Exchange Rate Proclamations and Inflation-Fighting Credibility

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Alexandra Guisinger
Assistant Professor
Department of Political Science
University of Notre Dame
aguising@nd.edu

David Andrew Singer
Assistant Professor
Department of Political Science
Massachusetts Institute of Technology
dasinger@mit.edu

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Abstract

If governments choose economic policies that often run counter to their public commitments, are those commitments meaningless? We argue that government proclamations can be critical in signaling economic policy intentions. We focus on the realm of exchange rate policy, in which countries frequently implement an exchange rate regime that differs from the officially declared regime. We argue that the official exchange rate regime is one of the most important signals of a government's economic policy preferences. When a government makes a *de jure* public commitment to a fixed exchange rate, it sends a signal to domestic and international markets of its strict monetary-policy priorities. In contrast, a government that proclaims a floating exchange rate signals a desire to retain discretion over monetary policy, even if it has implemented a *de facto* fixed rate. We use data on up to 110 developed and developing countries from 1974-2004 to test two hypotheses: first, that governments that adopt *de facto* fixed exchange rates will experience less inflation when they back up their actions with official declarations; and second, that governments that abide by their commitments—as demonstrated by a history of following through on their public declarations of a fixed exchange rate regime—will establish greater inflation-fighting credibility. Within developing countries, democratic institutions enhance this credibility. Results from fixed-effects econometric models provide strong support for our hypotheses.

It comes as no surprise that governments often pursue economic policies that differ from their official proclamations. Policymakers face short-term incentives to deviate from policy commitments that are otherwise optimal in the long term, including protecting property rights, maintaining free trade, and keeping prices stable. If deviations from official policy become the norm, then government proclamations may seem of little value. However, the disparate actors in any economy depend on signals of the government's economic policy intentions. The government's past behavior provides one such signal, but official proclamations—which are necessarily forward looking, addressing future policy behavior—are another, especially when they are clear and transparent to the public.

Exchange rate policy is one of the most important areas in which governments often deviate from their public declarations. Countries officially declare an exchange rate regime—whether fixed, floating, or somewhere in between—to the International Monetary Fund and to their own citizens, and subsequently decide how their currencies will be valued on the foreign exchange market. For many countries, the official (*de jure*) policy differs from the actual (*de facto*) policy. In an oft-cited article, Calvo and Reinhart argue that many countries demonstrate a "fear of floating," in which policymakers use monetary policy to restrict exchange rate movements even when the currency is officially floating.[1] On the other hand, scholars have long recognized that countries with officially-declared fixed exchange rates often allow their currencies to fluctuate, either in response to speculative attacks or for other politically-motivated reasons. The disjunction between *de jure* policies and exchange rate movements has prompted several economists to

[1] Calvo and Reinhart 2002; see also Haussman, Panizza, and Stein 2001 and Plümper and Troeger 2008.

develop new measures of exchange rate regimes based on actual behavior.[2] These new *de facto* measures have quickly become *de rigueur* in the literature on the political economy of monetary institutions.[3] A recent study demonstrates that the empirical literature in political science that employs *de jure* measures does not hold up when substituting these newly available *de facto* measures.[4]

In this article, we argue that government proclamations should not be so easily discarded in the study of economic policymaking. The effective communication of policy intentions is essential in monetary policymaking, and a country's official exchange rate regime is one of the most important signals of a government's economic policy preferences.[5] When a government makes a *de jure* commitment to a fixed exchange rate, it sends a signal to domestic and international markets of its strict monetary-policy priorities.[6] In contrast, a government that proclaims a floating exchange rate signals a desire to retain discretion over monetary policy, even if it has implemented a *de facto* fixed rate. In short, a fixed exchange rate is most effective as a nominal anchor for monetary policy when it is the official and unambiguous policy of the government. The implication of this argument is that words—by way of government proclamations—can be just as important as actions in the forging of monetary policy.

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[2] Reinhart and Rogoff 2004; Levy-Yeyati and Sturzenegger 2003; and Jay Shambaugh 2004.
[3] See, for example, Bearce and Hallerberg 2008; and Mukherjee and Leblang 2006.
[4] Simmons and Hainmueller 2005.
[5] Genberg and Swoboda 2005.
[6] There is a large literature on the use of various forms of fixed exchange rate regimes to combat inflation in the developed and developing world (see, for example, Ghosh, Gulde, and Wolf 2003; and Reinhart and Vegh 1999). Notable examples include Argentina's currency board and Britain's involvement in the Exchange Rate Mechanism (ERM) in the early 1990s and Mexico's Pacto in the 1980s. Nearly all of the central banks in Western Europe have attempted inflation stabilization through exchange rate targeting. See Kool and Lammertsma 2005.

We derive two testable hypotheses from this argument. First, governments that adopt *de facto* fixed exchange rates will experience lower inflation when they back up their actions with official declarations. Second, governments that abide by their commitments over time will maintain greater inflation-fighting credibility; thus a *de jure* fixed rate will be associated with lower inflation only when the government has demonstrated a history of following through on its policy proclamations. In non-OECD countries, we expect the inflation-fighting power of matching words and actions will be strongest in democratic countries because of their institutionalized mechanisms for accountability. We use data on up to 110 countries from 1974-2004 to test these hypotheses. Results from fixed-effects econometric models provide strong support for our hypotheses.

The article proceeds as follows. In the next section, we discuss the connection between a fixed exchange rate and inflation. We then discuss the divergence between *de facto* and *de jure* exchange rate regimes since the 1970s, and develop our argument that official proclamations are consequential for macroeconomic outcomes. After discussing the results from our empirical tests and associated robustness checks, we turn to the implications of the argument for other areas of economic policymaking.

Inflation and the Exchange Rate Regime

The money supply is a powerful policy tool that governments can change at will. A surprise increase in the money supply can lead to short-term gains in economic growth and employment. The unfortunate side-effect of increasing the money supply is inflation,

which is widely understood to be detrimental to long-term economic growth and political stability. These trade-offs imply that monetary policy is "time-inconsistent": governments with short time horizons have incentives to announce a policy of low inflation but subsequently increase the money supply to achieve short-term economic gains.[7] However, if the government's promise of low inflation is not credible, then private actors in the economy—including those who set wages for employees and prices for goods and services—will anticipate the government's opportunism and adjust their behavior accordingly, resulting in self-fulfilling inflation. Prices throughout the economy will rise, but the government will not realize any gains in economic growth or employment.

To address the time-inconsistency problem in monetary policymaking, governments must credibly commit to low inflation. In other words, private actors in the economy must be confident that the government will use monetary policy solely for the purpose of maintaining stable prices, rather than for short-term political or economic gains. One of the most effective anti-inflation strategies is to announce a quantitative target for monetary policy, such that policymakers' decisions are mechanistic rather than subject to political discretion.[8] Many governments adopt a fixed exchange rate for precisely this purpose. A fixed exchange rate provides an automatic rule for money policy, since the money supply must adjust to maintain the parity of the exchange rate. Indeed, when capital is internationally mobile, a fixed exchange rate implies a complete loss of domestic monetary policy autonomy. Countries generally fix their currency to that of a stable currency, such as the U.S. dollar or euro, and thereby import the credibility of

[7] See, for example, Bernhard, Broz, and Clark 2002; and Keefer and Stasavage 2002.
[8] Fatas, Mihov, and Rose 2007.

that currency.[9] A country that fixes to the dollar, for example, essentially matches the monetary policy of the U.S. Federal Reserve.[10] Any deviations in interest rates from those of the anchor currency are immediately arbitraged away.

