

The Effectiveness of Monetary Policy Anchors: Firm-Level Evidence

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Second Draft: November 4, 2008

First presented at the conference on "The Political Economy of Monetary Anchors," The Leonard Davis Institute for International Relations, Hebrew University of Jerusalem, May 25-26, 2008. Also presented at the 2008 Annual Meeting of the American Political Science Association, August 28-31, 2008. We thank William R. Clark, William Keech, and other conference participants for comments.

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Abstract: Analyses of monetary policy posit that exchange-rate pegs, inflation targets, and central bank independence can discipline monetary policy decision-making and serve as anchors for *private sector* inflation expectations. Yet there are few direct, micro-level empirical tests of these arguments. We offer cross-national evidence on the effectiveness of monetary anchors in controlling private sector inflation expectations. Using firm-level data from the World Bank's World Business Environment Survey (81 countries, ~10,000 firms), we find robust evidence that fixed exchange-rate commitments significantly and substantively reduce private sector concerns about inflation. By contrast, we find no evidence that either inflation targeting or central bank independence is related to firm owners' inflation concerns. Overall, our results suggest that private sector inflation expectations are sensitive only to the most transparent, constraining, and costly of monetary anchors: exchange-rate pegs.

1. Introduction

The literature on monetary policy highlights the role of institutional commitments in stabilizing private-sector inflation expectations. Central bank independence, (CBI) inflation targeting (IT), and fixed exchange rates (Pegs) are widely viewed as institutions that have the capacity to mitigate private sector concerns that policymakers will exploit them after they have locked in their price, wage, and investment decisions. While previous empirical work has looked at the institutional correlates of realized inflation levels, we use firm-level data to directly assess the impact of monetary anchors on private sector inflation concerns and expectations. We find that fixed exchange rates mitigate firm owners' concern with inflation; firm owners' concern about inflation falls by as much as 10 percentage points under a pegged regime. By contrast, other commitment institutions--central bank independence and inflation targets --are uncorrelated with private-sector inflation expectations.

Considerable research has investigated the use of central bank independence, inflation targets, and fixed exchange rates as institutions that governments might use to establish policy credibility. In empirical work, however, private-sector expectations have been skipped over in favor of approaches that model macroeconomic aggregates--inflation, the output gap, etc--as a reduced form function of commitment institutions and other influences. This has left a gap between positive theories of monetary institutions, which rest on private agent microfoundations, and empirical work, which lack micro-level treatments altogether.¹

¹ See, however, Crowe (2006).

If certain monetary institutions are inherently more credible than others, then not only inflation but also private-sector inflation expectations must differ systematically across countries that differ in their institutions. If central bank independence reduces inflation, then firm owners in countries with more independent central banks should perceive their governments' promises of low inflation to be more credible. Likewise, if inflation targets and exchange-rate pegs anchor inflation expectations, we should expect to find that firm managers in countries with such regimes perceive policymakers to be more credible than firm owners in countries that lack these anchoring institutions. Examining the impact of institutions at the individual level of analysis is necessary because the structure of incentives provided by a country's monetary institutions must work through private agents to have aggregate effects.

Improvements in cross-national survey information allow us to analyze the effects of institutions on individual perceptions. We draw upon the World Bank's World Business Environment Survey (WBES) for our firm-level data. In 1999, the WBES was administered to over 10,000 firms in 81 countries; the stated purpose of the survey was to identify the features of a country's investment climate that matter most for productivity and growth, *from the perspective of private-sector actors*. The WBES assessed the institutional and policy environment for private enterprise using a common survey instrument, administered to a representative sample of firms in each country. This standardized approach allows us to draw consistent, cross-national inferences from the data.

Our micro-level approach provides a more direct test of institutional theories of monetary credibility and reduces some of the inferential difficulties associated with

current work. For example, the problem of endogeneity in cross-country inflation regressions--i.e., inflation-averse countries may select independent central banks, as in Posen (1993)--is less of a concern since it is unlikely that firm owners' survey responses "cause" monetary institutions. Our empirical approach remains consistent with prevailing institutional theories but we differ in that we test these arguments at the individual level of analysis. Our findings are thus relevant to the wider body of literature and suggest new avenues for research.

The plan of the paper is as follows. In section 2, we describe our research design and contrast it with existing work on monetary institutions. Section 3 presents our dependent variables from the WBES and assesses their validity. Section 4 presents our measures on monetary commitment regimes and provides preliminary evidence on how these regimes relate to private sector inflation expectations. Section 5 contains our empirical models and findings, and Section 6 concludes.

2. Monetary Institutions: Theory and Evidence

One of the most widely accepted models of inflation is that of Barro and Gordon (1983). In that paper, the authors look at the costs and benefits of surprise inflation in a game between the monetary authority and the private sector. After the monetary authority has announced its policy and the private sector has taken actions that rely on that policy, the authority has an incentive to raise output above its full employment level through surprise inflation. In a rational-expectations equilibrium, where inflation is predicted correctly by the private sector, output remains at its full employment level, but inflation is higher than it would have been had the monetary authority been able to pre-commit.

This rational-expectations model of inflation and inflation expectations has been a workhorse for thinking about issues of credibility and institutional design. Rogoff (1985) offers an institutional precommitment in which the policymaker delegates monetary policy to an independent and conservative central banker who places a higher weight on the inflation goal. The private sector, upon observing that the conservative central banker is in charge of monetary policy, writes lower inflation into its wage and price contracts. However, delegation to an independent central bank forces a tradeoff between lowering inflation and stabilizing the real economy. Because a conservative central banker places a lower weight on the output stabilization goal, the banker responds too little to real shocks. An ancillary literature considers institutions that bring about commitment to low inflation while allowing some degree of flexibility to stabilize the economy. Lohmann (1992) proposes a partially independent conservative central banker that accommodates political pressures when extreme shocks hit the economy. Other solutions to the "credibility vs. flexibility" tradeoff include an exchange-rate target with an escape clause (Flood and Isard 1989, Canavan and Tommasi 1997), an inflation target for a transparent and accountable central bank (Bernanke et al 1999, Bernanke and Mishkin 1997), and optimal contracts for central bankers (Walsh 1995).

A large body of empirical work on inflation is built upon the Barro-Gordon framework. Some earlier studies found that CBI and low inflation are correlated (Cukierman 1992, Grilli et al 1991, and Alesina and Summers 1993). However, there is debate about both the measurement of CBI and the causality of its relationship to inflation (Forder 1998, Berger, de Haan, and Eijffinger 2001, de Haan and Kooi 2001). With respect to exchange-rate regimes, Ghosh et al. (1997) found that pegs are associated

with lower inflation, but at the cost of more variable output than in flexible exchange-rate regimes. Similarly, Bleaney and Francisco (2007) provide more evidence that hard pegs (currency boards and common currency arrangements) are associated with lower inflation--again at the cost of slower and more volatile growth--than either floats or soft peg regimes. As for inflation targeting, the evidence is by and large supportive of its association with lower inflation levels and inflation volatility, perhaps without increasing output volatility (Mishkin 2007, IMF 2005).²

The typical estimation strategy in this literature is to regress cross-country inflation rates (or some other macroeconomic aggregate) on the relevant monetary anchor while controlling for a host of country-level factors. But according to the theory of inflation, monetary commitment institutions do not directly affect inflation rates; rather, institutions influence individual *perceptions and behaviors* which, in aggregate, influence inflation. Private-actor agency lies between institutions and aggregate outcomes. This suggests that empirical research would benefit from estimating the impact of monetary anchors on individual inflation perceptions, if not on the economic behaviors of private agents.

Figure 1 diagrams the causal pathway modeled in institutional theories of monetary policy and contrasts it with research designs evident in current empirical work. The heavy horizontal arrows depict the theoretical relationship between institutions, the perceptions and behaviors of private sector actors, and inflation. Most researchers,

² However, Ball and Sheridan (2005) caution that the decision to adopt inflation targeting is an endogenous choice, such that countries with higher initial inflation are more likely to choose it. They suggest that the apparent success of inflation targeting is simply reversion to the mean: inflation fell faster in inflation targeting countries that started with high inflation than in non-targeting countries with initially lower inflation.

however, skip over these the intermediate steps in the casual process and run regressions of inflation on institutions (depicted by the upper dashed arrow). This avoids the crucial issue of whether monetary institutions affect individual perceptions and behavior and thereby imposes the causality relationship from the outset. Regardless of the institution that commits monetary policy to low inflation--central bank independence, exchange-rate pegs, inflation targets--every institutional theory works through individual expectations and actions. That is, institutions affect inflation and other macroeconomic outcomes by encouraging certain expectations and behaviors and discouraging others. Our approach is to test this intermediate stage of the analysis. To this end, we utilize individual responses from business owners to questions from the WBES to develop distinct indicators for individual "inflation expectations."

3. Operationalizing Private Sector "Inflation Expectations"

In this section, we present our operationalization of private sector "inflation expectations" and analyze the validity of our measure. Our data come from the WBES, an 81-country cross-sectional firm-level survey conducted in developed and developing countries in 1999 by the World Bank.³ At least 100 firms were interviewed in each country, with an overall total of 10,090 firms in the sample. The survey has a number of questions on the business environment in which firms operate, including assessments of monetary policy conditions and institutions.⁴ The database also includes information on

³ For a general discussion of the WBES, see Batra, Kaufmann, and Stone (2003).

⁴ Beck, Demirguc-Kunt, and Maksimovic (2004) use the WBES to explore the effects of financial obstacles on firm growth. Broz and Weymouth (2007) utilize the WBES to examine the connection between the political party orientation of government and firms'

firm ownership (foreign, government), firm size, sales performance, sector of operation (manufacturing, services, agriculture), and export orientation, which we tap as control variables.

In most macroeconomic models, the inflation expectations of price and wage setters are a crucial factor in the inflation process. But data on the price expectations of business firms--the price setters in the first instance--as well as information on nominal wage expectations is scarce. The most widely used surveys ask household consumers, as opposed to firms or labor representatives, about their inflation expectations (Mankiw, Reis, and Wolfers 2004). For example, the University of Michigan's "Survey of Consumer Attitudes and Behavior" has tracked the inflation expectations of U.S. households for over 50 years by asking consumers to predict the change in prices over the next 12 months. Since consumers do not set prices or wages, these surveys do not measure the forecasts of the individuals that matter in models of inflation.⁵

One of the advantages of the WBES is that it is a survey of business owners and managers, so that people with the capacity to set prices form the pool of respondents. A shortcoming is that the WBES does not explicitly ask businesses to forecast inflation. Nevertheless, we think one of the WBES queries on inflation is forward-looking and approximates of the concept of "inflation expectations." We label this indicator "INFLATION," which is firm owners' response to the following query:

perceptions of property rights. Broz, Frieden, and Weymouth (2008) use the WBES to analyze firms' attitudes toward exchange rates.

