Handbook of Development Economics

(The Effect of) Monetary and Exchange Rate Policies (on Development)

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1. Introduction

How to achieve stable, sustainable and equitable economic growth is the defining question in development economics. Unfortunately, a clear answer to this question have proven to be as elusive as the question is important, not the least because visually any decision that policy makers make can be argued to have an effect on at least some of the main development dimensions. Monetary and exchange rate policies (MERP), the subject of this chapter, are no exception to this rule. Because they determine, to a great extent, the macroeconomic environment in which the economy operates, its relevance for development appears to be quite natural. But the analytical economic literature has not been supportive of this connection: nominal variables are often seen as immaterial for the real economy in the long run. Moreover, even in the vast body of work that explores this link empirically, a multiplicity of country–specific channels that have been proposed –and usually examined separately–, which makes the task of deriving usable policy conclusions rather arduous.

As we will argue below, the choice of MERP not only has a direct implication on the evolution of key nominal variables of the economy (prices, the exchange rate) and, as a result, on inflation, output volatility, and the evolution of the financial sector –which, in turn, may have effects on policy objectives such as output growth and income distribution– but may also affect other variables that are somewhat unrelated to monetary issues: stable exchange rates may foster trade as well as financial vulnerability (as it undermines the incentives of agents to hedge against currency risk). Consider, for example, the adoption of the Euro, which was –at least officially– predicated on its potential trade gains rather than on the benefits of a monetary anchor; or the preference for non-pegged regimes induced by the need to elude the speculative currency attacks that the pegs often invite.

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To tackle such a broad range of topics would be impossible without narrowing the scope down to a subset of issues that can be meaningfully covered within the space constraints imposed by the chapter. To determine this subset, here we focus on the aspects that we judge more relevant in the design of a development policy, from the perspective of a policy maker in a small open economy. Specifically, our exploratory trip will by oriented to answer the following question: What exchange rate regime and monetary policy framework are more conducive to achieve my development policy objectives in my country today –and why? This query deliberately highlights the fact that the answer cannot ignore the evolution of the external and domestic context or the structural characteristics of the country, and would yield criteria for policy choices rather than closed answers.

Do nominal variables matter for development?

Before getting into the matter, it is useful to revisit the broader methodological debate spurred by the overarching theme of the link between nominal and real variables in open economies. A good starting point is the so called "classical dichotomy", which argues that nominal variables have no lasting effect on the real economy, beyond (at most) short-run output fluctuations: it is inconsequential whether countries choose fixed or floating regimes because *price flexibility* makes nominal variables irrelevant. At most, it would be argued in this context, monetary policy and the evolution of nominal aggregates will be related to the choice of the inflation rate, which in turn could have effects on economic performance. But any other channel would be obliterated in such framework. Notice, however, that this argument is in stark contrasts with the relevance assigned to MERP in policy discussions, where the choice of exchange rate regimes and monetary policy frameworks are considered critical –a reflection that the perfectly flexible and frictionless classical world is not a complete representation of reality.

But this skeptical classical view on the relevance of MERP has found some support in empirical work. In a now classical reference, Baxter and Stockman (1989) looked at the time series properties of several macro variables and found that their change over time showed little relation with the choice of exchange rate regimes. They acknowledged that the real exchange rate appeared to move more under floating arrangements, but this did not seem to matter for the behavior of real variables. Backus and Kehoe (1992) also looked at the properties of output and prices over the whole of the XXth century and found that the properties of business cycles have remained fairly constant regardless of the changing exchange rate regimes, and in spite of the fact that price levels did exhibit significant differences, particularly before and

after WWII. A similar result was found later by Flood and Rose (1995), who argued that there was little effect of exchange rate regimes on the volatility of output, stock markets or even monetary policy! This work, however, was confined to industrialized countries and thus of relative use for policy makers in developing economies as we will see below.

The view that nominal variables do not matter has been the premise underlying a large literature on real models, which simply do not include MERP as relevant dimensions for understanding open economies and have had only minor empirical success in open economies (see Box # 1). This is not surprising, since prices are generally less than perfectly flexible (particularly when it comes to price cuts) and markets are generally less than perfectly efficient.

Box 1: Real models

The classical dichotomy provides the justification for a large body of literature known as real models that include no reference whatsoever to monetary or exchange rate policies. Typically, development and growth models did not focus on monetary issues and could be considered real models themselves, but in recent years "real models" has become a synonym of a large class of models representing the "real business cycle approach" pioneered by Kydland and Prescott (1986) and applied to open economies by Backus, Kehoe and Kydland (1992). The innovation of these models is that they claimed to be able to replicate the patterns at business cycle frequencies in output and main macroeconomic variables, thus providing further support for the classical view.

Typically these models postulate an economy with a representative intertemporal-utility-maximizing consumer that faces a labor–leisure choice, -that is, chooses how much to work. In the closed economy version the consumer decide how much to save and invest, and the system is shocked by productivity disturbances that drive the dynamics. In open economies the representative consumer can also trade goods and financial assets with other countries. The solution technique which consists of looking for the central planner solution is tantamount to assuming access to complete financial markets. Because the economies are subject to shocks the methodology is to simulate the proposed economy and then contrast the statistical properties of the model with those of the data. While highly elegant, and quite successful in closed economies, the models have done poorly for open economies. Investment tends to move dramatically in response to changes in productivity across countries, while the financial structure implies consumption levels that appear to be too correlated across countries. While output across countries typically is positively correlated the models deliver a negative correlation. These contradictions have been addressed in further work as well as extended to small open economies. Mendoza (1991) provides the canonical application to small open economies, but again he needs to assume a large cost of adjustment for investment in order to obtain reasonable results.

While it is true that this framework has had little power to explain overall macro data in open economies, this does not mean the exercises are not useful. Sometimes these poor results are somewhat helpful in suggesting relevant deviations from a canonical simple structure. For example, Neumeyer and Perri (2004) show that in small open economies shocks to the risk premia are sufficient to explain the volatility of outputs seen in a standard emerging economy, putting thus the focus on the need to reduce capital market instability; or Chari, Kehoe and McGrattan (2005) who show that in "sudden stop" –the

abrupt curtailment of funds to an economy- a real model suggests an output expansion, not the observed contraction. This result is useful to understand that it is not the curtailment of funds per se that explains the output decline observed after sudden stops but this in combination with some other feature of the economy, for example the use of tradables in the production function (Hevia, 2007) or the typical balance sheet borrowing constraint popularized in third generation currency crisis models.

In fact, price rigidities are the key assumption behind the Mundellian view of exchange rates. In a seminal contribution that developed what has since been known as the theory of optimal currency areas, Mundell (1963) argued that exchange rate flexibility was useful both as a shock absorber and as an expenditure switching instrument to attain internal balance. Mundell argued that countries should weigh these benefits against the gains of stable exchange rates that reduce the costs of international trade (both due to reduced transactions costs and price uncertainty). In his setup, openness compounded the gains from fixing because it reduced the need of the exchange rate as an shock adjustment mechanism (the larger the trade share, the easier to accommodate external shocks without major changes in relative prices) –as well as labor mobility or fiscal transfers, which make up for price rigidity facilitating income smoothing within the currency area. Similarly, concentrated trade with a single partner increased the benefits of fixing vis a vis this partner's currency, because it maximized the trade benefits of exchange rate stability. On the other extreme, volatile terms of trade called for greater exchange rate flexibility to facilitate adjustments to real shocks. Most of these predictions, as we will see below, are amply validated in the data. Ultimately, in Mundell's world, MERP amounted to a tradeoff between output smoothing and trade.[2]

While highly popular among policy makers, this approach has been criticized in academic circles for its sometimes ad-hoc assumptions and imprecise welfare implications. Overcoming these weaknesses has been the agenda of a large literature that has attempted to rescue the main intuitions of the paradigm, in models which provide explicit microfoundations for price rigidities, in a world of optimizing rational agents. In a nutshell, the new Keynesian models in international finance typically consists of three equations: a dynamics IS curve, a Philips curve and a policy reaction function. The IS curve is derived from the Euler equation of consumer maximization, where aggregate demand matters because the model assumes monopolistic competition. The Philips curve is built on the assumption of price rigidities,[3] and

[2] Later developments, including Dornbusch's famous overshooting model (Dornbusch, 1976), broadened the applications of the model to the woorkings of foreign exchange and financial markets.

[3] A popular choice to model this price rigidity is Calvo's (1983) price staggering mechanism. In Calvo's model firms are allowed to change prices randomly, but once they do so, they do so rationally anticipating the conditions of the economy during the period in which they thought the price would be relevant. Because change opportunities appear stochastically and independently across firms, it means that a constant fraction of firms adjust their prices making the price level a smooth

because these models have well defined objective functions they allow for precise statements on welfare, a key step to evaluate policy. Monetary policy, in turn, can be described by an interest rule. With these models, the literature has come full circle, recovering the main tenets of the Mundellian approach, but now derived in coherent fully specified general equilibrium models. [4] More importantly, their emphases on price rigidities and financial frictions set the stage for a more realistic approach to the nominal-real link in the developing world.

Box 2: Statistical methods in international finance

In order to test the relevance of the many models that have been suggested, estimate the response of the economy to shocks, and to estimate policy functions, at some stage any researcher wants to take the models to the data. Two main approaches have become a permanent instrument of open economist macroeconomics. The first is are Dynamic Stochastic General Equilibrium (DSGE), that have become the main workhorse of the literature both for real models and for the new Keynesian framework, but while the specifications have gained in complexity there has been less progress on the empirical validation of such models. Canova (2001) suggests that this was due to the fact that researchers knew these models, were, at best a partial representation of the real world, so that estimating of the mode, per se, would just be an futile attempt to estimate or reject "a model that is known to be false". Thus the literature drifted towards the "computational experiments" of Kydland and Prescott (1996) in which models are calibrated and the macro features of the simulated model compared with the data. Recently some advances have been made on the estimation of DSGE using Maximum Likelihood, or Bayesian inference (see Canova, 2007 for a review of these methods, Lubik and Shorfheide, 2007 provide an application to open economies).

Naturally, the estimation of the structural parameters implies that misspecification of the model translates to all parameters; on the other hand, if the model is correct, it provides a series of restrictions that allow to improve statistical significance. However, in some cases, researchers are not willing to subscribe on a specific specification. If so, a very common methodology has been the use of VARs (vector autoregressions). VARs are regressions of a set of endogenous variables on their joint lags plus additional exogenous variables. Using this structure to simulate forward provides a series of impulse response functions with a rich dynamic structure.

The problem with these systems is that the matrix of errors is usually correlated, so that each shock has no clear economic interpretation. SVARs (structural VARs) solve this by ortogonalizing the matrix of residuals. This is done through ordering the variables from the most exogenous to the most endogenous, or through using economic restrictions imposed by theory in the form of short or long run restriction to obtain identification. Again, the output of the model are a series of impulse responses that

variable that changes only over time. Occasionally, simpler structures (e.g., the assumption that prices have to be set one period in advance) are used instead, as for example, in Obstfeld and Rogoff (1995), which provides the first fully fledged general equilibrium model with price rigidities applied to the international framework. See also Obstfeld and Rogoff (2000), Bacchetta and van Wincoop (2000), Betts and Devereaux (2000) and Corsetti and Pesenti (2001).

[4] These neo-keynesian models have come a long way from its closed economy versions (Woodford, 2003). Following the initial lead of Calvo (1983) and his work on stabilization (to which we come back below), to applications to macro model building by Kollman (2001) and Chari, Kehoe and McGrattan (2002). Important references include McCallum and Nelson (2000), Corsetti and Pesenti (2001, 2005), Clarida, Gali and Gertler (2001, 2002), Schmitt-Grohe and Uribe (2001), Kollman (2002), Parrado and Velasco (2002) and Benigno and Benigno (2003) among others.

allow to assess how the different variables in the system affect the endogenous variables (see, for example, Clarida and Gali (1994) who study the effect of nominal and real shocks on exchange rate).

To organize our presentation we need to distinguish between two aspects that have been at the center of the empirical literature as it moved from industrial economies to a broader set of countries. First, the measurement or monetary and exchange rate *policies*, understood as the policy maker's reaction function (as opposed to the simple characterization of variables such as the interest rates or the exchange rate). Second, the precise identification and testing of the specific (direct and indirect) channels through which MERP may exert their influence on the policy objectives.

In line with the implicit definition of the development problem proposed in the first line of this chapter, we will focus on the following development policy objectives that have been recurrently discussed in the literature: output growth and volatility, price stability, and poverty reduction and equity. How can be MERP characterized and how does it affect each of these policy dimensions? We approach these two questions in turn. We start in section 2 with a conceptual description of different exchange rate and monetary policies, including a critical survey of the many alternative classifications of exchange rate regimes that have appeared in recent years. Next, in section 3, we map the various channels linking MERP with real economic variables identified in the literature, and the empirical evidence on each of them.

Once measurement and links are properly presented, in section 4 we revisit the development policy question, bringing together theory and evidence to distill some concrete criteria that help determine the optimal choice of the exchange rate/monetary policy mix.

2. What do we talk about when we talk about MERP?

To summarize something that will become clear by the end of this chapter, the characterization of MERP as it is actually implemented in reality is plagued by definitional and measurement problems that make any particular definition quite controversial. Hence, a critical condition to advance in the analysis of its economic consequences, we need to be precise about what we understood by MERP. To that end, it is

useful to start from the two-way scheme of exchange rate and monetary policy frameworks proposed by the International Monetary Fund.[5]

The scheme for the latest period available online (mid-2006) is reproduced in Table 1. The rows indicate the exchange rate regime, which range from fully floating exchange rates to regime with no national legal tender, spanning the standard three-way classification: floats, intermediates and pegs. In turn, the columns characterize the monetary policy framework according to the target of choice for monetary policy (the exchange rate, the monetary aggregates or the inflation rate), reflecting the fact that monetary policy has often been defined in terms of "nominal anchors", that is, a nominal variable that the Central Bank chooses to be kept within a pre-determined range, as a means to anchoring expectations about the evolution of nominal variables in general.[6]

Table 1. Exchange Rate regimes and Monetary Frameworks

[5] [online reference]

[6] The classification reflects the subjective assessment of IMF country economists of the de facto policies conducted in the country. We describe and compare this and other MERP classifications later in the paper. For simplicity, we subsume several intermediate regimes (bands, managed floats) in the intermediate category, and include currency boards in the pegged group.

Exchange Rate Regime (Number of countries)	Monetary Policy Framework						
	Exchange rate anchor				Monetary aggregate target	Inflation targeting framework	IMF-supported or other monetary program	Other
	Another currency as legal tender	ECCU	CFA franc zone					
			WAEMU	CAEMC				
Exchange arrangements with no separate legal tender	Ecuador El Salvador Kiribati Marshall Islands Micronesia, Fed. States of Palau Panama San Marino Timor-Leste, Dem. Rep. of	Antigua and Barbuda Dominica Grenada St. Kitts and Nevis St. Lucia St. Vincent and the Grenadines	Benin Burkina Faso Côte d'Ivoire Guinea-Bissau Mali Niger Senegal Togo	Cameroon Central African Rep. Chad Congo, Rep. Equatorial Guinea Gabon				**Euro area** Austria Belgium Finland France Germany Greece Ireland Italy Luxembourg Netherlands Portugal Spain
Currency board arrangements	Bosnia and Herzegovina Brunei Darussalam Bulgaria Hong Kong SAR Djibouti Estonia Lithuania							
Other conventional fixed peg arrangements	**Against a single currency** Aruba Bahamas, The Bahrain, Kingdom of Barbados Belarus7 Belize Bhutan Bolivia Cape Verde China Comoros Egypt Eritrea Ethiopia Guyana Honduras Iraq Jordan Kuwait Latvia Lebanon Lesotho Macedonia, FYR Maldives Malta Mauritania Nambia Nepal Netherlands Antilles Pakistan Qatar Oman Rwanda Saudi Arabia Seychelles Sierra Leone Solomon Islands Suriname Swaziland Syrian Arab Rep Trinidad and Tobago Turkmenistan Ukraine United Arab Emirates Venezuela, Rep. Vietnam Zimbabwe Sierra Leone				China Guyana Sierra Leone Suriname			Pakistan
	Against a composite Fiji Libyan Arab Jamahiriya Morocco Samoa Vanuatu							
Pegged exchange rates within horizontal bands	**Within a cooperative arrangement** Cyprus Denmark Slovak Rep. Slovenia	**Other band arrangements** Hungary Tonga				Hungary Slovak Rep.		
Crawling pegs	Azerbaijan Botswana Costa Rica Iran, I.R. of Nicaragua				Iran, I.R. of			
Managed floating with no pre-determined path for the exchange rate					Argentina Bangladesh Cambodia Gambia, The Ghana Haiti7 Jamaica Lao P.D.R. Madagascar Malawi Mauritius Moldova Mongolia Sri Lanka Sudan Tajikistan Tunisia Uruguay Yemen, R. Zambia	Colombia Czech Rep. Guatemala Peru Romania Serbia, Rep. of Thailand	Afghanistan, I.R. Armenia Georgia Kenya Kyrgyz Rep. Mozambique	Algeria Angola Burundi Croatia Dominican Rep. Guinea India Liberia Kazakhstan Malaysia Myanmar Nigeria Papua N. Guinea Paraguay Russian Federation S. Tomé & Príncipe Singapore Uzbekistan
Independently floating					Albania Congo, Dem. Rep. of Indonesia Uganda	Australia Brazil Canada Chile Iceland Israel Korea Mexico New Zealand Norway Philippines Poland South Africa Sweden Turkey United Kingdom	Tanzania	Japan Somalia Switzerland United States

Predictably, the table shows a strong correlation between the exchange rate regime and monetary policies, as reflected by the fact that countries tend to cluster along the diagonal. Countries that fix their exchange rate naturally choose the exchange rate as the nominal anchor. Conversely, countries that opt for a flexible exchange rate arrangement need to choose an alternative nominal anchor.

