The Discipline Effects of Fixed Exchange Rates: Constraint versus Incentive Effects and the Distinction between Hard and Soft Pegs

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Available online: 23 Feb 2012

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The Discipline Effects of Fixed Exchange Rates: Constraint versus Incentive Effects and the Distinction between Hard and Soft Pegs

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ABSTRACT   *There has been much interest in whether fixed exchange rates can provide a strong source of discipline over domestic monetary and fiscal policies. We argue that previous studies, however, have not paid sufficient attention to the distinction between constraint and incentive effects and that these operate quite differently for hard and soft fixes. Using annual data for 31 emerging and 32 developing countries during 1990–2003, our analysis implies that hard fixes should have much stronger discipline effects on money growth and inflation and our empirical study supports their prediction. Our theoretical analysis suggests that neither hard nor soft fixes are likely to provide strong discipline over fiscal policy and this is confirmed by our empirical analysis as well.*

KEY WORDS: Hard fixes, Soft pegs, discipline effects, incentive structure, macroeconomic discipline

JEL CLASSIFICATION: E52, E62

1. Introduction

Whenever the costs and benefits of an action do not have the same time profiles, decision makers face time-inconsistent incentives (Kydland & Prescott, 1977; Barro & Gordon, 1983). This often creates strong incentives to pursue actions that are beneficial in the short-run but harmful in the long run. Unless we have very long time horizons and considerable self-restraint, we are likely to bias our choices toward actions where the benefits are front loaded and the cost delayed. As a consequence, policy-makers often have incentives to implement time-inconsistent policies, which

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bring short-term economic and political benefits at the cost of longer term economic instability. In the long run, unconstrained domestic monetary and fiscal policies can therefore generate inflationary bias and excessive instability.[1]

Given the prevalence of time-inconsistent policy incentives, it is not surprising that there has been much interest in the use of institutional mechanisms to limit the effects of short run political pressures on macroeconomic policies. Considerable support has developed in official circles as well as among economists for the adoption of institutional mechanisms to restrain such tendencies. On the domestic front, central bank independence and inflation targeting have become popular. On the international side, there has been considerable interest in, and use of, fixed or pegged exchange rates as external sources of discipline. The effectiveness of such strategies has been the subject of considerable dispute. There is a substantial body of empirical literature on the effects of alternative exchange rate regimes on macro economic performance.[2] On economic growth the results are mixed, but on inflation most studies have found that when high income countries are excluded, fixed rates reduce inflation substantially compared with floating rates.[3] For example, as Bleaney and Fielding (2002) summarize, "[r]ecent work suggests that LDCs which peg their exchange rates achieve lower inflation than those whose exchange rates float. . ." (pp. 223–224) and Klein and Shambaugh (2010) conclude, "we have shown that inflation is significantly lower when countries peg than when they float." (p. 181).[4] However, most of these studies have failed to distinguish systematically between hard and soft fixes.[5]

We argue in Section 2 that we should expect substantially different effects from hard and soft fixes on macroeconomic discipline. Too often fixed exchange rate regimes are treated as if they were binding constraints whereas this is only true for monetary policy under a hard fix and does not hold for fiscal policy under either regime. Using annual data from 31 emerging-market and 32 developing countries during 1990–2003, we present evidence that supports these propositions.

The paper is organized as follows. We provide a general overview on the issue of different types of fixed exchange rate regimes as external constraints and incentives for macroeconomic policy-making and hence as a source of macroeconomic discipline in Section 2. Section 3 describes the data, methodology and the empirical model. Section 4 presents our core empirical results along with robustness checks and Section 5 concludes.

2. Fixed Exchange Rates as External Source of Macroeconomic Discipline: Constraints versus Incentives

A wide range of views can be founded in the literature about the role of exchange rate regimes in promoting macroeconomic discipline. While in some contexts such as discussing currency crises and the bipolar and vanishing middle hypotheses,[6] economists often stress the distinction between hard fixes and soft pegs. However, in the empirical literature on the effects of exchange rate regimes on macroeconomic discipline this distinction has frequently been ignored or glossed over. While considerable attention has been paid to the propensity of soft pegs to be highly crisis prone relative to hard fixes as analyzed in the literature on the unstable middle and bipolar hypotheses, one still often sees statements implying that any form of peg should be expected to promote discipline. A recent example is given by Husain *et al.*

(2005a, p. 45) who argue that "[a]n important prediction from economic theory is that exchange rate pegs act as a disciplinary device..."

An exchange rate regime that serves as a constraint must meet two conditions. The first and most straightforward condition is that the exchange rate itself cannot be changed. The second condition is that this constrained exchange rate must place an absolute constraint over domestic policy. Fiscal policy is not linked as tightly to exchange rate policy as is monetary policy. Thus while this second condition is met with respect to monetary, it is not for fiscal policy – and even with monetary policy the fixed exchanged rate implies a necessary constraint over monetary only in the long run unless capital mobility is very high. For fiscal policy, even a hard fix implies no direct constraint. Thus we must analyze how fixing the exchange rate affects the incentives for expansionary fiscal policy.

2.1. Monetary Discipline under Hard Fixes

Fixed exchange rates can constrain monetary policy through two different mechanisms. One is the balance of payments constraint. With the possible exception of reserve currency countries, nations cannot run balance of payments deficits indefinitely, as they will run out of means to finance them. This need for eventual adjustment puts a constraint on monetary policy in the long run. In the short run, however, there is still scope for some independence of monetary policy as long as international capital mobility is not so high that sterilization of monetary flows is not possible.

Concerns over the eventual need to restore balance of payments equilibrium limits the incentives for rapid monetary expansion in the short run, but these incentives are much weaker if the country can devalue its fixed rate in the future rather than having to adopt contractionary monetary policy. Thus the more costly it is to change the exchange rate; the greater is the degree of monetary discipline imposed. While even hard fixes such as currency boards can be abandoned as in the case of Argentina, the higher cost of doing so makes the incentives stronger for monetary restraint and it was fiscal rather than monetary excesses that caused Argentina's crisis.

Thus hard fixes certainly come much closer to the ideal type of a true constraint than the typical adjustable peg regimes where exchange rates can be adjusted with much greater frequency and at lower cost. Thus it is surely inappropriate to treat these soft pegs as anything approaching true constraints. Rather we must analyze how they change the incentive structures facing policy-makers.

Adjustable pegs do generally increase the perceived political costs of devaluation compared to an equal depreciation under flexible rates since the government is likely to be held more responsible. However, as we discuss below, they may also increase the incentives to follow highly expansionary policies in the short run. This leaves their net effects on macroeconomic discipline in doubt and illustrates the need to distinguish between hard and soft fixes. In the following subsections we will take up a more detailed discussion of the expected effects of these types of exchange rate regimes on monetary and fiscal discipline.

2.2. Monetary Discipline under Soft Pegs

However, since the complete surrender of monetary policy autonomy is viewed as quite costly by most governments, this discipline strategy has been adopted by

relatively few countries. Even with a substantial number of countries joining the Euro Zone soft pegs are still the most common form of fixed rates.

These soft fixes are a much weaker commitment technology since they only affect policy-makers' incentives, and do not act as absolute constraints on monetary policy. The pegs can be changed if future political cost-benefit calculations suggest that this is the lower cost option. Even under soft pegs, however, devaluations can carry substantial political costs. The future prospect of such a development can provide incentives for monetary discipline today. This requires governments to give considerable weight to prospective developments that might not occur for some time. If political pressures force the government to adopt a short time horizon, the weight given to such future prospects will be substantially lessened. And against this must be weighted the possibility that in the short run pegged rates may reduce the inflation costs of expansions giving increased incentives for short run monetary expansion. Thus pegged rates give rise to conflicting incentives.[7]

While theory indicates that adjustable pegs should be less effective at providing discipline than hard pegs, whether adjustable pegs provide more discipline than flexible exchange rates is indeterminate theoretically. The balance depends on the magnitudes of short run benefits and longer run costs and the discount rate at which they are evaluated, and thus can vary both across countries and time.[8]

2.3. Fiscal Policy Discipline

Time horizons are also important for evaluating the effects of different exchange rate regimes on fiscal discipline, because neither hard fixes, adjustable pegs, nor flexible exchange rates acts as constraints on fiscal policy autonomy. They only affect incentive structures. Interestingly, hard fixes can actually provide the strongest incentives for profligate fiscal spending in the short run. Even though this type of exchange rate regime raises the long-run cost of continued excessive fiscal deficits, it can increase the ease with which deficits can be financed in the short run. When capital mobility is high, expansionary fiscal policy can induce its own financing through capital inflows and a consequent expansion of the domestic money supply under hard fixes. By providing lower cost financing, this can reduce short-run discipline over fiscal policy.[9] The recent Greek crisis provides a vivid example. While the market eventually imposed discipline on Greece with a vengeance, it allowed the situation to build over along period of time before a strong alarm was sounded.

