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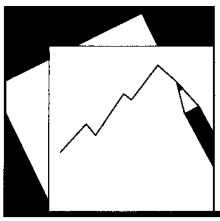

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Words vs. Deeds: What Really Matters?

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Words vs. Deeds: What Really Matters?

Prepared by Atish R. Ghosh, Mahvash S. Qureshi, and Charalambos Tsangarides[†]

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Abstract

This paper revisits the link between the nominal exchange rate regime and inflation, based on a sample of 145 emerging market and developing countries (EMDCs) over the period 1980–2010. We contend that, just as a de jure peg that is not backed by a de facto peg will have little value, de facto pegs that lack the corresponding de jure will likewise reap few of the low inflation benefits associated with pegging the exchange rate. To test our hypothesis, we exploit a novel dataset of both de jure and de facto exchange rate regime classifications. We find that pegged exchange rates are associated with significantly lower inflation in EMDCs than flexible exchange rates, and that this effect is much stronger for de facto pegs that are matched by de jure pegs than for those that are not. When it comes to anchoring expectations and delivering low inflation, therefore, both deeds and words matter.

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Author's E-Mail Address: aghosh@imf.org; mqureshi@imf.org; ctsangarides@imf.org

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I. INTRODUCTION

As the world economy recovers from the global financial crisis, inflationary pressures—driven in part by surges of capital inflows and higher food and fuel prices—are again raising concerns in emerging market and developing countries (EMDCs). Many of these countries have achieved policy credibility only in recent years, and the inflationary pressures risk re-igniting inflationary expectations. While there may be many ways of dealing with such pressures, EMDCs have often relied on pegging their exchange rate to help maintaining price stability and anchor expectations. Yet this strategy is not uncontroversial, with existing studies offering very mixed evidence on whether pegging the exchange rate is associated with lower inflation, especially in emerging market (as opposed to developing) countries.

In this paper, we revisit the link between the nominal exchange rate regime and inflation performance. We argue that the varied findings of previous studies can be reconciled by the different impact on inflation that ad hoc interventions in the foreign exchange market (a de facto peg), and a formal commitment by the central bank to maintain the parity (a de jure peg), are likely to have. The early literature on this subject (Ghosh et al., 1997; Ghosh, Gulde, and Wolf, 2003) uses de jure classifications—the central bank's declared exchange rate regime—and finds a strong statistical association between pegged exchange rate regimes and low inflation. The explanation is that pegging the exchange rate both instills monetary discipline (limits central bank credit expansion) and engenders confidence in the currency (raises money demand and thus lowers inflation for a given rate of monetary expansion). But subsequent papers (Levy-Yeyati and Sturzenegger 2001; Rogoff et al. 2003; Reinhart and Rogoff, 2004), using de facto classifications (that is, based on the actual behavior of the exchange rate) generally find a much weaker association between pegging the exchange rate and low inflation. A natural interpretation of the different findings across studies is that it is "deeds" (the de facto behavior of the exchange rate) rather than "words" (the de jure commitment) that matter.

We offer a slightly different interpretation. While acknowledging that words not backed by deeds will have little value, we contend that de facto pegging the exchange rate without a corresponding de jure commitment will likewise reap few(er) of the low inflation benefits of pegging. Our premise is based on the observation that divergences between de jure and de facto classifications reflect two distinct phenomena. The first is "soft" pegs, whereby the central bank is unable or unwilling to fulfil its commitment to maintain the parity: despite the de jure peg, the exchange rate de facto floats. The second is "closet" pegs—where the central bank intervenes in the foreign exchange market to keep the rate roughly constant, but makes no formal commitment to do so (also known as "fear of floating"; Calvo and Reinhart (2002)). Whereas soft pegs may have been relatively common in the 1970s and 1980s (including in the context of failed stabilization programs), over the past couple of decades, closet peggers have been more prevalent. That is, most de jure pegs are also de facto pegs, but many de facto pegs are not de jure pegs (and, correspondingly, many de jure floats are not de facto floats).[1]

[1] "Soft" pegs are generally associated with weak institutional quality and macroeconomic management (Alesina and Wagner, 2006). Several hypotheses have been put forward regarding closet peggers. Calvo and Reinhart

(continued…)

If that is the case, then the different results for inflation performance under de jure versus de facto pegs cannot be attributed to deeds mattering more than words—because, when it comes to de jure pegging the exchange rate, in most cases deeds back those words. Rather, the explanation must lie in the fact that many de facto pegs are not also de jure pegs. We therefore hypothesize that it is the formal commitment to the de jure peg that instills monetary discipline and helps anchor inflationary expectations.[2] Of course, if this commitment were lightly broken, then there would be few credibility benefits of the de jure peg—our point is that this seldom happens (most de jure pegs are also de facto pegs).

Testing our hypothesis using existing studies runs into several obstacles. While the source for the de jure classification is the International Monetary Fund's *Annual Report on Exchange Arrangements and Restrictions* (AREAR), the source and methodology underlying the various de facto classifications are usually quite different, resulting in little agreement among them, and making it difficult to judge whether disparate findings reflect substantive differences across the classifications or simply idiosyncracies in how they have been constructed. Moreover, empirical studies differ considerably in terms of the sample considered and the methodology employed, further complicating comparisons across them.[3]

To get around these problems, we exploit a unique data set created by the IMF for our empirical analysis that provides *both* de jure and de facto classifications of the exchange rate regime of all member countries over the period 1980–2010. Since these classifications are from a common source, any differences between them should be substantive, and not just idiosyncracies in how they are constructed. Moreover, applying the two classifications to a common sample and using the same methodology allows for a direct comparison of inflation performance under de jure and de facto pegs.

(2002) argue that countries de facto peg because exchange rate volatility could affect their risk premium on borrowing, and may also give rise to dollarization. Rogoff et al. (2003) suggest that de facto pegs may arise because of currency mismatch and balance sheet concerns, and/or fear of Dutch Disease (in the face of potentially large appreciations). Levy-Yeyati and Sturzenegger (2005) contend that de facto pegs not backed by words reflect a "fear of pegging," as official pegs are more likely to face speculative attacks. Alesina and Wagner (2006) put forward a signaling argument—that is, countries de facto peg to avoid wide exchange rate fluctuations, which may be taken as an indicator of poor economic management, while retaining the flexibility to respond to idiosyncratic shocks. By contrast, Genberg and Swoboda (2005) suggest that fear of floating may not indicate the breaking of any commitment at all, but rather reflect exchange rate stability achieved through optimally chosen monetary policies.

[2] By analogy, the de facto interest rate policy of a central bank that does not inflation target (IT) may be very similar to that of an inflation-targeting central bank—but proponents of IT would argue that it is the *commitment* to the formal IT regime that helps anchor inflationary expectations.

[3] For example, using the de jure and several de facto classifications, Bleaney and Fransisco (2005) find that hard pegs reduce inflation and money growth in developing countries. The estimated coefficients of hard pegs are, however, not strictly comparable across their estimations since the sample composition varies considerably. Guisinger and Singer (2010) use a common sample but different sources for their de jure and de facto classifications. Moreover, they pool developed and developing countries in the same sample, which may explain why they find that pegs are not associated with lower inflation under either de jure or de facto classifications alone (previous studies using both de jure (Ghosh et al. 2003) and de facto (Rogoff et al., 2003) classifications find no association between the regime and inflation performance in developed countries).

Our results based on a sample of 145 EMDCs over 1980–2010 support the hypothesis that formal commitment to pegging matters.[4] Specifically, we find that pegged exchange rates are associated with significantly lower inflation—through both the confidence and monetary discipline channels—than either the intermediate or floating exchange rate regimes, but that this effect is much stronger for de jure pegs than for de facto pegs. Moreover, the finding of a relatively smaller impact of de facto pegs stems from those cases where the de facto peg is not supported by the de jure commitment. Indeed, when we restrict the sample to those cases where the de facto peg is also a de jure peg, the estimated association between de facto pegs and low inflation strengthens significantly. In addition, we find that the effect of pegs evolves over time with longer duration of the regime associated with lower inflation, albeit at a diminishing rate. Our findings are generally robust, including taking account of potential endogeneity of regime choice, and to the exclusion of the extreme cases of freely falling regimes and hard pegs.

Beyond providing fresh empirical evidence on the relationship between the nominal exchange rate regime and inflation performance in a large sample of EMDCs, our main contribution to the existing literature is thus three fold. First, by employing a novel dataset of both de jure and de facto classifications from the same source (the IMF), and applying the same empirical methodology, we are able to obtain results across alternative regime classifications that are more readily comparable than has hitherto been possible. Second, we help clarify the respective roles of formal commitments versus actual behavior of the central bank in anchoring inflationary expectations. Third, as a by-product, we are able to reconcile the often starkly different findings in previous studies of how the exchange rate regime affects inflation performance.

The remainder of this paper is organized as follows. Section II lays out a simple theoretical framework in which the central bank's commitment to peg helps to anchor inflationary expections and deliver low inflation, and also discusses our empirical strategy. Section III describes the exchange rate regime classification. Section IV presents our main empirical results and the robustness tests. Section V concludes.

II. THEORETICAL FRAMEWORK AND EMPIRICAL STRATEGY

We begin by developing a simple theoretical model to explore how the nominal exchange rate regime could affect inflation performance. The model builds on the policy credibility models of Barro and Gordon (1983a, b), as applied to the exchange rate regime (see Wolf et al., 2008). Using this setup, we first compare "pure" pegged and floating exchange rate regimes—that is, when the central bank both de jure commits to, and de facto follows, its chosen regime. We then consider the "hybrid" cases of closet pegs (a de jure non-peg, but de

[4] We focus on EMDCs because they are more likely to benefit from importing credibility (by pegging to a strong anchor currency) than advanced economies, which tend to have credible policy institutions of their own. Within the sample of EMDCs, the results for emerging market economies (EMEs) are of particular interest as the differences in findings between de jure and de facto classifications is greatest for this group (see, for example, Rogoff et al., 2003).

facto peg) and soft pegs (a de jure peg, but de facto non-peg)—modeling them as pegged exchange rate regimes with limited commitment/adherence—and compare inflation performance under these hybrid regimes to the pure pegs and floats.[5]

Our model suggests that, comparing various pegged exchange rate regimes, inflation will be lowest under the pure peg (where the central bank both de jure commits to maintain the parity and de facto does so) followed by closet pegs (where the central bank does not commit to maintain the peg but de facto does so) and soft pegs (where the central bank de jure commits to maintain the parity but de facto does not do so); inflation is highest under a pure float (that is, where the central bank neither de jure nor de facto pegs). This ranking of inflation rates reflects a combination of the monetary discipline that de facto maintaining the peg entails, and the confidence in the currency that a de jure commitment engenders.

A. The Setup

Output is determined by a Lucas-type "surprise inflation" supply function:

$$y = \theta(\pi_d - \pi_d^e) + \eta \tag{1}$$

where y is the level of output (with the "natural" level of output normalized to zero), $\theta > 0$ is the elasticity of output with respect to the inflation surprise, π_d is price inflation of the domestically produced good, and π_d^e is the private sector's expectation of inflation, which must be formed before the realization of the shock to output, η, which has mean zero and variance σ_η^2.[6]

Consumer price inflation (CPI), π, is a weighted average of domestic (π_d) and imported goods' (π_i) price inflation, where $\beta \in [0,1]$:

$$\pi = \beta\pi_d + (1-\beta)\pi_i \tag{2}$$

Domestic price inflation is given by inverting the money demand function:

$$\pi_d = \Delta m + v\pi_d^e \tag{3}$$

where Δm is broad money growth, and $0 \leq v < 1$ is the elasticity of the growth of velocity with respect to expected inflation, reflecting forward-looking elements in household money demand, whereby higher expected inflation reduces the trend growth of money demand.

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[5] Under a peg, the central bank subordinates its monetary policy (domestic credit expansion) to maintaining the nominal exchange rate constant; under a float, the central bank is free to respond to shocks, but cannot commit ex ante to the monetary policy that it will follow. For closet pegs, monetary policy is consistent with maintaining the peg, whereas for soft pegs it is not.

[6] Alternative formulations, for example where workers are assumed to care about overall consumer price inflation rather than just domestic price inflation, are possible. While some of the specific results of the model depend on the precise formulation chosen, the model's key results about the ranking of inflation rates under the various regimes is unchanged.

