DISCUSSION PAPER SERIES

No. 7006

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INTERNATIONAL MACROECONOMICS

Centre for Economic Policy Research

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ISSN 0265-8003

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Discussion Paper No. 7006
October 2008

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CEPR Discussion Paper No. 7006

October 2008

ABSTRACT

Fear of Floating and Pegging: A Simultaneous Choice Model of De Jure and De Facto Exchange Rate Regimes *

We present an analysis of the determinants of de jure and de facto exchange rate regimes based on a panel probit model with simultaneous equations. The model is estimated using simulation-based maximum likelihood methods. The empirical results suggest a triangular structure of the model such that the choice of de facto regimes depends on the choice of de jure regimes but not vice versa. This gives rise to a novel interpretation of regime discrepancies.

JEL Classification: C35, F33 and F41
Keywords: de facto exchange rate regimes, developing countries and simultaneous equations

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* We thank Nelson Mark, seminar participants at the University of Bonn, Notre Dame University, and Indiana University and participants at the first RIEF conference for suggestions and comments. Jizhong Zhou acknowledges the financial support from Deutsche Forschungsgemeinschaft when he was doing research at the Center for European Integration Studies (ZEI), University of Bonn. This research is also sponsored by Shanghai Pujiang Program.

Submitted 02 October 2008

1. Introduction

Choosing an exchange rate regime is one of the most important decisions of macro economic policy for governments of developing and emerging market economies to make. What guides this choice in practice is, therefore, an interesting empirical question of international macroeconomic policy. Until the late 1990s, empirical investigations into this question generally focused on the “de jure” regimes officially declared by the governments to the IMF.[1] Since then, several studies have documented differences between the de jure and the “de facto” regimes, the latter being identified based on the observed behavior of exchange rates and exchange-rate policies. For example, Ghosh et al. (1997) point out that many countries declaring currency pegs as their exchange rate regimes in fact allow frequent and sometimes substantial exchange rate adjustments. Their exchange rate policies are, therefore, observationally equivalent to floating-rate regimes. In contrast, Calvo and Reinhart (2002) show that many countries which claim to have floating regimes manage their exchange rates so tightly that they mimic the behavior of fixed-rate regimes. These studies suggest that discrepancies between de jure and de facto exchange rate regimes are not uncommon. Based on this finding, several recent papers have studied the empirical determinants of the choice of de facto exchange rate regimes.[2]

How are the choices of de jure and de facto regimes related? This seems a natural question to ask, but most of the existing literature focuses on either one or the other type of regime. Levy-Yeyati et al (2006) consider both choices in the same paper, but treat them separately as though they were not correlated, which seems unlikely. Alesina and Wagner (2006) study the deviations of de facto from de jure regimes, which they interpret as commitments broken by the governments, but they do not ask what determines the de jure regimes.

This paper contributes to the literature by considering the two choices jointly. Specifically, we provide an empirical analysis of the joint choices of de jure and de facto regimes in a large number of developing countries since the collapse of the Bretton Woods system. We use a simultaneous-equations probit model allowing explicitly for structural interdependence between the choice of de jure and the choice of de facto exchange rate regimes. As in Levy-Yeyati et al. (2006), the reduced-form estimate of this model shows that both choices

[1] One early exception is Holden et al. (1979), who constructed an empirical index to measure de facto exchange-rate flexibility. For empirical analyses of de jure exchange rate regimes in developing countries, see, among others, von Hagen and Zhou (2007).

[2] See e.g. Poirson (2001), Hausmann et al. (2001), Alesina and Wagner (2006), Levy-Yeyati et al (2006), and von Hagen and Zhou (2005b).

depend on similar sets of explanatory variables relating to optimum-currency-area arguments, macroeconomic stabilization, and political economy. The structural-form estimate of the model is recursive in the sense that the choice of de jure regimes affects the choice of de facto regimes but not vice versa. This allows us to represent the choice of the de facto regime as being solely dependent on the latent variable driving the choice of de jure regimes, but with thresholds which are wider than those relating to the choice of de jure regimes. Thus, consider a situation where both the de facto and the jure regimes have fixed exchange rates. As the desirability of exchange rate flexibility increases, a country will first move to a more flexible de facto regime and then to a more flexible de jure regime. Yet, as the desirability of exchange rate flexibility rises further, the country will first move from an intermediate regime to a de jure float and then to a de facto float. Thus, the tendency to avoid intermediate regimes seems greater for de jure than for de facto regimes.

Studying de facto exchange rate regimes requires a set of criteria to classify alternative regimes, an issue on which there is still no general agreement in the literature. [3] The classification proposed by Levy-Yeyati and Sturzenegger (LYS) (2005) uses exchange rate data reported by the central banks and the IMF and identifies de facto regimes based on measures of the average volatility of a country's exchange rate relative to the volatility of the exchange rates of all countries in the sample. The most prominent alternative is provided by Reinhard and Rogoff (RR) (2004). They use a host of additional data including unofficial, black market exchange rates when available and identify regimes based on a country-by-country approach measuring the probability of large exchange rate changes. Which of these approaches is preferable depends on the specific application one has in mind. In our view, the LYS approach is closer to the intentions and behavior of the relevant policy authorities, while the RR classification may be a better reflection of actual market conditions. This is most obvious in the case where the authorities use capital and foreign exchange controls to maintain a stable rate in the official market, while the black market rate fluctuates heavily. Such a situation would count as a peg under the LYS classification but as a floating rate under the RR classification. Since we are interested in this paper in the behavior of the monetary authorities, our subsequent analysis focuses on the LYS data and uses the RR classification in a robustness check.

The rest of the paper is organized as follows. Section 2 describes and compares the classifications of the two de facto and the de jure exchange rate regimes. Section 3 develops a simultaneous equations model to explain the joint determination of de facto and de jure regimes. Section 4 discusses empirical results. Conclusions are presented in section 5.

[3] See Tavlas et al (forthcoming) for a review of the literature on classifying de-facto regimes.

2. Exchange Rate Regimes: Classification and Comparisons

2.1 Classification of Exchange Rate Regimes

LYS (2005) apply cluster analysis to a sample of 172 countries during the period from 1974 to 2000 and distinguish between three types of de facto regimes, fixed, intermediate, and flexible.[4] We label this data set the “LYS” classification, see the upper panel of Table 1. Reinhart and Rogoff’s (2004) “natural classification” of de facto regimes is based on a data set covering 153 countries and different periods, the longest of which ranges from 1946 to 2001. They distinguishe between 15 different de facto exchange rate regimes. We label this data set the “RR” classification. To facilitate comparison with the LYS and the de jure regime classifications, we group their 15 regimes into fixed, intermediate, and flexible regimes. They are listed in the upper middle panel of Table 1.

[Table 1]

De jure exchange rate regimes refer to those announced by governments and classified by the IMF.[5] The main source of information is the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*). Before 1981, the IMF adopted a dichotomous classification scheme based on whether or not exchange rates were maintained against some reference. For the period from 1981 to 1997, three broad categories were used: pegged regimes, regimes with limited flexibility, and more flexible arrangements. Since 1998, the IMF has used an eight-regimes scheme to give a more accurate classification of exchange rate policies.[6] We condense these eight into three broad

[4] The authors also identify a small number of “inconclusive” regimes where it is difficult to infer the policy regime when the foreign exchange market is tranquil. In this paper, we treat regimes as fixed ones, because they at least share a common feature of stable exchange rates. Because the number of inconclusive regimes is small, the empirical results do not change, when these regimes are excluded from the fixed-rate group.

[5] Ghosh et al (1997) point out that many countries classified by the IMF as maintaining pegged regimes have frequently adjusted their exchange rate parities, while Calvo and Reinhart (2002) argue that many officially declared floating regimes are actually intervening their exchange rates to ensure their strong stability. These evidences suggest that the classification of some regimes is certainly subject to controversy. But this is why a separate de facto classification is necessary and important. Therefore, we stick to the notional classification made by the IMF in order to highlight the discrepancies between de jure and de facto classifications.