However, the correspondence between exchange rate and monetary policies is far from perfect. There are many different degrees of exchange rate commitments among those countries that use the exchange rate as nominal anchor, and there are alternative anchors used by countries that favor more flexible exchange rates regimes. In some cases the classification is unclear as the entry in the upper right quadrant indicates: the euro area could be characterized as a fixed regime vis a vis other union members, and a float vis a vis the rest of the world: Should that be included in the fix or float group?

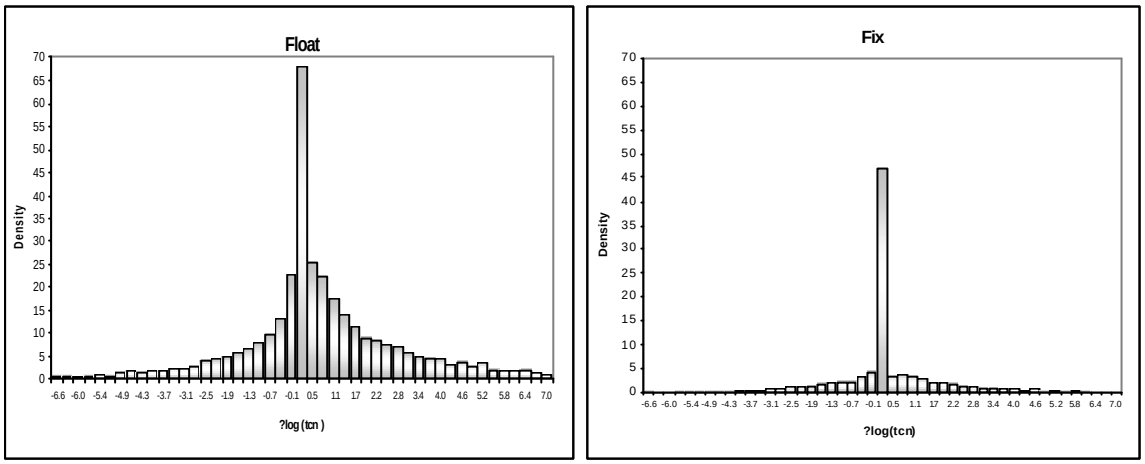
2.1. Classifying exchange rate policies

Few economist would contest the textbook definition of canonical exchange rate regimes: fixed regimes involve a commitment to keeping the nominal exchange rate at a given level (typically through central bank purchases and sales of foreign currency); floating regime imply no market intervention by the monetary authorities and therefore an exchange rate that moves according to market forces to find its equilibrium (which could tautologically be defined as that induced by market forces in the absence of intervention).

Reality, as hinted by Table 1, is much more nuanced. Hardly any textbook float can be found among developing countries, and the empirical distinction between alternative non-pegged regimes is not always clear. Moreover, actual policies often tend to differ significantly from stated intentions. For example, it is not unusual that a country that officially announces a fixed exchange rate adjusts its parity if it finds the constraints imposed by the peg (on monetary policy or economic activity) too taxing. By the same token, there are situations in which a country that commits to a flexible exchange rate may choose to intervene in the foreign exchange markets to dampen exchange rate fluctuations. There is vast anecdotal evidence on both behaviors. Exchange rate realignments have been a pervasive feature of fixed exchange rates in emerging economies, and countries which claimed to run a floating regime had stable exchange rates (e.g. El Salvador prior to its unilateral dollarization).

In fact, Figure 1 shows the distribution of monthly changes in the exchange rate among fixers and floaters classified according to the IMF's de jure regime classification.[7] As can be seen, only 54% of de jure pegs keep (monthly) exchange rate variations within a 0.4% band around zero. Conversely, many floats display very little exchange rate variability, with 33% showing less than 0.4% change.[8]

Figure 1. Exchange rate changes in fixers and floaters

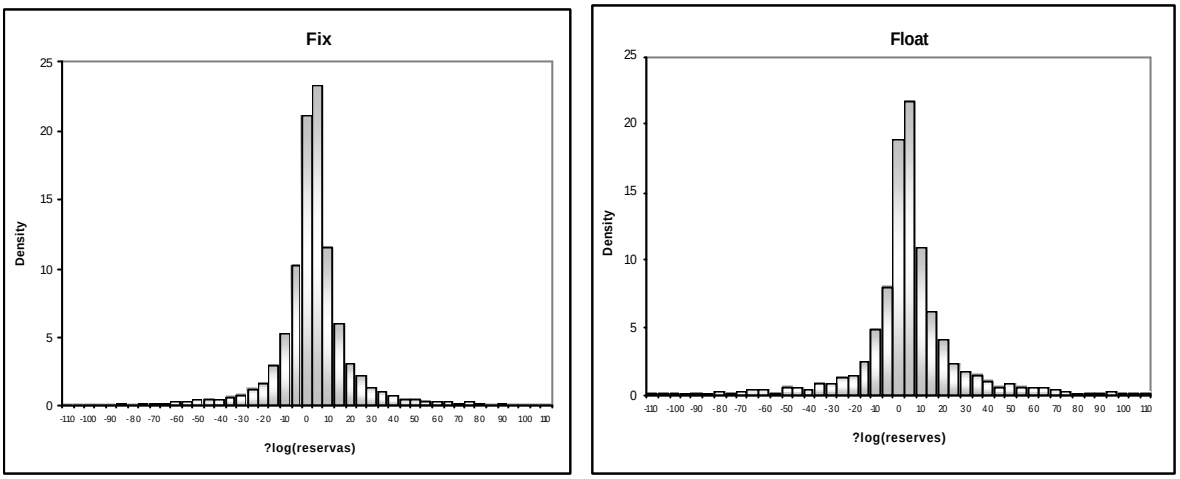


The same can be said of the change in reserves. While typically one would expect this change to be smaller under floating regimes, the distributions of changes between floats and fixes (again, as defined by the IMF) is virtually indistinguishable.

[7] The IMF's de jure classification, sourced from Ghosh et al. (2003), reproduced the regimes officially informed by the countries' monetary authorities and was discontinued in 2000.

[8] Arguably, while a mobile exchange rate is in direct contradiction with a peg, limited variability does not necessarily contradict a float, since exchange rate stability may simply reflect a stable environment. We come back to this identification problem below.

Figure 2. Reserve changes in fixers and floaters



This weak link between the variable that supposedly defines the regime and the official classifications has led to the development of alternative attempts to classify exchange rate regimes. In all cases these classifications relied, to different degrees, on policies observed, and as such have been dubbed *de facto* classifications of exchange rate regimes. Tavlas et al (2006) provide a survey and Table 2 succinctly describes the most widely used.[9]

These new classifications go from the textbook three-way taxonomy (float-intermediate-fix) to more nuanced groupings that distinguish specific modalities (such as the Reinhart-Rogoff classification). These classifications, in turn, use to different degrees a combination of statistical methods and reliance on the de jure classification. In their original paper, Ghosh et al (1997) for example, simply "corrected" the de jure classification by excluding from the peg group all countries that had more than one exchange rate realignment (in the parity or in the basket weights, depending on the case) during a calendar year. In Ghosh et al (2003) they computed a z-score variable which combined the mean and variance of monthly depreciation rates and then mapped this continuous score into three de facto regimes (pegged, intermediate and floats). Reinhart and Rogoff "verify" if the de jure regime is compatible with the observed one; if it is not, they classify according to the volatility of the nominal exchange rate, identifying fixers with stable parities and floaters with more volatile parities. Others rely on purely statistical methods.

[9] See also Bénassy-Quéré and Coeuré (2001), who build a de facto clasification, and Poirson (2001), who constructs an index of exchange rate flexibility based on the relative volatility of exchange rates and reserves.

Levy-Yeyati and Sturzenegger (2001, 2005) compute the volatility of reserves and the nominal exchange rate, and then use cluster analysis to group countries: those with high volatility of the exchange and little volatility of reserves go into the float cluster; those with high volatility of reserves and little volatility of the nominal exchange rate are assigned to the fix cluster, and so on.[10]

The key question when assessing alternative classifications is to what extent they capture appropriately the nature of exchange rate *policy* as opposed to the behavior of exchange rates (as, for example, measured by its volatility). As summarized in Table 2, many recent classifications have largely relied on the volatility of nominal exchange rates, paying no attention as to the extent to which policy interventions stimulated or quelled this volatility. As a result, countries with large movements in nominal exchange rates are typically classified as floats regardless of whether or not the authorities make efforts to reduce exchange rate volatility. Conversely, stable countries with little volatility are often classified as pegs in spite of little or no intervention. But, as suggested by Figure 1, exchange rate volatility appears to be a poor indicator of exchange rate regimes.

This is not only a question of academic interest: the implications of alternative exchange rate regimes are critically influenced by how we classify them. In particular, mistaking flexibility with volatility may assign to the float category countries facing volatile external conditions or suffering strong market pressure, both situations that tend to coincide with subpar economic performance.

One way around this empirical conundrum is to classify with attention to the intervention. Levy Yeyati and Sturzenegger is an example of this approach: by comparing exchange rate volatility and changes in international reserves, they attempt to replicate the textbook analysis –according to which fixed regimes should exhibit little volatility in the nominal exchange rate coupled with larger movements in reserves– and sort the data by similarity based on these two classifying dimensions. Along the same lines, Poirson (2001) uses the ratio of the volatility of the nominal exchange rate to that of reserves.

Even these broad ideas encounter significant difficulties when confronted with the specifics of each country. The many pending issues that plague existing classifications include the following:

[10] As a result of this debate the distinction between de jure and de facto regimes, a well-known drawback that have triggered the numerous de facto classifications since 2000 as well as the IMF's own mixed revised grouping: most of them start by the de jure classification, however.

- Reference currency. When assessing a regime researchers need to define a currency (or a basket of currencies) that, if at all, monetary authorities target. This is relevant because to the extent that volatility in terms of this currency or currencies becomes a policy objective it becomes a constraint on monetary policy. In most cases such reference currency is trivial to define. But in other cases it is not. For example does the Swiss National Bank look to the euro or to the dollar when thinking of its monetary policy?
- What is the exchange rate regime of countries that are contained within a monetary union that floats? In other word does Spain –or California– have a pegged or a floating regime? This is an unsettled issue, which casts doubts on the validity of the classifications and the related results for advanced countries after the launch of the euro.
- Black markets and official exchange rates, which one should be used? The problem with using parallel markets is that we have no idea of knowing how relevant the parallel market exchange rate is. For example, 7% of observations in the RR classification are classified as non pegs, due to the presence of a parallel exchange rate, in spite of massive intervention to contain the movement of the official exchange rate[11]. It is an open question whether that is not a signal that the regime is imposing a constraint and that the regime should not be classified as a float (there is also an analogy that could be make: should a housing market with rent control and black market for the rental market be characterized as one with free prices?) At any rate, this issue has become of lesser relevance in recent times.
- Then there is the issue of non traditional forms of intervention such as interventions in the exchange market by fiscal authorities, use of derivatives, etc.). These have mostly been ignored in the classifications available at this stage.

The bottom-line is simple. Although the literature has moved significantly forward in recent years, classifications are still an imperfect a proxy for exchange rate policy and should be taken as such.

[11] As we will see below the RR classification has, as a result of using parallel markets, the lower number of pegs.

Table 2. De facto exchange rate regime classifications

Study	Period	Frequency	# of countries	# of regime types	Approach
Ghosh, Gulde, Ostry, Wolf (1997), updated by Ghosh, Gulde, Wolf (2002)	1970-99	Annual	150	3 coarse 6 fine	Continuous classification based on z score, which is the square root of the square of both the mean and volatility of exchange-rate changes. Converted this measure into discrete classification using the relative-frequency distribution of de *jure* regimes. Retained those regimes for which the de *jure* and de *facto* methods coincided.
Levy-Yeyati and Sturzenegger (2001), extended backwards in LYS (2005), updated in LYS (2007)	1974-2004	Annual	179	3 coarse	Cluster analysis based on the behavior of exchange rate and reserves. Observations with very low exchange rate and reserve volatility excluded as inconclusives.
IMF revised	1990-2003	Annual and monthly	190	3 coarse 15 fine	De jure-based, revised according to the assessment of IMF desk economists, based on an analysis of exchange-rate and reserves.
Bailliu, Lafrance,Perrault (2003)	1973-98	Five-year average	60	3 coarse 5 fine (pegged, intermediate with and without anchor, floating with and without anchor)	Used 2-step procedure: (1) regime classified as pegged if de *jure* peg or if exchange-rate volatility less than .45 percentage point in a given year, (2) remaining regimes classified on basis of exchange rate volatility relative to averages of country groups. Distinguished between regimes with and without anchors.
Reinhart, Rogoff (2004)	1946-2001	Annual and monthly	153	5 coarse 15 fine	Use the dual/parallel rate where it diverged from market rate. High inflations and crises grouped in the freely falling category (12-month rate of inflation above 40 per cent or 6-months post-crisis period accompanied by a move from fix to float).
Shambaugh (2004)	1973-2000	Annual and monthly	155	2 coarse (pegs, non-pegs)	Used prespecified bands to determine if a regime is pegged or non-pegged. Tested only for degree of monetary autonomy.
Dubas, Lee, Mark (2005)	1971-2002	Annual	172	3 coarse 6 fine	Modeled de *jure* regimes as outcomes of a multinomial logit choice problem conditional on measures of volatility of (1) a country's effective exchange rate, (2) bilateral exchange rate against an anchor currency, and (3) international reserves. An "effective" de facto coding was obtained by assigning country-year observations to the regime with the highest predictive probability obtained from the multinomial logit..

2.2. Exchange rate policy trends in the post-Bretton Woods era: a casual glance at the distribution of regime choices

Classifying exchange rate arrangements is relevant not only to analyze whether and how different regimes have affected economic performance, but also to assess the trends in exchange rate choice and how they relate to global and country-specific contexts. The literature has identified or predicted two main trends in the way countries choose their exchange rate policies. First, the fairly established view that countries have systematically moved away from U.S. dollar pegs since the demise of Bretton Woods in the early 70s, in favor of more flexible regimes. Second, the so called "bipolar view", in vogue during the mid 90s, which suggested that intermediate regimes (including conventional pegs) would tend to disappear with financial development and integration, as large swings in cross-border flows and increasingly liquid domestic capital markets would make them vulnerable to speculative currency attacks.[12] As a result, it was argued that countries would (or, at least, should) move either to more flexible regimes with no exchange rate precommitment (including dirty floats) or, when this was not an option, to superfixed regimes with no margin for monetary policy (the "hard pegs" which typically groups currency board agreements and regimes with no national legal tender). How have these hypothesis fared, once we can take a look at actual regime choice from the perspective of the last thirty years?

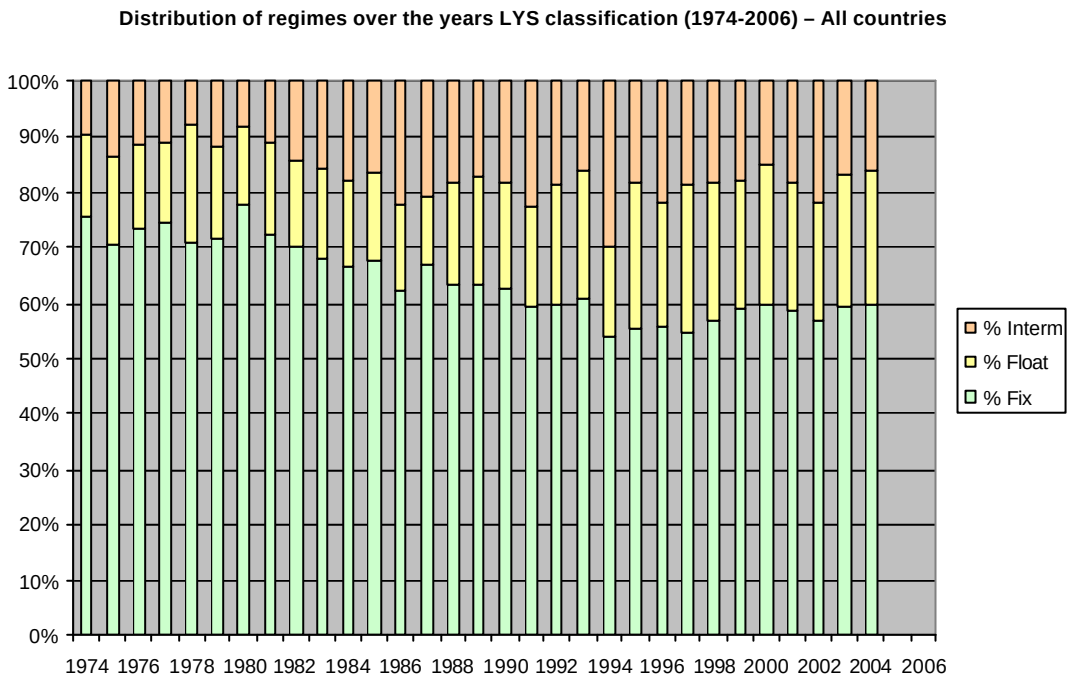
The analysis can be done in two ways. First, asking the question of how many countries choose one regime or the other. Second, asking the question of how much economic activity is done under one regime or the other, which implies taking into consideration not only the number but also the size the of the countries involved. The first question is relevant when thinking in the number of decision units that prefer one regime to the other, but the second criteria is more relevant when assessing how economic activity may respond to different types of shocks to the extent that this response differs according to the exchange rate regime.

