CREDIT Research Paper

No. 07/04

The Performance of Exchange Rate Regimes in Developing Countries – Does the Classification Scheme Matter?

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Michael Bleaney and Manuela Francisco

Abstract

Official and four alternative regime classification schemes based on observed exchange rate behaviour are used to examine the relationship with inflation and growth in developing countries. For an identical sample of observations from 73 countries for 1984-2001, only the scheme based on parallel rates suggests a significant effect (negative) of floating on growth. Floats that claim to be pegs, or have high exchange rate volatility, are the ones with lower growth. Hard pegs offer inflation benefits. Floating is not consistently associated with higher inflation than soft pegs, and any apparent association is a possible by-product of the design of the classification algorithms.

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

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The Performance of Exchange Rate Regimes in Developing Countries – Does the Classification Scheme Matter?

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JEL Nos: E31, F41, O40

Keywords: exchange rate regimes, growth, inflation

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1. INTRODUCTION

For countries with weak monetary institutions, it is an important issue whether an external nominal anchor can provide price stability, and whether it can do so without sacrificing growth. The Asian crisis focused observers' attention on the fact that exchange rate regimes in developing countries are not always quite what they are claimed to be. This realisation stimulated the development of classification schemes other than those reported by the IMF which, up until then, had been self-declarations by countries' authorities. This proliferation of classification schemes has made it harder to reach a definitive answer to the question of the relationship between the exchange rate regime and macroeconomic outcomes, such as inflation and growth. In this paper, we try to simplify the issue by estimating the relationships on a sample that is identical across classification schemes.

Four such "*de facto*" schemes are those of Bubula and Ötker-Robe (2002), Levy-Yeyati and Sturzenegger (2005), Shambaugh (2004) and Reinhart and Rogoff (2004). Bubula and Ötker-Robe (2002) [hereafter BOR] backdate the IMF practice begun in 1999 of checking the self-declared exchange rate regime against other statistical and documentary evidence about the official exchange rate. Levy-Yeyati and Sturzenegger (2005) [LYS] use a purely statistical methodology, based on the behaviour of the official exchange rate and international reserves, floats (pegs) being associated with high (low) exchange rate volatility and low (high) reserve volatility. Shambaugh (2004) aims only to differentiate pegs from other regimes, and defines a peg as having at most one devaluation within a calendar year. Finally, Reinhart and Rogoff (2004) [RR] use a classification methodology based essentially on the statistical behaviour of the *parallel* rather than the official exchange rate, where such a rate exists.

The correlation between these classification systems, beyond the obvious cases, is surprisingly low, and not just because behaviour differs from official claims. Alternative *de facto* classification systems produce disconcertingly different results. Here we focus on what difference this makes to the empirical relationship between exchange rate

regimes and macroeconomic outcomes (inflation and growth) in developing countries. Developing countries are more likely than advanced countries to have weak monetary institutions and therefore to rely on an exchange rate peg for monetary credibility. Such a policy is considerably less attractive if there is a growth penalty attached. The evidence from previous research on this subject is conflicting, in part because previous authors have used different samples, different methodology, and at most one alternative classification scheme. We show here that, if we compare IMF and the three alternative classification schemes that go back before 1990 *on a common data set*, at least some of these differences are resolved. We focus exclusively on the statistical association between macroeconomic outcomes and exchange rate regimes, and we do not attempt to identify causality. This is partly because the persistence of regimes makes causality issues difficult to resolve, and partly because causality only becomes an issue once a statistical association has been established.

2. BACKGROUND

In this section we briefly summarise the evidence on the performance of exchange rate regimes in developing countries, without going into details of the classification schemes, which we discuss in the next section.

Ghosh *et al*. (2002) use a large data set of 147 countries over a thirty-year period (1970-99). They find that, according to official IMF classifications, pegs are associated with significantly lower inflation than intermediate regimes (such as crawling pegs or tightly managed floats) or floats, except in the advanced countries. With a finer classification of regimes (their Table 6.3), they find that hard pegs have the lowest inflation, but that other pegs still have lower inflation than more flexible regimes.