⁵ The Livingston "Survey of Professional Forecasters," conducted quarterly by the Federal Reserve Bank of Philadelphia, comes closer to measuring the expectations of price-setting firms, since respondents come largely from the business world. But, like the Michigan consumer survey, data are limited to the United States.

“Please judge on a four point scale how problematic inflation is for the operation and growth of your business.”

Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). We think this variable is a reasonable proxy for price-setters’ inflation expectations. On the one hand, the frame of the query --“operation and growth of your business”--suggests a forecast. “Growth” is, of course, a forward-looking concept. On the other hand, “operation” suggests a short-run (recent past, current, near future) perspective. This part of the frame, however, is not a severe problem for our analysis because existing survey measures of inflation expectations correlate strongly with current inflation levels (Thomas 1999). Since other types of respondents (consumers and business economists) have been shown to pay a great deal of attention to recent inflation data when forming expectations about future inflation--even for forecasts as far out as five years--we believe our variable captures business expectations as well as a more explicitly forward-looking query might. Later in the paper, we return to this issue and analyze two other WBES queries about firm owners’ perceptions of the monetary policy environment. Our results are robust to these alternative measures of the dependent variable.

Our measure of businesses’ inflation expectations, INFLATION, has a mean of 2.8 and a standard deviation of 1.07. Overall, 34 percent of all firms in the sample report that inflation is a major obstacle to the operation and growth of their businesses. Another 26 percent see inflation as a moderate obstacle, while 23 percent of firms view inflation as minor obstacle, and 16 percent view inflation as no obstacle at all. **Table 1** indicates that the concern with inflation not only varies across firms within a country but it also

varies significantly across countries. The table lists the country average of INFLATION for the top and bottom ten countries in the sample; it also reports actual inflation for each country in 1999, the year of the survey. With few exceptions, the lists are intuitively appealing: in the ten countries where firms reported the least concern with inflation, actual inflation averaged just 2.7 percent. Bosnia, the country where firms expressed the least concern with inflation despite a 1999 inflation rate of 8.4 percent, saw a steady decline in inflation over the previous five years, with inflation running at 3.9 percent over that period. By contrast, in the ten countries where firms reported the most concern with inflation, recent inflation averaged 71.2 percent. The exception--Kazakhstan--had relatively low inflation the year of the survey but inflation over the previous five years averaged 49.6 percent. We therefore claim sufficient support for the face validity of INFLATION and use it as the main dependent variable in our regressions.

4. Monetary Anchors and Private Sector Inflation Expectations

High and volatile inflation distorts private sector decision-making with regard to investment, savings, and production, and ultimately leads to slower economic growth. A number of institutions have been suggested to lower inflation expectations by way of credible monetary policy commitment. These institutions include an independent central banker that places a higher weight on inflation stabilization than the private sector (Rogoff 1985), an incentive contract that penalizes central bank governors either by loss of compensation or prestige (Walsh 1995), and a monetary policy commitment rule such as an inflation target (Bernanke et al. 1999). Pegging the exchange rate to a stable foreign currency provides another institution for providing a credible commitment to low inflation (Ravenna 2005). As Frankel (1999) has observed, choosing the exchange rate

as the nominal anchor and importing credibility from abroad has the advantage of being relatively easy to implement and provides an easily observable commitment to monetary policy.⁶

Our research goal is to examine whether monetary commitment institutions anchor private sector inflation expectations in the manner specified by theory. In this section, we describe our measures of monetary institutions and provide some preliminary comparisons of firm owner inflation expectations across these regimes.

With respect to exchange rate regimes, we want to assess how firms' inflation expectations are conditioned by the country's exchange-rate regime. For this purpose, we need to classify countries by exchange-rate regime. We employ two classifications of *de facto* exchange rate regimes: Levy-Yeyati and Sturzenegger (2005), and Reinhart and Rogoff (2004). Although the methods differ, both classifications attempt to capture the actual behavior of the exchange rate. Levy-Yeyati and Sturzenegger categorize countries as floats or pegs according to observed changes in the nominal exchange rate, the volatility of these changes, and the volatility of international reserves. Reinhart and Rogoff, exploit the conditional probability of the exchange rate staying within a given range over a rolling five-year window, and use information about parallel (dual market) exchange rates in determining whether a regime continues from one year to the next. We collapse RR into three regimes (0 = Float, 1 = Intermediate, 2 = Fixed) and take values for 1999 and call this variable "PEG (RR)." We take the LYS 3-way classification for

⁶ There is a large literature on why pegged regimes may be crisis prone, an issue that is beyond the scope of this paper.

1999 and label it "PEG (LYS)".⁷ Our results are robust to these alternative *de facto* regime classification schemes.⁸

We also include a *de jure* measure of exchange-rate regime on the grounds that an announced regime may be more easily observed by private-sector actors than a *de facto* regime. "PEG (IMF)" is the regime the government announces and reports to the IMF. As above, we take values from 1999 and construct a 3-way indicator (0 = Float, 1 = Intermediate, and 2 = Fixed).

To test the effects of central bank independence on firm owner expectations about inflation, we use three alternative measures. For *de jure* CBI, as written into countries' laws and legal systems, we use the Polillo and Guillén (2005) update of the Cukierman, Webb, and Neyapti (1992) index. Polillo and Guillén replicated the Cukierman, Webb, and Neyapti method to update the *de jure* CBI index for the 1992-2000 period. Our variable, "CBI (CWN)," is the 1999 value of the Polillo and Guillén index for countries in our sample.⁹

Our second measure of *de jure* central bank independence is from Mahadeva and Sterne (2000). Unlike the CBI (CWN) index, which was coded by academic experts on the basis of a reading of central banking statutes, Mahadeva and Sterne's index is

⁷ Please see the data appendix for details.

⁸ Neither of these classifications systematically codes basket pegs as a unique category; thus, we are unable to determine how firms respond to *de facto* single-currency pegs relative to softer pegs.

⁹ We also utilized Crowe and Meade's (2007) update of the Cukierman, Webb, and Neyapti index. The Crowe and Meade CBI index data were for the end of 2003, four years after the WBES was conducted. For this reason, we prefer the Polillo and Guillén data. However, regression results using the Crowe and Meade data are substantively the same. We are grateful to Chris Crowe and Ellen Meade for graciously sharing their data.

constructed from a 1998 survey administered directly to central bankers. Under the auspices of the Bank of England, the survey was designed along the lines of Cukierman's (1992) *de jure* approach. The resulting composite CBI index is a weighted average of central banker responses to questions about (1) their statutory obligation to focus on price stability, (2) target independence, (3) their instrument independence, (4) the finance of government deficits, (5) and the term of office of the governor. The index, which we label, "CBI (M&S)," was administrated in 1998 across 94 economies. As such, it provides timely coverage for our purposes; we obtain values for 51 of the 81 countries in the WBES sample.¹⁰

Our third measure of CBI is a *de facto* indicator. Based on pioneering work by Cukierman (1992), it is the central bank governor turnover rate. This measure relies on the assumption that governors who resist political pressure will be replaced; high governor turnover is interpreted as indicating political interference in the conduct of monetary policy.¹¹ Our variable, "CBI (TURNOVER)", is the turnover rate of central bank governors for the five years between 1995 and 1999. These data are from Ghosh, Gulde, and Wolf (2002).

Inflation targeting is another institutional framework that can help constrain monetary policy and achieve low and stable inflation. In contrast to targeting the exchange rate of an anchor currency, inflation targeting involves targeting inflation directly. Under this regime, the central bank is mandated, and commits to, a numerical

¹⁰ As with other *de jure* CBI indicies, this one is subjective. However, it is open to the additional criticism that the responses of central bankers may be particularly biased.

¹¹ Of course, low turnover need not indicate independence since a governor that is pliant to (political) pressure would not have to be replaced.

target in the form of a level or a range for annual inflation. This means the inflation forecast (over some horizon) becomes the intermediate target of policy. Other distinguishing features of inflation targeting are greater central bank transparency and accountability. These features are important because inflation targeting is supposed to enhance credibility while allowing the central bank some flexibility to respond to shocks. On the one hand, the medium-term inflation target makes it clear that low inflation is the primary goal of monetary policy, yielding an increase in credibility. On the other, greater transparency and accountability are meant to compensate for the greater operational flexibility that inflation targeting offers. Short-term deviations of inflation from the medium-run forecast target are possible and do not necessarily translate into losses in credibility.

Mishkin's (2004) definition of inflation targeting thus has five elements: (1) an announced, numerical, medium-term inflation target, (2) price stability as primary goal of monetary policy, (3) an information-inclusive strategy in which many variables are used for deciding the setting of policy instruments, (4), high transparency of the monetary policy strategy through communication with the private sector about the plans, objectives, and decisions of the monetary authorities, and (5) accountability of the central bank for attaining its inflation objectives.

We draw upon two sources for data on inflation targeting regimes. The first is the Mishkin and Schmidt-Hebbel (2002) classification of IT countries that met the above criteria prior to the WBES survey in 1999. We use a binary indicator for the variable, "IT (MISHKIN)": 1 if an inflation target regime was in place prior to 1999, 0 otherwise. In the WBES sample of countries, inflation targeting countries are Canada, Chile, Czech

Rep, Mexico, Poland, Sweden, and the United Kingdom. We exclude Spain since it adopted the Euro in January 1999.

Our second indicator of IT comes from Mahadeva and Sterne (2000) who construct an index of IT from the responses of central bankers to a 1998 survey. One of the purposes of the survey was to gauge the relative emphasis that a central bank places on inflation, the exchange rate, and money targets. The survey thus provides a measure of the *degree* to which a country's policy focused on a particular target, rather than assuming that a policy framework could be classified entirely committed to a single target. The index for "inflation target focus" is the equally-weighted average of numerical responses to four questions: (1) Is your regime described as inflation targeting? (2) Do you publish a specific target/monitoring range now? (3) In practice, how highly do you rank this objective? (4) Does inflation prevail when there are policy conflicts? The variable, "IT (M&S)" ranges from 0, for a country that does not focus on targeting inflation at all, to 1, for a central bank whose focus is entirely on targeting inflation.

We thus have multiple indicators of each monetary institution, as well as a mix of *de jure* and *de facto* indicators of these institutions. See **Appendix A** for country values of all our data; summary statistics are in **Table 2**.

Having described our data, we provide preliminary comparisons of firms' concerns about inflation across these monetary commitment regimes. **Figures 2-4** group firm owners by the commitment institution they operate under--pegs, CBI, and IT--and reports their average responses to the WBES query about inflation. Values range from 1, indicating that firm owners think inflation is a "no obstacle," to 4, which means inflation is perceived as "major obstacle." **Figure 2** illustrate how the exchange-rate regime

relates to firms' inflation concerns, using the three-way (Float, Intermediate, Fixed) *de facto* indicator from Reinhart and Rogoff (2004). The average response among firms operating in fixed exchange-rate environments is 2.4, which is closest to the “minor obstacle” response, versus the 3.2 average for firms in floating exchange rate regimes, which is above the “moderate obstacle” response. **Figure 3** and **Figure 4** repeat the exercise using regime indicators from Levy-Yeyati and Sturzenegger and the IMF. Regardless of the measure we use--RR, LYS, or IMF-- the distributions in **Figures 2-4** reveal that firms operating in pegged regimes are consistently less concerned about inflation than firms in floats.