In this context it is important to distinguish between the degree of capital mobility and how rational and far-sighted expectations are in financial markets.[10] In models based on the assumption of perfect capital mobility, these two types of considerations are typically combined, but in theory it is possible for capital mobility to be high but for the market to not be very far-sighted. Argentina in the 1990s provides a vivid example that it is quite possible for a hard fix to provide strong monetary discipline (Argentina's inflation rate fell drastically under currency board) but the hard fix and international financial mobility failed to provide strong discipline over fiscal policy. Because the long-run costs are considerable, far-sighted governments might decline to take advantage of such short-run opportunities, but governments often do. Thus, the net effect of even hard fixes on fiscal discipline could go either way.

3. Data and Methodology

Since today's debate about using exchange rate regimes as mechanisms to promote macroeconomic discipline focuses primarily on the developing and emerging market economies, our empirical analysis focuses on these countries. We use a panel OLS model with fixed effects which allows us to capture the differences across the various countries in the sample. The estimation period runs from 1990 to 2003, covering 31 emerging-market and 32 developing countries with annual observations, as shown in Appendix A. The start and the end year were chosen based on the availability of the *de facto* classification of exchange rate regimes by Bubula and Ötker-Robe (2002). The summary statistics are presented in Table 1.

There is of course a potentially serious problem of endogeneity that could bias the results against flexible rates, because countries with high inflation usually of necessity adopt some form of floating rates.[11] Some studies have attempted to address this problem of endogeneity by using different techniques try to get unbiased estimates. For example, Miles (2008) makes a strong case for using the difference-in-differences approach popular in microeconomic studies. A major problem with this approach for macroeconomic issues is finding enough cases where the only highly relevant consideration is the change in regimes.[12] Therefore, we follow the basic approach suggested by Reinhart and Rogoff (2004), who deal with this issue by putting high-inflation countries into a separate category of freely falling rates, and limit our consideration in our empirical analysis to low and moderate inflation countries.[13] Since there is no general agreement about the threshold at which moderate inflation gives way to high inflation, we use a range of thresholds and fortunately find that our results are not highly sensitive to the particular inflation threshold considered.[14]

There is a strong argument for an approach along these lines. High inflation economies usually behave very differently from normal economies (see Heymann & Leijonhufvud, 1995). Most of the arguments about time inconsistency problems and discipline mechanisms implicitly assume the existence of moderate inflation rates, so

Table 1. Summary statistics

Variables	Observations	Mean	Std. Dev.	Min	Max
M2Growth $_{t-1}$	832	46.50	268.47	−57.14	6384.91
Inflation $_{t-1}$	870	65.65	395.61	−3.96	7481.66
Inflation $_{t-2}$	812	69.85	409.17	−3.96	7481.66
Fiscal balance (CAB) $_{t-1}$	847	−3.61	8.72	−127.57	20.08
Fiscal balance (CAB) $_{t-2}$	787	−3.71	8.98	−127.57	20.08
Hard peg $_{t-1}$	875	0.12	0.32	0	1
Adjustable peg $_{t-1}$	875	0.27	0.45	0	1
Narrow float $_{t-1}$	875	0.11	0.31	0	1
Broad float $_{t-1}$	875	0.38	0.48	0	1
Openness $_{t-1}$	859	0.79	0.54	0.13	3.75
Terms of trade $_{t-1}$	635	100.65	29.09	28.20	721
Real GDP grow $_{t-1}$	873	4.25	9.52	−50.68	95.98
US T-bill Rate $_{t-1}$	882	−9.71	27.01	−53.28	41.42
Crisis $_{t-1}$	716	0.11	0.31	0	1

Note: M2 Growth, Inflation and CAB are our dependent variables used in this analysis, respectively.

that there is still some degree of stickiness in the adjustments of expectations, the monetary system is still functioning normally and there is a stable enough political situation such that the government has a reasonable degree of short-run discretionary control over policy.[15] It therefore is for moderate inflation countries that the standard analysis of incentives is relevant.[16]

We use three different measures for macroeconomic discipline, two for monetary policy discipline and one for fiscal discipline. "Monetary discipline" is measured both as the growth rates of monetary aggregates and as inflation growth as reflected by changes in the Consumer Price Index (CPI).[17] The measure used for "fiscal discipline" is the cyclically adjusted fiscal balance, which controls for the effects of macroeconomic fluctuations (CAB).[18] The cyclical adjusted balance is measured as the fiscal balance adjusted to output growth, then divided by GDP and multiplied by 100.[19]

To identify the effects of different exchange rate regimes on macroeconomic discipline, we focus our analysis on the effects of three categories of exchange rate regimes: hard pegs, adjustable pegs and flexible rates, the ones that are most relevant for the current discussion. We use the IMF's classifications of de facto regimes. While other sets of classifications are available we believe that this set is the most accurate overall.[20] We compare these to a separate category of "other regimes", which includes the remaining IMF classifications: crawling pegs and bands, backward-looking crawling pegs and bands.[21] We further differentiate flexible exchange rate regimes into two types: "narrow float" and "broad float".[22] Using this grouping allows us to retain all of our observations while putting more focus on the regimes covered by our hypotheses. "Other regimes" are used as the default regime, and hence the coefficient for each exchange rate regime should be interpreted as the difference in performance between the particular regime and "other regimes". Our hypothesis is that hard fixes will provide greater monetary discipline than soft pegs. There is not a clear theoretical prediction for the comparison between soft pegs and flexible rates. On the fiscal side, we do not expect to see large differences in discipline across the various regimes.[23]

We control for a standard set of economic variables to minimize omitted variable bias. These variables include: the degree of openness, measured by a ratio of imports and exports to GDP; the terms of trade; real GDP growth; changes in US 3-month Treasury bill interest rate; and a currency crisis index. The ratio of exports and imports to GDP is included to test the argument by Romer (1993) that trade openness reduces inflation in the non-industrial countries.[24] Appendix B provides detailed definitions and sources of all variables used in the analysis.

The empirical model can be summarized as:

$$Y_{i,t} = \alpha Y_{i,t-1} + X'_{it}\beta + \nu_i + \varepsilon_{i,t} \qquad i = 1, \ldots, N, t = 1, \ldots, T$$

where $Y_{i,t-1}$ are our macroeconomic variables monetary and fiscal discipline taking one year lag. X is a set of exchange rate regime dummy variables, which takes a value of 1 if country i adopts a particular exchange rate regime and 0 otherwise. ν is a set of control variables as mentioned above and $\varepsilon_{i,t}$ is the error term. Our explanatory variables are lagged by one period to capture both current economic situations and the information that policy-makers took into account when choosing monetary and

fiscal policies. The exceptions are our openness and crisis index measures, which are included without lags to avoid serial correlation problems.

4. Empirical Analysis

4.1. Basic Results

Table 2 presents the results from our base equation on the effects of different exchange rate regimes on M2 growth, inflation rates and fiscal balance. The major proposition that we are testing is that the coefficients on money growth and inflation for hard fixes are negative and greater than those for the adjustable pegs. The theoretical comparison for adjustable pegs versus floats is indeterminate but we anticipate that the coefficients for floating rates on inflation and money growth will be negative and also greater than for adjustable pegs. We also expect that the differences between pegs and floats will be greater for narrow than for broader floats. For fiscal policy there is no clear theoretical presumption on the sign, but our hypothesis is that arguments that fixed or pegged rates will promote substantial fiscal discipline are overstated so we expect the effects to be small, whether positive or negative.

For the control variables there are often not clear expected signs. Exceptions include the lagged dependent variables where we expect and generally find positive signs for the first term. While we would expect the previous year's fiscal balance to have positive effects on this period's money growth and inflation this does not turn out to be the case, casting some doubt on the popular hypothesis that fiscal deficits are a major cause of inflation. We also do not find strong support for the hypothesis that trade openness promotes discipline regardless of the exchange rate regime. For both developing and emerging markets the signs are positive for monetary growth but negative for inflation.[25] In all cases the coefficients are small and insignificant. For fiscal balance the effects are negative for the developing countries but positive and significant for the emerging market countries. These results generally hold across various inflation thresholds.

The results for inflation rates strongly support our theoretical argument that it is quite important to distinguish between hard and soft pegs. Hard fixes are associated with inflation rates two to three percentage points lower than adjustable pegs. The results are quite similar for the emerging market and developing country samples. The differences between the adjustable or soft pegs and floating rates are typically smaller and show more variability across the estimates. Inflation rates under floating are about one percentage point less than under adjustable pegs. This conclusion is driven by the results for emerging markets. The differences are small for the developing countries.

