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The Choice of Exchange Rate Regime: How Valid is the Binary Model?

by

Michael Bleaney and Manuela Francisco

Centre for Research in Economic Development and International Trade, University of Nottingham

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Abstract

Recent research on exchange rate regimes has stressed the similarity amongst intermediate regimes (managed floats and "soft" pegs) rather than the traditional peg/float dichotomy. We investigate the choice of regime amongst hard pegs, soft pegs, managed floats and independent floats for a panel of developing countries over the period 1990-2000. A simple binary peg/float model is rejected by the data. Our results suggest a matched ordering of regimes and country characteristics. Countries on intermediate regimes differ less than do those at opposite poles. Our findings are robust to regime classification by "what countries do" rather than by "what they say".

Keywords: Exchange rate regimes, developing countries
JEL Nos: F31

Outline

1. Introduction
2. The Theoretical Determinants of Exchange Rate Regimes
3. Data and Methodology
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5. Conclusions

1. INTRODUCTION

Theoretical and empirical research on the choice of exchange rate regime has traditionally focused on a binary model: fixed versus flexible. Empirical work in this vein includes Collins (1996), Edwards (1996), Juhn and Mauro (2002), Poirson (2001) and Rizzo (1998). These authors tend to find only limited empirical support for theoretical models of regime choice, and this may be related to recent scepticism about the specification of the dependent variable as a simple peg/float dichotomy. A view emerged in the 1990s that there is a critical difference between the "poles" (independent floats and "hard" pegs) and "intermediate" exchange rate regimes (managed floats and "soft" or adjustable pegs), because the latter offer too much of a one-way bet to speculators in a world of greatly increased capital mobility (Fischer, 2001; Obstfeld and Rogoff, 1995). The Washington consensus of the 1990s seemed to advocate a flight to the extremes, at least for emerging markets and more developed economies (Williamson, 2000), although it is not clear that intermediate regimes have been abandoned to any significant extent in practice (Masson, 2001). A slightly different but not entirely unrelated development is the recognition that, despite the increased popularity of floating amongst developing countries, many of them are still managing their exchange rates very heavily, and are not floating in the same sense as the major currencies (Calvo and Reinhart, 2002; Hausmann *et al*., 2001). Research into the actual behaviour of exchange rates has revealed marked divergence from the official classification of an exchange rate regime (Bubula and Ötker-Robe, 2002; Levy-Yeyati and Sturzenegger, 2003; Poirson, 2001). Consequently, even the IMF has recently adopted a more *de facto* method of classifying a country's exchange rate regime, rather than simply recording the country's official classification.

The lack of homogeneity amongst floats and pegs has not hitherto been widely reflected in empirical work on the choice of exchange rate regime. It is possible that the limited correspondence between theory and empirical results reflects some mis-specification of the dependent variable. There are various interesting issues. First, is the important difference that between pegs and floats, or are intermediate regimes in reality more similar to each other than to their neighbouring extreme regime? The latter would imply that a comparison of the extremes (hard pegs and independent floats) might yield very different results from a

comparison of intermediate regimes (soft pegs and managed floats). Are the factors that determine the choice of a peg or a float fundamentally different for intermediate (as opposed to polar) regimes? Collins (1996) suggests that for countries on intermediate regimes the issue is not whether exchange rate adjustments occur but the degree of politicians' responsibility for them. Thirdly, do countries on intermediate regimes indeed have intermediate characteristics, or are they extreme in some respects?

These are the issues that we address in this paper. We use a sample of developing countries (excluding transition economies) over the period 1990 to 2000. We exclude advanced countries because of the likelihood of introducing structural breaks (for example, export price volatility and balance sheet effects are much less likely to be of significance in advanced countries). We also exclude transition economies precisely because they were in transition at this time.