Figures 5-7 explore the link between inflation concerns and CBI. To do so, we collapsed our three indicators for CBI into binary variables, where 0 indicates a level of CBI that is below the mean level in our data, and 1 indicates CBI above the mean. The figures are average responses across the regimes. With respect to *de jure* CBI as proxied by the Cukierman, Webb, and Neyapti (Polillo and Guillén) measure, firms in high CBI countries are slightly *more* concerned about inflation than firms in low CBI settings, which runs against our priors (**Figure 5**). However, the *de jure* indicator from Mahateva and Sterne (**Figure 6**), and the *de facto* measure based on governor turnover (**Figure 7**), both suggest that CBI reduces inflation concerns among business owners and managers.

Figures 8 and 9 plot the relationship between inflation targets and firms' average inflation concerns. As with the distributions for CBI, the alternative indicators for IT regimes yield conflicting results. When IT is proxied by the Mishkin sample (**Figure 8**), there is *prima facie* support for the claim that inflation targets anchor price concerns. But when the Mahateva and Sterne data are used, (**Figure 9**), IT seems to have a perverse

effect, as firms in nations that focus more on targeting inflation report *greater* concern with inflation than firms in nations that focus less on targeting inflation.

This preliminary evidence suggests that fixed exchange rates contribute to a perception among businesspeople that inflation is less of a problem to their firms. There is less consistent evidence that CBI and IT have a similar effect. To further assess the evidence and control for other factors that might contribute to these differences, we move to regression analysis.

5. Model and Results

Survey responses may reflect other firm- or country-level characteristics besides monetary institutions. For firm-level controls, we use the responses to five other WBES questions: sales change, firm size, sector of operation, foreign ownership, and export orientation. Firms that experience sales increases may be more successful and therefore less likely to view inflation as a problem. Our variable, SALES CHANGE, is the percent change in firm sales over the previous three years. Larger firms may be more established and therefore less likely to find inflation a problem. Our measure, FIRM SIZE, is an ordered response where 1=small (5-50 employees), 2=medium (51-500 employees), and 3=large (>500 employees). Firms in manufacturing and services may have greater market power than firms in agriculture and, consequently, may be able to pass through price increases to customers. We use binary indicators for MANUFACTURING and SERVICES, treating agriculture as the reference sector. Firms with foreign ownership and an export orientation might be more diversified internationally and therefore less subject to price shocks in the home market. Our binary indicators are FOREIGN

OWNED and EXPORTER, which respectively indicate if some share of the firm is owned by foreign nationals and some portion of its sales are exported.

We also include several country-level variables in our models to control for national factors other monetary institutions. Firms in more developed countries may have less concern with inflation, so we control for per capita GDP in 1999. Firms in countries with higher rates of economic growth may be less concerned with inflation so we control for growth performance with the change in GDP per capita between 1998 and 1999.

Lastly, we control for inflation, measured as the change in consumer prices between 1998 and 1999.¹² We include inflation as a control because inflation might affect the types of monetary institutions a nation adopts as well as individuals' perceptions of inflation as a problem. For instance, recent inflation could positively influence worries about inflation while at the same time increasing the likelihood that a government fixes the exchange rate, grants greater autonomy to the central bank, or adopts inflation targeting. Leaving inflation out of the model would thus bias the effects of monetary institutions on private sector inflation expectations.

We run ordered probit models with robust standard errors clustered by country to estimate the following equation:

$$(INFLATION\ EXPECTATIONS)_{ij} = \alpha + \beta_1 (REGIME)_{ij} + \beta_2 (FIRM)_{ij} + \beta_3 (ECONOMY)_j + \varepsilon_{ij}$$

where the subscripts stand for firm i in country j . The dependent variable is INFLATION EXPECTATIONS, the response of firm i in country j . We use three ordered responses

¹² Our results are robust to 5 year averages and logs of these three country-level variables.

from the WBES as alternative measures of the dependent variable (see above). Our variable of interest is REGIME, which represents one of three monetary institutions designed to credibly commit policy to low inflation: fixed exchange rates, CBI, and inflation targeting. The vectors FIRM and ECONOMY are the firm- and country-level controls described above.

Table 3 presents results of regressing our indicator of businesses' inflation expectations, INFLATION, on the type of exchange-rate regime and a set of control variables. The dependent variable records firms' ordered responses to the WBES inquiry, "How problematic is inflation to the operation and growth of your business?" Answers range from 1="No Obstacle" to 4="Major Obstacle". Model 1 estimates the effects controlling for firm-level characteristics; all coefficients are signed correctly and significant. Model 2 adds country-level control variables. Intuitively, higher inflation increases the likelihood that a firm will perceive inflation to be a problem while the level of economic development and recent economic growth both significantly reduce businesses' concern about inflation.

Models 3-5 introduce our three measures of exchange rate regime: RR, LYS and IMF. Each is coded as 0=Float, 1=Intermediate, and 2=Peg, so negative estimates indicate that pegging reduces concerns about inflation. The estimates are indeed all negative and statistically significant. Overall, firms report more problems with inflation in floating regimes than firms operating under pegged exchange rates.

As the magnitudes of ordered probit results are difficult to interpret directly, we simulated the change in the predicted probability of observing a "4=Major Obstacle" response as we moved the exchange-rate regime indicators from a float to a peg (i.e.,

from 0 to 2), holding other independent variables in Models 3-5 at their means.¹³ The effects are substantively important. The probability that a firm will report inflation to be a "Major Obstacle" decreases by 10.4 percentage points as the regime environment moves from an RR float to an RR peg. A move from an LYS float to an LYS peg reduces the likelihood of this response by 7.2 percentage points. The impact of a change in official IMF regimes falls between these two estimates: firm owners are 9 percentage points less likely to report that inflation is a major obstacle under a *de jure* peg.

Other monetary institutions appear unrelated, or perversely related, to firm responses. **Table 4** reports results as we introduce our indicators of CBI and IT to the baseline model. Model 1 is the base model, containing firm- and country-level controls. Models 2-3 include PEG (RR) and PEG (LYS) for the purposes of comparison. Models 4-6 introduce our three indicators of CBI. Although CBI (CWN) and CBI (TURNOVER) have the correct sign, none of these CBI proxies is significant. The two indicators for inflation targeting have the wrong sign--IT appears to *increase* inflation concerns among firm owners--and in the case of the survey-based measure, IT (M&S) is significant at the 5 percent level.

The perverse effect of IT on firms' inflation concerns is puzzling. To pursue the matter further, we ran Models 7 and 8 again and included a measure of central bank "transparency." Since IT requires transparency in order to compensate for its relatively high level of discretion, our thought was that we should control for central bank

¹³ The simulations were performed with "Clarify" (Tomz et al 1998). We set FIRM SIZE to 2, and MANUFACTURING, SERVICES, FOREIGN OWNED, and EXPORTER to 1. All country-level controls were held at their means.

transparency to obtain more predictable results on the IT variables.¹⁴ The results (not reported) indicate that there is no direct relationship between transparency and inflation concerns. More importantly, with the transparency control included in Model 8, IT (M&S) estimate remains positive and significant (at the 10 percent level). Thus, if IT has any effect on the perceptions of firms in our sample, it is to increase concerns about inflation. It may be that inflation targeting is an endogenous variable, such that countries that had greater problems with inflation in the past were more likely to have selected IT as a focus for central bank policy. A cursory look at our data doesn't support this interpretation, however, as countries where central bankers gave greater focus to targeting inflation by 1999 experienced lower average inflation rates over the prior five year period than countries with below average attention to IT. In countries with above-the-mean values of IT, as measured by Mahadeva and Sterne index, prices rose 23.9 percent per year on average from 1994 to 1998. By contrast, inflation was even higher--28.9 percent--in countries with below average attention to inflation targeting.

Even if endogeneity can account for our positive estimate on the IT (M&S) coefficient, the result does not suggest that adoption of an IT regime *itself* mitigates inflation concerns among businesses. Policymakers may need to earn a reputation for their commitment to low inflation by maintaining low and stable prices for some period after the adoption of an IT regime. Unlike commitment to a fixed exchange-rate regime, which implies an automatic policy rule that is easily verified by way of currency fluctuations in the foreign exchange market, inflation targeting permits more discretion

¹⁴ The transparency variable is from Crowe and Meade (2007), who create a transparency index from five dimensions of central bank transparency: political, economic, policy, procedural, and operational.

for policymakers. IT allows central bankers the discretion on how and when to bring inflation back to the target; it also allows them the discretion to change targets. All this discretion contrasts sharply with the binding constraint and the transparency of an exchange rate peg. Businesses may thus be skeptical about how policymakers will use this discretion when an IT regime is initially adopted, leading to an increased focus on inflation-related concerns when conducting their affairs

We now assess the robustness of our initial results to alternative measures of the dependent variable, also from the WBES dataset. Although these measures are derived from survey queries that are further removed from the concept of “inflation expectations,” they capture firm owner perceptions of the macroeconomic policy environment and are thus relevant to our analysis. A following WBES survey question gauges firm owners' perception of the predictability of economic and financial policies:

"Do you regularly have to cope with unexpected changes in economic and financial policies which materially affect your business? Changes in economic and financial policies are ..."

Answers vary between 1 (completely predictable), 2 (highly predictable), 3 (fairly predictable), 4 (fairly unpredictable), 5 (highly unpredictable), and 6 (completely unpredictable). This variable, "PREDICTABILITY," provides an indication of the extent to which firms find unstable/uncertain government policies problematic to the operation and growth of their business. Perceptions of economic policy instability are related to the concept of monetary policy "credibility." In particular, if a government is credible in its policy announcements, then its policies will be perceived as more stable and certain.

In another monetary-related inquiry, the WBES asked firms to rate the quality and efficiency of the central bank:

"Please rate the overall quality and efficiency of services delivered by the following public agencies: The Central Bank."

Answers vary between 1 (Very Good), 2 (Good), 3 (Slightly Good), 4 (Slightly Bad), 5 (Bad), and 6 (Very Bad). While quality and efficiency are subjective terms, we expect responses to this question to be related to the central bank's performance in credibly committing to low inflation. In this broad sense, the inquiry taps into the private sector's perception that the central bank behaves in a time-consistent manner.

