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The Survival of Intermediate Exchange Rate Regimes

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Abstract

Why are so many emerging countries reluctant to follow the prescription of the economic profession to let their exchange rate float freely or fix it forever? We show how the traditional trade-off between stabilization and disinflation can produce soft pegs as optimal exchange rate regimes even when financial fragility and the cost of regime switches in terms of credibility are taken into account. The optimal degree of exchange rate flexibility depends on the structural characteristics of the country and on the preferences of monetary authorities, confirming Jeffrey Frankel's insight that "*no single currency regime is right for all countries or at all times*". This finding is confirmed by a cross-section logit estimation for 92 countries before and after the 1997-1998 emerging markets crises, relating exchange rate regime choice with the countries structural patterns. The model correctly predicts up to 86% of observed regimes and some of the recent moves towards hard pegs. It also suggests that some countries, including Argentina, should have adopted intermediate exchange rate regimes rather than hard pegs.

Keywords: Exchange rate regime, Developing countries, Logit model

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1. Introduction

1.1 Conventional wisdom

It is now part of the conventional wisdom of international policymaking that economies open to international capital flows should not try to fix their nominal exchange rate, unless they adopt a currency board or they move to full dollarization, "euroization" or currency union. This advice is rooted in the experience of the 1992-1993 collapse of the European exchange rate mechanism and the 1997-1998 emerging markets crises. As Stanley Fischer (2001) has noted, "*each of the major capital markets-related crises since 1994 has in some way involved a fixed or pegged exchange rate regime*". There is also some empirical evidence of a "hollowing out" of the distribution of exchange rate regimes in recent years, away from intermediate regimes and towards free floats or hard pegs (Caramazza and Aziz, 1998, and Fischer, 2001).

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The crux of the argument in favor of the "two corner" or "two pole" theory of exchange rate regime choice is Robert Mundell's impossible trinity. In a world of high capital mobility, nominal exchange rate pegs cannot be sustained without giving up an independent monetary policy, either by implementing a currency board arrangement[1], by joining a currency union, or by adopting a currency issued by another country. The choice between hard pegs and free float then falls on the traditional stabilization/inflation trade-off and on optimal currency area arguments.

Recently, the argument has been tilted toward the "hard peg" corner by focusing on financial structure and asset markets channels. Domestic risk premia, liability dollarization and vulnerability to international contagion make a case for dollarization against floating, at least for economies which are already partially dollarized -see Calvo (2000) or Eichengreen and Hausmann (1999)[2].

If this trend continues, the implications will be striking for what Jerry Cohen (1998) called the "geography of money". The world will ultimately be structured into a few large currency areas (say, a US dollar area in the Americas, a euro area around Europe, and possibly an Asian currency area in a more distant future) and a handful of independently floating currencies. The whole issue of exchange rate regime choice will then belong to economic history.

1.2 A fragile wisdom?

At a closer look, however, the picture appears much less clear cut. First, the "two corner" approach does not yet have undisputed theoretical foundations. Oddly enough, no existing theoretical model produces hard pegs or free floating as optimal solutions of some welfare maximizing exercise where the whole range of exchange regimes would be available as policy options. Second, there is growing empirical evidence that intermediate exchange rate regimes are well alive, maybe under the form of dirty floats or soft pegs.

Many emerging countries claim to be floating but do actually manage their exchange rate with interest rate or foreign exchange market intervention (Calvo and Reinhart, 2000; Levi-Yeyati and Sturzenegger, 2000; Bénassy-Quéré and Coeuré, 2001). Thus, in the IMF annual reports on exchange arrangements and exchange restrictions, many regimes classified as free floats are in fact managed. As from 2000, the IMF has corrected its classification for evident discrepancies with *de facto* behavior, but the corresponding time series are not available so far. Even drawing on the official classification, Paul Masson (2001) has shown that the dynamics implicit in exchange rate regime switches does not support the hypothesis that intermediate regimes are hollowing out in the long run.

Guillermo Calvo and Carmen Reinhart (2000), among others, have suggested explanations for this *fear of floating:* exchange rate pass-through, liability dollarization, dollar invoicing of domestic

[1] See Ghosh, Gulde and Wolf (2000) for an appraisal of the experience with currency boards.
[2] See Berg and Borensztein (2000) or Levy-Yeyati and Sturzenegger (2001) for a survey of dollarization, including the seigneuriage and financial supervision aspects which are out of the scope of this paper.

and external transactions, and an underdeveloped market for currency hedging make more desirable to fix the nominal exchange rate. These factors are specific to emerging markets and dependent on each country's own history.

There remains of course a difference in terms of commitment and institutional framework between managed floats and old-style exchange rate commitments such as the crawling pegs or fluctuation bands advocated by John Williamson (2000). What is important in our view, and what we will try to investigate in this paper, is the survival of "intermediate" exchange rate regimes, or soft pegs, defined in a broad sense as regimes other than free floats and hard pegs.

1.3 Which currency regime is right for which country and at which time?

Given these competing arguments and the lack of a unified framework to sort them out, it has often been concluded that the choice of an exchange rate regime should depend on each country's own characteristics and history. Jeffrey Frankel's intuition that "*no single currency regime is right for all countries or at all times*" is increasingly fashionable.

The fact that this motto has been more or less endorsed by the IMF (see Masson et al., 2000) and by policymakers[3] is not necessarily good news. Although it is an apt summary of the literature, it could allow the official community to become more relaxed with the exchange rate regime issue. As the memories of the recent crises recall us, this would be a mistake. On the contrary, what we urgently need is an analytical and empirical tool to give each country, given its economic structure and at a given point in its history, the right policy advice. This is the direction we try to explore.

To sort out the arguments, we start from a simple model of exchange rate regime choice in a continuum going from a free float to a hard peg. We find that optimal choice depends on the country structural characteristics and government preferences, namely: the magnitude of domestic and foreign shocks, exchange rate pass-through, trade openness, the magnitude of the interest-rate channel, the persistence of inflationary reputation, and the government's time preference and aversion to inflation. We then discuss under which conditions the optimal regime will be sustainable.

The relevance of these factors is assessed on a cross-section of 92 countries before and after the 1997-1998 emerging markets crises. We use a non-ordered trinomial logit model so as to account for intermediate regimes independently from corner solutions. We then use the estimated model to understand why some countries have changed regimes after the crises and some others have not – and whether they should better have done so. Finally, we discuss dynamics issues which are not addressed as such in the paper.

[3] A recent example is the 2001' Asia-Europe finance ministers' meeting concluding statement : " *Ministers acknowledged that there is a spectrum of possible exchange rate arrangements, depending on various aspects such as the size of the economy, trade and investment structure, the sequencing of capital account liberalization and the level of economic development. No single arrangement is necessarily right for all countries all the time.*"

2. Exchange rate regime choice: theory

2.1 Existing literature [4]

Why do theoretical models fail to exhibit corner solutions? Most of them are open economy extensions of a Barro-Gordon trade-off between stabilization and disinflation. They concentrate on two simplified cases: fixing and floating, without considering "intermediate" regimes as an option (see e.g. the models of Edwards, 1996; Ghosh et al., 1999; Berger, Sturm, and de Haan, 2000; Méon and Rizzo, 2001). An important but isolated contribution is Aizenman and Frenkel (1986) where the degree of exchange rate flexibility is introduced as the elasticity of the money supply to the nominal exchange rate.

Recently, Lahiri and Végh (2001) proposed a model of optimal choice among four policy options: nominal exchange rate peg, pure floating, dirty floating, and sterilized intervention. Concentrating on monetary shocks, they find that the optimal rule depends on the size of the shock: policymakers should let the exchange rate adjust for small negative monetary shocks, while for larger shocks they should intervene to stabilize it.

There exists a gap between the existing literature and some important dimensions of the ongoing policy debate.

First, it is important to distinguish two features of the exchange rate regime: the degree of flexibility, which ranges from a fixed peg to a free floating regime; and the degree of institutional commitment, which differentiates hard pegs from intermediate regimes (defined in a broad sense, as indicated above).