We find the same general patterns with M2 growth as with inflation, but with the differences in magnitudes being greater. Monetary growth rates under hard fixes are typically four to five percentage points lower than under adjustable pegs, while narrow floats have money growth two to three percentage points lower than pegs. As we expected for fiscal policy discipline we failed to find statistically significant differences among hard fixes, soft pegs and floats, and the coefficients for the differences are small, only 0.5% of GDP or less.

Table 2. Disciplinary effects with narrow floats without inflation thresholds

	Model 1								
	M2 growth			Inflation			Fiscal balance		
	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
M2 growth (t−1)	0.551***	0.602***	0.366***	–	–	–	–	–	–
	(17.211)	(15.762)	(6.294)	–	–	–	–	–	–
Hard peg (t−1)	−5.480***	−7.800*	−4.789	−2.785**	−3.807*	−2.502*	00.211	0.695	0.089
	(−2.441)	(−1.916)	(−1.575)	(−1.947)	(−1.962)	(−2.07)	(0.729)	(1.469)	(0.181)
Adjustable peg (t−1)	−1.269	−4.974**	4.422	0.663	0.043	2.230	0.059	0.271	−0.621
	(−0.827)	(−2.545)	(1.632)	(0.679)	(0.035)	(1.240)	(0.292)	(1.164)	(−1.419)
Narrow float (t−1)	−2.705	−5.319**	6.253	−0.065	−0.304	3.493	0.246	0.455*	−0.400
	(−1.404)	(−2.476)	(1.522)	(−0.053)	(−0.219)	(1.289)	(1.008)	(1.813)	(−0.622)
Trade openness (t−1)	−0.165	1.193	3.611	−0.199	−1.071	−0.882	0.290*	0.554***	−0.381
	(−0.134)	(0.801)	(0.993)	(−1.515)	(−1.092)	(−0.362)	(1.789)	(3.093)	(−0.648)
Term of trade (t−1)	0.003	−0.012	−0.003	−0.009	−0.029	−0.012	0.003	−0.011	0.004
	(0.139)	(−0.209)	(−0.130)	(−0.714)	(−0.738)	(−0.846)	(1.229)	(−1.511)	(1.294)
Real GDP growth (t−1)	−0.122	−0.057	−0.078	−0.075	0.155	−0.137*	0.042***	0.076***	0.033**
	(−1.320)	(−0.317)	(−0.715)	(−1.273)	(1.283)	(−1.736)	(3.476)	(3.510)	(2.056)
US T-bill rate (t−1)	−0.005	0.008	−0.027	0.004	0.021	−0.027	−0.001	−0.000	−0.001
	(−0.242)	(0.289)	(−0.750)	(0.280)	(1.176)	(−1.131)	(−0.432)	(−0.113)	(−0.176)
Fiscal balance (t−1)	−0.553***	−0.997***	−0.633***	−0.056	−0.103	−0.071	0.420***	0.348***	0.460***
	(−3.470)	(−3.843)	(−2.856)	(−0.543)	(−0.574)	(−0.492)	(10.131)	(6.564)	(6.840)
Crisis index (t−1)	1.630	2.045	1.430	4.111***	4.789***	3.308	0.412	0.050	1.012**
	(0.799)	(0.798)	(0.447)	(3.174)	(2.912)	(1.555)	(1.464)	(0.156)	(1.969)
Broad float (t−1)	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–
Inflation (t−1)	–	–	–	0.808***	0.842***	0.750***	−0.008*	−0.007	–0.011
	–	–	–	(33.197)	(25.453)	(10.839)	(−1.888)	−1.527	(−1.163)

Table 2. (*Continued*)

	Model 1								
	M2 growth			Inflation			Fiscal balance		
	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inflation (t − 2)	–	–	–	−0.035***	−0.037***	−0.018	–	–	–
	–	–	–	(−11.056)	(−10.646)	(−0.271)	–	–	–
Fiscal balance (t − 2)	–	–	–	–	–	–	0.378***	0.398***	0.358***
	–	–	–	–	–	–	(9.914)	(8.307)	(5.691)
Constant	7.500***	7.582	5.715	3.775**	4.350	4.161	−1.017***	−1.087	−0.443
	(2.846)	(1.191)	(1.464)	(2.239)	(1.038)	(1.562)	(−2.976)	(−0.112)	(−0.719)
R-squared (overall)	0.473	0.601	0.300	0.752	0.788	0.712	0.821	0.836	0.815
Number of observations	488	190	198	488	290	198	455	271	184
Chi-squared statistic	428.326	420.391	80.065	1443.569	1035.337	460.249	2028.436	1317.422	608.627
Degrees of freedom	10	10	10	11	11	11	11	11	11

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

4.2. Robustness Checks

To check on the robustness of our results, we conduct several sensitivity tests using different grouping of exchange rate regimes and adding inflation thresholds across different country groups. Model 1 uses the narrower definition of flexible regimes, while Model 2 incorporates the broader category of flexible regimes as shown in Table 3. Results with various inflation thresholds are reported in Table 4 through 9.

Again we find that hard fixes generally are associated with lower inflation rates than adjustable pegs across the different inflation thresholds. This relationship also holds up for M2 growth as well. As might be expected, when we use the broad measures of floating including managed floating, the differences from the adjustable peg generally become smaller. This suggests that more heavily managed floats operate more like pegged that highly flexible rates.

Interestingly, when inflation thresholds are applied (as they are in Tables 6 and 9), we find a weakly significant pro-disciplinary effect for emerging markets when floating rates are narrowly defined (see columns 5 through 8 in Table 6). As shown in Table 8, on average, inflation is a little lower with the floats than with adjustable pegs, but the differences are as great as one percentage point only when the inflation threshold is raised to 50% [columns (4), (8) and (12)]. When the definition of a floating rate is expanded to the broader Model 2 form, this effect vanishes (see columns 5 through 8 in Table 9). Again we find that none of our exchange rate regime specifications appear to exert any significant pro- or anti-disciplinary influence over fiscal balance in developing countries (see columns 9 through 12 in Tables 6 and 9). This is consistent with the findings of Tornell and Veloasco (1998, 2000).

When emerging and developing countries are combined into the full pooled sample, adjustable pegs tend to exert a pro-disciplinary influence over fiscal balance (see columns 1 through 4 of Tables 6 and 9); this is most pronounced when floating regimes are most narrowly defined, as in Table 6. It is unclear whether this finding reflects a true relationship between adjustable peg regimes and fiscal discipline or is merely indicative of idiosyncrasies of the subsamples when combined, as it is muted in both subsamples and only arises when inflation thresholds are applied. Additional data is required to make a sound determination on this point.

To sum up, our empirical results prove to be quite robust and support our argument that there exist significant and sizeable differences between hard and soft pegs' disciplinary effects on rates of money growth and inflation; they also give some justification for our belief that the distinction between the effects of constraints and incentives is a meaningful one. They further underscore the imprudence of treating all types of pegged exchange rate regimes as one in empirical studies.

Our results for fiscal discipline are less dramatic, but this conforms to our expectations that exchange rate regimes cannot be expected to provide strong discipline over fiscal policy. The differences in fiscal positions across the alternative exchange rate regimes are small as we expected, seldom exceeding 0.5% of GDP.

5. Concluding Remarks

The analysis in this paper suggests that it is important to clearly distinguish in empirical analyses between hard and soft fixes, with only the former providing strong discipline over monetary expansion and inflation in comparison with both soft pegs