2. THE THEORETICAL DETERMINANTS OF EXCHANGE RATE REGIMES

Wickham (1985) surveys the literature on the choice of exchange rate regime in developing countries. Mundell's (1961) theory of Optimum Currency Areas (OCA) predicts that fixed exchange rates are most appropriate for countries that are closely integrated through international trade and factor movements. Fixed regimes are also the preferable arrangement when a country has geographically concentrated trade, a high degree of internal factor mobility and a low inflation differential relative to its main trading partners. In these cases there is less need for exchange rate adjustment. On the other hand, flexibility is more appropriate for countries exposed to real shocks (such as terms of trade movements) – Broda (2004) finds that output recovers significantly more slowly from negative terms-of-trade shocks in developing countries when exchange rates are fixed. Countries for which this consideration is relevant are those that experience greater volatility in their terms of trade, or have a relatively high proportion of primary product exports. A comparatively recent argument is that exposure to balance sheet effects from currency movements (e.g. a large external debt denominated in foreign currencies, or significant foreign-currency liabilities in the commercial banking system) may cause governments to favour exchange rate stability (Hausmann *et al*., 2001).

Cukierman *et al*. (1992) show that political instability tends to be associated with greater reliance of seigniorage revenue. Political instability makes it harder for governments to make difficult choices. In a similar vein, Edwards (1996) suggests that such instability makes governments more reluctant to take strong measures to defend a peg, so that they are more likely to resort to floating.

Recently there has been a substantial body of empirical work on currency crises. This research has identified indicators that are associated with a greater likelihood of a crisis. For example, Komulainen and Lukkarila (2003) find, in a sample of 31 emerging-market economies over the period 1980-2001, that the probability of a currency crisis is significantly correlated with macroeconomic indicators such as inflation, unemployment, the current account balance, the real exchange rate, public debt, and the ratio of M2 to foreign exchange reserves, and also with U.S. interest rates, a dummy for a banking crisis, bank lending and banks' foreign liabilities. The relevance of these findings to the issue of regime choice is limited by the fact that, since exchange rate regimes are relatively persistent, the sample of countries that are floating at any date is dominated by countries that were previously floating, rather than by those that have exited a peg. Consequently, it is not clear that these variables would help to explain which countries are currently floating. Nevertheless it is desirable to test whether macroeconomic indicators do in fact help to explain regime choice.

There are other factors that may be associated with a particular regime but where the causality is ambiguous. For example, we find that a dummy for capital controls and the ratio of foreign exchange reserves to imports each tend to be negatively correlated with exchange rate flexibility. The problem is that the decision to impose such controls or to maintain a particular level of reserves is likely to be as much an effect as a cause of the regime chosen. Consequently it seems preferable to omit these variables from the analysis. Such an argument is also sometimes made about inflation, but we include it as an explanatory variable because the evidence suggests that (except in the case of hard pegs) the causality tends to run from inflation to the exchange rate regime (Bleaney and Francisco, 2005).

3. DATA AND METHODOLOGY

We gathered information on the exchange rate regime for 102 developing countries for the years 1990-2000. We constructed a data set based on IMF classifications reported in the Annual Report of Exchange Arrangements and Exchange Restrictions. The IMF classification is based on the official description provided by its members to the IMF. To test the robustness of the results, we also use a *de facto* classification that adjusts for cases where the actual behaviour of the exchange rate is inconsistent with the declared regime – that of Bubula and Ötker-Robe (2002), henceforth called the BR classification. The main effect of the adjustment is that there are many fewer independent floats and many more soft pegs, which is consistent with the idea that developing countries are fearful of floating (Calvo and Reinhart, 2002). Note that in the *de facto* classification intermediate regimes are significantly more frequent, and polar regimes significantly less frequent, than in the declared classification.

Each of these classifications contains more than four categories. No aggregation of floats was required, since they were already divided into only two categories (independent floats and managed floats). Pegs were aggregated as follows:
(i)Hard Peg regimes: Currency Boards and No Separate Legal Tender;
(ii) Soft Peg regimes: Pegs to a Single Currency, Peg to a Basket of Currencies and Crawling Pegs and Bands.