In addition, models *à la* Barro and Gordon usually do not capture the financial channels which are at the heart of the current discussion on the viability of exchange rate regimes. In particular, they fail to describe how the credibility of the exchange rate regime may impact balance sheets and thereby the real economy through the domestic interest rate.

Finally, these models usually assume purchasing power parity, whereas the crises have highlighted the role of real exchange rate misalignments. The real exchange rate may vary both in the short run (because of nominal exchange rate targeting and/or price rigidities) and in the long run (because external balance has to adjust somehow). In the next section, we present a simple model which incorporates these ingredients.

[4] See Edwards (2000) or Mussa et al. (2000) for a general overview of exchange rate regime choice.

2.2 Optimal exchange rate flexibility: disinflation, stabilization, and credibility

In Appendix A, we present a model of exchange rate regime choice in a small economy. There are two periods, short term and long term. In the long run, prices are fully flexible and the real exchange rate balances the current account, either through nominal exchange rate or through price adjustment. The exchange rate regime is therefore neutral for the real economy and the only difference between a fixed and a flexible regime is the amount of price adjustment. In the short run, exchange rate movements pass only partially through prices, depending on pricing to market, wage indexation and the degree of *de facto* dollarization. Long run depreciation expectations are built into the short run interest rate, thereby impacting aggregate demand. Lastly, there is an inflation reputation effect: Period 1 inflation has a lasting impact on Period 2.

The authorities pick the exchange rate regime for each of the two periods in a continuum ranging from a hard peg to a free float. They can use the exchange rate to stabilize short run aggregate demand, but to a certain extent only, depending on how much they weight price stability. In addition, there is a cost *à la* Drazen and Masson (1994) to changing regimes; this cost is proportional to the amount of added flexibility and it is used by the authorities as a commitment not to renege on their first period choice.

The implications of the model are threefold.

Conclusion 1. In the presence of a Barro-Gordon "inflation bias" problem, the optimal exchange rate regime is typically an intermediate one, depending on the trade-off between stabilization and disinflation.

Conclusion 2. The optimal degree of exchange rate flexibility depends on the structure of the economy, the nature of the shocks it faces, the preferences of monetary authorities, and the persistence of inflationary reputation. All things being equal, the following patterns will tend to favor less flexible regimes:

- a more persistent inflationary reputation, a higher aversion to inflation and/or a longer time horizon of monetary authorities. This latter result is in line with theoretical contributions which stress the political cost of adjustment under a hard peg, thus the difficulty of sustaining such a regime for governments with a weak political support -see e.g. Edwards (1996), and Frieden, Ghezzi and Stein (2000) for a survey;
- a higher degree of exchange rate pass-through. This is consistent with the recent literature on the fear of floating, which stresses the importance of *de facto* dollarization and of pass-through effects[5];

[5] See also Jadresic (1998) for a discussion of exchange rate regime choice with indexed wage contracts.

- a less open economy, because of a lesser need to accommodate foreign shocks. Consistently, hard pegs are more likely to be chosen by countries facing shocks on domestic demand or on interest rates than by countries facing shocks on foreign demand. In a nutshell, the "current account" channels favor flexibility while the "capital account" channels favor harder pegs;
- an aggregate demand less reactive to real interest rates, for instance due to longer term debt contracts or weaker balance sheet effects.

Conclusion 3. The authorities may be tempted to renege on the exchange rate regime. This can be fixed by raising ex-ante the cost of changing regimes. It turns out that corner solutions require a stronger ex-ante commitment than intermediate regimes. For instance, since hard pegs cannot accommodate foreign demand shocks, they create an incentive to use the nominal exchange rate in the following period to achieve part of the necessary adjustment of the real exchange rate.

2.3 Back to the hollowing out hypothesis

To sum up, we have seen that intermediate regimes are tailored to address the stabilization/disinflation trade-off better than hard pegs or free floats, which concentrate on one only of these two aspects. This result is not surprising in a Barro-Gordon framework; at its heart lies the idea that whatever the exchange rate regime chosen by the authorities in the short run, real exchange rate adjustment will require some amount either of nominal exchange rate or of price flexibility in the long run. The degree of flexibility in intermediate regimes can then be adjusted through the authorities' announcements to market participants and, if the case of fluctuation bands, by choosing the width and "softness" of the bands – see Williamson (2000) for a discussion.

It could be concluded that the only issue at stake is the optimal degree of nominal exchange rate flexibility and that this line of reasoning discards in principle corner solutions. However, bringing credibility into the debate, we have also seen that regimes close to the corners are more difficult to commit to. Since it is likely that the commitment to a particular regime (what we captured in our model as raising the cost of regime switches) requires not only an appropriate institutional framework but also transparency and verifiability (see Frankel et al., 2000, for more on this issue), there is a case for moving directly to the corners. Thus what we expect to find in practice is either intermediate regimes or, whenever the case for a very flexible or a very inflexible exchange rate is pervasive enough, corner solutions.

3. Exchange rate regime choice: broad facts

We now turn to the empirical relation between exchange rate regime choice and countries characteristics and preferences.[6]

[6] Other cross section studies focus on the reserve causality running from exchange rate regime choice to growth and inflation performance, see e.g. Ghosh et al. (1997); Levy-Yeyati and Sturzenegger (2001).

Several recent studies of the determinants of exchange rate regime choice have concentrated on the impact of political instability, with a particular attention to Latin America (Edwards, 1996; Frieden, Ghezzi and Stein, 2000; Méon and Rizzo, 2001) They conclude that political instability make fixed pegs more difficult to sustain, consistently with the theory.

Other recent contributions are Rizzo (1998), Berger, Sturm and de Haan (2000), and Poirson (2001). Rizzo (1998) finds a significant role for optimal currency area criteria: country size, level of development, openness and geographical diversification of trade. Berger, Sturm and de Haan (2000) concentrate on the volatility and correlation of domestic and foreign output. Poirson (2001) evidences the role of the following factors: country size, external shock vulnerability, inflation performance, capital mobility, level of reserve, political risk, partial dollarization and foreign currency borrowing.

We want to improve on these studies in two directions. First, all of them use a binomial or an ordered multinomial discrete choice model, or even a linear relationship between an exchange rate flexibility index and the explanatory variables (Poirson, 2001). In so doing, they impose an implicit pecking order on exchange rate regime choice. They are therefore not suited to identify factors which may favor intermediate regimes against corner solutions, and they are not consistent with the empirical finding of Masson (2001) that transitions are symmetrical between the three types of regimes. In what follows, we shall give the three categories the same status by estimating a multinomial logit model. Besides, except for Poirson (2001) who uses an alternative exchange rate flexibility measure, all of these studies use some version of the IMF official classification. As already noted, this classification is at odd with actual behavior and it is therefore inappropriate. We shall therefore use an alternative measure based on actual exchange rate behavior.

3.1 Identifying exchange rate regimes

We need a classification of exchange rate regimes according to their degree of flexibility. First, we use the official classification (IMF, 1997 and 2000) after rearranging regimes into three categories: adjustable pegs, crawling pegs, regimes with fluctuation bands and managed floats are grouped into “intermediate regimes”, while currency boards, dollarized regimes and currency unions are grouped into “hard pegs”.

Several methods are available to identify *de facto* exchange rate pegs (see Bénassy-Quéré and Coeuré, 2001, for a discussion). Most authors regress the bilateral exchange rate against some numeraire currency (or a commodity, or a basket of currencies) against the exchange rates of reference currencies against the same numeraire (see e.g. Frankel and Wei, 1995). This approach is not satisfactory since the numeraire is likely to be correlated with one or all of the reference currencies. Recently, Levi-Yeyati and Sturzenegger (2000) have suggested using cluster analysis to classify countries according to the volatility of exchange-rate variations and of official reserves. However their

classification does not discriminate hard pegs from more traditional fixed pegs, which makes it unsuitable to test for the choice of corner solutions against intermediate regimes.

