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ABSTRACT

The relevance of the exchange rate regime for macroeconomic performance remains a key issue in international macroeconomics. We use a comprehensive dataset covering nine regime-types for one hundred forty countries over thirty years to examine the link between the regime, inflation, and growth. Two sturdy stylized facts emerge. First, inflation is both lower and more stable under pegged regimes, reflecting both slower money supply and faster money demand growth. Second, real volatility is higher under pegged regimes. In contrast, growth varies only slightly across regimes, though investment is somewhat higher and trade growth somewhat lower under pegged regimes. Pegged regimes are thus characterized by lower inflation but more pronounced output volatility.

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1 Introduction

Few questions in international economics have aroused more debate than the choice of the nominal exchange rate regime.[1] Yet, to date, little consensus has emerged on the link between the exchange rate regime and macroeconomic performance. At a theoretical level, it is difficult to establish unambiguous relationships because of the many - partly offsetting, partly reinforcing - links between the nominal exchange rate regime and macroeconomic variables. To cite just two examples from the burgeoning literature, fixed exchange rates have been argued to foster output and trade growth by reducing exchange rate uncertainty, but also to reduce trade and output growth by impeding necessary relative price adjustments; they have been argued to reduce inflation by creating a visible gauge of discipline, but also to raise inflation by making it easier to shift the costs of "cheating" to future governments. Further progress seems unlikely until a better understanding of the relative *empirical* importance of the various linkages is obtained, the objective of this paper.

We focuses on two key macroeconomic targets: inflation and growth. The paper goes beyond previous work in three important respects. First, the data set is both more comprehensive - covering some 140 countries over the thirty year period 1960-90 - and more detailed, using up to nine exchange rate regime types in preference to forcing all regimes into the "fixed versus flexible" dichotomy. Second, we distinguish between the *de jure* and the *de facto* regime by combining stated intentions with actual exchange rate behavior. Third, we allow for inflation and growth themselves to influence the choice of exchange rate regime.

We find fixed exchange rate regimes to be associated with lower and less variable inflation, reflecting both a lower rate of monetary growth (consistent with models predicting greater central bank *discipline* under pegged rates) and a lower growth rate of residual velocity *given* monetary growth (consistent with models predicting *credibility* to be higher under pegged rates). We also find a strong negative link between the flexibility of the nominal exchange rate regime and the volatility of output and employment: lower inflation in countries operating under pegs comes at the cost of higher real volatility. In contrast,

[1] See Nurkse (1944), Friedman (1953) and Johnson (1969) for some of the classical discussions. The literature remains very active, recent studies providing surveys include Argy (1990), Dornbusch and Giovannini (1990), Edwards (1989), Flood and Rose (1993), Frenkel et al. (1991), Helpman (1981), Krugman (1989), Marston (1988), Obstfeld (1985) and Williamson (1982).

we find only a weak link between the exchange rate regime and (per capita) output *growth*, reflecting the combination of somewhat higher investment ratios under pegged regimes and somewhat higher residual productivity and trade growth under flexible rate regimes.

In the next section, we discuss some of the issues involved in classifying exchange rate regimes. In section 3 we discuss the link between the exchange rate regime and inflation performance. Section 4 presents results of a battery of robustness tests intended to address concerns about classification of the exchange rate regime; reverse causality; and possible contamination across regimes. Section 5 discusses inflation and reserves volatility. Sections 6-8 present analogous results for the relationship between the exchange rate regime and output growth. Section 9 provides some brief concluding remarks.

2 Classifying Exchange Rate Regimes

Two options are available in classifying regimes: a *de jure* classification based on the publicly stated commitment of the central bank and a *de facto* classification based on the observed behavior of the exchange rate. Neither method is entirely satisfactory. The de facto classification has the obvious advantage of being based upon observable behavior, but it does not allow a distinction between stable nominal exchange rates resulting from an absence of shocks and stability that results from policy actions offsetting shocks. As such, it fails to capture what is perhaps the very essence of an exchange rate regime, the commitment of the central bank to intervene in, and subordinate its monetary policy to, the foreign exchange market. The de jure classification captures this formal commitment, but fails to control for actual policies inconsistent with the commitment, leading , in the case of pegged regimes, either to a collapse or frequent changes of parity transforming a de jure peg into a de facto float.

We adopt a combination of the two approaches. While our primary classification is based on the stated commitment of the central bank (as summarized in the IMF's Annual report on Exchange Arrangements and Exchange Restrictions), we report, as part of the robustness checks, a secondary classification in which the pegged regimes are divided into "frequent" and "infrequent" adjusters, the former being defined as all regimes with more than one change per year in either parity or, for basket pegs, in the weights.

A second issue arises with respect to the fineness of the regime classification. While

it is customary to speak of "fixed" and "floating" regimes, actual arrangements are quite diverse, ranging from pegs, to target zones, to floats with heavy, light, or no intervention. Furthermore, it seems not unreasonable to expect significant behavioral difference between, say, single currency pegs and cooperative arrangements like the EMS within the fixed category, or between floats with heavy intervention and pure floats within the flexible category, suggesting that forcing all regimes into either the fixed or the flexible category may mask important differences. To avoid a surfeit of statistics for a highly disaggregated classification, we will stick with a fairly aggregated three-way classification for our main results, but examine whether a finer classification yields additional insights in the sections checking for robustness of results. The three-way classification is based on aggregating this finer nine-way grouping into the three categories of *pegged*, *intermediate* and *floating* regimes. The *pegged* regimes consist of single currency pegs, SDR pegs, other published basket pegs, and secret basket pegs. The *intermediate* group consists of cooperative systems, unclassified floats, and floats within a pre-determined range. The *float* group consists of floats without a pre-determined range and pure floats.

3 Data

The full sample covers annual observations for one hundred and thirty-six countries over the period 1960-90. The regime classification, as stated above, is based primarily on the stated commitment of the central bank as summarized in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. In the robustness tests, we also employ a secondary grouping dividing the pegged and intermediate regime into frequent and infrequent adjusters, the former being defined as those years in which more than one adjustment in either the weights or the par values was undertaken in a country officially following a pegged regime.

The data for inflation, GDP growth and a range of additional controls, including broad money growth, short term nominal interest rates, the terms of trade, dollar exports, dollar imports, employment and the investment to GDP share were taken from the IMF World Economic Outlook database. Our control for regime choice endogeneity relies on a set of proxies for central bank independence developed by Cukierman [1992], including the turnover rate of the central bank governor, and three variables intended to measure the

legal aspects of central bank independence, relating to the appointment of the governor, monetary policy formulation, and lending limits of the central bank.

Data availability differs across countries; in particular, the controls for regime endogeneity are only available for a smaller subset of countries. To enable comparisons across tables, we report results for *consistent* samples, in consequence, the series with the fewest number of observations determines the sample size, leading to a sample of slightly less than one-thousand annual observations for both inflation (968) and growth (987).

4 Inflation

The predominant view in the sizable literature on exchange rate regimes and inflation is that pegged exchange rates - if accompanied by consistent macro policies - can be an important anti-inflationary tool.[2] Two reasons are typically cited. A pegged exchange rate provides a highly visible commitment and thus raises the political costs of excessive monetary growth. Moreover, to the extent that the peg is credible, money demand is likely to be more robust, thereby reducing the inflationary consequences of a *given* monetary expansion.