The translation of theoretical concepts into empirical measures is often constrained by data availability. OCA theory suggests that size, openness, inflation, the degree of economic development, and the degree of financial integration are determinants for the choice of exchange rate regime.

Size is often measured by GDP (usually in natural logarithms), but it seems unduly restrictive to assume that the two components of this (population and GDP per capita) should have the same coefficient, so we keep them separate.[1]

1 Where not stated, the source of the data is *World Development Indicators*.

We measure openness by the ratio of imports plus exports to GDP. For given country size, greater openness means that nominal exchange rate changes are more likely to be offset by movements in the domestic price level, but it also implies a greater sensitivity of output to external shocks, so the expected sign of the effect is uncertain.

We transform the percentage inflation rate (p) as $[p/(100+p)]$ to reduce the effect of high-inflation outliers. A higher inflation rate (relative to trading partners) implies a greater frequency of adjustment of a peg, and therefore, if adjustments are costly, a greater incentive to avoid them by choosing a floating regime.

Countries with greater financial development are likely to have more liquid financial markets, in the absence of which flexible exchange rates may be excessively volatile. Consequently we expect greater financial depth to be assocated with a greater probability of floating. We proxy financial depth by the ratio of quasi-money (*International Financial Statistics* line 35) to money (*IFS* line 34).

To capture balance sheet effects, we use two variables – the ratio of external debt to GDP, and the ratio of foreign-currency liabilities in the deposit money banks (*IFS* line 26c) to GDP. Larger values of these variables are expected to be associated with a greater probability of pegging, in order to control the balance sheet effects of currency movements.[2]

Ideally, in order to allow for shifts in average values of variables over time, it would be desirable to include year dummies in the regression. Since this overloads the convergence algorithm, we include a time trend instead. It should be noted that the coefficient of the time trend cannot be interpreted simply as a shift in the relative popularity of different regimes over time, because it adjusts to ensure that any time trend in the predicted values matches the time trend in the dependent variable.

2 Panama has significantly larger values of the ratio of foreign-currency liabilities in deposit money banks to GDP than other countries. Since Panama has used the US dollar for a long time, we adjusted this ratio to zero for Panama, to avoid spurious correlation.

The variables mentioned above tend to emerge as statistically significant and are included in the regressions reported in the next section. We did, however, test a number of other variables, which were generally insignificant (or occasionally significant but not of the expected sign). These included terms of trade volatility, the ratio of land area to population (as a proxy for specialisation in primary products), the geographical concentration of exports, GDP growth, real export growth and the current account balance as a proportion of GDP (each of these last three relative to the country's average over the period), the ratio of government consumption to GDP, the turnover rate of the central bank governor, and a variety of political variables – the frequency of changes of government and its political orientation (on a left/right scale), the frequency of government crises, the frequency of demonstrations against the government, and the size of the government's parliamentary majority.

4. ESTIMATION RESULTS

We begin by estimating a binary probit model, dividing the sample into floats and pegs. Potentially there are 1122 observations (11 years, 102 countries), but data availability for the independent variables reduces the usable sample to 835. Table 1 shows the results for both the declared (IMF) classification and the *de facto* (BR) classification. The table suggests that floaters have on average a larger population, lower per capita incomes, higher inflation, greater openness, and (somewhat more ambiguously) less external debt and fewer foreign-currency liabilities in the banking system. The regional dummies (not shown in the table) indicate that there is a greater propensity to float in the western hemisphere. Although there are more pegs in the *de facto* classification, the two regressions are remarkably similar overall.