Let us start, with the help of Figure 3, by the first question, namely, the prevalence of specific regimes around the world. The graph shows both the IMF de jure classification, as well as the Levy-Yeyati and Sturzenegger (2007) and the Reinhart and Rogoff (2004) de facto alternatives. The three show somewhat different paths. The IMF classification displays a clear trend towards floating regimes that accelerates in

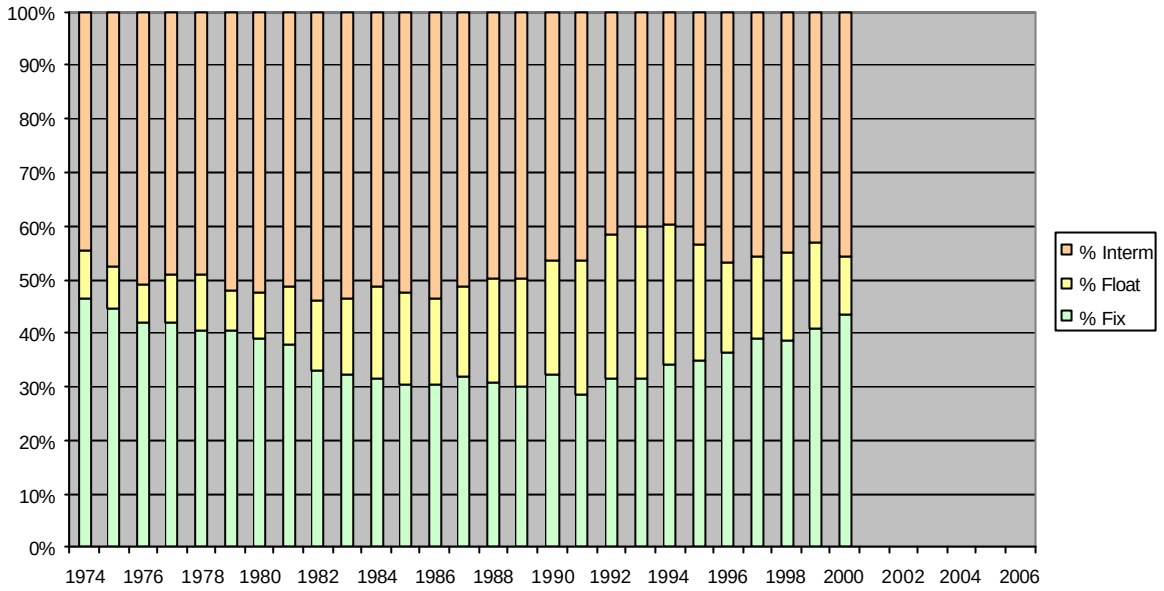
[12] See Eichengreen (1994) and Fischer (2000), among others. We revisit these views in section 4, when we discuss the connection between MERP and country characteristics.

the 1990s and somewhat reverses in recent years, a pattern that is replicated in the Reinhart and Rogoff classification. In the LYS classification, on the contrary, the trend is much less pronounced and the regime choices more stable. At any rate, while these trends were heralded as the triumph of floating regimes, in practice most countries still opt for fixed exchange rate arrangements, with the number of fixers oscillating between 40 and 60% depending on the classification. More striking is the recent reversal. Since 1998, the share of pegs increased for all classifications, while floating regimes declined from a 26% participation in 2000 to less than 10% in 2006 according to the IMF's de facto classification. Similarly, according to LYS, the share of non-floats (intermediates, conventional and hard pegs) represents 75% of the sample, exactly the same share as in 2000.

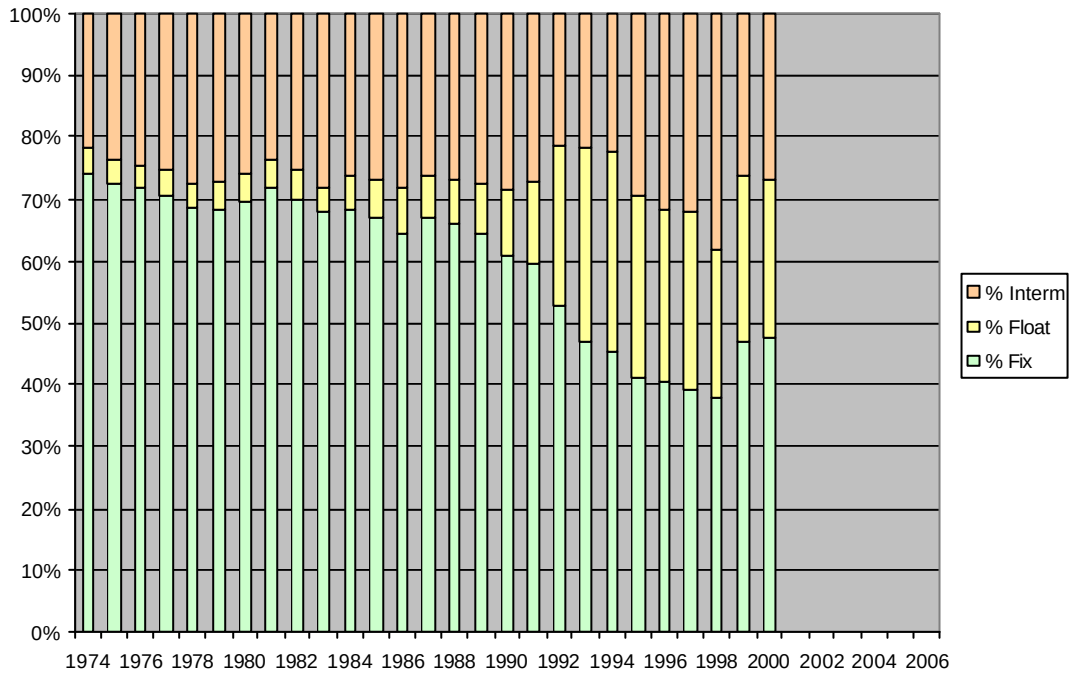
Figure 3. IMF, RR, LYS exchange rate trends

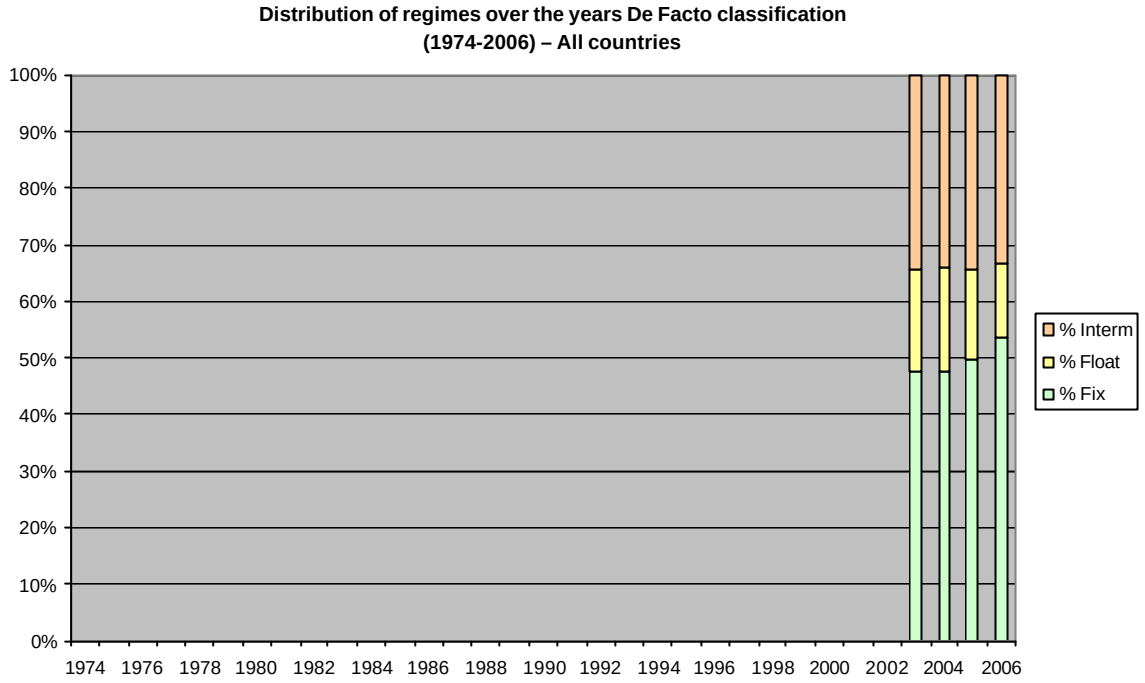


Distribution of regimes over the years Reinhart & Rogoff classification (1974-2006) – All countries



Distribution of regimes over the years IMF classification (1974-2006) – All countries





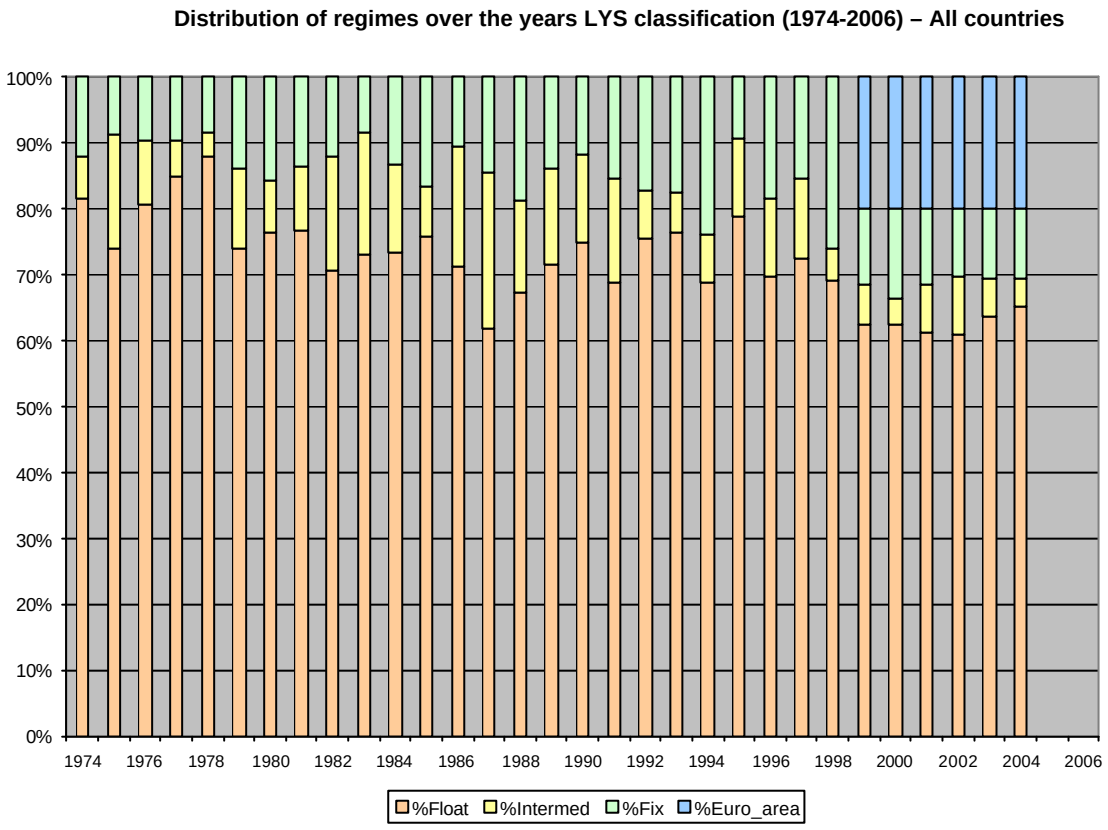
This broad distribution masks important differences across groups of countries. For example, according to LYS, Latin American countries seem to have embraced floating arrangements full-heartedly (mostly in combination with inflation targeting regimes), with the amount of de facto floats doubling between 2000 and 2004 at the expense of both intermediate and pegged regimes, whereas emerging Asia has preserved its bias toward more rigid arrangements. Interestingly, this evidence is a priori at odds with the bipolar view, since currency mismatches in Latin America are large, and certainly larger than in Asia.[13]

A somewhat different story is obtained when countries are weighted by their economic size. Because large countries tend to float, floating arrangements appear to prevail. Figure 5 shows that while most countries still choose to fix, most economic activity is conducted under floating regimes. The euro zone represents a peculiar case of a floating common currency, and is identified separately in the chart. If the euro zone is classified as a peg (as they usually are), the latter would display a slight jump in the new millennium; if it is classified as a float, the jump would favor the float group, which by 2004 would represent 80% of the

[13] Following the convention in the literature, an economy is denoted as emerging when it is included in the Emerging Market Bond Index Global Portfolio compiled by J. P. Morgan, which requires that the country has issued frequently traded sovereign bonds in international markets.

world economy. Anyway, the interpretation of exchange rate regimes changes radically once economic size is taken into account.

Figure 5. Classification weighted by market size



2.3. Inside the non-float group

As shown in Table 1 the non float group in itself includes a wide array of alternatives. Nine countries that have chosen to adopt the currency of another state provide an extreme version of pegging typically called "dollarization"[14]. Less extreme are monetary unions where several countries share their currencies. There are four such areas, the ECCU, WAEMU, CAEMC and the EMU including a total of 42 countries. While the first three peg the common currency to another currency (the dollar in the case of the ECCU; the French franc and, later, the euro in the case of the WAEMU and CAEMC) and as a result can easily by

[14] While typically it is the US dollar that is used, this is just a convention, as some countries such as San Marino have adopted a currency other than the dollar (the euro in this case).

classified as fixed regimes, the euro zone presents a n ambiguous status, as it has established a currency union among its members, which means a very tight exchange rate at that level, but a floating regime vis a vis the rest of the world.

A slighter weaker commitment to the peg –although still considered a "hard" peg–, currency board arrangements entail a legal obligation to keep (almost) full backing of monetary liabilities with liquid reserves, which in principle eliminates any margin for monetary policy.[15] This regime, once very popular, received the support of institutions such as the IMF in the mid 1990s (see, for example, Enoch and Gulde, 1998, or Balino and Enoch, 1997) has nowadays dwindled to a mere seven countries. Finally, we have the so called "conventional" pegs that comprises a large group of 52 countries that peg to a currency (or a currency basket) without additional legal constraints.

Traditionally, standard classifications have characterized exchange rate rigidities from a symmetric perspective that is, without distinguishing between interventions to avoid a depreciation from those intended to avoid an appreciation. Underlying this focus is the Mundellian framework in which these rigidities amplify real shocks, both positive and negative. But the direction of intervention is not irrelevant, for at least two reasons. First, the price rigidities that introduce a role for exchange rate adjustments are generally asymmetric as well: prices tend to adjust upwards much more easily than downwards. Second, the motivation of intervention (and possibly its effects) differs with its direction: the prevention of a depreciation may be geared to avoid financial distress or high inflation; the prevention of an appreciation may target an undervalued currency to gain competitiveness.

At any rate, whereas or the RR or Shambaugh classifications classify countries on the basis of exchange rate volatility, LYS looks additionally at the *absolute* value of interventions, ignoring their sign. So do Calvo and Reinhart (2002) in their *fear of floating* study, where they examine three intervention variables: the *absolute value* of changes in exchange rate, in reserves and in monetary aggregates. They define the typical intervention of a floater as the changes in these variables of some uncontroversial floats: Australia, Japan and the U.S., and then compare the intervention variables in specific emerging countries with those in the "model floats". They find that emerging countries (as well as some industrial ones like Canada) intervene much more heavily than the prototypic float, and attribute this to fear of floating.

[15] See Sturzenegger (2007) for a description and further references.

While the comparison is done based on symmetric measures, the motivation is clearly asymmetric. They argue that fear of floating responds to devaluation fears within economies with financial dollarization (FD) and a high pass-through (PT, which tends to be associated with FD), in the context in which a realignment of the exchange rate may lead to massive balance sheet losses of currency mismatched debtors, and to high inflation. This leads to a reaction function that is more responsive to depreciation pressures than to appreciation pressures –which according to this story entails no obvious policy concern.[16] In other words, the motivation for exchange rate policy –unlike the methodology used to characterize it– is clearly one sided.

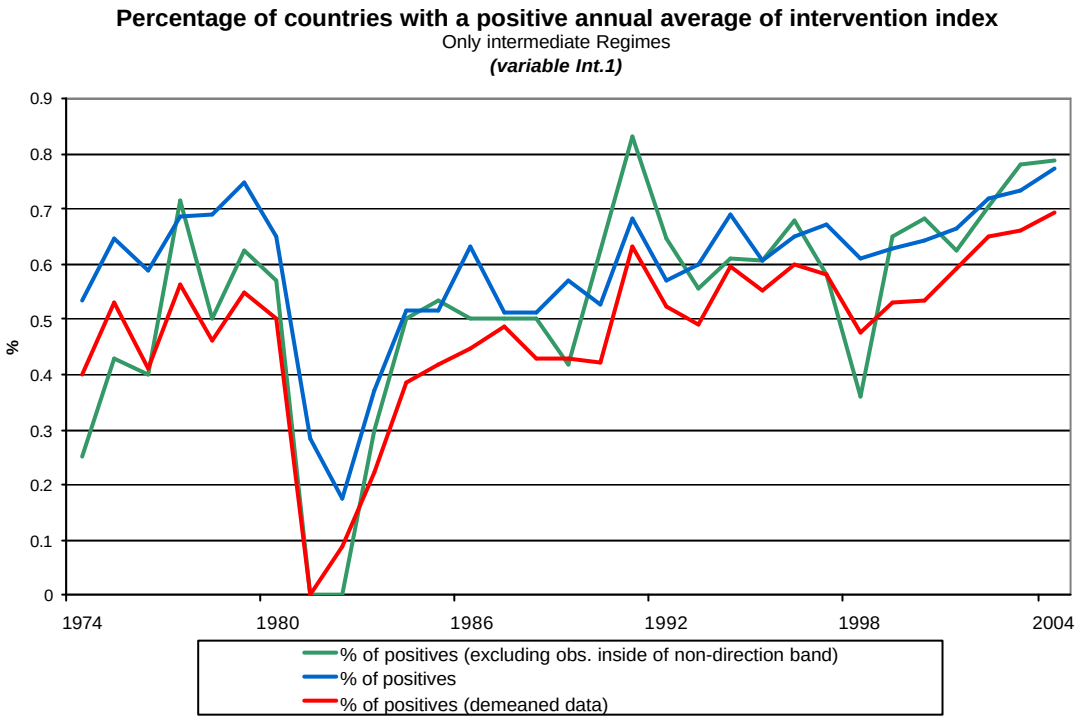
On the other hand, recent years have witnessed the increasing popularity of an alternative motivation for intervention connected to the traditional "mercantilist" objective of preserving international competitiveness through a depreciated exchange rate or, more generally, protecting growing economies from the adverse effect of an appreciating currency.[17] Again the purpose here is clearly asymmetric: only changes in one direction are a source of concern.

