



Real exchange rate policies for economic development

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ABSTRACT

This paper analyzes the role of real exchange rate (RER) policies in promoting economic development. Markets provide a suboptimal amount of investment in sectors characterized by learning spillovers. We show that a stable and competitive RER policy may correct for this externality and other related market failures. The resulting development of these sectors leads to overall faster economic growth. A system of effectively multiple exchange rates is required when spillovers across different tradable sectors differ. The impact of RER policies is increased when they are complemented by traditional industrial policies that increase the elasticity of the aggregate supply to the RER. Among the instruments required to implement a stable and competitive RER are interventions in the foreign exchange market and regulation of capital flows. We also discuss the trade-offs associated with alternative stable and competitive RER policies and the relationship between the use of exchange rate policies for macro-stability and for development.

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1. Introduction

The role of exchange rate policies for economic development is still largely debated. There are two central and interconnected issues regarding exchange rate policies in the macroeconomic literature on emerging economies in recent decades that relate to the links between the balance of payments and macro stability and growth: (i) the role that the exchange rate plays in facilitating or hindering economic growth, including through promoting diversification; and (ii) the extent to which the exchange rate regime and capital account management help manage cyclical swings in external financing and terms of trade fluctuations, especially in commodity-exporting countries, and open or limit the space for counter-cyclical macroeconomic policies. Both of these issues highlight the potential importance of exchange rate policies in open economies, alongside monetary and fiscal policies, and also the specific and somewhat contradictory links between exchange rate and monetary policies in emerging economies subject to strong boom-bust cycles in external financing.

The first of these issues focuses on exchange rates as an instrument of industrial policy, and underscores the central role that economic diversification plays in the long-term growth of emerging and developing countries (Ocampo, Rada, & Taylor, 2009; Rodrik, 2007, 2013; Stiglitz and Greenwald, 2014). In this view, scaling up toward activities with higher technological contents is the key to dynamic growth. These new activities can be found in natural resources, but are most commonly associated with the development of higher-tech manufacturing and modern services. The East Asian experiences, first of the Newly Industrializing Countries and most recently of China, are underscored as success stories of such diversification (Rodrik, 1994; Stiglitz, 1996; Lin, 2017). This contrasts with the difficulty faced by a large number of natural-resource dependent economies in diversifying their production and export structures, and even the “premature de-industrialization” that several of them have faced (Rodrik, 2016; Noman and Stiglitz, 2012).¹

¹ Note that changes in technology and the structure of the global economy mean that the pattern of growth for countries going forward may have to be markedly different from those that were successful in the past. Global employment in manufacturing is on the decrease, and those countries seeking to increase industrial employment will face increasing competition for a diminishing number of jobs. Moreover, there is likely to be some onshoring, with robotization. See Stiglitz and Greenwald (2014).

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The second issue—the management of cyclical swings in capital flows—emphasizes the importance of counter-cyclical macroeconomic policies for long-term growth. The essential problem in this regard is that capital flows, like finance in general, are pro-cyclical. In commodity-exporting economies, this means, moreover, that capital flows reinforce rather than mitigate the commodity price cycle. There is overwhelming evidence that capital flows to emerging and developing countries are pro-cyclical and have become one of the major determinants—and in many cases *the* major determinant—of business cycles.²

There have been two largely separate strands of literature, addressing these two issues—one focusing on macro-stability in open economies, the other on industrial policies, especially in (developing) economies for sectors with large learning externalities. Both of these literatures have explored a variety of instruments for achieving their goals, in one case stability, in the other, development. There is an instrument that they share in common: the exchange rate. While managing the exchange rate has been seen as central to macro-stability, it has been somewhat peripheral to industrial policy—and although there is a strand of the literature that argues that the policies for economic development must include a competitive and a stable real exchange rate (RER), it does not analyze with sufficient precision under what conditions a competitive RER is desirable.³

This paper, with its focus on the exchange rate, brings these two literatures together, and in doing so extends the precision and reach of each, arguing that (a) having a competitive and stable RER can be an important instrument for both macro-stability and development; (b) the effects are intertwined and complementary: a more competitive and stable RER leads to diversification, especially for resource-rich countries, which contributes to macro-stability; and macro-stability increases the power of a competitive and stable RER as a tool of industrial policy; (c) there are complementary policies that can increase the power of exchange rate policy, both in enhancing development and in promoting stability; in particular, complementary industrial policies such as the provision of credit and public investments can enhance the response of the economy to competitive and stable exchange rates, and while some macro policies, such as capital account management, have been seen as a substitute for direct intervention in exchange rate markets, they may as well be complementary; (d) what is required is a portfolio of instruments aimed at achieving both goals, and in deciding on the role of any particular instrument, and in particular of exchange rates, both impacts on macro-stability (directly and indirectly) and on development need to be analyzed.

While a full discussion of optimal interventions in open economies is beyond the scope of this paper, the paper establishes two important results (proven in the [Appendix](#)) that clarify under what conditions a competitive RER is a constrained optimal policy: while without any constraints on subsidies to the tradable sector, optimal intervention entails the appreciation of the RER, when subsidies are not allowed (as under WTO agreements), optimal policy entails a depreciation of the RER, and a set of taxes on tradable goods which generate low or no learning benefits, creating, in effect, a system of *effectively* multiple RER (by this last term we recognize the need to introduce other policy instruments that effectively lead to a less competitive exchange rate for sectors with

negative spillovers, while maintaining the commitment of members of the International Monetary Fund to avoid multiple exchange rates). Optimal interventions entail both static and dynamic tradeoffs, balancing out the dynamic gains of learning with distortions in both intertemporal and contemporaneous consumption. The paper provides guidance on how limits on policymakers' information, market imperfections, and other constraints, such as those imposed by international agreements, determine the second best nature of the optimal planning problem.

Any policy that has the potential for reallocating the economy's factors of production towards the sector with learning spillovers could be welfare improving. In particular, if the government could identify the learning spillovers associated with each type of activity and if it could use subsidies and lump-sum taxes to finance the subsidies, then there would be a set of subsidies and transfers that would constitute the first best policy response. These policies would entail an appreciation of the real exchange rate (see [Itskhoki and Moll, 2014](#) and the [Appendix](#) for the analytical development of this proposition). The reason is that if the planner could use non-distortionary transfers, it would allocate more resources to the production of the tradable good that features learning spillovers. Thus, the non-tradable good that do not feature learning spillovers would become more scarce, and its price would increase in relation to the price of the tradable good with learning spillovers. But if the implementation of these first-best policies is not possible (either because there are severe political economy problems or risks of rent seeking that impede an efficient allocation of subsidies, or there are international regulations that impede the implementation of subsidies in the first place), then there is a key role for real exchange rate policies as second-best solutions.

Under those circumstances, a competitive exchange rate will increase the profitability of tradable sectors (including “infant sectors” and new export activities). Implicitly, the competitive real exchange rate acts as a subsidy to the tradable sectors.⁴ However, there may be multiple tradable sectors, including some that do not feature learning spillovers. Therefore, as a means to correct relative prices, optimality will require that the sectors with no learning spillovers that receive the implicit subsidy implied by the competitive real exchange rate are taxed, while sectors characterized by learning spillovers retain the implicit subsidy. The resulting system of effective multiple real exchange rates will help those sectors that must go through a learning process in order to be competitive. This implies that the exchange rate operates as a type of industrial policy, or in a broader sense, as a type of production sector policy.⁵

This consideration of real exchange rate policies as a means for fostering the development of sectors that are associated with larger technological progress is backed up now by a growing literature that shows that long-term growth in developing countries is positively associated with the capacity to guarantee a competitive exchange rate ([Rodrik, 2008](#); [Rapetti, Skott, & Razmi, 2012](#); [Razmi, Rapetti, & Skott, 2012](#); [Rapetti, 2013](#); and for a review of the literature, [Frenkel and Rapetti, 2014](#); [Damill, Frenkel, & Rapetti, 2015](#); [Missio, Jaime, Britto, & Oreiro, 2015](#)).