As a monetary commitment device, a fixed exchange rate has three main advantages. First, it is transparent: the public can monitor day-to-day fluctuations in the currency to see if the government is upholding its commitment.[11] The public can therefore hold the government directly accountable if it abandons its exchange rate target. As Broz notes, "When governments shoulder direct responsibility for a transparent exchange-rate commitment, they pay political costs when the commitment is broken."[12] Second, a fixed exchange rate is a nominal anchor—a numeric variable that serves as a target for monetary policy. Such quantitative targets remove political discretion from the conduct of monetary policy and provide a well-defined rule for adjusting the money supply. And finally, a fixed exchange rate requires only minimal domestic financial infrastructure and human resources. A poor country with little expertise in central banking will find it administratively easier to adopt a fixed exchange rate than to conduct an autonomous monetary policy.[13]

The inflation-fighting impact of a fixed exchange rate arises from its ability to anchor the public's expectations of future monetary-policy adjustments.[14] However,

[9] Giavazzi and Pagano 1988.
[10] Jay Shambaugh 2004 demonstrates that pegged countries follow the base country's interest rate policies more than non-pegged countries.
[11] Broz 2002; Canavan and Tommasi 1997; Herrendorf 1999; and Keefer and Stasavage 2002.
[12] Broz 2002, 865.
[13] Of course, governments require foreign currency reserves to maintain a fixed exchange rate.
[14] See, for example, Herrendorf 1999; and Klein and Shambaugh 2007.

fixed exchange rates are not all created equal. Some countries will actively limit exchange rate movements without declaring a fixed exchange rate. For example, at various points throughout the 1980s and 1990s, countries such as Belgium, China, El Salvador, Lebanon, Hong Kong, and Mexico all implemented exchange rates that were more rigid than their officially declared regimes. This phenomenon naturally raises the question, are official exchange rate regimes an important determinant of inflation outcomes, or can governments obtain the same outcomes by limiting exchange rate movements without making a public commitment? More generally, what are the consequences of a discrepancy between words and actions?

Words Versus Actions in Exchange Rate Policy

Since the beginning of the post-War period, the International Monetary Fund (IMF) has required member countries to make official announcements of their exchange rate regimes. Article IV, Section 2 of the IMF's Articles of Agreement grants the IMF the responsibility for exercising "firm surveillance" over the exchange rate policies of members, which it has used to publish its Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Ironically, the IMF's surveillance has, until recently, entailed no evaluation of the accuracy of members' declarations.[15] This practice is most likely due to the original wording of Section 2, which states that member countries must report the regime that they *intend* to apply in fulfillment of their international monetary obligations.

[15] The IMF's reporting procedures changed after 1999; the Annual Report now indicates whether there is a discrepancy between *de jure* and *de facto* regimes.

The number of countries that officially declare fixed exchange rates has varied considerably over the years. From the founding of the IMF through the early 1970s, countries generally pegged their exchange rates to the U.S. dollar, which itself was fixed to the price of gold at $35 per ounce. After the collapse of the Bretton Woods monetary system, countries adopted a range of exchange rate strategies, including fixing unilaterally to a relatively stable currency—such as the dollar, French franc, or deutsche mark—and allowing their currencies to float, often within predetermined bounds. In 1975, only eight countries had officially declared freely floating rates; all other countries adopted more rigid regimes.[16] By 1995, the number of countries with *de jure* freely floating rates had increased to 42. As of 2004, there were 34 countries with *de jure* freely floating rates and 86 countries with fixed rates, with the remaining countries classifying themselves as somewhere in between.[17]

Upon examining the actual behavior of exchange rates rather than government proclamations, the data look remarkably different. Based on data for *de facto* exchange rate regimes (discussed later), only Germany's exchange rate demonstrated enough flexibility to be classified as floating in 1975. By 1995, the number of *de facto* free floaters increased to seven—far shy of the 42 countries with *de jure* freely floating regimes. And as of 2004, there were 15 countries with *de facto* freely floating regimes. The discrepancy is also evident in the opposite direction: there are many countries that declare a fixed exchange rate but allow full or partial flexibility. Figure 1 shows the number of country-year observations in our dataset from 1974 to 2004 that fall into four

[16] The countries with floating rates were Canada, Italy, Japan, Lebanon, Spain, Switzerland, United Kingdom, and United States.
[17] Data from the IMF's Annual Report on Exchange Rate Arrangements and Exchange Restrictions, 2004.

categories based on *de jure* and *de facto* policies. More than half of all declared floats and almost a quarter of all announced fixes conflict with actual exchange rate outcomes. Indeed, nearly all countries have, at one point or another, implemented a different exchange rate regime from the officially declared regime.

Figure 1 here

This discrepancy between words and actions in exchange rates has emerged as an important puzzle for economists and political scientists. In a recent paper, Alesina and Wagner argue that countries with poor institutional quality—including high levels of corruption and weak protection of property rights—are more likely to allow their currencies to fluctuate under *de jure* fixed regimes, because they lack the ability to maintain macroeconomic stability in the absence of domestic monetary-policy adjustment.[18] In contrast, they argue that stronger institutions are associated with exchange rate rigidity under *de jure* floating regimes, as governments attempt to signal macroeconomic rigor and raise their credibility. Calvo and Reinhart offer a different explanation for the "fear of floating" phenomenon, namely that governments wish to reduce the risk premia on foreign borrowing associated with exchange rate instability.[19]

[18] Alesina and Wagner 2006.

[19] Calvo and Reinhart 2002 also discuss inflation targeting and exchange rate pass-through as possible explanations for fear of floating. For additional discussions on the discrepancy between *de jure* and *de facto* policy, see Baerg 2007; Haussman, Panizza, and Stein 2001; and von Hagen and Zhou 2005.

The trade-offs involved in the choice of exchange rate regime can in part explain why countries often implement a different regime from the officially declared regime.[20] When capital is internationally mobile, a fixed exchange requires the government to forgo the use of monetary policy to respond to exogenous shocks to the domestic economy. For example, the U.S. government's decision in 1971 to remove the link between the dollar and gold is often attributed to President Nixon's desire to prime the economy in advance of the 1972 election. Nixon's decision required changing the official exchange rate policy, but many countries—including Egypt, Finland, Jordan, and Norway—have granted themselves a degree of domestic monetary flexibility without changing their *de jure* exchange rate targets. For developing countries, any slippage between public commitments and actual exchange rate movements can be disastrous; indeed, in an environment of mobile capital, countries that officially declare a fixed exchange rate are more prone to speculative currency attacks.[21] Governments that desire the additional benefits of exchange rate stability—including stabilizing the value of debt-service payments on foreign-currency liabilities and avoiding import-related inflationary shocks due to currency depreciation—might be better served by limiting exchange rate movements *ad hoc*, rather than incurring the risks of declaring an official exchange rate target.