[6] The last scheme was introduced by the IMF in order to better account for actual exchange rate policies. Since it still relies heavily on official information, however, the literature still regards the new IMF classification as one of de jure regimes. See von Hagen and Zhou (2005a, 2005b) and Reinhart and Rogoff (2004) for more elaboration on this argument.

groups, fixed, intermediate, and flexible rate regimes in order to facilitate comparison with the de facto regimes. Our empirical analysis is based on a sample of 112 developing countries during the period from 1978 to 2000 covered by all three classifications. The total number of country-year observations is 1805.

2.2 A Comparison of De facto and De jure Exchange Rate Regimes

In this sub-section, we compare the IMF classification of de jure exchange rate regimes with both the LYS and the RR classification of de facto exchange rate regimes. The upper panel of Table 2A presents a cross-classification of the de jure against the two de facto exchange rate regimes. The column labeled “IMF” reports the sample distribution of de jure regimes. It shows that fixed-rate regimes are the predominant ones, accounting for 54% of all observations. Flexible regimes, with a share of 39.2%, rank second, and intermediate regimes are the smallest group with only 6.8% of all observations.

The bottom row of the upper panel reports the sample distributions of the de facto regimes under the LYS and the RR classifications. Compared to the de jure regimes, intermediate regimes gain a substantial share and do so mainly at the cost of flexible regimes. Based on the LYS data, intermediate regimes account for 21.3% of all observations, flexible regimes for 20.1%. The RR classification gives intermediate regimes 31.5% of all observations and flexible ones 28.5%. The share of fixed regimes in the LYS data is 58.6%, even higher than in the IMF data, but it drops to 40% when the RR classification is used.

[Table 2A - 2B]

The remaining cells of this panel indicate the distribution of the de facto regimes given a certain type of de jure regime. For example, of the 975 cases of official fixed-rate regimes, 843 have de-facto fixed rates under the LYS classification, 87 are intermediate regimes, and 45 are de-facto flexible exchange rate regimes. Based on these cross-classifications, we test whether de jure and de facto regimes are independently distributed. Under the null hypothesis of independence, the conditional distribution of de facto regimes given de jure regime choices is the same as the unconditional distribution of de facto regimes and vice versa. The relevant test statistic has a chi-squared distribution with four degrees of freedom. As shown in the lower panel of Table 2A, we reject independence at the one-percent significance level for both cross-classifications. Thus, the data suggest that the choices of de jure and de facto regimes are not independent of each other.

Entries on the main diagonal of the top panel of Table 2A are characterized by the fact that the de jure and the de facto regimes exhibit the same degree of exchange rate flexibility. We call this “regime consistency”. Entries below the main diagonal are characterized by the fact that the de facto regime is less flexible than the de jure regime. Recent literature refers to this case as “fear of floating”.[7] In contrast, elements above the main diagonal are characterized by the fact that de facto regime is more flexible than the de jure regime. Following LYS (2005), we call this “fear of pegging”. We aggregate the nine regime parings of Table 2A into these three categories, since some of them have too few observations to treat them separately in the subsequent empirical analysis.

Based on the LYS classification, fear of floating and fear of pegging together account for 35.7% of all observations; based on the RR classification, they account for even 44%. Using the LYS data, 26% of all cases exhibit fear of floating and nearly 10% fear of pegging. Based on the RR data, the share of cases with fear of floating decreases slightly to 23.7%, while the share of cases with fear of pegging increases to 20.4%. This difference can be attributed to the difference in the exchange rate data used for the two de facto regime classifications. Since the IMF classification is based on official announcements, it is not surprising to see that the IMF-LYS comparison gives a slightly higher share of regime consistency than the IMF-RR comparison. Moreover, if a country declares a fixed regime and maintains a stable official exchange rate, while the black-market rate fluctuates freely, the de facto regime will be identified as a fixed one by LYS but a flexible one by RR. This results in regime consistency based on LYS, but fear of pegging based on RR.

Table 2B gives a cross classification of the LYS against the RR de facto regimes. It shows that the two approaches yield consistent results in only 56 percent of all cases. Only 50 percent of the cases classified as intermediate regimes under the LYS approach are classified in the same way under the RR approach, while 41 percent appear as floating rate regimes under the RR approach. Similarly, only 43 percent of the cases classified as floating rate regimes are classified in the same way under the RR approach. Despite these differences, the hypothesis of independence of the two distributions is firmly rejected.

Tables 3A-C present information about the dynamics of regime choices over time. For each country-year observation, we ask whether the flexibility of exchange rates implied by the current regime is lower, the same, or higher than in the previous year. The tables report the

[7] The term is first used by Calvo and Reinhart (2002) to describe the phenomenon that a country announces a de jure floating regime but keep the exchange rate very stable through tight management. Alesina and Wagner (2006) subsume under “fear of floating” all observations where de facto regimes are less flexible than de jure ones.

unconditional and the conditional distributions of regime changes for de jure and the two de facto classifications.

[Table 3A – 3C]

Consider the unconditional distributions, first. Here, the frequency of unchanged exchange rate flexibility is a measure of exchange rate persistence. The first column of Table 3A indicates that in 92.6% of all cases the exchange rate flexibility is unchanged, suggesting a very high degree of persistence in de jure regimes. The bottom row of the same table shows that, with 72.1% of all cases unchanged, the persistence of de facto regimes based on the LYS classification is considerably lower than that of the de jure regimes. It is also much lower than the persistence of de facto regimes under the RR classification, where 92.7 of all cases exhibit no change in exchange rate flexibility.

The conditional distributions reported in Table 3A allow us to study the pattern of changes in the de facto regimes given a change or no change in the de jure regime. First, conditional on no change in the de jure regime, de facto regimes change more frequently under the LYS classification (25.8%) than under the RR classification (6.4%). Second, given a decrease in exchange rate flexibility under the de jure regime, the LYS classification indicates a decrease in exchange rate flexibility in only 31.6% of the cases, and the RR classification in only 10.5% of all cases. Given an increase in exchange rate flexibility under the de jure regime, the LYS classification indicates an increase in exchange rate flexibility under the de facto regime in 43.4% of all cases, and the RR classification in only 15.8%. We use a chi-square test to check for independence of the distribution of de jure and de facto regime changes. For both classifications, we cannot reject the hypothesis of independence.

Finally, Tables 3B and 3C consider the relationship between de jure and de facto regime changes with a one-year lag in either direction. Again, the relevant chi-square tests do not reject the hypothesis of independence. In sum, there does not seem to be any systematic correlation in regime changes from year to year.