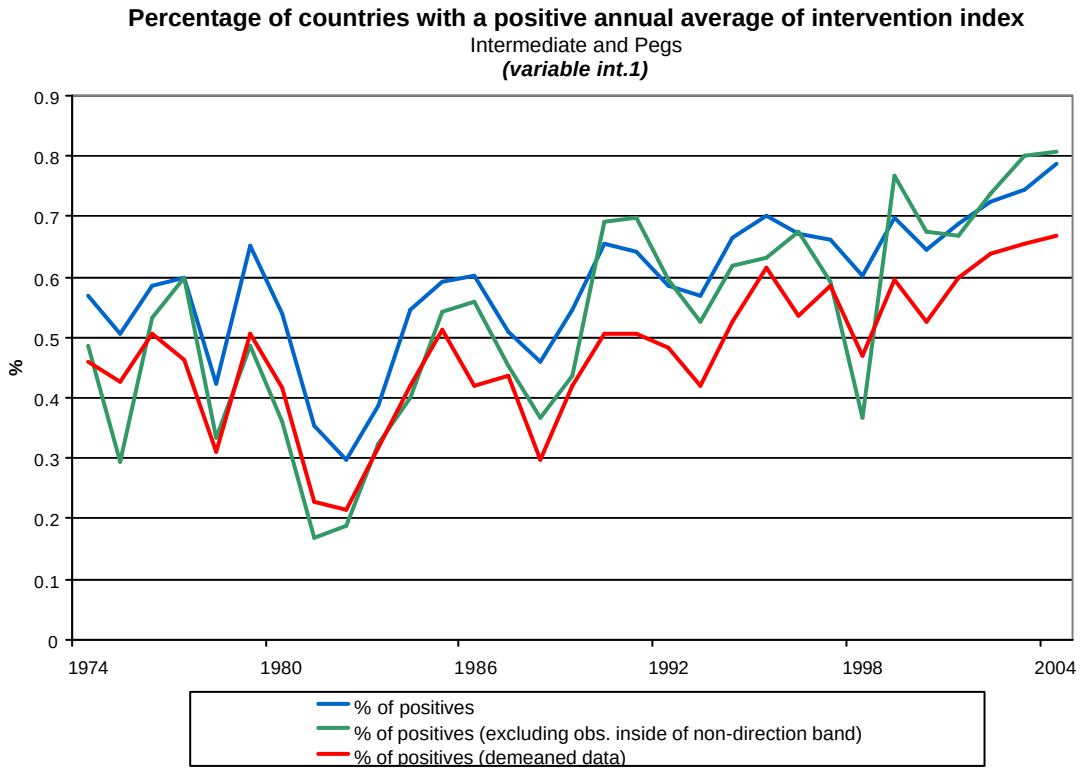
Both the fear of floating and the mercantilist stories call for a regime grouping that unveils this asymmetric effects and policy responses. Figure 6 shows that these asymmetries have evolved over the years, by indicating the share of intermediate regimes (alternatively, intermediates and pegs) that intervene purchasing reserves. As the figure shows, this share has changed dramatically (and predictably) over time. The debt crises years found most developing countries selling the foreign currency to defend their exchange rate anchors and avoid sharp depreciations, whereas in recent years (with the unsurprising exception of 1998) countries have increasingly intervened in the opposite direction. The same story emerges when the interventions are detrended (to factor out the positive intervention that may be associated with the long-run growth of output and monetary aggregates) and when small interventions are filtered out (with the cutoff defined as the 95% confidence interval of the distribution of interventions in benchmark floats Australia, Japan and the US). As it turns out, conventional "defensive" pegs associated with fear of floating represented in 2004 between 20% and 30% of the cases. This evidence has highlighted the comeback of proactive exchange rate policies, to which we will come back below.

[16] Unless policy makers believe that an appreciation increases the risk of a posterior devaluation.

[17] Aizenmann and Lee (2005) who test whether this motive explains the buildup or reserves, associate this view with the Bretton Woods II approach of Dooley, Folkers Landau and Garber (2003). But as we discuss below and is surveyed in Eichnegreen (2006) the mercantilist approach has a large tradition in development economics.

Figure 6 Direction of intervention



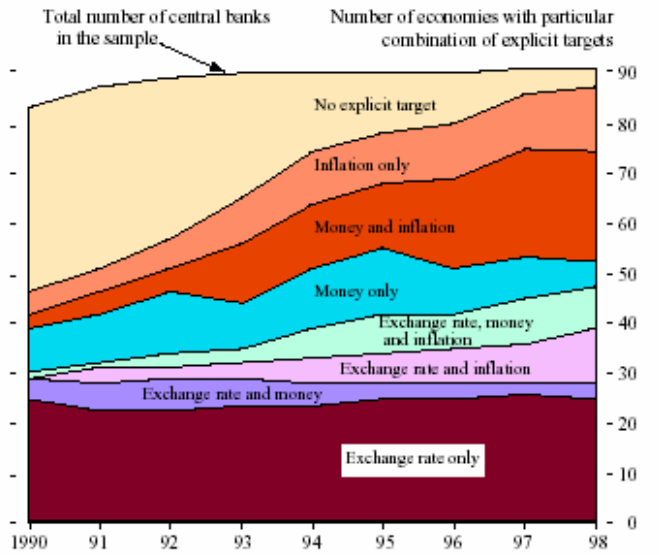


2.4. Monetary policy: from exchange rate anchors to inflation targeting

Since early 1970s, when the rise of inflation led to increased skepticism on the role of monetary authorities, a significant body of literature has framed the debate over monetary policy as that of choosing the appropriate nominal anchor, motivated in part by the concepts of time inconsistency and inflation bias.[18] Because it is typically accepted, even by New Keynesians, that there is no long run tradeoff between inflation and output, the goal of the anchor is intended to reduce inflation expectations and, in turn, ex post incentives to validate high inflation expectations through monetary expansions, thus facilitating the conduct of monetary policy through the usual intermediate targets (typically, monetary aggregates or the interest rate). As a result, monetary policy has been discussed as a tension between the credibility provided by an anchor, and the costs of the anchor in terms of a smaller degree of flexibility to respond to shocks. Finding a credible anchor that imposes minimum constrains on the ability to react to shocks has been dilemma at the core of the monetary policy debate to this day.

Table 1 above assigned anchors into four mutually exclusive groups: the exchange rate, the inflation rate, monetary aggregates and other miscellaneous regimes. Sterne (1999) provides a more nuanced classification, making sure to capture the overlaps usually observed in the choice of anchors. Figure 6, which shows the trend in regimes during the 1990s, illustrates how the weight of each anchor has changed over recent years. Casual inspection reveals a growing preference for explicit targets (in line with greater transparency in the conduct of monetary policy), and a declining incidence of monetary aggregates as the sole anchor (in line with a increasing preference for inflation targets).

[18] The seminal contribution on this front was Kydland and Prescott (1977). Calvo (1978) provided an alternative modelization, focusing on the time inconsistency problem of domestically denominated debt. The setup achieved textbook status with Barro and Gordon (1983). In later years the problem of time inconsistency led to an explosion of work focused on how policies should be framed to deal with it. See Rogoff (1985) on conservative central bankers, Backus and Driffil (1985) or Cukierman and Meltzer (1986) on reputation models; and Alesina (1988), Alesina and Summers (1993), Grilli, Masciandaro and Tabellini (1991), and Cukierman, Webb and Neyapti (1992) on the independence of the Central Bank,. The time inconsistency problem has been and is still a key feature of monetary policy debates, all the way through the current discussion on inflation targeting.



Note: Money targets include all targets for different definitions of money and credit.

Sources: Bank of England survey of monetary frameworks, Cottarelli and Giannini (1997), and IFS (various issues).

Note, however, that the regimes depicted in Figure 6 correspond to de jure statements on the objective of monetary policy. Very much in parallel with our discussion on exchange rate policies, there remains the question about whether these policies are implemented in reality –or, alternatively, about the nominal anchor used de facto by the monetary authorities. As before, an exchange rate anchor is easy to verified. A more complex problem arises with alternative anchors. Mishkin (2007) describes the problems with measuring monetary aggregates:

"Why did monetary targeting in the United States, Canada and the United Kingdom during the late 1970s and the 1980s not prove successful in controlling inflation? There are two interpretations … One is that monetary targeting was not pursued seriously, so it never had a chance to succeed. The Federal Reserve, Bank of Canada, and particularly the Bank of England, engaged in substantial game playing in which they targeted multiple aggregates, allowed base drift (the initial starting point for the monetary target was allowed to shift up and down with realizations of the monetary aggregate), did not announce targets on a regular schedule, used artificial means to bring down the growth of a targeted aggregate, often overshot their targets without reversing the overshoot later and often obscured the reasons why deviations from the monetary targets occurred."

A similar obstacle appears with inflation targeting (although it is seldom acknowledged by its promoters). As Mishkin and Schmidt Hebbel (2001) put it:

"Classifying country cases into inflation targeting and other monetary regimes involves subjective choices for two reasons. First, there is lack of full agreement on the main conditions and features of inflation targeting and how they apply during transition to low inflation … Second, some countries have used simultaneously inflation targets and other nominal anchors (the exchange rate and/or a monetary aggregate), particularly at their early years of inflation targeting. "

In addition, inflation targeters differ significantly on many dimensions: target price index, target width, target horizon, escape clauses, accountability of target misses, goal independence, and overall transparency and accountability rules.[19]

More generally, monetary policy comprises so many dimensions to take into account that any characterization of monetary policy remains exceedingly difficult and always controversial.[20] The problem is compounded in the developing world by the fact that, in most countries, the exchange rate is bound to play an important role even in the absence of an exchange rate target, particularly in inflationary contexts associated with exchange rate high pass-through due to dollar pricing, or dollarized financial sectors where exchange rate fluctuations may be contractionary rather than expansionary as predicted by the standard open macro models.

In the end, how can monetary policies in developing countries be characterized in an empirically useful way? Unlike exchange rate regimes, monetary policy cannot be easily identified by a few summary variables. If anything, de facto policies can be typified only by an analysis of the reaction function of the central bank. Hence, it is not surprising that no standard de facto classification has yet appeared.

[19] The options include, for the target price index: Core CPI, Headline CPI, Core excluding food, energy and indirect taxes, Core excluding regulated prices, and other similar variants. For target width the range is typically 2 to 3% and most countries have a positive floor for inflation except New Zealand and Thailand whose range starts at zero. The target horizon is typical one year but in many cases it is indefinite. Most countries do not have escape clauses but some do under fairly undefined circumstances. Accountability also differs. It is quite famous in New Zealand the provision that the Minister of Finance may ask for resignation of the Governor. Less drastic is the open letter to the Minister of Finance explaining the target breach in the UK.

[20] Consider for example that description that the IMF does of the Chinese monetary regime, an alleged monetary aggregate targeter: "On July 21, 2005, China announced a 2.1% revaluation of the renminbi-U.S. dollar exchange rate and a change in its exchange rate arrangement to allow the value of the renminbi to fluctuate based on market supply and demand with reference to an undisclosed basket of currencies. To permit a greater role for market forces in determining the renminbi exchange rate, steps have been taken since July 2005 to liberalize and develop China's foreign exchange markets, including the establishment of an over-the-counter spot foreign exchange market and markets for currency swaps and futures. From end-July 2005 to end-July 2006, the renminbi exchange rate was more flexible, but the fluctuation in the renminbi-U.S dollar exchange rate was less than the 2% range (for a three-month period) used in the IMF's de facto exchange rate classification system as an indicator for a conventional fixed peg exchange rate arrangement."

Box 3. Estimating the reaction function

In a first analysis of monetary rules, Bryant, Hooper and Mann (1993) concluded that policy rules typically conformed to the "stated dual objective of many central banks to achieve sustainable growth in real activity while avoiding inflation" (p. 225). In recent years there has been an active literature trying to estimate the policy reaction function of Central Banks, following Taylor's innovative (1993) description of a simple rule by which interest rates were adjusted in response to inflation changes and the output gap. Taylor suggested that the simple equation

$$i_t - p_t = r^* + 0.5(p_t - p^*) + 0.5(\ln Y_t - \ln \overline{Y}_t)$$

represented US policy fairly well[21]. Orphanides (2001a, 2001b) criticizes this rule on the basis that the information used is unavailable to policy makers at the time of the decision and suggests a rule based on information available at the time. Clarida, Gali and Gertler (2000) suggest that the Taylor rule has more to do with expectation of inflation and the output gap, and use an IV GMM procedure to estimate it, instrumenting future values of inflation and output on current and lag information. But do these Taylor rules depend exclusively on the inflation rate as suggested by Taylor or do they take into consideration other variables? In developing countries in particular, it is likely that the exchange rate plays an important role as well. Lubik and Shorfheide (2007) use Bayesian techniques to estimate the Taylor rules for four countries: the UK, Australia, NZ and Canada. They find that the UK and Canadian monetary authorities do care about nominal exchange rates[22]. This is not contradictory with inflation targeting per se, but it signals how complex the measurement of monetary policy is.

In spite of all the uncertainties about the specific nature of monetary policy, Mishkin (2007) argues that there are six consensus statements on monetary policy that have developed over the years: (i) there is no long-run tradeoff between output (employment) and inflation; (ii) expectations are critical to monetary policy outcomes; (iii) inflation is costly; (iv) monetary policy is subject to the time-inconsistency problem; (v) central bank independence improves the efficacy of monetary policy; and (vi) a strong nominal anchor is the key to producing good monetary policy outcomes.

This consensus has been reflected in some visible trends, particularly in middle-income countries with more developed financial sectors. *Pari passu* with the decline in the preference for official commitments with exchange rate targets, recent years have witnessed a growing preference for targeting the inflation rate directly. It is only natural that, as many country became increasingly de-dollarized, financial stability considerations became less relevant and fluctuations in the exchange rate grew less correlated with the inflation rate (pass-through fell), the benefits of the exchange rate anchor declined accordingly, paving the way to what some observers regards as a new Floating and Inflation Targeting (FIT) paradigm. By 2006,

[21] Svensson (1997) is the classical reference where IT rules are derived from an optimal program for the Central Bank.
[22] Ortiz, Sturzenegger and Talvi (2007) replicate this exercise for a large set of emerging countries and find that the exchange rate is typically an important actor in the Taylor rule.

25 developed and middle-income developing countries officially ran inflation targeting regimes in the context of freely floating exchange rates.[23]

However, the manifestation of FIT in the developing world is still far from the homogeneity implied by the term paradigm. Varieties of inflation targeting in a developing economy may differ from that of an industrial country. A simple example helps dilucidate the distinction between foreign exchange intervention and exchange rate targeting, and illustrates the severe identification problems associated with it. In developing economies with large pass-through or balance sheet concerns, one would expect that the central bank reacts to exchange rate fluctuations (either though interest rates adjustments or outright forex intervention) even in the absence of an exchange rate target. Moreover, in some cases, two regimes coexist: a FIT (or, more generally, a flexible regime with autonomous monetary policy) that tolerates moderate exchange rate movements, together with a de facto peg activated by substantial exchange rate realignments (see Box # 4).

Box 4. A minimalist FIT model for a developing economy

Consider the following reduced model of a small open economy under IT, based on the backward-looking framework in Ball (1999):

(IS) $y_t = -\beta r_{t-1} + \delta e_{t-1} + \lambda y_{t-1} + e_t$
(PC) $\pi_t = \pi_{t-1} + \alpha y_{t-1} + \gamma(e_{t-1} - e_{t-2}) + \mu_t$

where *r* is the real interest rate, *e* the (log) real exchange rate, *y* the (log) output gap, and π inflation.

To solve the model, we update (PC) two periods and impose an inflation target (which, without loss of generality, we can assume equal to zero), to obtain

(IT) $0 = E_t\pi_{t+1} + \alpha E_t y_{t+1} + \gamma E_t (e_{t+1} - e_t) + \mu_t$

Next, we update (IS) and (PC) one period and take expectations:

(IS1) $E_t y_{t+1} = -\beta r_t + \delta e_t + \lambda y_t$
(PC1) $E_t\pi_{t+1} = \pi_t + \alpha y_t + \gamma(e_t - e_{t-1})$

Finally, substituting (IS1) and (PC1) into (IT) and rearranging, we have the following equation (where the left hand side is referred to as the Monetary Conditions Indicator, or MCI):

(MCI) $\alpha\beta r_t - (\gamma + \alpha\delta)e_t - \gamma E_t (e_{t+1} - e_t) = [\pi_t + \alpha (1 + \lambda)y_t - \gamma e_{t-1}] + \mu_t$

[23] This does not include the economies of the euro zone, which target inflation jointly but are typically excluded from the float group.

The first, trivial thing to note here is that a change in the nominal exchange rate e demands a compensating change in r. In other words, monetary policy under IT cannot neglect exchange rate fluctuations. The reaction function and the direction of the policy response, however, would depend on a number of factors: the interest rate effect through domestic absorption ($\alpha\beta$), the pass-through of the exchange rate change to domestic prices γ, the effect of a depreciation on domestic demand, δ, and the link between the interest rate and the exchange rate, the equation needed to close the model.