Official Declarations and Inflation

[20] On the trade-offs involved in fixing the exchange rate, see Frieden 1991, 2002; Cohen 1993; Plümper and Troeger 2008; and George Shambaugh 2004.
[21] Eichengreen 1999; Genberg and Swoboda 2005; and Obstfeld and Rogoff 1995.

Our analysis focuses on the macroeconomic consequences of the slippage between the government's words and actions in exchange rate policy. We argue that governments' attempts to keep prices stable by implementing a fixed exchange rate are less effective if they do not declare an official exchange rate target. Our argument is similar to the existing literature in that it hinges on the difficulty that the public faces in determining the government's monetary policy preferences. As Canavan and Tommasi note, "the public is unsure of the government's true preferences, and may have a strong prior suspicion that the government is unwilling or incapable of halting inflation."[22] However, we part company with prior scholarship by contrasting the effectiveness of *de facto* and *de jure* signals of the government's preferences and intentions.

Canavan and Tommasi and Herrendorf, among others, have argued that exchange rate targets are transparent and completely controllable by the government, and therefore serve as signals of a government's anti-inflation stance.[23] Our argument does not dispute this premise; on the contrary, it builds on the notion of government signaling. Scholars tend to compare the anti-inflationary impact of *de facto* pegging to more opaque targets such as the money supply and nominal interest rates, or to discretionary monetary policy within an independent central bank.[24] Compared to these alternatives, *de facto* pegging clearly has many advantages in helping governments overcome the time-inconsistency problem. However, it is important to consider the quality of the signal that a government sends to the public by adopting a *de facto* peg. The public can easily monitor fluctuations in the exchange rate, but it is uncertain as to whether the peg reflects a conscious attempt

[22] Canavan and Tommasi 1997, 102. See also Keefer and Stasavage 2002.
[23] Canavan and Tommasi 1997 and Herrendorf 1999.
[24] See, for example, Broz 2002; Herrendorf 1999; and Keefer and Stasavage 2002.

by the government to import the low-inflation credibility of another currency. The ability to monitor exchange rate *outcomes* is not the same as the ability to ascertain the government's intentions. Governments may limit exchange rate movements for a variety of reasons, including stabilizing the value of debt-service obligations on foreign-currency bonds, easing international trade, and minimizing the influence of currency fluctuations on domestic prices.[25] Governments that *de facto* peg may not even deliberately target the exchange rate; indeed, exchange rate stability may be an externality that arises when two countries adopt similar monetary policies due to high levels of economic integration, as with Switzerland and Germany throughout the 1980s.[26] In short, a *de facto* peg provides a relatively noisy signal to the public—albeit a cleaner signal than many of the opaque alternatives suggested in the literature.

On the other hand, a *de facto* peg backed by an official proclamation of the exchange rate target sends a stronger signal to the public of the government's commitment to contain inflation. The declaration itself is consequential, as the public can monitor the government's commitment and hold it accountable if it reneges. In contrast, it is not possible for a government to "renege" on a *de facto* outcome if its behavior is in line with *de jure* policy. An additional benefit of a *de jure* peg is also a cost: as discussed earlier, official exchange rate targets increase the likelihood of speculative currency attacks.[27] As a result, government proclamations on exchange rate policy are not "cheap talk." The combination of a *de facto* and a *de jure* peg—what can be labeled a

[25] On the use of *de facto* pegging to avoid the inflationary effects of currency depreciation, see Plümper and Troeger 2008.
[26] Genberg and Swoboda 2005
[27] Obstfeld and Rogoff 1995.

"supported" *de facto* peg—should therefore provide the strongest signal to the public of the government's commitment to maintain stable prices.

We present preliminary evidence of our argument in Figure 2, which shows a simple plot of average annual inflation rates (logged) of supported *de facto* fixed exchange rate regimes compared to *de facto* only fixed exchange regimes. The figure shows that even when a government maintains a *de facto* fixed exchange rate year after year, inflation will be higher than if the government's actions are supported by a *de jure* fixed exchange rate.

The preceding discussion suggests two sets of observable implications. First, *de facto* fixed exchange rate regimes in isolation are a noisy signal of a government's monetary policy intentions. A *de jure* fixed exchange rate, on the other hand, is a cleaner signal of the government's strict monetary policy priorities. Countries that implement a fixed exchange rate will therefore experience less inflation when they support their actions with a *de jure* exchange rate target.

Second, the effectiveness of the signal sent by announcing a *de jure* fixed exchange rate depends in part on a country's reputation for following through on previous commitments to a fixed exchange rate. Exchange rate policy will be most successful in anchoring the public's inflation expectations when governments consistently follow through—year after year—on their official proclamations. In light of the politically salient trade-offs inherent in exchange rate policy, the public at large will constantly monitor the government's actions and adjust their expectations accordingly.

Empirical Analyses

As signals of governments' intended and actual monetary policy, *de jure* and *de facto* exchange rate regimes should directly influence the market's expectation of future inflation rates. Matching *de jure* announcements to *de facto* policies not only provides an immediate signal to market actors concerned with the upcoming round of price setting, but also offers markets a measure of a country's reputation for keeping exchange rate commitments over time. We therefore provide two sets of analyses: Analysis 1 focuses on the short-term (1-year) effects of matching a *de facto* fix with a *de jure* fix and Analysis 2 focuses on a longer-term (3-year) horizon in which countries either maintain or lose a reputation for keeping their monetary policy commitments. We test these hypotheses on a dataset of 110 developed and developing countries from 1974-2004 utilizing an estimation method which accounts for both the potential for a country-specific intercept and serial autocorrelation.

In each analysis, the annual average consumer price inflation rate serves as the primary dependent variable.[28] The use of an inflation measure creates two related theoretical and empirical concerns: how to deal with incidents of negative inflation and how to compensate for outliers. Although negative or low inflation rates have recently re-emerged as a concern, our theoretical discussion of monetary policy commitments centers on preventing high levels of inflation.[29] Therefore we explicitly focus on the positive observations of inflation, which constitute over 95 percent of the sample's consumer price inflation rate observations. Excluding negative inflation rate observations simplifies the treatment of outliers. While the mean inflation over the sample period is in the single

[28] Data from World Bank 2007. A common alternative measure of inflation, the annual deflation rate for GDP (World Bank, 2007) is highly correlated (.99 for this sample).
[29] On low or negative inflation rates, see Bernanke 2003.

digits (8.4 percent), almost 4 percent of observations exceed three digits. As is common, we constrain the influence of such outliers by logging inflation rates.[30] As a robustness check, we implement an alternative depreciation-based mechanism suggested by Cukierman and his colleagues.[31] The results are briefly noted with other robustness checks below.