3. Simultaneous Exchange Rate Regime Choices

3.1 The Model

Let q_{it} be a discrete indicator of the de facto exchange rate regime observed in country i in year t. It can take one of the three values: 0, 1, or 2. We assume that the realization of this random variable depends on whether a latent variable, denoted by q_{it}^*, crosses some thresholds. Specifically,

$$\left.\begin{array}{llll} \text{If} & q_{it}^{*} \le -t_q, & \text{then } q_{it} = 0 & \Leftrightarrow \text{ de facto fixed regime,} \\ \text{If} & -t_q < q_{it}^{*} \le t_q, & \text{then } q_{it} = 1 & \Leftrightarrow \text{ de facto intermediate regime,} \\ \text{If} & q_{it}^{*} > t_q, & \text{then } q_{it} = 2 & \Leftrightarrow \text{ de facto flexible regime.} \end{array}\right\} \quad (1)$$

We interpret q_{it}^{*} as an unobservable measure of the desirability of exchange rate flexibility. Without loss of generality, we center the range of values giving rise to intermediate regimes on zero, while the borders of that range, $\pm t_q$, must be estimated. Similarly, the de jure exchange rate regime in country i and year t is indicated by a discrete variable y_{it} with the associated latent variable y_{it}^{*}, and the mapping from y_{it}^{*} to y_{it} is similar:

$$\left.\begin{array}{llll} \text{If} & y_{it}^{*} \le -t_y, & \text{then } y_{it} = 0 & \Leftrightarrow \text{ de jure fixed regime,} \\ \text{If} & -t_y < y_{it}^{*} \le t_y, & \text{then } y_{it} = 1 & \Leftrightarrow \text{ de jure intermediate regime,} \\ \text{If} & y_{it}^{*} > t_y, & \text{then } y_{it} = 2 & \Leftrightarrow \text{ de jure flexible regime.} \end{array}\right\} \quad (2)$$

The analysis of the previous section suggests that de facto and de jure regime choices are correlated. For example, actual exchange rate policies may be constrained by public announcements, which in turn are made so as to formalize de facto exchange rate policies, thus generating mutual endogeneity of the two regime choices. To account for this possibility we use a simultaneous equations model, which describes the joint determination of de facto and de jure regime choices as follows:

$$q_{it}^{*} = \mathbf{x}_{it}^{q}\beta_q + y_{it}^{*}\alpha_q + e_i^q + u_{it}^q, \quad (3a)$$

$$y_{it}^{*} = \mathbf{x}_{it}^{y}\beta_y + q_{it}^{*}\alpha_y + e_i^y + u_{it}^y, \quad (3b)$$

where $\mathbf{x}_{it}^{q}$ ($\mathbf{x}_{it}^{y}$) is a row vector of determinants for the choice of de facto (de jure) exchange rate regime, and $e_i = (e_i^q, e_i^y)'$ is a vector of country-specific, time-invariant random effects, which are assumed to be independently and identically distributed (i.i.d.) bivariate normal with zero mean and a variance-covariance matrix denoted by Σ_e:

$$e_i = \begin{pmatrix} e_i^q \\ e_i^y \end{pmatrix} \sim \text{i.i.d. N}(\mathbf{0}, \Sigma_e), \forall i, \quad \Sigma_e = \begin{pmatrix} \sigma_{qq} & \sigma_{qy} \\ \sigma_{yq} & \sigma_{yy} \end{pmatrix}. \quad (4a)$$

The two error terms, u_{it}^{q} and u_{it}^{y}, are assumed to be i.i.d. standard normal and independent of each other, that is,

$$u_{it} = \begin{pmatrix} u_{it}^{q} \\ u_{it}^{y} \end{pmatrix} \sim \text{i.i.d. N}(\mathbf{0}, \Sigma_u), \forall i, \forall t, \quad \Sigma_u = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}. \tag{4b}$$

The model is estimated using a two-stage approach. At the first stage, we estimate the reduced-form equations for q_{it}^{*} and y_{it}^{*} and compute their fitted values. Since the reduced-form error terms are composites of the structural disturbances (u_{it}^{q} and u_{it}^{y}), they are correlated with each other, and a bivariate probit model exploiting this correlation leads to more efficient estimation. At the second stage, we replace the endogenous variables appearing on the right-hand side of the structural equations by their fitted values, and the structural parameters can be estimated consistently. At both stages, we need to first formulate the probabilities conditioned on both the explanatory variables and the random-effect terms, and then approximate the probabilities conditioned only on the explanatory variables by their simulated means. These simulated probabilities are then plugged into the likelihood function for maximization (see Appendix I for details).

3.2 Explanatory Variables

There is now a large body of literature studying the empirical determinants of exchange rate regimes. We refer the reader to the excellent summaries of this literature by Alesina and Wagner (2006) and Levy-Yeyati et al. (2006). Notwithstanding many differences in the specific choices of individual explanatory variables, the literature has identified three sets of variables explaining the choices of exchange rate regimes. The first group relates to the research on optimal currency areas (OCA) pioneered by Mundell (1961). The second group relates to macroeconomic stabilization policies in the presence of international capital flows. The third group relates to arguments of political economy and views the exchange rate regime as part of a country's broader political regime. While most studies so far have focused on one or two of these sets without considering the others, Levy-Yeyati et al (2006) and von Hagen and Zhou (2005a,b, 2007) incorporate elements of all three to explore their relative merits.[8] Here, we follow the same approach and use elements from all three groups to explain the choice of de jure and de facto regimes.

[8] Alesina and Wagner (2006) use variables from the OCA group and measures of institutional quality, which can be regarded as elements of the political-economy group, but no elements from the second group arguing that institutions are more fundamental than macroeconomic policies. Their empirical measures of institutional quality, however, do not span our entire sample. In view of this, we use elements of the second group keeping in mind that the quality of macroeconomic management partly reflects the quality of institutions.

Our group of OCA variables includes trade openness (OPENNESS, defined as the ratio of total trade to GDP), geographical concentration of foreign trade (GEOCON, measured by the share of trade with the largest trading partner in total trade), economic size (SIZE, measured by GDP), the level of economic development (LEVEL, measured by per capita GDP), and financial sector development (FINDEV, proxied by the ratio of broad money to GDP). In line with the literature, we expect that a higher degree of trade openness and a more geographically concentrated trade structure will make fixed regimes more preferable than flexible regimes, while larger economic size and higher levels of economic and financial development will make flexible regimes more likely to be adopted.

Our second group of variables starts with the ratio of foreign liabilities to GDP (FL) to capture the exposure to international financial flows and their volatility.[9] Heavier burdens of foreign liabilities should increase the preference for fixed exchange rates (Hausmann et al., 2001). The ratio of non-gold international reserves to broad money (RESERVE) is used to proxy the availability of international reserves to defend a peg. The intensity of capital controls (KCONTR) is included to account for the argument that maintaining capital controls can help protect fixed exchange rate regimes.[10] We expect that higher reserve stocks and more intensive capital controls improve the sustainability of fixed regimes and make them more likely choices. To account for the argument that fixed regimes should be preferable if nominal shocks are the dominant type of shocks affecting the economy, while flexible regimes will be a better choice, if real shocks are dominant, proxies of the volatility of nominal shocks (NSHK) and real shocks (RSHK) are included. We use a measure of the pass-through of exchange rate adjustments to domestic prices (PASSTHRU) suggesting that stronger pass-through makes fixed rates more attractive. Finally, domestic consumer price inflation (CPINF), and fiscal and current account balances normalized by GDP (FISCAL and CA, respectively) are included in this group as measures of the quality of domestic macroeconomic policies. While bad macroeconomic management calls for more exchange rate flexibility, governments might also wish to use fixed exchange rates as a tool to discipline macroeconomic policies. Thus, the expected sign on these variables is ambiguous.

[9] In an earlier version of this paper, we used the ratio of gross capital flows to GDP for this purpose. While the results were similar, the use of FL has been common in recent literature, see Levy-Yeyati et al (2006), Alesina and Wagner (2006) and Hausmann et al (2001).

[10] One might suspect in this context that the choice of the intensity of capital controls is not exogenous in this context since governments might choose their capital account regimes jointly with the exchange rate regime. We have studied this issue in von Hagen and Zhou (2008), where we find that empirically the choices of capital account regimes is predetermined relative to the choice of exchange rate regimes.

Turning to the political economy of exchange rate regimes, we follow Levy-Yeyati et al. (2006) and use the two measures of political strength which are consistently significant in their empirical analysis. The first is a measure of the turnover of governments proxied by the number of years in office of the current administration (YRSOFFC). The second is the number of veto players in the domestic political system which measures the difficulties an administration has in pushing through its political agenda (XCONST). Note that large values of the first and low values of the second indicate a strong government. Under the "political crutch hypothesis" (Levy-Yeyati et al, 2006), one would expect that weaker governments favor more rigid exchange rate regimes in order to fend off domestic political pressures for expansionary fiscal and monetary policies. In contrast, it may be that the sustainability of fixed-rate regimes requires a degree of policy discipline that only relatively strong governments can achieve, which would lead one to expect the opposite signs.