The previous paragraphs have provided the intuition behind the use of RER as an instrument of industrial policy. A direct extension of these arguments can be used to establish the desirability of a

² This was well known before the global financial crisis (see, for example, [Prasad, Rogoff, Wei, & Ayhan Rose, 2003](#), [Ocampo, Spiegel, & Stiglitz, 2008](#)), but has been reinforced by the effects of the September 2008 Lehman shock, the effects of developed countries' expansionary monetary policies on capital flows toward emerging economies, and the more recent swings associated with the gradual dismantling of U.S. expansionary monetary policy, the commodity price collapse and the turbulence in Chinese stock markets.

³ Even though the real exchange rate is an endogenous variable and not a direct policy instrument, we still speak of *real exchange rate policies*, understanding that these policies rely on the management of a set of *actual* policy instruments.

⁴ The intervention that makes the real exchange rate more competitive will be associated with static and dynamic losses but will also bring dynamic gains. In the margin, the dynamic gain will dominate ([Korinek and Serven, 2016](#)).

⁵ It should be emphasized that modern industrial policy is not just concerned with expanding the manufacturing sector. Instead, it entails any policy directed at affecting the sectorial composition of the economy and the choice of technology. Modern industrial policies can be directed not only at promoting growth, but increasing employment, reducing inequality, promoting the environment, or any other societal objective. See [Greenwald and Stiglitz \(2014a\), \(2014b\)](#). To avoid the negative connotation and the narrow framing associated with the term industrial policy, below we refer to such policies simply as production sector policies.

stable RER. But stabilizing the RER in the midst of macro shocks can lead to macroeconomic instability. Macro stability itself affects industrial development and the responsiveness of the market to lowering of the RER. This suggests both the need to use additional instruments, like capital account regulations, and, if these instruments are not fully effective, to compromise on the extent of stabilization of the exchange rate that otherwise would have been desirable.

There is also an empirical literature on the effectiveness of different policy instruments in managing the *real* exchange rates. The conclusion of our analysis of the empirical evidence is that there are in fact certain interventions, such as foreign exchange interventions and capital account regulations, that are effective for maintaining a stable and competitive exchange rates, including dampening the effects of financial shocks on the exchange rate.

The rest of the paper is organized as follows. Section 2 analyzes the usefulness of competitive, stable, and effectively multiple real exchange rate (RER) policies as a vehicle for economic development in economies with low diversification. It also stresses how those policies must be complemented by other interventions that increase the elasticity of the aggregate supply to the real exchange rate policies, and discusses the trade-offs for the society in terms of present versus future consumption associated with their implementation. Sections 3 and 4 describe the alternative instruments that can be used for achieving a competitive and stable RER, emphasizing the advantages and disadvantages of each of them: Section 3 focuses on capital account regulations and Section 4 on complementary interventions in foreign exchange markets. Section 5 analyzes the challenges that competitive, stable, and effectively multiple RER policies face; it focuses on the need to coordinate different macroeconomic policies, and on the challenges that the identification of economic trends poses for implementing stable and competitive real exchange rate (SCRER) policies that can be sustained over time. Section 6 provides conclusions. Finally, the Appendix provides a simple analytical model showing the circumstances under which optimality entails the implementation of competitive real exchange rate policies.

2. Real exchange rate policies for economic development

Many developing economies, especially in Africa and South America, are highly dependent on agricultural and/or non-renewable natural resource exports (fuels and minerals). The abundance of natural resources, instead of increasing standards of living, has led to noncompetitive exchange rates that strangled the development of tradable non-natural resource sectors, leading to structures of production with low diversification. The lack of diversification, in turn, has undermined sustainable economic growth and aggravated the problems of dependence on the terms of trade, leading to high macroeconomic volatility and vulnerability. This overall failure is known as the resource curse.⁶

⁶ There are other dimensions of the resource curse, e.g., related to rent-seeking (for a thorough analysis of factors that have historically prevented economies rich in resources to make a proper use of them for fostering development, see Venables, 2016). Some of the excess volatility observed in resource dependent countries is related to the highly pro-cyclical nature of capital flows, noted earlier (see Humphreys, Sachs, & Stiglitz, 2007 for a discussion of this and other dimensions of the resource curse). This curse or “disease” can also be thought as the existence of a wedge between the market exchange rate equilibrium and the exchange rate(s) that would make the emergence of non-resource tradable sectors viable (Bresser-Pereira, 2008; Gerchunoff and Rapetti, 2016). The variety of mechanisms through which the abundance of natural resources can affect the economic performance is analyzed by Van der Ploeg (2011). The literature has provided rationale for using a number of policy instruments to deal with the type of resource curse known as Dutch disease (see for instance Corden (2012) for an analysis of policy options for dealing with Dutch diseases in Australia; see Stiglitz (2007) for a broad discussion of the role of the state in mitigating the resource curse). This paper focuses on understanding how policies that affect the real exchange rate can play a positive role for the development of sectors that would, in a free market solution, be smaller than in the social optimum.

There are a variety of policies that could effectively attack the macroeconomic problems posed by resource price volatility, such as stabilization funds and other counter-cyclical macroeconomic policies supported by active interventions in foreign exchange markets and capital account management, to which we refer below (Ocampo, 2008). Nevertheless, those policies are not sufficient to attack two more fundamental problems: the low labor requirements of some commodity sectors, particularly of fuels and minerals, and the limited learning spillovers associated with those economic activities (Stiglitz and Greenwald, 2014).⁷

Combining exchange rate policies with other types of industrial policies may transform the comparative advantage of economies, with positive effects on economic development. Properly designed interventions may allow for the development of the sectors that are more conducive to learning –and hence lead societies to create more and better “social resources” and to use them more efficiently in the long-term.

This section describes the role of exchange rate policies for achieving those goals. It analyzes the characteristics that those policies must include, and investigates how in specific structures of production those policies must be complemented by other active interventions (i.e., other types of industrial policies) that increase the elasticity of the aggregate supply to the real exchange rate. It also analyzes the trade-offs that the society faces with their implementation, as they may entail the sacrifice of present consumption in exchange for larger levels of future consumption.

2.1. Competitive real exchange rates

A competitive real exchange rate makes investment and production in the tradable sector more profitable. A competitive real exchange rate policy plays a role for the development of those sectors, through two channels: a reallocation of the domestic demand towards locally produced goods, and an increase in the foreign demand for the locally produced goods, i.e., both through the promotion of exports and import substitution. It may allow “infant sectors” to emerge and become self-sustaining. In the absence of interventions, the size of sectors with large learning spillovers would be suboptimal, as the market would not internalize the positive effects of those sectors on the rest of the economy. Even if learning spill-overs are limited to the sector itself, when there exists such spill-overs, the size of the sector will be sub-optimally small. Besides, when there are credit constraints, the *within-sector*⁸ learning spillovers—i.e., the benefits that a learning process would imply for the same sector in the future—will also be underexploited. Interventions that give these sectors an advantage over the conditions that the free market solution would provide constitute a (at least partial) correction of externalities and other market failures.

These types of benefits are important for all economies, as these pervasive externalities and market failures are always present no matter the stage of development; but they are particularly important for developing economies, where there is more to learn and where credit constraints may be more binding.⁹ Thus, exchange rate policies are a type of industrial or, more generally, production sector policy that would especially benefit economies with more potential unexploited learning, i.e. with more infant sectors characterized with more learning spillovers.¹⁰

Four caveats must be made in relation to these propositions. The first refers to the potential need for complementing real

⁷ It must be emphasized that while, historically, linkages between natural resource sectors and the rest of the economy have often been limited, this is at least partly the result of not implementing adequate industrial policies. See Greenwald and Stiglitz (2014a), (2014b), Jourdan (2014).

⁸ Or, for that matter, within-firm learning potentials.

⁹ This is especially so because of the predominance of SMEs in such economies.