Table 1. The probability of choosing a floating regime 1990-2000

Independent variables	Declared (IMF) Classification	*De facto* (BR) Classification
Constant	-5.29 (-6.26)	-4.55 (-5.43)
Log population	0.340 (7.81)	0.301 (6.73)
Log per capita GDP	-0.229 (-3.25)	-0.287 (-4.05)
Inflation (%) ? ? ? ?	0.0323 (5.30)	0.0179 (4.16)
Openness [(Exports + Imports)/GDP]	0.876 (4.63)	0.908 (4.81)
Quasi-money/money	0.009 (0.21)	-0.011 (-0.25)
External debt/GDP	-0.112 (-1.67)	-0.129 (-2.25)
Foreign currency liabilities in banking system/GDP	-2.31 (-2.45)	-1.52 (-1.16)
Time	0.055 (3.31)	0.092 (5.59)
Sample size	835	835
Pseudo-R-squared	0.197	0.169
% correct predictions	74	72
Log likelihood	-463.6	-439.9

Notes. Figures in parentheses are *t*-statistics. Three area dummies (Asia, Western Hemisphere and Middle East + Europe) are also included in the regression.

We next test whether the picture is significantly different if we split the sample into polar and intermediate regimes. In Table 2, the first column shows a regression for the probability of floating, according to the IMF classification, given that a country has a *polar* regime (independent float or hard peg). The second column shows the same regression, given that the country has an *intermediate* regime (managed float or soft peg). In the first column all the coefficients are significant, 84% of the predictions are correct and the pseudo-R-squared is 0.47. In the second column, despite the slightly larger sample, many of the coefficients are insignificant, only 69% of the predictions are correct, and the pseudo-R-squared is only 0.11. Thus the results in Table 1 are clearly driven mainly by a comparison of the polar regimes. The third and fourth columns of Table 2 show the equivalent regressions for the *de facto* classification. Compared with the IMF classification, another 133 observations (15.9% of the sample) are classified as intermediate, which makes intermediate regime observations nearly

twice as frequent as polar regime observations, and rather more coefficients are significant in the intermediate sample than is the case with the IMF classification. The difference between the pseudo-R-squareds is nevertheless still large (0.43 and 0.15 respectively), and the proportion of correct predictions again favours the polar sample (83% compared with 73%). A Chow test reveals that the null hypothesis of equality of coefficients between the two sub-samples is decisively rejected in each case.

Table 2. The probability of choosing a float (polar and intermediate regimes separately)

Independent variables	Declared (IMF) Classification		*De facto* (BR) Classification	
	Polar regimes	Intermediate regimes	Polar regimes	Intermediate regimes
Constant	-10.2 (-6.58)	-5.30 (-4.46)	-8.78 (-4.41)	-4.60 (-4.24)
Log population	0.668 (7.71)	0.272 (4.86)	0.631 (5.27)	0.311 (5.84)
Log per capita GDP	-0.471 (-3.75)	-0.004 (-0.05)	-0.646 (-3.70)	-0.240 (-2.78)
Inflation (%) [π/(100+π)]	0.0916 (7.51)	0.0127 (1.70)	0.0866 (5.80)	-0.0005 (-0.10)
Openness [(Exports + Imports)/GDP]	2.07 (4.62)	0.39 (1.65)	2.36 (3.97)	0.80 (3.82)
Quasi-money/money	0.283 (3.02)	-0.077 (-1.45)	0.317 (2.92)	-0.066 (-1.23)
External debt/GDP	-0.237 (-0.99)	-0.001 (-0.02)	-0.641 (-3.01)	-0.087 (-1.32)
Foreign currency liabilities in banking system/GDP	-5.25 (-2.68)	-1.35 (-1.28)	-9.90 (-3.27)	1.46 (1.28)
Time	0.082 (3.15)	0.052 (2.42)	0.119 (3.59)	0.070 (3.42)
Sample size	424	411	291	544
Pseudo-R-squared	0.469	0.108	0.433	0.150
% correct predictions	84	69	83	73
Log likelihood	-154.7	-243.9	-106.5	-289.7
Chow statistic	$\chi^2(10) = 130.1$ (p=0.000)		$\chi^2(10) = 141.5$ (p=0.000)	

Notes. Figures in parentheses are *t*-statistics. Three area dummies (Asia, Western Hemisphere and Middle East + Europe) are also included in the regression. Polar regimes are independent floats and hard pegs; intermediate regimes are managed floats and soft pegs.