In **Table 5** we give results of ordered probit regressions of PREDICTABILITY-- an alternative measure of government credibility from the WBES. The dependant variable, PREDICTABILITY, is the firm owner response to the inquiry: "Do you regularly have to cope with unexpected changes in economic and financial policies which materially affect your business? Changes in economic and financial policies are: 1=completely predictable to 6=completely unpredictable." Our estimates once again support a role for exchange-rate pegs in anchoring private-sector inflation expectations and building credibility for the commitment to low inflation. Both the PEG (RR) and the PEG (LYS) estimates are negative and significant. By contrast, all of the other monetary anchoring institutions except CBI (TURNOVER) are wrongly signed (but insignificant) in Models 4-8.

Table 6 presents results using CB QUALITY as the dependent variable. This variable ranges from 1="Very Good" to 6="Very Bad" and captures firms' responses to inquiry: "Please rate the overall quality and efficiency of services delivered by the

following public agencies or services: The Central Bank." Our indicators of the exchange rate regime return estimates that are negative and significant (in the case of the RR measure), suggesting that pegs improve assessments of the central bank. In addition, central bank independence, as proxied by CBI (TURNOVER), makes it more likely that firms will rate the central bank as low quality. All other monetary anchors have no relationship to assessments of central bank quality, although IT is in the expected direction.

6. Conclusion

We have examined micro-level evidence to see if institutions actually influence the individual perceptions of price-setting businesses in the manner stipulated in theory. Micro-processes underlie all theories of inflation, but empirical scholarship has largely ignored the intermediate stage where human agency stands between institutions and aggregate economic outcomes. In this paper, we utilized firm-level data from a large, cross-national survey to assess the impact of alternative monetary commitment institutions on individual inflation perceptions in the private sector. We found that exchange-rate pegging reduces concerns about inflation, improves perceptions of economic policy certainty and stability, and raises regard for the central bank among business people. However, firm-owner responses in our sample seem unaffected by inflation targeting and central bank independence.

In principle, all three monetary anchors should yield improvements in private sector credibility. But pegging has three characteristics that give it an advantage over inflation targets and central bank independence in raising credibility. First, pegs are transparent. Choosing the exchange rate as the nominal anchor and importing credibility

from abroad has the advantage of being a more easily observable commitment to monetary policy than either CBI or IT (Frankel 2002). Atkeson and Kehoe (2001) show formally that the greater transparency of an exchange rate peg reduces the credibility problems that arise when a government cannot commit to monetary policies. Broz (2002) shows that low-credibility non-democracies are more like to choose pegs than democracies because pegs provide the transparency that autocracies lack. While an exchange-rate target is a simple and verifiable promise, CBI and IT are more difficult to observe, even for academic specialists!

A second characteristic of fixed exchange rates that helps anchor expectations is that pegs eliminate discretion. By delegating monetary policy authority to the anchor currency's central bank, exchange-rate targets result in losing much, if not all, monetary autonomy. By contrast, the entire logic of adopting CBI or IT is to allow a modicum of policy flexibility so that monetary instruments can be used for stabilization purposes. But this discretion may result in a loss of credibility.

Third, pegging is costly. Not only does pegging require governments to sacrifice domestic policy autonomy, it can also cause speculative attacks unrelated to the fundamentals. In the spirit of signaling models, the costliness of adopting a peg could be what makes pegging so credible in the eyes of the private sector in our data. The knowledge that costly trade-offs exist lends credibility to the commitment since it would not be optimal to incur the costs of pegging unless the commitment to low inflation is unusually strong (Flood and Isard 1989)

These theoretical considerations provide a foundation for interpreting our results. Of course, further research is needed before we draw definitive conclusions.

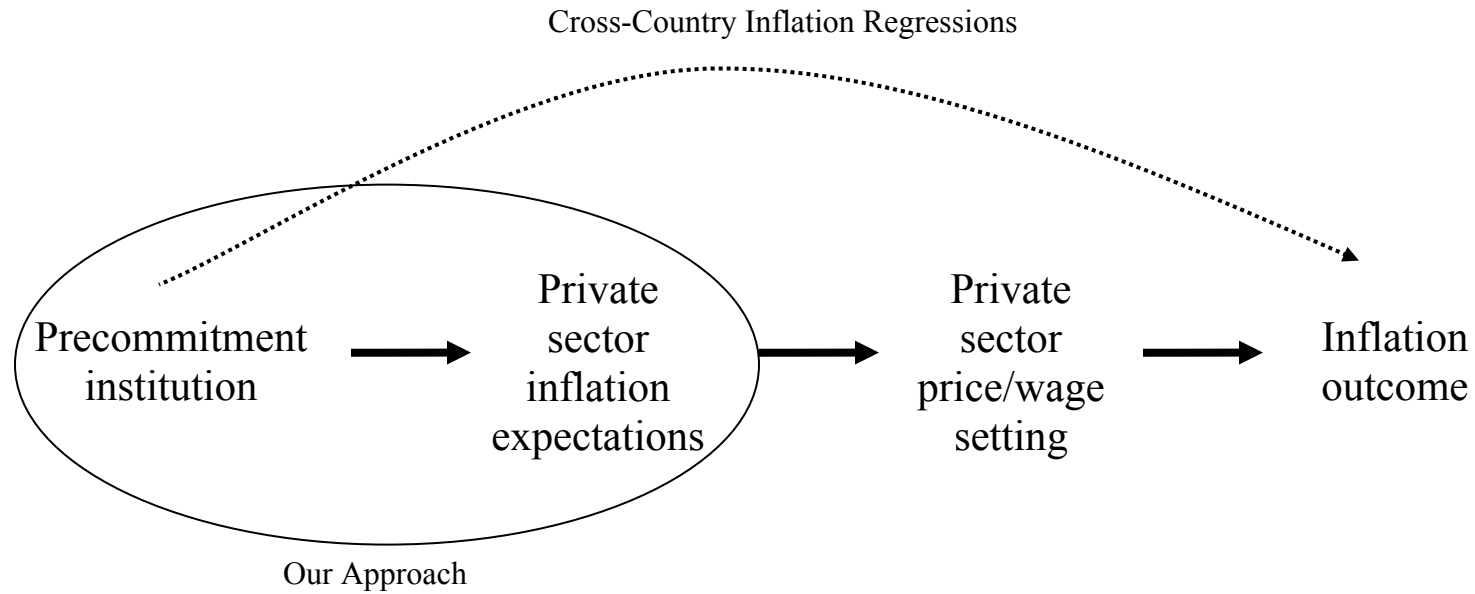
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Figure 1: The Causal Pathway from Institutions to Aggregate Outcomes



Notes: The heavy horizontal black arrows indicate the causal pathway in the rational expectations theory of inflation. The upper dashed line depicts empirical research that bypasses individual expectations and behavior. Inside the oval is our approach: we estimate the impact of precommitment institutions on private sector inflation expectations.