¹⁰ Greenwald and Stiglitz (2006) refer to policies promoting development in such economies as *infant economy* policies (as opposed to *infant industry* policies).

exchange rate policies with other more traditional industrial policies. The second relates to the challenge of channeling the benefits of exchange rate policies to the right sectors – i.e., those with larger positive externalities. The third refers to the trade-offs that the implementation of these policies imposes on societies. The rest of this subsection analyzes these issues.

A final caveat, not analyzed in detail here, relates to the international implications of these policies. Adopting an active exchange rate policy may have negative externalities on other countries, especially if the country adopting such a policy is a large player in world trade. Also, if many emerging and developing countries adopted these policies, the joint effect would be more limited than if fewer economies did so.

2.1.1. The complementarity between the exchange rate and industrial policies

A competitive exchange rate can be viewed as a type of industrial policy that can partially substitute for other traditional industrial policies¹¹; however, normally, it should also be complemented by the implementation of those other policies.

Given the complex political economy that may be associated with appropriate management of active industrial policies, and the rent seeking that has sometimes characterized these policies in the past, a broad based policy like competitive exchange rates has a distinct advantage over any approach that consists in what has come to be called “picking winners”. Production sector policies should be viewed as an exercise in correcting market failures, creating social capabilities and exploiting them optimally over time—i.e., in “creating” rather than “picking” winners.

Competitive exchange rates may be insufficient for correcting those failures if other conditions that are also necessary for expanding the sectors with larger learning spillovers are not present. If the non-natural resources tradable sectors that these policies intend to expand do not have the other necessary conditions to emerge (for instance, access to technology and credit), the elasticity of aggregate supply to the real exchange rate will be low.

It is then crucial to create those conditions. Other, more traditional industrial policies may help create them.¹² One of those traditional policies is the provision of credit. Many countries have built up successful development banks to correct a myriad of market failures: inadequate long-term finance (including for infrastructure), promoting innovative sectors (“infant sectors” in the terminology of this paper) and others with positive externalities (those associated with environmental protection, including combating climate change), guaranteeing access to finance for SMEs and poor households, and counteracting the procyclical behavior of private finance (Griffith-Jones and Ocampo, 2018). Some major developed countries (notably Germany and Japan) have made extensive use of development banks; but so too have several emerging and developing countries. Even countries that lack national development banks develop several interventions to guarantee access to finance or regulatory policies that affect the allocation of credit – the US Small Business Administration and the US Community Reinvestment Act, for example.¹³ The success of development banks is related to the development of institutional capabilities of the country. The process of building-up development banks involves learning itself.¹⁴ Indeed,

¹¹ But, of course, it is far more than an industrial policy, one of the central concerns of this paper.

¹² At the same time, exchange rate policy itself may help mitigate the consequences of these other market failures. For instance, a more competitive exchange rate will engender greater profitability in say the manufacturing export sector, loosening the effect of credit constraints.

¹³ Interventions in credit markets was a central feature of the successful East Asian countries. See Stiglitz and Uy (1996) and World Bank (1993).

¹⁴ See for instance Shimada (2016) for an analysis of the role of development banks in Japan and their evolution. Stiglitz and Greenwald (2014) note the importance of institutional learning.

successful learning in the development of these institutions tend to transform them into essential instruments of production sector policies, as well as of the provision of public goods and the promotion of socio-economic inclusion.

Non-convexities – as for instance those associated with large sunk costs and Kaldor-Verdoorn scale effects – may also prevent the emergence of tradable sectors associated with learning spillovers in the presence of credit-constraints or prevent such sectors from attaining the scale necessary to be competitive.¹⁵ Under those conditions, a sufficiently large increase in demand, generated by a more competitive exchange rate, will increase the scale of production to a point where it pays off to meet the sunk costs – within the macroeconomic constraints to the adoption of expansionary aggregate demand policies.¹⁶

Investments in infrastructure, education and R&D to enhance the competitiveness of the learning sectors are other traditional policies that could complement real exchange rate policies. Investments in human capital are especially profitable when the skills composition of the labor force is not well tuned for developing the infant sectors. In those situations, re-training the labor force must be an essential element of the integral development plan.

2.1.2. Channeling the benefits of competitive RER to the “right” sectors: The need for effectively multiple real exchange rates

Economies with strong competitive advantages in natural resources face particularly difficult challenges in following the recommendation of adopting competitive exchange rate policies. This is especially so when traditional export sectors are benefiting from high commodity prices, such as those experienced during the super-cycle of commodity prices that recently came to an end. In the absence of interventions, the benefits of commodity booms would be concentrated on the resource tradable sector, with limited benefits to non-resource sector exports and import competing sectors (indeed, when commodity booms lead to exchange rate appreciation, these sectors may be disadvantaged).

The problem is that, although competitive and stable exchange rate policies can help overcome the uncertainties and fixed costs that characterize the creation of new sectors of production and associated learning processes, such policies also benefit traditional export sectors, including natural resource-intensive sectors, and generate additional incentives to invest in them¹⁷. A policy of competitive real exchange rate implies an “implicit” subsidy to all the tradable sectors, including those that do not feature learning externalities.

Thus exchange rate policy *alone* may fail to encourage diversification. Raising taxes on traditional commodity production (including through export taxes) to capture part of the commodity price windfall and to channel the benefits of the interventions to the right sectors should be part of the policy package under these circumstances. These interventions would generate the capacity for distributing the benefits of the boom to the rest of the economy, and would align relative prices with the marginal social returns; this policy approach creates *de facto* a system of *effectively multiple exchange rates* that could make exports in the non-resource sector competitive.

¹⁵ Verdoorn (1949), Kaldor (1966); see also Setterfield (1997) on the mechanisms of cumulative causation. See Dasgupta and Stiglitz (1988) for a broader, earlier discussion of the role of industrial and trade policies in such circumstances.

¹⁶ The point of these policies is to shift demand towards sectors where there are large learning/scale effects and away from other sectors. Under a wide variety of conditions, such shifting of demand can succeed in generating a welfare improvement. Even within a model of symmetric learning, there can be multiple equilibria, a high growth one, where households are induced to supply more labor enabling the economy to benefit from more returns to scale. See Stiglitz (1994).

¹⁷ It is not just that the more competitive exchange rate increases the marginal return to investments in these sectors. In the presence of imperfect capital markets, the additional revenues may not flow easily to other sectors.

The proposition is general: sectors with negative externalities and with smaller learning spillovers should be more heavily taxed. This tax policy, besides creating the incentives for expanding the “desirable” sectors, would at the same time contribute to generating the revenues for running active industrial or production sector policies that increase the elasticity of output to the real exchange rate policy.

The strong static comparative advantage of the commodity sector also implies that industrial policies must particularly aim at exploiting the upstream, downstream, and horizontal linkages, including the linkages that might be associated with processing and resource extraction itself – i.e., exploiting the sideways externalities. For this type of an economy, the exploration and development of linkages with activities that have larger learning spillovers can be the basis of an effective industrial policy, one that enhances the capabilities of both individuals and firms.¹⁸

2.1.3. The associated trade-offs

A more “undervalued” (or more competitive) RER means higher prices of tradable goods and services in terms of the domestic currency. Therefore, following a policy of competitive RER is associated with lower real wages and incomes in the present, with the objective of achieving higher real wages and incomes in the future. The magnitude of these effects depends on the composition of the consumption basket, and would tend to be stronger the larger the share of tradables in that basket (a basket that is endogenous).¹⁹ These trade-offs are also associated with distributive effects: not all the individuals of the society pay the same “price” in the present for achieving larger economic growth—and it may not be clear who will benefit from the increases in economic growth as it is achieved.²⁰

Therefore, the implementation of competitive RER policies requires social coordination that in many occasions is difficult to achieve—especially so when the sectors that would lose purchasing power in the present believe that they will not share the potentially larger purchasing power of the aggregate economy in the future.