Table 3. Disciplinary effects with broad floats without inflation threshold

	Model 2								
	M2 growth			Inflation			Fiscal balance		
	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
M2 growth (t − 1)	0.549***	0.579***	0.366***	–	–	–	–	–	–
	(16.971)	(14.803)	(6.309)	–	–	–	–	–	–
Hard peg (t − 1)	−6.069**	−9.454**	−2.893	−3.948***	−4.673*	−3.955*	0.220	0.694	0.084
	(−2.516)	(−2.307)	(−0.856)	(−2.576)	(−1.714)	(−1.782)	(0.708)	(1.434)	(0.158)
Adjustable peg (t − 1)	−1.886	−8.102***	−6.027**	−0.462	−1.117	−0.707	0.074	0.356	−0.0554
	(−1.072)	(−3.586)	(1.987)	(−0.413)	(−0.750)	(0.352)	(0.317)	(1.264)	(−1.147)
Broad float (t − 1)	−1.957	−6.726***	4.312*	−1.876*	−1.749	−1.756	0.110	0.288	−0.055
	(−1.246)	(−3.374)	(1.679)	(−1.871)	(−1.333)	(−1.033)	(0.535)	(1.191)	(−0.137)
Trade openness (t − 1)	0.236	2.438*	2.535	−1.098	−0.808	−1.197	0.257	0.476***	−0.314
	(0.194)	(1.648)	(0.705)	(−1.410)	(−0.818)	(−0.495)	(1.605)	(2.642)	(−0.557)
Term of trade (t − 1)	0.003	0.034	−0.000	−0.009	−0.020	−0.013	0.003	−0.013*	0.004
	(0.175)	(0.572)	(−0.013)	(−0.713)	(−0.517)	(−0.905)	(1.209)	(−1.807)	(1.315)
Real GDP growth (t − 1)	−0.120	−0.033	−0.060	−0.088	0.135	−0.156*	0.041***	0.072***	0.034**
	(−1.295)	(−0.188)	(−0.548)	(−1.489)	(1.133)	(−1.941)	(3.422)	(3.342)	(2.133)
US T-bill rate (t − 1)	−0.005	0.003	−0.026	0.002	0.019	−0.030	−0.001	−0.000	−0.001
	(−0.129)	(0.098)	(−0.720)	(0.149)	(1.066)	(−1.235)	(−0.478)	(−0.108)	(−0.164)
Fiscal balance (t − 1)	−0.556***	−1.074***	−0.675***	−0.031	−0.129	0.009	0.420***	0.349***	0.463***
	(−3.483)	(−4.175)	(−2.984)	(−0.305)	(−0.720)	(0.059)	(10.110)	(6.550)	(6.864)
Crisis index (t − 1)	1.877	3.365	1.551	4.283***	5.037***	3.290	0.394	−0.014	1.001*
	(0.918)	(1.314)	(0.486)	(3.312)	(3.059)	(1.544)	(1.395)	(−0.043)	(1.938)
Narrow float (t − 1)	–	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	–
Inflation (t − 1)	–	–	–	0.799***	0.828***	0.750***	−0.008*	−0.007	−0.011
	–	–	–	(32.386)	(24.076)	(10.802)	(−1.843)	(−1.411)	(−1.159)

Table 3. (*Continued*)

	Model 2								
	M2 growth			Inflation			Fiscal balance		
	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries	Full sample	Emerging markets	Developing countries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inflation (t − 2)	–	–	–	−0.035***	−0.036***	−0.017	–	–	–
	–	–	–	(−11.027)	(−10.412)	(−0.294)	–	–	–
Fiscal balance	–	–	–	–	–	–	0.379***	0.402***	0.359***
(t − 2)	–	–	–	–	–	–	(9.967)	(8.377)	(5.694)
Constant	7.745***	4.917	4.426	5.001***	4.509	6.092**	−0.996***	0.173	−0.508
	(2.837)	(0.796)	(1.074)	(2.858)	(1.104)	(2.164)	(−2.792)	(0.226)	(−0.789)
R-Squared (overall)	0.473	0.608	0.302	0.754	0.790	0.711	0.820	0.835	0.815
Number of observations	488	190	198	488	290	198	455	271	184
Chi-squared statistic	427.531	433.278	80.774	1457.979	1043.505	458.198	2024.374	1306.194	674.255
Degrees of freedom	10	10	10	11	11	11	11	11	11

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 4. Model 1, M2 growth with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
M2 growth $(t-1)$	0.363***	0.380***	0.384***	0.396***	0.439***	0.402***	0.400***	0.418***	0.252***	0.280***	0.299***	0.310***
	(9.134)	(11.293)	(11.622)	(12.125)	(8.467)	(11.023)	(10.880)	(11.959)	(3.776)	(4.142)	(4.460)	(4.639)
Hard peg $(t-1)$	−7.183***	−5.702***	−4.835***	−5.238***	−7.107***	−5.459**	−5.599**	−6.441**	−9.541***	−7.171***	−5.007*	−5.036*
	(−4.797)	(−3.462)	(−2.894)	(−2.990)	(−2.907)	(−2.169)	(−2.101)	(−2.315)	(−3.905)	(−2.615)	(−1.849)	(−1.782)
Adjustable peg $(t-1)$	−1.619	−0.829	−0.717	−0.734	−2.200*	−2.554**	−2.375*	−2.674**	0.473	3.395	3.931	4.588*
	(−1.544)	(−0.723)	(−0.608)	(−0.601)	(−1.949)	(−2.105)	(−1.867)	(−2.013)	(0.190)	(1.340)	(1.523)	(1.773)
Narrow float $(t-1)$	−3.389**	−3.674**	−3.120**	−3.873**	−4.049***	−4.733***	−4.587***	−5.562***	1.802	1.074	2.395	2.036
	(−2.543)	(−2.538)	(−2.137)	(−2.554)	(−3.105)	(−3.400)	(−3.180)	(−3.744)	(0.485)	(0.280)	(0.635)	(0.519)
Trade openness $(t-1)$	−0.959	−0.977	−1.101	−1.215	−1.109	−1.222	−1.642	−1.877*	6.201**	4.435	3.550	3.260
	(−1.173)	(−1.077)	(−1.180)	(−1.247)	(−1.215)	(−1.252)	(−1.592)	(−1.759)	(2.088)	(1.351)	(1.076)	(0.960)
Term of trade $(t-1)$	−0.001	−0.005	−0.006	−0.008	−0.052	−0.066	−0.047	−0.042	0.004	−0.001	−0.003	−0.006
	(−0.119)	(−0.381)	(−0.381)	(−0.551)	(−1.272)	(−1.563)	(−1.080)	(−0.941)	(0.270)	(−0.061)	(−0.170)	(−0.308)
Real GDP growth $(t-1)$	0.213***	0.055	0.004	−0.005	0.255**	0.173	0.012	−0.063	0.156	0.010	−0.020	0.002
	(3.124)	(0.779)	(0.052)	(−0.070)	(1.966)	(1.367)	(0.095)	(−0.485)	(1.639)	(0.104)	(−0.201)	(0.020)
US T-bill rate $(t-1)$	0.006	−0.008	−0.009	−0.016	−0.003	−0.005	−0.006	−0.009	0.018	−0.011	−0.009	−0.018
	(0.354)	(−0.461)	(−0.522)	(−0.910)	(−0.149)	(−0.276)	(−0.325)	(−0.480)	(0.594)	(−0.344)	(−0.264)	(−0.524)
Fiscal balance $(t-1)$	−0.226**	−0.306**	−0.303**	−0.309**	−0.252	−0.312*	−0.238	−0.185	−0.347*	−0.505**	−0.542***	−0.602***
	(−2.008)	(−2.545)	(−2.451)	(−2.401)	(−1.514)	(−1.776)	(−1.285)	(−0.964)	(−1.759)	(−2.494)	(−2.635)	(−2.841)
Crisis index $(t-1)$	3.156**	3.220*	4.629***	3.899**	2.645	2.341	5.113***	3.942**	2.217	3.447	3.381	3.457
	(2.026)	(1.952)	(2.811)	(2.327)	(1.576)	(1.298)	(2.851)	(2.132)	(0.728)	(1.120)	(1.076)	(1.112)
Constant	9.423***	10.353***	10.511***	11.109***	13.359***	16.493***	15.617***	15.914***	5.440*	6.574*	6.709*	6.962*
	(5.001)	(5.118)	(5.077)	(5.166)	(2.928)	(3.535)	(3.269)	(3.268)	(1.689)	(1.862)	(1.902)	(1.896)

Table 4. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.331	0.335	0.329	0.340	0.434	0.474	0.458	0.479	0.300	0.254	0.238	0.244
Number of observations	395	437	453	463	239	260	271	274	156	177	182	189
Chi-squared statistic	190.341	214.452	216.297	232.660	174.896	224.657	219.832	241.977	62.100	56.395	53.539	57.489
Degrees of freedom	10	10	10	10	10	10	10	10	10	10	10	10