For example, assuming uncovered interest rate parity, $E_t (e_{t+1} - e_t) = r_t - r^f_t$ (where r^f the international interest rate) implies that, in general, exchange rate changes would elicit a countervailing interest rate move in the opposite direction, as (IT) becomes:

$$(MCI1)\ r_t - \omega e_t = [\pi_t + \alpha (1 + \lambda) y_t - \gamma e_{t-1} - \gamma r^f_t] / (\alpha\beta - \gamma)$$

where $\omega = \gamma + \alpha\delta / (\alpha\beta - \gamma)$ which for very low pass-through ($\omega \sim \delta / \beta$) would be roughly equal to the tradables share of GDP.

However, interest rate increases that raise the exchange rate may be "inflationary" if the pass-through coefficient is too large ($\gamma > \alpha\beta$). Similarly, contractionary devaluations ($\delta < 0$) that may arise, for example, due to balance sheet effects in financially dollarized economies, may call for lower interest rates if $\delta < -\gamma/\alpha$. Finally, when the foreign exchange market is under speculative pressure, lowering interest rates would reduce the cost of shorting the domestic currency and fuel a run. In those cases, the authorities may choose to intervene directly in the forex market.

A succinct synopsis of the lessons from the new Keynesian economics would indicate that monetary policy should aim at offsetting the distortions introduced by sticky nominal prices: ideally, monetary policy should try to reproduce the outcome that would be achieved if nominal prices were flexible. In open economies with price stickiness relative prices change when the nominal exchange rate changes. Even if the FIT paradigm ultimately prevails, a policy of benign neglect of the exchange rate is difficult to conceive at the current stage: the characterization and identification of monetary policy should take this aspect into account.

3. Why do we talk about MERP?

The first variable that comes to mind when talking about development and, more generally, macroeconomic performance, is real per output growth. There is, indeed, a body or work that has directly examined the direct link between MERP and growth from an empirical perspective. As can be readily seen from the succinct review presented in Table 3, while exchange rate policies are often found not to be significant for industrial countries, there is no basic agreement in the case of developing economies.

Why are these results so different? One could think of several reasons. First, regime endogeneity: for example, peg failures are often recorded as intermediates or floats; more generally, most classifications do not control for crisis episodes in which the behavior of exchange rates and reserves ceases to reflect a regime choice. Second, regime flexibility is usually measured as exchange rate variability, as was discussed above, which often leads to an association with bad economic outcomes (rigid regimes under attack are often coded as floats; stable floats are often dropped or coded as intermediate or pegged regimes).[24] Third, lack of complete information on intervention variables (even in classifications that do control for policy intervention, the focus on reserves captures exchange rate policy only imperfectly, as it leaves out other intervention mechanisms such as open market operations –interest rates– and currency derivatives as well as the incidence of capital controls).

However, rather than endorsing the view that no general conclusion can be drawn from existing studies, we believe that the emphasis needs to be placed in a critical methodological drawback faced by the overall exchange rate policy agenda: the limitations of "reduced" form tests that conflate a variety of channels into one linear relation between MERP and economic performance. By contrast, a quick look at the analytical literature reveals the complexity of specific channels that may account for a link in the first place –where their relative importance depends, additionally, on country characteristics–, many of which work in opposite directions, rendering the finding of a significant link between long-run growth and exchange rate policy an uncertain empirical outcome.[25]

In this light, to get a better understanding of the economic implications of MERP we need first to identify the multiple *channels* through which it may ultimately have an effect on growth (or, more generally, on the policy objectives listed above), and examine the evidence on those channels individually. With this in mind, next we draw a stylized map of the direct and indirect impact of MERP on development goals, which we then use to orient the discussion of the empirical literature.

[24] Points (i) and (ii) suggest a potential bias of classifications based on exchange rate variability to find flexibility associated with bad outcomes –and an opposite bias for codings where flexibility is associated with no policy intervention..
[25] The growth literature in general has been usually criticized along these lines.

Table 3. Some results on the effects of exchange rate regimes

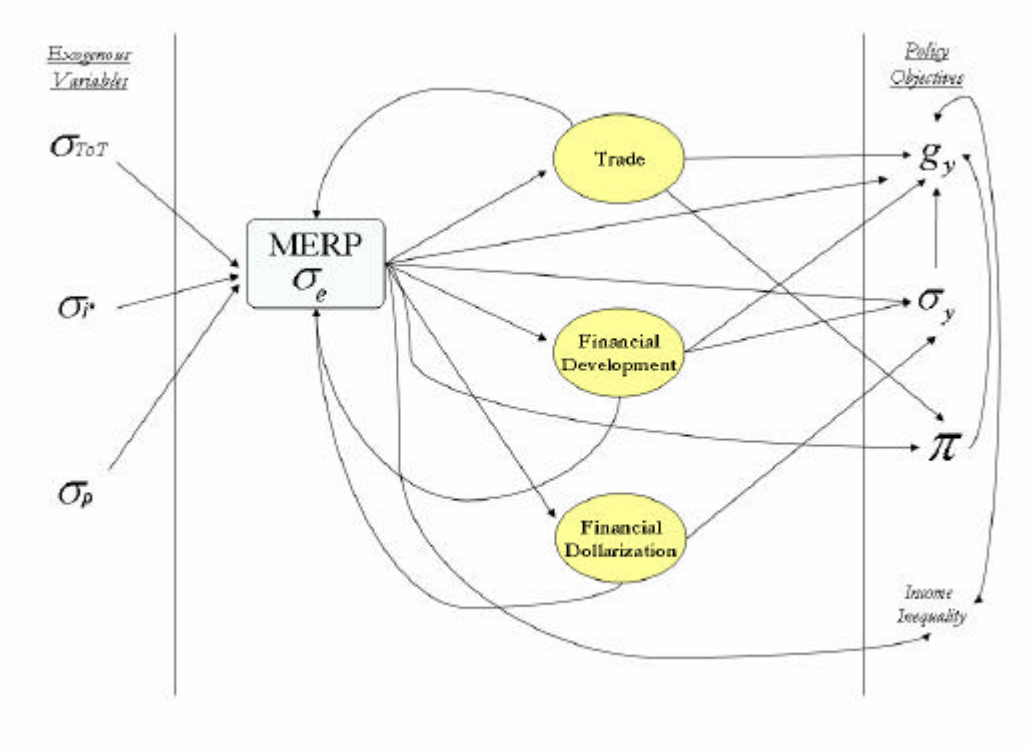
Study	Estimation method	Sample period	Key results
Ghosh, Gulde, Ostry, Wolf (GGOW) (1997)	OLS panel data, two-stage instrumental variables	1960-1990	GDP growth was not affected by (de jure or de facto) regimes.
Levy-Yeyati, Sturzenegger (LYS) (2001)	two-stage instrumental variables	1974-1999	No significant links for industrial economies. For non-industrial economies, pegs associated with slower growth.
Bailliu, Lafrance, Perrault (BLP) (2003)	GMM panel data	1973-1998	Pegged regimes grow by about one-half percentage point faster than floats and about one percentage point faster than intermediate regimes. Regimes with anchors and pegged regimes grew faster than regimes (floats and intermediates) without anchors.
Levy-Yeyati, Sturzenegger (LYS) (2003)	two-stage instrumental variables	1974-2000	For aggregate of all economies, growth for intermediate regimes and pegged regimes was about 1 percentage point and 0.8 percentage point, respectively, below growth under floating. Controlling for endogeneity, growth under pegs was about 2 ½ percentage points below floating, while for intermediate regimes there was little difference from floating. Application of separate regressions to industrial and developing countries showed little impact of regime for former group, while for developing countries less-flexible regimes were associated with slower growth.
Ghosh, Gulde, Wolf (GGW) (2003)	OLS panel data, fixed effects, two-stage instrumental variables	1970-1990	Compared with floats, growth was as about 3.3 percentage points higher under intermediate regimes and 2.5 percentage points higher under pegs. Attributed this result to the fact that their coding tends to drop floats with stable exchange rates.
Rogoff et al.(2004)	OLS panel data, fixed effects	1970-1999	For developing economies, real growth appears to decline with increased flexibility; for emerging markets, no evidence of a link between regimes and growth is found. For advanced economies, growth rose with increased flexibility.
Dubas, Lee, Mark (2005)	Random effects	1971-2002	For all countries, pegged regimes grew a bit more than one percentage point relative to floats. The difference between floats and intermediate regimes was not statistically significant. For industrial countries, regime dummies were not significant. For non-industrialized economies, pegs grew 1.3 percentage points more that floats, but there was no statistically-significant difference between floats and intermediates.
De Grauwe, Schnabl (2005)	For inflation: GMM panel data for growth: GLS	1994-2004	For de jure regimes, no clear association with growth. Using de facto coding, pegged rates were associated with higher growth.
Aghion, Bachetta, Ranciere and Rogoff (2006)	GMM panel data	1970-1999	Pegs are associated with slower growth for not financially developed countries.

3.1. The big picture

To organize our discussion of the vast literature on the effect of MERP that will allow to inform our policy discussion it is useful to distinguish the multiple direct and indirect effects identified in the related literature, and their various interactions. At the risk of being excessively schematic, we can distinguish the following: (i) direct effects on some of the policy variables mentioned in the introduction (for example, from exchange rate anchors on inflation expectations and, in turn, inflation rates or by affecting how the economy responds to exogenous conditions and shocks, for example, through the benign effect of exchange rate flexibility on the output response to real shocks and, in turn, on output volatility; and (ii) through the links between MERP and "intermediate variables" that are not the policy objectives themselves but that have been portrayed in the literature as having an effect on some of the policy objectives, for example, the link between exchange rate stability and trade, where the latter –has been argued– may affect growth.[26] Figure 8 summarizes the different nexus to be explored in this section (i^* represents international risk-free interest rates, ρ stands for the sovereign risk premium, e denotes the exchange rate, g_y and σ_y are output growth and volatility, and π is the inflation rate).

[26] Note the similarity with Kose et al (2006) , where a similar distinction is used to characterize another nominal-real connection: financial integration and economic performance. [This will probably be also in the Handbook.]

Figure 8. Direct and Indirect Links



On the left-hand side, we have the exogenous shocks (real, such as variations in international prices that lead to changes in the terms of trade; or financial such as changes in global liquidity or global risk aversion that drive cross-border flows and the country's cost of capital). On the right-hand side, we have the four policy objectives of economic development: output growth, (low) output volatility, (low) inflation and equity. In the middle, we have the choice of MERP, which affects policy objectives directly (modifying the impact of exogenous shocks on policy objectives), and indirectly (affecting intermediate variables that may, in turn, have significant consequences for some of the policy objectives.[27] The rest of this section surveys the relevant contributions to the study of each of these channels.

3.1.1. The link between ERR and growth revisited

[27] These objectives may interact among themselves: Output volatility may be associated to (lower) output growth, (high) inflation may be associated with (lower) growth, and equity and growth growth may affect each other (an old debate dating back to Kuznets's inverted U curve hypothesis). This survey, however, will not deal specifically with these complex interactions.

We start with the most significant link in reference to the objectives of this handbook, the relation between exchange rate and monetary policies and growth. We reviewed above a recent empirical literature that attempts to measure the link between exchange rate regimes and growth. However this literature is silent on the mechanisms.

A first point to clarify is the difference between the effects of the exchange rate regime and those of a change in the exchange rate level. Interestingly, whereas much of the recent literature reviewed above had dealt with the first channel, historically it has been the second that has been at the center of the development policy debate. We review both in turn.

Several hypotheses have been presented on why the regime may be related to growth. Some channels have to do with global factors and others with domestic ones. At the global level, fixed exchange rates were viewed as one of the important drivers behind the development of international financial markets at the end of the XIXth century. Johnson (1956) provides an early defense:

"The advantages of a single currency within a nation's frontiers are, broadly, that it simplifies the profit-maximizing computations of producers and traders, facilitates competition among producers located in different parts of the country, and promotes the integration of the economy into a connected series of markets, these markets including both the markets for products and the markets for the factors of production (capital and labor). The argument for fixed exchange rates, by analogy, is that they will similarly encourage the integration of the national markets that compose the world economy into an international network of connected markets, with similarly beneficial effects on economic efficiency and growth."

More recently, alternative mechanisms have been identified. For example, the Mundellian paradigm suggests that fixed regimes tend to magnify real shocks. In turn, to the extent that volatility deters long=run growth, fixed regimes are likely to deliver a weaker economic performance. Gavin and Hausmann (1996), Ramey and Ramey (1995), Aizenman and Marion (1999), and Caballero (2000), among others, provide evidence on the link between higher volatility and lower growth.

Others have suggested that fixed exchange rates tend to create exchange rate misalignments and lead to speculative attacks and sharp crises resulting over the years in lower growth performance: here, the growth effect comes from a higher propensity to suffer an economically costly crisis event. Aizenman and Glick (2005) and Kuttner and Posen (2001) have both found that the harder and longer the peg, the larger are

the depreciations upon exiting. This is to be expected: long standing fixed exchange rates are often associated with a stronger commitment to the peg, which in turn calls for more unfavorable conditions in order for the government to let go.

At any rate, the literature has not emphasized so much the link between regimes (exchange rate flexibility) and growth as the one between the *level* of the exchange rate and growth. In fact, a recent literature has recovered a theme that has been discussed extensively in the history of financial markets: the use of undervalued exchange rates to stimulate economic growth. This is a view that goes back to Meade (1951) and Friedman (1953)[28] Eichengreen (2007), for example, argue that the undervalued exchange rates implemented by the Bretton Woods agreement were a key driver of Europe's recovery in the post war period. Ohkawa and Rosovksy (1973) and Eichengreen (2007) argue along the same lines for the case of Japan. This mercantilist view that exchange rate policy –more precisely, a temporarily undervalued currency– could be used to protect infant industries as a development strategy has a long tradition in economic theory and have recently enjoyed a minor revival.

A somewhat related story is provided by Hausmann and Rigobon (2003), who argue that the volatility of exchange rates may induce an under-specialization in tradables that hurts growth performance. The argument is that volatile real exchange rates makes production in the tradable sector more risky relative to nontradables (as nontradables investment declines, their price increases partially insulating the sector from the negative shock). The implicit assumption is that growth opportunities are concentrated in tradable sector. The same assumption is made by Hausmann and Rodrik (2003) to argue in favor of a depreciated exchange rate to foster innovation.[29]

Empirical evidence on the relation between the level of the exchange rate and growth has been reported in a number of recent pieces. Hausmann *et al* (2005) find that depreciated real exchange rates and trade growth are important components of growth accelerations; Johnson, Ostry and Subramanian, (2006) show that persistent overvaluations tend to be associated with poorer growth. Moreover, the effects of under and overvaluation have been invoked to explain the "Dutch disease" effect of foreign aid (Rajan and Subramanian, 2006) the disappointing growth dividends of financial integration (see Prasad, Rajan and

[28] See also Dornbusch, 2001; Kenen, 2002, etc

[29] As a result a competitive exchange rate has been regarded as an "efficient development tool "(Rodrik, 2006a). The assumption that technological innovation is faster in the tradable sector may not necessarily be correct.

Subramanian, 2006), or the positive correlation between reserve purchases, investment and growth (Levy Yeyati and Sturzenegger, 2007). However, neo-mercantilist views have been saluted, at best, with skepticism.[30]

3.1.2. ERR and output volatility

The relation between the exchange rate regime and output volatility is also a channel with a long tradition in international finance, and one of the key links underlying the debate on optimal currency areas. It involves understanding the role played by the exchange rate as shock absorbers: under floating exchange rates the economy has a greater ability to adjust to "real" external shocks whereas fixed exchange rates have a larger ability to absorb "nominal" shocks.[31]

[30] Neo-mercantilism as a deliberate policy decision has also been under dispute. For example, Aizenman and Lee (2005) argue that the evidence on reserve accumulation favors prudential over mercantilist motives. There is a literature on overvaluation-misalignments and growth: Razin and Collins (1997), Aguirre and Calderón (2005), Aizenman and Lee (2005), Dollar (1992), Sachs (1985).

[31] A view that goes back to Meade (1951) and Friedman (1953) (see also Dornbusch, 2001; Kenen, 2002; etc)

Box 5. Exchange rates, volatility and the nature of the external shocks

Calvo (1999) provides a minimum framework to understand the mechanics. Imagine a simple demand determined output equation (this could be interpreted as the traditional "IS" curve)

$$y = ae + u \qquad (1)$$

where y is output, e is the exchange rate, a a parameter and u a random shock, and a money demand equation (which could stand for the traditional "LM" curve)

$$m = y + v. \qquad (2)$$

Here m is the stock of nominal money and v a liquidity shock. Consider two polar cases: fixed exchange rates where e is constant and y and m endogenous, and a floating regime where m is exogenous and e and y are endogenous. In the first case output is determined by (1) and in the second by (2). If so, under fixed rates

$$s_y^2 = s_e^2$$

and

$$s_e^2 = 0,$$

whereas under float

$$s_y^2 = s_v^2$$

and

$$s_e^2 = \frac{1}{a^2}\left(s_u^2 + s_v^2 + 2r\, s_e s_e\right).$$

Testing the response of fixed and flexible exchange rates to different types of shocks has received some attention in recent years. Empirically, the trigger of choice is often a real shock (terms of trade, external demand, natural disasters, etc.) and the tests examine whether more flexible ERP mitigate the output response, reducing output volatility for a given exposure to shocks as a result. The premise is that, if nominal prices are (primarily downward) inflexible, floating regimes should make up for (primarily negative) real shocks.

Edwards and Levy Yeyati (2005) analyze empirically the effect of terms of trade shocks on economic performance under alternative exchange rate regimes. They estimate a two equation model, one with the equilibrium growth rate and another describing the process of adjustment to this rate. They test if the response of the adjustment of the growth rate is different for floating and fixed regimes. They find evidence suggesting that terms of trade shocks get amplified in countries that have more rigid exchange rate regimes. They also find evidence of an asymmetric response to terms of trade shocks: the output response is larger for negative than for positive shocks.