Figure 2: Firms' Concern with Inflation, by *de facto* Exchange Rate Regime

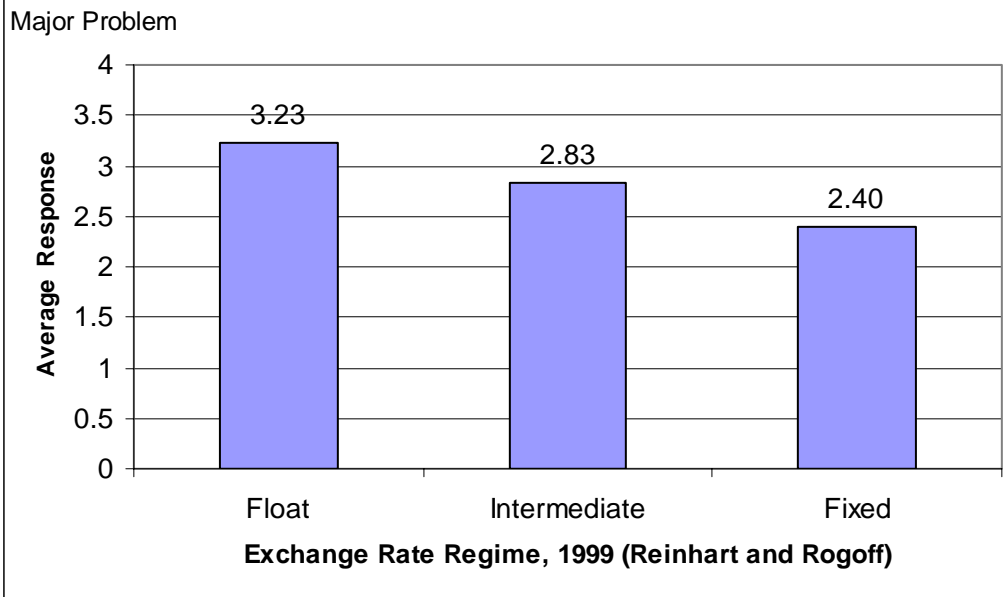
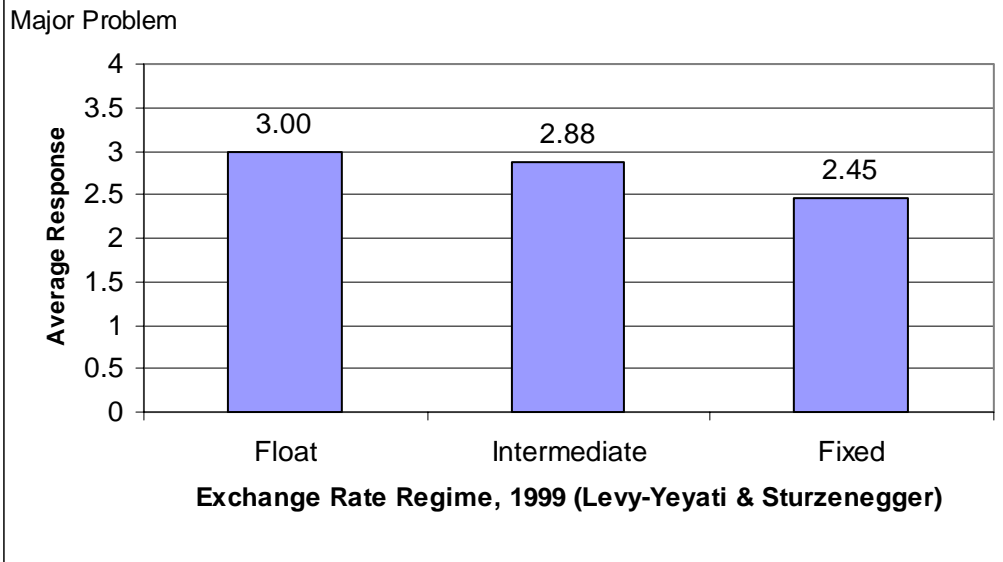
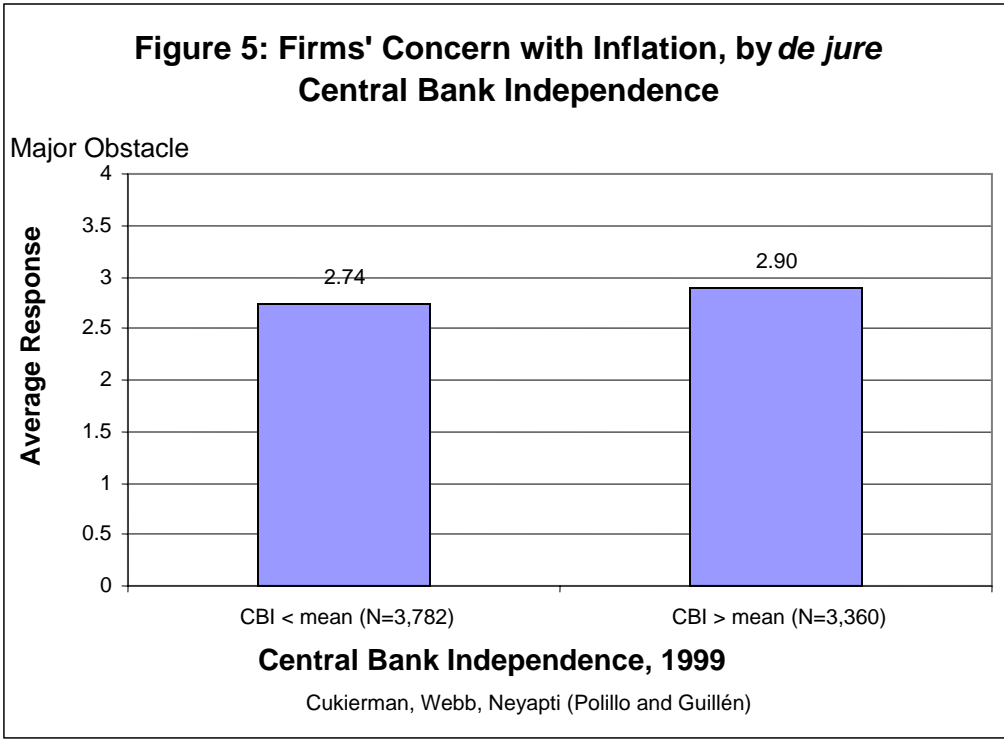
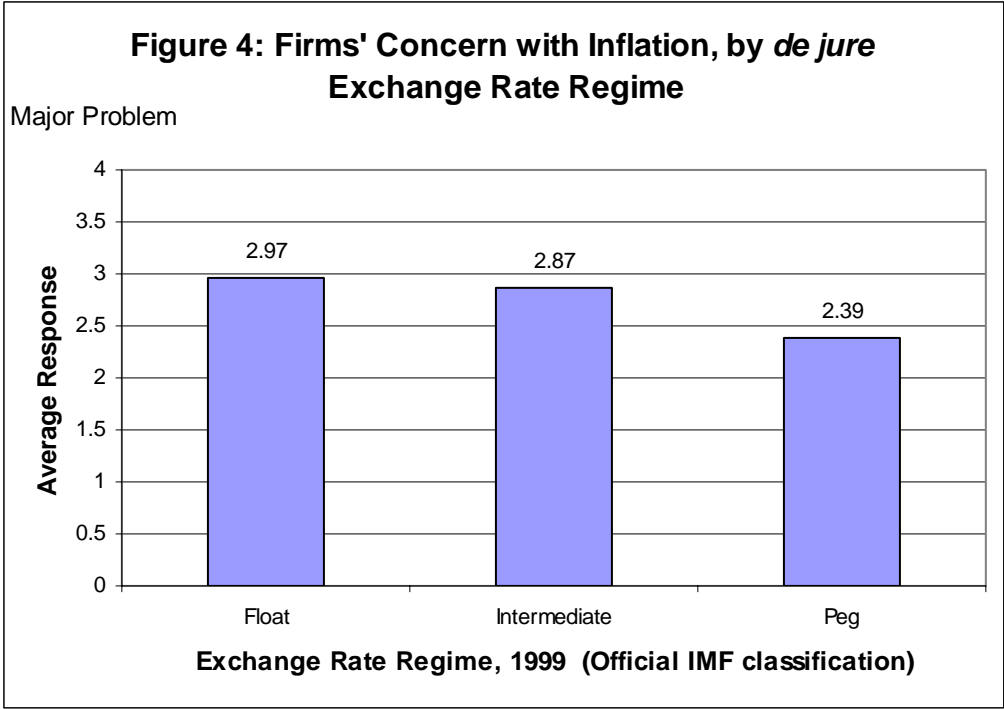
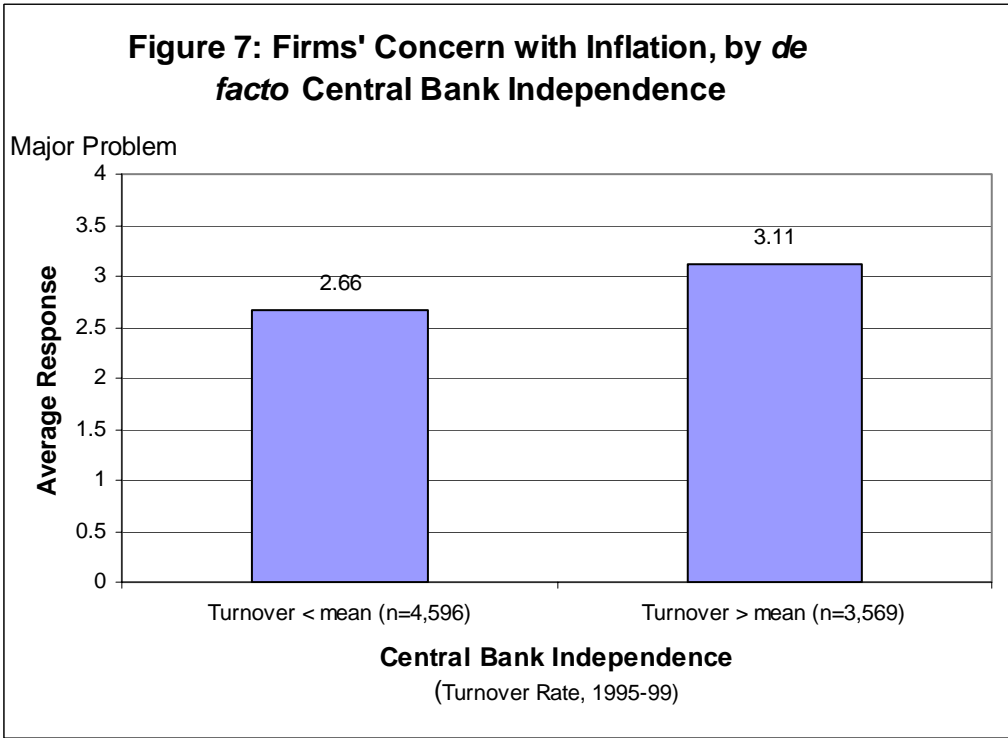
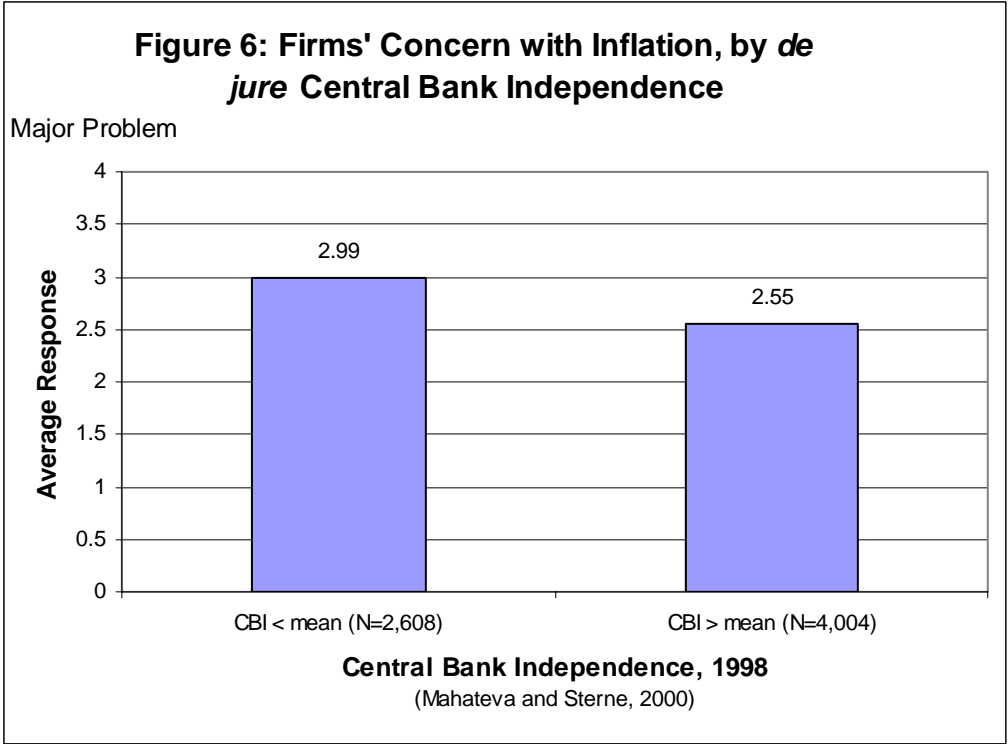


Figure 3: Firm Owners' Concern with Inflation, by *de facto* Exchange Rate Regime