The implementation of competitive real exchange rate policies may be associated with another trade-off: a more depreciated exchange rate means higher costs of imported inputs and capital goods.²¹ But as long as the domestic production of tradable goods also has domestic contents, the profitability of the tradable sector will increase. But the development of sectors that eventually become internationally tradable may take time – i.e. it may take time until firms learn enough as to become competitive in international markets. If learning requires imported inputs, the cost of learning will increase with a more depreciated real exchange rate.

All of these imply the desirability of associated policies to accompany exchange rate policy, and have implications for the optimal dynamics of the package of interventions.

2.2. Stable real exchange rates

Under the assumption that firms are risk-averse and in the presence of non-convexities, optimal policies require a *stable* real exchange rate. The reason is that the real exchange rate instability is a major source of uncertainty for the production of tradable (export and import-competing) goods and services, and therefore discourages investment in these sectors. If firms are risk averse

and face non-convexities as those associated with bankruptcy costs, they will care not just about the average exchange rate, but also about its volatility.²² Furthermore, exchange rate instability increases the volatility of cash flows for firms in these sectors, the main source of funding for small and medium firms in imperfect capital markets, further deterring investments.²³

An additional adverse effect of exchange rate instability is associated with the hysteresis accompanying dynamic economies of scale (e.g., if productivity tomorrow depends on production today) or learning.²⁴ Under these circumstances, exchange rate appreciation during booms can have adverse impacts on productivity, and therefore, adverse effects on long-term growth—an effect neatly captured in a classic paper by Krugman (1987).

Short run movements in the exchange rate today are largely related to changes in capital flows.^{25,26} While we focus in this section on the exchange rate effects, we need to recognize that these changes in capital flows have far more reaching effects than just the change in exchange rates, for (in the absence of fully countervailing measures by monetary authorities) they affect the flows of funds to different sectors of the economy, and thus, affect the structure of the economy.

The effects of cyclical behavior that characterizes capital flows goes beyond the effect of increasing volatility in exchange rates. The large and growing literature on macroeconomic externalities (Jeanne and Korinek, 2010; Korinek, 2010, 2011) emphasizes that because of these externalities, there is *no* presumption that market determined exchange rates have optimality properties. They provide a theoretical rationale for the capital account management interventions analyzed below.²⁷

A major source of concern of the recent literature and policy debates is the macroeconomic and financial stability risks generated by swings in both the balance of payments and domestic finance that are associated with these cycles. Since we are concerned here with the exchange rate and the capital account, we will concentrate on the balance of payments effects—although these risks have other major implications, such as perverse distributive effects.

The increase in external liabilities associated with capital account booms are sometimes offset by an increase in foreign

²² Rothschild and Stiglitz (1971) provide the analytical foundations of this mechanism.

²³ It is now well established that SMEs are especially cash constrained, and that cash flows are the major source of funding for their investments. This is true even in advanced countries with well-developed capital markets.

²⁴ See Atkinson and Joseph (1969) and Stiglitz and Greenwald (2014).

²⁵ Recent shocks in global financial markets have once again demonstrated that the cyclical supply of finance toward emerging economies is largely driven by monetary policy and portfolio decisions in industrial countries, related in turn to the response of banks and portfolio investors to incentives created by monetary and financial events generated in developed countries and, particularly in the U.S. These responses include the “search for yield” and the “flight to safety”, which are typically part of different phases of financial cycles. In emerging economies, the domestic financial risks are made more complex by the currency mismatches that they generate in domestic economic agents borrowing abroad (especially in the absence of adequate regulation), as well as the pro-cyclical response to exchange rate and interest rate movements by portfolio foreign investors in the domestic currency bond and equity markets of emerging economies, including through carry trade.

²⁶ Of course, as we have already noted, for resource dependent economies, exchange rate volatility is also related to the volatility of the prices of resources.

²⁷ Even more challenging in policy terms are the *medium-term* cycles in the availability and costs of financing. Since the mid-1970s, emerging economies have experienced three full medium-term cycles of external financing—mid-1970s to late-1980s, 1990–2002, and 2003–2009—and a fourth one may be coming to the end – which started in late 2009 and has been followed by several episodes of capital outflows since the initial announcements of U.S. monetary tapering in May 2013, and became more severe since the collapse of commodity prices in 2014 and the turbulence of Chinese stock markets since mid-2015. These medium-term swings strongly affect *all* major macroeconomic variables: exchange rates, interest rates, domestic credit, asset prices and, through all of them, the balance of payments and the level of economic activity.

¹⁸ For further elaboration, see the various chapters in Stiglitz, Lin, and Patel (2014), especially Jourdan (2014) and Greenwald and Stiglitz (2014b).

¹⁹ These effects are also stronger in the presence of tighter credit constraints or other capital market imperfections.

²⁰ The magnitude of these trade-offs depends on what is the portion of learning spillovers that are appropriated by different sectors.

²¹ Indeed, import shares may even increase with a devaluation (see Blaum, 2017).

assets. Even in these cases, the currency mismatch between assets and liabilities generates risks. However, the major problem is when capital account booms are associated with growing current account deficits, thus generating a deterioration of external balance sheets. (As capital flows into the country, the exchange rate appreciates, hurting exports and encouraging imports.) Large current account deficits are a major source of financial risks; when external financial conditions deteriorate there can be a sudden stop in flows, giving rise to a crisis (see, for example, Calvo, 1998). This enhances the probability and potential costs of balance of payments crises. Furthermore, the associated exchange rate correction that then takes place generates massive wealth losses associated with currency mismatches in domestic portfolios, which may lead to a domestic financial crisis. This is reinforced by the possible bust of the domestic credit and asset price bubbles generated during the external financing boom.²⁸

Finally, pro-cyclical capital flows limit the space for counter-cyclical macroeconomic policies and, more generally, exacerbate major policy trade-offs. For example, exchange rate flexibility generates some degree of monetary policy autonomy. However, by attracting additional capital flows, the use of counter-cyclical monetary policies exacerbates appreciation pressures during booms—in a sense just displacing the effects of pro-cyclical capital flows to the exchange rate, and therefore exacerbating current account imbalances. Besides, as monetary policy itself has sectoral impacts, the reliance on monetary policy for managing volatility in capital flows disadvantages sectors that are particularly sensitive to the exchange rate and interest rate. Even then, monetary policy may be relatively ineffective in countervailing the inflationary impact of capital surges: the decrease in activity in the interest rate and exchange rate-sensitive sectors can be more than offset by the stimulus generated by the additional capital inflows induced by the higher interest rates.

An alternative to reducing the expansionary pressures generated by capital inflows is to adopt a contractionary fiscal policy. But this makes fiscal policy hostage to capital account volatility.

There is, therefore a strong rationale for intervening directly in the source of the cyclical swings, i.e., on capital flows; or in the exchange rate market, through counter-cyclical accumulation of foreign exchange reserves.²⁹ These are the issues to which we now turn.

3. Complementary macroeconomic policy instruments: Capital account regulations

The implementation of competitive and stable real exchange rate policies requires an identification of effective policy instruments. This section analyzes the role that can be played by capital account regulations (CARs). While standard analyses have begun by asking what is the best portfolio of instruments for achieving macro-stability, one can flip the question around and asking what is the best portfolio of instruments for achieving a competitive real exchange rate. But neither question is quite right: the ultimate objective is the maximization of societal welfare—today and in the future. Society is concerned about growth, but also about volatility. The real exchange rate, in particular, is not an end in itself, but a means to an end. Macro-stability is only one objective, and there may be trade-offs with (or complementarities with) other objectives, in particular long term growth.

CARs play multiple roles: they serve as a *macroeconomic* policy tool, as a *financial stability* tool (Ocampo, 2015) and, following our analysis above, as an instrument for maintaining a competitive real exchange rate – a role that we could define as a *development* tool.

²⁸ Some of these adverse effects might be mitigated by the capital account management techniques described below, which are part of appropriately designed macroprudential regulations.

²⁹ See also Stiglitz (2015).