INFLATION PERFORMANCE

The top panel of Table 1 reports the average inflation rate over our sample of 968 observations. Inflation averaged 10.7 percent per year, with substantial differences across regimes: inflation averaged 8.4 percent in countries that had some form of exchange rate peg, 11.6 percent in countries that followed one of the intermediate exchange rate regimes, and 15.2 percent in countries with floating rates. These raw means are, however, subject to two potential biases. First, the pegged exchange rate regimes are more heavily concentrated in the low-inflation 1960s, whereas the flexible regime observations are predominant in the higher-inflation 1970s and 1980s. The shift from low inflation under pegged exchange rates to higher inflation under flexible rates may, of course, be causal — an issue we examine below — but equally, it might reflect nothing more than a greater prevalence of negative macroeconomic shocks in the latter period. Second, average inflation performance — particularly under floating exchange rates — might be skewed by a few hyperinflationary

[2]See Crockett and Goldstein (1976), Romer (1993), Quirk (1994). Svensson (1993) and Tornell and Velasco (1994) provide some counter-arguments.

episodes.

To address these potential biases, we transform the inflation rate by calculating a scaled measure, $\frac{\pi}{1+\pi}$ — which reduces the importance of outliers — and express individual observations in any given year as a deviation from the average inflation rate in that year for all regimes.[3] The bottom panel of Table 1 reports the relative inflation performance with these two adjustments. The bunching of pegged regime observations during the 1960s is not sufficient to explain the good inflation performance of pegged exchange rates, nor does reducing the role of outliers much improve the relative performance of flexible regimes: taking out the annual means, (scaled) inflation remains more than 5 percentage points lower under pegged exchange rates than under floating rates.

A simple money demand function provides a useful framework for understanding the factors underlying this difference in inflation performance across regimes:[4]

$$\frac{mv}{p} = y^{\alpha}\ i^{-\beta} \qquad \alpha, \beta > 0 \tag{1}$$

Where m is broad money, p is the consumer price index, y is real output, i is the nominal interest rate, and v is residual velocity controlling for interest and income effects. Taking logarithms and first differences, and re-arranging, yields an expression for inflation:

$$\pi = \Delta \log m - \alpha \Delta \log y + \beta \Delta \log i + \Delta \log v \tag{2}$$

Differences in inflation rates across regimes can thus arise from different growth rates of the money supply, interest rates, real GDP, or the residual velocity. Column [2] of Table 1 shows that part of the difference between pegged and more flexible regimes might indeed be attributable to lower monetary growth, indicative of greater monetary discipline under pegged exchange rates: whereas broad money growth averaged 15 percent per year under pegged rates, it averaged 19 percent under intermediate regimes, and 27 percent under floating regimes. Moreover, these differences persist when the growth rates are again measured relative to the annual average (bottom panel of Table 1).

[3] In the regressions reported below, year-dummies are used to take out these annual means.

[4] It bears emphasizing, however, that the basic findings do not depend upon the existence of a particular form for the money demand function.

Pegged exchange rates might also raise money demand by reducing uncertainty about monetary policy. In part, this is likely to be reflected in a decline of nominal interest rates (in the case of a perfectly credible peg, the domestic interest rate falls to "world" levels immediately). Falling nominal interest rates, in turn, are associated with rising money demand (as long as $\beta > 0$), and thus lower inflation, for a given growth rate of the money supply. The effect is, of course, temporary, ending when nominal rates have adjusted to their new equilibrium level. Empirically, interest rates in a sizable subset of our sample have been set administratively, impeding their interpretation as market rates. With this caveat, Table 1 suggests that nominal interest rates, while increasing over the sample for most countries, rose most in countries that did not peg their exchange rate, and thus, depending on the interest rate elasticity of money demand, may have influenced relative inflation performance. The distinction across regimes is, however, quite small once allowance for time effects is made (bottom panel). Given these data problems, credibility effects are probably only partially captured by the behavior of the nominal interest rate, raising the possibility of a *residual* credibility effect measured by differences in velocity growth controlling for interest rates and income movements ($\Delta \log v$).

To examine these issues more formally, we estimate two regressions. In the first, the inflation rate is regressed on two exchange rate regime dummies for the pegged (Peg) and intermediate (Int) regime, with the floating regime providing the excluded category. The other explanatory variables are annual dummies, output growth ($\Delta \log y$), the turnover of the central bank governor ($Turn$) and openness (measured as the ratio of exports plus imports to GDP), ($Open$). The turnover variable was found by Cukierman (1992) to be the single most important determinant of inflation in his study of various central bank independence proxies. The openness variable is included to proxy a variety of effects including the disciplinary effect imposed by the higher costs of monetary expansion in open economies [Romer (1993), Lane (1994)] and the strength of international arbitrage constraints.

The coefficient on the pegged exchange rate dummy is -0.05 (t-statistic: 4.9***); on the intermediate regime dummy the coefficient is -0.015 (t-statistic: 1.6*).[5] Pegged exchange rates are thus associated with 5 percentage points lower inflation (and intermediate regimes with 1.5 percentage points lower inflation) compared to floating regimes. Since

[5]Throughout the paper, the numbers in parentheses are t-statistics based on White standard errors. One, two and three asterisks denote significance at the 10, 5, and 1 percent levels respectively.

this regression does not include the money growth rate as an explanatory variable, the coefficient estimates on *Peg* and *Int* reflect *both* the credibility and the discipline effects of the exchange rate. To separate these two, we estimate a second regression also including the growth rates of broad money ($\Delta \log m$) and of interest rates ($\Delta \log i$), among the explanatory variables, obtaining:

$$\begin{array}{lcccc} \pi = & 0.112 & -0.018\ Peg & -0.006\ Int & -0.334\ \Delta \log y \\ & (12.80^{***}) & (2.74^{***}) & (0.96) & (3.86^{***}) \\ & +0.075\ Turn & -0.002\ Open & -0.014\ \Delta \log i & +0.386\ \Delta \log m \\ & (3.55^{***}) & (5.12^{***}) & (1.16) & (13.03^{***}) \end{array} \tag{3}$$

with an R^2 of 0.70. The results suggest that *ceteris paribus*, higher output growth and greater openness reduces inflation, while a faster turnover of the central bank governor increases inflation, as expected. Monetary growth rates are highly significant, while the interest rate term is insignificant. The coefficient on *Peg* now falls (in absolute value) to -0.018, but remains significant. Therefore, even *controlling* for monetary growth (and hence, roughly, for the *disciplinary effects* of a pegged exchange rate) inflation remains lower under pegged rates than under floating rates. The decline in the regime coefficient from 5.0 to 1.8 suggests that reduced money supply growth (the "discipline effect") accounts for much of the difference in performance.[6]. For the intermediate regimes, virtually all of the better inflation performance arises from greater monetary discipline as the residual credibility effect is statistically insignificant, and quite small at 0.6 percent. A somewhat different measure of the credibility effect of pegged exchange rates is given by the behavior of the (ex-post) *level* of real interest rates: as the second to last column of Table 1 reveals, real interest rates have been lower, on average, under pegged exchange rates even controlling for annual means.

The evidence thus suggests quite strongly that pegging the nominal exchange rate is associated with lower inflation, both because of a reduced rate of monetary growth and because of lower residual velocity growth controlling for income and interest rate effects. These associations, of course, do not imply that the adoption of pegged regimes is *causal*

[6]The explanatory power of $\Delta \log i$ is negligible.

in bringing about these effects, an issue to which we turn next.

ROBUSTNESS

Our robustness tests are intended to answer four questions. First, is it the announced regime which matters for inflation, or the de facto behavior of the monetary authority?. Second, do the findings hold for less aggregated regime-classifications and country subgroups? Third, are the results contaminated by leakage across regimes at times of regime switches? Finally, can causal inferences be drawn from the results, specifically, does the choice of a pegged regime lower inflation, or is it merely the case that countries with low inflation tend to adopt fixed exchange rates?