Appendix II contains the detailed empirical definitions and sources of the explanatory variables used in this paper. In the estimates below, we instrument all variables in the second group by one year to avoid problems of simultaneity. Because proper scaling can substantially ease the burden of computation, we standardize all explanatory variables by subtracting sample means and dividing them by their sample standard deviations. We also include dummies for every five-year interval starting in 1986, using the pre-1986 period as the benchmark, to account for any trend in the distribution of exchange rate regimes. The sample for the subsequent analysis consists of the countries and years for which all variables are available. The sample size is reported below the following tables.

4. Empirical Results

Table 4 reports the reduced-form estimates of our model. As in Levy-Yayati et al (2006), we find that a relatively small group of variables explains the pattern of exchange rate choices quite well, and that the results are qualitatively similar for de jure and de facto regimes. The positive time dummies indicate that the frequency of de jure and de facto fixed-rate regimes has decreased during the sample period, an observation also made by Levy-Yeyati et al (2006). We also observe from Table 4 that the threshold for regime changes is considerably larger for de facto regimes than for de jure regimes, an observation which will play a role later on.

[Table 4]

Next, we estimate the structural form of our simultaneous choice model. In order to sharpen the focus, we retain only those explanatory variables which are significant in the reduced-form estimates. The first two columns of Table 5 show the results from estimating the system allowing for the latent variable driving the choice of the de jure regime to affect the choice of the de facto regime and vice versa. For space reasons, we do not report the time dummies and the intercept. Two results are noteworthy at this stage. First, the latent variable driving the choice of de jure regimes has a positive and significant coefficient in the equation for the de facto regime, but the coefficient on the latent variable driving the choice of de facto regimes is not statistically significant in the first equation. Second, the thresholds for regime changes in the equation for de jure regimes are again much smaller than the thresholds for regime changes in the equation for de facto regimes.

[Table 5]

We use this result to impose a triangular structure on the model, allowing the latent variable for the choice of de jure regimes to affect the choice of de facto regimes but not the other way around. This restriction is sufficient to identify the system. Furthermore, we impose some zero-restrictions on insignificant variables. A likelihood-ratio test does not reject these restrictions.

The third and fourth columns of Table 5 show the results. Consider the equation for de jure regimes, first. As expected, more open and larger economies have a preference for more flexible regimes. Higher per-capita incomes and higher levels of financial development induce a preference for fixed exchange rates. This is in contrast to our expectation, but it may be due to the fact that our sample only contains developing and emerging market economies, which the conventional argument behind our hypothesis relates to more developed countries. Higher volatility of real shocks induces a preference for de jure floats, while higher volatility of nominal shocks does the opposite. This is in line with standard open-economy macroeconomics. High CPI inflation rates induce choices of de jure floating-rate regimes. Larger stocks of foreign liabilities give rise to a preference for fixed exchange rates, a result which is consistent with Alesina and Wagner (2006) and Levy.Yeyati et al. (2006). As indicated by the number of veto players, weaker governments tend to choose more flexible exchange rate regimes, a result which is consistent with Levy-Yeyati's (2006) results for developing countries. The other variables do not appear significant in the structural form.

Turning to the equation for de facto regimes, the coefficient on the latent variable driving the choice of de jure regimes is positive and highly significant. The same factors that influence the choice of de jure regimes also have an indirect impact on the choice of the de facto regime through this latent variable. The coefficients on the other variables now indicate by how much the choice of de facto regimes is influenced by the relevant variables in addition to this indirect impact. Here we see that geographical concentration of trade has a significant effect in favor of fixed exchange rates, which is as expected. The prevalence of stronger capital controls induces a preference for more flexible de facto regimes. A possible interpretation is that, in the absence of strong capital controls, a government announcing a peg must conform to this announcement in its actual exchange rate management to avoid any doubts about the credibility of its commitment that might lead to speculative attacks. With capital controls in place, such governments can afford some exchange rate flexibility even under an officially announced peg. The effects of the volatility of nominal shocks and of political weakness of the government are reinforced compared to the equation for de jure regimes.

Table 5 shows that the model's overall performance is quite good. Among the de jure regimes, the model predicts 71.3 percent of all occurrences of fixed exchange rates correctly, 11.2 percent of all intermediate regimes and 65.7 percent of all floating-rate regimes. Among the de facto regimes, the model predicts 70 percent of all pegs correctly, almost 60 percent of all intermediate regimes and 19.2 percent of all floating-rate regimes. The table also shows that the country-specific random effects are highly correlated across the two equations. As in the reduced-form estimates, the threshold for the choice of de jure regimes is numerically smaller than the threshold for the choice of de facto regimes.

These results provide an interpretation of the puzzle posed by the observed regime discrepancies. Consider, first, a country, maintaining a consistent peg. For simplicity, assume that the country corresponds to the sample average for the remaining variables in the de-facto regime equation, such that these variables vanish. For the latent variables, we must then have that $y_i^* < -1.22$ and $q_i^* < -0.56$. Assume that the desirability of exchange rate flexibility as measured by y_i^* gradually increases. As the latent variable q_i^* crosses the threshold at -0.56, the government adopts an intermediate de facto regime, allowing for some exchange rate flexibility. As long as $y_i^* < -0.24$, however, the government maintains the de jure peg. If the desirability of exchange rate flexibility increases further and crosses the threshold at -0.24 for y_i^*, the government adjusts the de jure regime, which now also becomes an intermediate one. With further increases in the desirability of exchange rate flexibility, the government first announces a de jure float (at the threshold of 0.24), such that "fear of floating" is observed. Eventually, as y_i^* becomes larger than 1.22 and the latent variable q_i^* crosses the threshold at 0.56, the de facto regime is adjusted to a float. Unless the distribution of the latent variable y_i^* is concentrated on the small corridor between the lower and the upper threshold, such a pattern is likely to produce a distribution of exchange rate regimes where intermediate de jure regimes are less frequent than intermediate de facto regimes, which is consistent with what we have observed in Table 2A.

How can such a behavior be rationalized? It is well known that the sustainability of a fixed exchange rate requires building up a stock of reputational capital assuring that international investors find the government's commitment to the peg credible and keeping speculative pressures against the peg at bay. Acquiring such reputational capital may involve sacrificing short-term political benefits from monetary and fiscal expansions and pursuing unpopular economic policies. This means that governments will be careful to preserve their reputational capital once it has been acquired. This will make governments reluctant to give up a fixed-exchange rate regime, even if it is otherwise desirable to move to a more flexible one, unless they are sure that they will not want to return to the peg for a long time. Assume that the reputational capital associated with a de jure peg is larger than that associate with a de-facto peg, since the former is an official statement, and that the political cost of losing that capital is greater if the move to a floating-rate regime is forced by a speculative attack than if it comes by a deliberate announcement of the government.

Starting from a consistent peg, it may then be rational for a government to first adjust its de facto regime to an increase in the desirability of exchange rate flexibility to see whether or not the increase is lasting and large enough to justify giving up the reputational capital invested in the de jure peg. Furthermore, if the desirability of exchange rate flexibility increases starting from a consistent intermediate regime, where the reputational capital is not large, it may also be rational to move to a de jure float early in order to avoid the dangerous exposure to speculative attacks which is especially large for intermediate pegs. Thus, the government displays fear of floating to avoid the political costs of exchange rate crises while preserving some of the benefits of more stable exchange rates.