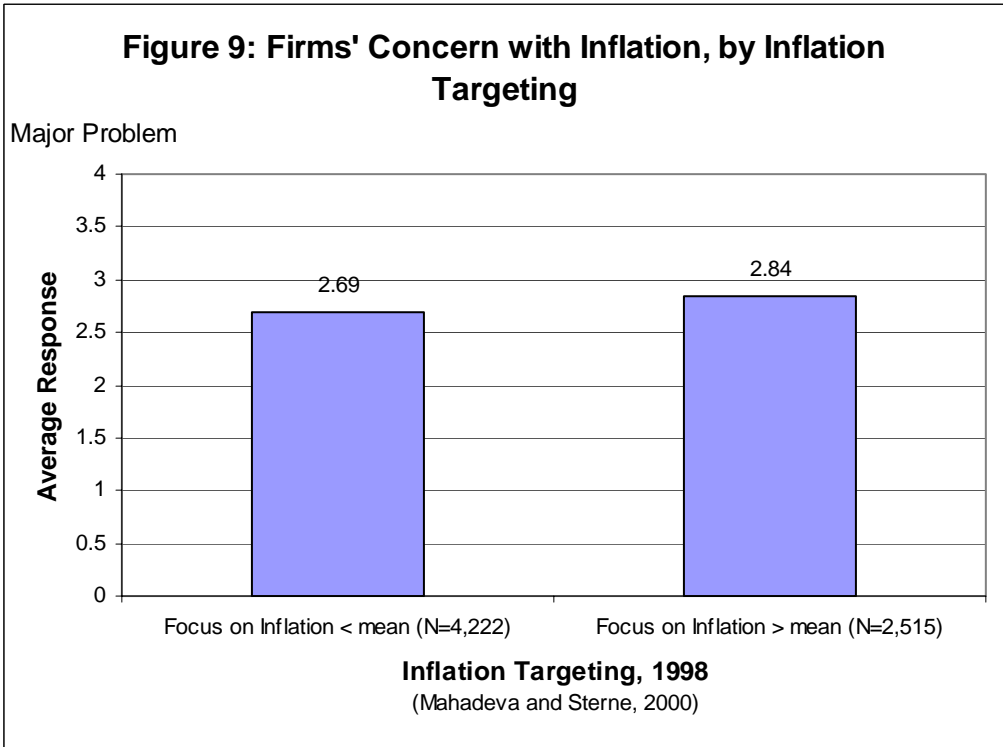
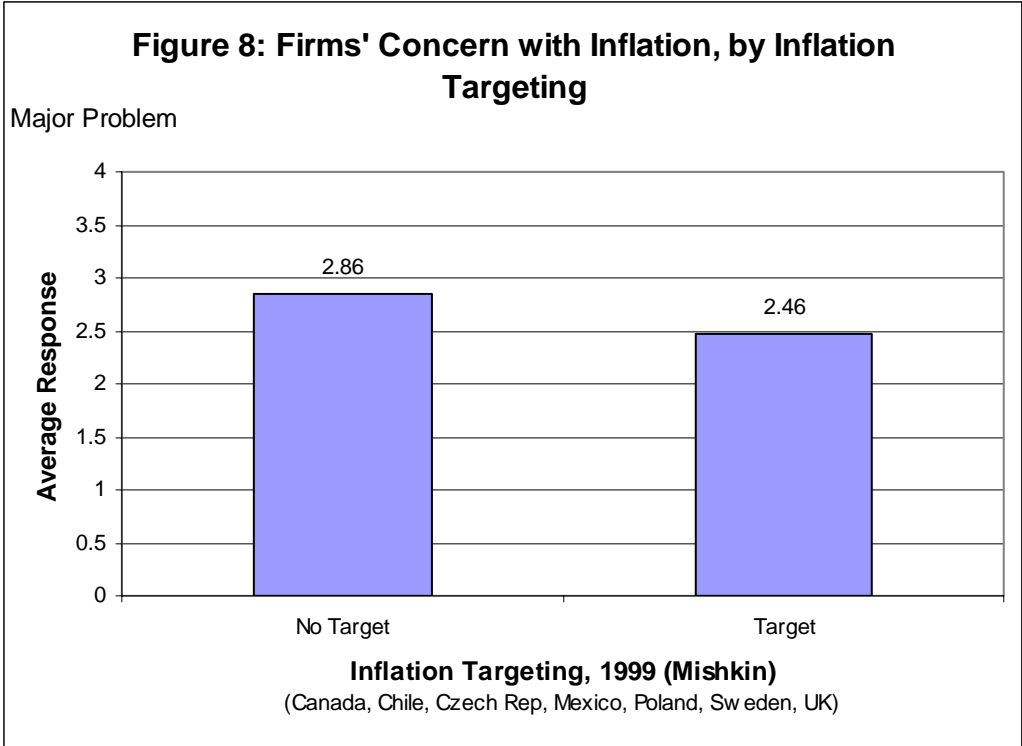


Table 1: Firm Owners' Inflation Concern, Country Averages

	<i>Country</i>	<i>Inflation Concern</i>	<i>Inflation 1999</i>
1.	Bosnia	1.32	8.36
2.	Singapore	1.56	0.02
3.	Sweden	1.69	0.46
4.	Tunisia	1.74	2.69
5.	Germany	1.86	0.57
6.	Botswana	1.95	7.75
7.	France	1.97	0.50
8.	Argentina	2.01	-1.17
9.	Panama	2.02	1.25
10.	Namibia	2.02	6.49
...	<i>top 10 mean</i>	<i>1.81</i>	<i>2.69</i>
70.	Russia	3.51	86.00
71.	Zambia	3.52	26.79
72.	Turkey	3.56	64.87
73.	Kazakhstan	3.57	8.30
74.	Malawi	3.60	44.80
75.	Belarus	3.65	293.68
76.	Kyrgyzstan	3.73	37.57
77.	Ecuador	3.76	52.24
78.	Zimbabwe	3.84	58.52
79.	Moldova	3.84	39.27
...	<i>bottom 10 mean</i>	<i>3.66</i>	<i>71.20</i>

Note: "Inflation Concern" is the average of firm owner responses, by country, to the WBES inquiry: "Please judge on a four point scale how problematic inflation is to the operation and growth of your business:" (1 = "No Obstacle" to 4 = "Major Obstacle"). "Inflation" is the percentage change in consumer prices in 1998-1999.

Table 2: Summary Statistics

<i>Firm-Level Variables</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max.</i>
INFLATION CONCERN	2.083	1.074	1	4
SALES CHANGE	0.124	0.477	-1	9
FIRM SIZE	1.792	0.753	1	3
MANUFACTURING	0.362	0.481	0	1
SERVICES	0.431	0.495	0	1
FOREIGN OWNERSHIP	0.189	0.391	0	1
EXPORTER	0.359	0.48	0	1

<i>Country-Level Variables</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min.</i>	<i>Max.</i>
INFLATION	16.955	38.231	-8.516	293.679
GDPpc	4.0019	6.448	.1169	33.748
dGDPpc	3.541	3.841	-6.299	11.91
PEG (RR)	1.006	0.68	0	2
PEG (LYS)	0.928	0.819	0	2
PEG (IMF)	0.657	0.866	0	2
CBI (CWN)	0.552	0.19	0.21	0.92
CBI (M&S)	0.781	0.122	0.416	0.978
CBI (TURNOVER)	0.19	0.25	0	1
IT (MISHKIN)	0.087	0.283	0	1
IT (M&S)	0.456	0.285	0	1

Table 3: "Inflation Concern," by Exchange Rate Regime
(Ordered Probit Regressions of Firm-Level Responses)

	1	2	3	4	5
Sales change	-0.067 (0.039)*	-0.054 (0.030)*	-0.052 (0.028)*	-0.066 (0.029)**	-0.046 (0.028)*
Firm size	-0.057 (0.028)**	-0.097 (0.025)***	-0.109 (0.025)***	-0.098 (0.025)***	-0.099 (0.023)***
Manufacturing	-0.227 (0.060)***	-0.178 (0.045)***	-0.156 (0.045)***	-0.151 (0.043)***	-0.161 (0.042)***
Services	-0.226 (0.067)***	-0.153 (0.048)***	-0.161 (0.049)***	-0.16 (0.048)***	-0.146 (0.047)***
Foreign owned	-0.212 (0.065)***	-0.101 (0.054)*	-0.091 (0.054)*	-0.119 (0.054)**	-0.091 (0.053)*
Exporter	-0.332 (0.064)***	-0.148 (0.050)***	-0.174 (0.047)***	-0.172 (0.049)***	-0.132 (0.049)***
Inflation, 1999		0.008 (0.004)**	0.007 (0.003)**	0.007 (0.003)**	0.008 (0.003)**
GDPpc, 1999		-0.039 (0.007)***	-0.038 (0.007)***	-0.038 (0.007)***	-0.035 (0.007)***
dGDPpc, 1999		-0.036 (0.011)***	-0.035 (0.013)***	-0.035 (0.011)***	-0.044 (0.013)***
Peg (RR)			-0.183 (0.089)**		
Peg (LYS)				-0.13 (0.055)**	
Peg (IMF)					-0.169 (0.055)***
Observations	7886	7807	7093	7577	7778
Pseudo R2	0.014	0.071	0.081	0.076	0.078

Robust standard errors in parentheses, clustered by country

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: The dependant variable, "Inflation Concerns" is the firm owner response to the WBES inquiry: "Please judge on a four point scale how problematic inflation is to the operation and growth of your business:" (1="No Obstacle"...to... 4="Major Obstacle").

Table 4: "Inflation Concern," by Monetary Anchor
(Ordered Probit Regressions of Firm-Level Responses)

	1	2	3	4	5	6	7	8
Sales change	-0.054 (0.030)*	-0.052 (0.028)*	-0.066 (0.029)**	-0.050 (0.030)*	-0.088 (0.025)***	-0.053 (0.031)*	-0.054 (0.030)*	-0.083 (0.026)***
Firm size	-0.097 (0.025)***	-0.109 (0.025)***	-0.098 (0.025)***	-0.103 (0.026)***	-0.083 (0.026)***	-0.09 (0.027)***	-0.097 (0.025)***	-0.081 (0.024)***
Manufacturing	-0.101 (0.054)*	-0.091 (0.054)*	-0.119 (0.054)**	-0.118 (0.055)**	-0.083 (0.056)	-0.114 (0.055)**	-0.101 (0.054)*	-0.087 (0.055)
Services	-0.148 (0.050)***	-0.174 (0.047)***	-0.172 (0.049)***	-0.160 (0.053)***	-0.117 (0.047)**	-0.142 (0.052)***	-0.149 (0.049)***	-0.134 (0.046)***
Foreign owned	-0.178 (0.045)***	-0.156 (0.045)***	-0.151 (0.043)***	-0.179 (0.048)***	-0.162 (0.053)***	-0.158 (0.050)***	-0.178 (0.046)***	-0.156 (0.052)***
Exporter	-0.153 (0.048)***	-0.161 (0.049)***	-0.16 (0.048)***	-0.135 (0.052)***	-0.085 (0.048)*	-0.115 (0.051)**	-0.153 (0.048)***	-0.092 (0.047)*
Inflation, 1999	0.008 (0.004)**	0.007 (0.003)**	0.007 (0.003)**	0.008 (0.003)**	0.015 (0.003)***	0.008 (0.004)**	0.008 (0.004)**	0.016 (0.003)***
GDPpc, 1999	-0.039 (0.007)***	-0.038 (0.007)***	-0.039 (0.007)***	-0.039 (0.007)***	-0.037 (0.009)***	-0.041 (0.008)***	-0.040 (0.008)***	-0.035 (0.007)***
dGDPpc, 1999	-0.036 (0.011)***	-0.035 (0.013)***	-0.035 (0.011)***	-0.030 (0.013)**	-0.025 (0.015)*	-0.036 (0.015)**	-0.036 (0.011)***	-0.031 (0.015)**
PEG (RR)		-0.183 (0.089)**						
PEG (LYS)			-0.13 (0.055)**					
CBI (CWN)				-0.252 (0.246)				
CBI (M&S)					0.19 (0.471)			
CBI (Turnover)						0.083 (0.227)		
IT (Mishkin)							0.011 (0.15)	
IT (M&S)								0.323 (0.161)**
Observations	7807	7093	7577	6510	5327	6640	7807	5444
Pseudo R2	0.073	0.082	0.077	0.080	0.092	0.083	0.073	0.099

Robust standard errors in parentheses, clustered by country

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: The dependant variable, "Inflation Concerns" is the firm owner response to the WBES inquiry: "Please judge on a four point scale how problematic inflation is to the operation and growth of your business?" (1="No Obstacle" ...to... 4="Major Obstacle").

