

The evolution of exchange rate regimes

SUMMARY

The last two decades have seen far-reaching changes in the structure of the international monetary system. Europe moved from the European Monetary System to the euro. China adopted a dollar peg and then moved to a basket, band and crawl in 2005. Emerging markets passed through a series of crises, leading some to adopt regimes of greater exchange rate flexibility and others to rethink the pace of capital account liberalization. Interpreting these developments is no easy task: some observers conclude that recent trends are confirmation of the ‘bipolar view’ that intermediate exchange rate arrangements are disappearing, while members of the ‘fear of floating school’ conclude precisely the opposite. We show that the two views can be reconciled if one distinguishes countries by their stage of economic and financial development. Among the advanced countries, intermediate regimes have essentially disappeared; this supports the bipolar view for the group of countries for which it was first developed. Within this subgroup, the dominant movement has been toward hard pegs, reflecting monetary unification in Europe. While emerging markets have also seen a decline in the prevalence of intermediate arrangements, these regimes still account for more than a third of the relevant subsample. Here the majority of the evacuees have moved to floats rather than fixes, reflecting the absence of EMU-like arrangements in other parts of the world. Among developing countries, the prevalence of intermediate regimes has again declined, but less dramatically. Where these regimes accounted for two-thirds of the developing country subsample in 1990, they account for a bit more than half of that subsample today. As with emerging markets, the majority of those abandoning the middle have moved to floats rather than hard pegs. The gradual nature of these trends does not suggest that intermediate regimes will disappear outside the advanced countries anytime soon.

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The international monetary system in the last and next 20 years

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1. INTRODUCTION

2005 marks the twentieth anniversary not just of *Economic Policy* but also of a much-commented-upon event in the evolution of the international monetary system, the Plaza Accord.¹ After allowing the dollar to float freely for the first half of the 1980s, officials concluded in 1985 that the currency's unregulated movement had become excessive and intervened in concerted fashion. Now the possibility of a sharp dollar movement is back. Predictably, there are renewed calls for intervention and even for a new Plaza Accord, although the applicability of the precedent is contested.²

In other countries, meanwhile, there have been far-reaching developments in the interim. Europe moved from the European Monetary System to the euro. China

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¹ See, for example, Funabashi (1988) and Solomon (1999).

² A Google search brings back more than 150 entries containing the phrase 'new Plaza Accord'.

unified its multiple exchange rates and adopted a dollar peg before moving to a basket, band and crawl in 2005. Emerging markets passed through a series of crises, leading some of them to adopt regimes of greater exchange rate flexibility and others to rethink the pace of capital account liberalization.

These developments have encouraged considerable research on the current condition and future prospects of the international monetary system. One strand of literature seeks to better characterize what is happening to exchange rate regimes. Early research here focused on the ‘bipolar view’ that rising capital mobility was forcing countries to abandon regimes characterized by intermediate degrees of exchange rate flexibility.³ Perhaps predictably, there then was a backlash against this strong hypothesis.⁴ Calvo and Reinhart (2002) observed that many countries claiming to have moved toward greater flexibility in fact still managed their exchange rates heavily. Others generalized the point by documenting the divergence between the exchange rate regimes that countries reported to the International Monetary Fund and the actual behavior of their currencies. The collapse of Argentina’s hard peg then highlighted doubts about the feasibility of arrangements at the other end of the currency spectrum. In response, some observers concluded that hard pegs are not viable, while others suggested that the set of feasible arrangements is limited to floats and to very hard pegs that entail the elimination of separate sovereign currencies and the creation of transnational institutions of monetary management, as in Europe with the advent of the euro and the ECB. Together, these observations encouraged the notion that the exchange rate system is evolving into a dollar area, a euro area, and an Asian currency bloc.⁵

The paper provides a roadmap through this thicket of facts and interpretations. Following Section 2, which describes the evolution of the debate, Sections 3 and 4 use several alternative classifications of exchange rate and capital account regimes to analyse what has been happening to international monetary and financial arrangements. The results highlight differences in behaviour between more and less advanced countries and between Europe and the rest of the world. Section 5 therefore asks why emerging markets are different. Section 6 then asks the same question of Europe. Section 7, in concluding, offers a forecast of how the international monetary system will look when *Economic Policy* celebrates its fortieth anniversary 20 years from now.

2. BACKGROUND

As with any topic in the history of economic thought, it is hard to know how far back in time to look in the effort to uncover the deep roots of a literature. At some level,

³ This view has many progenitors, some of whom are cited below. A summary statement is Fischer (2001).

⁴ See Frankel (2001). William Branson once referred to the ‘pendulum theory’ of exchange rate arrangements, according to which prevailing views of desirable arrangements tend to swing from one extreme to another. Thus, the recent reaction can be understood as another swing of the pendulum.

⁵ Alternatively, among those who doubted Asia’s appetite for regional monetary integration, into just a trans-Pacific dollar area and a euro area (Dooley *et al.*, 2003).

the literature on the bipolar view builds on classic studies of the pre-World War I gold standard. The miracle of the gold standard was that it somehow managed to successfully reconcile stable exchange rates with high capital mobility. The modern literature attributes this success to the hegemony of a model of monetary policy in which central banks attached priority to exchange rate stability, to the absence of a theory linking monetary policy to the business cycle, and to the fact that the public was not organized or enfranchised in a way that might enable it to apply pressure for the pursuit of alternative goals of policy.⁶ Thus, Keynes (1930) modelled the prewar gold standard as a stable intermediate regime – essentially, as a credible target zone.

All this changed with the extension of the franchise and the politicization of monetary policy in the 1920s.⁷ The result was intense speculative pressure leading to the final collapse of the gold standard in the early 1930s. Disenchantment with open capital markets followed. Capital controls were widely imposed. Their maintenance allowed countries to operate a wide variety of different exchange rate regimes after 1931.

Restrictions on transactions on capital account were maintained for many years – in some countries into the 1990s. Thus, while the Articles of the Agreement of the International Monetary Fund required members to make their currencies convertible for purposes of current account transactions after a short transitional period, there was no obligation to make currencies convertible for transactions on capital account. The architects of Bretton Woods essentially took for granted the indefinite maintenance of capital controls when designing the new post-World War II system of pegged-but-adjustable rates.

With the gradual postwar recovery of financial markets and transactions, investors found a growing number of ways around these controls; the development of the Eurodollar market starting in the 1960s was only the most graphic case in point. Policy makers responded in two ways. One was by widening the bands around their exchange rate parities. Thus, the Smithsonian Agreement in 1971 that sought to salvage the Bretton Woods System expanded fluctuation bands against the dollar from ± 1 to $\pm 2.25\%$. European policy makers adopted this convention of 2.25% bands after Bretton Woods collapsed and they substituted the European Monetary System in 1979. The other response was to elaborate and further tighten controls in order to prevent capital flows from destabilizing currency pegs.⁸

What is striking in retrospect is that there seem to have been so few analyses acknowledging that the rise in capital mobility was ineluctable and that it posed a challenge to the maintenance of intermediate regimes – that countries would ultimately be forced to move either to hard pegs (in Europe, in the form of monetary union) or freer floats (in other parts of the world). To be sure, there were hints of this in the early work of Mundell and Fleming, which focused on the polar cases of no

⁶ See, for example, Eichengreen (1996).

⁷ See Obstfeld and Taylor (2003).

⁸ An analysis emphasizing these two responses is Giovannini (1989).

capital mobility and perfect capital mobility and on firmly fixed versus freely floating rates.⁹ There were hints in early 1970s work on global monetarism, which similarly assumed perfect capital mobility and emphasized that a country seeking to peg its exchange rate in this environment would have to subordinate all other goals of monetary policy to the maintenance of that regime. It is thus no coincidence that the earliest statement of something resembling the bipolar view, by Swoboda (1986), emanated from the global-monetarist school.¹⁰

As capital mobility continued to rise and the adoption of the Single Market Program in 1986 augured the elimination of controls, European economists in particular emphasized the implications of high capital mobility for the exchange rate regime. Giavazzi and Giovannini (1989) argued that controls were central to the stability of the European Monetary System through its first decade of operation – in particular, that it would have been impossible in their absence to realign periodically in order to restore competitive balance. Giavazzi and Spaventa (1990) pointed to the emergence of a ‘New EMS’ in which capital controls had been removed and where, consequently, periodic realignments were a thing of the past. Realignments having been ruled out, problems of competitiveness now tended to cumulate. The stage was thus set for the 1992 crisis, in which competitive imbalances combined with very large capital flows to destabilize currency pegs. In analysing this crisis, authors like Eichengreen and Wyplosz (1993) argued that the only viable responses were the reimposition of capital controls, a forced march to monetary union, and wider bands tantamount to floating.

In the event, a permanent tightening of capital controls was not on the cards. In Europe it would have conflicted with the Single Market Programme; more broadly, it ran counter to the tendency to liberalize financial markets and to the progressive development of information technology, which made the effective enforcement of controls significantly more difficult and distortionary. Thus, in response to the 1992 crisis, some of the affected countries abandoned their pegs in favour of greater flexibility, while the others rededicated themselves to the goal of monetary union. But in both cases they moved away from the middle of the exchange-rate spectrum. Thus, it was this crisis and response that provided the immediate impetus for the further development of the bipolar view. Crockett (1994) and Eichengreen (1994) independently provided statements of this view as it applied to the advanced countries. Fischer (2001), responding to the series of attacks on pegged exchange rates in developing countries, starting with Mexico in 1994 and ricocheting through Asia in 1997 and reaching Argentina in 2001, influentially applied the view more widely.

As with all strong hypotheses there was, predictably, a reaction. Close observers of the emerging Asian economies pointed to the successful maintenance of soft pegs to the dollar by a variety of Asian countries in the first half of the 1990s (McKinnon and Pill, 1997). This was possible, they observed, because many such countries maintained

⁹ See Fleming (1962) and Mundell (1963).

¹⁰ See also Genberg and Swoboda (1987).

significant restrictions on capital flows, although they came under pressure to remove them from, *inter alia*, the OECD and the International Monetary Fund, a fact that may not have been unrelated to their continued difficulty in limiting the volatility of their exchange rates. Champions of Argentina's quasi-currency board, such as Cavallo and Cottani (1997), argued that this country's experience documented the continued viability of pegging, a conclusion that came to be viewed as less compelling following that country's crisis in 2001. The most general and consequently influential rebuttal to the bipolar view was probably Calvo and Reinhart (2002), who demonstrated empirically that many developing countries in fact had not abandoned the middle ground of heavily managed exchange rates. They attributed this preference to the fragility of financial systems and the danger that these might be destabilized by wider currency fluctuations. Hausmann *et al.* (2001) made the same observation and pointed specifically to currency mismatches on national balance sheets as a financial factor that rendered unregulated exchange rate changes potentially destabilizing.

In sum, the strength of the bipolar view was the insight it provided into the strains affecting prevailing exchange rate arrangements. It highlighted the fact that rising capital mobility left little room for inconsistencies between governments' internal and external objectives. It shed light on the fragility of pegged but adjustable rates in a world of unlimited international capital flows. But it was less prescient about what would replace those pegs. Some countries abandoning soft pegs moved not to free floats or hard pegs but to heavily managed floats, under which exchange rate flexibility seemed to be limited almost as strictly as before. Some statements of the bipolar view also failed to adequately distinguish the responses of advanced and emerging-market economies. Where the first class of countries tended to abandon intermediate regimes for the extremes of free floating or firm fixing, as predicted, it seemed as if members of the second group were more likely to move from pegging to heavily managed floating – that is, to implement more limited changes in their previous exchange rate arrangements.

3. WHAT HAS HAPPENED TO EXCHANGE RATE REGIMES?

Is this in fact what the most recent data show? In an effort to answer this question, we consider in more detail what has happened to exchange rate arrangements. To bring the story up to date, we use data through 2004.¹¹ A key issue is how to classify exchange rate regimes. The two choices are the *de jure* exchange rate regimes reported by member countries to the IMF and measures of *de facto* policies constructed on the basis of the behaviour of market exchange rates. Our investigation concerns actual exchange rate policy, so we utilize data on *de facto* arrangements, employing the

¹¹ In contrast to previous studies, we do not use data for the period before 1990 owing to what we think are important differences in economic structure and policies, in particular very pervasive capital controls. We made the argument for this decision in Section 2 above.