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.
Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 5. Model 1, inflation with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Inflation $(t-1)$	0.494***	0.471***	0.512***	0.600***	0.630***	0.472***	0.567***	0.608***	0.378***	0.508***	0.479***	0.552***
	(18.409)	(19.840)	(20.917)	(24.419)	(19.116)	(15.788)	(17.689)	(19.973)	(6.874)	(9.474)	(8.852)	(8.622)
Inflation $(t-2)$	−0.010***	−0.018***	−0.021***	−0.024***	−0.013***	−0.018***	−0.023***	−0.024***	0.006	−0.026	−0.026	−0.000
	(−5.598)	(−9.431)	(−9.406)	(−10.113)	(−8.194)	(−8.396)	(−9.622)	(−10.050)	(0.181)	(−0.620)	(−0.525)	(−0.000)
Hard peg $(t-1)$	−3.079***	−3.314***	−3.104***	−3.032***	−3.066***	−4.553***	−5.031***	−5.032***	−3.826***	−2.932***	−2.285*	−2.376
	(−5.247)	(−3.633)	(−3.139)	(−3.045)	(−3.251)	(−3.405)	(−3.179)	(−3.132)	(−4.536)	(−2.598)	(−1.725)	(−1.482)
Adjustable peg $(t-1)$	−0.481	−0.381	−0.688	−0.310	−0.453	−1.177*	−0.776	−0.753	0.215	0.561	0.079	1.461
	(−1.177)	(−0.651)	(−1.023)	(−0.446)	(−1.068)	(−1.840)	(−1.041)	(−0.993)	(0.245)	(0.527)	(0.061)	(0.971)
Narrow float $(t-1)$	−0.748	−1.690**	−1.350*	−1.371	−0.273	−2.183***	−1.775**	−1.681**	0.519	0.320	1.074	0.108
	(−1.495)	(−2.458)	(−1.685)	(−1.591)	(−0.560)	(−3.016)	(−2.124)	(−1.999)	(0.398)	(0.200)	(0.575)	(0.048)
Trade openness $(t-1)$	−0.763**	−1.745***	−2.217***	−1.950***	−0.492	−1.660***	−2.114***	−1.969***	1.880*	−0.010	−1.772	−2.239
	(−2.305)	(−3.375)	(−3.921)	(−3.497)	(−1.411)	(−3.269)	(−3.542)	(−3.257)	(1.802)	(−0.007)	(−1.079)	(−1.130)
Term of trade $(t-1)$	0.001	−0.006	−0.011	−0.011	−0.016	−0.044**	−0.071***	−0.056**	0.001	−0.004	−0.009	−0.010
	(0.270)	(−0.941)	(−1.425)	(−1.320)	(−1.050)	(−1.983)	(−2.786)	(−2.200)	(0.262)	(−0.508)	(−0.986)	(−0.901)
Real GDP growth $(t-1)$	0.004	0.010	0.008	−0.003	0.113**	0.011	0.007	−0.033	−0.033	0.001	0.011	0.000
	(0.159)	(0.315)	(0.200)	(−0.073)	(2.497)	(0.163)	(0.099)	(−0.446)	(−0.908)	(0.025)	(0.200)	(0.005)
US T-bill rate $(t-1)$	0.001	0.008	0.006	−0.004	0.005	0.011	0.015	0.012	−0.006	0.004	0.002	−0.020
	(0.147)	(1.123)	(0.669)	(−0.409)	(0.821)	(1.211)	(1.361)	(1.075)	(−0.591)	(0.283)	(0.141)	(−0.982)
Fiscal balance $(t-1)$	−0.061	−0.020	0.049	0.039	−0.108*	−0.030	0.089	0.079	−0.075	−0.029	0.008	−0.027
	(−1.337)	(−0.295)	(0.658)	(0.527)	(−1.671)	(−0.313)	(0.801)	(0.696)	(−1.079)	(−0.340)	(0.082)	(−0.225)
Crisis index $(t-1)$	2.046***	2.620***	3.459***	3.712***	1.887***	1.799*	3.852***	4.023***	1.705	3.076**	2.904*	3.267*
	(3.566)	(3.560)	(4.006)	(3.897)	(3.038)	(1.916)	(3.708)	(3.871)	(1.593)	(2.388)	(1.864)	(1.807)
Constant	3.481***	6.229***	7.270***	6.353***	3.282*	10.195***	12.899***	11.029***	2.658**	4.368***	6.888***	6.352***
	(4.810)	(6.460)	(6.451)	(5.202)	(1.884)	(4.130)	(4.528)	(3.896)	(2.233)	(2.865)	(3.801)	(2.899)

Table 5. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.608	0.619	0.613	0.646	0.741	0.648	0.686	0.731	0.507	0.600	0.537	0.567
Number of observations	395	437	453	463	239	260	271	274	156	177	182	189
Chi-squared statistic	556.725	598.248	613.851	823.698	647.812	456.159	565.118	710.668	148.222	247.751	197.210	231.948
Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.
Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6. Model 1, fiscal balance with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Fiscal balance $(t-1)$	0.471***	0.465***	0.465***	0.457***	0.298***	0.317***	0.318***	0.331***	0.864***	0.681***	0.689***	0.643***
	(9.511)	(10.502)	(10.605)	(10.406)	(5.032)	(5.676)	(5.772)	(5.948)	(9.582)	(9.240)	(9.363)	(8.626)
Fiscal balance $(t-2)$	0.306***	0.320***	0.321***	0.339***	0.392***	0.399***	0.400***	0.401***	−0.016	0.087	0.098	0.167**
	(6.948)	(7.874)	(8.005)	(8.517)	(7.390)	(7.823)	(7.979)	(7.953)	(−0.207)	(1.313)	(1.467)	(2.489)
Hard peg $(t-1)$	0.340	0.372	0.286	0.268	0.783	0.798*	0.781*	0.706	0.407	0.532	0.264	0.240
	(1.212)	(1.413)	(1.124)	(1.040)	(1.417)	(1.650)	(1.652)	(1.471)	(1.125)	(1.063)	(0.596)	(0.555)
Adjustable peg $(t-1)$	0.424**	0.387**	0.379**	0.325*	0.133	0.269	0.268	0.254	0.584	0.474	0.440	0.218
	(2.088)	(2.045)	(2.027)	(1.741)	(0.510)	(1.088)	(1.105)	(1.030)	(1.597)	(1.094)	(1.070)	(0.565)
Narrow float $(t-1)$	0.457*	0.391*	0.383*	0.305	0.637**	0.563**	0.559**	0.435*	−0.306	−0.560	−0.433	−0.367
	(1.867)	(1.719)	(1.748)	(1.383)	(2.226)	(2.114)	(2.187)	(1.693)	(−0.571)	(−0.853)	(−0.715)	(−0.622)
Trade openness $(t-1)$	0.483***	0.431***	0.433***	0.389***	0.772***	0.683***	0.674***	0.618***	0.090	0.081	0.295	0.194
	(3.058)	(2.920)	(2.990)	(2.657)	(3.655)	(3.549)	(3.578)	(3.253)	(0.204)	(0.139)	(0.555)	(0.375)
Term of trade $(t-1)$	0.002	0.002	0.002	0.002	−0.005	−0.005	−0.005	−0.007	0.002	0.001	0.002	0.002
	(0.882)	(0.950)	(1.023)	(1.059)	(−0.550)	(−0.603)	(−0.674)	(−0.920)	(0.730)	(0.618)	(0.797)	(0.996)
Real GDP growth $(t-1)$	0.030**	0.035***	0.035***	0.038***	0.076***	0.063***	0.062***	0.067***	0.025*	0.031**	0.030**	0.031**
	(2.368)	(3.054)	(3.158)	(3.389)	(2.825)	(2.626)	(2.725)	(2.960)	(1.721)	(2.333)	(2.285)	(2.319)
US T-bill rate $(t-1)$	−0.000	0.000	0.000	0.001	−0.002	0.000	0.001	0.001	0.003	0.001	0.001	0.003
	(−0.087)	(0.081)	(0.065)	(0.426)	(−0.425)	(0.138)	(0.152)	(0.225)	(0.665)	(0.351)	(0.286)	(0.731)
Inflation $(t-1)$	−0.005	−0.001	−0.000	−0.002	−0.005	−0.001	−0.001	−0.002	0.015	−0.003	0.001	−0.001
	(−0.420)	(−0.231)	(−0.023)	(−0.434)	(−0.311)	(−0.156)	(−0.104)	(−0.370)	(0.885)	(−0.227)	(0.097)	(−0.141)
Crisis index (t-1)	0.083	0.219	0.234	0.124	0.196	0.329	0.373	0.144	−0.288	−0.118	−0.166	−0.050
	(0.279)	(0.779)	(0.868)	(0.467)	(0.508)	(0.884)	(1.073)	(0.416)	(−0.629)	(−0.289)	(−0.402)	(−0.120)
Constant	−1.177***	−1.172***	−1.190***	−1.113***	−1.018	−0.878	−0.834	−0.522	−0.882*	−0.960*	−1.091**	−0.964*
	(−3.295)	(−3.678)	(−3.810)	(−3.539)	(−0.963)	(−0.940)	(−0.938)	(−0.589)	(−1.763)	(−1.710)	(−2.090)	(−1.857)