Table 5: "Economic Policy Predictability," by Monetary Anchor
(Ordered Probit Regressions of Firm-Level Responses)

	1	2	3	4	5	6	7	8
Sales change	-0.018 (0.027)	-0.013 (0.032)	-0.024 (0.03)	-0.017 (0.023)	-0.045 (0.03)	-0.022 (0.029)	-0.019 (0.027)	-0.035 (0.031)
Firm size	-0.093 (0.029)***	-0.107 (0.028)***	-0.099 (0.028)***	-0.113 (0.034)***	-0.137 (0.033)***	-0.094 (0.030)***	-0.092 (0.029)***	-0.142 (0.033)***
Manufacturing	-0.028 (0.048)	-0.016 (0.045)	-0.027 (0.042)	-0.031 (0.046)	-0.061 (0.047)	-0.027 (0.047)	-0.027 (0.048)	-0.05 (0.047)
Services	-0.059 (0.046)	-0.062 (0.047)	-0.068 (0.046)	-0.091 (0.047)*	-0.09 (0.051)*	-0.063 (0.048)	-0.06 (0.046)	-0.08 (0.05)
Foreign owned	-0.121 (0.044)***	-0.107 (0.043)**	-0.109 (0.043)**	-0.121 (0.050)**	-0.151 (0.050)***	-0.126 (0.046)***	-0.12 (0.045)***	-0.143 (0.050)***
Exporter	-0.074 (0.040)*	-0.066 (0.038)*	-0.074 (0.039)*	-0.059 (0.042)	-0.014 (0.05)	-0.091 (0.039)**	-0.076 (0.040)*	-0.01 (0.048)
Inflation, 1999	0.004 (0.002)**	0.002 (0.001)*	0.003 (0.002)*	0.004 (0.002)*	0.008 (0.002)***	0.003 (0.002)*	0.004 (0.002)**	0.008 (0.002)***
GDPpc, 1999	-0.012 (0.005)**	-0.009 (0.016)	-0.012 (0.005)**	-0.018 (0.006)**	-0.015 (0.006)**	-0.011 (0.007)*	-0.013 (0.005)**	-0.012 (0.006)**
dGDPpc, 1999	-0.005 (0.017)	-0.006 (0.016)	-0.003 (0.017)	-0.002 (0.018)	0.015 (0.018)	0.001 (0.02)	-0.005 (0.017)	0.013 (0.019)
PEG (RR)		-0.21 (0.082)**						
PEG (LYS)			-0.097 (0.058)*					
CBI (CWN)				0.244 (0.310)				
CBI (M&S)					0.425 (0.618)			
CBI (Turnover)						0.299 (0.198)		
IT (Mishkin)							0.061 (0.121)	
IT (M&S)								0.107 (0.142)
Observations	6778	6475	6581	5818	4995	6171	6778	5108
Pseudo R2	0.017	0.022	0.019	0.018	0.026	0.019	0.017	0.026

Robust standard errors in parentheses, clustered by country

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: The dependant variable, "Economic Policy Predictability" is the firm owner response to the WBES inquiry: "Do you regularly have to cope with unexpected changes in economic and financial policies which materially affect your business? Changes in economic and financial policies are: 1=completely predictable... to...6=completely unpredictable."

Table 6: "Central Bank Quality," by Monetary Anchor
(Ordered Probit Regressions of Firm-Level Responses)

	1	2	3	4	5	6	7	8
Sales change	-0.061 (0.047)	-0.057 (0.049)	-0.06 (0.051)	-0.078 (0.049)	-0.066 (0.049)	-0.104 (0.047)**	-0.058 (0.045)	-0.074 (0.052)
Firm size	-0.107 (0.034)***	-0.116 (0.034)***	-0.107 (0.035)***	-0.085 (0.035)**	-0.108 (0.037)***	-0.102 (0.035)***	-0.111 (0.034)***	-0.105 (0.036)***
Manufacturing	-0.003 (0.08)	0.009 (0.081)	-0.015 (0.081)	-0.011 (0.078)	0.035 (0.082)	-0.046 (0.076)	-0.006 (0.08)	0.009 (0.078)
Services	-0.09 (0.083)	-0.097 (0.084)	-0.111 (0.084)	-0.093 (0.084)	-0.043 (0.082)	-0.128 (0.083)	-0.09 (0.083)	-0.073 (0.08)
Foreign owned	-0.045 (0.06)	-0.053 (0.061)	-0.05 (0.059)	-0.067 (0.058)	0.028 (0.068)	-0.055 (0.058)	-0.048 (0.058)	0.016 (0.066)
Exporter	-0.16 (0.070)**	-0.164 (0.069)**	-0.178 (0.070)**	-0.197 (0.071)***	-0.156 (0.076)**	-0.197 (0.071)***	-0.155 (0.069)**	-0.159 (0.077)**
Inflation, 1999	0.004 (0.002)*	0.002 (0.002)	0.004 (0.002)*	0.004 (0.002)*	0.009 (0.003)***	0.003 (0.002)	0.004 (0.002)*	0.009 (0.003)***
GDPpc, 1999	-0.016 (0.008)**	-0.013 (0.008)	-0.016 (0.008)**	-0.014 (0.009)*	-0.014 (0.011)	-0.015 (0.009)*	-0.014 (0.009)	-0.015 (0.009)
dGDPpc, 1999	-0.008 (0.017)	-0.009 (0.019)	-0.008 (0.018)	0.002 (0.022)	0 (0.027)	-0.003 (0.024)	-0.008 (0.017)	0.001 (0.025)
PEG (RR)		-0.207 (0.088)**						
PEG (LYS)			-0.013 (0.073)					
CBI (CWN)				0.052 (0.348)				
CBI (M&S)					0.066 (0.665)			
CBI (Turnover)						0.366 (0.227)*		
IT (Mishkin)							-0.182 (0.188)	
IT (M&S)								-0.052 (0.237)
Observations	5757	5382	5607	4799	4083	5119	5757	4164
Pseudo R2	0.021	0.026	0.022	0.023	0.032	0.027	0.022	0.034

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Note: The dependant variable, "Central Bank Quality" is the firm owner response to the WBES inquiry: "Please rate the overall quality and efficiency of services delivered by the following public agencies or services: The Central Bank." Responses range from 1="Very Good"...to...6="Very Bad."

Appendix A: Country Averages

Country	Firm-Level Variables						Country-Level Variables										
	dSales	Size	Manuf.	Serv.	Foreign	Export	Inflation	GDPpc	dGDPpc	Peg (RR)	Peg (LYS)	Peg (IMF)	CBI (CWN)	CBI (M&S)	CBI (Turnover)	IT (Mishkin)	IT (M&S)
Albania	0.14	1.40	0.29	0.50	0.13	0.20	0.39	1115.05	10.10	0	0	0	0.51	0.66		0	0.94
Argentina	0.06	1.88	0.32	0.54	0.32	0.28	-1.17	7847.37	-3.39	2	2	0	0.74	0.79	0	0	0
Armenia	-0.16	1.40	0.21	0.66	0.02	0.08	0.65	582.28	3.30	1	2	0	0.85	0.76	0	0	1
Azerbaijan	-0.11	1.41	0.30	0.48	0.03	0.06	-8.52	594.49	7.40	1	1	0	0.25		0	0	
Bangladesh	0.13	2.02	0.51	0.29	0.20	0.49	6.11	325.06	4.87			2		0.56		0	0.44
Belarus	0.08	1.89	0.28	0.27	0.06	0.26	293.68	1199.66	3.40	0	0	0	0.73		0.67	0	
Belize	0.06	1.38	0.40	0.49	0.27	0.22	-1.21	3048.29	8.44			2	2	0.43	0	0	0.27
Bolivia	0.03	1.95	0.49	0.47	0.26	0.36	2.16	1005.56	0.43	1	1	1	0.63		0.33	0	
Bosnia	0.49	1.70	0.52	0.42	0.13	0.58	8.36	1369.54	9.60	2	2	2		0.81		0	0
Botswana	0.27	1.84	0.23	0.42	0.47	0.51	7.75	3354.68	7.22	1	2	2	0.45	0.65	0.33	0	0.63
Brazil	0.02	2.00	0.32	0.61	0.24	0.29	4.86	3600.81	0.31	0	1	2	0.21		1	0	
Bulgaria	0.12	1.54	0.51	0.27	0.10	0.33	2.57	1456.37	2.30	2	2	2	0.55	0.79		0	0
Cambodia	0.07	1.31	0.48	0.44	0.21	0.18	4.01	268.21	11.91		1	0				0	
Cameroon	0.15	1.91	0.34	0.27	0.57	0.66	1.87	624.16	4.39	2	2	2				0	
Canada	0.13	2.02	0.28	0.64	0.25	0.47	1.72	22586.70	5.53	1	0	0	0.45	0.91	0	1	0.88
Chile	0.07	2.01	0.45	0.50	0.34	0.41	3.34	4763.95	-0.76	1	0	0	0.77	0.93	0	1	0.88
China	0.03	1.81	0.60	0.36	0.35	0.33	-1.41	881.85	7.60	2	2	2	0.29	0.68	0	0	0.31
Colombia	0.05	2.36	0.38	0.58	0.39	0.40	10.88	1985.11	-4.20	1	0	1	0.44		0	0	
Costa Rica	0.20	2.16	0.53	0.39	0.32	0.44	10.05	4079.52	8.22	1	1	1	0.61		0.33	0	
Cote d'Ivoire	0.08	2.06	0.26	0.22	0.48	0.65	0.79	648.55	1.59	2	2	2				0	
Croatia	0.07	1.98	0.51	0.46	0.13	0.67	4.01	3937.04	-0.86	1	1	2	0.44	0.79		0	0.75
Czech Rep	0.06	1.43	0.18	0.67	0.15	0.32	2.14	5321.85	1.34	1	0	0	0.73	0.98	0.33	1	0.94
Dom Rep	0.18	2.16	0.57	0.33	0.21	0.32	6.47	2126.69	8.15	1	1	0			0	0	
Ecuador	-0.05	1.99	0.52	0.42	0.12	0.23	52.24	1277.43	-6.30	0	1	0		0.93	0.33	0	0.56
Egypt	0.07	2.19	0.17	0.41	0.14	0.58	3.08	1450.47	6.11	2		2	0.55	0.53	0	0	0.44
El Salvador	-0.01	1.92	0.54	0.39	0.18	0.28	0.51	2111.84	3.45	2	2	2				0	
Estonia	0.52	1.66	0.37	0.52	0.20	0.57	3.30	3790.14	0.31	2	2	2	0.78	0.85	0.33	0	0
Ethiopia	0.23	1.86	0.33	0.17	0.09	0.17	7.94	116.92	6.04		1	0	0.44		0.33	0	
France	0.13	1.88	0.40	0.56	0.24	0.44	0.50	21800.36	3.30	2	2	2	0.78	0.90	0	0	0.4
Georgia	0.09	1.53	0.31	0.47	0.14	0.24	19.19	628.88	2.88	1	1	0	0.73	0.80	0	0	0.56
Germany	0.06	1.89	0.20	0.64	0.30	0.36	0.57	22428.94	2.01	2	2	2	0.92	0.96	0	0	0.19
Ghana	0.14	1.91	0.27	0.31	0.30	0.37	12.41	243.80	4.40	1	2	0	0.31	0.60	0.33	0	0.19
Guatemala	0.15	1.83	0.39	0.50	0.21	0.31	4.86	1697.85	3.85	1	0	0			0.33	0	
Haiti	0.00	1.68	0.42	0.47	0.20	0.21	8.67	454.95	2.70	0	0	0			0.33	0	
Honduras	0.06	1.70	0.50	0.46	0.18	0.34	11.65	927.62	-1.89	1	0	1	0.55		0	0	
Hungary	0.21	1.50	0.24	0.50	0.07	0.32	10.00	4451.99	4.17	1	0	1	0.67	0.86	0.33	0	0.19
India	0.11	2.22	0.77	0.05	0.28	0.62	4.67	442.77	7.39	1	1	0	0.34	0.83	0.33	0	0.44
Indonesia	-0.04	1.88	0.20	0.70	0.18	0.25	20.49	772.63	0.79	0	1	0	0.8	0.56		0	0.5
Italy	0.10	2.02	0.27	0.69	0.31	0.34	1.66	18611.54	1.93	2	2	2	0.92	0.88	0	0	0.44
Kazakhstan	0.07	1.66	0.20	0.53	0.06	0.20	8.30	1115.95	2.70	1	1	0	0.44	0.76	0.33	0	0.44
Kenya	0.11	2.27	0.36	0.24	0.36	0.80	5.74	414.69	2.28	1	0	0	0.5	0.66	0	0	0.44
Kyrgyzstan	0.00	1.75	0.28	0.25	0.06	0.11	37.57	267.03	3.66	0	1	0	0.52		0.33	0	0.75