Broda (2001) tackles the same question, using a VAR model to compute the way in which terms of trade shocks affect growth. He finds that the (negative) effect of a 10% deterioration in the terms of trade has a greater negative effect on growth under fixed than under flexible exchange rate regimes.

Ramcharan (2005) looks at the problem by exploiting the randomness of natural shocks. His evidence supports the idea that adverse natural shocks are associated with higher investment and FDI in countries with fixed regimes, but that the recoveries appear to be faster in such countries as well. So his results combine two effects: the stability dividend of pegs in otherwise volatile countries, and the benefits of greater exchange rate flexibility in floating regimes in the event of an exogenous shocks reported in Broda (2003, 2005) and Edwards-Levy Yeyati (2005).

3.1.3. MERP on income distribution

There is not much of a debate on the relation between the exchange rate regime and income distribution beyond perhaps the large literature on the adverse distributive consequences of inflation.[32] To the extent that floating regimes are characterized by higher inflation rates (as we discuss later in the section), one could assign a regressive bias to more flexible regimes. However, this connection has seldom been made.

More attention has received the link between the *level* of the exchange rate and income distribution. The early reference is Kalecki´s (1939) analysis of the effects of a devaluation in an open economy, according to which a depreciation would not necessarily increase aggregate demand because it would reduce the share of wages in output (and thus the income of those with a larger propensity to consume). This point was later taken up by Díaz Alejandro (1965) who provided a careful analysis of the link of a depreciated

[32] See xxxx

real exchange rate with poverty and inequality. Diaz Alejandro's setup had in mind a country exporting food-biased commodities where landowners –the beneficiaries of the depreciated real exchange rate– had a large expenditure share of imported goods –in contrast to workers whose real wages fall with the real value of the local currency. In Diaz Alejandro's world, a depreciation redistributed income from workers to landowners reducing aggregate demand and inducing a contractionary devaluation.

At the conceptual level several caveats could be mentioned regarding Diaz Alejandro's original argument. First, it included a very restrictive class of beneficiaries –in modern societies the benefits of a real depreciation may be more widespread. Second, if an economy is subject to nominal wage rigidities a devaluation may allow to reduce this constraint leading to an expansion in employment with beneficial income distribution effects. Finally, in Diaz Alejandro's story resources transferred to the landowners/capitalists made their way to consumption abroad, rather than to the domestic financial sector that channels them towards investment activities at home –as assumed by Aghion et al, (2006) where the extraordinary profits due to the depreciated currency increases the liquidity of financially constraint local firms, enhances their access to finance, rendering devaluations expansionary.

At any rate, there has been relatively little empirical work testing this hypothesis. Edwards (1989) finds that devaluations reduce the real wage with little impact on the labor share. Levy-Yeyati and Sturzenegger (2007) revisit the issue and find that interventions aimed at depreciating the currency reduce the labor share, as well as unemployment. More generally, the literature has explored how output volatility (particularly, output contractions) and inflation affect income distribution and poverty, an indirect channel examined later in the chapter.

3.1.4. MERP on price stability

The use (and benefits) of exchange rate anchors have typically been associated with what could be broadly referred to as a "deficit in monetary credibility", which manifests in high inflation expectations, inflation inertia (backward indexation to past inflation), and a low impact of monetary policy announcements. Underlying this credibility story there is a time inconsistency argument, by which high inflation expectations induce high inflation equilibria with steep nominal interest rates that, in turn, make it optimal

for the government to dilute its debt burden through inflation, generating an inflation bias.[33] In this case, the use of an exchange rate anchor may make dilution more costly, to the extent that abandoning the anchor entails some (political or economic) reputation cost, playing the role of a partial commitment mechanism.[34] [35]

Exchange rate anchors present an additional advantage, namely, that of an expectations coordinator. In high inflation economies, it is not unusual to partially index prices to the exchange rate (typically vis a vis the dollar). Therefore, an exchange rate anchor could trade forward indexation to the announced exchange rate for backward indexation to past inflation –that is, inasmuch as monetary policies are kept in line with the targeted inflation path. Canavan and Tommasi (1997) make this point. They explain the link between an exchange rate anchor and discipline with a model that assumes that the public can monitor the nominal exchange rate more easily than it can the other variables. In their game of incomplete information with imperfect monitoring, they show that serious stabilizers prefer more visible anchors, such as the nominal exchange rate even when fixed exchange rates have some costs, such as diminished capabilities to respond to external shocks.

From an empirical perspective, the literature has focused on the link between exchange rate regimes –and, in particular, varieties of exchange rate anchor such as (crawling) bands and pegs– and the inflation rate.[36] Overall, there seems to be agreement on the fact that pegs are associated with lower inflation. However, the direction of causality and, more importantly, the duration of the effect are more controversial.

Among the many qualifications raised by these studies, perhaps the most troubling is the well-known fact that failed pegs tend to collapse to floats, which in imperfectly specified tests may result in a spurious association between floating exchange rates and high inflation rates. Intuitively, in the long run, pegs not

[33]The time inconsistency version of the inflation bias has a long tradition in international finance that builds on work for closed economies: Kydland and Prescott, (1977), Calvo (1978), Barro and Gordon (1983), Rogoff, (1985), Walsh (1995), Persson and Tabellini, (1993) and Svensson (1995). For open economies, see Giavazzi and Pagano (1988), Obstfeld (1996).

[34] Some authors have suggested that the channel may work in the opposite direction: flexible rates provide more credibility. That is the argument, for example, in Tornell and Velasco (2000), on the basis that fiscal mismanagement implies costs in the long run under fixed regimes but is immediately apparent when exchange rates are flexible. If policy makers are impatient, the latter implies that flexibility entails the largest incentives for consistent fiscal behavior.

[35]As we will discuss below, hard pegs represent the extreme example of this line of reasoning, increasing exit cost in an number of ways (attaching a legal framework to the peg, fostering the use of the peg currency, and even eliminating the national currency in the case of unilateral dollarization).

[36]See. i.a., Ghosh et al. (1997, 2003); LYS (2001), Rogoff et al. (2004); and De Grauwe and Schnabl (2005). This suggests that countries with higher pass-though coefficients will tend to benefit the most from the immediate impact of the anchor on inflation expectations –and explains why they were its most active promoters.

only may discipline monetary policy; they are also endogenous to it, as they cannot be sustained in the face of persistently high inflation. This may explain why a closer inspection indicates that only long-lasting pegs are significantly linked to low inflation levels in the long run (LYS, 2001). Ultimately, the effectiveness of an exchange rate anchor is always debatable, as it depends on the policy maker's ability to reign in the fiscal deficit and, if that is not fully achieved, his willingness to refrain from monetary financing.[37]

As noted, besides the disciplining effect of a peg on monetary policy (associated to the reputation cost of breaking the commitment) that could be measured directly on the evolution of monetary aggregates, there is the effect on inflation expectations once monetary policy is already factored in, an effect that may be estimated, for example, by controlling for the presence of a peg in a standard monetary equation, the most commonly used approach found in the literature. This expectations channel introduces an intrinsically temporary effect on inflation that has been supported by the empirical data (LYS, 2001; Ghosh et al. 2003). Important in this regard is the presence of a high exchange rate pass through, as a result of partial dollar indexation –which, as noted, tends to arise in environments with chronic inflation.[38]

3.1.5. Indirect links: The integration channel

There is vast body of work on MERP (more specifically, exchange rate regimes and exchange rate volatility) on economic integration (more specifically, bilateral trade and, to a lesser extent, cross-border capital flows, including foreign direct investment). This literature is largely based on the well-known premise that the incidence on transaction costs of currency conversion (which includes not only bid-ask spreads but also currency risk due to potential losses from exchange rate variations) plays the role of an implicit barrier for international transactions between countries using different currencies. The findings, mostly based on gravity models, point at a positive but small effect of exchange rate stability on trade.[39]

Also based on the gravity model is a stream of this literature that became popular with the lead up to the launch of the euro in the late 90s, which focused on the trade effects of a monetary union, particularly

[37] However, there seems to be some evidence on the effects of hard pegs on fiscal discipline. Ghosh, Gulde and Wolf (1998) and Culp, Hanke and Miller (1999) argue that countries on currency boards tend to run tighter fiscal policies, whereas Fatas and Rose (2000) find that currency boards are associated with fiscal restraint (although, somewhat surprisingly, this restraint does not carry on to unilaterally dollarized economies or to members of a monetary union).
[38] See, i.a., Taylor (2002) for an analytical model, and Goldfajn and Werlang (2000) for an empirical discussion.
[39] Among many others, see Thursby and Thursby (1987), DeGrauwe (1988), and Brada and Mendez (1988) and Parsley and Wei (2001).

since Rose (2000) argued that the average increase in bilateral trade due to the adoption of a common currency was of the order of 200%. These findings have since been greatly qualified for a number of reasons that included lack of representativeness (results were based on common currency pairs that include subnational entities with historical and political links with the issuer of the currency, and could hardly be extrapolated to real independent countries) and endogeneity (a common currency was more likely to be adopted in the presence of strong trade links).[40] At any rate, subsequent estimates by Rose himself later placed the number between 100% (Glick and Rose, 2002), and 50% (the estimate for the trade effect of the euro reported in Rose and Van Wincoop, 2001).[41]

Underlying these analyses was the Optimal Currency Area (OCA) precept that, in addition to removing transactions costs, a monetary treaty, by preventing competitive devaluations, fosters foreign direct investment and intra-industry trade. Interestingly, though, most of the related empirical literature is based on common currency pairs that do not belong to a monetary union, but rather would fit in the unilateral dollarization group. Moreover, more recent estimates using actual monetary union data (specifically, data from the European Monetary Union to measure the effect of the adoption of the euro) go as low as 5%-10% (Micco et al., 2003) and 4% (De Nardis et al., 2007), or even zero (Berger and Nitsch, 2005).[42]

The influence of MERP on FDI flows is more scantily documented. There seems to be some effect from hard pegs (currency boards or the unilateral adoption of a common currency)[43] For example, De Sousa and Lochard (2004), using data for EMU, find a strong link between the adoption of the euro and the increase in intra-EMU FDI flows.[44]

In sum, while the order of magnitude of the integration channel is still under dispute, the existing evidence appear to support the view that, when measured in medium-sized countries, the effect is positive and small (for the trade channel, much smaller than originally argued), particularly in those cases in which integration has already been achieved by other means such as trade agreements or investment treaties.

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[40] See Barro and Tenreyro (2007), and Persson (2001) among others. Frankel (2005) provides a defense of Rose´s results in the face of these criticisms.
[41] Rose's (2004) meta analysis of 34 previous studies yield an estimated increase of between 30% to 90%.
[42] See also Klein (2002), who in related work contends that the trade effect of unilateral dollarization does not differ significantly from that of a conventional peg.
[43] See Wei and Choi (2002). It has to be noted, however, that their result is subject (albeit to a lesser extent) to the a sample problem similar to that plaguing the early literature on common currencies and trade: apart from a few currency board countries, the rest of the hard peg group is comprised of very small economies and subnational entities.
[44] There is, in addition, a literature documenting the complementary link between trade and FDI (Lipsey and Weiss 1981; Svensson, 1996; Clausing, 2000).

3.1.5.1. The effects of integration

Covering here the implications of increased trade openness on our policy variables would take us beyond the route map of the chapter. Let us just mention here the benign effect of trade on inflation originally suggested by Rogoff (1985) and tested empirically by Romer (1993), who found that more open economies tend to have lower inflation rates due to the disciplining effect of international competition on domestic prices, particularly in the context of imperfectly competitive local markets.[45]

Less conclusive results are offered by the literature documenting the impact of trade openness on output growth. A number of studies argue that trade has a positive effect on growth (Ben-David, 1993; Sachs and Warner, 1995; Frankel and Romer, 1999) and productivity (Edwards, 1998; Alcala and Ciccone, 2004). In turn, Frankel and Rose (2002) directly attempt to estimate the indirect effect from MERP to growth through the trade channel: they combine the positive impact of a common currency on bilateral trade (which, in line with earlier gravity results, they estimate that leads to a 100% increase in bilateral trade), with what they find to be a positive effect of trade openness on growth, to estimate an economically important impact of monetary integration on output growth.

However, the growth dividend from trade have been contested in recent work (Rodrik and Rodríguez, 2000; Rodrik et al. , 2004).[46] Similarly, while Lee, Ricci, and Rigobon (2004), in response to Rodrik and Rodríguez (2000), apply identification through heteroskedasticity –a methodology developed by Rigobón (2000)– to find that openness has a positive –albeit small– effect on growth, Rigobon and Rodrik (2004), using the same methodology, find that openness has a negative impact on income levels. In sum, whereas the conventional wisdom tends to view trade as beneficial for growth, the empirical evidence has been less supportive[47].

[45] Terra (1998) provides a critical view of this result, suggesting that it confounds the effect of openness with that of the debt crisis.

[46]The main caveats raised by this literature are problems of mismeasurement and omitted variables. As Rodríguez and Rodrik (2000) put it, "the indicators of openness used by researchers are poor measures of trade barriers or are highly correlated with other sources of bad economic performance."

[47] Broda and Weinstein (2006) have argued that the increased variety in trade leads to significant undermeasurement of import price indices, suggesting that the welfare gains may be larger than anticipated. Based on an analysis of the share of income spent on food, and an estimate of Engel curves, Chamon and Carvalho (2006) also argue that the gains from trade are larger than typically measured. They apply this methodology to Brazil and find that as a result of trade liberalization real income growth was closer to 4.5% per year rather than the official 1.5%.

One area that has received increasing attention lately is the influence of financial and trade integration (often embedded in the broad term 'globalization') on output and consumption volatility. Here the profession appears to coincide: while industrial countries seem to benefit from financial integration, non-industrial countries exhibit an increase in output and (particularly) consumption volatility as a result (O'Donnell (2001); Kose et al. (2003)).[48] The findings of these papers are more benign for the case of trade links, which are found to weaken the impact of macroeconomic volatility (Kose et al., 2003) and to increase the business cycle correlation between trade partners due to the propagation of demand shocks through external demand and intra-industry trade (Frankel and Rose, 1998).

In addition, a group of recent papers (Calvo et al., 2005; Cavallo and Frenkel, 2004) argue that trade reduces output volatility through its benign effect on financial crisis propensity in financially dollarized economies: the real exchange rate adjustment in the event of a capital account reversal is smaller in more open economies, leading the more limited balance sheet effects. This channel, it follows, would disappear as financial dollarization phases out.

3.1.6. Indirect links: The financial channel

MERP has been associated to financial development through two distinct channels. The first one related to the consequences of exchange rate instability on cross-border flows and effective financial integration, which we discussed above. A second one deals with domestic markets, and documents the costs of nominal instability (moderate to high inflation, even if it is predictable) in terms of the demand for local assets and the deepening of local financial markets (Boyd, Levine, and Smith, 2001; Khan, Senhadji, amd Smith, 2006)[49].

More recently, a third channel has come to the foreground in the context of financially integrated developing countries, namely, the implications of exchange rate regimes (most notably, pegs) on the degree of financial dollarization, where the latter is defined as the use of a foreign currency to denominate

[48] See also Chapter NN in this volume for a more detailed survey.

[49] Neumeyer (1991) constructs an incomplete market model that suggests that what is key in reducing the size of markets is the volatility of inflation, as large changes in the inflation rate imply very large real payments on nominal contracts thus making them unfeasible.

financial assets and liabilities held by residents. In a nutshell, this literature points to four potential aspects that may make a peg more conducive to the use of a foreign currency in financial transactions.

The first one, starting from the assumption that risk-averse resident investors choose their asset portfolio to optimise the real risk/return profile (in terms of the local consumption basket), argues that the currency composition (and, in particular, the dollar share) of domestic savings and loans depend on the volatility of inflation relative to that of the real depreciation rate (Ize and Levy Yeyati, 2003). If so, a mix of flexible exchange rates and low inflation should minimize dollarization incentives. By contrast, an exchange rate anchor in a context of high and volatile inflation expectations would have the opposite effect.

The second channel is associated with the so-called "peso problem" (a large local currency interest rate premium due to persistent devaluation expectations) typically associated with imperfectly credible exchange rate anchors. In the presence of non-linear liquidation costs, the currency composition of debt is optimally chosen to minimize the probability of default and liquidation. Thus, if the devaluation threat is large but unlikely, the borrower may opt for the less costly dollar funding: if peso interest rates are such that peso borrowers default in the absence of a devaluation that dilute their debts, the borrower may prefer to take his chances with currency risk (Jeanne, 2005).

A third explanation attributes the dollarization bias to the presence of externalities that generate the perception of implicit debtor guarantees (Burnside et al., 2001). To the extent that the social cost of massive bankruptcies following the collapse of a peg makes a debtor bailout ex-post optimal for the government, borrowers would anticipate this bailout and underprice currency risk accordingly. This implicit guarantee highlights the time inconsistency of the government's promise to limit its involvement in the resolution of a systemic financial crisis.[50]

Finally, a fourth channel linking MERP with dollarization relates to financial regulation. Again, in the case of an exchange rate anchor, a currency-specific regulation that recognizes the higher risk of dollar intermediation would be at odds with the anchor undermining its credibility. Conversely, a currency-blind

[50] The argument goes beyond the case of bailouts: any implicit debtor insurance, to the extent that defaults are correlated with the real exchange rate, would favour dollarization. For example, the accumulation of international reserves may fuel the dollarization of the banking sector, if they are perceived by commercial banks as increasing the probability that the central bank provides dollar liquidity in the event of a dollar shortage (Broda and Levy Yeyati, 2003).

regulation would send the right signals at the expense of underpricing currency risk and encouraging financial dollarization.[51]

The empirical evidence on regimes and financial dollarization is plagued by a number of empirical constraints, including lack of data (the currency composition of bank deposits is available for a broad group of countries only since the late 90s; data on the currency composition of debt is even more scarce), and slow dynamics (which limits any analysis that go beyond cross-country comparisons). With this caveat in mind, recent work has found support for the portfolio view (De Nicoló et al., 2005; Levy Yeyati, 2006), and for the presence of implicit guarantees in association with pegs, more specifically, in the form of increased larger unhedged short currency positions at the firm level (Werner and Martinez; 2002).