The main independent variables are based on classifications of countries' *de jure* and *de facto* exchange rate regimes. Since 1974, the IMF has published a summary of countries' *de jure* exchange rate policies in its *Annual Report on Exchange Rate Arrangements and Exchange Restrictions*.[32] For the analysis below, we focus on a simple distinction between fixed and floating. "Fixed" encompasses pre-announced policies which limit flexibility: no separate legal tender, pegs or currency board arrangements, crawling pegs, and narrow crawling bands (narrower than or equal to +/- 2%). "Floating" includes both "managed floats" in which central banks may intervene to avoid excessive volatility in exchange rates, possibly by setting wide crawling bands (wider than +/- 2%), and pure floats with no direct intervention. In 1999, the IMF moved from a classification system based solely on countries' stated intentions to a classification system that incorporates IMF analysts' judgment on the actual regime, noting in footnotes perceived *de facto* discrepancies from *de jure* policies. For observations from 1999 to 2004, where discrepancies were noted, we used the detailed text from the country

[30] See, for example, Broz 2002.
[31] Cukierman, Webb, and Neyapti 1992; Cukierman and Lippi 1999; and Cukierman, Miller, and Neyapti 2002.
[32] An electronic version of these data for the years 1970 to 2000 was generously provided by Alex Wagner.

pages to code *de jure* policy. As noted below, we undertake a robustness check to ensure that our post-1998 coding does not affect our results.

To code *de facto* exchange rate regimes, Reinhart and Rogoff use parallel market exchange rates, foreign reserve movements, and detailed country chronologies.[33] From 1974 to 2001, they classify exchange rate regime choices made by 153 countries into a fine-grained 15-point scale, which is then categorized into a coarse 5 point scale. We discard observations that are classified as "freely falling" (including episodes of currency crises and hyperinflation) and those for which parallel market data are missing. We then code the remaining observations as "fixed" (pegs and limited flexibility) or "floating" (managed float and free floating). Additionally, we expand the dataset by appending Eichengreen and Razo-Garcia's (2006) version of the dataset for the years 2002 to 2004. Policy variables are lagged one period to account for the market's inability to react immediately to exchange rate signals (for example, many wage contracts are renegotiated only once per year).

We include a number of control variables in the analyses. Broz argues that central bank independence is effective at controlling inflation in transparent political systems.[34] We use a dichotomous measure of central bank independence developed from Cukierman by McNamara and Castro and the Alvarez *et al*. measure of democracy to measure transparency, and include the interaction of the two variables.[35] Given that increased inflation rates may be associated with political disturbances,[36] we also include

[33] Reinhart and Rogoff 2004.
[34] Broz 2002.
[35] Cukierman 1992; McNamara and Castro 2003; and Alvarez, Cheibub, Limongi, and Przeworski 1996.
[36] Dornbusch, Sturzenegger, Wolf, Fischer, and Barro 1990.

a variable for political crises, coded 1 if a country has had one or more political crises in the past five years (based on the Political Instability Task Force database of Adverse Regime Changes). Additionally, we control for economic growth, GDP per capita, and the share of trade in GDP.[37] Both GDP per capita and trade openness are logged to account for outliers. We also include a measure of capital account openness from Chinn and Ito.[38] Decade dummies account for historical, world-wide trends in inflation rates.

We report results from fixed-effects estimation models with robust standard errors clustered by country. By calculating a "unit-specific" or "idiosyncratic" error term, the fixed-effects estimator controls for unobserved unit heterogeneity, but does so at a triple cost: the loss of efficiency in the calculation of standard errors, the danger of excluding time-invariant or rarely changing variables, and the artifice of out-of-sample predictions.[39] We should note that two alternative strategies were considered and rejected. First, scholars frequently prefer the more efficient random-effects model for pooled time-series cross-sectional data, but this model assumes that the regressors are uncorrelated with unit-specific effects. When this assumption is not met, bias may emerge in the estimation of coefficients. Despite similarities in the coefficients of the policy variables of interest estimated by both the fixed- and random-effects methods, a test using the artificial regression approach found evidence to reject the null hypothesis that the regressors and unit-effects were uncorrelated.[40] Second, Plümper and Troeger

[37] Data from World Bank, various years.
[38] Chinn and Ito 2006. The index ranges from -2.66 to 2.66, with higher values indicating greater openness.
[39] See Plümper and Troeger 2007.
[40] The artificial regression approach to testing overidentifying restrictions is like a standard Hausman test but incorporates the heteroskedastic and clustered data often found in cross-sectional, time-series dataset while additionally guaranteeing a

propose a new technique for estimating panel data models that include time-invariant or rarely changing variables in the presence of unit fixed effects.[41] While many of the variables included in our model of inflation are in fact "sluggish," none is truly time-invariant and all have a ratio of between- and within-variances that fall below the authors' suggested threshold for preferring their vector decomposition model over the more traditional fixed-effects model. In the presentation of the fixed-effects findings, we utilize an "average" country for illustrative effects.

Analysis 1: Does de jure fixing matter for inflation?

Table 1 presents the results of an analysis of *de jure* and *de facto* exchange rate regimes (lagged one year) on consumer prices. The two dummy variables ("De Jure Fix" and "De Facto Fix") combined with their interaction capture all four possible policy combinations: *de jure* and *de facto* floating, *de jure* and *de facto* fixing, *de facto* fixing with *de jure* floating (so-called "fear of floating"), and *de facto* floating with *de jure* fixing. The interaction term allows for the estimation of the additional inflation-fighting benefits accrued by countries which both proclaim and support a fixed exchange rate regime.

To address the problem of serial autocorrelation, we use a two-year lagged dependent variable. In the presence of the other one-year lagged policy variables, this modeling strategy ensures that the lagged dependent variable is itself not a manifestation

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nonnegative test statistic. See Arellano 1993; Wooldridge 2002; and Schaffer and Stillman 2006.

[41] Plümper and Troeger 2007.

of *de jure* and *de facto* policy. [42] The combination of a fixed-effects estimator with a lagged dependent variable creates a very stringent test for the significance of the policy variables.[43]

The positive coefficient on the "De Facto Fix" variable indicates that a *de facto* fixed exchange rate by itself is not associated with lower inflation. This result suggests that *de facto* fixing alone does not serve as an effective signal of the government's overall commitment to low inflation. Instead, we find that only countries that support their *de facto* fixed exchange rate regimes with *de jure* pronouncements receive the benefit of inflation control. Because of the non-linear nature of logs, the magnitude of the impact of regime choice on inflation rates depends on the assumptions about the other variables. Assuming a democratic country without political crises, an independent central bank, and average wealth, GDP growth, capital account openness, and trade, the predicted inflation rate for a country with a combined *de jure* and *de facto* fix is 6.6 percent. In contrast, the predicted inflation for a country that exhibits "fear of floating" (a *de facto* fix with a *de jure* float) is 8.4 percent, or more than 27% higher. In other words, a proclamation of a fixed exchange is a necessary condition for the inflation-fighting effectiveness of a *de facto* fix. Analysis 2 further explores the credibility of *de jure* signals.

The results for the other variables are in line with the extant literature. As argued by Broz, independent central banks lead to lower rates of inflation but only within a

[42] Note that the more immediate the effect of the lagged policy variable on the economy, the greater is the likelihood that that the inclusion of a lagged dependent variable might mask the real effect of the policy. An alternative technique using the ARCH family of models is discussed below.