Levy-Yeyati and Sturzenegger (2001, Table 15), using their own classification, find that in non-industrial countries hard pegs have lower inflation than other regimes, as do soft pegs which last for at least five years, but that otherwise there is little difference in inflation rates across exchange rate regimes in a 1974-99 data set. Bleaney and Francisco (2005) report that, once inflation persistence or fixed country effects are taken into

account, there is no difference in inflation rates between soft pegs and floats, using either the IMF or the BOR classification, over the period 1985-2000. They also find that hard pegs are associated with significantly lower inflation. Husain *et al.* (2005, Table 9), using the RR classification for 1970-99, conclude that in developing countries (other than emerging markets), exchange rate flexibility is associated with significantly higher inflation, but it is unclear if this finding is robust to the separation of hard and soft pegs.

To summarise: the lowest inflation rates amongst developing countries are associated with hard pegs. Whether other types of pegs have lower inflation rates than floats is still a matter of some debate.

With respect to per capita growth, most authors (Bleaney and Francisco, 2005; Ghosh *et al*., 2002; Husain *et al*. 2005) find no robust association between exchange rate regimes and growth. An important exception is Levy-Yeyati and Sturzenegger (2001, 2003), who claim that floats are associated with significantly higher growth in non-industrial countries, by about one percentage point *per annum*.

These differences in results provide the motivation for our investigation of the regime/performance relationship with different classification schemes but an identical sample. With an identical sample, variations in results across classification schemes can be reliably attributed to different classification methods rather than to differences in the sample.

3. CLASSIFICATION SCHEMES

This section gives a brief explanation of the classification schemes, and presents some statistical comparisons. Even using official classifications, there are important aggregation and other issues. For instance, how wide does an exchange rate band have to be before it is classified as a float? For the official classification, we treat managed floats and free floats as flexible regimes, and everything else as a form of peg. Many other authors (e.g. Ghosh *et al*., 2002) have an intermediate category that includes regimes such as crawling pegs. We do not distinguish such an intermediate category because crawling

pegs are clearly designed to achieve one of the main functions of a peg – real exchange rate stability. Since pegs only crawl as a result of inflation, to treat a crawling peg as something other than a peg would bias the results towards a finding of lower inflation for pegs.

Bubula and Ötker-Robe (2002) backdate the post-1999 IMF practice of checking the announced regime against other official documents and exchange rate behaviour. A regime is only defined as a peg if there is documentary evidence of a policy of pegging, as well as exchange rate stability.[1] Thus their procedure for identifying *de facto* regimes is not purely statistical. Where multiple exchange rates exist, they use the one characterised by the most transactions. Unfortunately their classification is not available before 1990.

Levy-Yeyati and Sturzenegger (2005) use cluster analysis to identify a country during each calendar year as having either a pegged regime, a crawling peg, a dirty float or a flexible regime, based on three variables: the volatility of the nominal exchange rate level against the identified anchor currency (average absolute monthly percentage change), the volatility of exchange rate changes (standard deviation of monthly percentage changes), and the volatility of foreign exchange reserves (average absolute monthly percentage change in net dollar international reserves relative to the dollar value of the monetary base in the previous month), which is a measure of exchange rate intervention. The last variable is mainly used to distinguish between "clean" and "dirty" floats rather than between floats and other regimes. A feature of this scheme is that sizeable devaluations within a calendar year will cause that year to be classified as something other than a peg even if the exchange rate is pegged immediately before and after the devaluation, because of their impact on the exchange rate volatility measures.

Shambaugh (2004) uses a relatively strict definition of pegs, since his interest is in the extent to which nominal interest rates follow those in the anchor currency. The nominal

[1] They write (p. 11): "[w]hen available information indicated that the authorities targeted to keep the exchange rate stable and the exchange rate remained within a range less than 2 per cent for at least four months vis-à-vis a given currency, the regime was classified de facto as a conventional fixed peg."

exchange rate must remain within a two per cent band within the year, or have zero movement for eleven out of twelve months. If neither criterion is met, the regime is a non-peg. Like LYS, his scheme generates annual classifications only.