Based on the triangular structure emerging from Table 5, we develop the empirical model further by making the choice of "fear of floating" and "fear of pegging" explicit in the empirical model for de facto regimes. We redefine the choices of de facto regimes as follows:

$$\left.\begin{array}{lll}
\text{If} \quad q_{it}^{*} \le t_q^{(0)}, & q_{it} = y_{it} = 0 & \Leftrightarrow \text{ consistent peg,} \\
\text{If} \quad t_q^{(0)} < q_{it}^{*} \le -t_q^{(1)}, & q_{it} > y_{it} & \Leftrightarrow \text{ fear of pegging,} \\
\text{If} \quad -t_q^{(1)} < q_{it}^{*} \le t_q^{(1)}, & q_{it} = y_{it} = 1 & \Leftrightarrow \text{ consistent intermediate,} \\
\text{If} \quad t_q^{(1)} < q_{it}^{*} \le t_q^{(2)}, & q_{it} < y_{it} & \Leftrightarrow \text{ fear of floating,} \\
\text{If} \quad q_{it}^{*} > t_q^{(2)}, & q_{it} = y_{it} = 2 & \Leftrightarrow \text{ consistent floating,}
\end{array}\right\} \qquad (9)$$

with ordered thresholds as $t_q^{(0)} < -t_q^{(1)} < 0 < t_q^{(1)} < t_q^{(2)}$. The equation to be estimated is similar to equation (3), except for the simplification of the error structure, since we only need to consider the marginal distribution of the random effect (e_i^q) and the disturbance (u_{it}^q).[11] Compared to Alesina and Wagner (2006), the main difference is that we treat the choice of de jure regimes as endogenous yet predetermined relative to the choice of de facto regimes.

Table 6 has the results. The first column shows the estimated model allowing for separate influences of the other regressors in addition to the latent variable y_{it}^* driving the choice of de jure regimes. Two things are noteworthy. First, the coefficient on the latent variable y_{it}^* is statistically close to one. Second, the number of veto players is the only other explanatory variable with a significant influence on the choice of de facto regimes. This suggests imposing a unit-coefficient on y_{it}^* and excluding the insignificant explanatory variables. The third column of the table has the results. The likelihood ratio test does not reject these restrictions. The estimated model once again illustrates how regime choices move from consistent pegs to consistent floats as the desirability of exchange rate flexibility increases.

[Table 6]

How dependent are these results on the classification of de facto regimes? Tables 7 and 8 present estimates of the same models using the RR classification. Three results are noteworthy. First, as before, a relatively small number of variables from all three sets does well explaining the choice of de facto regimes. Second, the structural form estimates do not admit significant impacts of the latent variables across equations. Thus, the triangular structure we found for the LYS classification does not hold for the RR classification. Third, in the extended probit model, the restrictions setting the coefficient on y_{it}^* equal to one and omitting all other insignificant explanatory variables are strongly rejected. Using the RR classification, therefore, does not give rise to the same interpretation of de jure and de facto regime classifications as before. We attribute this to the fact that the RR classification pays more attention to market performance and less to the behavior of the monetary authorities.

5. Conclusions

Recent empirical studies have pointed out the difference between de jure and de facto exchange rate regimes pursued by developing countries around the world. The observation that governments declare one regime and practice another raises the question, what determines the choice of a de jure regime and how does this relate to the choice of a de

[11] As Alesina and Wagner (2006), we include in “fear of floating” all cases where $q_{it} < y_{it}$, not just those where q_{it} = 1 and y_{it} =2 and similar for “fear of pegging. We also used the more restrictive definition in alternative estimates with qualitatively similar results.

facto regime. This paper has provided an answer to that question be developing an empirical model of the joint choice of both regimes.

Similar to earlier studies, we find that the observed choices of exchange rate regimes since the breakdown of the Bretton Woods System can be explained by a relatively small set of variables relating to optimum-currency-area arguments, macro economic stabilization, and political economy considerations. The contribution of this paper is to develop an empirical model considering both choices simultaneously. We find that both are driven by the same latent variable, which we interpret as a measure of the desirability of exchange rate flexibility. According to our results, the desirability of de jure exchange rate flexibility affect the choice of the de facto regime but not vice versa. The main difference between de jure and de facto regimes is that governments adopt de facto regimes of intermediate flexibility for a wider range of values of our measure of the desirability of exchange rate flexibility. These results put more structure on the observation of regime discrepancies than previous studies.

We offer an interpretation of fear of floating and fear of pegging based on these results which builds on the notion that de jure pegs require more costly investments in reputational capital from the governments than de facto pegs and that losing that capital in a speculative attack is more painful than declaring a floating-rate regime intentionally. This is different from, but not necessarily contradicting Alesina and Wagner's (2006) interpretation of "fear of pegging" as instances of cheating by governments with weak institutions and "fear of floating" as an attempt to signal stability by governments with strong institutions. Developing a theoretical framework that fits this behavior remains an interesting topic of research in international macroeconomics.

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Appendix I. Two-Stage Estimation Procedures

In the first stage we estimate the following reduced-form model:

$$q_{it}^{*} = \mathbf{x}_{it}\Pi_q + \tilde{e}_i^{q} + \tilde{u}_{it}^{q}, \tag{A-1a}$$

$$y_{it}^{*} = \mathbf{x}_{it}\Pi_y + \tilde{e}_i^{y} + \tilde{u}_{it}^{y}, \tag{A-1b}$$

where

$$\tilde{e}_i^{q} = \frac{e_i^q + e_i^y \alpha_q}{1-\alpha_y\alpha_q},\quad \tilde{u}_{it}^{q} = \frac{u_{it}^q + u_{it}^y \alpha_q}{1-\alpha_y\alpha_q},\quad \tilde{e}_i^{y} = \frac{e_i^y + e_i^q \alpha_y}{1-\alpha_y\alpha_q},\quad \tilde{u}_{it}^{y} = \frac{u_{it}^y + u_{it}^q \alpha_y}{1-\alpha_y\alpha_q},$$

and $\mathbf{x}_{it}$ contains all distinct variables of $\mathbf{x}_{it}^q$ and $\mathbf{x}_{it}^y$. Let $\tilde{e}_i = (\tilde{e}_i^q, \tilde{e}_i^y)'$. The distribution of $\tilde{e}_i$ is i.i.d. $\mathrm{N}(\mathbf{0}, \tilde{\Sigma}_e)$, where the elements of $\tilde{\Sigma}_e$ can be expressed as functions of the elements of Σ_e as well as structural parameters α_q and α_y. Similarly, let $\tilde{u}_{it} = (\tilde{u}_{it}^q, \tilde{u}_{it}^y)'$. Its distribution is normalized to be bivariate normal with unit variance on both dimensions and covariance parameter ρ.

The reduced-form equations can be estimated using a bivariate ordered probit model. Let the joint probability of choosing de facto regime j and de jure regime k by country i in year t be denoted by P_{it}^{jk}, and its counterpart conditioned on random effects de noted by $P_{it}^{jk}|\,\tilde{e}_i$. That is,[12]

$$P_{it}^{jk} = \Pr(q_{it} = j \text{ and } y_{it} = k) \text{ and } P_{it}^{jk}|\,\tilde{e}_i = \Pr(q_{it} = j \text{ and } y_{it} = k \mid \tilde{e}_i).$$