The results in Table 2 strongly suggest that the traditional binary model, according to which the sample is simply divided into pegs and floats, is inadequate. Nevertheless, there is clearly some

concordance between the regression for polar regimes and that for intermediate regimes. In the case of the majority of coefficients that matter (eight out of eight for the IMF classification, and five out of eight for the BR classification, ignoring the constant), there is agreement of the signs of the coefficients between the polar and intermediate sub-samples. Moreover, *in every single case* the coefficient in the polar sub-sample is larger in absolute value. This suggests a similarity in the factors that determine the choice between a float and a peg, but also that polar regimes have more extreme characteristics.

Table 2 also shows that countries on managed floats are clearly empirically distinguishable from those on soft pegs. They tend to be more populous – this coefficient is significant in both the IMF and BR classifications. According to the *de facto* classification only, countries on managed floats also tend to be poorer and more open to international trade. The results in Table 2 are approximately what one would expect if there is an ordering of regimes from independent floats at one end of the spectrum to hard pegs at the other. Countries on polar regimes would have more extreme characteristics than countries on intermediate regimes, and would be more different from countries at the opposite pole than from intermediate regimes, but different types of intermediate regime would also have different characteristics. The much better fit to the data in the case of the sample of polar regimes is consistent with this hypothesis.

If the idea that there is a matched ordering of regime and country characteristics is correct, differences between countries on floats (or pegs) of different sorts should be of a similar order of magnitude to the differences between managed floats and soft pegs, yet rather smaller than the differences between the extremes (independent floats and hard pegs). Accordingly, we now investigate each step in the ordering, adding comparisons of independent floats with managed floats, and of soft pegs with hard pegs, to the regressions that we have already done. If the ordered model is correct, the two types of float should be significantly different from one another, as should the two types of peg. In addition the signs of the coefficients at each step should be consistent with the signs for the comparison of the two poles.

Table 3 shows four regressions: for the choice between the two types of float and between the two types of peg, for the IMF and BR classifications respectively. The regressors are

collectively statistically significant in each case, which indicates that the null hypotheses that all floats are the same and all pegs are the same are rejected for both classifications. The rejection is more decisive in the case of pegs than of floats. There is also more consistency in the results between the two classifications in the case of pegs – for floats, no individual coefficient is significant at the 0.05 level in *both* classifications. Note that in the BR classification there are 117 more pegs (14.0% of the sample) than in the IMF classification. Essentially, in the BR classification there are many more soft pegs and many fewer independent floats than in the IMF classification.

Table 3. Comparing different types of floats/pegs

Independent variables	Declared (IMF) Classification		*De facto* (BR) Classification	
	Float – Indep't *vs* Managed	Peg – Soft *vs* Hard	Float – Indep't *vs* Managed	Peg – Soft *vs* Hard
Constant	2.81 (2.14)	-6.38 (-5.85)	4.85 (2.51)	-7.06 (-6.77)
Log population	-0.018 (-0.26)	0.234 (4.55)	-0.319 (-3.30)	0.295 (6.64)
Log per capita GDP	-0.334 (-3.17)	0.290 (3.17)	0.014 (0.11)	0.236 (2.49)
Inflation (%) [π/(100+π)]	0.096 (1.67)	0.077 (5.91)	0.014 (2.17)	0.073 (4.95)
Openness [(Exports + Imports)/GDP]	0.014 (0.06)	0.532 (1.96)	-1.10 (-3.37)	0.872 (3.23)
Quasi-money/money	0.129 (1.95)	0.370 (4.66)	0.010 (0.12)	0.354 (4.71)
External debt/GDP	-0.212 (-2.08)	-0.046 (-0.55)	-0.026 (-0.15)	-0.061 (-0.80)
Foreign currency liabilities in banking system/GDP	1.03 (0.47)	-0.055 (-0.06)	-3.46 (-1.24)	-0.58 (-0.65)
Time	-0.010 (-0.39)	-0.029 (-1.38)	0.110 (3.48)	-0.029 (-1.46)
Sample size	392	443	274	560
Pseudo-R-squared	0.107	0.262	0.092	0.292
% correct predictions	69	75	68	79
Log likelihood	-235.6	-223.2	-163.8	-253.9