Reinhart and Rogoff (2004) differ from the others principally in focusing on parallel rather than official exchange rates. Their statistical approach is based purely on exchange rate movements, on the grounds that reserve movements are an unreliable measure of exchange market intervention. They allow regimes to be categorised as a peg or a band even if a significant minority of exchange rate movements is large. A country which experiences a zero exchange rate change over four months, or for which no more than 80 per cent of the monthly absolute exchange rate changes over five years exceed one per cent, is classified as pegging. If this criterion is not met, but no more than 80 per cent of the monthly absolute exchange rate changes over five years exceed five per cent, the episode is classified as a form of band.[2] Episodes that fail both tests are classified as floats. Within this category, RR separate out observations with twelve-month inflation greater than 40 per cent into a "freely falling" category. In our analysis we also shall omit these observations, which are characterised by particularly low growth.

Theory suggests that adjustment to macroeconomic shocks poses very different problems if exchange rate flexibility is removed. Yet many pegs permit adjustment of the parity, and in practice such adjustments are frequent. It is therefore important to distinguish pegs that retain the devaluation option (soft pegs) from those that do not, or at least which make it very difficult (hard pegs). We define hard pegs as currency board systems and the absence of a separate legal tender. Currency boards incorporate rules preventing sterilisation of reserve losses, and the parity is frequently backed by legal commitments. Lack of a separate legal tender means that devaluation cannot be a unilateral decision (as in the case of currency unions such as the CFA zone) or is effectively impossible (where

[2] The 80 per cent criterion is designed to avoid classifying infrequent devaluation episodes as floats, and perhaps also to ensure that not every case of a parallel exchange rate is classified as a float. It does mean, however, that floats that are characterised by low exchange rate volatility, perhaps because their trade is dominated by a large neighbouring country, as in the case of Canada or Switzerland, end up being classified as non-floats.

the country has adopted the currency of a much bigger country, commonly referred to as dollarisation).[3] We define hard pegs in the same way across all classification schemes, so the differences across schemes relate to the distinction between soft pegs and floats.

For each classification scheme, we separate the observations that are not hard pegs and not "freely falling" into soft pegs and floats. Floats are those that are described as free, managed or dirty floats. Other regimes that are sometimes lumped into an intermediate category, such as crawling pegs or bands, we label as a form of soft peg. The one exception to this is the JS classification, which uses a relatively narrow definition of a peg, and categorises everything else as a non-peg.

4. THE DATA

We use annual data for all developing countries other than transition countries from 1984 to 2001. We exclude transition countries to avoid possible distortion of results by the abnormal experience of transition. Since the BOR classification covers only the 1990-2000 period, we use a different sample for that classification, and a common sample for the other four exchange rate regimes. After excluding observations with inflation above 40 per cent p.a., the common sample comprises 898 observations from 73 countries for inflation, and 877 observations from 73 countries for per capita growth. Macroeconomic outcomes for a calendar year are compared with the exchange rate regime in place at 31 December of the previous year (or the classification for the whole of the previous year in the case of LYS and JS).

It is instructive to analyse the 617 observations that are common to each classification and which are not hard pegs or inflationary crises. As Table 1 shows, the proportion of these observations classified as floats rather than soft pegs is 41.1 per cent for the IMF classification, 71.0 per cent for the JS classification, 45.7 per cent for the LYS classification, 28.2 per cent for the RR classification and 49.9 per cent for the BOR classification. Thus alternative classifications vary considerably in the proportion of floats identified. These differences primarily reflect the stringency of the definition of a

[3] This definition of hard pegs is standard (e.g. Bubula and Ötker-Robe, 2002).

peg, rather than the choice between official and parallel rates or the time span used in the analysis.

Perhaps more surprising are the rather low correlations between the classifications in relation to the identification of floating regimes as opposed to soft pegs, with the exception of the IMF/BOR pair (see Table 1). The correlation between the IMF and BOR classifications is 0.64, but *de facto* schemes agree even less with each other than with the *de jure* classification. The average correlation with other classifications is 0.36 for IMF, and varies from 0.40 (BOR) down to 0.16 (RR) for the alternative classifications. What this indicates is that purely statistical methods of identifying exchange rate regimes produce markedly different results not only from other approaches, but also from each other. Perhaps most notable is the fact that the RR classification, based on parallel rates, is something of an outlier.