In a second step, we thus use a *de facto* classification derived from the observed behavior of each currency against the US dollar, the euro and the yen, which gives a symmetrical role to reference currencies (Bénassy-Quéré and Coeuré, 2001). A currency is said to be freely floating over some period of time if there exists no stable combination of its bilateral exchange rates against the US dollar, the euro and the yen. Unsurprisingly, such situations are much less frequent than reported by the IMF.[7] We define intermediate regimes as those regimes where a *de facto* basket peg (or single currency peg) is identified but not reported to the IMF as a hard peg. Lastly, we define hard pegs the same way as the IMF. The estimation is run separately for each country on weekly data on the pre-crises (January 1994-June 1997) on post-crises (October 1998-March 2001) periods[8].

3.2 Relevant structural features

In order to draw the lessons of the 1997-1998 emerging markets crises and to allow for a possible structural break, we run the estimation separately on the same sample of countries before and after the crises. Given the availability of the data[9], this leaves us with 92 countries which comprise industrial, emerging and less developed economies. The estimated logit model is:

$$P(Y_i=1|X_i) = a_0^1 + a_1^1 \, OPEN_i + a_2^1 \, TDEBT_i + a_3^1 \, DOMVAR_i + a_4^1 \, CAPC_i + a_5^1 \, IND_i + a_6^1 \, TURN_i + u_i$$

$$P(Y_i=2|X_i) = a_0^2 + a_1^2 \, OPEN_i + a_2^2 \, TDEBT_i + a_3^2 \, DOMVAR_i + a_4^2 \, CAPC_i + a_5^2 \, IND_i + a_6^2 \, TURN_i + v_i$$

$$P(Y_i=0|X_i) = 1 - P(Y_i=1|X_i) - P(Y_i=2|X_i)$$

Y_i is the exchange rate regime of country i: $Y_i = 0$ for a free float, 1 for an intermediate regime and 2 for a hard peg. Contrary to an ordered logit, the two probabilities $P(Y_i=1)$ and $P(Y_i=2)$ are not nested. The explanatory variables included in X_i are the following:

- *OPEN* is the ratio of exports to GDP in 1996 or 1999. Since the dollarization index was not significant (see below) and was therefore not introduced as such, this variable may capture both trade exposure and exchange rate pass-through effects. Its sign is therefore ambiguous. In order to disentangle the two effects, we supplemented *OPEN* with the share of manufacturing in value–added, *IND*, as a rough proxy of sectoral diversification.[10] The idea is that a larger weight of

[7] On a sample of 92 countries, we find that the proportion of true floats has increased only from 10% to 11% after 1997/98, while the official proportions are 24 % and 28 %, see Bénassy-Quéré and Coeuré (2001).
[8] A detailed presentation of the method is to be found in Bénassy-Quéré and Coeuré (2001). A spreadsheet with complete estimation results, including basket coefficients for each country, is available on request to the authors.
[9] All variables and data sources are detailed in Appendix E.
[10] This follows Poirson (2000). More sophisticated measures of trade diversification (calculated on very disaggregated data from the CHELEM trade database) did not show up significant.

manufacturing, thus a smaller weight of primary goods, makes an emerging market economy less dependent on commodity market fluctuations, which are especially large.

- *TDEBT* is the ratio of total (domestic + foreign) debt to GDP in 1996 or 1999. This variable catches the importance of the interest-rate channel. It is appropriate to include foreign debt since interest rate rises due to depreciation expectations will also lead domestic agents to expect a re-evaluation of foreign currency debt. This variable is set to zero for industrial countries due to data unavailability.

- *DOMVAR* is the variability of domestic demand. It is calculated as the standard deviation of domestic demand growth over the period 1982-1996.

- *CAPC* is an index of capital controls taken in 1996 (pre crises) or 1999 (post crises) from the corresponding IMF exchange arrangements and exchange restrictions reports (IMF, 1997 and 2000)[11]. Capital controls reduce the likeliness of financial account shocks, captured in the model of Section 2 as shocks to the interest rate.

- *TURN* is the rate of turnover of central bankers over the period 1980-1989, used as a proxy of aversion to inflation. Although it is only available for a subset of countries and over a relatively remote period, we preferred using this variable rather than past inflation performance. The link between inflation and the choice of an exchange rate regime is ambiguous since a high inflation record makes a hard peg more desirable, but less likely to be sustained.[12] The lag in the turnover variable also rules out the reverse causality problem;

Other variables consistent with the theoretical model were tried but turned out not to be available and/or significant and are therefore not reported in the tables:

- we introduced a dollarization index taken from Baliño, Bennett and Borensztein (1999). However this index is available only for a limited number of countries, and it was not significant in this limited subset;

- another variable suggested by theory is the government discount factor. We introduced it as the share of majority seats in Parliament, using World Bank data (see Appendix E). Contrary to Frieden et al. (2000), Méon and Rizzo (2001) and Poirson (2001), the variable was not significant. This may be due to our particular proxy or to the fact that our sample includes both industrial countries and emerging countries and LDCs. Among the mentioned studies, the two former studies only include emerging countries and LDCs, whereas the latter proxies political unrest by the

[11] Namely, CAPC is the proportion of financial transactions categories subject to government restrictions.
[12] Past inflation is not significant in Frieden et al. (2000) and hardly so in Poirson (2000).

number of revolutions, which is equal to zero in industrial countries and which is not relevant for politically mature emerging economies;

- as an alternative to central bankers turnover, we tried average GDP growth over 1982-1996, with the idea that a poor growth performance raises the government incentive to inflate. This variable was not significant.

3.3 Estimations results

The maximum-likelihood estimation results are presented in Appendix C in Tables C1 (baseline model), C2 (adding the share of manufacturing) and C3 (adding central bankers turnover). Each of them covers the two periods and the two alternative exchange rate regime classification.

The first four columns give the estimates and corresponding p-values for the coefficients of the probabilities of intermediate regimes $P(Y_i=1|X_i)$ and of hard pegs $P(Y_i=2|X_i)$.[13] The last four columns give the derivatives of the three probabilities with respect to the explanatory variables.

The rate of correctly predicted observations goes from to 31% (model with turnover, IMF classification, pre-crises) to 86% (same model, de facto regimes, post-crises). This rate, as well as the log-likelihood, are systematically higher when using *de facto* classification rather than the IMF one. They are also higher when using augmented models rather than the baseline one. We now concentrate on Table C2 (with manufacturing share) in order to interpret the coefficients.

We find that most variables, although not always significant, have the sign predicted by theory:

- the most significant variable is trade openness *OPEN*. This result is robust to the time period and dataset. Trade openness increases the probability of an intermediate regime and even more of a hard peg, relatively to free float. This is consistent with Frieden et al. (2000), but it contrasts with Méon and Rizzo (2001), Poirson (2001) and Berger et al. (2000) who find either no significant relationship or a positive relationship between openness and exchange rate flexibility[14]. Remember that *OPEN* captures both exposure to foreign shocks (which is expected to favor flexibility) and pass-through effects (which are expected to favor fixing), the result suggests that the latter tend to dominate. This is confirmed when the model is augmented with the manufacturing share *IND*: hard pegs are even more likely when *IND* is higher, thus when the economy is more immune to global shocks. The only ways to settle the debate would be to include a separate dollarization or pass-through index;

[13] To compute p-values, estimated coefficients are normalized by assuming that $a_i^1+a_i^2=1$.
[14] One possible explanation for the result of the three studies mentioned is that they include country size along with trade openness, and larger countries are more likely to be found floating.

- although the coefficient is not always significant, a higher debt ratio *TDEBT* seems to reduce the probability of an intermediate regime. This is consistent with the fact that intermediate regimes lead to more unstable interest rates, which are all the more costly that debt is higher (in the model of Section 2, this is captured by interest rate elasticity $\boldsymbol{a}$). However, *TDEBT* does not clearly favor hard pegs over free floats;

- domestic demand variability *DOMVAR* is significant only in the post-crises period. It increases the probability of a hard peg, and even more of an intermediate regime relatively to a free float;

- capital controls *CAPC* raise the probability of intermediate regimes (in the first period, they also raise the probability of a hard peg). Taking the result at face value, the derivative of the corresponding probability with respect to this variable is 0.173 in the second period, meaning that moving from 100% capital controls (CAPC=1) to free capital movements (CAPC=0) would increase the odds of choosing a corner solution by 17%;

- lastly, when introducing central bankers turnover *TURN* (Table C3), we find as expected that a higher turnover (thus a weaker central bank and presumably less aversion to inflation) reduces the probability of a hard peg, especially after the crises. Other results remain broadly unchanged.