Table 6. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.843	0.849	0.848	0.846	0.816	0.819	0.819	0.815	0.893	0.888	0.887	0.882
Number of observations	374	410	423	432	226	245	253	256	148	165	170	176
Chi-squared statistic	1940.925	2234.548	2288.436	2312.477	950.514	1052.921	1088.456	1078.315	1133.003	535.032	638.700	721.910
Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.
Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 7. Model 2, M2 growth with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
M2 growth $(t-1)$	0.374***	0.383***	0.388***	0.400***	0.461***	0.408***	0.409***	0.427***	0.250***	0.281***	0.302***	0.313***
	(9.362)	(11.305)	(11.669)	(12.171)	(8.774)	(11.031)	(11.007)	(12.012)	(3.754)	(4.170)	(4.534)	(4.721)
Hard peg $(t-1)$	−6.930***	−5.859***	−4.655**	−4.834**	−6.619***	−5.488**	−5.442**	−6.164**	−8.273***	−6.308**	−3.744	−3.289
	(−4.186)	(−3.263)	(−2.562)	(−2.537)	(−2.609)	(−2.120)	(−1.981)	(−2.137)	(−2.976)	(−2.040)	(−1.228)	(−1.038)
Adjustable peg $(t-1)$	−1.449	−1.050	−0.609	−0.416	−2.411	−3.647**	−3.081*	−3.366**	1.836	4.228	5.097*	6.217**
	(−1.160)	(−0.784)	(−0.445)	(−0.292)	(−1.620)	(−2.368)	(−1.918)	(−1.998)	(0.634)	(1.456)	(1.741)	(2.125)
Broad float $(t-1)$	−0.861	−1.609	−0.898	−0.817	−1.729	−3.176**	−2.562*	−2.886**	2.282	1.530	2.423	3.124
	(−0.770)	(−1.345)	(−0.741)	(−0.650)	(−1.327)	(−2.352)	(−1.843)	(−1.989)	(1.026)	(0.647)	(1.020)	(1.288)
Trade openness $(t-1)$	−0.511	−0.497	−0.709	−0.751	−0.352	−0.255	−0.776	−0.916	6.133**	4.296	3.199	2.875
	(−0.634)	(−0.554)	(−0.768)	(−0.775)	(−0.376)	(−0.254)	(−0.734)	(−0.828)	(2.118)	(1.334)	(0.987)	(0.862)
Term of trade $(t-1)$	−0.000	−0.004	−0.005	−0.008	−0.024	−0.028	−0.018	−0.010	0.005	−0.000	−0.002	−0.004
	(−0.035)	(−0.299)	(−0.333)	(−0.506)	(−0.582)	(−0.625)	(−0.412)	(−0.205)	(0.341)	(−0.018)	(−0.105)	(−0.222)
Real GDP growth $(t-1)$	0.218***	0.058	0.011	0.006	0.270**	0.194	0.045	−0.013	0.158*	0.017	−0.009	0.019
	(3.167)	(0.813)	(0.147)	(0.081)	(2.046)	(1.516)	(0.345)	(−0.100)	(1.676)	(0.174)	(−0.085)	(0.182)
US T-bill rate $(t-1)$	0.010	−0.004	−0.007	−0.013	0.001	−0.003	−0.006	−0.008	0.017	−0.011	−0.008	−0.016
	(0.625)	(−0.259)	(−0.375)	(−0.709)	(0.037)	(−0.174)	(−0.293)	(−0.416)	(0.577)	(−0.326)	(−0.249)	(−0.471)
Fiscal balance $(t-1)$	−0.254**	−0.323***	−0.327***	−0.342***	−0.314*	−0.398**	−0.314*	−0.263	−0.413**	−0.542**	−0.588***	−0.669***
	(−2.234)	(−2.671)	(−2.625)	(−2.634)	(−1.826)	(−2.208)	(−1.659)	(−1.329)	(−1.968)	(−2.560)	(−2.758)	(−3.069)
Crisis index $(t-1)$	3.406**	3.603**	4.887***	4.119**	3.349**	3.209*	5.859***	4.671**	2.282	3.457	3.403	3.538
	(2.163)	(2.174)	(2.952)	(2.440)	(1.967)	(1.768)	(3.234)	(2.479)	(0.758)	(1.127)	(1.086)	(1.143)
Constant	8.568***	9.990***	9.890***	10.187***	9.490**	12.277***	12.098**	11.793**	4.048	5.691	5.525	5.246
	(4.330)	(4.741)	(4.599)	(4.556)	(2.130)	(2.661)	(2.557)	(2.420)	(1.136)	(1.483)	(1.451)	(1.333)

Table 7. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.321	0.328	0.322	0.331	0.415	0.462	0.444	0.460	0.304	0.255	0.241	0.250
Number of observations	395	437	453	463	239	260	271	274	156	177	182	189
Chi-squared statistic	181.701	207.588	210.374	223.553	161.533	213.696	207.904	223.637	63.266	56.851	54.374	59.324
Degrees of freedom	10	10	10	10	10	10	10	10	10	10	10	10

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.

Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 8. Model 2, inflation with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Inflation (t − 1)	0.502***	0.485***	0.529***	0.596***	0.626***	0.462***	0.567***	0.608***	0.379***	0.510***	0.477***	0.547***
	(18.868)	(20.890)	(22.172)	(24.301)	(18.805)	(15.423)	(17.575)	(19.857)	(6.909)	(9.593)	(8.867)	(8.600)
Inflation (t − 2)	−0.010***	−0.019***	−0.022***	−0.024***	−0.013***	−0.017***	−0.023***	−0.024***	0.006	−0.018	−0.014	0.008
	(−5.824)	(−9.979)	(−9.991)	(−10.126)	(−8.137)	(−8.197)	(−9.583)	(−10.005)	(0.189)	(−0.418)	(−0.272)	(0.140)
Hard peg (t − 1)	−3.407***	−4.098***	−3.847***	−3.874***	−3.207***	−5.126***	−5.199***	−5.174***	−3.952***	−3.837***	−3.502**	−3.568**
	(−5.536)	(−4.714)	(−3.984)	(−3.622)	(−3.308)	(−3.794)	(−3.216)	(−3.151)	(−4.063)	(−3.023)	(−2.350)	(−1.986)
Adjustable peg (t − 1)	−0.837*	−1.505**	−1.727**	−1.159	−0.697	−2.520***	−1.413	−1.315	0.038	−0.402	−1.208	0.278
	(−1.785)	(−2.348)	(−2.369)	(−1.450)	(−1.250)	(−3.150)	(−1.512)	(−1.385)	(0.038)	(−0.333)	(−0.835)	(0.165)
Broad float (t − 1)	−0.806*	−2.065***	−1.950***	−1.829***	−0.405	−2.558***	−1.473*	−1.341*	−0.141	−1.446	−1.829	−1.927
	(−1.942)	(−3.653)	(−3.034)	(−2.584)	(−0.832)	(−3.680)	(−1.836)	(−1.652)	(−0.175)	(−1.441)	(−1.528)	(−1.372)
Trade openness (t − 1)	−0.654**	−1.356***	−1.850***	−1.712***	−0.403	−1.026**	−1.710***	−1.604***	1.777*	−0.048	−1.883	−2.153
	(−2.140)	(−3.060)	(−3.729)	(−3.123)	(−1.157)	(−1.986)	(−2.804)	(−2.592)	(1.744)	(−0.036)	(−1.170)	(−1.107)
Term of trade (t − 1)	0.002	−0.005	−0.011	−0.011	−0.012	−0.019	−0.057**	−0.043	0.001	−0.004	−0.009	−0.011
	(0.326)	(−0.851)	(−1.443)	(−1.259)	(−0.816)	(−0.823)	(−2.193)	(−1.640)	(0.254)	(−0.564)	(−1.035)	(−0.979)
Real GDP growth (t − 1)	0.001	0.001	−0.003	−0.008	0.111**	0.006	0.017	−0.022	−0.033	−0.008	−0.002	−0.014
	(0.037)	(0.037)	(−0.068)	(−0.195)	(2.452)	(0.091)	(0.229)	(−0.296)	(−0.887)	(−0.174)	(−0.034)	(−0.209)
US T-bill rate (t − 1)	0.001	0.008	0.004	−0.005	0.005	0.010	0.014	0.011	−0.007	0.002	0.000	−0.022
	(0.167)	(1.004)	(0.481)	(−0.473)	(0.806)	(1.117)	(1.296)	(1.021)	(−0.643)	(0.165)	(0.002)	(−1.084)
Fiscal balance (t − 1)	−0.051	0.001	0.072	0.050	−0.119*	−0.099	0.050	0.045	−0.063	0.024	0.078	0.030
	(−1.180)	(0.024)	(1.065)	(0.671)	(−1.817)	(−1.023)	(0.446)	(0.393)	(−0.849)	(0.272)	(0.739)	(0.237)
Crisis index (t − 1)	2.205***	2.826***	3.699***	3.913***	1.965***	2.257**	4.188***	4.294***	1.771*	3.119**	3.015*	3.235*
	(3.823)	(3.825)	(4.256)	(4.123)	(3.174)	(2.441)	(4.038)	(4.125)	(1.668)	(2.442)	(1.949)	(1.800)
Constant	3.690***	6.738***	7.811***	7.022***	3.075*	8.172***	11.540***	9.721***	2.873**	5.331***	8.231***	7.601***
	(4.937)	(6.966)	(6.884)	(5.578)	(1.850)	(3.417)	(4.138)	(3.499)	(2.243)	(3.329)	(4.326)	(3.302)