Reinhart and Rogoff ‘natural’ classification and the Bubula–Otker–Robe ‘judgmental’ classification. The Reinhart–Rogoff (RR) classification is based on actual exchange rate behaviour and has the attractive feature of distinguishing episodes of very high inflation and uncontrolled depreciation (‘freely falling’ regimes). The Bubula–Otker–Robe (BOR) classification combines market exchange rates and other quantitative information with assessments of the nature of the regime drawn from discussions with IMF desk economists as a result of bilateral consultations.¹² The BOR measures have been updated by IMF staff through mid-2004. We updated the RR measures ourselves from 2001, when their series ends, through the end of 2004.¹³ We do not have a view of which series is more reliable; fortunately, it turns out that the two measures tell a broadly consistent story. Somewhat arbitrarily, we focus in the text on the BOR measure, since it does not distinguish the freely falling exchange rates and thus makes for fewer categories and a more compact presentation. For comparison, tables based on the RR classification are discussed in Appendix 1.

Simple tabulations provide some support for the decline of intermediate regimes. Table 1 documents this decline since the early 1990s. For the full sample, the share of intermediate regimes falls from about 70% in 1990 to 45% in 2004. The evacuees move to hard pegs and floats in a ratio of 3 to 4.

Hiding behind these regularities are important differences between advanced countries, emerging markets and developing countries.¹⁴ Among the advanced countries, intermediate regimes have almost disappeared. This finding supports the bipolar view for the group of countries for which it was first developed. Within this subgroup, the dominant movement has been toward hard pegs, reflecting monetary unification in Europe.

Although emerging markets have also seen a decline in the prevalence of intermediate arrangements, these regimes still account for more than a third of the relevant sub sample. Here the majority of the evacuees have moved to floats rather than fixes, reflecting the absence of EMU-like arrangements in other parts of the world.¹⁵ Among developing countries, the prevalence of intermediate regimes has again

¹² We think that the alternative classification schemes have properties that render them less desirable for present purposes. The Ghosh *et al.* (2003) classification uses sophisticated methods to rank regimes by relative frequency but then maps them into three groups that match the frequency distribution of the three regimes in the *de facto* classification. (In other words, the authors assume that the overall frequency distribution of *de jure* regimes is reasonably accurate, even if individual observations are misclassified.) The Levy-Yeyati and Sturzenegger (2003) classification is hard to replicate and produces inconclusive results for a fair number of observations.

¹³ Doing so was relatively straightforward since Reinhart and Rogoff provide a detailed roadmap of their classification procedures. In a few cases, however, we were unsure about how to classify particular observations. We ended up collapsing the authors’ dozen or so regimes into four broad categories, so problems are likely to be minimal. We thank Carmen Reinhart for discussions of the procedures.

¹⁴ The definition of advanced countries coincides with the definition of industrial countries in the International Financial Statistics data set. Following Bubula and Otker-Robe (2002), we define emerging markets as the countries included in the Emerging Market Bond Index Plus (EMBI+), the Morgan Stanley Capital International Index (MSCI), Singapore, Sri Lanka and Hong Kong SAR. Taiwan is excluded from the sample of emerging countries to make the results comparable to Bubula and Otker-Robe (2002). The resulting sample consists of 24 advanced countries, 32 emerging market countries and 131 developing countries.

¹⁵ Note that BOR’s floats include managed floats but not ‘tightly managed floats’, which are classified as intermediate regimes, consistent with the idea that there really has been an increase in flexibility. We return to this below.

Table 1. Evolution of the exchange rate regimes: Bubula and Otker-Robe classification (percentage of members in each category)

	Shares		
	1990	1997	2004*
All countries			
Hard pegs ^a	15.82	18.48	25.67
Intermediate ^b	68.99	52.72	45.45
Floating ^c	15.19	28.80	28.88
Total	100.00	100.00	100.00
Members	158	184	187
Advanced countries			
Hard pegs ^a	0.00	4.17	54.17
Intermediate ^b	73.91	58.33	4.17
Floating ^c	26.09	37.50	41.67
Total	100.00	100.00	100.00
Members	23	24	24
Emerging market countries			
Hard pegs ^a	6.67	12.50	12.50
Intermediate ^b	76.67	56.25	40.63
Floating ^c	16.67	31.25	46.88
Total	100.00	100.00	100.00
Members	30	32	32
Developing countries			
Hard pegs ^a	21.90	22.66	23.66
Intermediate ^b	65.71	50.78	54.20
Floating ^c	12.38	26.56	22.14
Total	100.00	100.00	100.00
Members	105	128	131

Notes:

* Shares computed for June 2004.

^a Includes arrangements with no separate legal tender, currency boards and currency unions.

^b Includes fixed pegs, pegs to composite, horizontal bands, forward and backward crawling bands, forward and backward crawling pegs, and tightly managed.

^c Includes managed floating and independently floating.

Source: Authors' estimates using Bubula and Otker-Robe's classification.

declined, but less dramatically. Where these regimes accounted for two-thirds of the developing country subsample in 1990, they account for a bit more than half of that subsample today. As with emerging markets, the majority of those abandoning the middle have moved to floats rather than hard pegs. The gradual nature of these trends does not suggest that intermediate regimes will disappear outside the advanced countries anytime soon.

We now ask what the constellation of regimes will look like in 20 years if present trends continue. We use a Markov chain model, *à la* Masson (2001), to estimate the probability of regime transitions. Note that this assumes that the past is a guide to the future and that the probability of being in a regime in the next period depends only on the current regime. Appendix 2 describes the derivation of these matrices in more detail. In Appendix 3 we also present some modified matrices constructed on

the basis of estimates of how various covariates affect the likelihood of regime transitions. These matrices together with assumptions about the evolution of the covariates allow us to relax the assumption that transition probabilities are independent of country characteristics, and they allow us to apply alternative assumptions about how the key characteristics evolve over time. These additional results should be thought of as robustness checks on the results reported in the text.

For the sample as a whole, the most persistent state is a hard peg, followed by the intermediate and then the floating regimes (Table 2). There is no absorbing state and

Table 2. Transition probabilities and 2025 forecast, Bubula and Otker-Robe classification

Regime in period t	Estimated probability of regime in $t + 1$			
	Hard pegs	Intermediate	Floating	Total observations
All countries				
Hard pegs	0.9842	0.0059	0.0099	507
Intermediate	0.0121	0.9017	0.0862	1322
Floating	0.0043	0.1346	0.8611	691
Total				2520
Forecast 2025				
Share in the exchange rate distribution	29.98	41.64	28.38	
Advanced countries				
Hard pegs	1.0000	0.0000	0.0000	70
Intermediate	0.0876	0.8613	0.0511	137
Floating	0.0000	0.0236	0.9764	127
Total				334
Forecast 2025				
Share in the exchange rate distribution	64.42	5.55	30.03	
Emerging market countries				
Hard pegs	0.9796	0.0000	0.0204	49
Intermediate	0.0000	0.8726	0.1274	259
Floating	0.0222	0.1630	0.8148	135
Total				443
Forecast 2025				
Share in the exchange rate distribution	22.01	44.42	33.59	
Developing countries				
Hard pegs	0.9820	0.0077	0.0103	388
Intermediate	0.0043	0.9158	0.0799	926
Floating	0.0000	0.1585	0.8415	429
Total				1743
Forecast 2025				
Share in the exchange rate distribution	20.10	52.45	27.45	

Note: The last transition is from December 2003 to June 2004.

Source: Author's estimates using Bubula and Otker-Robe's annual classification.

hence no tendency for countries to converge to a single regime or subset of regimes. The last line of the table shows the distribution of regimes if current trends continue for an additional 20 years. This suggests that in two decades 30% of countries will have pegs, 30% will have floats, and 40% will have intermediate regimes. Compared to the current constellation of regimes, the share of intermediate arrangements will have declined further, but only modestly.

The picture looks different when one makes the same calculations separately for advanced countries, emerging markets and developing economies. Among the advanced countries, intermediate arrangements are the least persistent while hard pegs are an absorbing state. This is just another way of saying that no country that joined EMU since 1999 has left. By 2025, the share of floaters is forecast to decline from 40% to 30% of the advanced-country subsample, one imagines through the adoption of the euro by additional European countries. Not too much should perhaps be made of this point, which is a mechanical function of the fact that a growing number of European countries adopted the euro starting in 1999. Implicit here is the question of whether this tendency for countries to gravitate toward the euro area could shift into reverse in the future; see Section 6 below.

Among emerging markets, hard pegs are the most persistent regime, followed by intermediate arrangements and then floats; note that this is a different pattern than for the advanced countries. Here we do not find strong support for the bipolar view. Indeed, the Markov chain analysis suggests that the share of emerging markets with floating rates will be lower in 2025 than today, reversing the trend in recent decades. This reflects the fact that intermediate regimes are more persistent than flexible regimes in this subsample.¹⁶ They may be adopted infrequently, but once adopted they tend to persist. Results for the developing countries are similar.

4. CHANGES IN CAPITAL ACCOUNT REGIMES

The bipolar view acknowledges that pegging is more likely to be viable for countries that continue to apply restrictions to international capital flows. In particular, one reason that developing countries can and do continue to limit exchange rate variability is that they still bottle up market pressures through the application of controls. More generally, the question of what is happening to exchange rate arrangements is intimately connected to the question of what is happening to controls. So are financial innovation and the pressure of globalization really forcing governments to abandon capital account restrictions? Or, to paraphrase Mark Twain, are reports of their demise greatly exaggerated?

As with data on exchange rate regimes, there exist a variety of different series on statutory restrictions on capital flows. Unfortunately, virtually all of these end in the

¹⁶ We will show in Section 4 that this is not surprising, since in this subsample of countries regimes of limited flexibility are protected from market pressures by capital controls.

Table 3. Evolution of capital controls (percentage of members in each category)

	Shares		
	1990	1997	2003
All countries			
Closed	77.63	66.87	59.63
Open	22.37	33.13	40.37
Total	100.00	100.00	100.00
Members	152	163	161
Advanced countries			
Closed	42.86	18.18	9.09
Open	57.14	81.82	90.91
Total	100.00	100.00	100.00
Members	21	22	22
Emerging market countries			
Closed	80.00	74.19	54.84
Open	20.00	25.81	45.16
Total	100.00	100.00	100.00
Members	30	31	31
Developing countries			
Closed	84.16	74.55	71.30
Open	15.84	25.45	28.70
Total	100.00	100.00	100.00
Members	101	110	108

Note: Each component is equal to 0 when restrictions are present or 1 otherwise.

Source: Authors' estimates using one of the binary components of the Chinn and Ito index (capital account restrictions).

mid- or late-1990s, coincident with changes in the way that the IMF tabulates and reports such restrictions. One exception is the Chinn–Ito index, which extends the well-known Grilli and Milesi-Ferretti series through 2003. Grilli and Milesi-Ferretti (1995) extracted four variables from the *Exchange Arrangements and Exchange Restrictions* annual of the IMF: the presence or absence of restrictions on capital account transactions, the presence or absence of current account restrictions, the presence or absence of multiple exchange rates, and the presence or absence of export surrender requirements. The first variable focuses on capital controls narrowly defined, while the other three consider current account restrictions, given the tendency to relabel capital flows as current account transactions as a way of attempting to evade financial controls. Here we concentrate on the capital controls sub-index exclusively.¹⁷

This binary classification shows a steady trend in the direction of greater financial openness (Table 3). The share of countries with open capital accounts rises most among advanced countries (by 34 percentage points), followed by emerging markets (25 percentage points) and developing economies (13 percentage points). Although

¹⁷ Sensitivity analysis in Appendix 2 using alternative capital controls data and classifications shows broadly similar results.

Table 4. Transition probabilities and 2025 forecasts: capital controls

Regime in period t	Estimated probability of regime in $t + 1$		
	Closed	Open	Total observations
All countries			
Closed	0.9591	0.0409	1443
Open	0.0470	0.9530	638
Total			2081
Forecast 2025			
Share in the capital controls distribution	54.28	45.72	
Advanced countries			
Closed	0.7885	0.2115	52
Open	0.0172	0.9828	232
Total			284
Forecast 2025			
Share in the capital controls distribution	7.53	92.47	
Emerging market countries			
Closed	0.9468	0.0532	301
Open	0.0800	0.9200	100
Total			401
Forecast 2025			
Share in the capital controls distribution	59.84	40.16	
Developing countries			
Closed	0.9706	0.0294	1090
Open	0.0588	0.9412	306
Total			1396
Forecast 2025			
Share in the capital controls distribution	67.27	32.73	

Note: Each component is equal to 0 when restrictions are present or 1 otherwise.

Source: Authors' estimates using one of the binary components of the Chinn and Ito index (capital account restrictions).

advanced countries were already the most financially open at the beginning of the period, in other words, the divergence between them and the developing world has, if anything, widened further over time.