Price inflation of the imported good is given by purchasing power parity, where foreign price inflation is assumed to be zero:

$$\pi_i = \pi^* + \Delta e = \Delta e \tag{4}$$

while the nominal exchange rate (defined so that an increase in *e* represents a depreciation of the domestic currency) is determined by a simple monetary relation:

$$\Delta e = \Delta m \tag{5}$$

For simplicity, the banking system is not modeled, so the money supply consists of central bank domestic credit (*DC*) and foreign exchange reserves (*R*). Under a float, there are no foreign exchange reserves, and the money supply equals domestic credit. Under a peg, the central bank does not pursue an activist monetary policy but simply keeps the exchange rate constant by sterilizing any capital inflows or outflows, hence $\Delta DC = -\Delta R \Rightarrow \Delta m = 0$.

The central bank is assumed to have two objectives: stabilizing output around some desired level, $\overline{y} \geq 0$, that may exceed the natural rate of output, and keeping inflation low:

$$Min\ L = \frac{1}{2} E\{A(y - \overline{y})^2 + \pi^2\} \tag{6}$$

where $E\{.\}$ is the central bank's expectation and *A* is the relative weight placed on output.[7]

B. Pegged versus Floating Exchange Rate Regimes

Pure peg

Under a pure peg, the central bank both commits to maintain a constant parity and de facto does so: $\Delta e = 0$. From (5), this requires $\Delta m = 0$. In turn, from (4), $\pi_i = 0$, while taking expectations of (3) yields $\pi_d^e = 0$. Substituting into (1)-(3):

$$\pi = 0 \tag{7}$$

$$y = \eta \tag{8}$$

Thus, the central bank is able to achieve its bliss level of inflation, but at the cost of not being able to react at all to the output shock.

For a given realization of the stochastic shocks, the corresponding welfare loss under a de jure pegged exchange rate regime is thus:

$$L_{Peg}(\eta) = \frac{1}{2}\left\{A(\eta - \overline{y})^2\right\} \tag{9}$$

while the ex ante expected loss is:

[7] More generally, *A* can be interpreted as the marginal benefit of generating surprise inflation for any reason (for example, erosion of public debt).

$$L_{Peg} = \frac{1}{2}\left\{ A\sigma_{\eta}^{2} + A\overline{y}^{2} \right\} \tag{10}$$

Free float

Under a floating exchange rate regime, the central bank is free to choose its domestic credit policy to minimize its loss function. Substituting (3) into (6) where $\Delta m = \Delta DC$, and solving for the first-order condition for the optimal choice of monetary policy (DC), we get:

$$\Delta DC = \frac{A\theta(\overline{y} - \eta) - \pi_{d}^{e}(\beta v + A\theta^{2}(v-1))}{1 + A\theta^{2}} \tag{11}$$

Substituting (11) into (3) and taking expectations yields:

$$\pi_{d}^{e} = \frac{A\theta\overline{y}}{1-(1-\beta)v} > 0 \tag{12}$$

Optimal monetary policy becomes:

$$\Delta DC = \frac{(1-v)A\theta\overline{y}}{1-(1-\beta)v} - \frac{A\theta\eta}{1+A\theta^{2}} \tag{13}$$

From (13), the higher the central bank's target for output, $\overline{y} > 0$, the more expansionary will be discretionary monetary policy under the float, and correspondingly, the higher the domestic good and overall inflation rates:

$$\pi_{d} = \frac{A\theta\overline{y}}{1-v(1-\beta)} - \frac{A\theta\eta}{1+A\theta^{2}} \tag{14}$$

$$\pi = A\theta\overline{y} - \frac{A\theta\eta}{1+A\theta^{2}} \tag{15}$$

Using (1), however, output is independent of the central bank's target level of output because workers perfectly anticipate the central bank's incentive to generate surprise inflation:

$$y = \theta(\pi_{d} - \pi_{d}^{e}) + \eta = \frac{\eta}{1+A\theta^{2}} \tag{16}$$

The welfare loss for a given realization of shocks under a free float is thus:

$$L_{Flt}(\eta) = \frac{1}{2}\left\{ A\left(\frac{\eta}{1+A\theta^{2}} - \overline{y}\right)^{2} + \left(A\theta\overline{y} - \frac{A\theta\eta}{1+A\theta^{2}}\right)^{2} \right\} \tag{17}$$

and the expected loss is:

$$L_{Flt} = \frac{1}{2}\left\{ A\overline{y}^{2}(1+A\theta^{2}) + \frac{A\sigma_{\eta}^{2}}{1+A\theta^{2}} \right\} \tag{18}$$

Comparison of Regimes

The choice between a peg and a float depends on the trade-off between the anti-inflation credibility afforded by the peg and the ability to use an activist monetary policy to offset real

output shocks under a float. If the central bank has a large incentive to generate surprise inflation—or the private sector believes that it has ($\bar{y} = 0, \bar{y}^e > 0$)—then a pegged exchange rate regime dominates by solving the time-consistency problem.[8] Conversely, if the central bank does not have such an incentive—and enjoys credibility—then a flexible exchange rate that allows it to react to output shocks would be preferable. The exact condition under which ex ante expected welfare is higher under a pegged regime is given by a comparison of (10) and (18):[9]

$$L_{Peg} < L_{Flt} \Leftrightarrow A\sigma_\eta^2 + A\bar{y}^2 < A\bar{y}^2(1 + A\theta^2) + \frac{A\sigma_\eta^2}{1 + A\theta^2} \Leftrightarrow \frac{\sigma_\eta^2}{1 + A\theta^2} < \bar{y}^2 \tag{19}$$

While ex ante expected welfare (19) is the correct criterion for the optimal choice of regime, a decision to abandon an existing peg would be based on the welfare gain (for a given realization of the shock, η) from floating the exchange rate relative to the cost of exiting the peg, which we denote by *c*. When the private sector expects the peg to be maintained, $\pi_d^e = 0$, the central bank's welfare gain by abandoning the peg and floating the exchange rate is given by $L_{Peg}(\eta) - L_{Flt,(\pi_d^e=0)}(\eta)$. Therefore, the central bank exits the peg if:

$$L_{Peg}(\eta) - L_{Flt,\pi_d^e=0}(\eta) = \frac{A^2\theta^2(\eta - \bar{y})^2}{1 + A\theta^2} > c \tag{20}$$

where *c* captures the political and economic costs of the central bank reneging on the commitment to peg the exchange rate.[10]

C. Hybrid Cases: Closet Pegs and Soft Pegs

Closet peg

We model a closet peg as a regime where the central bank does not make a formal commitment to maintain the parity (or, put differently, the cost, *c*, of abandoning a de facto peg is assumed to be lower than the cost of exiting a de jure peg).[11] As shown above, in the

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[8] When the central bank does not have the incentive to create surprise inflation $(\bar{y} = 0)$, but the private sector believes that it has, $\bar{y}^e > 0$, then $\pi_d^e = A\theta\bar{y}^e / (1 - (1 - \beta)\nu) > 0, y = -A\theta^2\bar{y}^e / (1 + A\theta^2) < 0$. Therefore, even though the central bank does not actually have the incentive to generate surprise inflation, its lack of credibility implies that the economy has an inflationary bias and output is lower than its natural rate, yielding a welfare cost $L_{Flt} = 1/2\{(A(A\theta^2\bar{y}^e)^2 + \sigma_\eta^2)/(1 + A\theta^2)\} > 0$. This explains why disinflation under imperfect credibility will be costly (and why central banks with a history of high inflation often peg the currency in exchange-rate based stabilization programs).

[9] When the central bank does not have the incentive to generate surprise inflation but the private sector believes that it has $\bar{y} = 0, \bar{y}^e > 0$, then the condition becomes: $\sigma_\eta^2 < \bar{y}^{e2}$.

[10] Politically, as documented by Cooper (1971) and Frankel (2005), the incumbent government faces a significantly greater probability of losing office following devaluation from a de jure peg than otherwise. In terms of economic costs, the greater the private sector's confidence that the peg will be maintained, the larger its foreign currency debt exposure is likely to be, making any eventual devaluation that much more costly.

[11] This corresponds to Calvo and Reinhart's (2002) "fear of floating" case.

face of a sufficiently large real shock, the central bank will abandon its peg and generate surprise inflation to offset the negative shock to output. Let ρ be the probability that the peg survives, and (1-ρ) the probability that it is abandoned.[12] In forming its expectations, the private sector now needs to take into the possibility that the peg may be abandoned:

$$\pi_d^e = (\rho \times 0) + (1-\rho)\frac{A\theta\overline{y} + \pi_d^e(\nu(1-\beta) + A\theta^2)}{1 + A\theta^2} \tag{21}$$

Solving for expected inflation as a function of the probability that the peg survives:

$$\pi_d^e(\rho) = \frac{(1-\rho)A\theta\overline{y}}{[1 + \rho A\theta^2 - (1-\rho)\nu(1-\beta)]} > 0 \tag{22}$$

Expected inflation is given by (22) for some $\rho < 1$.[13] Under the de facto peg, however, it remains the case that the central bank maintains the parity implying $\Delta e = 0$, which from (5) requires that $\Delta m = 0$. Substituting (22) into (3) shows that even if the parity is maintained (Δe=Δm=0), the expectation of inflation will lead to some positive consumer price inflation:[14]

$$\pi = \frac{\beta\nu(1-\rho)A\theta\overline{y}}{[1 + \rho A\theta^2 - (1-\rho)\nu(1-\beta)]} > 0 \tag{23}$$

Soft peg

Under a soft peg, the central bank de jure pegs the exchange rate, but de facto chooses a discretionary monetary policy that is inconsistent with maintaining the peg. Despite the de jure commitment, the central bank's credibility is likely to be low in these circumstances, so inflation will again be given by (22) for some $\rho < 1$. Substituting (22) into (11) yields the optimal discretionary monetary policy, given the private sector's expectations:

$$\Delta DC(\pi_d^e(\rho)) = \frac{A\theta\overline{y}(1-(1-\rho)\nu)}{(1 + \rho A\theta^2 - (1-\rho)\nu(1-\beta)} \tag{24}$$

Substituting into (3) yields the domestic and overall CPI inflation rates::

$$\pi_d = \frac{A\theta\overline{y}}{(1 + \rho A\theta^2 - (1-\rho)\nu(1-\beta))} > 0 \tag{25}$$

$$\pi = \frac{A\theta\overline{y}(1-(1-\rho)\nu(1-\beta))}{1 + \rho A\theta^2 - (1-\rho)\nu(1-\beta))} > 0 \tag{26}$$

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[12] That is, $1 - \rho = \Pr\left(A^2\theta^2(\eta - \overline{y})^2 / (1 + A\theta^2) > c\right)$.

[13] For ρ=1, (22) collapses to $\pi_d^e = 0$ and π=0, the case of pure pegs.

[14] The positive expectation of inflation together with the tight monetary policy, $\Delta m = 0$, implies that the economy suffers an output loss: $y = \theta(\pi_d - \pi_d^e) = \theta(\nu - 1)\pi_d^e < 0$, akin to the "imperfect credibility" case under a pure peg.

both of which are again positive.[15] It is noteworthy, however, that soft pegs are not likely to last long because the central bank's monetary policy, $\Delta DC > 0$, is inconsistent with maintaining the parity.[16]

D. Inflation Performance under Alternative Regimes

Abstracting from realizations of the stochastic shock, η, the results obtained above can be used to rank average inflation rates across the various exchange rate regimes. First, from (7), inflation is lowest (actually, equal to the central bank's bliss value, here normalized to zero) under a pure peg. Under all other regimes, inflation is strictly positive.