As a macroeconomic policy tool, they provide larger room for counter-cyclical monetary policies. During booms, they increase the space to undertake contractionary monetary policy while avoiding the exchange rate appreciation pressures that such monetary policy can generate. By mitigating exchange rate appreciation, they also reduce the risks that rising current account deficits will generate a future balance of payments crisis. In turn, during crises, they can create some room for expansionary monetary policies while containing capital flight and excessive exchange rate depreciation, and the effects of the latter on domestic inflation. The increase in capacity for counter-cyclical monetary policies reduces the burden on fiscal policies throughout the business cycle.

On the other hand, viewed as a financial stability tool, CARs recognize the fact that the reversibility of capital flows varies significantly according to the nature of capital inflows: foreign direct investment is more stable than portfolio and debt flows and, among the latter, short-term debt flows are particularly volatile.³⁰ So, as a financial stability tool, CARs aim at moderating the build-up of debts, and particularly short-term debts, during booms as well as reversible portfolio flows. These interventions reduce the intensity of the capital account cycle.

CARs can also be justified as a way of avoiding the negative externalities of volatile capital flows on recipient countries. These externalities result from the fact that individual investors and borrowers do not take into account or ignore the effects of their financial decisions on the level of financial stability in a particular country, including on the exchange rate and other macroeconomic variables. (See Stiglitz, 2015.) Such market failures call for a Pigouvian tax—here, taxes on cross-border financial activities and other regulations (Korinek, 2011).

When CARs are used for macro-stabilization, they can be seen as belonging to the family of what have come to be called “macroprudential regulations”. This concept, cursorily discussed before the global financial crisis,³¹ has only received widespread acceptance in recent years, including in the IMF’s “institutional view” of capital account management. In fact, CARs should be seen as part of a spectrum of policies, which goes from regulation on financial transactions of domestic residents in the domestic currency (traditional prudential regulation), to those of domestic residents transacting in foreign currency, to those involving domestic agents’ transactions with foreign residents.

As components of the broader family or macroprudential regulations, those that focus directly on the capital account can be partly substituted by domestic prudential regulations. For example, a good fairly generalized regulatory practice is managing the net foreign exchange exposure of domestic financial institutions. This may entail forbidding banks and other domestic financial intermediaries from holding net liability positions in foreign currency, or using differential reserve requirements for liabilities of the domestic banks in domestic vs. foreign currencies. These regulations can be combined with oversight of the currency exposure of the firms to which the banks lend. One disadvantage of replacing purely domestic banking regulations for those that directly affect capital flows is that they do not encompass direct borrowing abroad by non-financial agents. A specific advantage of CARs is that they aim at the direct source of financial volatility.

CARs as a development tool—directly impacting on the level and stability of the exchange rate—affect flows of capital into and out of the country. They can be seen also a reducing the burden

³⁰ The classic treatment of the riskiness of short-term capital is Rodrik and Velasco (2000).

³¹ See, for example, the concept of “counter-cyclical prudential regulations” in Ocampo (2003), as well as the work of the Bank for International Settlements on what they already termed the “macroprudential perspective”. Stiglitz and Greenwald (2003) explain why such regulations should be seen as an essential part of monetary policy and as key in maintaining macroeconomic stability.

imposed on other tools of exchange rate stabilization, in particular direct intervention in foreign exchange rate markets. (Below, we noted the relative costs and effectiveness of these different instruments.) The experience of China illustrates the interplay of these mechanisms. In the absence of policy interventions, one might have expected an appreciation of the renminbi, due to the Balassa-Samuelson effect. But the pressures for appreciation were resisted through capital account policies. Similarly, without restraints on capital outflows, many Chinese would have chosen to diversify their portfolios, leading to a lowering of the exchange rate. Full capital market liberalization would have subjected China to a high degree of volatility. During the period, there was a large accumulation of foreign reserves. Instead of an appreciation of the real exchange rate with exchange rate volatility, the country experienced a large accumulation of foreign reserves, large trade surpluses, and a relatively stable exchange rate.

Most of the literature on the effectiveness of CARs comes from the analysis of individual countries or comparative experiences of countries that apply them.³² This has been complemented by an increasing number of multi-country studies.

The strongest consensus in the literature relates to the improvement in the quality of capital inflows generated by CARs, by lengthening the maturity of external debt obligations. There is also a fairly broad agreement in the capacity of regulations to increase monetary policy independence by partly delinking the interest and exchange rate effects of capital flows, thus allowing countries greater scope to increase domestic interest rates during booms and avoid raising them during crises while partly avoiding the exchange rate effects of such policies.

In contrast, there is no agreement on whether CARs can be used to affect overall capital inflows and exchange rates. Effects on capital flows are generally found to be statistically insignificant or at least temporary, implying that these regulations are “speed bumps”³³ rather than permanent restrictions³⁴. However, speed bumps do make a direct contribution to financial stability. Historically, financial crises have been associated with manias, typically including the rapid expansion of credit (Bhattacharya (1997), that in turn led to the rapid growth of prices of some type of assets (Kindleberger and Aliber, 2011).³⁵ Speed bumps may effectively discourage the creation of bubbles. A related implication is that in order to have more permanent effects, it may be necessary to modify regulations to respond to ways private agents learn to circumvent regulations.

While past studies similarly suggested limited effects on exchange rates, Jeanne (2012) shows that capital account policies – including all the policies that affect the private sector’s access to foreign capital – can have persistent effects on the real exchange rate.³⁶ The evidence is aligned with this theoretical prediction.³⁷

³² See, among others, several papers by the IMF (2011) and IMF experts (Ariyoshi et al. 2000; Ostry et al. 2010, 2011, 2012); the literature reviews of Magud and Reinhart (2007), Magud et al. (2011), Ocampo (2008) and Ocampo and Erten (2014); and the broad review of the debates on CARs in Gallagher (2014).

³³ This is the term used by Bhattacharya (1997), Stiglitz (1999) and Ocampo and Palma (2008), among others.

³⁴ Some CARs do, however, affect the relative attractiveness to, say, foreign exchange exposures, and thus should be expected to have a long run effect.

³⁵ Prolonged manias in presumably stable environments have also been associated with more severe crises (Gluzmann et al., 2014; Guzman and Howitt, 2015).

³⁶ A concern with the implementation of policies that control the capital account is that they could be circumvented. However, if evasion is costly, the controls will still bind. The evidence shows that, contrary to the common perception that capital controls can be evaded, they indeed affect the cross-market premium (Yeyati et al., 2008), indicating that they are effective. Relatedly, Bengui and Bianchi (2014) find that leakages do not necessarily make CARs as macroprudential policies less desirable, and that stabilization gains still outweigh the costs of leakages.

³⁷ See Blanchard et al. (2015), Levy-Yeyati and Sturzenegger (2007), Levy-Yeyati, Sturzenegger, & Gluzmann (2013), and Montecino (2015). Relatedly, Libman (2017) shows that pegs are associated with more overvaluation.

The effects on either exchange rates or capital flows may depend on the nature and strength of the regulations.³⁸ Using two instruments simultaneously may also enhance their effectiveness, as shown in the analysis by Rincón and Toro (2010) which illustrates the stronger effects of central bank interventions in foreign exchange markets and URRs on exchange rates when these interventions were adopted simultaneously.

CARs also have real effects, consistent with their ability to affect capital flows and exchange rates. According to IMF research, countries that had CARs in place before the global financial crisis were able to mitigate the contraction of GDP during the crisis (Ostry, Ghosh, Chamon, & Qureshi, 2012). This was confirmed by Erten and Ocampo (2017), who found that CARs not only helped countries avoid a strong impact of the crisis but also overheating during the recovery, indicating that they are, overall, an effective counter-cyclical policy instrument.