The transition matrices (Table 4) indicate that openness is the most persistent state among advanced economies but not for other countries. Small differences between columns in the size of the diagonal elements plus small differences in the off-diagonal elements yield little movement over time. The largest difference in off-diagonal elements is that for the advanced countries, suggesting a 20% probability that remaining restrictions will be removed in a given year.¹⁸ But since the advanced countries are

¹⁸ The two advanced countries classified by Chinn and Ito as still having some form of capital account restriction in 2003 are Iceland (which has some controls on capital market securities, money market instruments, collective investment securities, derivatives, direct investment and real estate transactions) and Australia (for which EAER lists some controls on the cross-border purchase and sale of securities and debt instruments, some controls on credit operations, and some controls on real estate transactions).

already so close to the upper bound on full openness, there is relatively little room for additional movement over the next two decades. There is much more room for such movement in developing countries, but here the forecasts suggest very slow movement over coming decades.

Finally, Table 5 combines data on capital account openness with data on exchange rate regimes. Given the constraints imposed by the Chinn–Ito index, the analysis here ends in 2003.¹⁹ There is not much additional information about the advanced countries here, since they have essentially removed all capital controls and show no signs of going back. Among emerging markets and developing countries, we now see that intermediate regimes are more popular among relatively closed than relatively open emerging and developing economies, as predicted by the bipolar view. Only a small subset of developing countries and emerging markets that have abandoned capital controls have moved to the hard peg end of the spectrum: in 2003 there were four such countries in our data set: Bulgaria, Ecuador, Hong Kong and Panama, which are all currency board countries or dollarizers. But once countries enter this cell, they have a tendency to stay there: the combination of a hard peg and an open capital account is the most persistent regime among the emerging market economies.

In Table 6 we see that the joint distribution of capital account and exchange rate regimes evolves very slowly over time. The forecasts of the joint distribution in 2025 do not look radically different than that distribution today. If the past is a guide to the future, then a significant share of emerging markets and developing countries will retain at least limited capital controls and still operate some form of intermediate exchange rate regime two decades from now.

In sum, the analysis here suggests that the distinction between advanced and developing countries still has content when it comes to choice of exchange rate and capital account regimes. The advanced countries have moved virtually all the way to fully open capital accounts and in doing so have abandoned intermediate exchange rate regimes characterized by limited flexibility in favour of either hard fixes or more freely floating rates. In contrast, emerging markets and developing countries have moved only a limited distance in this direction. Although they exhibit some movement away from intermediate regimes in favour of more freely floating exchange rates, progress in this case is slow. Even slower appears to be movement in the direction of more open capital accounts. If the Markov chain analysis of historical experience is any guide, only a small share of countries will have substantially more open current accounts even two decades from now.

The other thing that comes through clearly from this table is that Europe is different. There is no analogue to the large-scale movement from intermediate regimes to hard fixes (in the form of monetary union) evident in other parts of the world. In turn this raises two further questions. First, why is Europe different? And, second, how hard and irreversible is the fix?

¹⁹ At the time of writing, EAER provides information for 2004 for only about a third of our countries.

Table 5. Prevalence of capital controls and exchange rate regimes: Chinn and Ito Index and Bubula and Otker-Robe classifications (percentage of members in each category)

		Capital controls	Exchange rate	Shares		
				1990	1997	2003
All countries						
I	Open	Fixed	3.31	2.47	11.80	
II	Open	Intermediate	14.57	19.75	14.29	
III	Open	Floating	4.64	11.11	14.29	
IV	Closed	Fixed	12.58	14.20	11.80	
V	Closed	Intermediate	54.97	32.72	32.92	
VI	Closed	Floating	9.93	19.75	14.91	
Total			100.00	100.00	100.00	
Members			151	162	161	
Advanced countries						
I	Open	Fixed	0.00	0.00	50.00	
II	Open	Intermediate	33.33	45.45	4.55	
III	Open	Floating	23.81	36.36	36.36	
IV	Closed	Fixed	0.00	0.00	0.00	
V	Closed	Intermediate	42.86	13.64	0.00	
VI	Closed	Floating	0.00	4.55	9.09	
Total			100.00	100.00	100.00	
Members			21	22	22	
Emerging market countries						
I	Open	Fixed	6.67	6.45	12.90	
II	Open	Intermediate	13.33	12.90	12.90	
III	Open	Floating	0.00	6.45	19.35	
IV	Closed	Fixed	0.00	6.45	0.00	
V	Closed	Intermediate	63.33	45.16	25.81	
VI	Closed	Floating	16.67	22.58	29.03	
Total			100.00	100.00	100.00	
Members			30	31	31	
Developing countries						
I	Open	Fixed	3.00	1.83	3.70	
II	Open	Intermediate	11.00	16.51	16.67	
III	Open	Floating	2.00	7.34	8.33	
IV	Closed	Fixed	19.00	19.27	17.59	
V	Closed	Intermediate	55.00	33.03	41.67	
VI	Closed	Floating	10.00	22.02	12.04	
Total			100.00	100.00	100.00	
Members			100	109	108	

Notes: Each component is equal to 0 when restrictions are present or 1 otherwise. In this table we use Bubula and Otker-Robe's classification: (1) Includes arrangements with no separate legal tender, currency boards and currency unions; (2) Includes fixed pegs, pegs to composite, horizontal bands, forward and backward crawling bands, forward and backward crawling pegs, and tightly managed; (3) Includes managed floating and independently floating.

Source: Authors' estimates using one of the binary components of the Chinn and Ito index (capital account restrictions).

Table 6. Transition probabilities and 2025 forecast: Chinn and Ito Index and Bubula and Otker-Robe classifications

Capital controls		Exchange rate	Estimated probability of regime in $t + 1$						Total observations
			I	II	III	IV	V	VI	
All countries									
I	Open	Fixed	0.9643	0.0000	0.0000	0.0357	0.0000	0.0000	112
II	Open	Intermediate	0.0311	0.8416	0.0621	0.0031	0.0621	0.0000	322
III	Open	Floating	0.0000	0.0837	0.8916	0.0000	0.0049	0.0197	203
IV	Closed	Fixed	0.0187	0.0000	0.0000	0.9627	0.0037	0.0149	268
V	Closed	Intermediate	0.0025	0.0415	0.0025	0.0000	0.8642	0.0893	795
VI	Closed	Floating	0.0000	0.0054	0.0404	0.0081	0.1456	0.8005	371
Total									
Forecast 2025									
Share in the bivariate distribution			17.61	14.78	14.58	15.90	23.53	13.59	
Advanced countries									
I	Open	Fixed	1.000	0.000	0.000	0.000	0.000	0.000	42
II	Open	Intermediate	0.103	0.828	0.046	0.000	0.023	0.000	87
III	Open	Floating	0.000	0.019	0.961	0.000	0.000	0.019	103
IV	Closed	Fixed	0.000	0.000	0.000	0.000	0.000	0.000	0
V	Closed	Intermediate	0.050	0.175	0.000	0.000	0.700	0.075	40
VI	Closed	Floating	0.000	0.000	0.167	0.000	0.083	0.750	12
Total									
Forecast 2025									
Share in the bivariate distribution			63.02	4.78	28.28	0.00	1.19	2.73	

Table 6. *Continued*

	Capital controls	Exchange rate	Estimated probability of regime in $t + 1$						Total observations
			I	II	III	IV	V	VI	
Emerging market countries									
I	Open	Fixed	0.9667	0.0000	0.0000	0.0333	0.0000	0.0000	30
II	Open	Intermediate	0.0000	0.7021	0.1489	0.0000	0.1489	0.0000	47
III	Open	Floating	0.0000	0.2174	0.7826	0.0000	0.0000	0.0000	23
IV	Closed	Fixed	0.2000	0.0000	0.0000	0.7333	0.0000	0.0667	15
V	Closed	Intermediate	0.0000	0.0464	0.0052	0.0000	0.8247	0.1237	194
VI	Closed	Floating	0.0000	0.0000	0.0326	0.0326	0.1739	0.7609	92
Total									
Forecast 2025									
Share in the bivariate distribution			17.51	15.46	14.24	4.22	31.08	17.46	
Developing countries									
I	Open	Fixed	0.9250	0.0000	0.0000	0.0750	0.0000	0.0000	40
II	Open	Intermediate	0.0053	0.8830	0.0479	0.0053	0.0585	0.0000	188
III	Open	Floating	0.0000	0.1299	0.8312	0.0000	0.0130	0.0260	77
IV	Closed	Fixed	0.0079	0.0000	0.0000	0.9763	0.0040	0.0119	253
V	Closed	Intermediate	0.0000	0.0303	0.0018	0.0000	0.8895	0.0784	561
VI	Closed	Floating	0.0000	0.0075	0.0375	0.0000	0.1386	0.8165	267
Total									
Forecast 2025									
Share in the bivariate distribution			3.25	20.07	9.66	16.52	33.69	16.90	

Source: Authors' estimates. See notes to Table 5.

5. WHY ARE EMERGING MARKETS DIFFERENT?

The first stylized fact highlighted by our results is the reluctance of emerging markets to abandon regimes of limited flexibility. What accounts for this observation?

The simple answer is that many emerging markets lack essential preconditions necessary for the operation of alternatives. The familiar part of this argument is that the most durable form of hard peg, in which the national money is replaced by an international currency, is available in Europe but not other parts of the world. Unilateral fixes (currency boards, *de jure* euro- and dollarization) are less attractive because they require a country to forsake all control of its monetary policy. In monetary unions like Europe's, each participating country at least retains limited control in the form of a vote on the ECB Board. But this presupposes the will to create a transnational central bank, which in turn presumes a high level of political solidarity. Unilateral fixes are attractive therefore only to countries in exceptional circumstances where this ultimate sacrifice of policy autonomy is acceptable: 'post-conflict' societies (Bosnia, Ecuador, El Salvador), countries emerging from hyperinflation (Argentina), countries contending with the collapse of communism (Bulgaria, Estonia), and countries in very special political circumstances (Hong Kong). These other fixes are also less credible: exit is easier because the decision to fix is not part of a web of interlocking political and economic bargains, as in Europe. When push comes to shove, the country is likely therefore to get pushed off of its fixed rate, as in Argentina in 2001.

These conclusions are controversial. There are fervent advocates of currency boards who still believe that they are the wave of the future. There are similarly fervent advocates of monetary union in other regions, such as Asia, who believe that the political preconditions for the operation of a collective peg leading to the creation of a regional currency will develop soon. It will be clear that we are among the sceptics. We think the data speak clearly. While fixes are not disappearing, neither are they growing more popular outside the advanced industrial countries, Europe in particular, where monetary union provides a viable alternative.²⁰ For developing countries, this lack of popularity, reflecting lack of political preconditions, thus closes off one exit from intermediate regimes.

The other avenue for exit is foreclosed by the absence in developing countries of the preconditions for capital account openness. This brings us to the connections between capital account liberalization and the exchange rate regime highlighted in the preceding section. The argument comes in two parts. First, in most less-developed countries, the preconditions for rapid capital account liberalization are absent. The need to strengthen macroeconomic policies, financial systems, prudential supervision and regulation, transparency and corporate governance prior to significant liberalization of the capital account is the main conclusion to emerge from the literature on

²⁰ Viability of course is in the eye of the beholder (see Section 6 below).

the financial crises of the 1990s; this is now conventional wisdom even at the IMF.²¹ Unfortunately, installing these institutional preconditions takes time. Banking systems with strong internal controls and prudential supervisors and regulators employing state-of-the art practice do not develop overnight. Deep and liquid financial markets providing a range of financial instruments, including derivatives, with which foreign exposures can be effectively hedged have even more demanding informational and regulatory requirements; this is why banking systems develop before securities markets in low-income countries. Effective corporate governance requires a well-developed information environment so that outside investors can monitor the actions of insiders and a strong system of creditor rights so that they can enforce their claims. These are the institutional characteristics that distinguish advanced countries from their less economically and financially developed counterparts. And putting in place the preconditions for a high level of economic and financial development cannot be done overnight. This explains why relatively few developing countries have fully opened their capital accounts and why the number retaining significant capital account restrictions will decline only gradually in the course of coming decades.

Second, a high degree of exchange rate flexibility is problematic when capital mobility is limited. Essential preconditions for a high degree of exchange rate flexibility include financial markets and instruments with which private sector agents, non-financial firms in particular, can hedge balance-sheet exposures. Firms with foreign currency denominated liabilities can get smashed when the currency depreciates; they will want to hedge against this risk by swapping their exposure to the banks. The banks will want to hedge themselves by swapping this exposure to offshore residents. But doing so is impossible, or at least possible only to a limited extent, so long as significant capital account restrictions remain in place. In any case, the banking system must be strengthened before it can be trusted to make sound decisions about providing forward cover to non-financial enterprises (capital must be replenished, public banks must be commercialized, and the extent of the safety net must be limited to prevent excessive risk taking and politically driven lending). Until these things are done, it will not be prudent to open the capital account.