Table 1. Correlations between Classification Schemes

	CLASSIFICATION SCHEME					
	IMF	JS	LYS	RR	BOR	Proportion of floats
IMF	1					0.411
JS	0.37	1				0.710
LYS	0.28	0.38	1			0.457
RR	0.15	0.08	0.05	1		0.282
BOR	0.64	0.38	0.24	0.35	1	0.494
Mean	*0.36*	*0.30*	*0.24*	*0.16*	*0.40*	

Notes. The correlations refer to a common sample of 617 observations excluding hard pegs and inflationary crises, except in the case of the BOR classification which is unavailable before 1990. For the BOR classification the sample is 413 observations.

5. EXCHANGE RATE REGIMES AND INFLATION

We are now ready to examine the relationship between exchange rate regimes and macroeconomic performance. In this section we investigate whether the annual inflation rate varies with the exchange rate regime at 31 December of the previous year, using a sample of observations that is common to all the classification schemes. In order that the results are not unduly distorted by outliers, we exclude the cases of extremely rapid exchange rate depreciation (defined by Reinhart and Rogoff (2004) as "freely falling"). We also transform the inflation rate as $\frac{100p}{100+p}$, where p is the percentage change in the consumer price index since the previous year. This is less than but very close to p for small positive p, but tends to 100 as p tends to infinity, thus compressing differences at the high end of the range.

When the four regime classification schemes that cover the full period are used, we have a sample of 898 country-year observations from 73 countries over the period 1985-2001. Table 2 reports the results of a regression of transformed inflation on a start-of-year hard-peg dummy and a float dummy, two types of controls: year dummies only (panel A); and year plus country dummies (panel B). The hard-peg dummy compares average inflation rates for hard pegs (which are similarly defined across all classifications) with those for adjustable pegs (whose definition varies with the classification). The regression allows for a time trend in this coefficient, since inflation rates in regimes that are not hard pegs have fallen markedly over the period. The float dummy compares average inflation rates for floats with those for adjustable pegs.[4] Year dummies are included to control for global inflation fluctuations that affect all the countries in the sample. Adding country dummies may be regarded as a control for the effects of structural variables that are strongly persistent over time but have significant cross-country variation (e.g. country size, factor endowments, ratio of exports plus imports to GDP) without selecting an explicit model. This should produce similar results to an explicit model, without the disadvantage of reducing the sample size because of problems of data availability.

[4] There is no evidence of a time trend in this coefficient, once a time-varying hard-peg effect is allowed for.

Note first that the standard error of the regression is much smaller with country dummies, which indicates marked variation in countries' average inflation rates. Inclusion of the country dummies also makes estimation of the hard peg effect much less precise (the standard error is many times as large) because so few countries have switched to or from hard pegs. The clear message from the table is that hard pegs have very significantly lower inflation than other regimes, but that the difference has fallen over time as inflation in other regimes has declined towards that in hard pegs.

Table 2. Inflation and Exchange Rate Regimes

	CLASSIFICATION SCHEME				
	IMF	JS	LYS	RR	BOR
	Panel A. Year dummies only				
Constant	6.04 (6.27)	5.59 (5.92)	6.71 (7.37)	5.40 (6.63)	4.97 (6.03)
Hard peg dummy	–7.83 (–12.4)	–7.07 (–9.85)	–8.16 (–13.3)	–6.90 (–12.3)	–7.32 (–4.81)
Hard peg dummy x time	0.432 (5.10)	0.417 (4.98)	0.397 (4.72)	0.347 (4.29)	0.492 (2.42)
Floating dummy	1.70 (2.97)	2.44 (3.92)	1.34 (2.52)	5.96 (9.61)	2.12 (4.16)
Standard error	6.35	6.31	6.36	5.98	6.35
	Panel B. Year plus country dummies				
Hard peg dummy	–11.05 (–1.71)	–9.47 (–1.55)	–10.86 (–1.67)	–10.11 (–1.44)	–12.63 (–2.08)
Hard peg dummy x time	0.380 (4.94)	0.399 (5.36)	0.379 (4.95)	0.346 (4.57)	0.430 (2.67)
Floating dummy	0.14 (0.22)	2.44 (3.06)	0.58 (1.14)	4.42 (5.28)	0.45 (0.67)
Standard error	4.94	4.90	4.93	4.81	4.65
Sample size	898	898	898	898	904
No. of countries	73	73	73	73	92
Time period	1984–2001	1984–2001	1984–2001	1984–2001	1990–2001