[43] On the appropriateness of using a lagged dependent variable in a fixed effects model, see Beck and Katz 2004.

democratic environment.[44] As would be expected from the increased demand on money supply, GDP growth is positively associated with inflation, although the size of the effect is small. Also as expected, wealthier countries with more open capital accounts benefit from lower inflation rates. With the exception of the central banking finding, results on these variables of interest are significant.

Analysis 2: Does Reputation Matter?

Analysis 1 demonstrates that a *de jure* signal is a necessary component of an inflation-fighting monetary regime; a *de facto* fix alone is not associated with lower inflation rates. But the question remains: does the value of a *de jure* signal vary across countries depending on their reputation for matching actions with words? In Analysis 2, we model a country's history for matching its public commitment to a fixed exchange rate with actual behavior. To simplify the analysis, we assume that markets take note of defections from *de jure* commitments, such that countries can lose their reputation for credible monetary policymaking over time. We construct a measure called "Reputation for Fixing" based on the percentage of *de jure* fixes not matched by *de facto* fixes over the prior three years.[45] For example, a country that defected on its declared fixed exchange rate in one of the previous three years would receive a score of 66 percent.[46] Countries with *de jure* floating exchange rates or countries that have not followed through at all on their *de jure* fix commitments over the prior three years receive a score of zero. As with Analysis 1, we include a lagged dependent variable to account for serial

[44] Broz 2002.
[45] Shifting the reputation period back an additional year (i.e., t-4 to t-2) offered no substantial change to the analysis.
[46] Countries that have not announced a *de jure* fix retain an unsullied reputation.

autocorrelation. However, because the key explanatory variable (reputation) has an inherent three-year lag structure, we use a 4-year lagged dependent variable to ensure that it itself is not a manifestation of reputation.

Table 2 presents the results for the reputation measure. The three year reputation period reduces the time period under analysis to 1976-2004. The coefficients for a *de jure* fix or *de facto* fix alone are not significant. Instead, the efficacy of a *de jure* fix appears contingent on a reputation for supporting proclamations with *de facto* policy: "Reputation for Fixing" has a significant and substantial negative coefficient (-.24). Again, interpretation of the logged point estimates is not straightforward, especially for interaction terms. Let us assume a democratic country without political crises and an independent central bank and with average wealth, GDP growth, capital account openness and trade openness. Such a country announcing a *de jure* fix with an unsullied reputation for keeping commitments to a fixed exchange rate regime (reputation = 1) benefits from a predicted 2.6 percentage point lower inflation rate compared to a country with a poor reputation for keeping *de jure* fix commitments (reputation = 0).

Although the prior analysis demonstrates that reputation matters when countries announce a *de jure* fix, the extent of this effect may be conditional on a country's institutions of accountability.[47] As discussed above, the success of *de jure* signals depends on the susceptibility of governments to punishment for defections from their commitments. One of the primary advantages of a fixed exchange rate is that its transparency enables the public to detect deviations from government promises. But what happens when the public becomes aware of a broken promise? Presumably a country's

[47] See Stasavage 2003.

citizens will attempt to hold political leaders accountable for their actions. It is reasonable to assume that the mechanisms of accountability are more effective in democracies than in non-democracies. As Fearon notes, "In democracies, foreign policy is made by an agent on behalf of principals (voters) who have the power to sanction the agent electorally or through the workings of public opinion. By contrast, in authoritarian states the principals often conduct foreign policy themselves."[48] We should therefore expect that *de jure* policy is a more effective signal of government intent in democracies than in non-democracies.

To test this hypothesis, we interact our measure of reputation with a measure of democracy from Alvarez *et al*. To isolate the impact of democracy on the nexus between exchange rate regimes and inflation, we run the analysis on a subsample that includes only non-OECD countries. The truncated sample assures us that the results are not driven by the (highly democratic) OECD countries, which have traditionally faced less severe inflationary problems than developing countries. Table 3 presents results for non-OECD countries only (Analysis 2b). As expected, the interaction of democracy and reputation is associated with a large and significant decrease in predicted inflation rates.

To clarify the effect, Figure 3 depicts average inflation rates contingent on democratic institutions and reputation.[49] At reputation=0, a country has defected from a *de jure* fix in all three prior periods. At reputation=1, a country has consistently supported its commitments in the prior three years. For the intermediate reputations, we assume that at least one defection occurs in the previous year (t-1). For democracies, the difference

[48] Fearon 1994, 581.

[49] We additionally assume average levels of GDP growth, CDP per capita (logged), capital openness, and trade, and classify the country as being in the 1980s without a recent history of political crises and with an independent central bank.

between an unsullied and sullied reputation is an approximate 3.4 percentage point lower average annual inflation rate. Non-democracies demonstrate only a gradual benefit from matching words and actions, with the largest impact—an approximate 1.3 percentage point decrease—occurring primarily as a result of the prior year's policies.

These results support the notion that democracies are better able than non-democracies to signal their intentions to keep prices stable. One possible interpretation of this finding is that democracies are more subject to domestic pressure for monetary policy discretion than non-democracies, and therefore a consistently maintained fixed exchange rate is an especially costly signal for democracies.[50] This explanation is also consistent with Tomz, who notes that investors (and by extension wage-setters and consumers) learn from "behavior in context."[51] If democracies would normally be expected to acquiesce to political pressure and allow the exchange rate to float, then they will receive a substantial inflation-fighting benefit by going against their "type" and fixing their exchange rate.

Robustness

As noted above, the empirical analyses require a number of modeling assumptions. Here we explore alternative versions of the dependent variable, possible bias in coding *de jure* exchange rates, the inclusion of additional variables, an extended time frame for reputation, and an alternative modeling strategy for serial correlation. Additionally, we offer a simple exploration of the direction of causality.

[50] See Bearce and Hallerberg 2008; and Desai, Olofsgard, and Yousef 2003. Of course, public demands for price stability and other macroeconomic goals vary across democracies; see Scheve 2004.
[51] Tomz 2007.

First, we explore an alternative to the log of the annual rate of consumer price inflation as the dependent variable. Cukierman and his colleagues argue that the rate of depreciation in the real value of money more closely approximates relative changes as perceived by consumers.[52] We therefore transform the dependent variable using the Cukierman transformation, D=F/(1+F), where F is the average yearly rate of inflation. This transformation substantially increases the significance of the variables of interest ("De Jure & De Facto Fix lagged" and "Reputation for Fixing", respectively) in Analysis 1 and 2a. In Analysis 2b, the variables "Reputation for Fixing" and the interaction of Reputation and Democracy are negative and jointly significant.

On theoretical grounds, we initially excluded country-year observations with negative annual rates of inflation. A fixed exchange rate should theoretically help lower inflation toward *but not below* 0 percent, therefore precluding a simple linear relationship between the independent variables and the annual inflation rate in the full sample with negative values included. Recent economic history has led Bernanke (among others) to note the symmetrical risks of too low levels of inflation, suggesting that countries should try to avoid both high and low (or negative) levels of inflation.[53] To ensure that excluding negative observations did not bias the results, we include these country years but transform negative values to positive values in line with the theory of symmetric risks.[54] In Analysis 1 and 2a, the addition of these country year observations slightly increases the sizes of the coefficients and the significance of the key variables of interest. In Analysis 2b, the addition decreases the size of the coefficient on the interaction of

[52] Cukierman *et. al.* 1992; Cukierman and Lippi 1999; Cukierman *et. al.* 2002.
[53] Bernanke 2003.
[54] Specifically, we log the absolute value of negative annual rates of inflation.