3.1.6.1. The effects of finance

Is financial development a development objective? The empirical literature provides a positive answer: by improving access to enterprises, financial development fosters economic growth (Levine, 2005) due to productivity gains rather than greater investment volume (Beck, Levine and Loayza, 2000). Several channels through which this benign effect materializes have been documented: the promotion of start-ups and growth of firms (Beck, Demirgüç-Kunt and Maksimovic, 2006; Laeven and Woodruff, 2007; Klapper, Laeven and Rajan, 2006), greater innovation (Ayyagari, Demirgüç-Kunt and Maksimovic, 2007b), a better use of investment opportunities (Love and Zicchino, 2006), and a more conducive environment for small firms (Aghion, Fally and Scarpetta, 2006) that are often more financially constrained and therefore benefit proportionally more from a liquid financial market (Beck, Demirgüç-Kunt, Laeven and Levine, 2005). Moreover, financial underdevelopment has been singled out as a factor behind the failure of low-income economies to converge in income towards more advanced countries (Aghion, Howitt, and Mayer-Foulkes , 2005).

At the root of these arguments is the belief that financial constraints inhibit high-return entrepreneurial activity and limit firm growth, and that the factors underlying these constraints –insufficient loanable funds and high interest rates, lack of efficient collateral or costly and uncertain liquidation of the existing ones, burdensome bureaucracy or pervasive informality– are more prevalent in developing countries

[51] See Broda and Levy Yeyati (2003, 2006) for the case of banking regulation; Chamón (2002) for sovereign debt contracts, and De la Torre et al. (2002) for a discussion in the context of the Argentine currency board.

(Banerjee and Duflo, 2004, Ayyagari, Demirgüç-Kunt and Maksimovic, 2006a). However, most of the evidence on finance and growth is based on aggregate cross-country studies and, given that finance tends to flourish with growth opportunities, the direction of causality of these links is not always unambiguous, particularly for low-income countries (Rioja and Valev 2004 a, b). Rajan and Zingales (1998) address this problem distinguishing firms with high need to financial markets from firms in sectors with lower need of financial markets. This categorization (they look at some financial ratios that signal strong use of financial markets) is assumed to be exogenous. After ranking sectors by their degree of financial dependence, they show that financial development leads to faster growth of more financially dependent firms.

At any rate, from a conservative perspective, it would be safe to say that rather than finance being an independent growth driver, finance and growth feed into each other.

3.2. Summing up

Beyond the broad and often contradictory results linking MERP with development objectives there is a wealth of different channels that explain why MERP may play a long-standing role on real variables. Moreover, the workings of some of these channels can change dramatically depending on specific country characteristics.

For example, de facto financial integration and capital mobility could foster exchange rate flexibility as they force the country to choose between a stable exchange rate and an autonomous monetary policy; however, if financial flows are denominated in the foreign currency, the concomitant increase in dollar liabilities may optimally induce less exchange rate flexibility for fear of balance sheet losses in the event of a real depreciation. Similarly, whereas flexible exchange rates help buffer the economy against adverse external shocks, the same channel would be contractionary in heavily dollarized countries, which would be better off with more rigid exchange rate arrangements.

This multiplicity of effects has been present in the way countries actually choose their policies. The empirical literature has tested –often selectively– whether and how the arguments revisited above play a role in actual regime choices, particularly de facto ones, and have found support for many of these stories. **Table 4** summarizes the main findings in this body of work.

Choice of Real Exchange Rate						
Papers	**Number of Countries**	**Methodology**	**Exchange Rate Classification**	**Ideas tested**	**Variable Included**	**Results**
Collins (1995)	26 (1978 - 1992) Latin América (LAC)	Probit	IMF	? Exchange Rate misalignment ? Political cost of debts ? Difficult to management a flex ? Disciplinary effect of anchor	Past growth, inflation, size, openness, IMF program	Large and apen economies, high inflation and larger current account deficit implies float regimen. IMF, and OCA approve flex. Trend in favour of float.
Edwards (1996)	63 (1980 - 1992)	Probit	IMF	? Credibility vs. Flexibility	Political instability variables, coefficient of variation of export growth, coefficient of variation of real exchange rate (1970-1982), interacted with openness, percapita GDP, inflation bias: past growth and reserves	Unstable countries, external volatility, inflation, high income countries and less reserves accumulation imply float regimen.
Bayoumi, Eichengreen (1998)	21 (1963 - 1992) Industrial Countries	Instrumental Variable	Volatility exchange rate and volatility Intervention	? Optimal Currency Area (OCA)	Variability of output, openness, size, dissimilarity of exports	Variables support theory
Rizzo (1998)	All Developing Countries w / data (1977 - 1995)	Probit Binomial / Multinimial	IMF	? OCA ? Fiscal pressure and inflation	Size, development level, diversification of trade, openness, debts, current account, deficit, reserves, inflation	OCA is confirmed except for oppennes, that is associated with float, while other variables appear unstable, inflation is related with floating
Frieden, Ghezzi, Stein (2000)	26 (1960 - 1994) LAC	Ordered Logit	IMF	? Macroeconomics structural ? Institutional factors ? Intercept group factors ? Political factors	Inflation, hyperinflation, openness, reserves, term of trade volatility, capital controls, Central Bank independence, sectorial and political instability variables	Inflation is not significative, but hyperinflation leaves to fixed. More reserves, CB Independence, poltical instability, less openness, volatility of term of trade and weak governments are related with float regimen.

Choice of Real Exchange Rate						
Papers	**Number of Countries**	**Methodology**	**Exchange Rate Classification**	**Ideas tested**	**Variable Included**	**Results**
Poirson (2001)	93 (1990 - 1996)	Ordered Probit	IMF and FLT= σ_e / σ_r	? Political institution ? Currency mismatches ? OCA	Size, development level, exports diversification, openness, vulnerability to external shocks, reserves, inflation, political instability variables, capital controls, concentration of trade, dollarization, ability to hedge	Large economies, capital mobility, political instability, exports diversification, external vulnerability, lower reserves, high ability to hedge are in favour of float. Both dollarization and temptation to inflate are related to float de jure. Results of the facto regimen are weaker.
Juhn, Mauro (2002)	All Countries w / data (ACC to specific)	Bivariate Probit Multinomial logit to which at additive variable to test for robustness	IMF Levy Yeyati, Sturzenegger (LYS) (2001)	? OCA ? Capital openness ? Macro variables ? Historical institutional variables	Openness, size, concentration of trade, percapita GDP, volatility of term of trade, capital controls, openness of the capital account, dummy for emerging countries, inflation, reserves, political instability variables	Small and close economies, with no inflation are related to float, and other variables not robust.
Alesina, Wagner (2006)		Ordered Logit	Reinhart, Rogoff (2004) (RR)	? OCA ? Dollarization ? Institutional variables		Large and close economies, not dollarization and not institutional countries are related to float.
Von Hagen, Zhou (2007)	(1980 - 1987) Developing Countries (ACC to specific)	Statistics and dynamic random effect Multinomial	IMF	? OCA ? Stabilization consideration ? Currency crisis ? Polítical institutional factors	openness, size, geographical concentration of trade, development level, financial development, inflation, real exchange rate volatility, monetary shocks, reserves, fiscal	Large and open economies with neither financial development nor volatility of real exchange rate are in favour of floating. Political variables are unclear.
Levy-Yeyati, Sturzenegger (2007)	183 (1974 - 1999)	Pooled Logit	IMF , LYS and RR	? OCA ? Financial view ? Impossibility ? Balance Sheet ? Credibility view	Size, openness, term of trade shocks, capital openness, de jure/ facto finantial development, dollarization, political institutions, inflation	OCA variables work. Impossibility Trinity apply to developed countries, but Balance sheet issues appear relevant for developing countries. Political variables only are relevant for developing countries and suggest that weak goverments float.

4. The making of a policy

All the channels previously described have been reflected in the policy debate (and in the actual implementation of exchange rate policy) over the years. As noted in the introduction, the policy question that we posed at the start, namely, what is the best MERP for my country today?, incorporates both country- and time-specific aspects that tend to evolve (or, at least, vary) over time. Thus, as conditions in international financial markets and developing economies changed, the focus of the debate shifted accordingly. Tracing the policy debate in the post-Bretton Woods clearly illustrates how the different intervening factors identified in the literature provided justification for different MERP. More importantly, it provides the broader perspective needed to go from the analytical arguments and the empirical results based on historical data, to policy decisions that need to factor in the current context and prognosis.

With this in mind, a brief narrative of the debate, linking different conditions in international financial markets to different "trends" in the choice of regimes in the developing world, will be useful to set the stage to answer the more specific policy questions in the current context.

4.1. Exchange rate anchors in the 1980s

A casual review of the exchange rate debate in the late 80s and early 90s shows how the discussion hinged on the role of exchange rates and income policies as anchors in an otherwise high inflation environment. A good reference point is Fischer, Bruno, Di Tella and Dornbusch (1988), a book that brought together policy making experiences with inflation stabilization in emerging countries. The book index provides a summary view of the relevant issues at the time: a piece on Israel dealt with the modeling of the interaction of money, wages, prices; a chapter on Brazil addressed the effect of wage indexation and wage freezes; another one on Bolivia discussed the stabilizing role of the exchange rate in an economy with dollar pricing; a paper on Mexico asked on whether an income-policy-based program could control the ever increasing inflation in the country. Overall, the contents were an accurate reflection of the dominant role played by inflation concerns in the late 1980s.

The academic literature mirrored these concerns, assessing the merits of exchange rate-based stabilizations (ERBS) coupled with income policies, relative to the more traditional money-based stabilizations. Kiguel and Liviatan (1991, 1992) and Vegh (1992) documented that ERBS appeared to lead to an initial and temporary consumption boom that tended to end in a contraction, whereas money based stabilizations often induced an initial recession followed by a boom. Calvo and Vegh (1993, 1994) provided a formalization: in their model, a one-shot permanent stabilization tended to have the same result regardless of the anchor of choice, but transitory or not perfectly credible exchange ERBS lowered interest rates in the short run fueling a consumption and output boom (and a trade deficit) in the short run that were reversed once the program collapsed. On the other hand, non-credible money-based stabilizations were expected to increase the demand for money jacking up interest rates in the short run, appreciating the exchange rate and causing a recession in the short term.[52] Curiously enough, Calvo and Vegh's framework provided a fairly strong rationale for ERBS from the perspective of myopic politicians eager to obtain significant short-run effects.

4.2. Financial integration and financial crises in the 1990s

As inflation concerns subsided and financial integration increased in the second half of the 1990s, the exchange rate policy debate in developing economies placed the focus on the interplay of two contrasting features of financial development. First, the fact that financial globalization led to a growing ineffectiveness of monetary policy. More precisely, that capital controls were found to be decreasingly effective as economies became more sophisticated. As in the early years of the 20th century, growing financial integration and sophistication in the developed world strengthened the restrictions imposed by the *impossible trinity* –previously circumvented due to the absence of de facto financial integration (Obstfeld and Taylor, 2004; Rose, 2006)– all of which made floating regimes more attractive.

Second, the role of (domestic and external) financial dollarization, namely, the foreign currency denomination of residents' assets and liabilities that, to the extent that it introduced currency exposures that raised the risk associated with exchange rate jumps, made pegged regimes look more attractive. Indeed, it was the risk of balance sheet losses to financially dollarized governments and firms in the event of a devaluation –stressed in the third generation models of currency crises popularized in the context of

[52] De Gregorio, Guidotti and Vegh (1998) suggest that the boom in ERBS comes from the effect of the interest rate collapse on the purchase of durable goods.

the Asian crisis– that led to the definition of *fear of floating* (Calvo and Reinhart, 2002), namely, recurrent de facto exchange rate intervention in officially floating regimes. Financial dollarization, then, detracted from the benefits of flexible regimes, leading the view of flexibility as a source of volatility [53] and of hard pegs as a viable option in that context.[54]

The combination of these two views led naturally to one of the dominant views in the late 90s, the "bipolar" view (Fischer, 2000) that pointed at flexible exchange rates or, if MERP was geared towards an exchange rate anchor, superfixed regimes (the so called "hard" pegs such as currency boards or unilateral dollarization) as the only viable alternative for financially integrated developing economies, at the expense of conventional pegs, inherently vulnerable due to monetary policy inconsistencies and self-fulfilling speculative attacks. Combined with the fear of floating view, this approach derived naturally into what could be called a "unipolar view" (Calvo et al. 1999, 2000) according to which hard pegs were the only sensible option for financially dollarized economies: if devaluations in dollarized economies were contractionary due to balance sheet effects, exchange rate flexibility would only amplify the cycle, rather than smooth it out as predicated by the standard theory.[55] Thus, exchange rate anchors in the globalized world evolved from a signal to align expectations into legal constraints on the behavior of the Central Bank: ultimately, in the quest for credibility, the tyranny of the anchor eliminated the active pursuit of monetary policy altogether.

But while the debate was suggesting this one-way street, policy was heading in the opposite direction. The failure of a currency board to ensure fiscal and monetary discipline in Argentina cast doubt on the premises underscoring the unipolar view. The market discipline that would impose a hard budget constraint on the government in the absence of monetary financing did not materialize: procyclical capital markets lent to levels that proved unsustainable, and pulled off in bad times triggering a debt default.[56] On the other, the fact that, at the time of the currency run, the automatic stabilizer embedded in the currency board (associated to a contraction of the monetary base caused by the unsterilized sale of reserves) was neutralized by the issuance of fiat money by the national and subnational governments showed that not

[53]Financial dollarization has been identified as the single most important factor that may turn the exchange rate from a countercyclical shock absorver into a procyclical source of economic contractions (Frankel, 2005).

[54] See, e.g., Barro, (1999), Hausmann, et al (1999, 2000), Hausmann and Stein, (2001), Ghosh, Gulde, Ostry, and Wolf, (1997) and Dornbusch (2001).

[55] See Frankel (2005) on balance sheet effects and contractionary devaluations, and Calvo (2000a, 2000b) on the unipolar view.

[56]It is possible that the shift from bank to (typically atomistic) bond financing as a result of the creation of the emerging marlet bond class with the Brady plan deepened this uncoordinated procyclical behavior displayed by international capital markets vis a vis developing economies.

even monetary discipline was guaranteed by the currency board agreement. At any rate, for many observers, the hard pole of the bipolar view was restricted, at best, to the yet untested unilateral dollarization, a more extreme and less appealing choice.[57]

On the other hand, by the end of the decade the success in building central bank autonomy and monetary credibility, together with the resulting decline in inflation and exchange rate pass-through, led to the growing popularity of the float pole of the bipolar view as the background for different varieties of inflation targeting arrangements that prioritized the inflation rate, rather than the exchange rate, as the key nominal anchor, an option that recovered the possibility of exercising monetary policy. Not surprisingly, among emerging countries, this trend started in economies with relatively low levels of financial dollarization (Chile, New Zealand, South Africa, Brazil), gradually extending to other countries pari passu with a reduction in their degree of dollarization. In addition, the disappointing Argentine experience with a currency board cast doubt on the premises (monetary and fiscal discipline) on which the case for hard pegs had been predicated. Ultimately, as mentioned above, the debate in the new millennium appears to have converged to an inverted unipolar view, where flexible regimes are seen as the only sensible (and durable) choice as economies grow financially integrated and sophisticated.[58]

4.3. Float cum inflation targeting (FIT)

The declining degree of financial dollarization, combined with the improved quality of monetary institutions, explain the evolution of MERP in developing countries in recent years. The recent changes in debt composition and policy in developing countries have led developing economies to use the inflation rate rather than the exchange rate as the main policy target, allowing greater flexibility for the latter. This has led some observers to salute FIT as a new, possibly more resilient MERP paradigm (Rose, 2006).

FIT is in practice a broad category that includes a large array of alternative varieties, going from soft numerical inflation target (in the form of a wide inflation band) to the a more sophisticated system that includes, additionally: (i) an legal commitment to price stability as the primary goal of monetary policy, (ii)

[57] For a discussion of the 2001 Argentine crisis along these lines, see De la Torre et al. (2002) and Hausmann and Velasco (2002).
[58] See Levy Yeyati (2005) and references therein. Rose (2006) makes an eloquent case for the new FIT paradigm.

a dissemination strategy that allows agents to replicate and anticipate the policy decision context (if not the actual policy decision); (iii) direct accountability of the central bank management for attaining the targets.[59]

Historically, middle income developing countries adopting IT gradually proceed from the soft version (which in the early years usually coexists with a dirty exchange rate regimes, see Schmidt-Hebbel and Tapia 2002 for Chile; and Armas et al. 2006 for Peru; Fraga et al. 2005 for Brazil, and Mishkin (2006) for everything else) to the more canonical version. At any rate, the interpretation of existing empirical studies trying to assess the real implications of IT should be qualified by the fact that they are likely to cover different varieties of IT for each individual country. Moreover, the introduction of IT in developing countries often coincide with the transition from moderate two-digit to low one-digit inflation –and countries that chose IT exhibited higher initial inflation– so that a sacrifice ratio that captures this transition may overstate the net benefits of IT once inflation is brought under control.