Notes. The dependent variable is the transformed percentage change in the CPI since the previous year [$100p/(100+p)$, where p is the raw percentage change]. Observations with $p > 40$ per cent p.a. are excluded. The hard peg dummy is identical across classification schemes. Excluded category is soft peg. Figures in parentheses are heteroscedasticity-robust t-statistics. Time = zero in 1990. The identical sample is used for all but the BOR classification.

The estimates without fixed country effects suggest that floats are characterised by inflation about two percentage points higher than soft pegs, but for the RR classification the estimate is six percentage points. With fixed country effects (which confines the sample for the purpose of estimating regime effects to countries that have switched regime at least once), three classification schemes (IMF, LYS, BOR) estimate a difference that is below one percentage point and statistically insignificant. The JS and

RR schemes continue to suggest that (transformed) inflation is higher under floating, by 2.4 and 4.4 percentage points respectively.

The details of classification algorithms are important here. We have been careful to classify crawling pegs and bands as pegs, on the grounds that these regimes target real, even if not nominal, exchange rate stability, which is an important objective of a peg. The JS classification is an exception in that its peg classification requires nominal exchange rate stability, or at most one devaluation per calendar year. This means that crawling pegs would be defined as floats under the JS classification.

For the RR classification, the picture is complicated by the use of the parallel exchange rate. Since this classification effectively ignores the twenty per cent of months with the largest exchange rate movements, it is challenging for an exchange rate to be classified as a float using official rates, once countries with serious inflationary problems are discarded. Parallel rates are naturally more volatile, especially if the authorities are using import controls to defend an official exchange rate that inflation has rendered uncompetitive. In this sample it is noticeable that (a) observations with inflation in the 25-40 per cent range are considerably more likely to be classified as RR floats than those with inflation below 25 per cent, and (b) there is a correlation in the RR classification between a country experiencing inflationary crises and the likelihood of it being classified as floating in other years (see Table 3). Thus there seems to be something in the RR classification procedure that makes a float classification more likely in countries with inflationary problems. Indeed Reinhart and Rogoff's (2004, p. 8) claim that "market-determined dual/parallel rates are important barometers of monetary policy" seems to represent an acceptance that their classification is sensitive to the inflation rate.

Table 3. Classification of high-inflation observations

	Inflation rate		Countries with:	
	> 25 %	< 25 %	At least one year of inflation > 40 %	No years of inflation > 40 %
Number of observations	71	546	237	381
Classification scheme	*Proportion of observations classified as floats*			
IMF	0.69	0.59	0.67	0.56
JS	0.76	0.71	0.71	0.71
YS	0.45	0.46	0.33	0.53
RR	0.68	0.23	0.42	0.19

Notes. Observations with inflation > 40 per cent p.a. are excluded. The sample is the 898 observations used in the Table 2 regressions, with the 279 hard peg observations excluded.

Given that the JS and RR schemes can be argued to be biased towards a finding that floating is associated with higher inflation, and that the richer model that allows for countries' structural features shows no difference in inflation rates between floats and soft pegs for the other schemes, the safest conclusion appears to be that there is no robust evidence that soft pegs promote price stability.

6. EXCHANGE RATE REGIMES AND GROWTH

In this section we look at how per capita growth varies across exchange rate regimes at the end of the previous calendar year. We exclude all observations where per capita growth is outside the range -10 per cent to +15 per cent, as these observations are likely to be associated with civil wars and other disturbances, or the immediate recovery from them, and could seriously distort the results. We also continue to exclude the inflationary crisis observations with freely falling exchange rates, which are known to be associated with slow growth (Reinhart and Rogoff, 2004). We have a common sample of 877 observations for 73 countries over the period 1984-2001.