Alternative definitions of pegged regimes

We begin by asking whether it is the exchange rate *regime* — that is, the declared *commitment* of the central bank — which explains the inflation performance of countries with pegged exchange rates [Bordo and Schwartz [1994], Svensson [1993]). We address this question in two ways. First, we distinguish between *de jure* and *de facto* fixed exchange rate regimes, using the alternative classification of countries under pegged and cooperative systems into a group of "*infrequent*" and a group of "*frequent*" peg-adjusters. The latter group consists of those years in which a country operating under a pegged or co-operative system enacted more than one modification (either a change in the par value or a change in weights for basket pegs) to the regime. The remaining observations are grouped into the reference group "*Not pegged*".

The second panel in table 2 reports analogous statistics to table 1 for this new grouping. The rightmost columns contain the regression results. β_1 refers to the regime dummy coefficients obtained by simultaneously including both the dummies for the *frequent* and *infrequent* peg-adjusters while excluding $\Delta \log m$ and $\Delta \log i$ (analogous to the first regression reported above), while β_2 are the corresponding estimated coefficients when both dummies were included along with money and interest rate growth. The means, reported in the leftmost columns, again take out the annual averages of all observations to purge the data of time effects. To facilitate comparison, the first panel replicates the results for the pegged-intermediate- floating classification discussed above.

The results reveal that the mere declaration of a pegged exchange rate regime is not

sufficient to reap the *full* anti-inflationary benefits: while inflation in countries with frequent adjustments of the parity was 4.1 percent less compared to countries with floating rates, it was 3.7 percent higher compared to countries with infrequent adjustments of the peg. The difference reflects both higher monetary growth (column [2], Table 2), and faster residual velocity growth: the (β_1) coefficient on the regime dummy in the regression excluding monetary growth reveals inflation in both the infrequently and the frequently adjusted pegged regimes to be statistically significantly lower compared to the reference group of floating regimes. Controlling for the discipline effect (β_2), however, the coefficient on the frequently adjusted peg falls to less than 1 percentage point and is no longer significant — countries which adjust their exchange rate peg frequently thus do not appear to benefit significantly from the "credibility" effect of slower residual velocity growth.

For our second robustness test we sort the data by the nominal exchange rate variability *regardless* of the formal exchange rate regime and look at the performance of the quartile of countries with the *lowest* nominal exchange rate variability over the entire sample. If it is the *de facto* behavior of the nominal exchange rate which matters, then the declared regime — as captured by the pegged exchange rate dummy — should be quite insignificant for the subsample of low volatility countries. Conversely, if the declared regime matters beyond the effect of low nominal exchange rate variability, then the pegged exchange rate dummy should be significant. We find that, in a regression analogous to (3), but over the sub-sample of low nominal exchange rate variability observations, the pegged exchange rate dummy in fact remains highly significant, with a coefficient of -0.046 and a t-statistic of 2.61^{***}.

Taken together, the first two robustness tests suggest both that the formal exchange rate regime does matter for inflation — beyond the effects of low exchange rate variability — and that the full anti-inflationary benefits of pegged rates are only realized if the peg is not frequently adjusted.

Differentiating by regime and country characteristics

How sensitive are the results to aggregation across regimes and countries? The third panel of table 2 reports statistics for a broader classification differentiating between nine rather than our previous three exchange rate regimes. Overall, the results confirm the stylized fact of lower inflation rates in economies operating under less flexible exchange

rate regimes. The table also suggests, however, that the common practice of aggregating the rich variety of real world regimes into a "fixed" and a "flexible" category may lose some of the interesting detail. Thus the lowest inflation is observed not for the single currency pegs, but for countries on co-operative arrangements, including the EMS. At the other end of the spectrum, the positive correlation between regime flexibility and inflation is mainly due to the "dirty floats", indeed, regimes on pure floats have inflation rates that are not only below average, but are in fact lower than under single currency pegs. The last two columns again report the estimated coefficients and t-statistics on regime dummies, based on a regression analogous to the regression reported above, but now including eight dummies for all regimes except the pure float. Co-operative systems enjoyed the lowest inflation rates conditional on controlling for monetary, income and interest rate growth, again suggestive of a significant "credibility effect" in form of lower residual velocity growth.

Are these results, computed for the entire sample, robust across subsamples? The bottom half of Table 2 reports the means (again as deviations from the annual average of all observations), for the pegged, intermediate and floating regimes for seven subgroups, high and low income per capita countries (based on the World Bank classification), countries with no capital account restrictions (based on the IMF Yearbook on Exchange Arrangement and Exchange Restrictions), and high and low inflation countries.

While high income countries have lower average inflation rates for all three regimes, inflation under pegged rates was lower than under floating rates for both income groups. Intermediate regimes in poorer economies suffered the worst inflation, reflecting particularly high monetary growth. Countries without capital account restrictions have experienced below average inflation under all three regimes. Interestingly, the ranking is reversed: the intermediate regimes (including most of the EMS members) experienced the lowest inflation rates, followed by the floating and pegged regimes. As the last four columns reveal, however, the exchange rate regime does not matter for this subgroup - presumably because an open capital account itself imposes policy discipline regardless of the exchange rate regime.

The last four panels divide the sample by the inflation performance, both in terms of the average inflation rate over the entire sample, and by individual observations. We sort both by country and by observation. The first classification groups all observations for countries with an average inflation rate of less than five percent over the entire sample into the "low inflation" group, all other observations into the high inflation group. The second

classification groups all individual inflation observations below five percent into the low inflation group, all other observations into the high inflation group.

Within the high inflation sample pegged exchange rate regimes again fare best, followed by intermediate and floating regimes, with identical rankings for the raw inflation rate, the monetary growth rate and the residual velocity effect. For the low inflation sample, regime differences are almost negligible. For the sample sorted by individual observations, the difference between pegged and floating rates amounts to less than half a percent with insignificant residual velocity effects. For the sample sorted by the average inflation performance of the country over the entire sample, the differences are somewhat more pronounced with pegged regimes displaying a significantly lower inflation rate (controlling for monetary, output and interest rate growth). This lack of sizable differences among regimes for the group of countries experiencing low inflation raises the possibility that the negative association between pegged exchange rate regimes and inflation might simply reflect the greater ease of adopting a pegged regime in a low inflation environment rather than a causal effect of regime choice on inflation, our next focus.

Causality

Does pegging the exchange rate cause lower inflation? Or is it merely that countries with low inflation are better able to maintain a pegged exchange rate regime (Quirk [1994])? We address this issue in the context of a simultaneous equation framework explicitly allowing for endogeneity of regime choice. Suppose that the choice whether or not to peg depends on some set of variables X_2 as well as on the inflation rate π :

$$Peg^* = X_2\beta_2 + \gamma_2\pi + \eta_2 \tag{4}$$

where Peg^* is an unobserved "desire" to peg the exchange rate and η captures non-systematic features. Let Peg denote the observed indicator variable designating whether the country in fact has a pegged exchange rate, with $Peg = 1$ if Peg^* is above some critical value and 0 otherwise. A natural assumption might be $\gamma_2 < 0$: low inflation countries are best able to maintain and thus more likely to choose a pegged exchange rate regime. The structural equation determining inflation is given by:

$$\pi = X_1\beta_1 + \gamma_1 Peg^* + \eta_1 \tag{5}$$

where X_1 and η denote a vector of exogenous variables and an error term, and $\gamma_1 < 0$. The simultaneity implies that the anti-inflationary benefit of pegged exchange rates identified in the previous section may be spurious: we may find a statistically significant negative estimate for γ_1 even though its true value is zero. As the endogenous variable is dichotomous, standard two-stage estimation is not feasible. We therefore use a modification of Amemiya's [1979] 2SLS method for truncated endogenous variables. The modification, proposed by Maddala [1983] explicitly allows for dichotomous variables. The reduced forms of the structural model are given by:

$$\pi = X\lambda_1 + v_1 \tag{6}$$

$$Peg^* = X\lambda_2 + v_2 \tag{7}$$

where X includes both X_1 and X_2. Since Peg^* is only observed as a dichotomous variable, we can only estimate $\lambda_2^* = \frac{\lambda_2}{\sigma^2(v_2)}$. Defining $Peg^{**} = X\lambda_2^* + \frac{v_2}{\sigma^2(v_2)}$, the structural inflation equation can then be rewritten as:

$$\pi = X_1\beta_1 + \gamma_1\sigma_{v_2}^2 Peg^{**} + \epsilon \tag{8}$$

where ϵ is an error term. The two stage procedure then involves estimating λ_2^* by probit maximum likelihood, calculating Peg^{**} and substituting it into equation 8 which can then be estimated by OLS. If the adoption of a pegged exchange rate regime in fact exerts a negative effect on inflation, the estimated coefficient $\gamma_1\sigma_{v_2}^2$ is expected to be negative.[7]

For the second stage probit regression we use the three legal definitions of central bank independence developed by Cukierman [1992][8], the openness measure and the fitted value of inflation.[9] Of these, the independence variable measuring the legal status of the cen-

[7] An adjustment to the standard errors is also required. Corrected standard errors were calculated from $V = \sigma_1^2(H'X'XH)^{-1} + (\gamma_1\sigma_2)^2(H'X'XH)^{-1}H'X'X\Sigma X'XH(H'X'XH)^{-1}$

where Σ denotes the variance-covariance matrix of the first stage probit maximum likelihood parameter estimates, and $H = (\lambda_2|J)$ where J is a matrix of 1s and 0s defined by $XJ = X_1$.

[8] Consistent with Cukierman's findings, the three measures were assumed not to enter X_1.

[9] Optimal regime choice as a function of country characteristics is the subject of a substantial separate literature, see Flood and Marion (1991), Garber and Svensson (1995)Heller (1978), Klein and Marion (1994), Klein (1987), Lane (1994), Melvin (1985), Obstfeld and Rogoff (1995), Savvides (1990) and Wickham (1985), *inter alia*.

tral bank governor (CEO) enters significantly negative (that is, lowers the likelihood of a pegged exchange rate regime being chosen), while openness has a positive, and inflation the expected negative significant effect. Sixty-eight percent of all observations are predicted correctly. Allowing for regime choice endogeneity while controlling for the potential endogeneity of Δy, Δi and Δm by using lagged values of these variables as instruments yields:

$$\begin{array}{lcccc} \pi = & -0.066 & -0.013\ Peg & -0.358\ \Delta \log y & \\ & (17.4^{***}) & (2.63^{***}) & (4.86^{***}) & \\ & +0.046\ Turn & -0.003\ Open & +0.039\ \Delta \log i & +0.349\ \Delta \log m \\ & (1.51) & (5.39^{***}) & (4.15^{***}) & (16.14^{***}) \end{array} \tag{9}$$

with an R^2 of 0.65. The results closely match those obtained above for the OLS regressions: the residual effect on velocity growth is again both economically and statistically significant. Explicitly controlling for endogenous regime choice thus does not unravel our finding of lower inflation among countries operating under pegged regimes.

Corroborating evidence comes from observing the evolution of inflation in countries switching from a floating to a pegged regime. For this subgroup of countries, inflation was 0.6 percentage points lower one year after a switch to a fixed exchange rate regime, 0.5 percentage points lower after two years, and 0.5 percentage points lower after three years (all relative to the year preceding the regime change). Conversely, for countries switching from a pegged to a floating regime, inflation was higher by 3 percentage points one year after a switch, by 1.8 percentage points after two years, and by 2.3 percentage after three years. The time pattern of inflation after regime changes is thus consistent with an inflation-retarding effect of pegged regimes, though of course these figures do not control for other determinants of inflation that may have also changed at the time of the regime change.

Contamination

Finally, it is worth checking whether the results are driven by "contamination" across regimes. In particular, if countries under a peg pursue monetary policies inconsistent with maintaining the peg, inflationary pressures might build up but be initially held in check only to be released in an inflation burst once the peg is abandoned. In such a case, our approach

of correlating current regimes with current performance would, somewhat misleadingly, attribute the post-collapse inflation boom exclusively to the successor regime, likely a float (Rose [1995], Frankel and Rose [1996]). To control for such spill-over effects, we re-compute results for an alternative dataset excluding the first two years following a regime change. One might also argue that a pegged exchange rate regime is defined both by the formal commitment *and* by the pursuit of policies consistent with fulfilling the commitment. Under this stricter definition, it would not only be inappropriate to attribute the immediate *post*-crash observations to the successor regime, but it would also be inappropriate to attribute the immediate *pre*- crash observations to the class of "true" pegged regimes. To allow for this stricter definition of pegged rates, we also re-compute results for a sample excluding the two years *prior* to regime changes. Neither modification alters the basic results: excluding the year of the change along with the two prior and the two succeeding years, inflation under pegged exchange rates is 4.8 percentage points lower than inflation under floating rates, while inflation under intermediate regimes is 1.9 percentage points lower.

Summary

The main result that pegged exchange rates are associated with lower inflation is thus quite sturdy to a range of robustness tests. The link cannot be explained solely by a greater ease of adopting pegged regimes when inflation is low: pegged regimes are associated with lower inflation even after controlling for the endogeneity of regime choice. Nor can the results be explained by spillage across regimes: excluding the observations immediately preceding and following a regime shift does not significantly alter results. The robustness tests did, however, reveal two qualifications. First, both the de jure commitment and the de facto behavior matter: countries formally operating under pegged regimes but frequently changing the peg did not reap the full anti-inflationary benefits. Second, the choice of regime seems to be of lesser importance for the group of countries disciplined by unrestricted capital flows and for the group of countries with the lowest inflation rates.

4.1 Inflation Volatility

The literature on the welfare costs of inflation suggests that unexpected movements - or more generally volatility- of inflation matters as much if not more than the average inflation rate. We proxy this unexpected component by the three-year centered moving standard

deviation of the residual from a AR1 regression of the inflation rate on its own lag.[10] Analogous to the evidence presented above, we compute the deviation from the annual averages for the three regimes, reported in the first column of Table 3. The rankings are comparable to those obtained for the average inflation rates, suggesting the familiar positive relation between the magnitude of inflation and inflation uncertainty [Ball (1992)].

The differences in the volatility of inflation across regimes might reflect a variety of factors, including the incidence of nominal and real shocks. To examine whether the regime exerts an influence beyond these determinants, we regress our measure of inflation volatility on the central banker turnover rate, openness, and the volatility of the growth rates of the money supply, output, and interest rates. As above, two dummy variables are included for pegged exchange rate regimes and intermediate regimes. We obtain:

$$\begin{array}{rcccc} \sigma_\pi = & 0.996 & -0.040\ Peg & +0.018\ Int & +0.050\ \sigma_{\Delta \log y} \\ & (5.37^{***}) & (2.65^{***}) & (0.85) & (2.09^{**}) \\ & +0.310\ Turn & -0.002\ Open & -0.0003\ \sigma_{\Delta \log i} & +0.290\ \sigma_{\Delta \log m} \\ & (4.27^{***}) & (2.52^{***}) & (3.57^{***}) & (2.7^{***}) \end{array} \tag{10}$$

with an R^2 of 0.20. Volatility of GDP growth contributes to inflation volatility, as does a high central bank governor turnover rate, while more open economies have more predictable inflation rates. Increased volatility of monetary growth rates is associated with increased volatility of inflation, while higher volatility of interest rates reduces inflation volatility — though the effect is quantitatively small. Controlling for these conditioning variables, both intermediate and floating regimes are associated with significantly higher inflation variability than pegged exchange rates.