CARs can take on a number of different forms. They can be either administrative (quantitative) or price-based, but there are more complex typologies (see, for example, IMF, 2011). Collectively, these measures have been called “capital flow management measures” (IMF, 2011) and “capital management techniques” (Epstein, Gabel, & Jomo, 2003). Administrative regulations include ceilings or prohibitions or ceilings on certain transactions, minimum stay periods, restrictions on foreign investors taking positions in domestic securities or rules that only allow certain agents (residents and corporates) to undertake certain transactions. In turn, price-based regulations include unremunerated reserve requirements on capital inflows (URRs) or tax provisions applying to foreign-currency liabilities (see, on the latter, Stiglitz and Bhattacharya, 2000).

The literature has also discussed the advantages and disadvantages of these different forms of regulations. Among policymakers, there has been a strong preference for regulating inflows. However, the empirical evidence, including in past IMF research, indicate that regulations of outflows may be more effective in managing crisis, while those on inflows may be more effective in preventing crises.³⁹

There is also a preference among many policymakers for price-based over administrative regulations, as they are more market friendly and less susceptible to political economy failures (rent seeking and corruption). But again, the evidence in the literature, including past IMF research, is that administrative regulations may be more effective. Theory shows that in general, when information is imperfect and contracts are incomplete, it is optimal to use a set of controls that contain both price regulations to affect incentives and quantity regulation to affect constraints (Weitzman, 1974; Dasgupta and Stiglitz, 1977).⁴⁰

In relation to temporary versus permanent regulation, the crucial issue is whether countries have the institutions in place when they are needed, rather than having to improvise them, risking their ineffectiveness in the relevant time-span. This is closely related to the associated learning process as to how to use them, and the capacity to design rules that incorporate the most important adjustments required through the business cycle. In both regards, having permanent regulatory systems in place enables

³⁸ See, for example, the comparative study of the effects of CARs on inflows in Chile, Colombia and Malaysia in the 1990s (Ocampo and Palma, 2008), which concluded that the harsher 1994 Malaysian regulations had the strongest effect and, in turn, those of Colombia were more effective than those of Chile because the tax equivalent of the unremunerated reserve requirement (URR) was larger. Similarly, the strong tax on outflows introduced by Malaysia in 1998 is generally considered to have been very effective (Kaplan and Rodrik, 2002).

³⁹ See the older research by the IMF (Ariyoshi et al., 2000) and Erten and Ocampo (2017).

⁴⁰ The rent seeking that is sometimes associated with quantity controls may be primarily related to the ways in which they have traditionally been administered. Auctioning off quotas would reduce, if not eliminate, the potential for rent seeking.

the instruments to be used in a counter-cyclical way—including temporarily phasing out the regulations when there are no balance of payments pressures—is better than improvising institutions to manage either booms or crises.⁴¹

4. Complementary policy instruments: Interventions in foreign exchange markets

It can be argued that the basic disadvantage of capital market regulations is that they *segment* domestic from international markets. The reality, however, is that markets are already segmented. Indeed, the most common rationale for opening the capital account is that countries positively value being integrated into global financial markets. This preference, plus the generally negative view on regulating capital flows that prevailed before the global financial crisis, is why countries generally prefer to intervene directly in foreign exchange markets than to regulate capital flows.

Such exchange rate interventions have indeed become a major rule in many emerging and developing countries, particularly after the emerging countries' crisis that started in East Asia in 1997. In contrast to the mainstream view that prevailed in the 1990s, according to which only polar regimes were stable—hard pegs or freely floating exchange rates—the dominant exchange rate regime in emerging and developing countries has become intermediate regimes, in particular *managed* exchange rate flexibility (see Ilzetzki, Reinhart, & Rogoff, 2017). In fact, IMF research now shows that managed floats are significantly less prone to crises (Ghosh, Ostry, & Qureshi, 2014). This indicates that the pragmatic choice of many emerging and developing countries—in opposition to the prevailing views at the time—has been a correct one.

Interventions in foreign exchange market among countries differ, however, in terms of the magnitude and symmetry of their interventions through the business cycle. For example, among the five major Latin American countries with managed floats, Peru is the country that most massively intervenes in foreign exchange markets, followed by Chile (if we include the copper stabilization funds as a complement to foreign exchange reserves); Brazil falls in an intermediate position, and Colombia and Mexico have the most moderate levels of intervention (though Mexico has intervened more heavily since the global financial crisis). The unsurprising result is that Peru has had the most stable real exchange rate over the past decade (Ocampo and Malagón, 2015).⁴²

Managing fluctuations in foreign exchange earnings associated with commodity export price cycles also aim to smooth real exchange rates, and in this sense are complementary with those that try to avoid real exchange fluctuations associated with capital account volatility. In this sense, stabilization funds, such as those used by Chile to accumulate funds during copper price booms, play a complementary role to foreign exchange reserves.

A cursory look at trends in foreign exchange reserves in emerging economies shows also that interventions in foreign exchange markets have been asymmetric. In particular, the massive accumulation of reserves prior to the global financial crisis was followed by a rather moderate use of such reserves during the peak of the crisis—the year or so after the collapse of Lehman Brothers. In any case, central bank preferences differed significantly in this regard. Analyzing five large Asian economies over the past decade, Sengupta and Sen Gupta (2014) find that all countries accumulated

⁴¹ Klein (2012) finds that temporary controls are less effective than permanent controls, and that this is likely due to the fact that countries with long-standing controls have a larger probability of having incurred the sunk costs that building a system of surveillance requires, thus enforcement of controls works better in the latter economies.

⁴² Obviously, the magnitude of the necessary interventions depends on the capital account regime as well as the global conditions that determine the size and volatility of capital flows.

reserves during capital account surges but they allowed them to fall during episodes of sudden stop in external financing in a very diverse way. India and Korea reduced their reserves during such episodes but Indonesia and Thailand did not, while Malaysia's response depended on the specific episode.⁴³

If the basic problem of CARs is that they segment capital markets, the major disadvantage of reserve accumulation is that it is costly. As it is well known, the basic problem in this regard is that reserves are invested in very low-yield safe assets; so, if reserves are accumulated to avoid the appreciation of the exchange rate in the face of booming and higher yield private capital flows, the cost can be sizable. If reserve accumulation is sterilized, there are also domestic costs associated with such sterilization. As reserves have become sizable in most countries, these costs have increased (see, for example, the estimates of Gallagher and Shrestha, 2012).

However, there are circumstances in which sterilization costs can be compensated by the returns on accumulated foreign exchange reserves. This was the case of Argentina during 2003–2008, a period in which that country followed a policy of stable and competitive real exchange rate (and also of multiple effective exchange rates, determined by a structure of differential taxes on exports). To reach the real exchange rate “targets”, the Central Bank followed a managed floating regime within a monetary framework of targeting monetary aggregates. To achieve the monetary targets, the Central Bank had to sterilize part of the increase in liquidity generated by its intervention in foreign exchange markets through issuing short and medium term securities. As the interest payments on short and medium term securities were not greater than the yields obtained from international reserves, sterilized foreign interventions were not costly in net terms.

Furthermore, while countries have traditionally held low yielding assets in their reserves, they have increasingly recycled some of the reserves into higher yielding asset purchases, generating significant returns. In general, however, when for one reason or another, a country is unable to manage its reserves to yield significant return, a more active use of CARs may be seen as a less costly form of intervention.

Overall, this analysis indicates that best practice in open emerging economies subject to boom-bust cycles in external financing is the complementary use of traditional macroeconomic policies with interventions in foreign exchange markets and capital account regulations.⁴⁴ These interventions have proven effective. While studies in the 1980s had largely rejected the effectiveness of interventions in foreign exchange markets, subsequent studies have contested those earlier results, and have shown that interventions are indeed effective.⁴⁵

Note that if exchange rate interventions are effective (as is to be expected, and as seems to have been confirmed by the earlier cited studies), and if maintaining a competitive and stable exchange rate is an important instrument for growth and stability (including

⁴³ This reveals, according to the authors' analysis, the stronger relative preference by Indonesia and Thailand for exchange rate stability as a policy objective relative to monetary independence.