Table 4. Per Capita Growth and Exchange Rate Regimes

	CLASSIFICATION SCHEME				
	IMF	JS	LYS	RR	BOR
	Panel A. Year dummies only				
Constant	0.99 (2.19)	0.71 (1.60)	0.72 (1.76)	1.32 (3.35)	1.73 (4.63)
Hard peg dummy	–1.05 (–2.91)	–0.77 (–2.07)	–0.80 (–2.57)	–1.32 (–4.48)	–1.16 (–3.64)
Floating dummy	–0.07 (–0.25)	0.33 (1.06)	0.46 (1.82)	–1.14 (–3.87)	–0.41 (–1.55)
Standard error	3.55	3.55	3.54	3.52	3.51
	Panel B. Year plus country dummies				
Hard peg dummy	–0.68 (–0.24)	–0.92 (–0.31)	–0.44 (–0.14)	–0.89 (–0.32)	–0.83 (–0.32)
Floating dummy	–0.06 (–0.15)	–0.39 (–0.89)	0.39 (1.33)	–1.10 (–2.48)	0.13 (0.34)
Standard error	3.32	3.31	3.31	3.30	3.32
Sample size	877	877	877	877	882
No. of countries	73	73	73	73	92
Time period	1984–2001	1984–2001	1984–2001	1984–2001	1990–2001

Notes. The dependent variable is *per capita* GDP growth, with observations outside the range –10 to +15 per cent excluded. Observations with inflation > 40 per cent p.a. are excluded. The hard peg dummy is identical across classification schemes. Excluded category is soft peg. Figures in parentheses are heteroscedasticity-robust *t*-statistics. The identical sample is used for all but the BOR classification.

Table 4 shows the results, using the same controls as for inflation, but excluding the time trend in the hard-peg dummy, which is insignificant in every case. According to three classifications (IMF, JS, BOR), floats and soft pegs have very similar growth rates. According to the LYS classification, floats have the higher growth rates, by about 0.4 per cent p.a., but the difference is not statistically significant, especially with fixed country effects. Although the LYS classification is the most favourable to floats, we have not been able to reproduce the finding of Levy-Yeyati and Sturzenegger (2003) that there is a

statistically significant growth penalty for pegging.[5] The Reinhart-Rogoff classification, on the other hand, suggests precisely the opposite conclusion, with growth rates a statistically significant 1.1 per cent p.a. lower under floats. Hard pegs also have lower growth rates than soft pegs, but not significantly so with fixed country effects (which are highly collinear with hard pegs because of the infrequency of switches between hard pegs and other regimes).

The Reinhart-Rogoff classification thus seems to be something of an outlier in this regression. This may perhaps be related to Alesina and Wagner's (2003) finding that countries that claim to peg and actually float (according to RR) have poor institutional quality relative to those that claim to float and are classified by RR as a peg. It might be that countries with highly depreciated parallel exchange rates grow more slowly and are particularly likely to be classified as RR as a float. We have investigated this by setting up a dummy variable that takes the value one if the parallel exchange market values the domestic currency at least one-third less (in terms of its purchasing power over foreign currency) than the official market, and zero otherwise. This dummy takes the value one in 95 of the 877 observations in the common sample. Unfortunately it does not help to explain the differences between the results for RR and the other classification schemes. The same is true if we separate out observations with inflation over 25 per cent p.a., or countries which have had inflation over 40 per cent p.a. during the period.

A further way to investigate the discrepancies between the RR results and the rest is to split the data according to whether the RR and IMF classifications are in agreement or not. In column (1) of Table 5, there are dummies for an IMF float combined with an RR peg, for an IMF peg combined with an RR float, and for an IMF float combined with an RR float. The omitted category is a peg according to both classifications. It is clear that the lowest growth rates are associated with an IMF peg combined with an RR float. These are most probably cases of monetary policy that is inconsistent with a peg, so that

[5] This is not because our standard error is larger (it is in fact somewhat smaller than in their Table 5), but because their point estimate of the floating effect is more than twice as large as ours. Relevant factors are that they use data from 1970 to 1999, and they combine dirty floats and crawling pegs into an intermediate category.

the parallel rate is depreciating rapidly. Nevertheless agreed floats seem to have growth rates about one per cent less than agreed pegs. Column (2) of Table 5 shows that very little of these differences are explained by dummies for inflation above 25 per cent or for highly depreciated parallel exchange rates.