Table 3, constructed analogous to Table 2, reports the more detailed results. The first two columns report the averages - again taking out annual means - the leftmost columns report the t-statistics of the regressions. The first regression coefficient (β_1) is the coefficient on the regime dummy in a regression of inflation volatility on all determinants, the second coefficient is for the same regression with the reserve volatility as dependent variable. As

[10] As a robustness test, we re-calculated the results for the standard deviation of the inflation rate, with very similar results.

in Table 2, no dummy is included for the floating rate regimes, the non-pegged regimes and the pure float regimes, respectively. A number of points are noteworthy. First, little difference emerges between the frequently and infrequently adjusted pegged exchange rates. Second, across the more disaggregated regimes, countries operating under single currency pegs experienced a slightly above average volatility, though the effect vanishes once controls for terms of trade shocks, monetary and interest rate volatility are included. On the other end of the spectrum the below-average mean inflation rate of the pure float is matched by below average volatility. Across country subgroups, volatility is decreasing with per capita income though in both income groups pegged regimes are associated with lower volatility. The ranking is reversed for countries without capital controls, though the differences are insignificant after controlling for other factors, arguably again a reflection of the additional constraints on policy imposed by mobile capital.

Intriguingly, the ranking of volatilities is reversed for the low inflation sample, with a significantly higher volatility under pegged rates even after controlling for other volatility determinants. The positive effect might reflect the "credibility" effect associated with pegged rates: to the degree that adoption of pegged exchange rates leads to an initial decline of inflation beyond that suggested by the movements in the other determinants, countries switching to pegged rates will experience above average volatility in the initial years of rapid disinflation. To the extent that the pegged regime sample contains a significant number of such transition experiences, the high transitional volatility may dominate lower volatility once disinflation has been obtained, leading to a net positive effect. the results are however robust to dropping the two years following regime changes, suggesting that any volatility effect of inflation must be stretched over longer periods.

While inflation volatility is lower under pegged exchange rates than under floating rates, the volatility of the growth of foreign exchange reserves, reported in the second column of Table 3, is unsurprisingly higher as the central bank is obliged to intervene in the foreign exchange markets. Indeed, the analogous regression to (10) with reserve growth volatility as dependent variable yields a coefficient of 0.057 (t-statistic: 2.43**) for pegged exchange rate regimes, and an insignificant coefficient for intermediate regimes. A marked difference is noticeable between frequently and infrequently adjusted pegged exchange rate regimes, not surprising as adjustment of the parity provides an alternative to intervention.

5 Output Growth and Business Cycles

In contrast to the ample body of literature on nominal effects of exchange rate regime choice, relatively few studies examine the potential for exchange rate regime non-neutrality in terms of growth[11] though the effect of exchange rate uncertainty on some determinants of growth - notably trade and investment - has received some attention. From simple growth accounting, the exchange rate regime can influence output growth either through the rate of factor accumulation (investment or employment growth) or through the growth rate of total factor productivity. A priori, the linkages are ambiguous. Pegged exchange rates have been argued to foster investment by reducing policy uncertainties, lowering real interest rates, and reducing real exchange rate variability. Yet, by eliminating an important adjustment mechanism, fixed exchange rates can also exacerbate protectionist pressures and, to the extent that external trade is associated with higher productivity, reduce the efficiency of a given stock of capital. Moreover, pegged rates may result in misalignment of the real exchange rate which, by distorting price signals in the economy, prevent the efficient allocation of resources across sectors.[12]

The literature is somewhat more forthcoming on the link between pegged exchange rates and output - or employment — volatility. Flexible exchange rates, by facilitating price and real wage adjustments, are generally assumed to result in lower quantity volatilities. Inasmuch as speculative forces make the nominal exchange rate an independent source of volatility, however, a flexible exchange rate could exacerbate output and employment movements.

Growth Performance

For our consistent sample of 987 observations, per capita real GDP growth averaged 1.61 percent per year, 1.4 percent for countries operating under pegged exchange rates, 2.1 for countries with intermediate regimes, and 1.7 percent for countries with floating exchange rates (Table 4). Again, however, the concentration of the fixed exchange rate regimes in the

[11] Aizenman (1991) and Ghosh and Pesenti (1994) are two exceptions, developing models in which the adoption a pegged exchange rate increases the volatility of output but leads to higher investment rates and thus to faster output growth.

[12] See Friedman (1953), Hooper and Kohlhagen (1978), Cushman (1983), IMF (1984), Bailey et al. (1986), DeGrauwe and Bellefroid (1987), Dixit (1989) *inter alia*.

high-growth 1960s might distort this picture. To control for time effects, the bottom panel of Table 4 reports the average growth rates after the annual means of all observations have been subtracted. The results are not noticeably altered: on average, countries operating under floating rates enjoyed slightly higher growth (about 1 percent per year) compared to countries operating under pegged exchange rates.

The second and third columns of Table 4 report statistics for investment and trade growth. Controlling for annual means, the investment to GDP ratio was about one percent higher in countries with pegged exchange rates, while trade grew about 4.6 percent less per annum compared to countries with floating exchange rates. The combination of slightly lower overall growth, and slightly higher investment for countries with pegged exchange rates suggests lower productivity growth, possibly explained by (or at least, associated with) the lower growth of international trade.

These linkages can again be examined more formally by regression analysis. We first regress per capita growth on the variability of the terms of trade (σ_{TT}) (calculated as a three year centered moving standard deviation of the terms of trade), lagged growth in government consumption as a readily available fiscal stimulus proxy ($\triangle g$) ,and the World Bank index of development ($\bar{y}$), coded so that a positive coefficient indicates conditional convergence, as well as the dummies on pegged and on intermediate systems. The investment to GDP ratio (I/Y) and the growth rate of external trade ($\delta Trade$) are excluded, the coefficients on the regime dummies thus capture both factor accumulation and productivity growth differences. Both the coefficient on pegged regimes (-0.005) and the coefficient on intermediate regimes (-0.0002) are negative; however, neither is significant. We next include the investment ratio, the regime dummies thus now only reflect productivity growth (and excluded factor accumulation). The coefficient on the pegged regimes drops to -0.009 and becomes statistically significant at $t = 2.39^{**}$, while the coefficient on intermediate regimes remains insignificant. Finally, we also include trade growth in the regression to examine the extent to which the growth advantage conditional on controlling for capital accumulation can be explained by trade growth. We obtain:

$$\begin{array}{lcccc} \Delta \log y = & -0.066 & -0.005\ Peg & +0.002\ Int & -0.08\ \sigma_{TT} \\ & (17.4^{***}) & (1.48) & (0.73) & (3.41^{***}) \\ & & & & \\ & +0.001\ \Delta g & -0.004\ \bar{y} & +0.134\ (I/Y) & +0.061\ \Delta Trade \\ & (0.059) & (2.49^{**}) & (5.26^{***}) & (4.62^{***}) \end{array} \tag{11}$$

with an R^2 of 0.30. Both the investment ratio and the rate of external trade growth are significant and positively linked with growth. Controlling for investment and trade growth, the coefficient on *Peg* again becomes insignificant, suggesting that the negative coefficient on the regime dummy for pegged regimes in the regression controlling only for investment may indeed be related to sub-average trade growth.