Second, comparing (23) and (26) shows that, if the credibility of the peg is similar between closet pegs (where the central bank does not commit to maintain the peg but follows a monetary policy consistent with doing so) and soft pegs (where the central bank does commit to maintain the parity but then is not observed to do so), then inflation will be higher under the latter:

$$\pi_{SoftPeg} > \pi_{ClosetPeg} \Leftrightarrow 1-(1-\rho)\nu(1-\beta) > \beta\nu(1-\rho) \Leftrightarrow 1-(1-\rho)\nu > 0 \tag{27}$$

Third, comparing inflation under a soft peg to that under a free float (15) shows that inflation will be higher under the free float, that is, commitment matters:

$$\begin{aligned} &\pi_{Flt} > \pi_{SoftPeg} \Leftrightarrow 1+\rho A\theta^2-(1-\rho)\nu(1-\beta)) > (1-(1-\rho)\nu(1-\beta)) \\ &\Leftrightarrow \rho A\theta^2-(1-\rho)\nu(1-\beta)) > -(1-\rho)\nu(1-\beta) \Leftrightarrow \rho A\theta^2 > 0 \end{aligned} \tag{28}$$

Putting the chain together yields the following relative ranking of inflation performance across regimes:

$$\pi_{Flt} > \pi_{SoftPeg} > \pi_{ClosetPeg} > \pi_{PurePeg} \tag{29}$$

This ranking reflects both monetary discipline and confidence effects. To the extent that the central bank de facto maintains the parity, it must exhibit monetary discipline, $\Delta m = 0$. To the extent that the de jure commitment is credible (the private sector assigns a low probability to that the peg will be abandoned), expected inflation is low, engendering confidence in the currency and raising (the growth rate of) money demand, in turn implying that actual inflation is correspondingly lower for a *given* rate of monetary expansion.

E. Empirical Specification

Next, we assess whether the two key predictions of the model—that inflation is lower under pegs than under floats; and that among pegs, inflation is lowest when formal commitment is backed by deeds—hold. To do so, we first estimate the relationship between inflation and pegged exchange rate regimes, controlling for other factors that are likely to determine inflation:

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[15] When the probability of exiting the peg is unity, that is, $\rho = 0$, (25) and (26) collapse to the case of free floats.

[16] As documented below, in fewer than 2 percent of de jure pegs does the exchange rate de facto float.

$$\pi_{it} = \beta_0 + \beta_1 X_{it} + \beta_{Peg} Peg_{it} + \beta_{Int} Int_{it} + \beta_{Mon} \Delta m_{it} + v_t + \varepsilon_{it} \quad (30)$$

where π_{it} is the inflation rate for country *i* at time *t*;[17] *Peg* and *Int* are dummy variables for pegged and intermediate exchange rate regimes respectively (with the floating regime as the excluded category); Δm is the growth in broad money; X includes the other likely determinants of inflation performance (real GDP growth, trade openness, central bank independence (proxied by the central bank governor turnover rate), fiscal balance, and terms of trade shocks);[18] v are year effects to capture the effect of shocks over time that are common to all countries; and ε is a random error term.[19]

In equation (30)—which constitutes our benchmark specification—the estimates of β_{Peg} and β_{Int} are the *direct* effects of exchange rate regimes on inflation that are obtained after controlling for all other possible determinants. However, as mentioned above, money growth itself may vary systematically by regime, so the exchange rate regime could also affect inflation *indirectly* through its effect on money growth:

$$\Delta m_{it} = \alpha_0 + \alpha_1 X_{it} + \alpha_{Peg} Peg_{it} + \alpha_{Int} Int_{it} + \upsilon_t + \eta_{it} \quad (31)$$

Taking into account the possibility that money growth is endogenous to the exchange rate regime as in equation (31), we also estimate the *total* effect of pegs and intermediate regimes, which adds both the direct and indirect effects. Specifically, the total effect of pegs (γ_{Peg}) is given by $\beta_{Peg}+\beta_{Mon}\alpha_{Peg}$, and that of intermediate regimes (γ_{Int}) is given by $\beta_{Int}+\beta_{Mon}\alpha_{Int}$.

We then examine whether the formal commitment to pegging matters such that inflation is lower when a de facto peg is backed by a de jure peg than when it is not. We do so by estimating two alternate specifications. In the first, we estimate equation (30) but drop the observations when a de facto peg is not supported by a de jure peg (that is, restrict the sample to pure pegs and floats only). In the second case, we retain all observations but include dummy variables to capture pure pegs, closet pegs, and soft pegs respectively:[20]

$$\pi_{it} = \beta_0 + \beta_1 X_{it} + \beta_{PP} PurePeg_{it} + \beta_{CP} ClosetPeg_{it} + \beta_{SP} SoftPeg_{it} + \beta_{Mon} \Delta m_{it} + v_t + \varepsilon_{it} \quad (32)$$

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[17] To reduce the effect of or hyper-inflation observations, the inflation rate is transformed to $\pi/(1+\pi)$.

[18] Specifically, real GDP growth and trade openness are expected to lower inflation by raising money demand and increasing the costs of monetary expansions, respectively; central bank independence (lower turnover rate) is likely to be associated with lower inflation; fiscal deficit–with direct monetization or increased aggregate demand pressures–is expected to increase inflation; while the effect of terms of trade shocks is likely to depend on how the aggregate supply and cost structure of the economy is affected (see, for example, Romer, 1993; Ghosh, Gulde and Wolf, 2003; and Rogoff et al., 2003). Recognizing the possible endogeneity between the control variables and inflation, we estimate all regressions using instrumental variables where lagged values for real GDP growth, fiscal balance, and money growth are used as instruments.

[19] We do not include country fixed effects in equation (30) as that would imply identifying the effect of exchange rate regimes solely through the time variation of the regime (so that, even if pegged exchange rates were associated with lower inflation, but no country changed its regime over time, no effect would be identified). Country fixed effects are however included in the robustness analysis below.

[20] For each of these cases, the dummy variable takes a value of one (and zero otherwise). The excluded category is the (pure) float which reflects a de jure non-peg and a de facto non-peg (intermediate or float).

which allows for a more direct comparison of the estimated effects of the pure and hybrid exchange rate regimes on inflation performance.[21]

III. EXCHANGE RATE REGIMES: CLASSIFICATIONS AND TRENDS

Any empirical study of exchange rate regimes must contend with issues of regime classification. Early work used a de jure classification—the regime declared by national authorities in the IMF's AREAR. Thereafter, de facto classifications that seek to categorize the regime according to the behavior of the exchange rate (supplemented by information on movements in foreign exchange reserves, interest rates, and parallel market exchange rates) became more common.[22] The problem in comparing macroeconomic performance under de jure versus de facto pegs is that the source of the classifications is usually quite different, and even among de facto classifications there is little agreement (correlations between them are generally quite low and in the range of 0.1-0.4), making it difficult to judge whether the various findings reflect substantive differences or simply the variety of samples and methodologies employed.

To address these problems, we employ a unique dataset that provides both a de jure and a de facto classification from a common source—the International Monetary Fund. The de jure classification is based on the IMF's AREAR database; the de facto classification draws on IMF country teams, staff reports, and staff consultations with central banks, and has been compiled by Anderson (2008).[23] Appendix I establishes that our de facto classification is generally less idiosyncratic than other de facto classifications—in the sense that, observation by observation, a higher proportion of the other classifications agree with our classification than with any other classification, giving confidence that the empirical results are likely to be robust and not driven by idiosyncrasies of the classification.

The IMF's de jure and de facto classifications group exchange rate regimes into eight categories: (i) exchange arrangement with no separate legal tender; (ii) currency board arrangement; (iii) conventional pegged arrangement (further divided into single and basket pegs); (iv) pegged exchange rates within horizontal bands; (v) crawling peg; (vi) crawling band; (vii) managed float with no predetermined path for the exchange rate, and (viii) independently floating arrangement. For the empirical analysis, we group the first three arrangements (excluding basket pegs) into the pegged exchange rate regime category; group

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[21] Specifically, if formal commitment to pegging matters for inflation, then the estimated $|\beta_{PP}| > |\beta_{CP}|$.

[22] There are four commonly used de facto classifications in the literature: (i) Ghosh, Gulde and Wolf (2003) who base their de facto classification on the behavior of the exchange rate; (ii) Levy-Yeyati and Sturzenegger (2003) who use data on exchange rates, reserves, and interest rates to characterize intervention policy; (iii) Reinhart and Rogoff (2004) who use data on the exchange rate supplemented by information on parallel market rates; (iv) a two-way classification by Shambaugh (2004) who identifies pegs based on the behavior of the exchange rate against an identified reference currency. See Ghosh, Gulde and Wolf (2003), Rogoff et al. (2003), and Bleaney and Francisco (2005) for a detailed review of these classifications.

[23] Rogoff et al. (2003) term the IMF de facto classification as a 'hybrid' classification that combines data on actual exchange rate flexibility and reserve movements, with the information on policy framework. The IMF de jure and de facto classifications have been used in Ghosh, Ostry, and Tsangarides (2010).

the next four (including basket pegs) as intermediate regimes; and classify the last one as the floating regime (see Table 1 for the distributions).

Figure 1 shows the evolution of exchange rate regimes for our sample of 145 EMDCs over the period 1980–2010.[24] Three patterns are discernible. First, among the EMEs, floating exchange rate regimes have become more popular since the 1997/98 Asian crises—though there has not been a corresponding decrease in the proportion of pegged exchange rate regimes (including de jure pegs where the central bank formally commits to maintain the parity). Second, consistent with the bipolar hypothesis (Fischer, 2001), there has been a marked "hollowing out of the middle"—particularly in de facto terms—with the proportion of intermediate regimes in the EMEs shrinking from around 64 percent in the 1980s and 1990s to about 34 percent in the last decade. Third, there is significant divergence between the de jure and de facto classifications of pegged and floating exchange rate regimes. This divergence mainly reflects countries de facto pegging their exchange rate but being unwilling to take on the de jure commitment to the pegged exchange rate (as opposed to cases where the central bank violates its formal commitment to maintain the parity by allowing the exchange rate to move, see Table 2). Indeed, of de jure pegs, almost 95 percent are also backed up a de facto peg, but of de facto pegs, only about 70 percent are also de jure pegs; in other words, closet pegs are much more common than soft pegs.[25]

IV. Inflation and The Exchange Rate Regime

A. Some Stylized Facts

The model outlined in Section II predicts that inflation will be lower under pegged exchange rates. Table 3 indicates that this prediction is indeed borne out by the data—on average inflation is systematically lower (by about 5 percentage points per year) in countries with pegs compared to countries with intermediate or floating exchange rate regimes. What lies behind this better inflation performance? The most obvious explanation is that money growth is lower under pegged regimes (the "discipline" effect). Again, this is borne out in the data: broad money growth is, on average, 9 percentage points per year lower under pegs than under the other regimes.

The model also suggests that, in addition to the greater monetary discipline, there may be a "confidence effect" whereby inflation under pegged regimes is lower even after controlling for money growth. Figure 2 plots inflation against money growth for both pegged and floating regimes, and indicates that inflation is indeed lower under pegged regimes for a *given* rate of money growth with the difference initially increasing in money growth.

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[24] See Appendix A for the countries included in the sample, and a description of variables and data sources. Our emerging market group is defined as those countries that are included either in JP Morgan's EMBI Global Index (which consists of countries that issue bonds on international markets), or in the MSCI Emerging Markets Index, but excludes countries classified as advanced by the IMF's *World Economic Outlook*.

[25] Likewise, only in 55 percent of cases where the currency de jure floats does it also de facto float.

While the statistics reported in Table 3 and Figure 2 provide initial support for the monetary discipline and credibility effects, they also indicate that divergence in policy announcement and actual behavior may have implications for inflation performance across countries. For example, inflation and money growth are slightly lower under de jure pegs than de facto pegs, and the inflation and money growth differential of pegs with intermediate regimes and floats is larger under the de jure classification (Table 3). Not surprisingly, the confidence effect—lower inflation for a given rate of money growth—is greater for de jure pegs than for de facto pegs (Figure 2).

Considering that a vast majority of de jure pegs are also de facto pegs (Table 2), the observed difference in inflation performance (between the de jure and de facto pegs) must stem from the de facto pegs that are in fact *not* de jure pegs. Figure 3 indicates that this is indeed the case—both inflation and money growth are higher in cases where the peg is not backed by formal commitment, and that the difference in inflation performance and money growth (between the de facto pegs that are not backed by words and those that are) is larger for the EMEs. Figure 3 also indicates that inflation in soft pegs is higher than in closet pegs, but that the inflation performance of soft pegs is better than that of pure floats (particularly in developing countries). The observed pattern of inflation across the pure and hybrid regimes thus corresponds with the ranking obtained from the model, as given in (29).

These statistics, while consistent with the model's predictions, are only impressionistic as they do not control for other factors that may affect money growth and inflation. In what follows, we verify that the association between the nominal exchange rate regime and inflation implied by our model still holds once we condition for other factors. In addition, we examine the importance of formal policy announcements in determining this association.