In the absence of these things – banks and firms that prudently manage foreign currency exposures, the availability of hedging instruments, etc. – a high degree of exchange rate volatility can be economically and financially destabilizing. Thus, countries where the slow pace of institutional and market development mandates the retention of significant restrictions on capital flows will want to manage their exchange rates to limit volatility. This is the essential reason why we do not see more developing countries exiting intermediate regimes in favour of greater flexibility. This is not to say that they cannot move some way in this direction. Indeed, another conclusion from the ‘architecture’ literature of the 1990s is that at least a modicum of exchange rate flexibility should precede full liberalization of the capital account.

²¹ See IMF (2005).

Variability alerts firms and banks of the importance of not incurring excessive foreign-currency exposures. The fact that the exchange rate can move both ways on a day-to-day basis prevents investors from all lining up on one side of the market, since they can now suffer losses if their bets on the direction of future exchange rate changes turn out to be wrong. In turn this should help to limit one-way capital flows and bouts of speculative pressure.

This is the basis for the argument that China should move now to somewhat greater flexibility even though significant restrictions on capital movements remain in place. But it should continue to manage its more flexible rate to limit volatility until financial reform and development are significantly more advanced and most remaining restrictions on capital mobility can come off. Since the requisite institutional development takes time, the country is likely to remain in that transitional state, on the border between an intermediate and floating exchange rate regime, for a considerable period. So will a variety of other developing economies. This is why we do not see them as exiting more rapidly from intermediate rates.

6. WHY IS EUROPE DIFFERENT?

What then about the European exception? Our argument is that Europe is different because only it is able to satisfy the demanding preconditions for monetary union (something that is likely to remain the case for the foreseeable future). It is not that Europe obviously comes closer than other regions to satisfying the optimum currency area criteria emphasizing asymmetric disturbances and the extent of labor mobility. A long series of studies attempting to estimate the symmetry of disturbances and comparing Europe with Asia has not turned up first-order differences between the two continents (see, for example, Bayoumi and Eichengreen, 1994 and Zhang *et al.*, 2003). Similarly, comparisons of labour mobility do not point to significantly higher levels in Europe than Asia (Goto and Hamada, 1994). Even studies using recent data do not point to levels of labour mobility in the EU of a magnitude and frequency that is relevant for cyclical adjustment (Peri, 2005).

Instead, the fundamental difference between Europe and Asia relevant for the feasibility of monetary union lies not in economic structure but in political preference (see *inter alia* Bayoumi *et al.*, 2000; Eichengreen and Taylor, 2004; Katzenstein, 2005). Consider the challenge facing a group of Asian or Latin American countries contemplating the creation of a common currency. A single regional currency presupposes the creation of a regional central bank. Establishing and operating such an institution would require agreement on how decisions are taken and on how those taking them will be held accountable. Most immediately this raises the question of how many countries will be represented on the bank's policy board – all of them or only a subset at a point in time? How will their views be aggregated? Will a majority be permitted to override the wishes of a dissenting minority, which would seem essential for a quick response to unfolding events, or will decisions have to be taken unanimously?

Even if day-to-day policy decisions are delegated to an executive board of independent experts with no particular national affiliation, there will still have to be a mechanism for holding policy makers politically accountable for their decisions. In contrast to Europe, neither Asia nor Latin America possesses a political counterpart to a regional central bank to which those policy makers would have to report and that would be able to rein them in if their decisions are politically and constitutionally unacceptable. That is to say, there is no equivalent of the European Parliament and the European Court of Justice. This is a recipe either for a highly politicized, politically dependent central bank, whose board members would report directly to their national governments and view themselves as representatives of the national as opposed to the broader regional interest, or for a politically unaccountable central bank whose technocratic leaders would be free to take decisions without regard for their broader consequences. The first alternative would be inefficient economically, while the second would be unacceptable politically. The question, then, is whether it is possible to create a regional central bank without at the same time pursuing a broader process of political integration for which there is little appetite in either Asia or Latin America. Experience in Europe, where monetary and political integration have gone hand in hand, suggests that the answer is no.

In the first half of 2005, negotiation of the EU Constitutional Treaty suggested that further steps in the direction of political integration, supportive of monetary unification, seemed to be in the cards. The elimination of exchange risk and increase in price transparency associated with the advent of the single currency seemed to have given a considerable boost to the development of European financial markets. The euro zone seemed to be functioning smoothly. The euro's domain seemed to be expanding, with the addition of Greece and, prospectively, the Central and Eastern European economies that joined the EU in 2004. Only European countries with well-developed inflation targeting regimes and relatively flexible exchange rates (Sweden, the UK) seemed content to remain outside.

The French and Dutch referenda on the EU's draft constitution challenged this presumption. They led market participants to revise downward the perceived likelihood that additional countries would adopt the euro at an early date. They led Italian welfare minister Roberto Maroni to suggest that Italy should consider leaving the single currency and reintroduce the lira. The possibility that the euro zone might dissolve was then reportedly discussed at a meeting of high-level German finance officials.²² These developments thus pose a challenge to the presumption, drawn in Sections 3 and 4 above, of the sustainability of the movement toward rigid pegs and monetary unification on the one hand and freer floats on the other – and of the idea that past progress in this direction is unlikely to be reversed.

²² 'Italian Ministers Says Italy Should Study Leaving Euro', *Reuters* (3 June 2005, 7:28 AM ET). 'Euro Plumbs 7 1/2 Month Low on EMU Failure Report', *Reuters* (1 June 2005, 8:16 AM ET).

The referendum on the EU constitution was not a referendum on the euro. Nor is there a crisis of confidence in the ECB's ability to make monetary policy. While the central bank is criticized, the critics are evenly divided between those who would prefer a slightly looser and slightly tighter monetary stance. Those preferring a tighter policy observe that inflation in the euro zone continues to exceed the 2% ceiling on the ECB's target range. Those preferring a looser policy point to the slow growth of the European economy and the strength of the euro, which create the possibility of deflationary pressure down the road.

These disputes receive extensive press coverage. They sell newspapers. But they are simply the standard fodder of monetary policy debates. At some level, the fact that half the ECB's critics think its policy is too tight while the other half think that it is too loose is an indication that things are as they should be; were the critics all on one side of this debate, this would be a clear indication that the central bank was out of step.

In reality, there is still little serious discussion of giving up the euro. It is not obvious, except perhaps to politicians seeking headlines, that a more accommodating monetary policy will solve Italy's growth problems or strengthen fiscal discipline. It is not obvious that having a separate currency will make it easier for the country to service its debt. It is not obvious that the pressure for appreciation caused by the fall in the dollar and the reluctance of Asian countries to let their exchange rates move against the United States would be less if there existed more European currencies. While the euro and the ECB are convenient whipping boys for populist politicians, in other words, there is little reason to think that any of the members of the euro zone are seriously prepared to contemplate abandoning them, at least yet.

The crunch will come if and when the ECB is confronted with a major crisis. Imagine, for example, that the Italian public debt spirals out of control, leading investors to question the willingness and ability of the country's government to meet its obligations. The result could be a sharp sell-off in Italian debt and sharp rise in interest rates that further aggravate fiscal weaknesses. The threat of a default might then spread contagiously through European financial markets.

At this point the ECB will have a difficult choice. On the one hand it can stand back and let events run their course. Doing so would teach the offending government a lesson. The latter would have to clean up its own financial mess, presumably at considerable cost to its constituents. This would be a salutary reminder to other governments of the risks of similar policies.

The possibility that the ECB will respond in this way should not be underestimated. Doing so would be consistent with the no-bailout clause in its statute and with ECB officials' concern with moral hazard. It is also consistent with the reluctance of Europe's citizens to contemplate early steps in the direction of significantly deeper political integration.

Alternatively, the ECB may worry that problems in the market for Italian debt will spill over to other financial markets and threaten the solvency of major banks. Fearing

that such contagion could precipitate a meltdown, it might respond like the Fed responded to the collapse of Long-Term Capital Management in 1998. Injecting liquidity into European financial markets would prevent the contagious spread of Italy's financial problems and avoid precipitating a full-blown crisis. The inherently risk-adverse nature of central bankers suggests that the ECB may be reluctant to let an Italian crisis play itself out even if there is only a limited probability of it precipitating a financial meltdown. But this might only encourage more financial brinkmanship by governments. If the reaction became regular, the euro might then end up as an engine of inflation.

Which response is more likely? Which would be better? The fact that we have not seen a serious debt crisis in a major European country in modern times means that we can only guess at the answer. The central bank would similarly be forced to guess. It would have to make a difficult call.

Whatever its decision, it will be strongly criticized. If the ECB responds by injecting liquidity into the financial system, it will be criticized for fuelling inflation and rewarding fiscal profligacy. If it stands aside and financial instability ensues, it will be accused of neglecting its core responsibility for the stability of Europe's payments and financial systems. At this point, Europe's residents would almost certainly challenge the wisdom of leaving such important decisions to a set of anonymous monetary technocrats politically accountable to no one. The absence of a political counterweight capable of holding the members of the ECB board accountable for their actions and to sanction them for ill-advised decisions would then matter importantly. With the stakes so high, Europeans would inevitably question whether they might not be better off with national monetary policy makers directly accountable to their national political systems – that is, with national currencies and national central banks rather than the euro and the ECB.

None of this makes the disappearance of the euro inevitable, or even likely. A series of low-probability events would have to fall into place for this scenario to occur. A big European government would have to get into serious financial straits. Then the ECB would have to make the wrong decision about how to react. The adverse consequences of the ECB's response would have to be serious: a financial crisis if it did nothing, a major eruption of inflation otherwise. None of these events, much less the entire series, is assured. But if they do occur, we will have a reminder of the difficulty of attempting to run a monetary union without a political union. Then the transition matrices of Section 3 based on historical data, which suggest a further move in Europe away from floats to monetary union, may no longer be an accurate guide to the future.

7. IMPLICATIONS

So what have we learned in the end from this analysis of recent international monetary experience?

Our analysis suggests that as capital mobility continues to rise, more countries will choose to abandon the unstable middle ground of soft pegs and tightly managed floats. Among the now advanced countries where capital controls are a thing of the past, this transition is largely complete. The entrenchment of financial liberalization makes it hard to imagine that these countries will return to tightly regulated capital accounts. Since these countries have chosen to live with high capital mobility, they are similarly forced to choose between exchange rates that float relatively freely on the one hand and monetary union on the other. For this subgroup of countries, there is little evidence that there remains a third way.

In the developing world, in contrast, countries are only gradually deepening their links with international financial markets. More likely than not, it will take more than 20 additional years before the extent of financial liberalization matches that in the now-advanced countries. Preparing for financial openness is a laborious process. It requires building strong banking systems, liquid domestic financial markets capable of providing hedging instruments, and robust corporate governance systems able to compel banks and firms to effectively manage the risks of borrowing abroad. Eventually, emerging markets will succeed in putting these preconditions in place. But institution building takes time and recent financial crises serve as a reminder of the risks of relaxing restrictions on capital account transactions before appropriate institutional prerequisites are in place. Until those institutional preconditions exist and capital controls are significantly relaxed, the attractions of and pressure to abandon heavily managed exchange rates will remain underwhelming. This transition may be underway, but it will not have produced a world of uniformly open capital accounts, free floats and regional monetary unions when *Economic Policy* reaches middle age in 2025.

To the extent that there is movement, to which end of the exchange rate spectrum will most developing countries gravitate? Our belief is that the majority will move in the direction of greater flexibility. A hard peg obtained by adopting a currency other than one's own is attractive only for very small economies prepared to contemplate unilateral dollarization (and euroization) and for countries whose special political circumstances qualify them for membership in the euro zone. The French and Dutch votes on the EU constitution highlight the difficulties of achieving deeper political integration in a world of sovereign states. Even if Europe succeeds in finessing this problem, the obstacles to doing so are more formidable in other parts of the world. In the Western Hemisphere, the sheer size of the United States disinclines it to compromise its monetary sovereignty while at the same time rendering other countries reluctant to cede control. In Asia, China's large and growing size has similar implications. And in neither region does history create the appetite for political integration needed to support the creation of transnational monetary institutions like the ECB. One day, perhaps, but not by 2025.

Discussion

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What is the future of the international monetary system? The paper discusses at length the ‘bipolar view’, which emerged from the experience of the 1990s. This is the idea that rising capital mobility would force countries to abandon exchange rate regimes characterized by intermediate steps of exchange rate flexibility.

What I find quite interesting in the paper is the particular angle the authors take. Namely, they address the issue of assessing the merit of the bipolar view looking at its predictive power. The authors estimate a Markov-chain model of transition between different exchange rate regimes. Using estimated probability of transition, they look at the prediction of the model over the next 20 years or so.

So, to what extent does the ‘bipolar view’ have predictive power? It is useful to summarize (heroically) the arguments by the authors spelling out three main theses.