Table 8. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.610	0.628	0.619	0.649	0.741	0.654	0.684	0.729	0.507	0.605	0.542	0.572
Number of observations	395	437	453	463	239	260	271	274	156	177	182	189
Chi-squared statistic	590.775	673.318	706.637	835.350	649.273	468.347	561.558	706.041	147.963	252.842	201.533	236.293
Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.
Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 9. Model 2, fiscal balance with inflation thresholds

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Fiscal balance (t − 1)	0.470***	0.464***	0.463***	0.456***	0.303***	0.320***	0.320***	0.332***	0.869***	0.687***	0.692***	0.661***
	(9.447)	(10.432)	(10.535)	(10.354)	(5.052)	(5.669)	(5.762)	(5.941)	(9.509)	(9.232)	(9.336)	(8.796)
Fiscal balance (t − 2)	0.308***	0.323***	0.325***	0.342***	0.399***	0.406***	0.407***	0.406***	−0.017	0.090	0.098	0.174**
	(6.998)	(7.949)	(8.085)	(8.598)	(7.435)	(7.895)	(8.053)	(8.017)	(−0.209)	(1.341)	(1.459)	(2.569)
Hard peg (t − 1)	0.392	0.402	0.307	0.259	0.652	0.750	0.735	0.681	0.309	0.457	0.183	0.057
	(1.269)	(1.403)	(1.112)	(0.926)	(1.139)	(1.514)	(1.514)	(1.386)	(0.739)	(0.857)	(0.375)	(0.133)
Adjustable peg (t − 1)	0.482**	0.424*	0.407*	0.321	0.161	0.340	0.331	0.316	0.493	0.408	0.354	0.105
	(2.012)	(1.930)	(1.889)	(1.492)	(0.467)	(1.088)	(1.091)	(1.026)	(1.141)	(0.815)	(0.742)	(0.258)
Broad float (t − 1)	0.244	0.192	0.178	0.101	0.257	0.287	0.274	0.230	−0.189	−0.173	−0.202	−0.262
	(1.174)	(1.004)	(0.961)	(0.539)	(0.882)	(1.090)	(1.088)	(0.907)	(−0.560)	(−0.443)	(−0.543)	(−0.792)
Trade openness (t − 1)	0.418***	0.378***	0.382***	0.350**	0.646***	0.582***	0.573***	0.540***	0.133	0.141	0.347	0.253
	(2.710)	(2.597)	(2.664)	(2.417)	(3.034)	(2.936)	(2.968)	(2.777)	(0.308)	(0.254)	(0.663)	(0.555)
Term of trade (t − 1)	0.002	0.002	0.002	0.002	−0.009	−0.009	−0.009	−0.010	0.002	0.001	0.002	0.003
	(0.814)	(0.895)	(0.976)	(1.028)	(−1.002)	(−1.019)	(−1.040)	(−1.213)	(0.695)	(0.613)	(0.764)	(1.095)
Real GDP growth (t − 1)	0.030**	0.035***	0.035***	0.037***	0.070***	0.058**	0.057**	0.062***	0.024*	0.031**	0.029**	0.031**
	(2.328)	(3.017)	(3.094)	(3.314)	(2.577)	(2.436)	(2.489)	(2.777)	(1.683)	(2.331)	(2.255)	(2.351)
US T-bill rate (t − 1)	−0.001	−0.000	−0.000	0.001	−0.002	0.000	0.000	0.001	0.003	0.001	0.001	0.003
	(−0.240)	(−0.043)	(−0.021)	(0.340)	(−0.504)	(0.049)	(0.134)	(0.217)	(0.698)	(0.360)	(0.282)	(0.675)
Inflation (t − 1)	−0.006	−0.001	−0.000	−0.002	−0.010	−0.001	−0.001	−0.003	0.017	−0.002	0.001	0.000
	(−0.498)	(−0.242)	(−0.041)	(−0.464)	(−0.587)	(−0.207)	(−0.208)	(−0.446)	(0.939)	(−0.165)	(0.125)	(0.038)
Crisis index (t − 1)	0.040	0.175	0.195	0.105	0.086	0.228	0.277	0.083	−0.330	−0.150	−0.187	−0.073
	(0.133)	(0.621)	(0.719)	(0.391)	(0.222)	(0.610)	(0.795)	(0.239)	(−0.728)	(−0.364)	(−0.453)	(−0.172)
Constant	−1.157***	−1.149***	−1.159***	−1.063***	−0.381	−0.398	−0.407	−0.186	−0.815	−0.933	−1.045*	−0.846
	(−3.076)	(−3.465)	(−3.571)	(−3.255)	(−0.372)	(−0.430)	(−0.464)	(−0.213)	(−1.498)	(−1.589)	(−1.877)	(−1.636)

Table 9. (*Continued*)

	Full sample				Emerging markets				Developing countries			
	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50	Threshold: 20	Threshold: 30	Threshold: 40	Threshold: 50
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R-squared (overall)	0.842	0.848	0.847	0.846	0.813	0.816	0.816	0.814	0.893	0.889	0.887	0.883
Number of observations	374	410	423	432	226	245	253	256	148	165	170	176
Chi-squared statistic	1927.645	2221.761	2274.536	2301.968	928.313	1035.145	1068.995	1067.372	1132.893	586.636	650.312	980.603
Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11

Notes: All models are estimated using Panel OLS models with fixed effects. T-statistics are provided in parentheses below the coefficients. Models 1 and 2 use specifications of floating rates that respectively exclude (narrow) or include (broad) managed floats in the floating rate dummy variable. All varieties of crawling rates are combined (with managed floats, in Model 1 estimations) into an "Other Regimes" variable and dropped from the analysis to avoid matrix singularity.

Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

and flexible rates. The disciplinary advantage of hard fixes over soft pegs is not a trivial one; money growth and inflation are decreased by hard peg regimes by between 3 and 5% more than by adjustable peg regimes. While soft pegs do increase the long run costs of expansionary macroeconomic policies by increasing the risk of future depreciation, they also increase the short run benefits of such expansions, so that there is no general theoretical prediction about whether adjustable pegs or flexible rates would be more inflation prone. While higher time discount rates increase time-inconsistency problems and hence the need for disciplinary mechanisms, they also reduce the effectiveness of soft pegs as a technology to provide such discipline. Our empirical results find that contrary to what is often offered flexible rates tend to provide more monetary discipline than do adjustable pegs.

As we expected, we find little difference in fiscal discipline across exchange rate regimes. Our overall conclusion is that only hard fixes provide a reliable external source of discipline – and that only over monetary policy. Hard fixes make sense only for countries that can sufficiently closely meet the conditions delineated in the literature on optimum currency areas. While there is scope for disagreement about just how many countries meet these criteria sufficiently well, it seems clear that a majority of countries do not. Thus, proposals for most countries to adopt hard fixes to establish monetary discipline are not advisable.[26] Overall for most countries the search for institutional mechanism to provide monetary and fiscal discipline should focus on internal measures such as inflation targeting and limitations on the size of budget deficits.

Notes

[1] See, for example, the analysis and references in Alesina *et al.* (1997), Drazen (2000), Willett (1988) and Willett and Keil (2004).

[2] See Tavlas *et al.* (2008), Klein and Shambaugh (2010) and Rose (2010) for recent general reviews and Ghosh *et al.* (2002) on inflation; De Grauwe and Schnabl (2008); Rogoff *et al.* (2003); Levy-Yeyati and Sturzenegger (2003); Eichengreen and Leblang (2003) on growth; Kaminsky and Reinhart (1999); Eichengreen and Rose (2000); Husain *et al.* (2005); Angkinand *et al.* (2009); Angkinand and Willett (2011) on crises.

[3] High income countries are often excluded from such analyses because of their general low inflation rates.

[4] Rose (2010) expresses skepticism about the robustness of the results of such studies.

[5] An important exception is Bleaney and Francisco (2005), who do distinguish between hard and soft pegs and find that only the former have significant effects on many growth and inflation in a large sample of developing countries. We find similar results for a somewhat different set of countries and time period and also explore effects on fiscal policy. Bleaney and Fielding (2002) distinguish between unilateral and coordinated pegs and find much lower inflation with the latter. Levy-Yeyati and Sturzenegger (2001) distinguish between short duration pegs and those that are held for at least five years and find that only the latter have significant effects on lowering inflation. A few studies such as Edwards (2003) look only at hard fixes, which is perfectly legitimate, but does not give us information on the comparative behaviour of soft pegs. Ghosh *et al.* (2002) and Jackson and Miles (2008) also present separate results for hard and some types of soft fixes as robustness checks, but do not emphasize these results nor provide any discussion of why we would expect substantial differences in the effects of these different types of regimes.

[6] See, for example, Angkinand *et al.* (2009), Willett (2007) and Fischer (2001).