B. Estimation Results

The estimation results for the baseline equation (1) for the full sample, as well as the emerging market and developing country sub-samples, are presented in Table 4.[26] The various determinants of inflation enter the regression with the expected signs and are statistically significant (with the exception of the terms of trade variable). Specifically, higher real GDP per capita growth, a strong fiscal position, and greater trade openness are associated with lower inflation, while higher money growth, and a higher central bank turnover rate (a proxy for lack of central bank independence) tend to raise it.

Turning to the impact of the exchange rate regime, inflation under (de jure) pegged regimes is about 6 percentage points per year lower than under floating exchange rates. Of this differential, about 3 percentage points are associated with lower money growth (the discipline effect), and the remaining 3 percentage points represent the confidence effect

[26] In all estimations, we exclude observations for the year of (de jure and de facto) exchange rate regime change, and the following year. This is done to minimize any persistent effects of exchange rate arrangements even after a regime change—for example, if a peg collapses and there is a burst of inflation, this would be incorrectly attributed to the subsequent float. Excluding these years leads to slightly different sample sizes under the de jure and de facto classifications, but restricting the two samples to be equal does not alter the results.

(lower inflation for a given rate of money growth). Inflation under pegs is also lower than under the intermediate regimes, and at 5.5 percentage points, the differential is only slightly smaller than that of pegs with floats. For emerging markets and developing countries sub-samples, de jure pegs are associated with about 9 and 5 percentage points lower inflation than floating regimes, respectively, while intermediate regimes, on average, have about a 1 percentage point differential with floats.

Consistent with the findings of earlier studies, the inflation differential (through both the confidence and discipline effects) associated with de facto pegs is smaller than that associated with de jure pegs. De facto pegs are associated with about 3 percentage points lower inflation that floats, of which 2 percentage points are due to the confidence effect. The relatively smaller effect of de facto pegs on inflation for the full sample seems to come from the EMEs—where the inflation differential between pegs and floats is about 2 percentage points, less than half of that for the developing countries (about 6 percentage points).[27]

These results are in line with policy credibility models, which suggest that pegs should be associated with lower inflation both because they instill monetary discipline and engender confidence in the currency. But our findings also raise the question of why the estimated effects are weaker for de facto pegs than for de jure pegs. If the difference between de jure and de facto classifications is a matter of "deeds versus words," as argued by some earlier studies (for example, Levy-Yeyati and Sturzenegger, 2005), then this result is puzzling, since in most cases deeds are backed by words (Table 2). Rather, the effect must be coming from the de facto pegs that are not also de jure pegs, in other words, pegs that lack the central bank's commitment to maintain the parity. In the theoretical model, it is precisely this commitment, which is costly to break, that leads the central bank to maintain monetary discipline and imparts confidence in the currency, leading to lower inflation.[28] Thus, de facto pegs that are not supported by a formal commitment may not deliver the full disinflationary benefits of pegs.

Does this account for the difference in results between the de jure and de facto classifications? It does. This is readily verified by dropping those de facto pegged observations that are not also classified as de jure pegs (Table 5).[29] The inflation differential

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[27] These findings echo those of Rogoff et al. (2003) who find that the effect of de facto pegs on inflation performance is stronger for developing countries as compared to the emerging market economies.

[28] This is analogous to the institutional set up of an IT framework, which is supposed to help contain inflationary expectations through formal announcements. Genberg and Swoboda (2005) argue that in the context of exchange rate regimes, the emphasis on de facto classification has at times implied that the de jure classification is irrelevant and unhelpful. However, in other areas of economic policy, particularly monetary policy, effective communication of intention is viewed as essential. From this perspective, it is important to take into account both announcements and actions to better understand the properties of exchange rate regimes.

[29] In the consensus sample, the number of observations under the de jure and de facto classifications are different as the excluded observations based on a switch in exchange rate regime (as described in footnote 25) under the intermediate and floating categories are not the same. Restricting the consensus sample to only those observations where the classification of intermediate and floats is also the same under de jure and de facto classifications (and thus the sample under both classifications is the same) does not materially alter the results, and the coefficient for pure pegs remains larger than that for de facto pegs in the benchmark specification.

of a de facto peg relative to floats increases to 4 percentage points for the full consensus sample (4 and 8 percentage points for the EME and developing country samples, respectively).[30]

These results are also verified by the estimated alternate specification, equation (32), where we directly compare the estimated effect of de facto pegs matched by de jure pegs, with those that are not. The obtained results presented in Table 6 correspond to the pattern observed in Figure 3—inflation relative to non-pegs is lower by about 6 and 3 percentage points in the EMEs and developing country samples, respectively, when a de facto peg is supported by a de jure peg than when it is not; words matter. The results also show, however, that de jure pegs that are not matched by de facto pegs (that is, soft pegs) imply somewhat lower inflation than pure floats. While, as an empirical matter, there are very few of these cases (soft pegs are much rarer than closet pegs), this finding implies that deeds matter as well.[31]

C. Alternative Specifications and Robustness

The empirical analysis presented thus far indicates that the predictions of the policy credibility models hold—pegs are indeed associated with lower inflation as compared to more flexible exchange rate regimes—and that (de facto) pegs in which the central bank also makes a formal commitment imply lower inflation than pegs without such a commitment. We now establish the robustness of these findings through a range of sensitivity tests.

Dynamic effects

The benchmark specification looks only at the "static" relationship between the exchange rate regime and inflation, yet the impact of regimes may phase in over time. To examine any dynamic effects of pegs, we alter the baseline specification to include a variable equal to the (inverse of) the years into the peg (in addition to the peg dummy). Thus, for the first year of a peg, this variable is equal to 1; for the second year, it takes the value of 0.5, and so forth; asymptotically it approaches zero as the duration of the peg increases.[32] If the effect of pegs is dynamic, then the estimated coefficient of this (duration) variable would be significantly different from zero.

The results presented in Table 7 show that the duration of pegs is indeed important; inflation is reduced gradually over time as the peg is maintained, albeit at a diminishing rate. For example, for both de jure and de facto pegs, there is on average about a 10 percentage points reduction in inflation during the first ten years of pegging, but only 0.1 percentage point

[30] Using different de facto classifications, Ghosh, Gulde and Wolf (2003) and Rogoff et al. (2003) also find that the estimated effect of pegs is larger in the consensus sample.

[31] For EMEs, we find that soft pegs imply statistically significantly lower inflation through the monetary discipline channel than pure floats (by the same magnitude as pure pegs). This finding should however be interpreted with caution since it is based on very few observations. Specifically, 2 percent of the observations in the estimated sample correspond to the case where a de jure peg is not supported by a de facto peg. Of these, only one-tenth are EMEs while the rest are in developing countries.

[32] We also include a similar variable for duration of the intermediate regime.

reduction in the following ten years. The full effect of pegging—given by the sum of the estimated coefficients of the peg dummy and the duration variable—is larger for de jure pegs than for de facto pegs. For example, five years under a de jure peg is associated with 5 percentage points lower inflation relative to a float, whereas this differential under a de facto peg is 3 percentage points. The larger effect of de jure pegs is consistent with the results reported in Table 4. Further, as before, dropping the observations where the de facto pegs are not classified as de jure pegs, strengthens the estimated effect of de facto pegs. For both EMEs and developing countries, the inflation differential of de facto pegs relative to floats (five years into the regime) is about 1 percentage point greater in the consensus sample (Figure 4).

Capital inflows and current account surpluses

The results of the baseline specification (presented in Table 4) pertain to the average performance of the exchange rate regimes. There may however be particular circumstances in which they do not hold. For example, while pegging the exchange rate is supposed to import the credibility of the anchor currency, it can also import inflation—either because the anchor currency itself is subject to inflationary pressures or because of excessive money growth through unsterilized reserves accumulation in the face of positive balance of payments pressures (capital inflows or current account surpluses).[33]

To examine these possibilities, we restrict the sample to observations where capital inflows are large—defined as inflows above 2.5 percent of GDP (the full sample's 30th percentile for positive net flows)—or the current account surplus is large (defined as 2 percent of GDP, or about the full sample's 30th percentile for positive balances). The results presented in Table 8 show that in the face of large capital inflows, money growth is indeed higher for pegged regimes; however, the inflation differential between floating and pegged regimes remains positive for the full, and individual EME and developing country samples. By contrast, in the face of large current account surpluses, money growth is sufficiently higher under pegged regimes that the differential moves in favor of floating exchange rates. Specifically, for the full sample, de jure and de facto pegs are associated with 4-6 percentage points higher inflation than floating exchange rate regimes—with the effect stemming entirely from the money growth rather channel. For developing countries, even under large current account surpluses, pegs do not have significantly higher inflation than floating regimes.

In addition to the effect of large current and capital account surpluses, we also assess the effect of inflation in the anchor country (to which the currency is pegged) by including it in the regression.[34] The results show that the estimated effect of anchor country inflation is strongly positive, while the negative effect of pegs increases—indicating that higher inflation

[33] In the model developed above, it was assumed that under pegged exchange rate regimes, changes in domestic credit fully sterilize any capital flows, keeping the money supply constant. In practice, the central bank may not fully sterilize capital flows, including because of the costs of sterilization.

[34] The inflation rate for the anchor or reference currency (where such a currency can be identified) is included for pegged and intermediate regimes, while it is assumed to be zero for floating regimes. The results for this exercise are not reported here but are available upon request.

of the anchor currency is indeed imported by pegged countries. That said, at least for the EMDCs, inflation of the anchor currencies was not sufficiently high over the sample period for the countries that pegged to them to experience higher inflation than countries with intermediate regimes or floats.

Regime endogeneity

One difficulty in interpreting the results pertains to the potential endogeneity of the exchange rate regime itself. For example, if countries with low inflation—perhaps because of strong national consensus on the need for price stability—also have a greater proclivity, or ability, to peg their exchange rate, then the estimated effect on inflation of pegging the exchange rate regimes may be biased upward. To address this issue, we estimate a simultaneous equation system that allows explicitly for regime endogeneity.[35]

Specifically, we estimate a probit model where the decision to adopt a pegged regime (rather than an intermediate or floating exchange rate regime) is modeled as a function of the inflation rate, the control variables included in the baseline specification, and several variables deemed exogenous that may affect the choice of exchange rate regime but otherwise are not expected to have an effect on the inflation rate (such as the country's population size and the geographic concentration ratio of its exports). The predicted value of the exchange rate regime variable from the probit model is then used in the second stage regression to estimate the inflation rate.[36]

The results presented in Table 9 indicate that taking account of regime endogeneity does not make a large difference to the estimated effect of pegs on inflation performance: for the full sample, de jure and de facto pegs are associated with about 7 and 4 percentage points lower inflation, respectively, than the intermediate and floating regimes through both the credibility and monetary discipline channels.

Freely falling regimes and hard pegs

Another concern with both de jure and de facto classifications is that the floating category conflates countries that *choose* to float their exchange rate ("freely floating") with those that *must* float because they are in a state of economic and financial collapse ("freely falling" in the terminology Reinhart and Rogoff (2004)). To address the concern that the float may not be a country's natural choice, we exclude all observations from the sample that correspond to floaters but where either the nominal exchange rate depreciation is greater than 25 percent per year or the inflation rate exceeds 40 percent per year.

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[35] In principle, the non-linearity of the probit function is sufficient to identify the inflation regression; in practice, an exclusion restriction makes for more compelling identification; we assume that country size and export concentration influence the choice of exchange rate regime but not inflation directly.

[36] The probit and second-stage regressions are estimated simultaneously to correct the standard errors for cross-equation correlation. The exogenous variables (population size and the geographic concentration ratio of the country's top-three exports) are estimated to have a significant effect on regime choice—with both smaller and export-wise less geographically diversified countries more likely to opt for a peg.

Table 9 shows that excluding the freely falling regimes (using either definition) from the sample does not change the finding of lower inflation under pegged regimes—the inflation differential of pegged regimes vis-à-vis the floaters remains about 1-3 percentage points for the full sample, while intermediate regimes are associated with about 1-3 percentage points higher inflation than floats.[37]

Likewise, although hard pegs (currency boards and monetary unions) tend to have the lowest inflation rates among pegged exchange rate regimes, reassuringly the results are not entirely driven by them. Excluding all observations of hard pegs from the pegged regime category leads to a statistically significant inflation differential in favor of pegs vis-à-vis floats.[38]

V. CONCLUSION

This paper revisits the link between exchange rate regimes and inflation performance in 145 emerging market and developing countries over the period 1980–2010. We employ a novel dataset on de jure and de facto exchange rate regime classifications, which affords a more meaningful comparison of the results obtained from the two classifications, and allows us to reconcile differences in the findings of previous studies.