The first one is that the bipolar view applies to developed countries, not to emerging markets and developing countries. However, the main reason why it applies to the first group is the creation of the euro area. Providing evidence in support of their first thesis, the Markov model predicts:

- a modest overall decline in the share of intermediate exchange rate regimes for the world as a whole;
- a falling share of floating regimes among the emerging markets;
- more hard pegs among developing countries.

These results show that the *direction* of reform is indeed consistent with the bipolar view, but the world in the future will look quite different from what we should expect to see, if we take such view literally – that is, if we correctly interpret it as a theorem about the feasibility of intermediate exchange rate regimes once capital is free to circulate worldwide.

So why is the bipolar view faulty? The problem is that its predictive power is conditional on a degree of global capital mobility far ahead of the evidence. While the group of developed countries has moved to full liberalization of the capital account, the movement towards liberalizing the capital account is slow among emerging markets and developing economies. The empirical model suggests that developed countries are, and are likely to remain, in a regime of high capital mobility; countries in the other two groups may re-impose capital controls, or remain relatively closed to trade in assets. Hence, the first thesis can be summarized as saying that, conditional on past evidence, the bipolar view is grounded on a much deeper process of financial market integration than can be reasonably expected in the foreseeable future.

Presenting their second thesis, the authors aim to shed light on the roots of the apparent reluctance by emerging markets and developing countries to liberalize capital movements. The authors stress the point that capital mobility should be seen as a prerequisite to exchange rate flexibility, since firms and banks need financial instruments to deal with volatility in international prices. But capital account liberalization is possible only after the implementation of institutional, legal and macroeconomic reforms strengthening financial institutions and promoting stability and efficiency in financial markets. To put it simply, a floating regime is precluded to countries that have not completed such reforms, since financial and non-financial institutions would lack the necessary instruments to operate in a flexible-rate environment. The second thesis is therefore that the road towards exchange rate flexibility is parallel to the road towards successful deregulation and liberalization of capital markets. In light of this conclusion, any call for the Chinese government to embrace a free float in the near future appears premature, as there would not be enough time for the required institutional development.

But why don't we observe more hard pegs? The third thesis in the paper is that hard pegs are not viable for emerging markets for a variety of reasons. The most important one is that political and historical factors preclude the construction of regional monetary unions. A political drive towards integration is what makes Europe qualitatively different, in monetary matters, relative to other regions in the world with comparable characteristics in terms of their economic structures – hence similarly suitable (or unsuitable) for monetary unification. The alternative of adopting a unilateral peg against the dollar or the euro would force a country to give up its control over monetary policy, jeopardizing both stabilization and fiscal objectives. On top of this consideration, the experience clearly shows that unilateral pegs lack the necessary political commitment to make them irrevocable: sooner or later they become unstable and are likely to end with a macroeconomic crisis.

So combining the second and the third thesis, a vast group of countries will continue to pursue monetary and fiscal policy adopting some intermediate form of exchange regime, away from free float as well as from hard pegs. In this respect, I should note here that there is a lot of wisdom in the authors' analysis, independently of the extent to which one may like or dislike the Markov-chain model they use to back their arguments – the authors are rather explicit on some of its limitations.

The text ends with another thesis adding to the authors' vision about the future of the international monetary system. The question is whether the euro can be expected to be a stable feature of it. The authors believe that the real test of the stability of the euro area is yet to come. This can only be a major financial crisis (say, in the form of a run on the public debt of a country), forcing the European Central Bank (ECB) to choose between a tough stance (to teach the fiscally irresponsible government a lesson), or a loose stance (to prevent financial contagion via abundant injection of liquidity). The latter would create: (a) moral hazard and (b) risks for the goal of price

stability. Since the ECB should be technically capable to handle a liquidity crisis even when this has a large proportion, what the authors really worry about is the possibility that a financial crisis becomes a political one.

The possibility of a financial crisis involving a large number of European institutions cannot be excluded *a priori*. However, the authors' concern with this scenario helps re-considering the second and third thesis above in a new light. Financial markets development and stability are a clearly important prerequisite for embracing a regime with floating rates. But a well-designed financial architecture is equally important in countries pursuing hard pegs! The prerequisite includes effective financial supervision and regulation, containing distortions and moral hazard, as well as political institutions, which makes it possible to reach a political agreement on how to share the costs of a crisis.

In recent months, the consensus view is that China needs to revalue the renminbi. To the extent that Chinese authorities have managed to keep its currency undervalued (current available estimates are around 20–40%), Chinese firms have been operating facing distorted relative prices, possibly creating excess supply in the export sector. While persistent undervaluation keeps distorting allocation decisions, a correction will likely create financial stress and raise the risk of substantial macroeconomic fluctuations.

In a paper on the future of the International Monetary System in the next 20 years, I am surprised by the absence of analysis of many issues such as: Will the International Monetary Fund survive? If yes, which functions will it perform? Will new institutions be created? Is policy co-ordination desirable or feasible at any level? Will the dollar keep its status as the largest and unchallenged international reserve currency? How will the large current external imbalances by the US and many emerging markets be adjusted? There is a far-reaching debate on these issues, at both theoretical and policy levels.

The authors' (revealed) preference is to focus on a single crucial factor, presented as a frame for such debate: despite financial globalization, the bipolar view applies more to regimes of capital mobility than to exchange rate regimes. In other words, many emerging markets and developing countries seem to proceed quite slowly as regards capital account liberalization. As this raises the chance of the past to be a good guide to understand the future, who can beat economic historians at the game of drafting international monetary scenarios for the next two decades?

Panel discussion

Charles Wyplosz asked why the paper put so much emphasis on the bipolar view, instead of putting more emphasis on the opening of capital markets. Since the end of the Washington consensus, most emerging countries want stable exchange rates,

because it helps trade, helps counteract the phenomenon of beggar-my-neighbour, because it aids credibility in monetary policy, because financial markets are needed to hedge exchange rate variability, and a wide variance can hurt. Furthermore, several countries cannot borrow in their own currency and so need a stable exchange rate. Eichengreen replied, saying he felt that technology and democracy were developing so that it is harder to regulate the capital account, the implication being that capital account liberalization is gradual and set to continue.

Hélène Rey pointed out that over a longer time frame large shocks such as war and decolonization imply that capital mobility is endogenous. It is moving in spurts, and it is hard to tell whether it is evolving steadily or not. Lars Jonung felt the forecasts in the paper were too optimistic and suggested two threats of financial integration – wars and depressions. He said that the thinking was previously that financial integration could dampen business cycles, but that now the thinking is that financial integration could allow big imbalances to develop in the economy.

Paul Seabright pointed out that the methodology of Markov chains assumes that policy markets have the same probability of leaving a regime at all points in time, and this implies they learn nothing over time.

Hélène Rey took issue with the paper's prediction that the euro was likely to remain the only major currency union for the foreseeable future. She noted that a model with network externalities suggests there should only be one international currency, even if the addition to the model of regional trade links can allow several currencies. Eichengreen responded, saying he half agreed because network externalities do still limit the number of currencies.

A number of commentators noted the absence of the IMF in the paper. Eichengreen explained that this is a reflection of that fact that it has a smaller role as lender of last resort as more countries can borrow in their own currencies and thus the national banks can act as lender of last resort.

APPENDIX 1: RESULTS USING THE REINHART–ROGOFF CLASSIFICATION

Here we present a second set of results, analogous to those in the text, based on the Reinhart–Rogoff 'natural' classification of exchange rate regimes.

Table A1.1 reports first the simple tabulations. One difference from the BOR data is the very sharp rise between 1997 and 2004 in the all-country panel in the number of countries classified as having floating rates, a trend that was not evident in the Bubula–Otker data. This reflects an increase both in the number of emerging markets and in the number of developing countries moving to some form of floating. This difference is not simply a figment of the way managed floats are classified. When we reclassify managed floats as part of the intermediate category, we still get a sharp increase in the share of floating rate regimes between 1997 and 2003 in the all-country total, and this result is still reflected in the behaviour of both emerging markets and developing countries.

Table A1.1. Evolution of exchange rate regimes: Reinhart and Rogoff natural classification (percentage of members in each category)

	Shares		
	1990	1997	2004
All countries			
Hard pegs ^a	22.50	24.46	34.06
Intermediate ^b	45.83	51.08	32.61
Floating ^c	15.83	13.67	31.88
Freely falling	15.83	10.79	1.45
Total	100.00	100.00	100.00
Members	120	139	138
Advanced countries			
Hard pegs ^a	4.35	0.00	52.17
Intermediate ^b	73.91	65.22	13.04
Floating ^c	21.74	34.78	34.78
Freely falling	0.00	0.00	0.00
Total	100.00	100.00	100.00
Members	23	23	23
Emerging countries			
Hard pegs ^a	10.00	12.50	16.13
Intermediate ^b	60.00	53.13	41.94
Floating ^c	10.00	18.75	41.94
Freely falling	20.00	15.63	0.00
Total	100.00	100.00	100.00
Members	30	32	31
Developing countries			
Hard pegs ^a	34.33	35.71	35.71
Intermediate ^b	29.85	46.43	34.52
Floating ^c	16.42	5.95	27.38
Freely falling	19.40	11.90	2.38
Total	100.00	100.00	100.00
Members	67	84	84

Notes:

^a Includes arrangements with no separate legal tender, pre-announced peg or currency boards, and pre-announced horizontal band that is narrower than or equal to $\pm 2\%$.

^b Includes *de facto* pegs, *de facto* crawling band that is narrower than or equal to $\pm 2\%$, pre-announced crawling band that is wider than or equal to $\pm 2\%$, *de facto* crawling band that is narrower than or equal to $\pm 5\%$, moving band that is narrower than or equal to $\pm 2\%$ (i.e., allows for both appreciation and depreciation over time), pre-announced crawling peg, pre-announced crawling band that is narrower than or equal to $\pm 2\%$, and *de facto* crawling peg.

^c Includes managed floating and freely floating arrangements.

Source: Authors' estimates using Reinhart and Rogoff's exchange rate classification.

When we use the Markov model to project exchange rate regimes in 2025, the results for the advanced countries and emerging markets are essentially the same as with the Bubula–Otker data set (see Table A1.2). For developing countries, however, the RR classification predicts significantly more hard pegs. This reflects the relatively high historical probability of moving from a freely falling regime to a hard peg at the time of stabilization. If one thinks that high inflation and freely falling rates will be

Table A1.2. Transition probabilities and 2025 forecasts: different country groups, Reinhart and Rogoff natural classification

Regime in period t	Estimated probability of regime in $t + 1$				
	Hard pegs	Intermediate	Floating	Freely falling	Total observations
All countries					
Hard pegs	0.9781	0.0119	0.0020	0.0080	503
Intermediate	0.0165	0.9294	0.0294	0.0247	850
Floating	0.0061	0.0215	0.9141	0.0583	326
Freely falling	0.0543	0.1584	0.1176	0.6697	221
Total					1900
Forecast 2025					
Share in the exchange rate distribution	39.13	30.58	22.93	7.36	
Advanced countries					
Hard pegs	0.9839	0.0000	0.0161	0.0000	62
Intermediate	0.0728	0.8874	0.0265	0.0132	151
Floating	0.0093	0.0093	0.9813	0.0000	107
Freely falling	0.0000	1.0000	0.0000	0.0000	2
Total					322
Forecast 2025					
Share in the exchange rate distribution	53.18	4.78	41.88	0.06	
Emerging market countries					
Hard pegs	0.9492	0.0169	0.0000	0.0339	59
Intermediate	0.0000	0.9331	0.0335	0.0335	239
Floating	0.0120	0.0361	0.9157	0.0361	83
Freely falling	0.0727	0.1273	0.1455	0.6545	55
Total					436
Forecast 2025					
Share in the exchange rate distribution	18.78	39.70	32.45	9.08	
Developing countries					
Hard pegs	0.9817	0.0131	0.0000	0.0052	382
Intermediate	0.0065	0.9413	0.0283	0.0239	460
Floating	0.0000	0.0221	0.8603	0.1176	136
Freely falling	0.0488	0.1585	0.1098	0.6829	164
Total					1142
Forecast 2025					
Share in the exchange rate distribution	36.36	38.55	15.68	9.41	

Source: Authors' calculations using the updated classification of Reinhart and Rogoff.

less likely in the next 20 years than they were in the last 20, as we do, then one will be inclined to place more weight on the BOR results. The RR data also lead one to project fewer floats; again this is a result of the practice of breaking up this category into freely floating versus freely falling regimes.