Notes. Figures in parentheses are *t*-statistics. Three area dummies (Asia, Western Hemisphere and Middle East + Europe) are also included in the regression. The dependent variable in each case is the probability of the more flexible regime.

Table 4 systematically compares the results for each step (independent float *versus* managed float; managed float *versus* soft peg; soft peg *versus* hard peg) with the results for the polar regression (independent float *versus* hard peg) shown in Table 2. The signs for the individual steps tend to be consistent with those in the polar regression, as we would expect if the ordering of regimes matches the ordering of country characteristics. We use a non-parametric approach to test the null hypothesis of no concordance between the polar regression and the three regressions for the individual steps. In the case of the IMF classification (Table 4A), there are 18 out of 24 sign agreements and six disagreements. On a one-tailed binomial test (with a null of agreements and disagreements being equally probable), the probability of six or fewer disagreements is 0.011. For the BR classification (Table 4B), the results are somewhat weaker. There are 16 out of 24 sign agreements and eight disagreements ($p = 0.076$). A weakness of this test is that it attaches equal significance to the sign, whether or not zero falls within the confidence interval (in which case it might well be that the coefficient is truly of the opposite sign). To allow for this, we amend the test by discarding all cases where the coefficient is insignificant at the 0.10 level (i.e. with a single plus or minus in Table 4). For the IMF classification, there are twelve *significant* sign agreements and one disagreement, a distribution which has a *p*-value of 0.002 according to the binomial test. For the *de facto* (BR) classification, there are ten *significant* sign agreements and three disagreements ($p = 0.046$).

We may also compare the absolute size of the coefficients referred to in columns (2) to (4) of Tables 4A and 4B with those referred to in column (1). This is an indication of whether countries on the two polar regimes are more different from one another than are countries on "neighbouring" regimes. In column (1) (the comparison of polar regimes), the coefficients are larger in absolute size than in columns (2) to (4) in 23 out of 24 cases for each classification (p=0.000). Taken together with the evidence on signs, these results give strong support to the idea that regimes are ordered, from independent floats at one end of the spectrum, through managed floats and soft pegs, to hard pegs at the other end.

Table 4. Comparison of signs of coefficients in different regressions

Table 4A. IMF Classification

Independent variable	Independent float *vs* Hard peg	Peg – Soft *vs* Hard	Managed float *vs* Soft peg	Independent float *vs* Man'd Float	Sign concordance	Significant sign concordance
	(1)	(2)	(3)	(4)	(5)	(6)
Log population	++	++	++	-	2	2/2
Log per capita GDP	--	++	-	--	2	1/2
Inflation (%) [π/(100+π)]	++	++	++	++	3	3/3
Openness [(Exports + Imports)/GDP]	++	++	++	+	3	2/2
Quasi-money/money	++	++	-	++	2	2/2
External debt/GDP	--	-	-	--	3	1/1
Foreign currency liabilities in banking system/GDP	--	-	-	+	2	0/0
Time	++	-	++	-	1	1/1
Total					18/24	12/13
p-value (one-tailed test)					0.011	0.002