In line with the predictions of policy credibility models, our empirical results suggest that pegs are a useful commitment device and are associated with lower inflation in emerging market and developing countries. This effect is achieved through both monetary discipline (implying a lower rate of money growth) and greater credibility (whereby lower inflationary expectations lead to higher money demand and therefore lower inflation for a given rate of money growth).

Naturally, if the central bank does not follow through on its de jure commitment, then its credibility will soon be lost, as will the low-inflation advantage of pegging. Empirically, however, such "soft pegs" are rare. More common are closet pegs (de facto peg without the de jure commitment) where our analysis suggests that inflation will be significantly higher than if the central bank had made the corresponding de jure commitment as well. As such, deeds matter, but so do words.

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[37] In addition, since IT can be a substitute for the credibility effects of the central bank's commitment under a peg, we compare pegged exchange rate regimes to inflation-targeters (rather than to all floating regimes). The results (not reported here) for both EMEs and developing countries show that although the inflation differential is slightly reduced, pegs strongly out-perform inflation-targeters, indicating larger credibility gains for these countries from pegging.

[38] In addition, we also test the robustness of our results to the inclusion of country-specific effects, and to different time periods (results not reported here). We control for possible country specific effects in a variety of ways. We augment the baseline regression with the inclusion of per capita income and regional dummies; we add the lagged dependent variable; and we include country fixed effects in a specification comparing pegs to intermediate and floating exchange rate regimes. In each case, the estimated coefficient of pegs, though somewhat slightly smaller than in the baseline specification, remains statistically significant in the consensus sample. The results also hold when we split the sample to two sub-samples covering 1980–1994, and 1995–2010.

Since most de jure pegs are also de facto pegs, but many de facto pegs are not de jure pegs, our results help reconcile the findings of studies based on the de jure classification (which generally conclude that pegging the exchange rate is associated with lower inflation) and studies based on de facto classifications (which tend to find much weaker effects of pegs). Also, while the literature in recent years has tended to shift away from the use the de jure classification of exchange rate regimes, our results underscore the importance of both de jure and de facto classifications.

Of course, low inflation is just one macroeconomic objective—albeit an important one for a central bank, and one that is likely to be closely related to the choice of exchange rate regime. What our results show is that promising to maintain the parity and delivering on that promise yields the greatest benefit in terms of price stability. A fuller analysis would take account of the impact of de jure versus de facto pegs on other variables—for instance, susceptibility to currency crises. This is left to future research, which could usefully explore the overall cost-benefit calculus of pegged exchange rate regimes, including when words do—or do not—match deeds.

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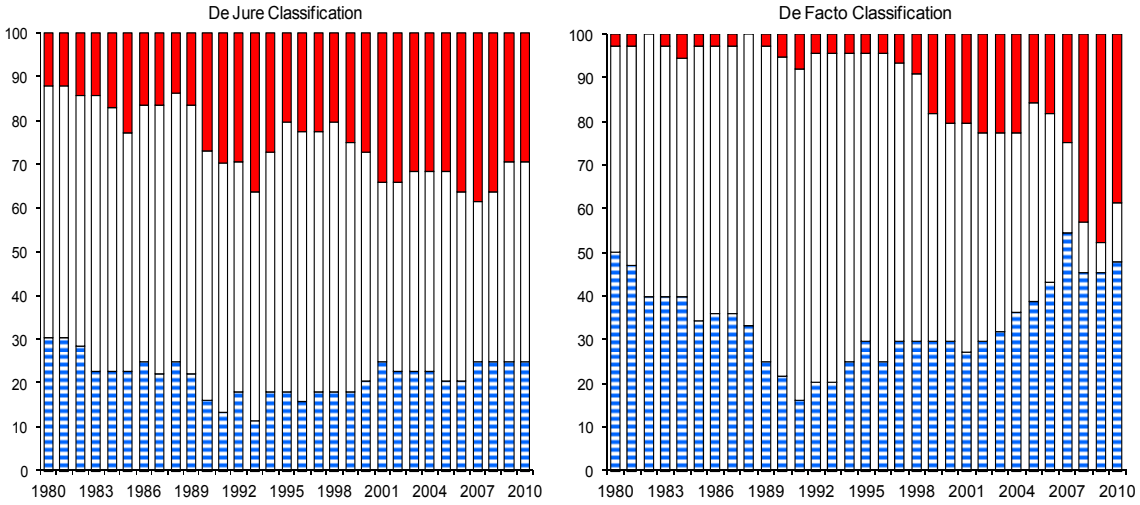
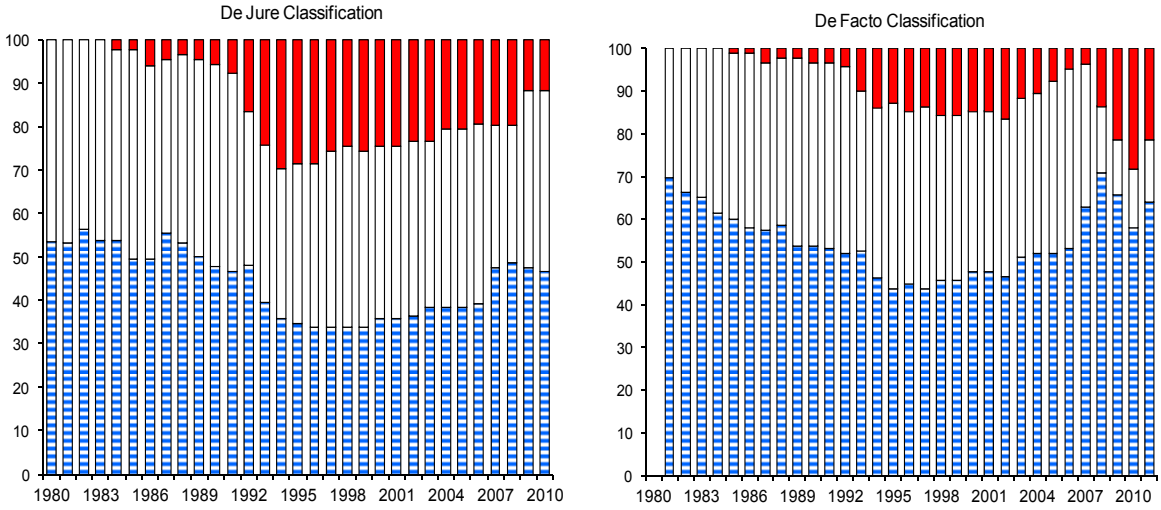
Figure 1. Frequency Distribution of Exchange Rate Regimes, 1980–2010
(in percent)

(i) Emerging Market Economies

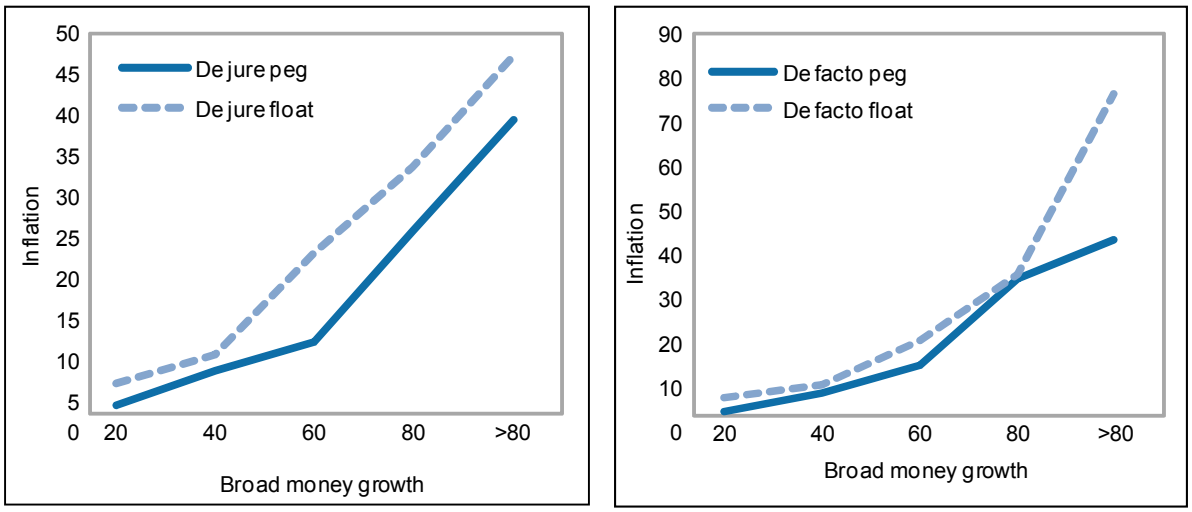


(ii) Developing Economies



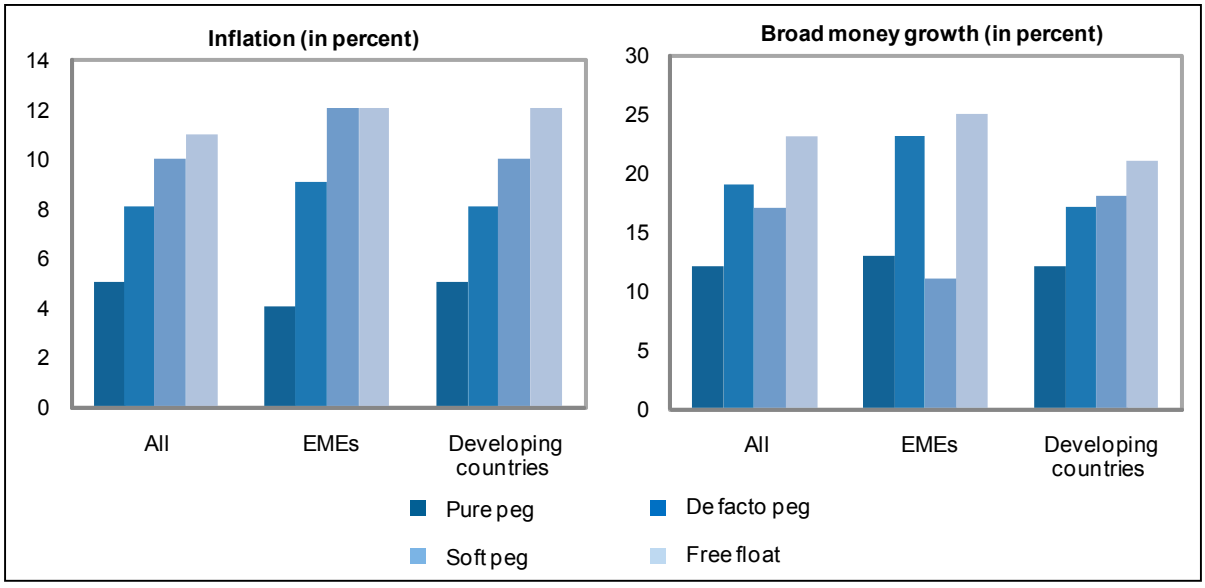
Source: Authors' estimates based on IMF's AREAR, and Anderson (2008).