Reputation and Democracy by one-sixth but the finding is jointly significant with Reputation for Fixing at the .05 level. In short, the exclusion of negative observations does not drive the results.

In 1999, the IMF adjusted its presentation of exchange rate regimes from *de jure* to *de facto* policy (as calculated by IMF analysts), noting deviations via annotations and textual discussion. Thus, *de jure* policy post-1998 was hand-coded by the authors based on the IMF country summaries. Excluding post-1998 observations does not substantially change the results presented in Analysis 1 or 2b. For Analysis 2, the coefficient on "Reputation for Fixing" falls below conventional levels of significance. In the case of *de facto* calculations of exchange rate policy, we appended Eichengreen and Razo-Garcia's (2006) version of the dataset for the years 2002 to 2004, to the original Reinhart and Rogoff dataset. The exclusion of this data from the analysis results in no substantial change in terms of the point estimates or significance of the policy variables of interest.

We also ensure that our results are robust to the inclusion of two additional control variables. First, stabilization programs administered by the International Monetary Fund might help control inflation rates. We therefore include a control variable for the presence of an IMF agreement. Second, governments with a large number of veto players might find it more difficult to pursue inflationary policies for political purposes, such as to prime the economy in advance of an election. We include the log of veto players (the "checks" variable from the Database of Political Institutions) to control for this possibility.[55] Our results are substantively and statistically unchanged with the inclusion of the IMF variable. In one case (Analysis 2), the inclusion of veto players—

[55] Keefer and Stasavage 2003.

which due to data availability results in an approximate 13 percent drop in the number of observations—causes the significance to fall below the conventional threshold.

The reputation measure captured only the most recent defections from an announcement of a fixed exchange rate (t-1 to t-3). Expanding the reputation period to five years further decreases the sample's time frame to 1979 to 2004 and leads to the loss of seven countries and between 14 percent and 17 percent of the observations. However, use of this expanded reputation measure leads to substantially larger and more significant coefficients for the policy variables of interest. [56]

The inclusion of a lagged dependent variable to control for serial correlation provides a high hurdle when used in conjunction with a fixed-effects estimator but offers greater flexibility in structuring the lag periods. The lesser used ARCH family models also allow for the selection of longer lag periods. Use of the ARCH model with an AR(2) process in Analysis 1 and an AR(4) process with Analysis 2 analysis resulted in no substantial change in terms of the point estimates or significance of the policy variables of interest.

An alternative explanation for the apparent correlation between *de jure* fixed exchange rate regime and lower inflation is that the policy follows rather than accounts for lower inflation: governments make *de jure* commitments only when inflation is under control. Simple descriptive statistics fail to support such a contention. Table 4 provides the average annual consumer inflation rate according to past and present policies. Countries that choose to transition from a *de jure* float to a *de jure* fix (the shaded upper right hand box) do so in the face of higher average rates of inflation than those continuing

[56] Full results for all the robustness checks are available from the authors.

with a *de jure* fix.[57] This selection process would make it less rather than more likely to see lower inflation rates among *de jure* fixers in subsequent years, a bias that works against our findings.

Conclusion

The behavior of individuals in any economy depends on expectations of government policy. If economic actors believe that the government is not fully committed to price stability, then they will behave as if prices will rise, and inflation will be self-fulfilling. Scholars have long recognized that countries can commit to fixing the exchange rate—which constitutes a "nominal anchor" for monetary policy—as a strategy for anchoring inflation expectations. However, the recent availability of data on *de facto* exchange rate regimes has called into question the value of government proclamations. Indeed, the divergence between *de jure* and *de facto* policies is often striking. Why should scholars pay any attention to the government's official policy if it often differs from actual policy? This article offers an answer. Official proclamations are indeed influential as a signal of the government's monetary-policy preferences. Our results demonstrate that countries experience the greatest inflation-fighting effect when they match their actual fixed exchange rate behavior with their official proclamations.

[57] A more nuanced test of causality is to create a model with *de jure* policy as the dependent variable and inflation and other controls as the explanatory variables. We conducted such a test using a random-effects model of the decision to transition from a floating to a fixed rate (where the dependent variable is dichotomous). As suggested by the descriptive statistics, higher rates of inflation were indeed found to be significantly correlated with the decision to switch from a *de jure* float to a *de jure* fix, limiting the concern that reverse causality is driving the results. Results are available from the authors.

This article also offers a new perspective on the influence of democratic accountability on the efficacy of exchange rate policy. Among developing countries, democracies garner a greater benefit from matching words and actions than non-democracies. This finding sits uncomfortably with the results from Broz (2002), who argues that non-democracies benefit from the transparency of a fixed exchange rate. If supported fixed exchange rates have a negligible impact on inflation in non-democracies, why would autocratic leaders adopt them? One possibility is that they are simply more effective than the alternatives, including central bank independence—which Broz notes is unlikely to be meaningful in "opaque" political systems.[58] Another possibility is that autocracies choose fixed exchange rates for other reasons, such as to facilitate international trade and investment and appease domestic business leaders.[59] More research is clearly needed to tease out the relationship between democracy and exchange rate politics.

A broader implication of this study is that scholars should be thoughtful about whether to use official or *de facto* measures in their research. It is no doubt tempting to discard official proclamations when actual state behavior can be measured and studied. Yet official proclamations are indeed *policy*, whereas government behavior can be considered *implementation*. In the case of exchange rate regimes, *de facto* exchange rate rigidity may not represent a deliberate strategy of the government. As Genberg and Swoboda note, a country like Switzerland with a *de jure* floating regime appears to have a fixed exchange rate vis-à-vis the Euro simply because the Swiss economy is heavily

[58] Broz 2002.
[59] Bearce and Hallerberg 2008.

integrated with the countries in the European Monetary Union.[60] Swiss monetary policy therefore resembles the policies of the European Central Bank, with the result being an inadvertent degree of fixity between the Swiss franc and the Euro. This *de facto* behavior should not distract researchers from the fact that official Swiss policy is to allow the currency to float. In short, the newly available datasets on *de facto* policy are a valuable resource that should be used with caution, lest scholars ignore the very policy decisions that they wish to explain.

[60] Genberg and Swoboda 2005.