Tables A1.3 and A1.4 combine data on capital account openness with data on exchange rate regimes. Some of the results are consistent with the bipolar view: for

Table A1.3. Prevalence of capital controls and exchange rate regimes (percentage of members in each category)

		Capital controls	Exchange rate	Shares		
				1990	1997	2003
All countries						
I	Open	Fixed	3.57	3.28	15.57	
II	Open	Intermediate	11.61	23.77	14.75	
III	Open	Floating	4.46	6.56	12.30	
IV	Open	Freely falling	2.68	0.82	1.64	
V	Closed	Fixed	17.86	18.85	17.21	
VI	Closed	Intermediate	34.82	29.51	16.39	
VII	Closed	Floating	11.61	8.20	19.67	
VIII	Closed	Freely falling	13.39	9.02	2.46	
Total			100.00	100.00	100.00	
Members			112	122	122	
Advanced countries						
I	Open	Fixed	4.76	0.00	50.00	
II	Open	Intermediate	28.57	50.00	9.09	
III	Open	Floating	23.81	31.82	31.82	
IV	Open	Freely falling	0.00	0.00	0.00	
V	Closed	Fixed	0.00	0.00	0.00	
VI	Closed	Intermediate	42.86	13.64	0.00	
VII	Closed	Floating	0.00	4.55	9.09	
VIII	Closed	Freely falling	0.00	0.00	0.00	
Total			100.00	100.00	100.00	
Members			21	22	22	
Emerging market countries						
I	Open	Fixed	6.90	6.67	16.67	
II	Open	Intermediate	10.34	16.67	20.00	
III	Open	Floating	0.00	3.33	6.67	
IV	Open	Freely falling	3.45	0.00	0.00	
V	Closed	Fixed	3.45	6.67	3.33	
VI	Closed	Intermediate	48.28	36.67	20.00	
VII	Closed	Floating	10.34	13.33	33.33	
VIII	Closed	Freely falling	17.24	16.67	0.00	
Total			100.00	100.00	100.00	
Members			29	30	30	
Developing countries						
I	Open	Fixed	1.61	2.86	4.29	
II	Open	Intermediate	6.45	18.57	14.29	
III	Open	Floating	0.00	0.00	8.57	
IV	Open	Freely falling	3.23	1.43	2.86	
V	Closed	Fixed	30.65	30.00	28.57	
VI	Closed	Intermediate	25.81	31.43	20.00	
VII	Closed	Floating	16.13	7.14	17.14	
VIII	Closed	Freely falling	16.13	8.57	4.29	
Total			100.00	100.00	100.00	
Members			62	70	70	

Source: Authors' calculations.

Table A1.4. Transition probabilities and 2025 forecasts: capital controls and exchange rate regimes

Regime in period t			Estimated probability of regime in $t + 1$								Total observations
Capital controls	Exchange rate		I	II	III	IV	V	VI	VII	VIII	
All countries											
I	Open	Fixed	0.9495	0.0101	0.0101	0.0000	0.0303	0.0000	0.0000	0.0000	99
II	Open	Intermediate	0.0310	0.8931	0.0241	0.0138	0.0000	0.0379	0.0000	0.0000	290
III	Open	Floating	0.0096	0.0192	0.9327	0.0096	0.0000	0.0000	0.0288	0.0000	104
IV	Open	Freely falling	0.0000	0.2667	0.0667	0.4667	0.0667	0.0667	0.0000	0.0667	15
V	Closed	Fixed	0.0213	0.0000	0.0000	0.0000	0.9539	0.0142	0.0000	0.0106	282
VI	Closed	Intermediate	0.0044	0.0574	0.0000	0.0000	0.0044	0.8675	0.0309	0.0353	453
VII	Closed	Floating	0.0000	0.0060	0.0417	0.0060	0.0060	0.0119	0.8274	0.1012	168
VIII	Closed	Freely falling	0.0000	0.0143	0.0000	0.0071	0.0500	0.1429	0.1500	0.6357	140
Total											1551
Forecast 2025											
Share in the bivariate distribution			19.7672	15.5786	15.4152	0.8577	20.1940	13.6495	9.6578	4.8393	
Advanced countries											
I	Open	Fixed	0.9783	0.0000	0.0217	0.0000	0.0000	0.0000	0.0000	0.0000	46
II	Open	Intermediate	0.0792	0.8713	0.0099	0.0198	0.0000	0.0198	0.0000	0.0000	101
III	Open	Floating	0.0120	0.0000	0.9639	0.0000	0.0000	0.0000	0.0241	0.0000	83
IV	Open	Freely falling	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2
V	Closed	Fixed	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0
VI	Closed	Intermediate	0.0541	0.1622	0.0000	0.0000	0.0000	0.7027	0.0811	0.0000	37
VII	Closed	Floating	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.8000	0.0000	15
VIII	Closed	Freely falling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0
Total											284
Forecast 2025											
Share in the bivariate distribution			44.8565	1.0056	48.3650	0.0219	0.0000	0.0964	5.6551	0.0000	

Table A1.4. *Continued*

Regime in period t			Estimated probability of regime in $t + 1$								Total observations
Capital controls	Exchange rate		I	II	III	IV	V	VI	VII	VIII	
Emerging market countries											
I	Open	Fixed	0.9667	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000	0.0000	30
II	Open	Intermediate	0.0000	0.8909	0.0182	0.0182	0.0000	0.0727	0.0000	0.0000	55
III	Open	Floating	0.0000	0.2000	0.7000	0.0000	0.0000	0.0000	0.1000	0.0000	10
IV	Open	Freely falling	0.0000	0.0000	0.0000	0.5000	0.2500	0.2500	0.0000	0.0000	4
V	Closed	Fixed	0.1739	0.0000	0.0000	0.0000	0.7391	0.0000	0.0000	0.0870	23
VI	Closed	Intermediate	0.0000	0.0366	0.0000	0.0000	0.0000	0.8902	0.0366	0.0366	164
VII	Closed	Floating	0.0000	0.0000	0.0741	0.0000	0.0185	0.0185	0.8333	0.0556	54
VIII	Closed	Freely falling	0.0000	0.0408	0.0000	0.0000	0.0612	0.0612	0.1633	0.6735	49
Total											389
Forecast 2025											
Share in the bivariate distribution			23.3832	20.4160	5.1394	0.7515	6.2800	22.0438	15.1955	6.7906	
Developing countries											
I	Open	Fixed	0.8696	0.0435	0.0000	0.0000	0.0870	0.0000	0.0000	0.0000	23
II	Open	Intermediate	0.0075	0.9104	0.0373	0.0075	0.0000	0.0373	0.0000	0.0000	134
III	Open	Floating	0.0000	0.0000	0.9091	0.0909	0.0000	0.0000	0.0000	0.0000	11
IV	Open	Freely falling	0.0000	0.2222	0.1111	0.5556	0.0000	0.0000	0.0000	0.1111	9
V	Closed	Fixed	0.0077	0.0000	0.0000	0.0000	0.9730	0.0154	0.0000	0.0039	259
VI	Closed	Intermediate	0.0000	0.0556	0.0000	0.0000	0.0079	0.8770	0.0198	0.0397	252
VII	Closed	Floating	0.0000	0.0101	0.0000	0.0101	0.0000	0.0101	0.8283	0.1414	99
VIII	Closed	Freely falling	0.0000	0.0000	0.0000	0.0110	0.0440	0.1868	0.1429	0.6154	91
Total											878
Forecast 2025											
Share in the bivariate distribution			2.8819	20.9716	11.0276	2.8950	27.9161	20.2461	7.8969	6.1969	

Source: Authors' calculations.

example, intermediate regimes are more popular among financially closed than financially open economies; this is true for both emerging markets and developing countries. There is little sign that financial openness is encouraging countries to move to the fixed rather than the floating end of the spectrum. As of 2003, the sample includes only five emerging-market countries that were financially open and had fixed rates: Bulgaria, Ecuador, Hong Kong, Panama, and Venezuela. Note that it also lists ten emerging market countries that were relatively closed but had a floating exchange rate: Argentina, Colombia, Indonesia, Korea, Mexico, Philippines, Poland, South Africa, Thailand and Turkey.

APPENDIX 2

Markov chains

In this appendix we describe the methods used to analyze the evolution of the exchange rate and capital controls regimes using a Markov chain process with transition probabilities $\{P_{ij}\}_{i,j=1,2,\dots,N}$. The transition probability $P_{ij,t}$ represents the probability of observing state i in period $t-1$ followed by state j in period t .

Definition 1 A stochastic process has the Markov property if the conditional probability distribution of future states, given the present state, depends only on the present state.

Definition 2 A Markov chain is a discrete-time stochastic process with the Markov property.

Let s_t be the observable regime-indicator-variable in time t and assume that s_t evolves according to the following Markov chain process:

$$P_{ij,t} = P\{s_t = j | s_{t-1} = i, s_{t-2} = k, \dots\} = P\{s_t = j | s_{t-1} = i\} \quad (\text{A1})$$

$$\sum_{j=1}^N P_{ij,t} = 1 \quad (\text{A2})$$

Equation (A2) is a constraint on the transition probabilities (i.e. the probabilities in row i of the transition matrix must add up to one). The transition matrix is a $(N \times N)$ matrix P containing the transition probabilities:

$$P_t = \begin{bmatrix} p_{11,t} & p_{12,t} & \cdots & p_{1N,t} \\ p_{21,t} & p_{22,t} & \cdots & p_{2N,t} \\ \vdots & \vdots & \cdots & \vdots \\ p_{N1,t} & p_{N2,t} & \cdots & p_{NN,t} \end{bmatrix}$$

In this paper we have computed two types of transition matrices.

1. With constant transition probabilities across time.
2. With time-varying transition probabilities.

Constant transition matrix. For the transition matrix with constant probabilities $P_t = P \forall t$. If $0 < p_{ij} < 1 \forall i, j = 1, 2, \dots, N$, we can say that the Markov chain is irreducible. On the other hand, if P is an upper triangular matrix we can say that the Markov chain is reducible.

$$P = \begin{bmatrix} p_{11} & 0 & \cdots & 0 \\ p_{21} & p_{22} & \cdots & 0 \\ \vdots & \vdots & \cdots & \vdots \\ p_{N1} & p_{N2} & \cdots & p_{NN} \end{bmatrix} = \begin{bmatrix} T_1 & 0 \\ T_2 & T_3 \end{bmatrix}$$

We call the state i an absorbing state when we observe that $p_{ii} = 1$. Once a country adopts regime i the probability of leaving that state is equal to zero (it is not possible to reach other states once we are in state i).

Time-varying transition matrix. To relax the assumption that the transition matrix is constant across time we allow the transition probabilities to change with some macroeconomic variables. In this case, the transition matrix will change every period as the independent variables change. Following Masson and Ruge-Murcia (2005) we use the following functional forms for the transition probabilities.

$$P(s_t = j | s_{t-1} = i) = p_{ij,t}(X_{t-1}) = \frac{\exp(\beta'_{ij} X_{t-1})}{1 + \sum_{j \neq i}^N \exp(\beta'_{ij} X_{t-1})} \quad (\text{A3})$$

$$P(s_t = i | s_{t-1} = i) = p_{ii,t}(X_{t-1}) = \frac{1}{1 + \sum_{j \neq i}^N \exp(\beta'_{ij} X_{t-1})} \quad (\text{A4})$$

The functional forms (A3) and (A4) implicitly takes into account the condition that the sum of the probabilities in any row of the transition matrix must add up to one (see Equation (A2)).

Estimation of the transition matrix

Given the non-linearities exhibited by the functional forms chosen for the transition probabilities, there is no analytic solution for the maximum likelihood estimators. We compute the maximum likelihood estimators using a numerical method. The algorithm used in this paper is the Davidon-Powell-Fletcher algorithm (DFP). We use this method to estimate the transition matrix with constant and time-varying probabilities. One advantage of this algorithm is that it does not require the analytic calculation of the second derivatives of the objective function (minus the *log likelihood function*).