Figure 2. Money Growth and Inflation under Alternative De Jure and De Facto Regimes, 1980–2010* (in percent)



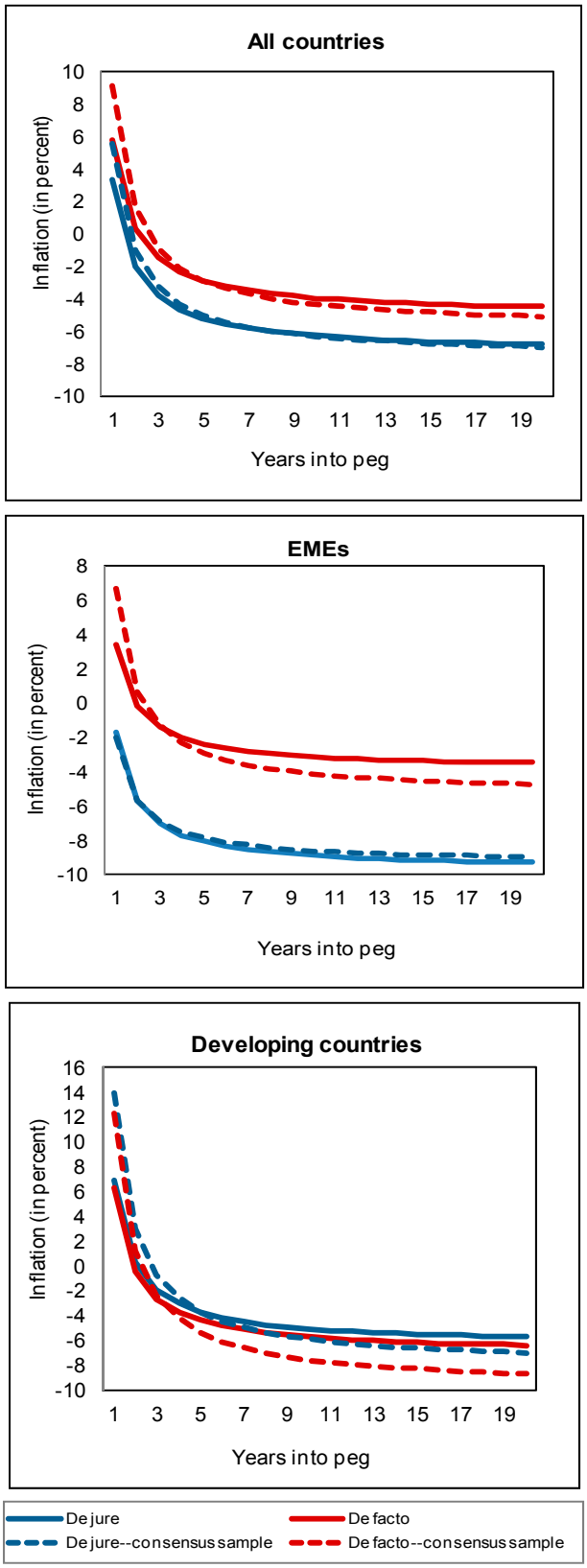
Source: Authors' estimates.
* Figure shows the relationship between broad money growth and inflation (in percent per year) under alternative de jure and de facto regime classifications. The inflation rate has been transformed by: inflation/(1+inflation).

Figure 3. Inflation and Money Growth under Pegs and Non-Pegs, 1980–2010*



Source: Authors' estimates.
Based on the estimated sample where inflation is transformed as follows: inflation/(1+inflation).

Figure 4. Dynamic Effect of De Jure and De Facto Pegs on Inflation*



Source: Authors' estimates.
*Figure shows estimated inflation dynamics following adoption of a de jure or de facto peg.

Table 1. Classification of Exchange Rate Regimes, 1980–2010
(in percent of observations)

	Full Sample 1980-2010	Sub-samples 1980-1989	1990-1999	2000-2010	Full Sample 1980-2010	Sub-samples 1980-1989	1990-1999	2000-2010
	De Jure classification				*De Facto classification*			
Pegged regimes	**36.8**	**44.4**	**31.8**	**35.6**	**47.8**	**53.1**	**40.0**	**50.8**
Hard pegs	17.3	18.5	19.6	14.5	17.4	18.5	19.4	14.7
Conventional pegs	19.5	26.0	12.1	21.1	30.5	34.6	20.6	36.1
Intermediate regimes	**44.4**	**49.2**	**44.8**	**40.4**	**41.1**	**45.1**	**49.3**	**31.1**
Basket pegs	11.9	22.3	12.6	3.6	10.7	19.5	11.7	3.3
Pegged within bands	6.5	10.0	4.7	5.4	1.7	2.2	1.9	1.2
Crawiling pegs/band	2.5	2.7	2.9	2.1	11.6	16.5	14.4	5.5
Managed floats	23.5	14.2	24.6	29.3	17.2	6.9	21.3	21.0
Floating regimes	**18.9**	**6.4**	**23.4**	**23.9**	**11.1**	**1.8**	**10.7**	**18.2**
Independent floats	18.9	6.4	23.4	23.9	11.1	1.8	10.7	18.2

Source: Authors' estimates based on IMF's AREAER and Anderson (2008).

Table 2. Distribution of De Jure and De Facto Classifications, 1980–2010
(in percent of observations)

De Facto classification	De Jure Classification: Pegged	Intermediate	Floating	Total	Percentage consensus
Pegged	1,430	484	85	1,999	71.5
Intermediate	76	1,260	363	1,699	74.2
Floating	20	103	338	461	73.3
Total	1,526	1,847	786	1,386	
Percentage consensus	93.7	68.2	43.0		

Source: Authors' estimates based on IMF's AREAR, and Anderson (2008).

Table 3. Inflation and Money Growth under Alternative Regimes, 1980–2010*
(in percent per year)

	De Jure			**De Facto**		
	Peg	Intermediate	Float	Peg	Intermediate	Float
			Inflation			
All countries	5.4	10.3	10.5	5.8	11.2	9.4
Emerging markets	4.7	11.3	11.1	6.0	12.6	7.5
Developing countries	5.5	9.4	9.7	5.7	9.8	11.2
			Broad money growth			
All countries	12.7	22.1	21.9	14.1	23.3	18.6
Emerging markets	13.0	25.4	21.6	16.5	26.5	14.2
Developing countries	12.6	19.1	22.2	13.3	20.0	22.7

Source: Authors' estimates.
* Based on the estimated sample. Inflation is transformed as follows: inflation/(1+inflation).

Table 4. Inflation Performance: Benchmark Specification

	De Jure Classification				De Facto Classification			
	Direct Effect		Total Effect 2/		Direct Effect		Total Effect 2/	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
All countries								
Constant	0.041	2.93 ***	0.041	2.93 ***	0.025	1.79 *	0.025	1.79 *
Pegged regimes	-0.029	-4.83 ***	-0.063	-11.76 ***	-0.019	-3.80 ***	-0.034	-7.35 ***
Intermediate regimes	-0.002	-0.50	-0.008	-1.680 *	0.011	1.00	0.027	5.16 ***
Money growth	0.391	6.41 ***	0.391	6.41 ***	0.404	5.69 ***	0.404	5.69 ***
GDP growth	-0.459	-3.86 ***	-0.459	-3.86 ***	-0.440	-3.28 ***	-0.440	-3.28 ***
Openness	-0.026	-6.50 ***	-0.026	-6.50 ***	-0.022	-4.40 ***	-0.022	-4.40 ***
Central bank turnover rate	0.040	4.44 ***	0.040	4.44 ***	0.040	4.00 ***	0.040	4.00 ***
Terms of trade growth	0.000	0.00	0.000	0.00	0.013	0.93	0.013	0.93
Fiscal balance (in pct. of GDP)	-0.108	-2.20 **	-0.108	-2.20 **	-0.187	-4.79 ***	-0.187	-4.79 ***
Number of observations, R^2	2,024	0.432	2,024	0.432	1,881	0.419	1,881	0.419
Emerging market countries								
Constant	0.037	1.54	0.037	1.54	0.023	0.92	0.023	0.92
Pegged regimes	-0.042	-3.23 ***	-0.087	-10.45 ***	-0.020	-2.50 **	-0.022	-3.00 ***
Intermediate regimes	-0.005	-0.83	-0.011	-1.801 *	0.022	2.75 ***	0.051	7.189 ***
Number of observations, R^2	790	0.524	790	0.524	707	0.521	707	0.521
Developing countries								
Constant	0.041	2.93 ***	0.041	2.93 ***	0.028	2.33 **	0.028	2.33 **
Pegged regimes	-0.026	-3.71 ***	-0.054	-7.02 ***	-0.028	-3.50 ***	-0.056	-7.69 ***
Intermediate regimes	-0.002	-0.29	-0.012	-1.637	-0.003	-0.38	-0.008	-1.093
Number of observations, R^2	1,234	0.373	1,234	0.373	1,174	0.347	1,174	0.347

Source: Authors' estimates.

1/ Regression of inflation (decimal fraction, per year) on regime dummy variables, and other control variables. Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP growth, fiscal balance, and money growth where lagged values are used as instruments. All specifications include time effects. t-statistics based on clustered standard errors. Negative coefficient on pegged or intermediate exchange rate regime dummies indicates lower inflation under that regime relative to inflation under floating exchange rate regimes (the omitted category). For example, the coefficient of -0.063 for pegged regimes implies 6.3 percent per year lower inflation under pegged exchange rate regimes compared to floats. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime on inflation, plus indirect effect through money growth.

Table 5. Inflation Performance: Consensus between De Jure and De Facto Pegs

	De Jure Classification				De Facto Classification			
	Direct Effect 2/		Total Effect		Direct Effect 2/		Total Effect	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
All countries								
Constant	0.033	2.20 **	0.033	2.20 **	0.012	0.71	0.012	0.71
Pegged regimes	-0.028	-4.67 ***	-0.064	11.28 ***	-0.020	-3.33 ***	-0.043	8.75 ***
Intermediate regimes	0.004	0.80	0.004	0.80	0.010	1.20	0.028	5.06 ***
Number of observations, R^2	1,682	0.441	1,682	0.441	1629	0.429	1629	0.429
Emerging market countries								
Constant	0.040	1.48	0.040	1.48	0.027	1.04	0.027	1.04
Pegged regimes	-0.041	-3.15	-0.085	9.74 ***	-0.022	-2.20 **	-0.037	4.28 ***
Intermediate regimes	0.001	0.14	-0.009	1.26	0.020	2.50 **	0.045	6.35 ***
Number of observations, R^2	673	0.523	673	0.523	639	0.521	639	0.521
Developing countries								
Constant	0.015	0.94	0.015	0.94	-0.006	-0.33	-0.006	-0.33
Pegged regimes	-0.028	-4.00	-0.064	7.40 ***	-0.031	-3.88 ***	-0.080	9.30 ***
Intermediate regimes	0.005	0.71	0.005	0.62	-0.003	-0.38	-0.015	1.90 *
Number of observations, R^2	1,009	0.388	1,009	0.388	990	0.351	990	0.351

Source: Authors' estimates.

1/ Regression of inflation (decimal fraction, per year) on regime dummy variables, and other control variables. Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP grow th, fiscal balance, and money grow th w here lagged values are used as instruments. All specifications include time effects. t-statistics based on clustered standard errors. Negative coefficient on pegged or intermediate exchange rate regime dummies indicates low er inflation under that regime relative to inflation under floating exchange rate regimes (the omitted category). For example, the coefficient of -0.064 for pegged regimes implies 6.4 percent per year low er inflation under pegged exchange rate regimes compared to floats. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime on inflation, plus indirect effect through money grow th.

Table 6. Inflation Performance: Consensus between De Jure and De Facto Classifications

	All countries				Emerging market countries				Developing countries			
	Direct effect		Total effect 2/		Direct effect		Total effect 2/		Direct effect 2/		Total effect 2/	
	coef.	t-stat	coef.	t-stat	coef.	t-stat	coef.	t-stat	coef.	t-stat	coef.	t-stat
Constant	0.041	3.15 ***	0.041	3.15 ***	0.036	1.50	0.036	1.50	0.042	3.23 ***	0.042	3.23 ***
Pure peg	-0.033	-6.60 ***	-0.066	-15.26 ***	-0.042	-3.50 ***	-0.081	-11.08 ***	-0.031	-6.20 ***	-0.056	-10.89 ***
De facto peg	-0.012	-2.40 **	-0.025	-4.84 ***	-0.016	-1.78 *	-0.025	-1.85 *	-0.013	-2.17 **	-0.028	-4.26 ***
Soft peg	0.011	1.22	-0.015	-1.85 *	0.006	0.17	-0.08	-2.09 **	0.013	1.63	0.006	0.74
Money growth	0.388	6.36 ***	0.388	6.36 ***	0.453	4.49 ***	0.453	4.49 ***	0.330	5.08 ***	0.330	5.08 ***
GDP growth	-0.471	-3.93 ***	-0.471	-3.93 ***	-0.819	-4.96 ***	-0.819	-4.96 ***	-0.171	-0.99	-0.171	-0.99
Openness	-0.025	-6.25 ***	-0.025	-6.25 ***	-0.029	-4.83 ***	-0.029	-4.83 ***	-0.020	-3.33 ***	-0.020	-3.33 ***
Central bank turnover rate	0.038	4.22 ***	0.038	4.22 ***	0.051	2.83 ***	0.051	2.83 ***	0.034	3.09 ***	0.034	3.09 ***
Terms of trade growth	0.001	0.07	0.001	0.07	-0.002	-0.05	-0.002	-0.05	0.001	0.07	0.001	0.07
Fiscal balance (in pct. of GDP)	-0.139	-2.84 ***	-0.139	-2.84 ***	-0.107	-1.26	-0.107	-1.26	-0.212	-4.16 ***	-0.212	-4.16 ***
Number of observations, R^2	2,024	0.438	2,024	0.438	790	0.527	790	0.527	1,234	0.383	1,234	0.383

Source: Authors' estimates.