Note that the performance of the model (in terms of the percentage of correct predictions as well as in term of likelihood) is systematically higher before the 1997-1998 crises, suggesting that the relationship between exchange rate regimes and structural features of the economies have not yet settled back to a "stable" configuration.

Let us now turn to individual predictions. Appendix D gives the "most certain" predictions of the model as measured by the 15 highest and 15 lowest predicted probabilities within each regime. The main results are the following:

- the model predicts hard pegs correctly for CFA countries in both periods, and after the 1997-1998 crises for Hong Kong, Estonia and Panama. However, it fails to predict Argentina's currency board, El Salvador and Ecuador's dollarization and EMU membership for most participating countries (except Luxembourg, Belgium and the Netherlands). According to the model, Argentina, El Salvador and EMU countries should have intermediate exchange rate regimes, while Ecuador should float. Interestingly, though, the probability of a hard peg has substantially risen for all EMU countries;

- the model predicts very few free floats, except for Japan (for which the probability to float is 91%) and Indonesia (the United States do not belong to the sample); interestingly, although the model

predicts that China should keep an intermediate regime, the probability of floating the renminbi has massively risen (from 12% to 25%) after the 1997-1998 crises.

Lastly, the model predicts that 22 of the 92 countries should have changed regimes after the 1997-1998 crises. These countries are:

- from an intermediate regime to a hard peg: four Latin American countries (Bolivia, Guatemala, Nicaragua and Panama), three Asian countries (Hong Kong, Singapore and Nepal), and five European countries (Belgium, Luxembourg, Denmark, Estonia, and the Netherlands); and to a free float: Ecuador, Sierra Leone and Indonesia;

- from a hard peg to an intermediate regime: Chile, Latvia, Slovakia and the Republic of Congo; and to a free float: Guinea-Bissau;

- from a free float to an intermediate regime: Venezuela and Yemen; and to a hard peg: none.

5. Conclusion

We have seen that there remains a theoretical case for intermediate exchange rate regimes even when financial channels and credibility costs are taken into account, because intermediate regimes are best suited to address the disinflation/stabilization tradeoff and because extreme choices in the short run may reveal counterproductive later on, when the real exchange rate has to adjust to long term equilibria. We have also seen that fixing or floating requires a stronger commitment, making a case for moving to the corners rather than close to the corners.

Theory suggests, and cross-section observation confirms that exchange rate regime choice should ultimately depend on the countries structural characteristics and preferences, notably trade openness and capital mobility. In addition, factors highlighted in the recent "fear of floating" literature such as exchange pass-through and interest rate sensitivity are likely to be associated with less exchange rate flexibility.

Are these factors likely to become more or less frequent as world integration goes on? The answer is probably positive, since trade openness and free capital mobility are likely to become the general case. Thus the trend towards harder pegs is likely to continue. However, there remains some room for intermediate regimes to survive.

A crucial question which we do not address in our model, is how to organize the transition from one regime to another in the case the fundamentals have changed.[15] Moreover, as most other authors, we did not explore the possibility that some of the "fear of floating" factors listed above, such as partial dollarization and interest rate sensitivity (not to mention trade invoicing and the market for currency

hedging), may be endogenously related to the choice of an exchange rate regime. We think that the priority for future research should be to endogenize these dynamics, building a bridge towards Masson's (2001) empirical account of the transitions between exchange rate regimes.

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Appendix A. Exchange rate regime choice : disinflation, stabilization, and credibility

Consider a small, open economy. The authorities choose the exchange rate regime for each of two periods, Period 1 and Period 2, in order to minimize a combination of output and inflation variability. There is a cost associated to changing regimes between the two periods.

Main features of the model

In the long run (Period 2), prices are fully flexible and the real exchange rate balances the current account. The exchange rate regime is therefore neutral for the real economy and the only difference between a fixed and a flexible regime is the amount of price adjustment. In the short run (Period 1), prices are sticky; they only partially react to the nominal exchange-rate variation. This pass-through effect captures pricing to market, short term wage indexation and/or the degree of *de facto* dollarization. The two periods are linked both forward by rational expectations in Period 1 of Period 2 exchange rate, and backward by an inflation reputation effect: Period 1 inflation has a lasting impact on Period 2.

The authorities choose for each period an optimal degree of exchange rate flexibility, after the realization of permanent shocks to the economy, which everybody can observe. They can use the real exchange rate as an instrument in order to stabilize short run aggregate demand, but to a certain extent only, depending on how much they weight price stability. They face a commitment problem which they can solve by putting in place a *commitment technology* under the form of a regime change cost.

The real economy

The real side of the economy is described by three equations (with t = 1,2):

$$y_t = b_t - a\, r_t + u \qquad a > 0 \qquad (1)$$

$$b_t = n\,(q_t + v) \qquad n > 0 \qquad (2)$$

$$r_t = Eq^{e}_{t+1} - q_t + w \qquad (3)$$

Equation (1) gives aggregate demand $\boldsymbol{y_t}$ as the sum of the trade account $\boldsymbol{b_t}$ and of domestic demand, the latter depending on the real interest rate $\boldsymbol{r_t}$ and on a permanent domestic demand shock $\boldsymbol{u}$.

Equation (2) gives the trade account $\boldsymbol{b_t}$ as a function of the (log-) real exchange rate $\boldsymbol{q_t}$ and of a permanent foreign demand shock $\boldsymbol{v}$. $\boldsymbol{n}$ is the openness ratio: the more open the country, the larger the impact of a foreign demand shock, and the larger the stabilizing role of the real exchange rate.

Equation (3) relates the real interest rate $\boldsymbol{r_t}$ to the expected real exchange rate depreciation and to a shock $\boldsymbol{w}$ either on the country risk premium or on the world interest rate.

- In the *long run*, the real exchange rate adjusts to balance the trade account, and aggregate demand only depends on the domestic demand and interest rate shocks: $q_2 = -v$, $r_2 = w$, and $y_2 = u - aw$. In the *short run*, the real exchange rate adjusts to stabilize output. Let $\tilde{q}_1$ be the "shadow" flexible exchange rate in Period 1, i.e. the real exchange rate that would obtain in a flexible regime. We have $\tilde{q}_1 = -x/(a+n)$ where $x = u+(a+n)v-aw$ is a compounded shock.[1] The real exchange rate tends to depreciate ($\tilde{q}_1$ rises) in the case of a negative demand shock or of a positive interest rate shock.

- Let now γ_t be the actual degree of exchange rate adjustment allowed by the authorities in Period t. γ_1 and γ_2 are comprised between 0 and 1: $q_1 = \gamma_1 \tilde{q}_1$ and $q_2 = \gamma_2 \tilde{q}_2$. We have $r_1 = (a+n)^{-1}\gamma_1 x - v + w$ and $y_1 = (1-\gamma_1)x$:

  - in a fixed exchange rate regime ($\gamma_1 = 0$), shocks are not accommodated in Period 1 but Period 2 adjustment impacts the first period through the real interest rate channel. For instance, in the case of a positive foreign demand shock v, the real exchange rate is expected to appreciate in Period 2 to balance the trade account, thereby lowering the real interest rate in Period 1;

  - in a free float ($\gamma_1 = 1$), shocks are accommodated by Period 1 real exchange rate. For instance, in case of a positive domestic demand shock, q_1 appreciates but q_2 cannot. A real exchange rate depreciation is therefore expected, which raises Period 1 real interest rate. The rise of r_1 contributes to the stabilization of aggregate demand.

Nominal adjustment under exchange rate pass-through

We shall now see how real exchange rate movements are split between nominal exchange rates and prices. Let $q_t = s_t - p_t$ where s_t is the nominal exchange rate and p_t the price level, both in logarithms.