Define $Q_{it} = \mathbf{x}_{it}\Pi_q + \tilde{e}_i^q$ and $Y_{it} = \mathbf{x}_{it}\Pi_y + \tilde{e}_i^y$. We use Φ_2 to denote the joint distribution function for standard bivariate normal variables, and use Φ to denote its marginal distribution. The conditional probabilities for various regime combinations are as follows:

$$P_{it}^{00}|\,\tilde{e}_i = \Phi_2(-Q_{it}, -Y_{it};\, \rho),$$

$$P_{it}^{01}|\,\tilde{e}_i = \Phi_2(-Q_{it}, t_y - Y_{it};\, \rho) - (P_{it}^{00}|\,\tilde{e}_i),$$

$$P_{it}^{02}|\,\tilde{e}_i = \Phi(-Q_{it}) - (P_{it}^{00}|\,\tilde{e}_i) - (P_{it}^{01}|\,\tilde{e}_i),$$

$$P_{it}^{10}|\,\tilde{e}_i = \Phi_2(t_q - Q_{it}, -Y_{it};\, \rho) - (P_{it}^{00}|\,\tilde{e}_i),$$

$$P_{it}^{11}|\,\tilde{e}_i = \Phi_2(t_q - Q_{it}, t_y - Y_{it};\, \rho) - (P_{it}^{00}|\,\tilde{e}_i) - (P_{it}^{01}|\,\tilde{e}_i) - (P_{it}^{10}|\,\tilde{e}_i),$$

$$P_{it}^{12}|\,\tilde{e}_i = \Phi(t_q - Q_{it}) - \Phi(-Q_{it}) - (P_{it}^{10}|\,\tilde{e}_i) - (P_{it}^{11}|\,\tilde{e}_i),$$

$$P_{it}^{20}|\,\tilde{e}_i = \Phi(-Y_{it}) - (P_{it}^{00}|\,\tilde{e}_i) - (P_{it}^{10}|\,\tilde{e}_i),$$

[12] Because the probabilities used in the paper always refer to those conditioned on explanatory variables, they are dropped out from the expressions for simplicity.

$$P_{it}^{21} | \tilde{e}_i = \Phi(t_y - Y_{it}) - \Phi(-Y_{it}) - (P_{it}^{01} | \tilde{e}_i) - (P_{it}^{11} | \tilde{e}_i),$$

$$P_{it}^{22} | \tilde{e}_i = 1 - \Phi(t_y - Y_{it}) - (P_{it}^{02} | \tilde{e}_i) - (P_{it}^{12} | \tilde{e}_i).$$

The joint probability P_{it}^{jk} not conditioned on $\tilde{e}_i$ can be viewed as an expectation of $P_{it}^{jk} | \tilde{e}_i$ over all possible realizations of $\tilde{e}_i$, which can then be approximated by the sample mean of $P_{it}^{jk} | \tilde{e}_i^r$, with $\tilde{e}_i^r$ being a random draw from the distribution given by i.i.d. $\mathrm{N}(\mathbf{0}, \tilde{\Sigma}_e)$, that is,

$$P_{it}^{jk} = \int (P_{it}^{jk} | \tilde{e}_i) f(\tilde{e}_i) d\tilde{e}_i \approx \frac{1}{R} \sum_{r=1}^{R} (P_{it}^{jk} | \tilde{e}_i^r), \quad j, k = 0, 1, 2. \qquad \text{(A-2)}$$

This is actually an application of the GHK simulator to panel probit model (for details see Train (2002)). With P_{it}^{jk} being defined in such a way, we can formulate the likelihood function and estimate the reduced-form model using maximum likelihood estimation methods.

In the second stage, we estimate the structural model after replacing the endogenous variables appearing on the right-hand side with their fitted values, $\hat{q}_{it}^*$ and $\hat{y}_{it}^*$. Let $\hat{\Pi}_m, m = q, y,$ be the estimates for $\Pi_m, m = q, y,$ then $\hat{q}_{it}^* = \mathbf{x}_{it} \hat{\Pi}_q$ and $\hat{y}_{it}^* = \mathbf{x}_{it} \hat{\Pi}_y$. Note that we drop the random-effect terms to ensure that the instruments are not correlated with the random-effect terms included in the structural model. Now rewrite the structural model as follows:

$$q_{it}^* = \bar{q}_{it} + u_{it}^q, \qquad \text{(A-3a)}$$

$$y_{it}^* = \bar{y}_{it} + u_{it}^y, \qquad \text{(A-3b)}$$

where $\bar{q}_{it} = \mathbf{x}_{it}^q \beta_q + \hat{y}_{it}^* \alpha_q + e_i^q$ and $\bar{y}_{it} = \mathbf{x}_{it}^y \beta_y + \hat{q}_{it}^* \alpha_y + e_i^y$. Because u_{it}^q and u_{it}^y are independent of each other (see (4b)), we have

$$P_{it}^{jk} | e_i = (P_{it}^{j\bullet} | e_i) \times (P_{it}^{\bullet k} | e_i),$$

where

$$P_{it}^{j\bullet} | e_i = \Pr(q_{it} = j \,|\, e_i) \text{ and } P_{it}^{\bullet k} | e_i = \Pr(y_{it} = k \,|\, e_i).$$

To be more specific,

$$P_{it}^{0\bullet} | e_i = \Phi(-\bar{q}_{it}), \;\; P_{it}^{1\bullet} | e_i = \Phi(t_q - \bar{q}_{it}) - (P_{it}^{0\bullet} | e_i), \;\; P_{it}^{2\bullet} | e_i = 1 - \Phi(t_q - \bar{q}_{it}),$$

$$P_{it}^{\bullet 0} | e_i = \Phi(-\bar{y}_{it}), \;\; P_{it}^{\bullet 1} | e_i = \Phi(t_y - \bar{y}_{it}) - (P_{it}^{\bullet 0} | e_i), \;\; P_{it}^{\bullet 2} | e_i = 1 - \Phi(t_y - \bar{y}_{it}).$$

Finally, we apply the GHK simulator to approximate P_{it}^{jk} using a formula similar to (A-2), with e_i replacing $\tilde{e}_i$ and e_i^r being drawn from the distribution characterized by (4a). The full-sample log-likelihood function to be maximized is

$$\log L = \sum_i \sum_t \sum_{j=0}^{2} \sum_{k=0}^{2} \mathbf{1}\{q_{it} = j \text{ and } y_{it} = k\} \log P_{it}^{jk} ,$$

where $\mathbf{1}\{\}$ is an indicator function which takes a value of 1 if the statement in brackets is true and 0 otherwise. The estimable structural parameters include β_q, α_q, t_q, β_y, α_y, t_y, σ_{qq}, σ_{qy}, and σ_{yy}.

Appendix II: Definitions of Variables and Data Sources

CA: current account balance normalized by GDP. Data source is the IMF, *International Financial Statistics* (*IFS*).

CPINF: annual consumer price inflation rate (π) transformed as $\pi^* = \pi/(1+\pi)$ to avoid any bias that could arise from hyper inflations; see Ghosh et al. (1997). Data source is the IMF, *World Economic Outlook* (*WEO*) database.

FINDEV: broad money (M2), normalized by GDP. Broad money is the sum of "money" and "quasi-money" taken from the IMF, *IFS*.

FISCAL: the ratio of central government budget balances to GDP. Data source is the IMF, *WEO* database.

FL: foreign liabilities normalized by GDP. Data source is the IMF, *IFS*.

GEOCON: share of trade (exports plus imports) with the largest trading partner in total trade with the ten largest trading partners. Data source is the IMF, *Direction of Trade Statistics* (*DOTS*).

KCONTR: intensity of capital controls, defined as the sum of dummies for (1) the existence of multiple or dual exchange rates, (2) the existence of restrictions on payments of current transactions, (3) the existence of restrictions on payments of capital transactions, and (4) the existence of surrender requirements for export proceeds. Data source is the IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*.

LEVEL: per capita GDP in US dollars and logarithms. Data source is the IMF, *WEO* database.

NSHK: average absolute deviation of the annual growth rate of broad money around the four-year backward moving average. Data source for broad money growth rates is Ghosh et al. (2002).

OPENNESS: the ratio of the sum of exports and imports of goods and services to GDP. Data source is the IMF, *WEO* database.

PASSTHRU: correlation coefficient between monthly consumer price inflation rates and monthly rates of depreciation of the nominal effective exchange rate (NEER) lagged by one month. The NEER is calculated vis-à-vis ten largest trading partners. Data source for inflation is the IMF, *WEO* database, for nominal exchange rate is the IMF, *International Financial Statistics* (*IFS)*, for trade data is the IMF, *DOTS*.

RESERVE: non-gold international reserves, normalized by broad money. Data source for reserves and for broad money is the IMF, *IFS*.