Robustness Tests

We again subject our findings to a set of robustness tests, reported in table 5, analogous to table 2 above. The first three columns report the average income per capita growth rate, the average investment to GDP ratio and the average trade growth, all controlling for annual means. The last six columns report the coefficient and the t-statistic on the regime dummy for the three regressions[13] The aggregate findings for growth do appear to mask significant differences across more disaggregated samples.

First, the lower growth rate under pegged rates affects primarily countries with frequent changes in parity, these countries also have the lowest trade growth. Second, while the pure floaters again resemble the single currency pegs in terms of overall growth, they experienced substantially lower investment but substantially faster trade growth. Third, the growth differentials arise primarily from differences across regimes among poorer economies, with poor countries operating under pegs experiencing a 1.6 percent below average growth rate.[14] Fourth, similar to our findings for inflation, results differ for countries without capital controls, again suggesting that full capital mobility exerts an important effect in addition to the choice of exchange rate regime.

[13] β_1: Excluding both the investment ratio and trade growth; β_2: including the investment ratio but excluding trade growth; β_3: including both the investment ratio and trade growth.

[14] The comparison between the two income groups reveals the well known absence of unconditional convergence.

The last four panels of Table 5 divide the sample into high and low growth subsample, again sorting alternatively by the average growth rate over the entire sample and by individual observations. High growth countries are defined by an average annual growth rate of per capita income exceeding one percent, likewise, for the sample composed of individual observations, all observations with growth rates above one percent were placed in the high growth sample. All other countries and observations were placed in the low growth sample. The results for the low growth sample match the overall results: pegged regimes exhibit lower output growth. In contrast, no significant differences across regimes emerges for high growth economies: conditional on obtaining a high growth rate, the choice of exchange rate regime appears to exert little additional influence. The similarity of growth rates however again hides differences in growth determinants: fast growing countries under pegged regimes experience substantially higher investment (1.9% for the country-classification, 2.7% for the observation classification) but lower trade growth (-1.4 and -1.5 percent).

We also check whether the findings are biased by potential endogeneity of the exchange rate regime, although the literature has generally not emphasized growth performance as a determinant of a country's exchange rate regime choice. As before, we use a simultaneous equation framework. We find that, conditional on investment, pegged exchange rates had about 1 percentage point lower growth. Unlike the results reported above, however, this difference is not entirely explained by the higher trade growth under flexible exchange rates: even with the inclusion of $\Delta Trade$, there remains a small, but statistically significant, negative effect of pegged exchange rates.

A different look at the data is again provided by the growth experience of countries switching regimes. Countries switching from pegged to floating rates experienced 0.6 percentage points higher output growth in the first year following the change of regime, 0.8 percentage points higher growth in the second year, and 0.7 percentage points higher growth in the third year (all measured relative to the year preceding the switch). Finally, dropping observations for the two years prior to, and following, the switch of regime does not alter the results materially.

Overall, we thus find that GDP per capita growth performance tends to be poorer under pegged regimes, though the difference is quantitatively small. Larger but offsetting differences are observed for growth determinants, with pegged exchange rate regimes generally characterized by higher investment to GDP ratios but experiencing slower trade growth.

5.1 Volatility

In the absence of price and wage flexibility, nominal exchange rate movements can, in principle, bring about required relative price adjustments, reducing output and employment volatility. The adoption of fixed exchange rate removes this option and may hence exacerbate output and employment movements. Since GDP is widely viewed as non-stationary, we use the variance of the GDP growth rate as our measure of output volatility. Our second measure is the variance of the employment rate (employment divided by labor force) which has the virtue of being a stationary series.

Table 6 reports the three year centered moving standard deviation of the GDP growth rate and the employment ratio (EMP) under the various regimes, again corrected for the annual means. Both GDP growth and employment have been more variable under pegged exchange rate regimes than under floating or intermediate regimes. Of course, the higher volatility under pegged rates might simply reflect a higher incidence of other shocks. To control for this possibility, we regress the volatility of real GDP growth on the level of development as proxied by the World Bank ranking, and the variance of the terms of trade, of government spending, of investment, as well as on the rate of growth of external trade, obtaining:

$$\begin{array}{lcccc} \sigma_{\Delta \log y} = & 0.034 & +0.003\ Peg & -0.002\ Int & +0.077\ \sigma_{TT} \\ & (6.77^{***}) & (1.64^{*}) & (1.03) & (5.10^{***}) \\ & +0.144\ \sigma_{g/y} & -0.004\ \bar{y} & +0.005\ \sigma_{I/Y} & -0.007\ \Delta Trade \\ & (2.69^{*}) & (1.26) & (5.26^{***}) & (2.03^{**}) \end{array} \tag{12}$$

with an R^2 of 0.35. Volatility of the terms of trade, government expenditure, and the investment ratio contribute to real GDP growth volatility while countries with faster trade growth had less volatile output growth. Even controlling for these factors, growth was somewhat more variable under pegged exchange rates, though the effect is only significant at the ten percent level. The results for employment are more compelling: the corresponding regression with the employment ratio as the dependent variable yields a coefficient of 0.003 for Peg (t-statistic: 2.72^{**}) and 0.004 for Int (t-statistic: 3.05^{***}).

6 Conclusion

Does the exchange rate regime matter for macroeconomic performance? Experience over the last thirty years suggests that it does. Our strongest results concern inflation. Countries with pegged exchange rates experienced significantly lower and less variable inflation rates. This anti-inflationary benefit of pegged exchange rates derives both from lower growth rates of the money supply (a "*discipline*" *effect*), and from slower growth of residual velocity (a "*credibility*" effect). These findings are generally robust, with two important exceptions. First, countries frequently changing their parities — while notionally maintaining a peg — do not reap the full anti-inflationary benefit of a fixed exchange rate regime. The credibility effect, in particular, is much lower in such countries. Second, among the subgroup of countries already exhibiting low inflation — or deriving credibility from other devices such as the absence of capital controls — the choice of the nominal exchange rate regime has only a small marginal effect.

Per capita growth rates, in contrast, differ only marginally across exchange rate regimes, with slighter slower growth under pegged rates. Growth determinants differ more significantly but are offsetting, with pegged regimes characterized by higher investment ratios but slower trade growth. While mean growth rates do not differ much, the lower average inflation rate under pegged rates is associated with a significantly higher volatility on the real side, with both output growth and employment shares less variable under floating rates.

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Table 1: **Inflation Performance**

	Average					
	π	$\Delta \log m$	$\Delta \log y$	$\Delta \log i$	$1+r$	Obs.
Pegged	0.084	0.151	0.031	0.016	1.003	532
Intermediate	0.116	0.194	0.028	0.078	1.018	217
Floating	0.152	0.268	0.029	0.083	1.023	219
	Deviation From Annual Global Mean					
	$\frac{\pi}{1+\pi}$	$\Delta \log m$	$\Delta \log y$	$\Delta \log i$	$1+r$	Obs.
Pegged	-0.015	-0.031	-0.001	-0.020	-0.010	532
Intermediate	-0.001	0.005	0.001	0.015	0.014	217
Floating	0.038	0.071	0.001	0.003	0.011	219