- In the *short run*, the price level adjusts to the nominal exchange rate up to a pass-through coefficient $m>0$ which depends on the degree of *de facto* dollarization and on wage indexation. The nominal exchange rate moves so as to let the real exchange rate adjust in the required proportion γ_1:

$$p_1 = ms_1 \qquad (4)$$

$$s_1 = (1-m)^{-1}\gamma_1 \tilde{q}_1 \qquad (5)$$

  The larger the pass-through, the more volatile nominal variables are, meaning that exchange rate flexibility yields more price instability in highly indexed or dollarized economies.

- In the *long run*, the nominal exchange rate can only account for a proportion γ_2 of the real exchange rate adjustment and price adjustment therefore accounts for the remaining $(1-\gamma_2)$. In

[1] All individual shocks will be assumed to be orthogonal. Thus the variance of x will be obtained by summing the variances of its components.

addition, we suppose that nominal variables keep a memory of what happened in the short run through a reputation (or disinflation credibility) effect:

$$p_2 - p_1 = -(1-\gamma_2)(q_2 - q_1) + hs_1 \qquad 0 < h < 1 \qquad (6)$$

$$s_2 - s_1 = \gamma_2 (q_2 - q_1) + hs_1 \qquad (7)$$

Note that exchange rate movements are the only source of price movements in the short run, as in a standard open economy version of the Barro-Gordon framework, but not in the long run, because the real exchange rate can adjust through a change in the price level. This setting is consistent with the monetary view of the balance of payments in a fixed exchange rate regime, where current account surpluses fuel inflation through reserve accumulation.

In a credibly fixed exchange rate regime ($\gamma_1 = \gamma_2 = 0$), all Period 2 real exchange rate adjustment is realized through price adjustment. In a credibly flexible regime ($\gamma_1 = \gamma_2 = 1$), Period 2 real exchange rate adjustment is realized through nominal exchange rate adjustment, and Period 2 inflation is only the consequence of Period 1 inflation through the reputation effect. For instance, a negative demand shock is accommodated by a nominal exchange rate depreciation, raising inflation in the short run and thus also in the long run. There is a reputation cost to exchange rate flexibility.

Making the exchange rate regime credible

The monetary authorities minimize a Barro-Gordon quadratic loss function which depends on aggregate demand and inflation variability in both periods. When announcing an exchange rate regime in Period 1, they have to convince the market that they will not renege on their commitment. They do so by putting in place a commitment technology. Suppose that changing regimes bears a reputation cost C, in the tradition of escape clause models. The cost $C = \theta(\gamma_2 - \gamma_1)$ depends on the amount of added flexibility and on a parameter θ. Moving from a fixed peg to free floating will bear a higher cost than moving from a fixed peg to a crawling peg. The total loss function is $L = L_1 + \beta E L_2$ with:

$$L_1 = \tfrac{1}{2}(y_1^2 + \lambda \dot{p}_1^2) \qquad \text{with } \dot{p}_1^2 = p_1$$

$$L_2 = \tfrac{1}{2}(y_2^2 + \lambda \dot{p}_2^2) + \theta(\gamma_2 - \gamma_1) \qquad \text{with } \dot{p}_2^2 = p_2 - p_1 \qquad (8)$$

The authorities proceed as follows. First, they solve the model for Period 1 under the hypothesis that the exchange rate regime will be the same for both periods: $\gamma_1 = \gamma_2 = \gamma$. Then, they define an optimal commitment technology θ so as to insure the credibility of the regime, in the sense that re-optimizing

in Period 2 would not lead to a regime change. Given Period 1 exchange rate regime γ_1, the optimal Period 2 regime γ_2^* is given by the minimization of Period 2 loss function, thus of $\dot{p}_2^2$:[2]

$$-\lambda(1-\gamma_2^*)v^2 - \gamma_1{}^2\left((1-\gamma_2^*)+\frac{h}{1-m}\right)\frac{x^2}{(a+n)^2}+\theta=0 \qquad (9)$$

The regime is fully credible if $\gamma_2^* = \gamma_1 = \gamma$, i.e. if:

$$\theta=\lambda(1-\gamma)v^2+\gamma^2\left((1-\gamma)+\frac{h}{1-m}\right)\frac{x^2}{(a+n)^2} \qquad (10)$$

Assuming $\gamma(1-\gamma) \sim 0$, we have:

$$\theta(\gamma)=\lambda(1-\gamma)v^2+\gamma^2\left(\frac{h}{1-m}\right)\frac{x^2}{(a+n)^2} \qquad (11)$$

Thus the commitment technology θ is a convex function of required exchange rate flexibility γ, with $\theta(0)=\lambda v^2$ (hard pegs) and $\theta(1)=\left(\frac{h}{1-m}\right)\frac{x^2}{(a+n)^2}$ (free float). θ reaches a minimum for an intermediate degree of flexibility $\gamma = \theta(0)/2\theta(1)$. We now have the following results:

- countries close to free float but which want to retain a certain degree of exchange rate management need to commit strongly if they want to refrain from floating in the period after. The strength of the commitment $\theta(1)$ depends *inter alia* on the persistence of inflation reputation h and on pass-through m. This is because if h and/or m is high, then the quasi-floating regime of Period 1 entails a large cost in terms of Period 2 inflation. Monetary authorities are then more reluctant to allow the real exchange rate to adjust through prices in Period 2 and they prefer to make use of nominal exchange rate flexibility.
- fixed pegs are not credible unless they are backed by strong institutional commitments. The strength of the commitment $\theta(0)$ only depends on the aversion for inflation λ and on the magnitude of foreign demand shocks v^2. This because hard pegs cannot accommodate foreign demand shocks, thus creating an incentive to use the nominal exchange rate rather than the price level to move the real exchange rate in Period 2;
- intermediate regimes require a weaker ex-ante commitment, because they are tailored to produce a balanced trade-off between stabilization and inflation in Period 1 that is less likely to be questioned in Period 2.

[2] Remember that aggregate demand in Period 2 does not depend on the exchange rate regime.

Optimal regime choice

- We can now safely assume that the exchange rate regime is the same in the two periods. Let us first consider the case of a very short sighted government ($\beta = 0$) so as to discuss the influence of the parameters abstracting from credibility issues. The optimal Period 1 exchange rate regime is found by minimizing L_1:

$$\gamma^* = [1 + \lambda \left(\frac{m}{1-m} \right)^2 \frac{1}{(a+n)^2}]^{-1} \qquad (12)$$

  We can check that γ^* is bounded by 0 (fixed peg) and by 1 (free floating). In this simplified case, the parameters which determine exchange rate regime choice are: the degree of exchange rate pass-through m; the share of exports in aggregate demand n; the elasticity of aggregate demand to the real interest rate a, which depends on the structure of domestic debt; the aversion for inflation λ. In particular, the optimal exchange rate regime is less flexible when:

  - the pass-through m is higher (because real exchange rate depreciation translates into higher inflation);
  - the openness ratio n is lower (because world demand shocks have a smaller impact);
  - the aversion to inflation λ is higher (unsurprisingly, because a nominal peg is the best way to insure zero inflation).

- If monetary authorities are not short sighted and minimize their loss over the two periods, the solution cannot be derived analytically. We can guess that in addition to m, n, a and λ, the discount factor β and the inflation reputation parameter h will play a role. Appendix B shows how changes in the parameters affect the loss function, thus the optimal solution, in reference to a benchmark situation with $m = n = a = h = \beta = 0.5$, $\lambda = 2$ and $u^2 = v^2 = w^2 = 1\%$:

  - the benchmark model is indicated as the thin line on all figures. The optimal exchange rate regime is typically an intermediate one because exchange rate flexibility increases inflation volatility but decreases output volatility;
  - in Figures B11 and B12, we explore government preferences. Unsurprisingly, higher aversion to inflation leads to a less flexible regime, and a shorter horizon leads to more flexibility, since the inflationary consequences matter less;
  - in Figures B21 to B24, we explore country characteristics. Hard pegs are more likely to be chosen by countries with a higher exchange rate pass-through (e.g. partially dollarized countries), a less open economy, strong inflation reputation effect, and a lower impact of real interest rates on aggregate demand;

- in Figures B31 and B32, we explore the nature of the shocks: harder pegs are more likely in the case of shocks to domestic demand or to interest rates (which do not require a real exchange-rate adjustment in Period 2).