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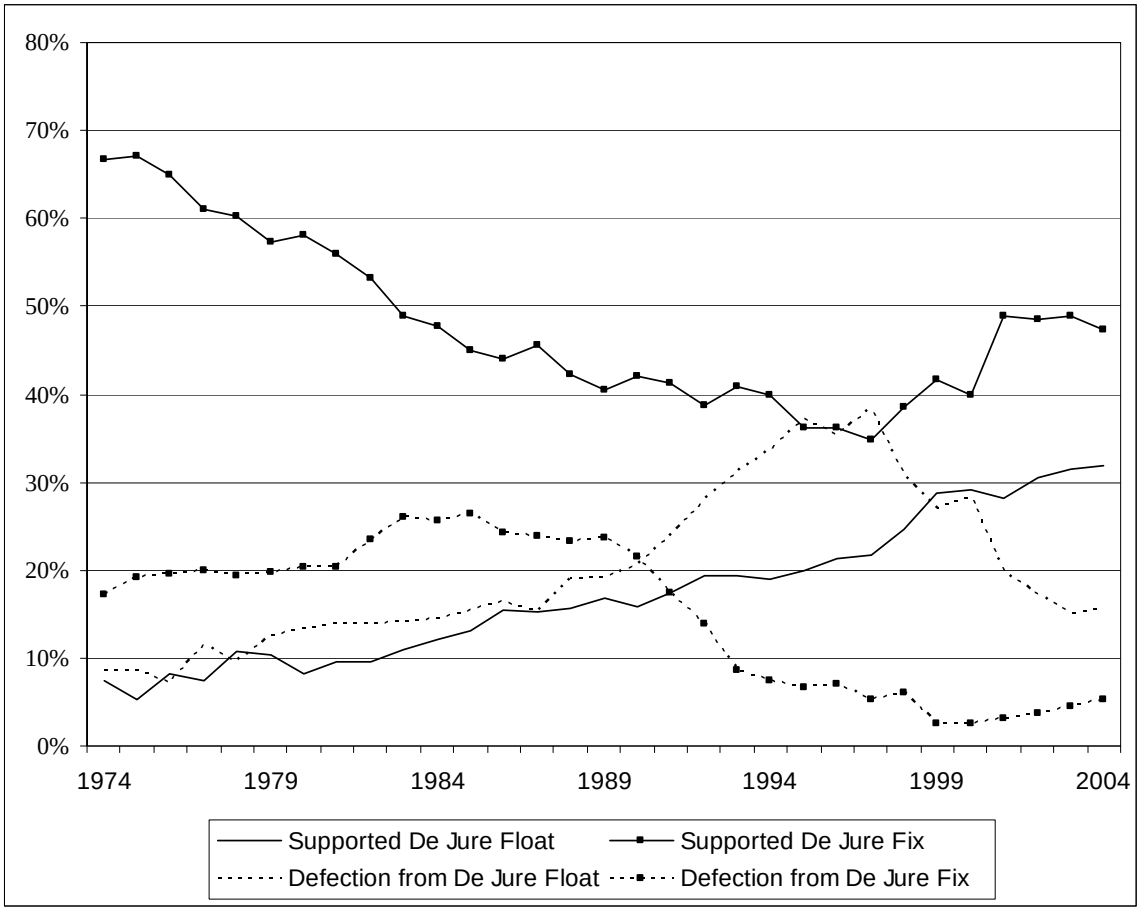
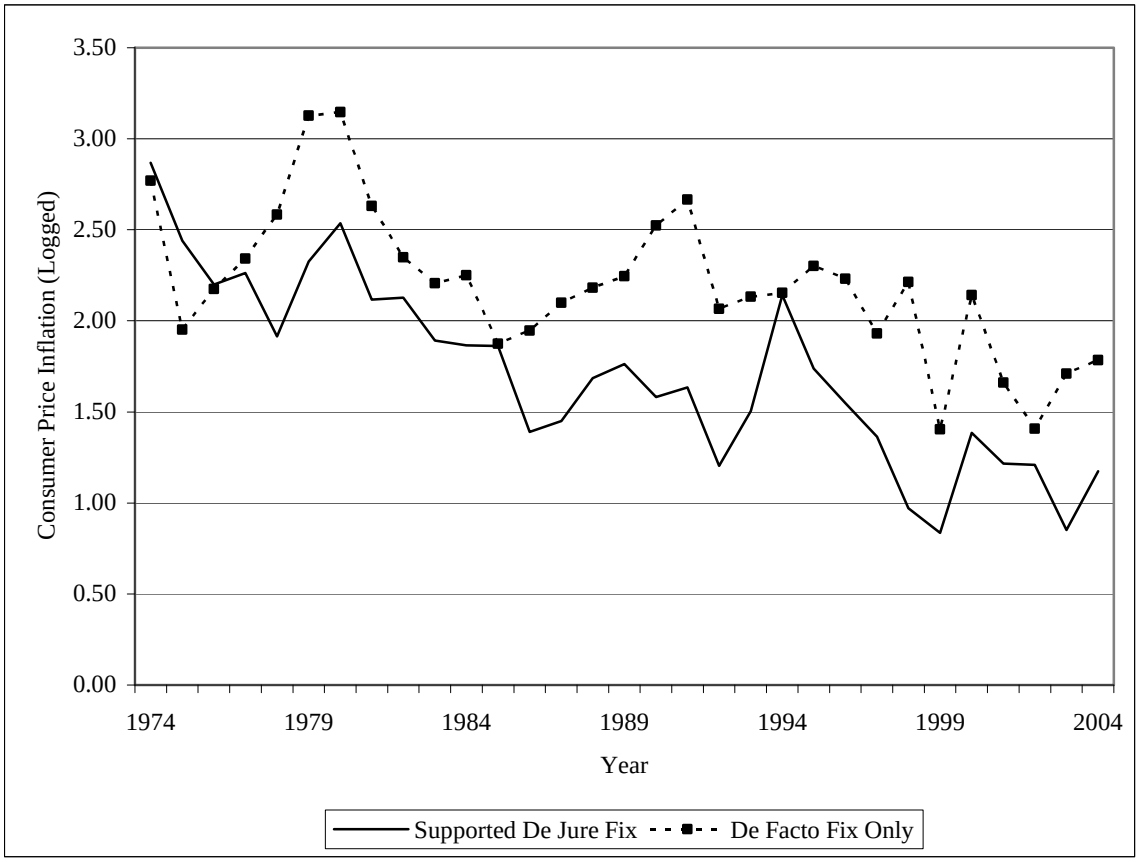
Figure 1: Global Sample Classification (by Percentage) of *De Facto* Versus *De Jure* Exchange Rate Regimes, 1974-2004*