Table 2: **Inflation: Alternative Samples**

Regime	$\frac{\pi}{1+\pi}$	$\Delta \log m$	$\Delta \log y$	$\Delta \log i$	$1+r$	Obs.	β_1	$t(\beta_1)$	β_2	$t(\beta_2)$
	Full Sample									
Pegged	-0.015	-0.031	-0.001	-0.020	-0.010	532	-0.050	-4.90	-0.018	-2.74
Intermediate	-0.001	0.005	0.001	0.015	0.014	217	-0.015	-1.60	-0.006	-0.96
Floating	0.038	0.007	0.001	0.003	0.011	219	-	-	-	-
Infreq. adj. peg	-0.029	-0.052	-0.002	-0.026	0.003	551	-0.069	-8.15	-0.033	-5.33
Freq. adj. peg	0.008	0.011	0.002	-0.001	-0.036	112	-0.019	-1.73	-0.010	-1.41
Not pegged	0.049	0.090	0.002	0.048	0.007	305	-	-	-	-
Single currency peg	-0.006	-0.015	-0.003	-0.009	-0.010	315	-0.024	-1.75	-0.002	-0.23
SDR peg	-0.009	-0.054	-0.008	-0.032	-0.056	42	0.002	0.12	0.008	0.72
Other published peg	-0.034	-0.078	-0.001	-0.080	0.014	58	-0.026	-2.50	-0.014	-1.64
Secret basket peg	-0.035	-0.045	0.009	-0.016	-0.006	117	-0.023	-1.87	-0.016	-1.56
Cooperative system	-0.052	-0.081	-0.003	-0.029	0.024	131	-0.026	-2.65	-0.020	-2.52
Unclass. float	0.006	-0.005	0.012	-0.005	-0.007	31	-0.007	-0.47	0.004	0.30
Float-det. range	0.117	0.217	0.003	0.129	0.003	55	0.089	4.58	0.053	4.32
Float-indet. range	0.077	0.169	0.004	0.060	0.020	121	0.053	3.19	0.023	2.09
Pure float	-0.010	-0.050	-0.003	0.004	-0.001	98	-	-	-	-
	Upper Half Of Income Per Capita Distribution									
Pegged	-0.015	-0.036	-0.001	-0.024	0.001	281	-0.030	-3.04	-0.006	-0.93
Intermediate	-0.014	-0.015	-0.001	0.018	0.017	186	0.002	0.16	0.001	0.14
Floating	0.024	0.070	-0.000	0.033	0.038	142	-	-	-	-
	Lower Half Of Income Per Capita Distribution									
Pegged	-0.015	-0.026	-0.000	-0.016	-0.022	251	-0.074	-5.11	-0.051	-4.22
Intermediate	0.082	0.123	0.014	-0.005	-0.003	31	0.006	0.29	0.005	0.33
Floating	0.064	0.073	0.003	0.037	-0.040	77	-	-	-	-
	Countries Without Capital Account Restrictions									
Pegged	-0.007	0.007	0.007	-0.025	0.001	57	-0.006	-0.31	0.005	0.33
Intermediate	-0.053	-0.068	-0.002	-0.030	0.025	65	0.005	0.49	-0.001	-0.09
Floating	-0.020	-0.032	0.005	-0.026	0.018	78	-	-	-	-
	Low Inflation: Country Average Over Sample									
Pegged	-0.069	-0.072	0.005	-0.031	0.036	179	-0.029	-2.33	-0.029	-2.37
Intermediate	-0.081	-0.102	0.001	-0.050	0.031	55	-0.018	-1.68	-0.018	-1.70
Floating	-0.078	-0.111	0.018	-0.057	0.022	44	-	-	-	-
	High Inflation: Country Average Over Sample									
Pegged	0.012	-0.011	-0.003	-0.015	-0.031	353	-0.042	-3.87	-0.007	-1.09
Intermediate	0.027	0.041	0.001	0.036	0.008	162	-0.009	-0.78	0.002	0.32
Floating	0.067	0.117	-0.003	0.058	0.008	175	-	-	-	-
	Low Inflation: Individual Observations									
Pegged	-0.057	-0.069	0.006	-0.031	0.018	169	-0.011	-1.11	-0.009	-1.01
Intermediate	-0.061	-0.076	-0.001	-0.026	0.023	82	-0.016	-2.36	-0.012	-1.86
Floating	-0.060	-0.098	0.004	-0.024	0.020	42	-	-	-	-
	High Inflation: Individual Observations									
Pegged	0.004	-0.014	-0.004	-0.015	-0.023	363	-0.044	-4.11	-0.012	-1.73
Intermediate	0.036	0.054	0.002	0.039	0.008	135	-0.007	-0.59	0.004	0.49
Floating	0.061	0.111	0.000	0.049	0.008	177	-	-	-	-

Table 3: **Volatility Of Inflation And Reserves**

Regime	σ_π	σ_{Res}	Obs.	β_1	t_1	β_2	$t2$
	Full Sample						
Pegged	-0.0090	0.0296	532	-0.0405	-2.65	0.0577	2.43
Intermediate	0.0053	-0.0636	217	0.0184	0.85	-0.0194	-0.83
Floating	0.0167	-0.0087	219	-	-	-	-
Infreq. adj. peg	-0.0174	-0.0021	551	-0.0553	-3.69	0.0364	1.65
Freq. adj. peg	-0.0225	0.0025	112	-0.0638	-4.22	-0.0004	-0.02
Not pegged	0.0396	0.0029	305	-	-	-	-
Single currency peg	0.0065	0.0921	315	-0.0452	-1.69	0.1398	3.29
SDR peg	-0.0168	0.0505	42	-0.0270	-1.14	0.0650	1.22
Other published peg	-0.0357	-0.0987	58	-0.0254	-1.18	-0.0835	-2.31
Secret basket peg	-0.0349	-0.0820	117	-0.0347	-1.68	-0.0750	-2.16
Cooperative system	-0.0554	-0.1268	131	-0.0222	-1.10	-0.0762	-2.40
Unclass. float	-0.0051	0.1100	31	-0.0330	-1.45	0.0890	1.51
Float-det. range	0.1559	-0.0109	55	0.1247	2.43	-0.0426	-1.17
Float-indet. range	0.0371	-0.0059	121	0.0054	0.21	-0.0273	-0.77
Pure float	-0.0085	-0.0122	98	-	-	-	-
	Upper Half Of Income Per Capita Distribution						
Pegged	-0.0213	-0.0364	281	-0.0007	-0.05	-0.0068	-0.24
Intermediate	-0.0066	-0.0737	186	0.0497	2.26	0.0196	0.79
Floating	-0.0072	-0.0225	142	-	-	-	-
	Lower Half Of Income Per Capita Distribution						
Pegged	0.0047	0.1033	251	-0.0831	-2.74	0.0728	1.99
Intermediate	0.0769	-0.0032	31	0.0033	0.06	-0.0704	-1.16
Floating	0.0607	0.0167	77	-	-	-	-
	Countries Without Capital Account Restrictions						
Pegged	-0.0075	0.0079	57	-0.0029	-0.11	0.0719	1.35
Intermediate	-0.0291	-0.1369	65	0.0357	1.61	0.0064	0.23
Floating	-0.0393	-0.1008	78	-	-	-	-
	Low Inflation: Country Average						
Pegged	-0.0189	0.0094	179	0.0020	1.97	0.0719	1.35
Intermediate	-0.0617	-0.1612	55	-0.0023	-2.05	0.0064	0.23
Floating	-0.0727	-0.1242	44	-	-	-	-
	High Inflation: Country Average						
Pegged	-0.0041	0.0398	353	-0.0636	-1.65	0.0584	2.46
Intermediate	0.0280	-0.0305	162	0.1079	1.57	-0.0200	-0.86
Floating	0 .0392	0.0203	175	-	-	-	-
	Low Inflation: Individual Observations						
Pegged	-0.0223	-0.0256	169	0.0425	3.70	0.1659	3.32
Intermediate	-0.0511	-0.1440	82	-0.0065	-0.76	0.0313	0.96
Floating	-0.0576	-0.1656	42	-	-	-	-
	High Inflation: Individual Observations						
Pegged	-0.0029	0.0552	363	-0.0534	-3.03	0.0287	1.11
Intermediate	0.0395	-0.0148	135	0.0282	1.02	-0.0200	-0.75
Floating	0.0343	0.0285	177	-	-	-	-