RSHK: three-year centered standard deviation of the growth rate of terms of trade. Data source is Ghosh et al. (2002).

SIZE: gross domestic product in current prices, expressed in billions of US dollars and logarithms. Data source is the IMF, *IFS*.

XCONST: the extent of institutionalized constraints on the decisionmaking power of the chief executive in government. Data source is the Polcon database maintained by Witold Jerzy Henisz available at http://www.management.wharton.upenn.edu/henisz/.

YRSOFFC: number of years in office of the current administration. Data source is DPI2000 introduced and maintained by Beck et al (2001).

Table 1: Classification of Exchange Rate Regimes

De facto classification by Levy-Yeyati and Sturzenegger (2005)		
Fixed	**Intermediate**	**Float**
De facto classification by Reinhart and Rogoff (2004)		
(1) no separate legal tender (2) pre-announced peg or currency board arrangement (3) pre-announced horizontal band, bandwidth not exceeding ±2% (4) de facto peg	(5) pre-announced crawling peg (6) pre-announced crawling band, bandwidth not exceeding ±2% (7) de facto crawling peg (8) de facto crawling band, bandwidth not exceeding ±2% (9) pre-announced crawling band, bandwidth exceeding ±2% (10) de facto crawling band, bandwidth not exceeding ±5% (11) moving band, bandwidth not exceeding ±2%	(12) managed floating (13) freely floating (14) freely falling (15) hyperfloating
De jure classification by the IMF (up to 1997)		
(1) single currency peg (2) SDR peg (3) other composite currency peg	(4) flexibility limited vis-à-vis a single currency (5) flexibility limited vis-à-vis a group of currencies (6) exchange rate adjusted according to a set of indicators	(7) other managed floating (8) independently floating
De jure classification by the IMF (since 1998)		
(1) no separate legal tender (2) currency board arrangement (3) other conventional fixed peg	(4) horizontal band (5) crawling peg (6) crawling band	(7) managed floating without pre-announced path for exchange rates (8) independently floating

Sources: Levy-Yeyati and Sturzenegger (2005); Reinhart and Rogoff (2004); IMF, *AREAER* (various issues).

Table 2A: Cross-Classification of De Facto and De Jure Exchange Rate Regimes

Regime Type	De jure	De facto Regimes					
			LYS			RR	
	IMF	0	1	2	0	1	2
0: Fixed	975 [54.0]	843 (86.5) [46.7]	87 (8.9) [4.8]	45 (4.6) [2.5]	641 (65.7) [35.5]	155 (15.9) [8.6]	179 (18.4) [9.9]
1: Intermediate	123 [6.8]	37 (30.1) [2.0]	43 (35.0) [2.4]	43 (35.0) [2.4]	20 (16.3) [1.1]	68 (55.3) [3.8]	35 (28.5) [1.9]
2: Flexible	707 [39.2]	178 (25.2) [9.9]	255 (36.1) [14.1]	274 (38.8) [15.2]	61 (8.6) [3.4]	346 (48.9) [19.2]	300 (42.4) [16.6]
Total	1805 [100.0]	1058 [58.6]	385 [21.3]	362 [20.1]	722 [40.0]	569 [31.5]	514 [28.5]
Independence of Regime Distributions							
Chi-squared		122.36***			107.68***		
Regime Discrepancies							
Fear of Pegging		175 [9.7]			369 [20.4]		
Consistent		1160 [64.3]			1009 [55.9]		
Fear of Floating		470 [26.0]			427 [23.7]		

Note: Numbers in parentheses are percentage shares of row sums reported under the column head “IMF”. Numbers in brackets are percentage shares of total number of observations (1805). Significance at 1% level is indicated by ***.

Table 2B: Cross-Classification of Two Sets of De Facto Exchange Rate Regimes

	LYS		RR					
			Fixed		Intermediate		Flexible	
Fixed	1058	[58.6]	665	(62.9)	192	(18.1)	201	(19.0)
Intermediate	385	[21.3]	37	(9.6)	191	(49.6)	157	(40.8)
Flexible	362	[20.1]	20	(5.5)	186	(51.4)	156	(43.1)
Total	1805	[100.0]	722	[40.0]	569	[31.5]	514	[28.5]

Note: Numbers in parentheses are percentage shares of row sums. Numbers in brackets are percentage shares of total number of observations (1805). The chi-squared statistics for the hypothesis of independence of two regime choices is 85.112, which is significant at 1% with 4 degrees of freedom.

Table 3A: Dynamics of Regime Choices

		De facto Regimes							
		LYS				**RR**			
De jure Regime		**Exchange Rate Flexibility**							
Exchange Rate Flexibility	**IMF**	**(-)**	**(0)**	**(+)**	**Sum**	**(-)**	**(0)**	**(+)**	**Sum**
(-) Decreased	3.2	31.6	50.9	17.5	100	10.5	86.0	3.5	100
(0) Unchanged	92.6	12.3	74.2	13.5	100	3.3	93.6	3.1	100
(+) Increased	4.2	14.5	42.1	43.4	100	6.6	77.6	15.8	100
Total	100.0	13.0	72.1	14.8	100	3.7	92.7	3.6	100
Independence	Chi2=1.07, p-value=0.9, df=4				Chi2=0.16, p-value=0.997, df=4				

Note: Entries in the first column are the percentage shares of changes in the de jure regime. Entries in the bottom row are the percentage shares of changes in the de facto regimes. Entries in the inner cells are the percentage shares of changes in the de facto regimes given a change in the de jure regime. The total number of observations is 1805.

Table 3B: Dynamics of Regime Choices: IMF vs LYS lagged

	IMF: t-2→t-1	LYS: t-1→t			LYS: t-2→t-1	IMF: t-1→t		
		(-)	(0)	(+)		(-)	(0)	(+)
(-) Decreased	3.2	11.1	61.1	27.8	13.3	3.6	92.8	3.6
(0) Unchanged	92.6	12.8	73.4	13.7	72.3	2.5	94.5	3.0
(+) Increased	4.1	29.0	53.6	17.4	14.5	6.6	88.0	5.4
Total	100.0	13.5	72.2	14.4	100.0	3.2	93.3	3.4
Independence	Chi2=0.331, p-value=0.988, df=4				Chi2=0.198, p-value=0.995, df=4			

Note: Numbers in parentheses are percentage shares of row sums. Numbers in brackets are percentage shares of total number of observations (1665).

Table 3C: Dynamics of Regime Choices: IMF vs RR lagged

	IMF: t-2→t-1	RR: t-1→t			RR: t-2→t-1	IMF: t-1→t		
		(-)	(0)	(+)		(-)	(0)	(+)
(-) Decreased	3.2	5.6	92.6	1.9	3.7	9.8	86.9	3.3
(0) Unchanged	92.6	2.9	93.5	3.7	92.7	3.0	93.7	3.3
(+) Increased	4.1	14.5	81.2	4.3	3.6	3.3	90.0	6.7
Total	100.0	3.4	92.9	3.7	100.0	3.2	93.3	3.4
Independence	Chi2=0.052, p-value=1.000, df=4				Chi2=0.025, p-value=1.000, df=4			

Note: Numbers in parentheses are percentage shares of row sums. Numbers in brackets are percentage shares of total number of observations (1665).