Appendix A: Country Averages (cont.)

Country	Firm-Level Variables						Country-Level Variables										
	dSales	Size	Manuf.	Serv.	Foreign	Export	Inflation	GDPpc	dGDPpc	Peg (RR)	Peg (LYS)	Peg (IMF)	CBI (CWN)	CBI (M&S)	CBI (Turnover)	IT (Mishkin)	IT (M&S)
Lithuania	0.05	1.20	0.19	0.68	0.05	0.28	0.75	3111.85	-1.70	2	1	2	0.78	0.89	0.33	0	0
Madagascar	0.13	2.08	0.35	0.15	0.23	0.45	9.93	235.48	4.66	0	0	0				0	
Malawi	0.38	2.18	0.17	0.17	0.31	0.53	44.80	152.07	3.04	0	2	0			0.33	0	
Malaysia	0.00	1.70	0.53	0.40	0.18	0.40	2.74	3646.64	6.14	2	2	2	0.36	0.85	0	0	0.44
Mexico	0.17	2.03	0.53	0.37	0.15	0.39	16.59	5647.06	3.87	1	0	0	0.56	0.82	0.33	1	0.94
Moldova	-0.10	1.78	0.26	0.34	0.02	0.22	39.27	300.38	-3.40	0	0	0	0.73	0.80	0	0	0.38
Namibia	0.19	1.81	0.17	0.40	0.32	0.66	6.49	1791.80	3.37		2	2		0.50		0	0.13
Nicaragua	0.16	1.62	0.46	0.44	0.17	0.17	11.55	752.03	7.04	1	1	1	0.63			0	
Nigeria	0.23	2.15	0.20	0.48	0.26	0.39	6.62	358.95	1.10	1	1	0	0.37	0.42	0	0	0.25
Pakistan	0.03	1.83	0.48	0.50	0.16	0.45	4.14	526.23	3.66	1	0	0	0.21		0	0	
Panama	0.07	2.26	0.49	0.47	0.21	0.42	1.25	3910.04	3.92	2	2	2	0.22		0	0	
Peru	-0.02	2.06	0.39	0.43	0.26	0.24	3.47	2044.19	0.91	2	0	0	0.74	0.89	0	0	0.44
Philippines	0.06	1.95	0.45	0.53	0.23	0.32	5.95	959.85	3.40	1	0	0	0.48		0	0	
Poland	0.25	1.65	0.28	0.56	0.08	0.42	7.28	4250.87	4.52	1	0	1	0.89	0.86	0	1	0.94
Portugal	0.06	1.86	0.25	0.70	0.28	0.22	2.30	10654.18	3.94	2	2	2	0.88	0.85	0	0	0.06
Russia	0.21	1.70	0.27	0.38	0.02	0.08	86.00	1613.70	6.40	0	0	0	0.49	0.76	0.33	0	0.31
Senegal	0.07	1.69	0.23	0.16	0.14	0.47	0.83	451.70	6.35	2	2	2				0	
Singapore	0.09	1.93	0.32	0.53	0.36	0.46	0.02	21280.18	7.20	1	2	0	0.29	0.90	0	0	0.19
Slovakia	0.10	1.53	0.26	0.59	0.05	0.46	10.57	3749.45	0.32	1	2	0	0.62	0.90	0	0	0.52
Slovenia	0.24	1.80	0.49	0.34	0.14	0.74	6.15	9343.18	5.42	1	1	0	0.63	0.86	0	0	0.25
South Africa	0.21	2.43	0.36	0.26	0.30	0.85	5.18	2972.20	2.36	0	0	0	0.48	0.85	0	0	0.31
Spain	0.16	1.81	0.34	0.61	0.26	0.38	2.31	13844.53	4.75	2	2	2	0.86	0.80	0	0	0.56
Sweden	0.17	1.72	0.29	0.55	0.23	0.54	0.46	26187.51	4.53	1	0	0	0.75	0.97	0	1	1
Tanzania	0.16	1.83	0.30	0.25	0.35	0.37	7.89	261.53	3.53	1	0	0	0.5	0.60	0	0	0.25
Thailand	0.30	1.60	0.48	0.45	0.30	0.44	0.30	1949.70	4.45	1	1	0		0.82	0.67	0	0.31
Trin & Tobago	0.14	1.64	0.46	0.40	0.19	0.43	3.44	5931.14	4.39		2	0			0.33	0	
Tunisia	0.14	2.42	0.39	0.41	0.18	0.59	2.69	1963.99	6.05	1	1	2				0	
Turkey	0.08	1.75	0.44	0.31	0.09	0.41	64.87	2806.57	-4.71	1	0	1	0.46	0.70	0.67	0	0.44
Uganda	0.14	1.56	0.21	0.24	0.26	0.49	6.60	234.21	8.05	1	2	0		0.81	0	0	0.69
Ukraine	0.02	1.63	0.37	0.43	0.04	0.23	22.68	594.28	-0.38	1	0	0	0.42	0.63	0	0	0.56
UK	0.19	1.41	0.25	0.58	0.13	0.30	1.56	23656.10	3.02	1	0	1	0.47	0.77	0	1	1
United States	0.10	1.82	0.22	0.66	0.10	0.30	2.19	33748.21	4.49	1	1	1	0.48	0.92	0	0	0.19
Uruguay	0.00	2.03	0.65	0.29	0.17	0.53	5.66	6376.99	-2.85	0	0	0	0.54	0.70	0	0	0.25
Uzbekistan	0.48	1.82	0.30	0.26	0.14	0.16	44.12	543.30	4.30			0	0.56		0	0	
Venezuela	-0.01	2.02	0.45	0.46	0.24	0.38	23.57	4733.82	-5.97	1	1	1	0.63		0	0	
West Bank	-0.08	1.20	1.00	0.00	0.10	0.42	5.54	1532.43	8.77							0	
Zambia	0.20	1.90	0.23	0.22	0.30	0.35	26.79	305.74	2.22	0	2	0	0.29	0.66	0.33	0	0.56
Zimbabwe	0.37	1.90	0.23	0.30	0.22	0.54	58.52	641.50	-3.60	2	2	2	0.34		0	0	

Appendix B: Data and Sources

Variable	Source	Description
Sales change	WBES	Reported percentage change in sales over the past three years
Firm size	WBES	Firm size, ordered (1-3: small, medium, large)
Manufacturing sector	WBES	Firm operates in the manufacturing sector, binary (1, 0; yes, no)
Services sector	WBES	Firm operates in the services sector, binary (1, 0; yes, no)
Foreign ownership	WBES	Foreign ownership of firm, binary (1, 0; yes, no)
Exports	WBES	Firm exports production, binary (1, 0; yes, no)
Inflation, 1999	WDI	Inflation in consumer prices, 1999
GDPpc, 1999	WDI	Per capita GDP/1000. 1999 data (in 2000 USD)
GDP growth, 1999	WDI	GDP growth, 1999, in 2000 USD
PEG (RR)	Reinhart and Rogoff 2004	<i>de facto</i> exchange-rate regime, ordered variable (0=float, 1=intermediate, 2=peg). Taken from mgcode, where 1 = peg, 2-3 = intermediate, 4-5 = float (5 corresponds to “freely falling”, which denotes a floating regime with at least forty percent inflation in a given year).
PEG (LYS)	Levy-Yeyati and Sturzenegger 2005	<i>de facto</i> exchange-rate regime, ordered variable (0=float, 1=intermediate, 2=peg).
PEG (IMF)	IMF, <i>Annual Report on Exchange Arrangements and Exchange Restrictions</i>	<i>de jure</i> exchange-rate regime, ordered variable (0=float, 1=intermediate, 2=peg).
CBI (CWN)	Polillo and Guillén (2005)	<i>de jure</i> CBI index for 1999, update of the Cukierman, Webb, and Neyapti (1992) data
CBI (M&S)	Mahadeva and Sterne 2000	CBI index from a 1998 survey of central bankers. Values range from 0 to 1.
CBI (TURNOVER)	Ghosh, Gulde, and Wolf 2002	<i>de facto</i> CBI: CB governor turnover rate, per five years.
IT (MISHKIN)	Mishkin and Schmidt-Hebbel, 2002	Binary indicator; 1 if country was an inflation targeter prior to 1999.
IT (M&S)	Mahadeva and Sterne 2002	"Inflation focus" is a weighted index of inflation targeting from a 1998 survey of central bankers.