1/ Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP grow th, fiscal balance, and money grow th w here lagged values are used as instruments. Pure peg is a binary variable equal to one if both classifications indicate a peg (and zero otherw ise). De facto peg is a binary variable if the de jure classification indicates a nonpeg (intermediate or float) but the de facto classification indicates a peg (and zero otherw ise). Soft peg is a binary variable if the de jure classification indicates a peg but the de facto classification indicates a nonpeg (and zero otherw ise). Negative coefficient on pure, closet, or soft pegs indicates low er inflation under that regime relative to inflation under (pure) nonpegs. For example, the coefficient of -0.066 for pure pegs implies 6.6 percent per year low er inflation under pegged exchange rate regimes compared to floats. All specifications include time effects. t-statistics based on clustered standard errors. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime and regime duration on inflation, plus indirect effect through money grow th.

Table 7. Inflation Performance: Regime Duration

	De Jure Classification				De Facto Classification			
	Direct Effect		Total Effect 2/		Direct Effect		Total Effect 2/	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
All countries								
Constant	0.043	3.07 ***	0.043	3.07 ***	0.026	1.86 *	0.026	1.86 *
Pegged regimes	-0.035	-5.83 ***	-0.074	-12.44 ***	-0.026	-4.33 ***	-0.051	-9.94 ***
Intermediate regimes	-0.008	-1.60	-0.024	-4.43 ***	0.011	2.20 **	0.017	3.13 ***
Pegged regimes duration	0.056	2.67 ***	0.107	5.087 ***	0.042	2.2 **	0.108	5.99 ***
Intermediate regimes duration	0.044	2.00 **	0.132	5.251 ***	-0.003	1.2	0.043	2.55 **
Money growth	0.387	6.34 ***	0.387	6.34 ***	0.400	5.63 ***	0.400	5.63 ***
GDP growth	-0.473	-3.97 ***	-0.473	-3.97 ***	-0.465	-3.47 ***	-0.465	-3.47 ***
Openness	-0.027	-6.75 ***	-0.027	-6.75 ***	-0.022	-4.40 ***	-0.022	-4.40 ***
Central bank turnover rate	0.038	3.80 ***	0.038	3.80 ***	0.040	4.44 ***	0.040	4.44 ***
Terms of trade growth	0.001	0.07	0.001	0.07	0.014	1.00	0.014	1.00
Fiscal balance (in pct. of GDP)	-0.101	-2.06 **	-0.101	-2.06 **	-0.182	-4.67 ***	-0.182	-4.67 ***
Number of observations, R^2	2,024	0.435	2,024	0.435	1,881	0.421	1,881	0.421
Emerging Market Countries								
Constant	0.038	1.58	0.038	1.58	0.023	0.92	0.023	0.92
Pegged regimes	-0.048	-3.20 ***	-0.097	-10.37 ***	-0.023	-2.30 **	-0.039	-4.47 ***
Intermediate regimes	-0.008	-1.14	-0.022	-2.99 ***	0.028	3.11 ***	0.048	5.97 ***
Pegged regimes duration	0.048	1.50	0.080	2.73 ***	0.016	0.62	0.073	3.34 ***
Intermediate regimes duration	0.025	1.14	0.084	3.223 ***	-0.031	-1.82 *	0.004	0.18
Number of observations, R^2	790	0.525	790	0.525	707	0.525	707	0.525
Developing Countries								
Constant	0.041	2.93 ***	0.041	2.93 ***	0.031	2.58 ***	0.031	2.58 ***
Pegged regimes	-0.033	-4.71 ***	-0.064	-7.64 ***	-0.036	-4.50 ***	-0.071	-9.31 ***
Intermediate regimes	-0.008	-1.14	-0.029	-3.48 ***	-0.004	-0.50	-0.017	-2.11 **
Pegged regimes duration	0.076	2.92 ***	0.127	4.697 ***	0.069	2.76 ***	0.133	5.14 ***
Intermediate regimes duration	0.059	1.79 *	0.151	4.291 ***	0.011	0.48	0.050	2.001 **
Number of observations, R^2	1,234	0.379	1,234	0.379	1,174	0.354	1,174	0.354

Source: Authors' estimates.

1/ Regression of inflation (decimal fraction, per year) on regime dummy variables, and other control variables. Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP growth, fiscal balance, and money growth where lagged values are used as instruments. All specifications include time effects. t-statistics based on clustered standard errors. Negative coefficient on pegged or intermediate exchange rate regime dummies indicates lower inflation under that regime relative to inflation under floating exchange rate regimes (the omitted category). The overall effect of pegs on inflation is the sum of the main coefficient for pegs and the duration of pegs. For example, the coefficient of -0.074 for pegged regimes and 0.107 for the duration of pegged regimes implies that for peg duration equal to 5 years, inflation is 5.2 percent lower under pegged exchange rate regimes compared to floats. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime and regime duration on inflation, plus indirect effect through money growth.

Table 8. Inflation Performance under Balance of Payments Surpluses

	De Jure Classification				De Facto Classification			
	Direct Effect 2/		Total Effect		Direct Effect 2/		Total Effect	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
All countries	[1] Capital inflows exceeding 2.5 percent of GDP 3/							
Constant	-0.003	-0.33	-0.003	-0.33	0.009	0.69	0.009	0.69
Pegged regimes	-0.018	-3.60 ***	-0.0505	7.79 ***	-0.017	-2.83 ***	-0.0368	6.06 ***
Intermediate regimes	0.009	1.80 *	0.0210	4.04 ***	0.014	0.86	0.0234	3.30 ***
Number of observations, R^2	1,117	0.432	1,117	0.432	1,046	0.387	1,046	0.387
Emerging market countries								
Constant	-0.002	-0.13	-0.002	-0.13	-0.027	-1.59	-0.027	-1.59
Pegged regimes	-0.029	-2.90 ***	-0.0723	6.83 ***	-0.017	-1.89 *	-0.0298	3.22 ***
Intermediate regimes	-0.003	-0.43	0.00753	1.14	0.016	1.78 *	0.0544	5.91 ***
Number of observations, R^2	425	0.591	425	0.591	385	0.547	385	0.547
Developing countries								
Constant	-0.031	-1.82 *	-0.031	-1.82 *	0.036	1.89 *	0.036	1.89 *
Pegged regimes	-0.018	-2.57 **	-0.0617	5.10 ***	-0.026	-2.36 **	-0.0483	5.30 ***
Intermediate regimes	0.020	2.22 **	0.0221	2.53 **	0.007	0.58	0.000248	0.02
Number of observations, R^2	692	0.360	692	0.360	661	0.325	661	0.325
All countries	[2] Current account balance exceeding 2 percent of GDP 3/							
Constant	0.059	3.47 ***	0.059	3.47 ***	0.010	0.59	0.010	0.59
Pegged regimes	-0.012	-1.33	-0.002	-0.254	-0.021	-1.91 *	0.005	0.490
Intermediate regimes	-0.013	-1.63	-0.001	4.039 ***	-0.004	0.92	0.023	1.920 *
Number of observations, R^2	374	0.543	374	0.543	358	0.574	358	0.574
Emerging market countries								
Constant	0.014	0.56	0.014	0.56	-0.009	-0.38	-0.009	-0.38
Pegged regimes	-0.010	-0.56	0.045	2.17 **	-0.015	-0.94	0.026	1.51
Intermediate regimes	0.001	0.07	0.038	2.264 **	0.024	1.33	0.045	2.48 **
Number of observations, R^2	151	0.717	151	0.717	143	0.801	143	0.801
Developing countries								
Constant	0.072	4.24 ***	0.072	4.24 ***	0.076	3.17 ***	0.076	3.17 ***
Pegged regimes	-0.020	-2.00 **	-0.013	1.24	-0.056	-4.31 ***	-0.058	4.33 ***
Intermediate regimes	-0.027	-2.45 **	-0.018	1.68 *	-0.048	-3.43 ***	-0.041	2.84 ***
Number of observations, R^2	223	0.565	223	0.565	215	0.372	215	0.372

Source: Authors' estimates.

1/ Regression of inflation (decimal fraction, per year) on regime dummy variables, and other control variables. Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP growth, fiscal balance, and money growth where lagged values are used as instruments. All specifications include time effects. t-statistics based on clustered standard errors. Negative coefficient on pegged or intermediate exchange rate regime dummies indicates lower inflation under that regime relative to inflation under floating exchange rate regimes (the omitted category). For example, the coefficient of -0.063 for pegged regimes implies 6.3 percent per year lower inflation under pegged exchange rate regimes compared to floats. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime on inflation, plus indirect effect through money growth.

3/ Corresponds to the 30th percentile of positive net capital flows and positive current account balances, respectively.

Table 9. Inflation Performance: Regime Endogeneity, Freely Falling, and Hard Pegs

	De Jure Classification				De Facto Classification			
	Direct Effect 2/		Total Effect		Direct Effect 2/		Total Effect	
	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.	coef.	t-stat.
All countries			[1] Controlling for regime endogeneity 3/					
Constant	0.056	-4.51 ***	0.056	-4.51 ***	0.045	-0.01	0.045	-0.01
Pegged regimes	-0.040	3.77 ***	-0.070	-6.90 ***	-0.015	1.03	-0.043	-3.19 ***
Money growth	0.389	-27.59 ***	0.389	-27.59 ***	0.423	-21.69 ***	0.423	-21.69 ***
GDP growth	-0.517	5.12 ***	-0.517	5.12 ***	-0.394	3.86 ***	-0.394	3.86 ***
Openness	-0.034	7.74 ***	-0.034	7.74 ***	-0.032	6.19 ***	-0.032	6.19 ***
Terms of trade growth	0.000	-0.01	0.000	-0.01	0.011	-0.85	0.011	-0.85
Fiscal balance (in pct. of GDP)	-0.138	2.86 ***	-0.138	2.86 ***	-0.220	4.81 ***	-0.220	4.81 ***
Number of observations	1,908		1,908		1,764		1,764	
All countries			[2] Freely Falling: Collapsing Exchange Rates 4/					
Constant	0.016	1.00	0.016	1.00	0.032	2.29 **	0.032	2.29 **
Pegged regimes	-0.012	-2.40 **	-0.026	5.98 ***	-0.014	-2.80 ***	-0.022	5.06 ***
Intermediate regimes	0.012	3.00 ***	0.029	7.42 ***	0.015	1.00	0.029	6.15 ***
Number of observations, R2	1,947	0.363	1,947	0.363	1,827	0.358	1,827	0.358
All countries			[3] Freely Falling: High Inflation 5/					
Constant	0.020	1.25	0.020	1.25	0.034	2.43 **	0.034	2.43 **
Pegged regimes	-0.017	-3.40 ***	-0.031	7.06 ***	-0.017	-3.40 ***	-0.026	5.77 ***
Intermediate regimes	0.009	2.25 **	0.025	6.13 ***	0.013	1.00	0.026	5.28 ***
Number of observations, R2	1,988	0.355	1,988	0.355	1,857	0.351	1,857	0.351
All countries			[4] Hard Pegs 6/					
Constant	0.044	-2.99 ***	0.044	-2.99 ***	0.031	-1.847 *	0.031	-1.85 *
Pegged regimes	-0.008	1.43	-0.038	-5.50 ***	-0.005	0.896	-0.012	-2.154 **
Intermediate regimes	-0.002	0.38	-0.012	-2.29 **	0.012	-2.070 **	0.024	4.575 ***
Number of observations, R2	1,645	0.455	1,645	0.455	1,506	0.438	1,506	0.438

Source: Authors' estimates.