Table 4: Reduced-form Estimates for De Jure and De Facto Regime Choices

	De Jure			De Facto (LYS)		
	Coeff.		S.E.	Coeff.		S.E.
OPENNESS	0.208***		0.052	0.071		0.070
GEOCON	0.092**		0.043	-0.118**		0.058
SIZE	0.476***		0.055	0.453***		0.099
LEVEL	-0.241***		0.060	-0.126		0.083
FINDEV	-0.452***		0.146	-0.362**		0.156
RSHK	0.177***		0.067	0.154**		0.073
NSHK	-0.143***		0.045	-0.322***		0.091
RESERVE	-0.035		0.041	0.030		0.063
KCONTR	-0.082**		0.042	0.298***		0.083
CPINF	0.283***		0.046	0.266***		0.077
PASSTHRU	-0.015		0.051	-0.120**		0.058
CA	-0.030		0.044	-0.007		0.043
FISCAL	0.025		0.042	-0.045		0.070
FL	-0.075**		0.034	-0.141***		0.050
YRSOFFC	-0.110**		0.046	0.021		0.052
XCONST	0.135***		0.048	0.460***		0.093
threshold	0.139***		0.013	0.648***		0.110
8590	0.315***		0.113	0.306*		0.177
9195	0.768***		0.115	0.716***		0.216
95+	0.800***		0.120	0.711***		0.221
Constant	-0.612***		0.088	-1.059***		0.227
log L (sample)	-1003.521 (89/1285)			-1007.485 (84/1099)		
(%) Correct predictions	fixed	intermediate	float	Fixed	intermediate	float
	72.9	10.7	63.4	66.4	57.0	22.0

Note: Significance at 10%, 5%, and 1% is indicated by *, **, and ***, respectively. The two numbers that provide sample information are for the number of countries and total observations.

Table 5: Structural Estimates for Joint Regime Choices

	(1)				(2)			
	IMF		LYS		IMF		LYS	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
q_{it}^*	0.42	0.69						
y_{it}^*			0.41***	0.13			0.46***	0.11
OPENNESS	0.39***	0.11			0.47***	0.09		
GEOCON	0.11	0.12	-0.11**	0.05			-0.12**	0.05
SIZE	0.67**	0.27	0.23***	0.07	0.86***	0.14	0.20***	0.06
LEVEL	-0.35**	0.14			-0.41***	0.11		
FINDEV	-1.03***	0.36	-0.34**	0.15	-1.13***	0.28	-0.31**	0.13
RSHK	0.21*	0.12	0.02	0.08	0.26**	0.11		
NSHK	-0.36**	0.17	-0.23***	0.07	-0.49***	0.08	-0.22**	0.06
KCONTR	-0.14	0.13	0.19***	0.05			0.21***	0.05
CPINF	0.33**	0.15	0.09	0.06	0.41***	0.08		
PASSTHRU			-0.07	0.05				
FL	-0.06	0.08	-0.06	0.05	-0.11*	0.06		
YRSOFFC	-0.01	0.06						
XCONST	0.17	0.32	0.36***	0.06	0.39***	0.10	0.35***	0.06
threshold	0.23***	0.03	0.57***	0.05	0.24***	0.02	0.56***	0.04

	σ_{yy}	σ_{qy}	σ_{qq}	σ_{yy}	σ_{qy}	σ_{qq}
Estimates	1.79***	1.11***	0.81***	2.03**	1.14***	0.74***
S.E.	0.68	0.20	0.27	0.82	0.20	0.23
log L	-2037.22			-2039.43		

	IMF			LYS			IMF			LYS		
(%) Correct predictions	0	1	2	0	1	2	0	1	2	0	1	2
	70.9	11.2	67.1	68.3	60.5	18.2	71.3	11.2	65.7	70.0	59.9	19.2

Note: The sample covers 1236 annual observations from 92 countries. Significance at 10%, 5%, and 1% are indicated by *, **, and ***, respectively. In both specifications, models are estimated with constant and period dummies for each regime choices.

Table 6: Recursive Model for De Facto Regime Choices

	Coeff.	S.E.	Coeff.	S.E.
y_{it}^{*}	0.795***	0.145	1	--
GEOCON	-0.049	0.041	0	--
SIZE	0.003	0.036	0	--
FINDEV	-0.017	0.028	0	--
RSHK	-0.010	0.043	0	--
NSHK	-0.039	0.065	0	--
KCONTR	0.017	0.099	0	--
CPINF	0.031	0.101	0	--
PASSTHRU	-0.027	0.052	0	--
FL	-0.010	0.032	0	--
XCONST	0.103**	0.045	0.052	0.044
th0	-0.489***	0.037	-0.518***	0.043
th1	0.046***	0.008	0.049***	0.009
th2	1.135***	0.062	1.195***	0.079
log L (sample)	-1538.328 (92/1236)		-1543.555 (92/1236)	
LR-test	LR = 10.454, p-value = 0.402, degrees of freedom = 10			

Note: Significance at 10%, 5%, and 1% is indicated by *, **, and ***, respectively. Constant and period dummies are included in the estimation. Numbers in parentheses are sample size for countries and observations.

Table 7: Structural Estimates for Joint Regime Choices (RR)

	(1)				(2)			
	IMF		RR		IMF		RR	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
q^*_{it}	0.33	0.80			0	--		
y^*_{it}			-0.02	0.04			1	--
OPENNESS	0.22	0.20	0.26***	0.05	0	--	1.07***	0.29
GEOCON	0.10	0.08			0	--		
SIZE	0.98***	0.36	0.47***	0.07	0.60***	0.06	1.96***	0.52
LEVEL	-0.40	0.25	-0.30***	0.07	0	--	-1.08***	0.39
FINDEV	-1.14**	0.45			-1.06***	0.20		
RSHK	0.26	0.17	0.18***	0.06	0	--	0.46*	0.26
NSHK	-0.30***	0.11			-0.20***	0.06		
RESERVE			-0.06	0.05			0	--
KCONTR	-0.16	0.28	0.34***	0.05	0	--	1.81***	0.39
CPINF	0.18	0.47	0.58***	0.06	0	--	1.65***	0.35
PASSTHRU			-0.07	0.05			0	--
FL	-0.10	0.08			0	--		
YRSOFFC	-0.20**	0.10			-0.16***	0.06		
XCONST	0.51**	0.23	0.28***	0.05	0.38***	0.06	1.42***	0.42
threshold	0.26***	0.05	0.82***	0.04	0.17***	0.02	4.69***	0.94

	σ_{yy}	σ_{qy}	σ_{qq}	σ_{yy}	σ_{qy}	σ_{qq}
Estimates	3.40**	1.38***	0.56***	1.14***	5.87***	55.29**
S.E.	1.63	0.28	0.13	0.26	1.30	22.64
log L	-2011.70			-2073.78		

	IMF			LYS			IMF			LYS		
(%) Correct predictions	0	1	2	0	1	2	0	1	2	0	1	2
	72.3	2.0	64.3	36.3	84.0	33.3	70.4	12.2	54.0	28.8	85.5	28.6
LR-test	LR = 124.17, p-value = 0.00, degrees of freedom = 11											

Note: The sample covers 1241 annual observations from 83 countries. Significance at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

Table 8: Recursive Model for De Facto Regime Choices (RR)

	Coeff.	S.E.	Coeff.	S.E.
y_{it}^{*}	0.247***	0.061	1	--
OPENNESS	0.153***	0.038	0.156***	0.038
SIZE	0.317***	0.059	0.466***	0.049
LEVEL	-0.212***	0.052	-0.268***	0.052
RSHK	0.110**	0.046	0.135***	0.044
RESERVE	-0.043	0.038	0	--
KCONTR	0.095**	0.038	0.072*	0.037
CPINF	0.276***	0.043	0.316***	0.041
PASSTHRU	-0.039	0.034	0	--
XCONST	0.243**	0.047	0.341***	0.042
th0	-0.931***	0.061	-0.933***	0.065
th1	0.078***	0.010	0.077***	0.010
th2	1.030***	0.067	1.032***	0.071
log L (sample)	-1663.322 (83/1241)		-1672.594 (83/1241)	
LR-test	LR = 18.544, p-value = 0.000, degrees of freedom = 3			

Note: Significance at 10%, 5%, and 1% is indicated by *, **, and ***, respectively. Constant and period dummies are included in the estimation. Numbers in parentheses are sample size for countries and observations.