[7] See Willett and Mullen (1982), Rogoff (1985) and Willett (1998).

[8] See Willett *et al.* (2008).

[9] See Andrews and Willett (1997), Tornell and Velasco (1998, 2000) and Willett (2000). For a more detailed discussion of the role of capital mobility in the context of macroeconomic discipline mechanisms, see Willett *et al.* (2008).

[10] See Willett *et al.* (2008) and Killeen *et al.* (2006).

[11] For a substantial discussion of this issue see Klein and Shambaugh (2010).

[12] Three of the four cases of changes in exchange rate regimes that Miles considers, for instance, Mexico in 1994–1995, Philippines and Thailand in 1997–1998, switched their regimes as a result of severe currency crises that lead to substantial increases in inflation. Miles notes this problem but for the Asian countries he deletes only 1997, comparing 1994–1996 with 1998–2000. Substantial effects from the crisis were still being felt in 1998, however, thus contaminating his analysis. Another problem with this study is the use of LYS's classifications of exchange rate regimes. These have some severe problems (see Willett *et al.* 2011). For example, Mexico is classified as having a fixed rate in 1994 (their methodology does not allow the distinction between hard and soft fixes) when it had a crawling band and as having intermediate regimes in 1995 and 1996 when it had gone to a flexible rate.

[13] Of course when this is done the remaining category of non-free falling floating rates is associated with much better macroeconomic performance and a critic could argue that this is just a biased way of making floating look better, but we believe that there are solid reasons for limiting our analysis to countries with moderate inflation rates.

[14] See Husain *et al.* (2005) and Rogoff *et al.* (2003).

[15] In cases where the government is too politically weak to effectively control fiscal policy, the incentive issues first discussed become substantially weakened, if not entirely moot. Under such circumstances, the only form of external discipline that would have any chance of working would be the hardest of fixes. Likewise, without fundamental reforms just legislating central bank independence and/or inflation targeting would have little chance of succeeding.

[16] There are interesting issues, in circumstances of very high inflation rates, concerning whether using exchange rate regimes as nominal anchors can help bring inflation under control faster, but addressing this type of question requires different types of testing than the standard approaches to testing the long run discipline effects of alternative exchange rate regimes and it is this latter question that we are addressing.

[17] Some studies such as Fielding and Bleaney (2000) and Klein and Shambaugh (2010) attempt to distinguish between the narrow effects of discipline in terms of reduced rates of money growth and additional short run credibility effects from changes in inflation given the rate of money growth by including money growth in inflation equations. Because of the potential variability of velocity – which can affect the rate of money growth leading to a particular rate of inflation – and the possibility that monetary authorities attempt to take such changes into account, we treat money growth and inflation as two alternative broad measures of monetary discipline and do not attempt to distinguish credibility effects. We believe that the latter is better done via detailed studies of particular episodes. Our data for the fiscal balance and the US Treasury bill interest rate were obtained from the International Monetary Fund's International Financial Statistics (IFS). With the exception of the crisis index, all other variables were obtained from the World Bank's World Development Indicators (WDI). Data on terms of trade were obtained from WDI, but augmented where necessary with data from IFS. For more discussions on the crisis index, see Chiu and Willett (2009).

[18] Some argue a better measure would be the cyclically adjusted *primary* fiscal balance; however, this variable was not readily available for the full sample since a number of countries do not report interest payments.

[19] For more details on how the adjustment is done, see Dechsakulthorn (2007).

[20] For descriptions and evaluations of these alternative classification schemes, see the analysis and references in Willett *et al.* (2011).

[21] This differs from Bleaney and Francisco who include crawling pegs and bands in their soft peg groups. We choose to focus on our analysis on the difference between hard and adjustable pegs since the theoretical considerations related to crawling pegs and bands are less clear-cut.

[22] The IMF classification designates three categories of floats, determined in part by staff judgments about how heavily they are managed. It is not clear a priori whether for our purposes the IMF's middle category of floating, labelled "managed floating" would more appropriately be included in our floating group or in our "other" group. Thus as a robustness check we estimate it both ways, including it as a float regime in our "broad float" category and excluding it from our "narrow float" category (which includes only those regimes classified by the IMF as independent floats).

[23] It should be noted that while our theoretical sections take a broad view, our empirical study is necessarily narrow in scope, focusing almost exclusively on the differences in the effects of hard and soft pegs on

discipline. For example, while capital mobility is presented in the theory section as an important part of the exchange rate regime/discipline story, it is not included as a part of our empirical analysis. Inflation targeting and central bank independence are two more examples of factors which can certainly be expected to matter in studies of this kind, yet which we do not include in the analysis presented herein. Since our purpose in this paper is to emphasize that there is an important difference between the effects of hard and soft pegs, the empirical treatment of the aforementioned factors in the context of exchange rate regimes and discipline has accordingly been set aside for future research.

[24] A more recent study by Alfaro (2005), however, does not find a negative effect of openness on inflation when measures of exchange rate regimes are included. She finds that fixed rates are associated with lower inflation, but does not distinguish between hard and soft fixes.

[25] We do find some negative and significant effects for trade openness on inflation particularly in emerging markets using various inflation thresholds.

[26] Recent example of such proposals includes Hausmann *et al.* (2000) and Steil and Litan (2006). For a recent set of analyses of the dollarization debate, see Salvatore *et al.* (2003).

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Appendix A: Country List

31 Emerging economies	Argentina	Latvia
	Bolivia	Lithuania
	Brazil	Malaysia
	Chile	Mexico
	China	Morocco
	Colombia	Pakistan
	Czech Republic	Peru
	Egypt	Philippines
	Estonia	Poland
	Hong Kong	Russia
	Hungary	Singapore
	India	South Africa
	Indonesia	Thailand
	Israel	Turkey
	Jordan	Venezuela
	Korea	
32 Developing economies	Algeria	Nepal
	Bahrain	Nigeria
	Bangladesh	Panama
	Belarus	Paraguay
	Botswana	Romania
	Bulgaria	Slovakia
	Cameroon	Slovenia
	Costa Rica	Sri Lanka
	Côte d'Ivoire	Syria
	Ecuador	Tanzania
	El Salvador	Tunisia
	Ghana	Ukraine
	Kazakhstan	Uruguay
	Kenya	Vietnam
	Lebanon	Yemen, Republic of
	Macedonia, FYR	Zimbabwe

Note: Emerging countries are those that are included in the 2005 Morgan Stanley Capital International (MSCI) index, but not identified as developed economies (Hong Kong and Singapore are the exceptions). Taiwan, an emerging economy, is excluded from the sample because of its data unavailability. Bolivia, Estonia, Latvia and Lithuania are also the exceptions and are included here as emerging-market economies.

Appendix B: Variable Descriptions

Monetary discipline: M2 Growth is measured both as the growth rates of monetary aggregates. Data is obtained from International Financial Statistics (IFS).

Inflation growth: is reflected by changes in the Consumer Price Index (CPI). Data is obtained from International Financial Statistics (IFS).

Fiscal discipline: is the cyclically adjusted fiscal balance, which controls for the effects of macroeconomic fluctuations (CAB). The cyclical adjusted balance is measured as the fiscal balance adjusted to output growth, then divided by GDP and multiplied by 100. Data is obtained from International Financial Statistics (IFS).

Exchange Rate Regimes: We use the classification of exchange rate regimes from the IMF de facto exchange rate regime classifications, compiled by Bubula and Otker-Robe (2003). The exchange rate regimes are divided into thirteen categories: (1) dollarization, (2) currency unions, (3) currency boards, (4) conventional fixed peg to a single currency, (5) conventional fixed peg to a basket, (6) horizontal band, (7) forward looking crawling peg, (8) backward looking crawling peg, (9) forward looking crawling band, (10) backward looking crawling band, (11) tightly managed floating, (12) other managed floating with no predetermined exchange rate path and (13) freely floating rates. Based on these thirteen categories, we regroup them into a five-way classification scheme in this paper: *hard pegs (1–3), adjustable pegs (4–6), other regimes (7–10) and flexible regimes (11–13)*.

Trade Openness: is measured by a ratio of imports and exports to GDP. Data is obtained from International Financial Statistics (IFS).

Terms of trade: Data is obtained both from International Financial Statistics (IFS) and World Development Indicators (WDI).

Real GDP growth: Data is obtained both from International Financial Statistics (IFS) and World Development Indicators (WDI).

Changes in US 3-month Treasury bill interest rate: Data is obtained both from International Financial Statistics (IFS) and World Development Indicators (WDI).

Currency Crisis Index: The crisis index is measured by exchange market pressure indices, which are computed based on the weighted averages of domestic currency depreciation or appreciation, changes in international reserves, and changes in interest rates. We use an equally-weighted index and employ a two standard deviation threshold for crisis identification.