The probability of observing a particular sequence of regimes $\{s_t\}_{t=0}^T$ for country c is equal to

$$P_c(s_0 \cap s_1 \cap \dots \cap s_T) = P_c(s_T | s_{T-1}) P_c(s_{T-1} | s_{T-2}) \dots P_c(s_1 | s_0) P_c(s_0) \quad (\text{A5})$$

The last inequality exploits our *Markov* chain assumption and uses the definition of the conditional probability. Then, the *likelihood function* for country c can be written in the following way

$$L_c(\beta) = P_c(s_0 \cap s_1 \cap \dots \cap s_T) \quad (\text{A6})$$

Using (A3)–(A5), (A6) can be rewritten in the following way

$$L_c(\beta) = \left[\prod_{t=1}^T \prod_{i=1}^N \prod_{j=1}^N (p_{ij,t,c}(X_{t-1}))^{I_{ij,t,c}} \right] P_c(s_0) \quad (\text{A7})$$

where

$$I_{ij,t,c} = \begin{cases} 1 & \text{if } s_t = j \text{ and } s_{t-1} = i \text{ for country } c \\ 0 & \text{otherwise} \end{cases}$$

The log likelihood function for C countries can be obtained by taking logs on both sides of (A7) and summing over all the countries of the sample, $c = \{1, 2, \dots, C\}$:

$$l(\beta) = \sum_{c=1}^C \sum_{t=1}^T \sum_{i=1}^N \sum_{j=1}^N I_{ij,t,c} \ln(p_{ij,t,c}(X_{t-1})) + \sum_{c=1}^C \ln(P_c(s_0)) \quad (\text{A8})$$

The maximum likelihood estimators of β_{ij} are obtaining through the following maximization program:

$$\hat{\beta} = \max_{\beta} l(\beta) \quad (\text{A9})$$

where the $p_{ij}(X_{t-1})$'s are defined by (A3) and (A4) and β_{ij} is a matrix of dimension $N(N-1) \times k$ where k is the number of covariates included in the analysis and N is the number of states. Given the restrictions in the probabilities (Equation (A2)) we cannot identify all the parameters. For each row we can identify the slopes and the intercept for $N-1$ states.

Exploiting the large sample properties of the MLE estimators we compute the variance-covariance matrix of the $\hat{\beta}_{MLE}$ using the information matrix. In the particular case of constant probabilities, we estimate the standard errors of these probabilities using the delta method. Note that the estimates of the constant probabilities are obtained using a constant vector as the independent variable (X_{t-1}).

Forecasts

Constant probabilities. Once we have estimated the transition matrix we can perform an M -step forecast. When $M = 1$ (one-step forecast) and for a given distribution of the regimes (r_t) in time t the one step forecast is:

$$[R_{t+1}^f | R_t = r_t] = r_t \cdot P \quad (\text{A10})$$

where r_t is \mathcal{N} -row vector of dimension $1 \times \mathcal{N}$ containing the distribution of the regimes in time t . Generalizing equation (A10) the M – step forecast can be obtained applying the following equation:

$$[R_{t+M}^f | R_t = r_t] = r_t \cdot P^M \quad (\text{A11})$$

R_{t+M}^f is the M – step forecast of the distribution of either the exchange rate or the capital controls regimes.

If the transition matrix P has only one eigenvalue equal to one and the other $\mathcal{N} - 1$ eigenvalues are inside the unit circle we can compute the invariant (long run or steady state) distribution of the process. For example, if these conditions hold for the transition matrix of the exchange rate (capital controls) regimes we can compute the long-run distribution of the exchange rate (capital controls) regimes and this distribution will not depend on the initial distribution of regimes.

Definition 3 If P is the transition matrix for the Markov chain process and if r is a distribution vector with the property that $rP = r$ then we refer to r as the long-run (steady-state or invariant) distribution.

The steady-state or invariant distribution can be computed as follows:

$$\lim_{M \rightarrow \infty} [R_{t+M}^f | R_t = r] = r \cdot P^M = P^M \quad (\text{A12})$$

for any distribution of the regimes $R_t = r$ and provided the eigenvalue conditions mentioned above hold. The limit described in (A12) indicates that the invariant distribution will be equal to any row of the matrix P^M .

Time-varying transition probabilities. To make an M – step forecast of the exchange rate or capital controls distributions using the time-varying transition matrices we first have to make an M – step forecast of the independent variables (X_{t-1}) or set a desired scenario or path for each independent variable and then use the maximum likelihood estimators $\hat{\beta}_{MLE}$ and Equations (A3) and (A4) to estimate the transition probabilities. Once we have a forecast of the transition matrix for each period we obtain the M – step forecast of the distribution in the following way:

$$[R_{t+M}^f | R_t = r_t] = r_t \cdot P_{t+1}^f \cdot P_{t+2}^f \cdot \dots \cdot P_{t+M}^f \quad (\text{A13})$$

where P_{t+s}^f is the forecast of the transition matrix for period $t + s$.

Maximum likelihood estimates

In the text we present forecasts of the exchange rate distribution 20 years from now (2025) using constant and time-varying transition probabilities. In the particular case of the time-varying probabilities (Equation (A3) and (A4)) we assumed that the transition probabilities depend on macroeconomic variables. In particular, the following functional form is assumed:

$$B'_{ij}X_{t-1} = \beta_0 + \beta_1 Inf_{t-1} + \beta_2 PIncome_{t-1} + \beta_3 \frac{DC_{t-1}}{GDP_{t-1}} \quad (A14)$$

where *Inf* is equal to the annual inflation rate, *PIncome* refers to the income per capita and *DC/GDP* is the ratio of domestic credit to gross domestic product. The inflation data was obtained from *International Financial Statistics*, income per capita and the ratio of domestic credit to gross domestic product were obtained from the World Development Indicators of the World Bank.

APPENDIX 3: FORECAST OF THE DISTRIBUTION OF EXCHANGE RATE REGIMES IN 2025: ALTERNATIVE SCENARIOS

In this appendix we present forecasts of the distribution of the exchange rate regimes for the year 2025 using time-varying transition probabilities, following the method of Masson and Ruge-Murcia (2005). The first step in doing so is to estimate covariates for the Markov transition probabilities. We model these as functions of three variables: the rate of inflation x (expressed as $x/(1+x)$), per capita GDP as a general measure of the level of economic development, and domestic credit as a share of GDP as a measure of financial development.

The coefficient estimates are shown in Table A3.1 for the transition probabilities based on the Bubula–Otker–Robe classification, and in Table A3.2 for the Reinhart–Rogoff classification. The estimates are generally plausible, although only a minority are statistically significant at standard confidence levels.²³ We do not wish to make too much of the magnitude of the coefficient estimates, which is why we present these alternative forecasts in this appendix rather than the body of the text. Nonetheless, we think that it is useful to indicate that the method can be used to forecast under different scenarios.

Thus, we see that higher inflation encourages movement from pegged to more flexible exchange rate regimes, although there is also a positive coefficient for the transition from floating to hard pegs, as if some high-inflation countries, emerging markets in particular, resort to hard pegs as an anti-inflationary device. Higher per capita incomes are associated with a movement to hard pegs among the advanced countries – this is picking up the transition to monetary union in Europe. In Table A3.2, we obtain similar results for both inflation and for per capita incomes.

We can now use these point estimates to forecast the distribution of exchange rate arrangements in 2025 conditional on different assumptions about the distribution of the independent variables. The ‘average’ scenario assumes that the independent three variables take on their sample-average values between now and 2025. Note that these

²³ This is the same result obtained by Masson and Ruge-Murcia using different data and independent variables.

Table A3.1. Estimated coefficients: time-varying probabilities, Bubula and Otker-Robe classification

	Constant	Inflation	Income (per capita)	Domestic credit/GDP
All countries				
p12	-6.74*	5.76	-1.17	7.69
p13	-4.53*	-16.69	0.30	-11.12
p21	-6.17*	2.83**	0.08*	0.96
p23	-2.62*	1.63*	-0.02	0.34
p31	-7.45*	5.69*	-0.09	2.24
p32	-1.93*	0.80	-0.08*	0.57
Advanced countries				
p12	—	—	—	—
p13	—	—	—	—
p21	3.60	-161.87*	-0.24*	2.28
p23	-7.31*	23.35**	0.11	1.49
p31	—	—	—	—
p32	3.30	8.92	0.04	-10.18*
Emerging market countries				
p12	—	—	—	—
p13	3.57	-491.08	-1.18	-0.06
p21	—	—	—	—
p23	-2.03*	-1.12	0.01	0.33
p31	-5.02*	5.33*	-0.05	0.00
p32	-1.79*	1.35	-0.05	0.27
Developing countries				
p12	-9.57*	18.81	-1.96	16.46
p13	—	—	—	—
p21	-5.98*	4.16*	-0.03	-0.70
p23	-2.31*	2.03*	-0.10	-0.94
p31	—	—	—	—
p32	-2.52*	1.01	0.10	2.32*

Note: Authors' estimates. * and ** denote the coefficients that are statistically different from zero at the 5% and 10% levels of significance, respectively.

forecasts differ slightly from those in the text, where transition probabilities were not modelled as functions of independent variables (there, they can be thought of as being regressed on a constant term alone). The 'good' scenario assumes that the inflation rate is one standard deviation below the sample mean, per capita income is 0.5 standard deviation above the sample mean, and domestic credit/GDP is one standard deviation above the sample mean.²⁴ Analogously, the 'bad' scenario assumes that the inflation rate is one standard deviation above the sample mean, per capita income is 0.5 standard deviation below the sample mean, and domestic credit/GDP is one standard deviation below the sample mean.

²⁴ Given the high dispersion of income per capita among the countries, subtracting one standard deviation to this variable gave a negative income per capita for a few countries. For that reason, we added or subtracted 0.5 standard deviation.

Table A3.2. Estimated coefficients: time-varying probabilities, Reinhart and Rogoff classification

	Constant	Inflation	Income (per capita)	Domestic credit/GDP
All countries				
p12	-4.52*	4.04*	-0.23	0.06
p13	-8.58*	3.76	0.05	2.28
p14	-4.70*	5.59*	0.22	-8.76
p21	-4.10*	-6.54	0.04	-0.54
p23	-3.20*	-3.19	0.01	-0.14
p24	-3.97*	4.36*	-0.03	-0.07
p31	-5.99*	-40.49	-0.17*	4.11*
p32	-3.92*	3.97	-0.01	-0.06
p34	-3.10*	8.17*	-0.28	0.28
p41	-2.98*	0.27	0.10	1.88
p42	-1.24*	-0.65	0.19**	0.35
p43	-0.18	-5.09*	-0.01	1.74
Advanced countries				
p12	—	—	—	—
p13	-6.52	71.03	-0.04	0.54
p14	—	—	—	—
p21	4.56	-76.51**	-0.27*	-1.01
p23	-7.39*	21.50	0.16**	-0.68
p24	-3.90	7.84	-0.07	0.86
p31	-1.33	-96.74	-0.11	0.57
p32	-4.30	-19.33	0.06	-1.41
p34	—	—	—	—
p41	—	—	—	—
p42	—	—	—	—
p43	—	—	—	—
Emerging market countries				
p12	150.84	-16.81	0.05	-1572.60
p13	—	—	—	—
p14	-3.59**	3.32	0.24	-4.95
p21	—	—	—	—
p23	-3.69*	-3.96	0.03	0.95
p24	-3.45*	1.92	0.01	-0.25
p31	-1472	-818.48	0.00	955.44
p32	-1.44	-37.81	0.00	-0.40
p34	-3.34*	9.76	-0.27	0.20
p41	-3.54*	-0.21	0.46	1.04
p42	-1.62	-0.85	0.18	0.13
p43	-1.41	-5.54**	0.41	2.49
Developing countries				
p12	-7.04*	3.53	-5.26	24.70*
p13	—	—	—	—
p14	9.59	21.62	-56.33	-173.69
p21	-4.53*	0.88	-0.46	1.49
p23	-2.43*	-4.62	-0.15	-1.71
p24	-3.97*	6.22*	-0.26	-0.47
p31	—	—	—	—
p32	-4.83*	11.81**	0.34	-4.97
p34	-3.30*	8.07*	-0.27	1.72
p41	-3.20*	0.06	0.01	4.07*
p42	-1.22*	-0.14	0.09	1.15
p43	-0.07	-2.91	-0.93	1.73

Note: Authors' estimates. * and ** denote the coefficients that are statistically different from zero at the 5% and 10% levels of significance, respectively.

Table A3.3. Forecast 2025: share in the exchange rate distribution using Bubula–Otker–Robe classification and time-varying transition probabilities

Scenario	Hard pegs	Intermediate	Floating
All countries			
Bad	30.22	40.66	29.12
Average	31.83	38.95	29.22
Good	33.32	37.26	29.42
Advanced countries			
Bad	54.39	40.02	5.59
Average	55.07	2.78	42.16
Good	57.74	0.01	42.26
Emerging market countries			
Bad	26.93	51.43	21.65
Average	19.77	46.31	33.93
Good	0.18	43.72	56.11
Developing countries			
Bad	26.03	32.80	41.18
Average	26.58	51.31	22.12
Good	25.31	65.11	9.58

Note: In the good scenario, inflation is equal to the sample average of the inflation rate minus one standard deviation, income per capita is equal to the sample average plus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average plus one standard deviation. In the bad scenario, inflation is equal to the sample average of the inflation rate plus one standard deviation, income per capita is equal to the sample average minus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average minus one standard deviation. In the average scenario all the variables assume their sample averages.