Table 4: **GDP Growth**

	Average			
	$\Delta \log y$	I/Y	$\Delta Trade$	Obs.
Pegged	0.014	0.223	0.087	518
Intermediate	0.021	0.216	0.082	238
Floating	0.017	0.201	0.109	231
	Deviation From Annual Global Mean			
	$\Delta \log y$	I/Y	$\Delta Trade$	Obs.
Pegged	-0.006	0.003	-0.014	518
Intermediate	0.007	-0.001	-0.001	238
Floating	0.005	-0.007	0.032	231

Table 5: **Output Growth: Alternative Samples**

Regime	$\Delta log(y)$	I/Y	$\Delta Trade$	Obs.	β_1	t_1	β_2	t_2	β_3	t_3
	Full Sample									
Pegged	-0.006	0.003	-0.014	518	-0.005	-1.33	-0.008	-2.39	-0.005	-1.49
Intermediate	0.007	-0.000	-0.001	238	-0.000	-0.06	-0.000	-0.15	0.002	0.73
Floating	0.005	-0.007	0.032	231	-	-	-	-	-	-
Infreq. adj. peg	-0.000	0.002	-0.008	534	-0.005	-1.62	-0.005	-1.98	-0.003	-1.25
Freq. adj. peg	-0.010	0.002	-0.011	124	-0.003	-0.62	-0.006	-1.22	-0.006	-1.14
Not pegged	0.004	-0.003	0.017	329	-	-	-	-	-	-
Single currency peg	-0.010	0.002	-0.020	316	-0.006	-1.04	-0.011	-2.18	-0.008	-1.48
SDR peg	-0.029	-0.055	-0.109	28	-0.006	-0.56	-0.005	-0.48	0.000	0.02
Other published peg	0.007	0.013	-0.007	68	0.005	1.16	0.001	0.32	0.004	0.98
Secret basket peg	0.005	0.018	0.024	106	0.011	2.10	0.005	0.84	0.005	1.01
Cooperative system	0.010	-0.005	0.012	140	0.005	1.69	0.006	1.74	0.007	2.14
Unclass. float	-0.004	0.008	-0.046	42	0.002	0.36	-0.002	-0.34	0.002	0.34
Float-det. range	0.008	0.005	0.000	56	0.012	2.47	0.008	1.66	0.010	2.03
Float-idt. range	0.011	-0.000	0.042	120	0.012	2.70	0.009	2.12	0.009	1.93
Pure float	-0.001	-0.015	0.022	111	-	-	-	-	-	-
	Upper Half Of Per Capita Income Distribution									
Pegged	0.002	0.011	-0.005	301	0.002	0.43	-0.003	-0.74	0.000	0.00
Intermediate	0.009	0.006	0.013	209	0.003	1.07	0.001	0.22	0.002	0.73
Floating	0.008	-0.004	0.035	150	-	-	-	-	-	-
	Lower Half Of Per Capita Income Distribution									
Pegged	-0.016	-0.007	-0.026	217	-0.010	-1.72	-0.011	-1.97	-0.011	-1.89
Intermediate	-0.002	-0.043	-0.099	29	-0.000	-0.03	0.006	0.71	0.010	1.08
Floating	-0.001	-0.012	0.028	81	-	-	-	-	-	-
	Countries Without Capital Account Controls									
Pegged	-0.002	-0.011	0.043	49	-0.011	-0.69	-0.010	-0.67	-0.011	-0.72
Intermediate	0.007	-0.011	0.005	65	-0.005	-1.43	-0.004	-1.30	-0.002	-0.44
Floating	0.014	0.004	0.044	91	-	-	-	-	-	-
	Low Growth Sample: Country Average									
Pegged	-0.031	-0.022	-0.083	199	-0.010	-1.99	-0.010	-2.03	-0.009	-1.87
Intermediate	-0.011	-0.013	-0.039	75	0.006	1.54	0.006	1.52	0.007	1.61
Floating	-0.018	-0.021	0.010	82	-	-	-	-	-	-
	High Growth Sample: Country Average									
Pegged	0.036	0.019	0.029	318	0.006	2.17	0.003	1.08	0.003	1.16
Intermediate	0.028	0.005	0.017	161	-0.000	-0.08	-0.001	-0.29	-0.000	-0.02
Floating	0.032	0.000	0.044	149	-	-	-	-	-	-
	Low Growth Sample: Individual Observations									
Pegged	-0.027	-0.029	-0.077	243	-0.012	-2.00	-0.012	-2.00	-0.010	-1.63
Intermediate	-0.004	-0.019	-0.056	65	0.006	1.08	0.006	1.07	0.008	1.28
Floating	-0.012	-0.026	-0.008	88	-	-	-	-	-	-
	High Growth Sample: Individual Observations									
Pegged	0.013	0.032	0.042	275	0.004	1.11	-0.002	-0.46	-0.000	-0.10
Intermediate	0.012	0.007	0.020	173	-0.000	-0.11	-0.001	-0.45	0.001	0.32
Floating	0.015	0.005	0.057	143	-	-	-	-	-	-

Table 6: **Volatility**

	GDP Volatility	Obs.	Employment Volatility	Obs.
	Full Sample			
Pegged	0.005967	539	0.001473	539
Intermediate	-0.007975	240	0.000102	240
Floating	-0.005230	249	-0.003207	249
Infreq. adj. peg	0.000798	552	0.000453	552
Freq. adj. peg	0.007023	127	0.003419	127
Not pegged	-0.003817	349	-0.001971	349
Single currency peg	0.007236	326	0.002215	326
SDR peg	0.013378	28	0.007660	28
Other published peg	-0.006451	68	-0.005938	68
Secret basket peg	0.007875	117	0.002312	117
Cooperative system	-0.013457	140	-0.000689	140
Unclass. float	0.003048	42	-0.000422	42
Float-det. range	-0.002722	58	0.002607	58
Float-indet. range	-0.003453	138	-0.004845	138
Pure float	-0.007440	111	-0.001171	111
	Upper Half Of Income Per Capita Distribution			
Pegged	0.002289	301	-0.001170	301
Intermediate	-0.009335	209	-0.000396	209
Floating	-0.007210	150	-0.004044	150
	Lower Half Of Income Per Capita Distribution			
Pegged	0.012295	217	0.004524	217
Intermediate	0.001206	29	0.003396	29
Floating	-0.002004	81	-0.001916	81
	Countries Without Capital Account Restrictions			
Pegged	0.006250	49	-0.000188	49
Intermediate	-0.013397	65	0.003838	65
Floating	-0.008922	91	-0.004474	91
	Low Growth Sample: Country Average			
Pegged	0.011148	199	0.004336	199
Intermediate	-0.004497	75	0.002993	75
Floating	-0.001689	82	-0.000738	82
	High Growth Sample: Country Average			
Pegged	0.003592	318	-0.000893	318
Intermediate	-0.009739	161	-0.001373	161
Floating	-0.007418	149	-0.004706	149
	Low Growth Sample: Individual Observations			
Pegged	0.016092	243	0.003346	243
Intermediate	0.000481	65	-0.002180	65
Floating	-0.002381	88	0.000048	88
	High Growth Sample: Individual Observations			
Pegged	-0.002012	275	-0.000871	275
Intermediate	-0.011257	173	0.000948	173
Floating	-0.007233	143	-0.005356	143