Finally, what does the model teach us?

Overall, the conclusions are the following:

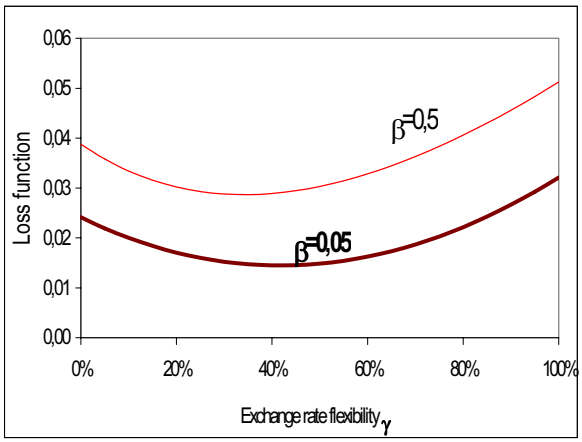
- When authorities weight inflation variability against output variability, the optimal exchange rate regime is typically an intermediate one. The optimal degree of exchange rate flexibility depends on the structure of the economy, the nature of the shocks it faces, and the preferences of monetary authorities.
- All things being equal, the following patterns will tend to favor less flexibility: a higher aversion to inflation and/or a longer time horizon; a higher degree of pass-through (for instance in the case of a *de facto* dollarized economy or in an economy with flexible wage contracts); a less open economy; a more persistent inflationary reputation; an aggregate demand less reactive to real interest rates, for instance due to lower indebtedness or longer debt contracts. Also, harder pegs are more likely for economy facing shocks to domestic demand or to interest rates than for economies facing shocks on foreign demand.
- The authorities face a commitment problem when they choose an exchange rate regime. This problem can be addressed by increasing ex-ante the cost of changing regimes. It turns out that corner solutions require a stronger ex-ante commitment. Countries which are close to floating but which want to retain a certain degree of exchange rate management have to commit not to move to a perfect float in the next period. Hard pegs need to be backed by strong institutional commitments, because they cannot accommodate foreign demand shocks and they thus create an incentive to use the nominal exchange rate to stabilize the current account. Intermediate regime require a weaker ex-ante commitment.

Appendix B. Figures

Note: The thin line on all figures is the loss function in the benchmark case.

Figure B1. Public preferences

B11. Discount factor β



B12. Aversion to inflation λ

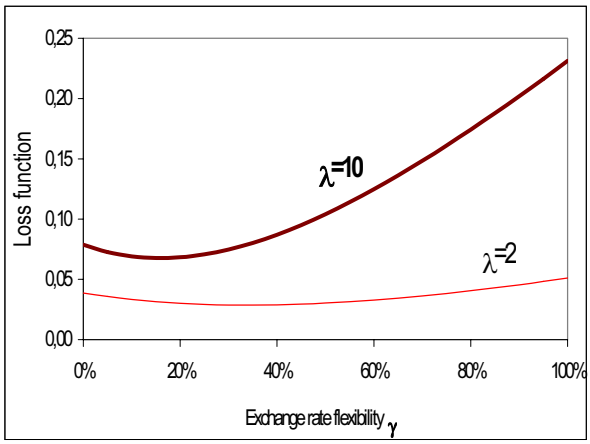
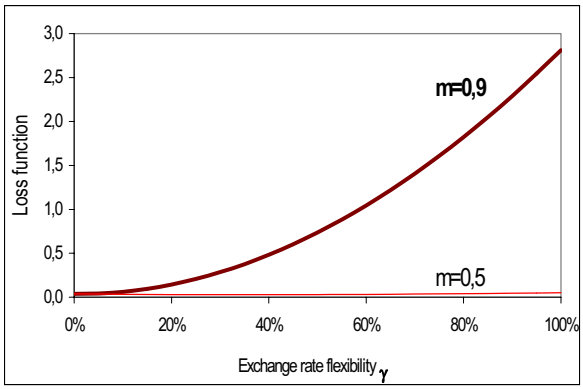
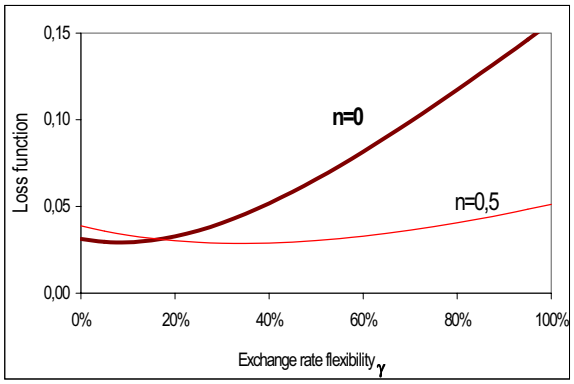


Figure B2. Country characteristics

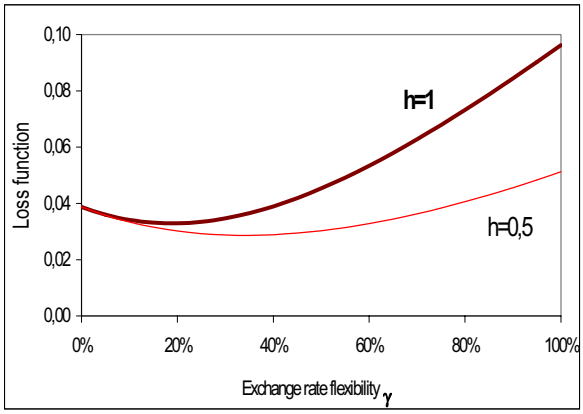
B21. Dollarization ***m***



B22. Openness ***n***



B23. Disinflation reputation ***h***



B24. Interest rate elasticity ***a***

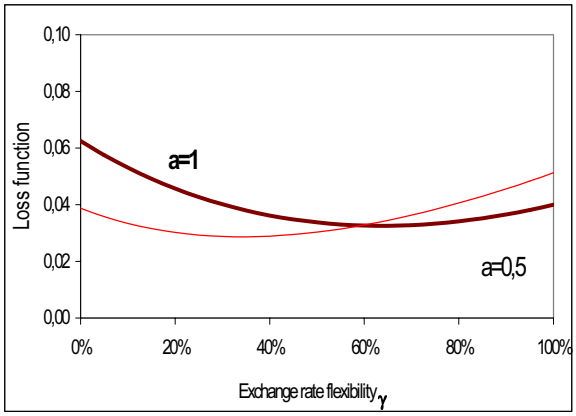
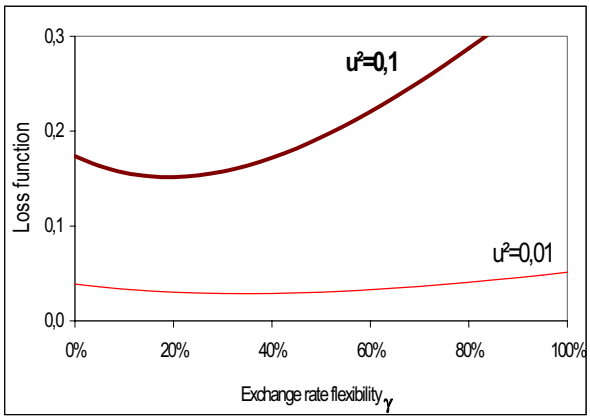
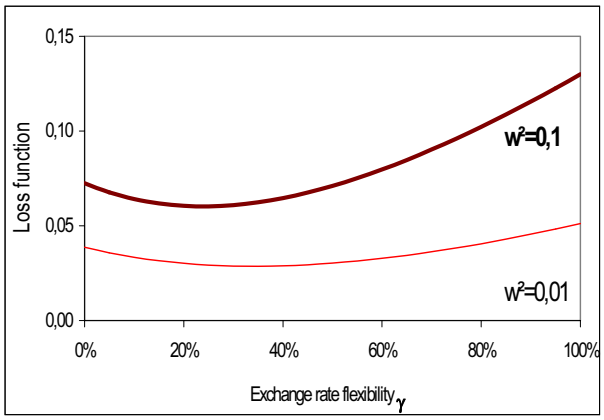