1/ Estimates obtained from instrumental variable estimation controlling for the endogeneity of real GDP growth, fiscal balance, and money growth where lagged values are used as instruments. All specifications include time effects. t-statistics based on clustered standard errors. *, **, and *** indicate signficance at the 10, 5 and 1 percent levels, respectively.

2/ Direct effect of exchange rate regime on inflation, plus indirect effect through money growth.

3/ Instrumental variable regression (with population size and geographic export concentration ratio as instruments) estimating the effect of pegged regimes relative to intermediate and floating regimes.

4/ Excludes floating regimes with rate of nominal exchange rate depreciation exceeding 25 percent per year.

5/ Excludes floating regimes with inflation over 40 percent per year.

6/ Excludes hard pegs (currency boards and monetary unions) from the pegs category.

APPENDIX A. DATA DESCRIPTION

Comparison of Exchange Rate Regime Classifications

The commonly used de facto exchange rate classifications differ considerably in their methodologies, and the ultimate coding of the exchange rate regimes in individual countries over the years. While a detailed review of the other available classifications is beyond the scope of this paper, a comparison of IMF's de facto classification with the other classifications reveals that it is less idiosyncratic than the other commonly used de facto classifications.[39] This means that—on average—for each (country-year) observation, the other commonly used de facto classifications agree more with the Fund's classification than with each other. Figure A1 compares the IMF's de facto (DF) and de jure (DJ) classifications with the classifications of Levy-Yeyati and Sturzenegger (LYS, 2003) and Reinhart and Rogoff (RR, 2004) using a composite measure of similarity when regimes are grouped as fixed, intermediate and floating. The constructed "similarity" index—which is a weighted average of the consensus between the classifications across the three regimes—takes a value between 0 and 1 indicating perfect dissimilarity and perfect similarity of the classifications, respectively.[40]

A comparison of the indices reveals that the IMF's classification has overall greater similarity with the other two classifications. On average, it receives a score of about 0.75 if the de jure classification is included in the comparator category (and of about 0.74 if it is not), while LYS and RR receive overall scores of 0.67, and 0.58, respectively. A low score means that the other classification methods would classify that observation differently—which does not necessarily imply that the classification is incorrect, but that any empirical results obtained using such a classification are unlikely to be robust.

The Shambaugh (JS, 2004) classification is not included in the similarity indices as it is available as a binary variable (pegs versus nonpegs) only. To include it in the comparison, we group the other exchange rate regimes (IMF, LYS, and RR) into binary variables, and compute the correlation matrix. The IMF's de facto classification is found to be the closest to the JS classification and the least similar to LYS (Table A1). About 87 percent of the observations in the IMF de facto classification are coded (as pegs or nonpegs) in the same way as in the JS classification, and the overall correlation between the two series is 0.76.[41]

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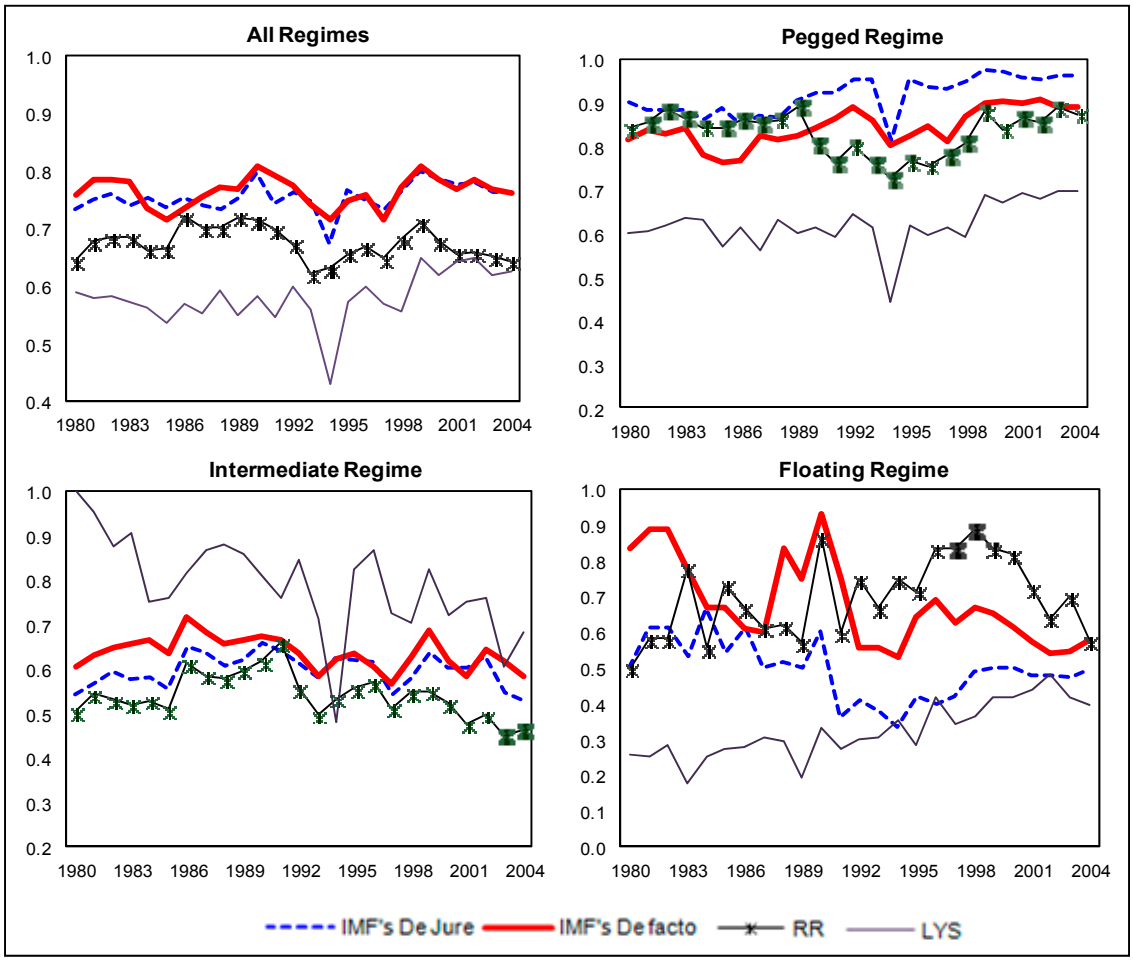
[39] Several studies provide a detailed review of the alternate classifications (see, for example, Ghosh, Gulde and Wolf, 2003; Rogoff et al., 2003; Bleaney and Francisco, 2005).

[40] Specifically, to construct the index based on DJ, DF, RR and LYS, we follow Ghosh, Ostry and Tsangarides (2010) and assign each classification a value of 1 if it agrees with any other classification. Hence, for every classification, a country-year observation receives a score of 1/3 for each other classification that agrees with it. The overall index is constructed as the weighted sum of the scores for the three regimes, with the weights being equal to the proportion of pegs, intermediate, and floats in the particular classification.

[41] For binary coding, RR's classification with codes 1-4 is considered as pegs; LYS's classification with code equal to 3 is treated as a peg; and JS's binary classification is used.

Figure A1. Similarity Index across different exchange rate regime classifications*



Source: Authors' calculations based on Anderson (2008).
*Sample period is restricted to 1980-2004 corresponding to data availability for the other classifications. Country coverage is expanded to include all countries for which data is available (advanced, EMEs, and developing countries).

Table A1. Agreement of Different Exchange Rate Regime Classifications, 1980–2004

	Percentage matching				
	IMF's De jure	IMF's De facto	JS	LYS	RR
IMF's De jure	100.0				
IMF's De facto	84.5	100.0			
JS	80.0	87.8	100.0		
LYS	69.8	59.6	62.9	100.0	
RR	77.6	77.7	82.0	54.3	100.0
	Correlation				
	IMF's De jure	IMF's De facto	JS	LYS	RR
IMF's De jure	1.0				
IMF's De facto	0.7	1.0			
JS	0.6	0.8	1.0		
LYS	0.5	0.6	0.6	1.0	
RR	0.5	0.7	0.6	0.5	1.0

Source: Authors' calculations.
*JS, LYS and RR refer to the de facto classifications of Shambaugh (2004), Levy-Yeyati and Struzenegger (2003), and Reinhart and Rogoff (2004), respectively.

Table A2. List of Countries in the Sample

EME		Developing				
Argentina	Kazakhstan	Afghanistan	Central African Rep.	Kenya	Nicaragua	Tajikistan
Belarus	Lithuania	Albania	Chad	Kiribati	Niger	Tanzania
Belize	Malaysia	Algeria	Comoros	Kuwait	Oman	Timor-Leste
Brazil	Mexico	Angola	Congo, Dem. Rep. of	Kyrgyz Rep.	Papua New Guinea	Togo
Bulgaria	Morocco	Antigua and Barbuda	Congo, Rep. of	Laos	Paraguay	Tonga
Chile	Nigeria	Armenia	Costa Rica	Latvia	Qatar	Trinidad and Tobago
China	Pakistan	Azerbaijan	Djibouti	Lesotho	Romania	Turkmenistan
Colombia	Panama	Bahamas	Dominica	Liberia	Rwanda	Uganda
Croatia	Peru	Bahrain	Equatorial Guinea	Libya	Samoa	United Arab Emirates
Côte d'Ivoire	Philippines	Bangladesh	Eritrea	Macedonia, FYR	Saudi Arabia	Uzbekistan
Dominican Rep.	Poland	Barbados	Estonia	Madagascar	Senegal	Vanuatu
Ecuador	Russia	Benin	Ethiopia	Malawi	Seychelles	Yemen
Egypt	South Africa	Bhutan	Fiji	Maldives	Sierra Leone	Zambia
El Salvador	Sri Lanka	Bolivia	Gambia, The	Mali	Solomon Islands	Zimbabwe
Gabon	Thailand	Bosnia & Herzegovina	Grenada	Mauritania	St. Kitts and Nevis	
Georgia	Tunisia	Botswana	Guatemala	Mauritius	St. Lucia	
Ghana	Turkey	Brunei Darussalam	Guinea	Moldova	St. Vincent & Grens.	
Hungary	Ukraine	Burkina Faso	Guinea-Bissau	Mongolia	Sudan	
India	Uruguay	Burundi	Guyana	Mozambique	Suriname	
Indonesia	Venezuela	Cambodia	Haiti	Myanmar	Swaziland	
Jamaica	Vietnam	Cameroon	Honduras	Namibia	Syria	
Jordan		Cape Verde	Iran	Nepal	São Tomé & Príncipe	

Table A3. Data Description and Sources

Variable	Description	Obs.	Mean	Std. Dev	Source
Broad money growth	Growth rate of broad money	1,937	0.186	0.224	IMF's WEO database
Central bank turnover rate	Central Bank governor turnover rate per 5 years	1,937	0.195	0.200	Ghosh et al. (2007)
Fiscal balance to GDP	Overall government balance to GDP	1,932	-0.029	0.051	IMF's WEO database
Geographic export concentration	Share of exports to top three destinations in total exports	1,824	0.574	0.169	IMF's DOTS
Inflation	Growth rate of Consumer Price Index. Transformed to inflation/(1+inflation)	1,937	0.085	0.095	IMF's WEO database
Population size	In millions	1,937	48.423	170.150	IMF's WEO database
Real GDP per capita growth	Growth rate of GDP (in constant prices) per capita	1,937	0.020	0.046	IMF's WEO database
Terms of trade change	Growth rate of terms of trade index				IMF's WEO database
Trade openness	Sum of exports and imports to GDP	1,937	0.768	0.407	IMF's WEO database
IMF exchange rate regime classification	Coarse classification (1=Peg; 2=Intermediate; 3=Float)				Anderson (2008)
De jure peg	Includes currency unions, currency boards, conventional pegs (excl. basket pegs)	1,937	0.366	0.481	Anderson (2008)
De jure intermediate	Includes pegs within bands, crawling pegs, basket pegs crawling band, and managed floats	1,937	0.460	0.499	Anderson (2008)
De jure float	Includes independently floating regime	1,937	0.174	0.379	Anderson (2008)
De facto peg	Includes currency unions, currency boards, conventional pegs (excl. basket pegs)	1,937	0.460	0.499	Anderson (2008)
De facto intermediate	Includes pegs within bands, crawling pegs, basket pegs crawling band, and managed floats	1,937	0.443	0.497	Anderson (2008)
De facto float	Includes independently floating regime	1,937	0.010	0.296	Anderson (2008)