Table 4B. *De facto* (BR) Classification

Independent variable	Independent float *vs* Hard peg	Peg – Soft *vs* Hard	Managed float *vs* Soft peg	Independent float *vs* Man'd Float	Sign concordance	Significant sign concordance
	(1)	(2)	(3)	(4)	(5)	(6)
Log population	++	++	++	--	2	2/3
Log per capita GDP	--	++	--	+	1	1/2
Inflation (%) [π/(100+π)]	++	++	-	++	2	2/2
Openness [(Exports + Imports)/GDP]	++	++	++	--	2	2/3
Quasi-money/money	++	++	-	+	2	1/1
External debt/GDP	--	-	-	-	3	0/0
Foreign currency liabilities in banking system/GDP	--	-	+	-	2	0/0
Time	++	-	++	++	2	2/2
Total					16/24	10/13
p-value (one-tailed test)					0.076	0.046

Notes. ++, --: coefficient of the indicated sign and significantly different from zero at the 0.10 level. +, -: coefficient of the indicated sign and not significantly different from zero at the 0.10 level. Column (5) compares signs in columns (2) to (4) with the sign in column (1). Column (6) compares significant signs in columns (2) to (4) with the sign in column (1).

Table 5. An ordered probit model of exchange rate regime choice 1990-2000

Independent variables	Declared (IMF) Classification	*De facto* (BR) Classification
Log population	0.250 (8.48)	0.228 (7.80)
Log per capita GDP	-0.147 (-2.60)	-0.142 (-2.49)
Inflation (%) [π/(100+π)]	0.0355 (7.26)	0.0249 (7.00)
Openness [(Exports + Imports)/GDP]	0.770 (5.57)	0.766 (6.13)
Quasi-money/money	0.0402 (1.24)	0.0130 (0.42)
External debt/GDP	-0.117 (-2.40)	-0.092 (-2.27)
Foreign currency liabilities in banking system/GDP	-2.05 (-3.36)	-2.32 (-3.47)
Time	0.0350 (2.75)	0.0637 (5.07)
Asia dummy	0.208 (1.73)	0.172 (1.41)
Middle East & Europe dummy	-0.024 (-0.19)	-0.149 (-1.23)
Western hemisphere dummy	0.452 (4.16)	0.313 (2.91)
Ancillary parameter: cut 1	3.23 [s.e. = 0.649]	2.90 [s.e. = 0.684]
Ancillary parameter: cut 2	4.26 [s.e. = 0.654]	4.27 [s.e. = 0.691]
Ancillary parameter: cut 3	4.85 [s.e. = 0.657]	5.11 [s.e. = 0.702]
Sample size	835	835
Pseudo-R-squared	0.112	0.093
Log likelihood	-1016	-973.3

Notes. Figures in parentheses are *t*-statistics. The omitted region is Africa. Dependent variable: hard peg = 1, soft peg = 2, managed float = 3, independent float = 4. "Cut 1", "Cut 2" and "Cut 3" are the estimated boundaries between regimes for the fitted values of the regression.

Accordingly, Table 5 reports an ordered probit regression (hard peg = 1, soft peg = 2, managed float = 3, independent float = 4). The regression is similar to that for the poles except that financial depth is insignificant. Countries with larger populations, lower per capita GDP, higher inflation, greater openness to international trade, lower external debt and fewer

foreign-currency liabilities in the domestic banking system tend to choose more exchange rate flexibility. Some of these results can be explained by theory more easily than others. The effects of external debt and of foreign-currency liabilities in the banking system are consistent with the idea that exposure to balance sheet effects causes countries to fear exchange rate flexibility. Since the advanced countries tend to have low inflation, the monetary independence conferred by greater flexibility is likely to be associated with higher inflation. More populous countries are economically larger, so the positive coefficient is consistent with the OCA prediction. The negative coefficient of per capita GDP is, however, inconsistent with OCA theory. The positive coefficient for openness suggests that greater exposure to external shocks is associated with more flexibility.