Tables A3.3 and A3.4 show the forecasts using the Bubula–Otker–Robe and Reinhart–Rogoff classifications, respectively. The overall results are not very different under the three scenarios. However, there are noticeable differences within the three subgroups of countries. In Table A3, the good scenario leads to even more complete movement on the part of the advanced countries out of intermediate regimes in favour of monetary union.²⁵ Among emerging markets the good scenario results in the all-but-total disappearance of hard pegs and movement to intermediate and floating regimes in almost equal proportions. Under the bad scenario, in contrast, more emerging markets stick with hard pegs, while fewer move to floating rates.²⁶ In Table A3.4, the good scenario again leads to more complete movement toward hard pegs (monetary union in Europe). Here, however, floating rather than intermediate regimes are the alternative in the bad scenario. Among emerging markets we again forecast fewer countries with floating rates in the bad scenario, but here the alternative

²⁵ In the bad scenario, interestingly, the monetary union does not grow, and a substantial share of floaters move back toward intermediate regimes.

²⁶ The results for developing countries are harder to reconcile with our priors. The tendency for these countries to move from floating to intermediate rates in the good scenario reflects the relatively large position coefficient on financial development on the transition probability from floating to intermediate regimes.

Table A3.4. Forecast 2025: share in the exchange rate distribution using the natural classification of Reinhart and Rogoff and time-varying transition probabilities

Scenario	Hard pegs	Intermediate	Floating	Freely floating
All countries				
Bad	18.37	53.19	13.51	14.93
Average	37.71	29.09	31.31	1.89
Good	79.75	10.45	9.66	0.14
Advanced countries				
Bad	23.89	12.92	63.02	0.17
Average	47.45	12.02	40.38	0.15
Good	64.82	11.21	23.84	0.13
Emerging market countries				
Bad	17.66	52.69	7.02	22.64
Average	19.98	16.23	59.47	4.32
Good	16.70	66.19	15.54	1.58
Developing countries				
Bad	49.59	33.14	6.47	10.79
Average	47.47	33.61	14.64	4.28
Good	43.66	25.32	29.48	1.54

Note: In the good scenario, inflation is equal to the sample average of the inflation rate minus one standard deviation, income per capita is equal to the sample average plus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average plus one standard deviation. In the bad scenario, inflation is equal to the sample average of the inflation rate plus one standard deviation, income per capita is equal to the sample average minus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average minus one standard deviation. In the average scenario all variables assume their sample averages.

is intermediate regimes rather than hard pegs.²⁷ Among developing countries the bad scenario leads, plausibly, to the abandonment of pegs in favour of freely-falling rates.

In addition we estimated the coefficients on the same covariates for the binary classification of the capital account restrictions and again used them to forecast the distribution of regimes in 2025. Table A3.5 shows the estimated parameters for the different country groups. Only a few of the parameters are statistically significant. Still, the alternative scenarios, in Table A3.6, are broadly plausible. For the full sample of countries, advanced economies and emerging markets, more (fewer) countries shift to capital account openness in the good (bad) scenario relative to the average. The least plausible result is that these forecasts suggest fewer emerging markets than developing countries having moved to capital account openness by 2025, but we hesitate to make too much of this difference due to the small number of significant covariates. Most importantly, the key conclusion in the text, that there will still be a significant fraction of emerging markets and developing countries with capital controls in 2025, remains unchanged.

²⁷ Another surprising result is that we forecast fewer floats and more intermediate regimes under the good scenario.

Table A3.5. Estimated coefficients of the explanatory variables, Chinn and Ito Index

	Constant	Inflation	Income (per capita)	Domestic credit/GDP
All countries				
p12	-3.223*	0.001	0.049*	-0.267
p21	-2.239*	0.000	-0.029	-1.070
Advanced countries				
p12	0.322	-2.072	-0.124**	2.759**
p21	-3.986**	0.301	-0.041	0.642
Emerging market countries				
p12	-2.682*	-0.005	0.096**	-1.410
p21	-0.932	-0.197	0.133	-4.643*
Developing countries				
p12	-3.117*	0.003	-0.004	-1.466
p21	-2.511*	-0.022	-0.022	-0.705

Note: Authors' estimates. * and ** denote the coefficients that are statistically different from zero at the 5 and 10% levels of significance, respectively.

Table A3.6. Forecast for 2025: share in the capital controls distribution using the Chinn and Ito index and time-varying transition probabilities

	Closed	Open
All countries		
Bad	68.30	31.70
Average	54.65	45.35
Good	41.68	58.32
Advanced countries		
Bad	26.91	73.09
Average	5.81	94.19
Good	1.90	98.10
Emerging market countries		
Bad	72.92	27.08
Average	54.44	45.56
Good	38.85	61.15
Developing countries		
Bad	61.94	38.06
Average	67.74	32.26
Good	72.46	27.54

Note: In the good scenario, inflation is equal to the sample average of the inflation rate minus one standard deviation, income per capita is equal to the sample average plus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average plus one standard deviation. In the bad scenario, inflation is equal to the sample average of the inflation rate plus one standard deviation, income per capita is equal to the sample average minus 0.5 standard deviation, and domestic credit/GDP is equal to the sample average minus one standard deviation. In the average scenario all variables assume their sample averages.

APPENDIX 4: ALTERNATIVE CAPITAL CONTROLS CLASSIFICATIONS

In this appendix we explore the robustness of our findings regarding trends in financial openness by analysing a number of alternative measures of capital account regimes. A first sensitivity analysis is to employ all four components of the Chinn–Ito index, which measure the presence or absence of restrictions on capital account transactions, the presence or absence of current account restrictions, the presence or absence of multiple exchange rates, and the presence or absence of export surrender requirements. We use these data to place countries in three categories: fully closed (if all four measures are present), fully open (if all four measures are absent) or in between. Doing so basically confirms the broad outlines of the analysis based on the binary measure discussed in the text.

This more detailed classification provides further nuance without fundamentally changing the picture. We see in Table A4.1 that the advanced countries did in fact

Table A4.1. Prevalence of capital controls: 3-way Chinn–Ito classification (percentage of members in each category)

	Shares		
	1990	1997	2003
All countries			
Closed	16.45	7.74	5.66
Intermediate	65.79	68.39	63.52
Open	17.76	23.87	30.82
Total	100.00	100.00	100.00
Members	152	155	159
Advanced countries			
Closed	0.00	0.00	0.00
Intermediate	52.38	22.73	9.09
Open	47.62	77.27	90.91
Total	100.00	100.00	100.00
Members	21	22	22
Emerging market countries			
Closed	23.33	7.14	0.00
Intermediate	60.00	75.00	74.19
Open	16.67	17.86	25.81
Total	100.00	100.00	100.00
Members	30	28	31
Developing countries			
Closed	17.82	9.52	8.49
Intermediate	70.30	76.19	71.70
Open	11.88	14.29	19.81
Total	100.00	100.00	100.00
Members	101	105	106

Notes: Each component is equal to 0 when restrictions are present or 1 otherwise. A country is considered closed, intermediate or open, with respect to the capital controls, when the sum of the four components is equal to 0, 1–3, or 4, respectively.

Source: Authors' estimates using the four binary components of the Chinn and Ito index.

start from a position of significantly greater capital account openness; circa 1990, none of them were totally closed to international capital flows, so measured, whereas some 20% of emerging markets and developing countries were still in this position. By 2003, none of the emerging markets remain totally closed – which is of course what defines them as emerging markets, namely, that international investors can acquire claims on them to at least some extent – while one in 12 developing countries remains in this position. The forecasts in Table A4.2 suggest that by 2025 the share of emerging markets and developing countries with fully open capital accounts will have risen only very slightly.

Table A4.2. Transition probabilities and 2025 forecasts: capital controls (3-way classification)

Regime in period t	Estimated probability of regime in $t + 1$			
	Closed	Intermediate	Open	Total observations
All countries				
Closed	0.7538	0.2410	0.0051	195
Intermediate	0.0233	0.9444	0.0323	1332
Open	0.0000	0.0497	0.9503	483
Total				2010
Forecast 2025				
Share in the capital controls distribution	5.53	57.97	36.49	
Advanced countries				
Closed	0.0000	0.0000	0.0000	0
Intermediate	0.0000	0.8000	0.2000	65
Open	0.0000	0.0183	0.9817	219
Total				284
Forecast 2025				
Share in the capital controls distribution	0.00	8.39	91.61	
Emerging market countries				
Closed	0.7250	0.2750	0.0000	40
Intermediate	0.0154	0.9462	0.0385	260
Open	0.0000	0.0921	0.9079	76
Relatively open				376
Forecast 2025				
Share in the capital controls distribution	3.81	68.04	28.31	
Developing countries				
Closed	0.7613	0.2323	0.0065	155
Intermediate	0.0268	0.9533	0.0199	1007
Open	0.0000	0.0691	0.9309	188
Total				1350
Forecast 2025				
Share in the capital controls distribution	7.99	71.05	20.98	

Notes: Each component is equal to 0 when restrictions are present or 1 otherwise. A country is considered closed, intermediate or open, with respect to the capital controls, when the sum of the four components is equal to 0, 1–3, or 4, respectively.

Source: Authors' estimates using the four binary components of the Chinn and Ito index.

Finally, we also considered an alternative measure of capital account openness constructed by Nancy Brune. Brune's data have the advantage of extending through 2004. They are also highly disaggregated: Brune collects 12 disaggregated measures of restrictions on capital inflows and outflows: (1) Controls on inflows of invisible transactions I (includes proceeds from invisible transactions, repatriation requirements, and surrender requirements); (2) Controls on inflows of invisible transactions II (includes proceeds from exports and repatriation requirements, and surrender requirements related to exports); (3) Controls on outflows of invisible transactions; (4) Controls on inflows pertaining to capital and money market securities; (5) Controls on outflows pertaining to capital and money market securities; (6) Controls on inflows pertaining to credit operations; (7) Controls on outflows pertaining to credit operations; (8) Controls on inward direct investment; (9) Controls on outward direct investment; (10) Controls on real estate transactions; (11) provisions specific to commercial banks; and (12) Exchange rate structure.²⁸ The peculiarity of the series is that it seems

Table A4.3. Evolution of capital controls: Brune's index (percentage of members in each category)

	Shares		
	1990	1997	2004
All countries			
Closed	82.58	69.19	65.41
Open	17.42	30.81	34.59
Total	100.00	100.00	100.00
Members	155	185	185
Advanced countries			
Closed	43.48	16.67	12.50
Open	56.52	83.33	87.50
Total	100.00	100.00	100.00
Members	23	24	24
Emerging market countries			
Closed	89.66	78.13	68.75
Open	10.34	21.88	31.25
Total	100.00	100.00	100.00
Members	29	32	32
Developing countries			
Closed	89.32	76.74	74.42
Open	10.68	23.26	25.58
Total	100.00	100.00	100.00
Members	103	129	129

Notes: Brune's index is collapsed in a binary variable that describes the openness of the capital account. This binary variable is equal to one (open) when the financial openness index (excluding the exchange rate structure) is greater than or equal to 7.

Source: Authors' estimates.

²⁸ To code the binary variable we did not take into account the exchange rate structure. Therefore the range of the untransformed index is 0–11.

Table A4.4. Transition probabilities and 2025 forecasts: Brune's capital controls Index

Regime in period t	Estimated probability of regime in $t + 1$		
	Closed	Open	Total observations
All countries			
Closed	0.9739	0.0261	1837
Open	0.0252	0.9748	675
Total			2512
Forecast 2025			
Share in the exchange rate distribution	54.51	45.49	
Advanced countries			
Closed	0.8529	0.1471	68
Open	0.0112	0.9888	267
Total			335
Forecast 2025			
Share in the exchange rate distribution	7.22	92.78	
Emerging market countries			
Closed	0.9723	0.0277	361
Open	0.0361	0.9639	83
Total			444
Forecast 2025			
Share in the exchange rate distribution	59.63	40.37	
Developing countries			
Closed	0.9801	0.0199	1408
Open	0.0338	0.9662	325
Total			1733
Forecast 2025			
Share in the exchange rate distribution	66.54	33.46	

Notes: See notes to Table A4.3.

Source: Authors' estimates.

to suggest that controls are quite pervasive among the advanced countries. We somewhat arbitrarily divided countries into two categories according to whether the maintained restrictions on fewer than five of these types of transactions.

Results using this alternative binary classification are shown in Tables A4.3 and A4.4. The results exhibit the same trend as those using the Chinn–Ito variable. All three groups of countries – advanced, emerging and developing – show a decline in the incidence of capital controls.²⁹ The transition matrix in Table A4.4 is very similar to that constructed from the binary version of the Chinn–Ito index. The forecasts still suggest that a majority of emerging markets and developing countries will maintain significant capital controls as late as 2025.

²⁹ Most of the variations we observe are due to differences in country coverage. For example, Brune includes San Marino, a country with significant capital controls, among her industrial countries, whereas Chinn and Ito do not consider it.

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