Figure B3. Nature of shocks

B31. Domestic shocks variability u^2



B32. Interest rate shocks variability w^2



Appendix C. Regression results

Table C1. Baseline regression results

	Estimations				$DP(Y_i=s)/dX_i$			
	Official regimes		De facto regimes		Official regimes		De facto regimes	
	1996	1999	Before crises	after crises	1996	1999	before crises	after crises
$P(Y_i=0\|X_i)$:								
Const.	-	-	-	-	0.307	0.278	0.064	0.196
OPEN	-	-	-	-	-0.008	-0.007	-0.004	-0.006
TDEBT	-	-	-	-	0.056	0.004	0.006	0.076
DOMVAR	-	-	-	-	0.014	-0.006	0.010	-0.028
CAPC					-0.294	-0.046	-0.201	-0.100
$P(Y_i=1\|X_i)$:								
Const.	-0.550	**-1.378**	-0.130	**-2.339**	0.196	-0.147	0.537	-0.031
	(0.434)	**(0.054)**	(0.921)	**(0.090)**				
OPEN	**0.045**	**0.036**	**0.066**	**0.080**	0.007	0.005	0.004	0.003
	(0.003)	**(0.007)**	**(0.057)**	**(0.026)**				
TDEBT	**-0.443**	-0.098	-0.155	**-1.295**	-0.096	-0.035	-0.055	-0.201
	(0.064)	(0.652)	(0.736)	**(0.007)**				
DOMVAR	**-0.162**	0.0394	-0.191	**0.383**	-0.044	0.007	-0.047	0.030
	(0.059)	(0.600)	(0.223)	**(0.053)**				
CAPC	**1.269**	0.469	**2.592**	1.646	0.100	0.128	-0.070	-0.239
	(0.050)	(0.453)	**(0.058)**	(0.164)				
$P(Y_i=2\|X_i)$:								
Const	**-4.925**	**-1.539**	**-5.376**	**-2.779**	-0.502	-0.131	-0.601	-0.165
	(0.000)	**(0.048)**	**(0.005)**	**(0.051)**				
OPEN	**0.0310**	**0.0342**	**0.060**	**0.0820**	0.001	0.002	0.000	0.003
	(0.102)	**(0.015)**	**(0.108)**	**(0.024)**				
TDEBT	0.112	0.103	0.291	-0.495	0.040	0.031	0.049	0.126
	(0.606)	(0.629)	(0.544)	(0.113)				
DOMVAR	**0.180**	0.017	0.155	**0.313**	0.030	-0.001	0.038	-0.002
	(0.071)	(0.839)	(0.401)	**(0.114)**				
CAPC	**2.505**	-0.141	**4.728**	0.729	0.194	-0.081	0.271	-0.139
	(0.010)	(0.837)	**(0.004)**	(0.536)				
Log-likelihood	-104.7	-129.7	-54.3	-75.22	-	-	-	-
% of correct predictions	59%	46%	72%	59%	-	-	-	-
Nb of observations	127	127	92	92	-	-	-	-

P-values in parenthesis.

Table C2. Results with manufacturing share

	Estimations				$DP(Y_i=s)/dX_i$			
	Official regimes		De facto regimes		Official regimes		De facto regimes	
	1996	1999	Before crises	after crises	1996	1999	Before crises	after crises
$P(Y_i=0\|X_i)$:								
Const.	-	-	-	-	0.326	-0.054	-0.055	-0.057
OPEN	-	-	-	-	-0.007	-0.008	-0.004	-0.006
TURN					0.056	0.029	0.015	0.079
TDEBT	-	-	-	-	0.201	-0.007	0.009	-0.027
DOMVAR	-	-	-	-	-0.235	-0.024	-0.200	-0.110
CAPC					-0.003	0.011	0.003	0.008
$P(Y_i=1\|X_i)$:								
Const.	-0.903	-0.208	1.287	0.484	0.036	-0.187	0.390	-0.376
	(0.321)	(0.817)	(0.460)	(0.832)				
OPEN	**0.038**	**0.040**	**0.059**	**0.128**	0.012	0.004	0.002	0.002
	(0.016)	**(0.009)**	**(0.102)**	**(0.026)**				
TDEBT	**-0.425**	-0.168	-0.255	-2.011	0.005	-0.023	-0.003	-0.166
	(0.103)	(0.454)	(0.586)	(0.001)				
DOMVAR	**-0.240**	0.032	-0.196	**0.621**	-0.079	0.002	-0.051	0.022
	(0.012)	(0.691)	(0.254)	**(0.058)**				
CAPC	0.686	0.198	**2.794**	**2.682**	-0.055	0.047	-0.095	0.173
	(0.313)	(0.763)	**(0.062)**	**(0.130)**				
IND	**0.046**	-0.034	-0.0371	**-0.148**	-0.015	0.005	0.008	0.017
	(0.077)	(0.166)	(0.495)	**(0.052)**				
$P(Yi=2\|X_i)$:								
Const	**-3.907**	1.209	-2.110	2.892	-0.362	0.241	-0.335	0.433
	(0.012)	(0.272)	(0.345)	(0.232)				
OPEN	**0.043**	**0.046**	**0.071**	**0.143**	0.003	0.004	0.002	0.004
	(0.031)	**(0.005)**	**(0.065)**	**(0.014)**				
TDEBT	0.007	-0.143	-0.080	**-1.355**	0.023	-0.007	0.016	0.086
	(0.975)	(0.533)	(0.875)	**(0.003)**				
DOMVAR	**0.209**	0.049	0.233	**0.597**	0.034	0.005	0.042	0.005
	(0.047)	(0.582)	(0.255)	**(0.073)**				
CAPC	**2.734**	-0.003	**5.482**	2.103	0.251	-0.023	0.296	-0.063
	(0.009)	(0.997)	**(0.003)**	(0.246)				
IND	**-0.064**	**-0.112**	**-0.144**	**-0.277**	-0.009	-0.016	-0.011	-0.025
	(0.073)	**(0.001)**	**(0.027)**	**(0.001)**				
Log-likelihood	-93.38	-117.12	-46.88	-56.46	-	-	-	-
% of correct predictions	62%	50%	74%	69%	-	-	-	-
Nb of observations	119	119	86	86	-	-	-	-

P-values in parenthesis.

Table C3. Results with central bankers turnover

	Estimations				$dP(Y_i=s)/dX_i$			
	Official regimes		De facto regimes		Official regimes		De facto regimes	
	1996	1999	Before crises	after crises	1996	1999	Before crises	after crises
$P(Y_i=0\|X_i)$:								
Const.	-	-	-	-	0.361	0.206	0.132	0.134
OPEN	-	-	-	-	-0.008	-0.004	-0.006	-0.006
TDEBT	-	-	-	-	0.054	0.015	-0.057	0.079
DOMVAR	-	-	-	-	0.002	-0.039	-0.009	-0.038
CAPC					-0.294	-0.012	-0.154	-0.078
TURN					-0.082	0.452	0.092	0.264
$P(Y_i=1\|X_i)$:								
Const.	-1.352	**-1.661**	-2.777	-2.010	-0.027	-0.350	0.277	-0.282
	(0.149)	**(0.069)**	(0.327)	(0.209)				
OPEN	**0.052**	**0.0303**	**0.132**	**0.072**	0.009	0.005	0.008	0.007
	(0.010)	**(0.053)**	**(0.089)**	**(0.059)**				
TDEBT	-0.398	-0.210	1.254	**-1.226**	-0.081	-0.061	0.027	-0.186
	(0.130)	(0.426)	(0.704)	**(0.016)**				
DOMVAR	-0.114	**0.229**	0.178	**0.456**	-0.042	0.032	-0.038	0.026
	(0.371)	**(0.052)**	(0.672)	**(0.066)**				
CAPC	**1.435**	0.409	3.351	1.392	0.154	0.148	-0.024	0.270
	(0.055)	(0.563)	(0.233)	(0.261)				
TURN	1.534	-0.702	-1.921	-1.351	0.491	0.438	0.213	0.637
	(0.254)	(0.569)	(0.482)	(0.451)				
$P(Y_i=2\|X_i)$:								
Const	**-5.070**	**-0.172**	**-7.725**	**-0.827**	-0.334	0.144	-0.409	0.148
	(0.010)	**(0.867)**	**(0.025)**	**(0.620)**				
OPEN	0.0103	**0.013**	**0.100**	**0.0513**	-0.002	-0.001	-0.002	-0.002
	(0.721)	**(0.495)**	**(0.217)**	**(0.189)**				
TDEBT	0.113	0.141	1.602	-0.412	0.027	0.046	0.030	0.107
	(0.069)	(0.577)	(0.629)	(0.157)				
DOMVAR	**0.450**	0.181	0.746	**0.445**	0.040	0.007	0.047	0.012
	(0.029)	(0.163)	(0.111)	**(0.078)**				
CAPC	**2.620**	-0.550	**5.474**	0.067	0.139	-0.135	0.178	-0.192
	(0.065)	(0.512)	**(0.079)**	(0.958)				
TURN	-4.340	**-5.699**	**-5.607**	**-6.195**	-0.409	-0.890	-0.305	-0.901
	(0.125)	**(0.009)**	**(0.120)**	**(0.016)**				
Log-likelihood	-71.7	-92.8	-31.8	-57.4	-	-	-	-