The ordered probit regression suggests that countries on hard pegs have particularly well defined characteristics. The estimated boundary between hard pegs and soft pegs (cut 1) is further from the estimated boundary between managed floats and soft pegs (cut 2) than is the estimated boundary between independent floats and managed floats (cut 3). The distances are 1.5 and 1.0 standard errors respectively for the IMF classification and 2.0 and 1.2 standard errors respectively for the BR classification. This is consistent with the evidence from Table 3 that the differences between countries on hard and soft pegs are sharper than the differences between countries on independent and managed floats.

The ordered probit specification assumes that countries on intermediate regimes always have intermediate characteristics. The evidence from Table 3 suggests that this is not always the case. Countries on intermediate regimes tend to have larger populations and (in the case of the *de facto* classification) higher per capita GDP and greater openness than those at either pole. Emerging markets (EMs) tend to be larger and have higher per capita incomes than other developing countries, so this suggests that emerging markets are more likely to choose an intermediate regime.[3] A simple goodness of fit test shows that this is indeed the case. Using the IMF classification,

3 We use Fischer's (2001) list of emerging market countries, which is based on inclusion in EM stock and bond indices. Since liquidity is important to the development of financial markets, for the same level of per capita GDP more populous countries are more likely to be classified as EMs.

60.3% of EM observations are in the intermediate category, compared with only 51.4% of non-EM observations ($? ^2(1) = 6.12$, $p < 0.02$). Using the BR classification, 78.9% of EM observations are in the intermediate category, compared with 64.8% of non-EM observations ($? ^2(1) = 17.3$, $p < 0.001$).[4]

5. CONCLUSIONS

Previous researchers have had some difficulty in finding empirical support for standard theories of the choice of exchange rate regime. We find that the following are associated with a greater probability of floating: a larger population, a lower per capita GDP, higher inflation, greater openness to international trade, more financial development, less external debt and fewer foreign liabilities in the commercial banking system. Using this regression specification, we find that the data do not support a simple binary model, according to which all floats have similar characteristics, as do all pegs, with pegs being significantly different from floats. Contrary to this model, independent floats are significantly different from managed floats, and (in particular) soft pegs are significantly different from hard pegs.

The differences between floating and pegged regimes tend to be systematically smaller for intermediate regimes than for polar regimes (and the fit of the model is much inferior). The regression coefficients for intermediate regimes are always smaller in absolute magnitude, and in the majority of cases of the same sign, as for the polar regimes. This suggests that countries on intermediate regimes are more likely to have intermediate characteristics, as defined by these variables, and that exchange rate regimes may reasonably be ordered on a line from hard pegs at one end of the spectrum to independent floats at the other. As a formal test of this hypothesis we use non-parametric methods to investigate the consistency of regression coefficients for each "step" along this line (independent floats *versus* managed floats, managed floats *versus* soft pegs, soft pegs *versus* hard pegs) with those for a comparison of the two poles (independent floats *versus* hard pegs). Counting coefficients of the same sign and significant as evidence in favour of this hypothesis, and those of the opposite sign and

4 We use Fischer's (2001) classification to define emerging market countries.

significant as evidence against, we find a statistically significant preponderance of evidence in favour. Moreover the coefficients at each step are overwhelmingly smaller in absolute value than in a comparison of the poles.

Our results are consistent with the idea that countries with more extreme characteristics in the relevant dimensions are more likely to choose a polar regime. Nevertheless we find statistically significant differences between managed floats and soft pegs, which implies that not all intermediate regimes are the same. We also find that the choice between a managed float and a soft peg seems to be determined by similar factors to those that determine the choice between an independent float and a hard peg. Certain characteristics are associated with a greater likelihood of choosing an intermediate regime – specifically greater economic size (larger population and higher per capita GDP). As this suggests, emerging market countries are significantly more likely to choose an intermediate regime.

Throughout the analysis, our conclusions are similar whether we use the declared exchange rate regime or a *de facto* measure. Indeed the results are surprisingly robust to the choice of classification, given that the *de facto* measure classifies at least 15% more of the observations as (soft) pegs, and 15% fewer as polar regimes (the difference is in the number of independent floats).

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