⁴⁴ These interventions must be seen as a complement and not a substitute for counter-cyclical macroeconomic policies, and of industrial policy. They should also not be seen as a sort of “interventions of last resort” once other macroeconomic policies have been exhausted, but rather as part of the normal counter-cyclical policy package.

⁴⁵ See for instance Sarno and Taylor (2003) for a comparative review of the empirical literature of the 1980s and 1990s; the study concludes that the studies of the 1990s, that are supportive of the effectiveness of intervention, should be given more weight than the studies of the 1980s. These earlier studies had two major handicaps: the lack of data on intervention and the lack of survey data on exchange rate expectations. More recently, Adler and Tovar (2011) studied the effects of sterilized foreign exchange interventions from 2004 to 2010 for a panel of 15 economies (most of them Latin American). They found that interventions are effective for maintaining the real exchange rate persistently undervalued, but this effect is stronger when the capital account is more closed.

through economic diversification), then there is an additional benefit of exchange rate intervention that has to be taken into account in determining the optimal balance of instruments.

5. Additional policy coordination challenges with the implementation of SCRER policies

The effectiveness of SCRER policies depends on the capacity of being maintained at least until the infant sectors become competitive and the learning externalities that those policies aim to foster are built up.⁴⁶ This capacity will in turn depend on the possibility of financing and politically supporting the complementary traditional industrial policies and of ensuring an economic structure associated with a low pass-through of tradable goods prices to other prices. What matters for the success of industrial policies is the real exchange rate, and with a high pass-through, interventions in the nominal exchange rate may have a limited effect on the real exchange rate.

There is evidence that countries with more volatile nominal exchange rates have higher pass-through elasticities (Campa and Goldberg, 2005).⁴⁷ A corollary from this relationship is that a policy that targets nominal exchange rate stability would also decrease the pass-through to prices, making the SCRER policy more sustainable. It also emphasizes the importance of avoiding boom-go-bust situations.

Generally, pass-through elasticities will depend on the characteristics of the market structure. Under the law of one price, in highly competitive markets there would be a perfect pass-through from movements in the exchange rate to domestic prices of tradable goods.⁴⁸ But a less than infinity elasticity of substitution between domestic and foreign goods would decrease the pass-through elasticity. Consistently, empirical studies show that pass-through elasticities are larger when the economy is more open. The elasticities also depend on macroeconomic conditions: they are smaller in recessions than in booms (Goldfjan and da Costa Werlang, 2000).

The sustainability of SCRER requires coordination with fiscal and monetary policies, and importantly, it requires a proper identification of productivity trends. Policies that encourage significant increases in consumption based on the expectation of future increases in productivity—perhaps as a consequence of the real exchange and other industrial policies—may fail dramatically if those expectations are not subsequently realized. If macro policies turn out to be over-expansionary ex-post, they may result in inflationary pressures that will severely damage the capacity for pursuing competitive real exchange rates. The recent case of Argentina is an indication of these risks: When the country followed a SCRER policy (2003–2008), the macroeconomic performance was successful. When macroeconomic policies undermined the continuity of that strategy (since 2010), economic performance was mediocre (Damill, Frenkel, & Rapetti, 2015).

Thus, it is important that macro policies generate the essential enabling environment for industrial policies to be effective⁴⁹—in-

⁴⁶ It also depends on the ability to remove the interventions, should the learning benefits cease to be significant.

⁴⁷ The quoted study provides evidence only for OECD countries. This empirical finding is consistent with Devereux and Engel (2001) theory, in which a higher volatility of the exchange rate makes the choice of foreign currencies for transaction invoices more likely. Then, variations in the exchange rate would have a larger effect on prices.

⁴⁸ Matters are somewhat more complicated than this discussion suggests. For instance, if the country purchases mostly machine goods from abroad, then a change in the exchange rate might not affect the short run marginal costs of production. If the country imports mostly food, the impact on manufactured goods will depend on the structure of the labor market and wage bargaining processes.

⁴⁹ Stiglitz and Greenwald (2014) explain why macro stability itself may enhance productivity enhancing investments and learning.

cluding for exchange rate interventions to affect the real exchange rate rather than just the nominal exchange rate.

6. Conclusions

There are a variety of historical experiences that support the claim that stable and competitive real exchange rate (SCRER) policies are good for economic development, as demonstrated by a number of Asian economies⁵⁰ (Rodrik, 2008; Razmi et al., 2012), and more recently by Argentina during 2003–2008 (Damill, et al., 2015).

This paper has described the theoretical foundations for those policies. We note that the main argument *against* such interventions—that they represent interference in the free functioning of markets, which, in the absence of such intervention would ensure efficiency—has been undermined by research over the past decades. In the absence of government intervention, markets are not in general either efficient or stable. Today, in fact, every government intervenes in the market, at the very least through the setting of interest rates (monetary policy). There is no such thing as a “pure” market equilibrium. Indeed, the market equilibrium is affected by virtually every regulation that affects the macroeconomic equilibrium, including those that affect domestic savings and investment.

We argued that a SCRER provides (some of) the necessary conditions for increases in diversification and development of the non-resource tradable sector. But in order to incentivize the sectors with larger learning spillovers, other complementary conditions must be established. Particularly, the sectors with smaller learning spillovers must be taxed more heavily, in order to create a structure of shadow prices that better reflects the true social benefits and costs. The revenues from that tax structure may be used to fund other traditional industrial policies; some of these policies, in turn, would increase the elasticity of the aggregate supply to real exchange rate policies. These include the provision of credit to the infant sectors and investments in infrastructure, R&D, and in education that allow for a restructuring of the labor force to one that is complementary to the pursued structure of production.

A variety of capital account regulations and foreign exchange market interventions can be used for achieving the goal of a SCRER. Those instruments may simultaneously enhance macroeconomic and financial stability, and such stability itself can promote development and diversification. The question should not be *which* instrument to utilize. Rather, there should be a portfolio of instruments; direct interventions combined with capital account management techniques, and in the latter case, price as well as administrative interventions. The optimal portfolio includes a variety of industrial policy instruments as well, including taxes on tradable sectors which do not contribute to societal learning. Such taxes create what is *effectively* a system of *multiple* exchange rates.

In short, pursuing a *stable and competitive exchange rates* can promote economic development, and given the instability of global financial markets, this requires *flexible and sustained interventions*. And these interventions and instruments need to be used in combination with, and in coordination with each other and a range of other monetary, macro-economic and micro-instruments, including, most notably, industrial policies. Macro-stability and industrial policies may enhance the effectiveness of a stable and competitive exchange rate as a tool for development and diversification; and to the extent that these policies succeed in enhancing diversification, they can contribute to macro-stability. Exchange

⁵⁰ The exact level and dynamics of exchange rate that maximizes growth and development may differ across countries. If a country's initial growth depends on importing capital goods, then the optimal path towards a competitive real exchange rate may include a stronger exchange rate at the beginning followed by a more depreciated level. See Stiglitz (1996) and the experience of Japan.

rate management is thus both an instrument of industrial policy, and a policy that can enhance the power of other instruments. Other policies, notably those associated with macro-stability and those that support the provision of credit and complementary factors like infrastructure and education, not only yield direct benefits but enhance the power of exchange rate interventions in promoting diversification and development.

Conflict of interest

None.

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Appendix A

This appendix sketches a simple two-period model for a small open economy with learning spillovers in the production of a tradable good, that clarifies the conditions under which the implementation of competitive (and effectively multiple) real exchange rate policies is optimal. The appendix ignores risk, but a slight extension of this model, employing now standard techniques for examining the effects of changes in risk on resource allocations (Rothschild and Stiglitz, 1971), can be used to establish general conditions under which it is desirable to maintain stability of the real exchange rate.

