the predictions of the trilemma continue to be valid. Central bank's capacity to intervene in such a situation is limited by its stock of international reserves. But there is no symmetry between situations of excess demand and excess supply of FX. In the first case, the trilemma is valid, but not in the second. The asymmetry lies in the fact that in the first case, sterilization is constrained by a fixed stock (i.e. FX reserves), while in the second, sterilization may be carried out indefinitely because of an accommodating stock (i.e. central bank's bonds). The central bank's ability to issue bonds but not FX reserves is the key difference. It seems that this conclusion is not generally acknowledged because the literature discussing monetary autonomy and exchange regimes rarely considers situations of excess supply of FX.

Even if circumventing the trilemma is feasible in cases of excess supply of foreign currency, one may wonder about the sustainability of such a strategy. This depends on the potential cost that the central bank faces when performing these operations. At a given targeted exchange rate, a sustained policy of fully sterilized interventions implies no change in the central bank's net worth. The asset side of its balance sheet increases by the increment of FX reserves, and the liability side increases by the bonds issued for sterilization. Both magnitudes are initially of equal value. The cost depends on the yield of FX reserves compared to the interest rate that the sterilizing bonds pay. Since FX reserves are typically allocated in low-risk assets —e.g., U.S. bonds—, the yield of FX reserves is likely to be lower than the bonds' interest rate (Rodrik, 2006). Notice, however, that the full cost of the operation also depends on the capital gains or losses associated with the variation of the exchange rate in time. If it depreciates (appreciates), the yield of FX reserves increases (diminishes) by the rate of depreciation (appreciation). Notice that if the central bank follows some sort of uncovered interest parity rule<sup>11</sup> to manage the exchange rate —devaluing by a rate equal to the difference between the interest rate that central bank's bonds pay and the one paid by the international reserves—the marginal cost of sterilization would be nil (Bofinger and Wollmershäuser, 2003). However, even if the marginal cost is positive, the policy may be financially sustainable. This would depend on the whole asset and liability structure of the central bank's balance sheet and the corresponding yields. Frenkel (2008) analyzes sustainability conditions for sterilized FX interventions considering reasonable balance sheet structures and reaches the conclusion that they are sustainable as long as the interest rate of monetary policy is “moderate”, which critically depends on sovereign and currency risk premia.

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<sup>10</sup> Except for special circumstances, public debt instruments —including those issued by the central bank— are the least risky assets in a developing economy. The interest rate of such instruments set the floor for the other interest rates in the economy. In fact, this is the very basis for conducting monetary policy via an interest rate set by the central bank. Thus, unless there is an institutional constraint, central banks should be able to offer such an asset and perform sterilization operations.

<sup>11</sup> UIP stands for uncovered interest parity, which states that portfolio decisions should lead to domestic interest rate being equal to the sum of foreign interest rate and the expected rate of exchange rate variation.

Sterilized FX intervention may be sustainable even if it generates a net positive cost to the central bank. This would imply that the Treasury has to finance the central bank's deficit. The decision to keep financing the policy would depend on a cost-benefit analysis of the strategy. If the costs of the sterilized interventions on which the SCRER strategy is based are low compared to the benefits in terms of structural change and development, then it may be worth financing them. As John Williamson (1996: 30) pointed out, regarding the cost of sterilization in Chile's SCRER policy during the 1990s: "[if paying 1-1.5 per cent of GDP] is the price of preserving a model that works, it would be cheap."

Despite the arguments developed so far, it is possible that in certain conditions the interest rate required to attain internal equilibrium would be too high to make sterilization financially sustainable. Capital regulations could help in this scenario, but it is also imaginable that inflows would find ways to at least partially circumvent them. These considerations highlight the fact that financial integration with international markets makes monetary policy not completely independent. For this reason, fiscal policy also needs to play a role in the management of aggregate demand under a SCRER framework. Given that most public spending items and taxes are rigid, and their modification typically requires legislative treatment, authorities need to develop some fiscal instrument flexible enough to help monetary policy conduct counter-cyclical policy. Some countries have successfully developed counter-cyclical fiscal funds that play such a role.

Managing aggregate demand under a SCRER strategy thus requires coordination of policies, including exchange rate, monetary, capital account and fiscal policies. If correctly coordinated, macroeconomic policy can properly respond to shocks and manage aggregate demand to attain internal equilibrium. It is important to bear in mind, however, that a SCRER strategy can have an inflationary bias, even if macroeconomic policy is adequately coordinated. A competitive or undervalued RER implies that real wages, or, more specifically, wages in terms of tradable prices, are lower than they would be if the RER were at equilibrium (Gerchunoff and Rapetti, 2016). Thus, even if aggregate demand is not generating inflationary pressures in the goods markets, inflation may still accelerate due to wage inflation pressures that arise from workers' perception that wages are too low. Wage aspirations are not only influenced by the degree of unemployment but also by history, social norms and institutions. Thus, keeping a RER competitive beyond the short run may ultimately depend on developing some mechanism making workers' wage aspirations compatible with modern tradable sector's profitability. Authorities would need to convince workers and their leaders that their cooperation in terms of prudent wage aspirations are beneficial, not only for modern tradable activities, but also for workers themselves. This is because, under cooperation, real wages would be higher in the medium run. Social agreements between governments, firms and workers linking real wages to productivity in key tradable activities may thus be an important element in a successful competitive RER strategy for development.<sup>12</sup>

#### **IV. Conclusions**

The mainstream approach to macroeconomic policy today is to conduct free floating and inflation targeting (FIT) regimes. Under this framework, central banks follow a mandate that focuses exclusively on inflation, and neglect other policy objectives like the level and stability of the RER. To fulfill the inflation mandate, domestic demand management is carried out through monetary policy, using a reference interest rate as the main instrument. Since credit markets in developing countries are small relatively to international

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<sup>12</sup> In commodity-exporting countries, such an agreement could be complemented with special taxes on rents. The proceeds could then be used to finance social transfers that function as indirect wages.

capital flows and the exchange rate pass-through is still significant, international shocks affect domestic prices. Because of the central focus on inflation, monetary policy under FIT tends to be more tolerant with currency appreciation than depreciation and, as a result, ends up having a RER appreciation-bias (Libman, 2017). This may represent an obstacle for long-run growth.

This paper makes the case for an alternative approach. There are both sensible explanations and a significant amount of evidence to believe that stable and competitive RER levels favor economic growth in developing countries. A SCRER appears to be growth-enhancing because it minimizes the risks of currency and financial crises and sudden-stops; relaxes the FX constraint on sustained economic growth; and more importantly, stimulates modern tradable activities that are key for economic development.

Attaining standard macro-policy objectives while targeting a SCRER is viable. The proposed scheme, however, is more complex than a standard inflation-targeting framework because it adds an additional target to macroeconomic policy: the RER.

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