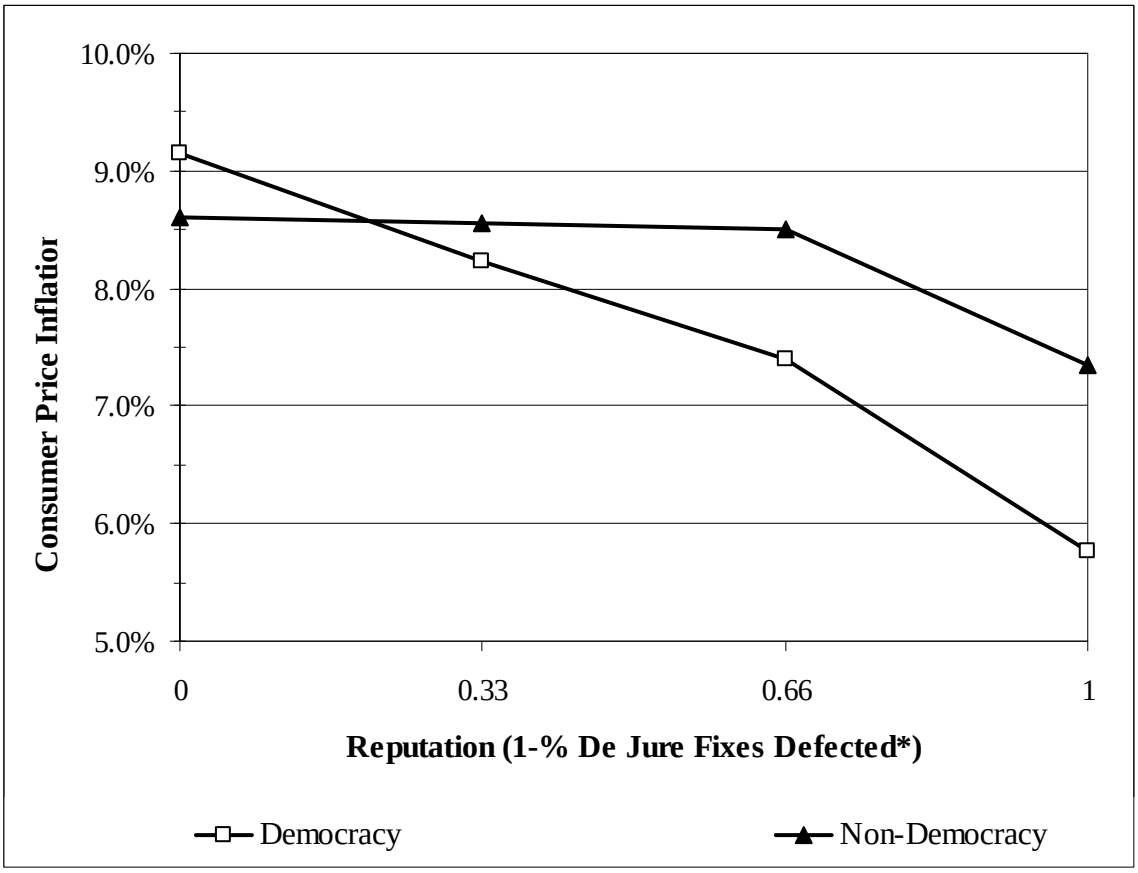
* Solid lines refer to "supported" regimes in which the official and actual regimes are the same. Dotted lines refer to "defection" in which there is a discrepancy between official and actual regimes.
Source: Reinhart and Rogoff 2004; Eichengreen and Razo-Garcia 2006; and IMF (multiple years).

Figure 2: Comparison of Annual Average Consumer Price Inflation Rates (1970-2004) by Type of Fixed Exchange Rate Regime



Source: Reinhart and Rogoff (2004), Eichengreen and Razo-Garcia (2006), IMF (multiple years), and the World Bank (2007).

Figure 3: Comparison of Predicted Inflation Rates for Non-OECD *De Jure* Fixers*



* Assumes a democratic country without political crises and an independent central bank and with average wealth, GDP growth, capital control openness and trade, and with the exception of Reputation=1, a *de facto* float in t_{-1} .
**In time period t_{-1} to t_{-3}.

Table 1: Analysis of the Effect of *De Jure* and *De Facto* Regimes on Annual Average Consumer Price Inflation Rates (1975-2004)

Dep var= Consumer Price Inflation (logged)	**All Countries**
Lagged Dependent Variable (t-2)	0.25 ***
	(0.04)
De Jure Fix (lagged)	-0.01
	(0.10)
De Facto Fix (lagged)	0.10
	(0.08)
De Jure & De Facto Fix (lagged)	-0.23 **
	(0.11)
Central Bank Independence (0/1)	0.10
	(0.11)
Democracy (0/1)	0.03
	(0.09)
Central Bank Independence & Democracy	-0.16
	(0.12)
Political Crisis in Past 5 Years (0/1)	0.10
	(0.12)
GDP growth	-0.01 *
	(0.01)
GDP per capita (logged)	-0.30 ***
	(0.08)
Capital Openness	-0.12 ***
	(0.03)
Trade as a % of GDP (logged)	0.32 ***
	(0.12)
1980s	-0.09
	(0.07)
1990s	-0.30 **
	(0.11)
2000s	-0.49 ***
	(0.15)
Constant	2.67 ***
	(0.80)
Observations	1924
Number of Countries	110
R-squared overall	0.37
R-squared within	0.30
R-sqared between	0.47

Robust, clustered standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Analysis of Reputation for *De Jure* and *De Facto* Compatibility on Annual Average Consumer Price Inflation Rates (1976-2004)

Reputation for Fixing	-0.24 *
	(0.14)
Central Bank Independence (0/1)	-0.00
	(0.12)
Democracy (0/1)	0.07
	(0.13)
Central Bank Independence	-0.10
& Democracy	(0.14)
Political Crisis in Past 5 Years (0/1)	0.15
	(0.15)
GDP growth	-0.02 ***
	(0.01)
GDP per capita (logged)	-0.42 ***
	(0.10)
Capital Openness	-0.14 ***
	(0.03)
Trade as a % of GDP (logged)	0.32 **
	(0.16)
1980s	-0.11 **
	(0.07)
1990s	-0.24 *
	(0.13)
2000s	-0.58 ***
	(0.17)
Constant	3.97 ***
	(1.09)
Observations	1659
Number of Countries	105
R-squared overall	0.29
R-squared within	0.26
R-sqared between	0.33

Robust, clustered standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Analysis of the Joint Effect of Democracy and Reputation on Annual Average Consumer Price Inflation Rates (1977-2004) in Non-OECD Countries

Dep var= Consumer Price Inflation (logged)	**Non-OECD**
Lagged Dependent Variable (t-4)	0.08 *
	(0.04)
De Jure Fix (lagged)	-0.07
	(0.16)
De Facto Fix (lagged)	-0.13
	(0.10)
Reputation for Fixing	-0.02
	(0.19)
Reputation for Fixing & Democracy	-0.34 **
	(0.15)
Central Bank Independence (0/1)	-0.03
	(0.14)
Democracy (0/1)	0.10
	(0.15)
Central Bank Independence	-0.05
& Democracy	(0.17)
Political Crisis in Past 5 Years (0/1)	0.19
	(0.14)
GDP growth	-0.01 **
	(0.01)
GDP per capita (logged)	-0.31 **
	(0.12)
Capital Openness	-0.08 **
	(0.04)
Trade as a % of GDP (logged)	0.33 *
	(0.17)
1980s	-0.10
	(0.09)
1990s	-0.15
	(0.15)
2000s	-0.78 ***
	(0.19)
Constant	3.03 ***
	(1.15)
Observations	1174
Number of Countries	85
R-squared overall	0.208
R-squared within	0.20
R-sqared between	0.265

Robust, clustered standard errors in parentheses;
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Annual Average Consumer Price Inflation by Current and Past Policy

De Jure

Past Year	Current Year Float	Current Year Fix
Float	11.3	15.1
Fix	20.6	6.2