Since the RR classification has a stringent definition of a float, RR floats will either be genuine but relatively clean and high-volatility floats (e.g. South Africa) or rapid depreciations of the parallel rate, often when the country is officially pegging (e.g. Nigeria from 1994 to 1998). The results suggest that these types of regime have lower growth than the rest.

Table 5. Growth and the IMF and RR Classifications, 1985-2001

	(1)	(2)
Independent variables		
Hard peg dummy	–0.94 (–0.34)	–1.05 (–0.37)
IMF float, RR peg	–0.18 (–0.46)	–0.24 (–0.56)
IMF peg, RR float	–1.56 (–2.37)	–1.37 (–2.09)
IMF float, RR float	–1.04 (–1.77)	–0.97 (–1.56)
Inflation > 25%		–0.51 (–0.92)
Depreciated parallel rate		–0.34 (–0.56)
Standard error	3.31	3.31
Sample size	877	877
No. of countries	73	73

Notes. The dependent variable is *per capita* GDP growth, with observations outside the range –10 to +15 per cent excluded, as are observations with inflation > 40 per cent p.a.. All regressors are indicator variables. Year and country dummies are included in the regression. Figures in parentheses are *t*-statistics. Omitted category is soft peg in both classifications.

To summarise: it is difficult to draw strong conclusions about the relationship between exchange rate regimes and growth in developing countries because differences in growth rates that are economically significant are often not statistically significant. Four out of five classifications show no significant differences, but the RR classification based on parallel rates suggests that adjustable pegs have higher growth rates than floats, which is perhaps not what one would expect, given the evidence, for example, that pegs suffer greater output losses from negative terms-of-trade shocks (Broda, 2004). The worst growth outcomes appear to be associated with a monetary policy that is inconsistent with an official peg.

7. CONCLUSIONS

Alternative schemes for classifying exchange rate regimes display a disappointing lack of consistency, and disagree with each other as much as with the official classification. This is only partly a reflection of how stringent they choose to be in defining a peg or band.

Three out of four alternative schemes that use official exchange rates agree with the official classification in suggesting that growth rates in developing countries are not significantly different under soft pegs and floats. According to the official and two alternative classifications, inflation rates are also similar in these two regimes. Hard pegs, in which adjustment of the parity is inhibited either by legal barriers (currency boards) or the need for the agreement of other countries (a common currency), are associated with lower inflation than other regimes, although the difference has fallen in recent years with the general decline in inflation rates in developing countries. Hard pegs are also associated with slower growth, by up to one per cent p.a., but there have been so few switches to and from hard pegs that it is impossible to distinguish clearly between a regime effect and fixed country effects.

The Reinhart-Rogoff (2004) scheme is unusual in that it is based on parallel exchange rates, and also uses a definition of a peg that is so wide as to include acknowledged low-volatility floats, such as Canada and Switzerland. One effect of this, at least in a sample

confined to developing countries, is a bias of the float classification towards countries with significant inflationary problems and low institutional quality, as found by Alesina and Wagner (2003). Observations with inflation above 25 per cent, or in countries whose inflation rate has exceeded 40 per cent in at least one other year, are much more likely to be classified as a float than a peg in this classification. Our finding of one per cent slower growth for floats than soft pegs using this classification is markedly different to our findings for the other classifications, and suggests that there is a particular growth penalty for official pegs with inconsistent monetary policy, resulting in rapidly depreciating parallel rates.

In summary, use of a common sample resolves some, but not all, of the discrepancies in previous results. For growth, the LYS scheme no longer suggests significantly higher growth under floating, but the RR scheme continues to suggest significantly *lower* growth for floats. For inflation, the RR scheme is again an outlier. The most probable explanation for this is that parallel market data convey information about issues beyond exchange rate policy (such as monetary and trade policy). This needs to be taken into account by the users of such a scheme.

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