% of correct predictions	65%	31%	86%	67%	-	-	-	-
Nb of observations	98	98	76	76	-	-	-	-

P-values in parenthesis.

Appendix D. Predictions of the logit model

Table D1. Model predictions before 1997-1998 crises
15 highest and 15 lowest probabilities for each regime

Hard peg		**Soft Peg**		**Free Float**	
Chad	98%	Ireland	97%	Uruguay	59%
Guinea-Bissau	87%	Belgium	96%	Venezuela	52%
Rwanda	87%	Netherlands	96%	Argentina	41%
Togo	84%	Korea	96%	Japan	29%
Ethiopia	82%	Singapore	95%	Yemen	26%
Niger	80%	Luxembourg	94%	El Salvador	26%
Jordan	80%	Mauritius	93%	Panama	22%
Cameroon	74%	Austria	93%	Italy	18%
Benin	71%	Indonesia	92%	Tr & Tobago	17%
Côte d'Ivoire	70%	Switzerland	92%	Nicaragua	17%
Congo Rep.	70%	France	91%	Bolivia	17%
Mali	60%	Spain	91%	Guatemala	17%
Slovak Rep.	57%	Norway	90%	Costa Rica	16%
Chile	52%	Thailand	89%	Ecuador	13%
Central Africa	50%	Hungary	89%	Germany	13%
…	…			…	…
Venezuela	2%	Slovak Rep.	42%	Slovak Rep.	1%
Denmark	2%	Latvia	42%	Senegal	1%
Korean Rep.	2%	Mali	39%	Coted'Ivoire	1%
Ecuador	2%	Uruguay	38%	Sri Lanka	1%
Greece	1%	Côte d'Ivoire	29%	Togo	1%
Ireland	1%	Benin	28%	Lesotho	0%
CostaRica	1%	Congo Rep.	27%	Belgium	0%
Canada	1%	Cameroon	24%	Luxembourg	0%
UK	1%	Jordan	20%	Jordan	0%
Norway	1%	Niger	18%	Grenada	0%
Netherlands	1%	Togo	15%	Chad	0%
Italy	1%	Ethiopia	15%	Malaysia	0%
Germany	1%	Guinea-Bissau	12%	Sweden	0%
Austria	0%	Rwanda	12%	Hong Kong	0%
Japan	0%	Chad	2%	Singapore	0%

Table D2. Model predictions after 1997-1998 crises
15 highest and 15 lowest probabilities for each regime

Hard peg		**Soft Peg**		**Free Float**	
Hong Kong	90%	Czech Rep.	92%	Japan	91%
Ethiopia	85%	Gabon	89%	Indonesia	76%
Nicaragua	82%	Malaysia	88%	Sierra Leone	68%
Mali	81%	Papua NG	88%	Guinea-Bissau	68%
Luxembourg	80%	Russia	88%	Ecuador	59%
Panama	80%	Tr & Tobago	87%	Egypt	35%
Benin	75%	Dominican Rep.	86%	Nigeria	26%
Chad	70%	South Africa	86%	China	25%
Cameroon	69%	Chile	85%	Germany	24%
Jordan	69%	Venezuela	84%	Brazil	20%
Bolivia	66%	Thailand	83%	Nicaragua	16%
Niger	66%	Swaziland	83%	Italy	15%
Togo	66%	Korea	83%	Bangladesh	14%
Central Africa	62%	Yemen	81%	Korea	13%
Estonia	60%	Lesotho	79%	India	10%
…	…	…	…	…	…
Brazil	13%	Jordan	31%	Togo	0%
South Africa	12%	Cameroon	31%	Panama	0%
T&Tobago	12%	Chad	30%	Belgium	0%
Malaysia	12%	Benin	25%	Ireland	0%
Venezuela	11%	Bolivia	24%	Czech Rep.	0%
Gabon	11%	Indonesia	22%	Grenada	0%
Russia	10%	Luxembourg	20%	Chad	0%
Czech Rep.	8%	Panama	20%	Latvia	0%
Ecuador	8%	Mali	18%	Slovak Rep.	0%
Papua NG	6%	Ethiopia	14%	Estonia	0%
Korean Rep.	4%	Hong Kong	10%	Malaysia	0%
Nigeria	4%	Sierra Leone	10%	Swaziland	0%
Indonesia	3%	Japan	8%	Luxembourg	0%
China	1%	Nicaragua	2%	Hong Kong	0%
Japan	1%	Guinea-Bissau	0%	Singapore	0%

Appendix E. Definition of variables and data sources

Variable	Definition	Source
IMF_{xx}	Official regime at end year xx	IMF, Exchange Arrangements and Exchange Restrictions, yearbook xx+1
BQCPRE	Official/de facto regime according to BQC before 97-98 crisis	Bénassy-Quéré, A., and B. Coeuré (2001), "On the identification of de facto currency baskets", mimeo.
BQCPOST	Official/de facto regime according to BQC after 97-98 crisis	Bénassy-Quéré, A., and B. Coeuré (2001), "On the identification of de facto currency baskets", mimeo.
$CAPC_{xx}$	Capital controls index at end year xx, calculated over at least 7 of the 9 capital controls items	IMF, Exchange Arrangements and Exchange Restrictions, yearbook xx+1
$OPEN_{xx}$	Openness ratio at year xx (exports/GDP in %)	World Bank, World Development Indicators, 2001.
DOL	Dollarization ratio, last year available (1995). Foreign currency deposits/broad money, in %.	Balino, T., A. Bennett, and E. Borensztein (1999), Monetary Policy in Dollarized Economies, IMF Occasional Paper, 171.
STAB	Index of political stability, 1-opposition seats/government seats in parliament (1 if dictatorship)	Beck, T., G. Clarke, A. Groff, Ph. Kefer, and P. Walsh (2000), New Tools and new tests on comparative political economy: The database of political institutions", World Bank working paper, 2283, http://paradocs.pols.columbia.edu/datavine/BrowseFrameSet.jsp?dsetID=100
IND	Share of industry in valu added (%)	World Bank, World Development Indicators, 2001.
TURN	turnover rate of cenrtral bankers over 1980-1989.	Cukierman, A., Webb, S.B. and Neyapti, B. (1992), "Measuring the independence of central banks and its effects on policy outcomes", World Bank Review, 6 (3), 353-398 ; and De Haan, J. and Kooi, W.J. (2000), "Does central bank independence really matter? New evidence for developing countries using a new indicator", Journal of Banking and Finance, 24, 643-664.
$TDEBT_{xx}$	total debt/GDP at end year xx (domestic+foreign debt)	World Bank, World Development Indicators, 2001
DOMVAR	Domestic demand instability (SD of growth rate over 1982-1996 in %)	World Bank, World Development Indicators, 2001

Note: xx stands for 1996 (before crises) or 1999 (after crises).