4.3.1. The FIT paradigm and the real economy

As noted, the literature on the consequences of FIT on the real economy in the developing world suffers from two important shortcomings. The first one, as noted, is semantic: FIT adopts a number of varieties –from light tentative targets to complex frameworks that involve a strong commitment by the Central Bank –that are not always strictly comparable. This caveat is more generally related with a definitional problem that plague inflation targeting as a distinct policy: if by inflation targeting one means an explicit commitment with low and stable inflation, then most central banks in mature economies (and most in high-middle income ones) are in fact inflation targeters. Thus, as was discussed in Section xx, as it appears, the empirical characterization of inflation targeting, in practice, hinges on the two other pillars mentioned above, namely, dissemination and accountability, the boundaries of what constitutes IT and what not are rather fussy.[60]

The second drawback faced by the empirical literature owes to the fact that IT in developing countries has been adopted: (i) very recently (Chile and Israel lead the way in the mid 90s, although they implemented a

[59]Truman (2003) provides a comprehensive and general discussion of IT. Price stability need not be the only mandate; IT may assign a role for output stability (as, e.g., the Reserve Bank os Australia). The same is true for financial stability in financially dollarized economies like Perú or Uruguay, although in those cases the application to the IT club is still under consideration.
[60]The European Central Bank (ECB), for example, has a numerical inflation target, but is not considered an "inflation targeter" due to a general lack of transparency in the communication of the policy-making process (Svensson, 2000).

fully-fledged IT framework only recently); (ii) in times of moderate (two-digit) inflation. In other words, whereas there is some evidence about the ability of IT to bring down inflation and the associated sacrifice ratio (in terms of slower and possibly more volatile growth), much less can be said about its relative advantages for developing economies once inflation declines. Bearing this in mind, a number of recent empirical studies take stock of the IT experience in the developing world.

These studies (which often include both industrialized and developing economies) on the implications of IT for the real economy have yielded mixed results. On the one hand, there appear to be no conclusive evidence on its effect on the sacrifice ratio, namely, the tradeoff between inflation and output.[61] Inflation targeters exhibit sacrifice ratios that are comparable to those observed in non-inflation targeting industrial countries (Corbo, V. and K. Schmidt-Hebbel, 2001; Cecchetti, S.G. and M. Ehrmann, 1999)[62], although they enjoy lower ratios and output volatility than before adopting IT.

On the other hand, there is no convincing evidence that they perform better than comparable non targeters in other respects. While, IT advocates point out that the adoption of IT in developing countries help bring down inflation (Corbo, V. and K. Schmidt-Hebbel, 2001) and align inflation expectations reducing pass-through coefficients (Corbo et al. 2001), they also stress that developing countries have perform relatively worse than industrial targeters: deviations from targets are larger and more frequent (Fraga, Goldfajn, and A. Minella, 2003). Even for industrial economies the jury is still out on this issue (Ball and Sheridan, 2003), either in terms of output volatility, interest rates, or even inflation level and variability. Indeed, it appears that targeting countries tend to have high initial inflation (which, not surprisingly, increases the propensity to adopt IT, Mishkin, F. and K. Schmidt-Hebbel, 2001) and, correspondingly, large short-run decreases: IT has been instrumental in bringing inflation rates to one-digit levels, but once there, its benefits are more difficult to identify.

4.4. The comeback of exchange rate regimes: Leaning against the appreciation wind

Unlike in the 90s, where financially dollarized economies displayed Calvo and Reinhart's (2003) "fear of floating" because of the presence of currency mismatches and widespread dollar indexation, in recent

[61] The standard measure of the sacrifice ratio computes the output loss associated with a unit percentage change in inflation.
[62] Interestingly, Cecchetti and Ehrmann (1999) find similar results for non-inflation targeting European Union (EU) countries as they focus on inflation in the run up to themonetary union

years intervention have been mostly leaning against the appreciation winds, a behavior that not only has distinct motivations and (presumably) economic consequences but also is in stark contrast with the FIT paradigm predicated by many developing economies.

In 2005, while 4 middle-income developing countries (Indonesia, Romania, Slovak Republic and Turkey) joined the group of 21 economies that officially subscribed to FIT, many countries (China, Malaysia, Thailand, Colombia and Argentina, to name a few) were still pursuing active exchange rate policies, and three of them (Argentina in 2005, Thailand and Colombia in 2006) introduced controls on capital inflows to countervail the appreciation of their currencies.

This comeback of exchange rate policies (which by comparison could be labeled "fear of floating in reverse") has been attributed to two main motives: a revival of mercantilist policies aimed at maintaining an undervalued currency as a means to protect the domestic industry from international competitors, and prudential motives linked with mean reverting exchange rate swings and the propensity to suffer dollar liquidity runs. We examine both motives in turn.

4.4.1. The prudential motive

The first interpretation of the current surge in international reserves in developing economies had to do with prudential considerations, specifically, the fear of a shortage of liquid foreign assets of the type that caused the many emerging market financial crises in the second half of the 90s. In this view, the less than perfectly flexible exchange rates that characterized many developing economies in the early 2000s was simply the result of the rapid accumulation of precautionary reserves in the aftermath of a crisis at home or in the neighborhood –a hypothesis partially supported by the data (Marion and Aizenmann, 2004; Lee and Aizenmann, 2005)[63].

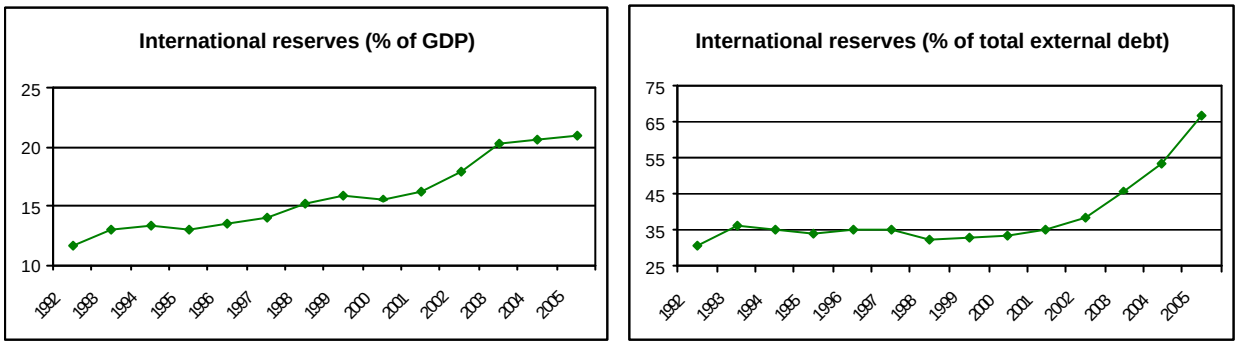
Indeed, a similar motive could be conceived for a more explicit exchange rate objective. For example, a policy of leaning against the appreciation wind during expansions may be seen as the countercyclical (prudential) response to procyclical (and largely exogenous) swings in capital flows and real exchange

[63] Cowan and Caballero (2006) argue that while there are arguments for government purchasing insurance this should not be done through reserve accumulation but through using contingent markets. Summers (2006) considers that reserves are larger than justifiable from a prudential motive. Rodrik (2006b) also argues reserves are too large.

rates. Limiting the transitory (and possibly excessive) appreciation of the local currency through the accumulation of foreign reserves in this context is a natural defensive strategy to limit the country's external vulnerability and minimize the real exchange rate adjustment and the associated balance sheet effects during the recessive phase.[64]

But there are clear indications that this, if at all relevant, is only part of the story. On the one hand, many of these economies are not financially dollarized or have seen their external debt to GDP ratio fall dramatically in recent years, at the time reserve accumulation was at its peak. In prudential concerns were at the root of the initial surge in intervention, it is difficult to attribute the still ongoing process to liquidity risk.

Figure NN



Prudential issues and currency mismatches certainly played an indirect role in the "mercantilist" view of intervention: a declining degree of financial dollarization relaxed the balance sheet concerns behind the fear of floating recovering the expansionary nature of depreciations. Indeed, the main hypothesis of the mercantilist view (namely, the pro-growth consequences of an undervalued currency) depends critically on the absence of the currency mismatches usually found in financially dollarized economies. In fact, the revival of the mercantilist view in the latest years is not independent of the decline in financial dollarization in the developing world.

4.4.2. The mercantilist motive

[64]See Levy Yeyati (2006) and Caballero and Lorenzoni (2006).

Perhaps the most intriguing new development in the MERP debate comes from an old unresolved question: Does a temporarily high real exchange rate have a persistent positive effect on economic activity? If so, does this effect come from an increase in external demand, a decline in the demand for exports (with a concomitant increase in the demand for domestic products), or the dilution of producer costs?

A number of recent papers examine the issue and provide supportive (albeit contradictory) evidence. While they tend to agree with the fact that mercantilist interventions and undervalued currencies are associated with faster growth, they are far less clear about the specific channel in place. Some arguments are in line with traditional export-led dynamics (Rajan and Subramanian, 2005; Prasad et al., 2006). For example, in analyzing the impact of foreign aid, they identify an adverse effect on sectors with a higher exported share which they attribute to a real appreciation. Inverting this Dutch disease argument, a real depreciation would foster the growth of export-oriented firms.[65] Some offer an alternative argument: devaluations reduce labor costs in terms of producer prices, increasing firm profitability and real investment (Levy Yeyati and Sturzenegger, 2007).[66]

Moreover, many of these studies suffer from a potential endogeneity problem, to the extent that intervention (or the estimated undervaluation) may also be the result of good economic conditions (including faster growth). Finally, even if the direction of causality implied by these finding were true, there would remain the question about the duration of the effect. Can these mercantilist policies be sustained at reasonable costs and, if so, for how long?

4.4.2.1. The question about the timeframe

To what extent and for how long can this proactive exchange rate policy coexist with an autonomous monetary policy aimed at price stability? One important distinction needs to be made when computing the cost of intervention: whether the country accumulates reserves for prudential measures (typically, a net debtor in foreign currency), or for prudential motives (typically, a net creditor in the foreign currency). In the fist case, reserves only narrow the currency mismatch (so that an eventual appreciation of the currency

[65] However, due to the way in which they measure sector growth, the effect may be capturing the higher price level perceived by the exporter as a result of the devaluation, rather than actual growth.
[66] See also Aghion et al. (2006) for a model along these lines.

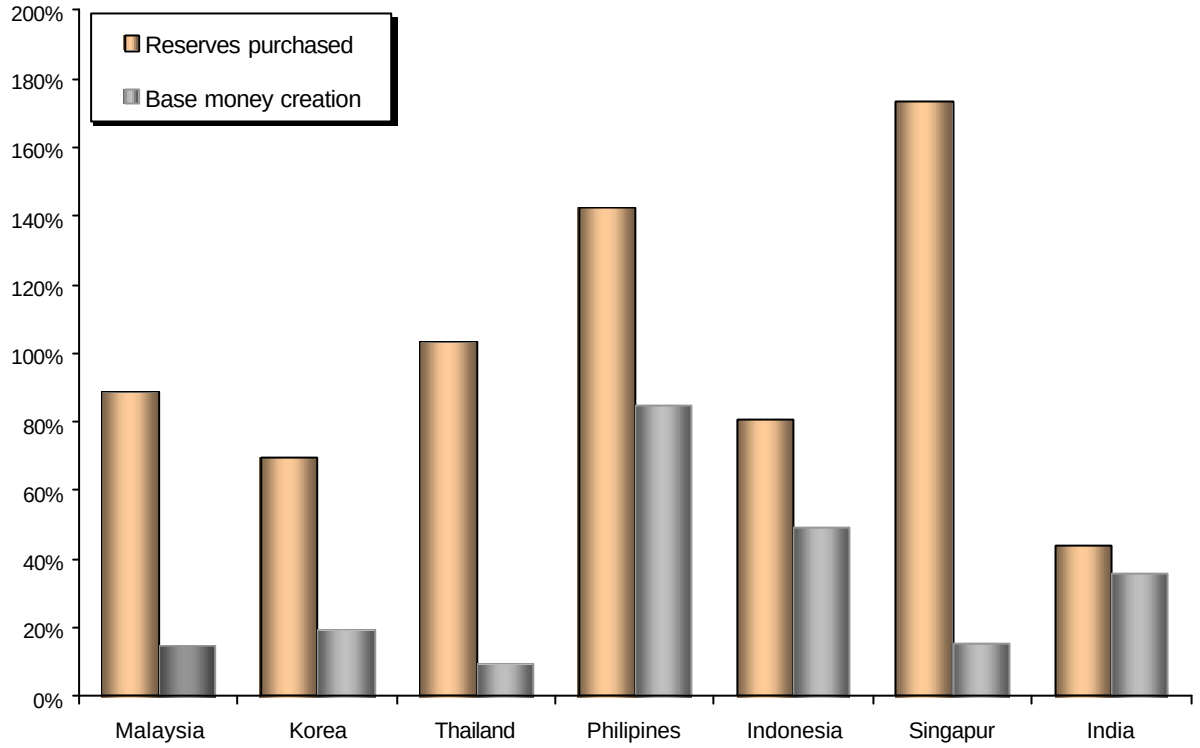
is actually beneficial in fiscal terms) and the cost of carrying reserves is proportional to the cost of the debt that implicitly fund them.[67]

In the second case, the purchase of reserves to defer the appreciation of the local currency can be funded essentially in two ways: by issuing money, or by issuing local currency-denominated debt.[68] The first option introduces inflation pressures: the appreciation materializes –albeit over a longer time– through a change in domestic prices rather than in the nominal exchange rate. The second option pays the cost in the form of high interest rates (the central bank's quasi fiscal cost) or, belatedly, through valuation losses associated with the nominal appreciation of the currency.

How are mercantilist reserves financed in practice? A first answer to this question is offered by the figures reported in Figure 7. There, we choose seven Asian fast growing countries that have been rapidly accumulating reserves in the last five years, and compare dollar purchases with the expansion of the monetary base and the inflation tax. The first series is estimated by converting the monthly change in net reserves into the local currency at the exchange rate beginning of the period (to filter out valuation changes). The inflation tax is approximated as the inflation rate times the monetary base at the beginning of the period. As can be seen, in most cases intervention has been sterilized (in other words, funded through local currency debt) and inflationary taxes have been low. In most case, again, the cost of intervention materializes not in the form of high interest rates –because appreciation expectations tend to depress the central bank's borrowing costs in the local currency– but in changes in valuation –as intervention entails, by definition, the purchase of dollar above their equilibrium exchange rate– much of which is still yet to come.

[67] For alternative takes on the cost of precautionary reserves, see Rodrik (2005), Jeanne and Ranciere (2006) and Levy Yeyati (2006).
[68] Since intervention is geared to offset the demand for the local currency, the issuance dollar debt would not do the trick in this case.

Figure 7. How are reserves funded?



It follows that, if appreciation pressures are a transitory phenomenon due to procyclical international capital flowing into the country during the expansionary phase of the cycle, the reversion of the equilibrium exchange rate to its earlier, more depreciated level would eliminate valuation losses and the hidden intervention cost. Ultimately, mercantilist reserves are costly if appreciation pressures are due to permanent changes in the country of the external environment. The fact that equilibrium exchange rates are in practice so difficult to estimate –and, as a result, often assumed to be random walks– makes a evaluation of long term intervention costs quite elusive.

5. Where do we stand?

A number of sobering lessons can be drawn from the previous discussion. The first thing to note is that the MERP debate is far from closed. This is a natural consequence of the fact that the pros and cons of alternative MERP (and actual policy choices) evolve with country characteristics. Exchange rate anchors that were popular in the developing world in the context of high, inertial inflation and partial dollar

indexation lost their edge when central banks won the inflation battle and pass-through coefficients declined –coincidentally, at a time when financial integration rendered pegged regimes more vulnerable to self-inflicted crises or self-fulfilling attacks. The fact that most medium and large developing economies (and virtually all industrial ones) reveal a preference for exchange rate flexibility and non-exchange rate anchors simply reflect this evolution. (However, the fact that de pegs still represent more than half of the IMF reporting countries –particularly small ones– suggests that exchange rate anchors are still favored by small open economies that give priority to the trade dividend of stable exchange rates and find the conduct of an autonomous monetary policy too costly, due to lack of human capital, scale, or an important non-tradable sector.[69])

The same can be said of attempts to mitigate the appreciation of local currencies, often perceived as part of a neo-mercantilist trend but not qualitatively different from the policies adopted in the wave of capital flows to emerging economies in the early 90s. Do they constitute a distinct MERP, one with the objective of a *persistently* undervalued local currency as a substitute to more specific tariff barriers, or is it simply the partial (countercyclical) smoothing of high-frequency exchange rate variability –in turn, fueled by procyclical cross-border flows– that in financially integrated developing economies may lead to unwarranted swings in the real exchange rate? In the second case, one could invert the question to ask whether small open economies can "afford" full flexibility in such a context.

We do not need to close this debate here. Do we need a new paradigm? A reading of the literature highlights that the importance of country characteristics goes beyond that standard commonplace. Indeed, one could conceive a correspondence between some schemes and the specific situations for which they that have been instrumental.

Some schemes that proved useful in the past (exchange rate anchors to reign in inflation; IT to bring inflation expectations from two-digit to one-digit levels) have become relatively less appealing as the context evolved and improved (lower inflation inertia and pass-through, greater central bank reputation, one-digit inflation). Some schemes, on the other hand, have seen their policy margin enlarged: reduced currency mismatches increased the scope for the use of flexible exchange rates as shock absorbers and, to

[69] Pegs account for more than 50% of classified countries both under de jure and all three de facto classifications described in the previous section.

a lesser extent, for countercyclical monetary policy (to the extent that the offset from cross-border flows allows it).

Countercyclical leaning-against-the-wind policies present prudential and short-term real benefits in avoiding overvaluation in mean-reverting, illiquid forex markets, but their real benefits in the long run (in terms, for example, of productivity growth) are still subject to scrutiny. Are the preliminary results capturing temporary protection of domestic industries, depressed salaries and regressive redistribution, or just endogenous intervention?

At any rate, while it is still too early to judge IT and mercantilist policies in the new millennium, the present study highlights a number of natural consequences of the evolution of many developing economies, including the decoupling of monetary policies and exchange rates, and a growing use of the latter either as countercyclical shock absorber or a procyclical protection of domestic industries in good times.

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