Case 1. Two goods: A tradable and a non-tradable

Suppose the economy produces two goods, a tradable good T and a non-tradable good N . There is a set of identical consumers-workers of measure L that have preferences defined by

$$U = u(c_1^T) + u(c_2^T) + v(c_1^N) + v(c_2^N)$$

where $u_{T,t} > 0$, $u_{TT,t} < 0$, $v_{N,t} > 0$, $v_{NN,t} < 0$, with $u_{T,t} = \frac{\partial u}{\partial c_1^T}$, $u_{TT,t} = \frac{\partial^2 u}{\partial c_1^{T^2}}$, $v_{N,t} = \frac{\partial v}{\partial c_1^N}$, $v_{NN,t} = \frac{\partial^2 v}{\partial c_1^{N^2}}$ and c_t^x is the consumption of good x in period t , $x = T, N$. For simplicity we assume the representative consumer has no impatience, and inelastically supplies her unit of time in each period as labor at the market wage w . Labor is perfectly mobile across sectors.

Each sector T and N is composed of identical firms, indexed by i . There is free entry in both sectors. Production in each sector requires labor as the only input. The production functions are described by

$$y_t^{N,i} = a_N L_t^{N,i} \tag{1}$$

$$y_t^{T,i} = a_T (y_{t-1}^T)^{\alpha} L_t^{T,i} \tag{2}$$

where $y_t^{N,i}$ and $y_t^{T,i}$ denote the production of the non-tradable and the tradable good by an individual firm, with $a_N > 0$, $a_T (y_{t-1}^T)^{\alpha} > 0$, and $a_T' (y_{t-1}^T)^{\alpha} \equiv \frac{\partial a_T (y_{t-1}^T)^{\alpha}}{\partial y_{t-1}^T} > 0$. The latter assumption corresponds to

the existence of learning spillovers in the tradable sector, as productivity of an individual firm in the tradable sector is increasing in the aggregate production of tradable goods. For simplicity, we assume that in the decentralized solution $a_T (y_{t-1}^T)^{\alpha} = a_T$ in equilibrium (this assumes that the learning gain is compensated by an equivalent destruction of capabilities in the first period).

The consumer has perfect access to international credit markets. There is no default, and we assume the international interest rate is zero. The budget constraints of the consumer are

$$p_1^N c_1^N + p_1^T c_1^T = w_1 + d_1$$

and

$$p_2^N c_2^N + p_2^T c_2^T = w_2 - d_1$$

where p_t^x is the price of good x and d_1 denotes net savings in the first period. Equilibrium in labor markets must satisfy the clearing condition $\int_{i \in N} L_t^{N,i} + \int_{i \in T} L_t^{T,i} = L \forall t$. The economy's constraints are

$$y_1^T + y_2^T \equiv \sum_{t=1,2} \left(\int_{i \in T} y_t^{T,i} \right) = (c_1^T + c_2^T)L$$

$$y_t^N = \int_{i \in N} y_t^{N,i} \forall t$$

The real exchange rate in the decentralized solution

From the utility maximization problem and the profit maximization problems, we obtain

$$\frac{u_{T,1}}{v_{N,1}} = \frac{u_{T,2}}{v_{N,2}} = \frac{a_N}{a_T} = \frac{p_1^T}{p_1^N} = \frac{p_2^T}{p_2^N}$$

Thus, the evolution of the real exchange rate, defined as the consumer price of the tradable good relative to the price of the non-tradeable good, in the decentralized equilibrium, $\{e_1^D, e_2^D\}$, is given by

$$e_1^D = e_2^D = \frac{a_N}{a_T}$$

The real exchange rate in the planner's solution

The planner solves the utility maximization problem subject to the resource constraints and the technological constraints. The difference with respect to decentralized solution is that the planner internalizes (2), the learning-by-doing externality.

The real exchange rate in the planner's first best solution, e_1^P , is given by

$$e_1^P = \frac{a_N}{a_T (1 + a_T' L_2^T)} < e_1^D$$

Thus, in the first best equilibrium the real exchange rate is stronger than in the market equilibrium. The reason is that the planner is moving labor from the non-tradable sector to the tradable sector; thus, the relative scarcity of the non-tradable good increases, and its relative price (as faced by consumers) increases.

A subsidy per unit of production of the tradable good that is equal to the learning externality would take the economy to the first best. In the first best, consumers experience a decrease in the relative price of the tradable good and producers experience an increase in the relative profitability of the tradable good.

Real exchange rate policies for economic development

If somehow it is not possible to provide a subsidy to the sector with the learning externality, the government can still resort to policies that affect the real exchange rate as a second best. Capital account policies as described in Jeanne (2012) or Korinek and Serven (2016) can be used for that purpose.⁵¹

⁵¹ See also Stiglitz and Greenwald (2014).

Suppose the government controls the capital account, purchases tradable goods in $t = 1$ – a purchase that is funded with a lump sum tax – saves them in the form of foreign reserves, and gives them back to the consumer in $t = 2$ also in the form of a lump-sum. Then, $e_1^i > e_1^j$, where e_1^i is the real exchange rate in period 1 under the intervention. Now, there is a relative scarcity of the tradable good the first period, driving up its relative consumer price. But (since direct production interventions are not allowed), the consumer price equals the producer price. The higher producer price encourages greater production of the tradable good. The real exchange rate under the intervention will be more depreciated in the decentralized solution in the first period. (In the second period, $e_2^i < e_2^j$.) *This intervention is optimal in the margin, because the net gain is the learning externality.* Going beyond the margin, the intervention creates both a static and dynamic distortion (the dynamic distortion, corresponding to the intertemporal misallocation of consumption, would not exist in an infinite horizon model as in Korinek and Serven, 2016), as well as a dynamic gain from learning. The optimal magnitude of the depreciation will be determined by the equalization of the distortion costs and the dynamic gain.⁵²

Case 2. Three goods: A resource tradable, a non-resource tradable, and a non-tradable

Suppose next that there are two tradable sectors, a extraction-resource sector R where learning does not occur, and a non-resource sector T where learning occurs, and one non-tradable sector.

The production function for the resource sector is

$$y_t^{R,i} = a_R L_t^{R,i}$$

with $a_R > 0$.

The preferences of the representative consumer in this extended economy are described by

$$U = u(c_1^T) + u(c_2^T) + v(c_1^N) + v(c_2^N) + h(c_1^R) + h(c_2^R)$$

and the consumer's budget constraints are now

$$p_1^N c_1^N + p_1^T c_1^T + p_1^R c_1^R = w_1 + d_1$$

and

$$p_2^N c_2^N + p_2^T c_2^T + p_2^R c_2^R = w_2 - d_1$$

Optimality now requires

$$\frac{h_{R,1}}{v_{N,1}} = \frac{a_N}{a_R}$$

$$\frac{u_{T,1}}{v_{N,1}} = \frac{a_N}{a_T(1 + a_T^i)}$$

$$\frac{u_{T,1}}{h_{R,1}} = \frac{a_R}{a_T(1 + a_T^i L_2^T)}$$

A policy that makes the real exchange rate more competitive will now face a targeting problem. It will increase the relative price of both the non-resource tradable good that has a learning externality and the resource tradable that does not. The competitive real exchange rate policy is providing an implicit subsidy to both of the tradable sectors, but there is no gain from subsidizing the resource sector, and there is a cost—A distortion in consumption and production. The solution to this targeting problem will then involve

⁵² Stiglitz and Greenwald (2014) develop an infinite horizon model in which there is a steady state with intervention, in which reserves accumulate without limit. The dynamic benefits of learning, which are persistent, are such that it pays never to consume the accumulated reserves.

a tax to the resource sector that eliminates the advantage that the initial foreign exchange intervention creates, that is, a tax τ^R such that

$$e_1^R = e_1^i (1 - \tau^R) = \frac{a_N}{a_R}$$

The tax revenues can be used for purchasing the non-resource tradable goods in the first period that the intervention requires.

Thus, in the environment with multiple tradable goods with different learning spillovers and in the absence of instruments to implement the first best, a policy of *competitive and effectively multiple real exchange rates* will achieve a second-best optimum. It will be a policy that will promote economic development.

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