

Elections, Exchange Rates and Central Bank Reform
in Latin America

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November 11, 2003

I. Introduction

In this paper we study the interaction between two interesting issues with potentially conflicting policy implications for development macroeconomics. On the one hand, despite official reports of increased floating, we know that, as a rule, developing countries actively manage their exchange rates (Calvo & Reinhart 2000). It is also often argued that exchange rates are managed in a way that puts off needed corrections until after politically sensitive events like elections. Since contested elections are becoming a more frequent phenomenon in the developing world, this raises the possibility that exchange rate instability will rise as well.

On the other hand, there is a large literature debating the macroeconomic benefits of granting policy independence to a nation's central bank, and many developing countries, especially in Latin America, have done so. Jácome (2001,p.4) documents how widespread central bank reform has been in Latin America in the 1990s, and argues that the "common denominator in these changes was the autonomy...granted to central banks in the design and execution of monetary policy as a means of securing price stability." Under the common assumption that central bankers are more conservative and less interested in elections than politicians, reforms that increase the autonomy of a central bank could also increase exchange rate stability.

Here we study the effect of elections on the real exchange rate process and the effect of central bank independence on that effect. We use monthly real exchange rate data for a panel of 9 Latin American countries from 1980 - 2000 (Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Peru, Uruguay and Venezuela). Our statistical model allows for both conditional heteroskedasticity and cross sectional correlation in the error processes. Beyond increasing the precision of the coefficient estimates in the mean equation, our model also allows us to test

hypotheses about the effects of elections and central bank reform (hereafter, CBR) on the predictability (i.e. conditional variance) of real exchange rates.

With Least Squares panel models that ignore the possible effects of CBR, we confirm the conventional wisdom that there is significant post-election depreciation, even in the real exchange rate. However, when we incorporate dummy variables representing the adoption of CBR and use a statistical model that allows for conditionally heteroskedastic and correlated errors, we find that CBR on its own reduces the average rate of RER depreciation and also reduces uncertainty about future values of the RER. With respect to elections, we find that post election real depreciations were a pre-reform phenomenon in these countries. On balance, our results point to a policy recommendation that CBR perhaps should go hand in hand with democratization in developing countries.

II. Exchange Rates, Elections & Central Bank Reform

We study the real exchange rate because it is the relevant variable for economic decisions and outcomes, even though policies are often stated in terms of nominal exchange rate objectives. Given that there is not a one-to-one, or even necessarily a monotonic, relationship between nominal and real exchange rate fluctuations, studying only the nominal exchange rate can give misleading inferences about whether or not politics affects the exchange rate.

In this section we consider how national elections and the CBR can influence the evolution of the real exchange rate. In the following section, we discuss a quantitative macroeconomic model of the RER that we use as a baseline to test the hypotheses presented here.

A. Elections and the RER

1. Delayed Depreciations

While most economists would agree that real exchange rate overvaluation will negatively impact the economy in the long run, there is a lot of anecdotal evidence that nominal exchange rate depreciations are politically costly and that policymakers avoid depreciating their currencies before an election. For example, Cooper (1971) argues that nominal devaluations are costly to developing country governments, especially finance ministers, who often are fired right after a devaluation takes place. Ben-Porath (1975) shows that the Israeli government has never devalued its currency less than eighteen months before an election.

Edwards (1994), in an empirical study of 39 large nominal devaluations in democratic countries, finds that the timing of devaluations is most often in the post-election period. Gavin & Perotti (1997) show that policymakers are more likely to abandon a fixed peg regime early on in their terms and not close to an election period. As Edwards (1994) puts it, policymakers can “devalue immediately and blame it on your predecessors.” Klein & Marion (1997) find support for this finding in a study of Latin American countries from 1956-1991, where the likelihood of abandoning an exchange rate peg is highest right after a presidential election. Stein & Streb (1998) argue that policymakers postpone exchange rate corrections at least in part because of the increased inflation they often bring. Thus they shift inflation problems to the next period, presumably after the election takes place.

In this paper we are interested in whether the stylized fact that depreciations are delayed until after elections will continue to hold when we (1) embed the test in a generously parameterized statistical macro model, controlling for conditional heteroskedasticity and cross

sectional dependence; (2) confine the test to elections with exogenous dates; (3) and use real, rather than nominal exchange rates as the relevant variable. We are also interested in whether or not any election date- real exchange rate link is altered when a country creates a legally independent central bank.

2. Increased Uncertainty

While the effect of elections on exchange rate uncertainty is less studied, it is a potentially important phenomenon as ER uncertainty has been linked to reduced exports and even reduced economic growth. An Alesina (1987) style rational partisan model implies that a contested election between political parties with different policy preferences creates uncertainty about the post-election inflation rate (and by extension the post election real exchange rate). Grier & Grier (2000) using a simple univariate GARCH model find exactly this result for Mexican inflation. Further, given the surprising frequency with which candidates run on one platform only to deliver another in Latin America, it is intuitively plausible that elections might generate increased uncertainty about the time path of macro variables.¹

We will test for increased electoral uncertainty by allowing the intercept of the conditional variance of the RER to during post-election periods. As in the case of electorally timed depreciations we will also investigate whether the advent of CBR has any influence on how elections affect exchange rate predictability.

B. Central Bank Reform and the RER.

All of the countries in our sample have undertaken significant CBR during the 1980-2000 period. Jácome (2001) characterizes these reforms and shows that significant increases in central bank autonomy were accomplished in three ways. First, many countries in the region, such as Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru, have changed the charter of the central bank so that its sole (or at least primary) objective is now price stability. Second, the reforms in this period have increased the political independence of the central banks in the region. For example, appointments to the central banks of Brazil, Chile, Colombia, Costa Rica, Mexico, and Venezuela are confirmed by the legislature and not the executive branch. In addition, the term of appointment for the central bank's Board of Directors in these countries no longer match that of the presidential term.

Lastly, Latin American countries have increased the economic autonomy of their central banks. Jácome (2001, p.8) argues that “economic autonomy refers to central bank freedom to formulate and implement monetary policy ...it should also include a legal prohibition or severe limitations on government financing—consistent with central bank's financial programming and the policy target—from the central bank, since this is often the key root of inflation.” An example of increased economic autonomy can be found in the reforms undertaken by Chile, Mexico, Peru, and Venezuela, all of whom outlawed central bank credit to the government except in cases of emergency.

While there is little debate that Latin American countries have significantly increased the autonomy of their central banks in the 1980-2000 period, the question of measuring the degree of central bank independence (hereafter, CBI) is controversial. Early indices of CBI constructed

by Grilli et.al. (1991) and Cukierman et.al. (1992) generated an extensive empirical literature looking for the economic effects of CBI. Initial cross-sectional evidence from developed countries showed a negative link between CBI and inflation.² These results have been questioned by Posen (1998), among others, who argue that they do not necessarily prove any causal connection between CBI and changes in inflation. Over time, the literature has become more sophisticated both theoretically and empirically, but as yet does not speak with one voice on the economic importance of CBI.³

While most of the literature uses a quantitative index or a measure of leadership turnover to measure CBI, we adapt a simpler before and after approach and examine whether the timing of central bank reforms affects the strength of electorally timed depreciations, as well as testing for any direct effect reform may have on the RER or RER uncertainty.

If central bank reform has been an effective and credible means for Latin American governments to reduce monetary manipulation, then we would expect to see any pre-reform relationship between RER depreciation and elections to be diminished in the conditional mean equation. Swinburne and Castello-Branco (1991) argue that laws which purport to safeguard CB independence may be useless if there are other ways (that is, non-statutory ways) in which politicians can influence the central bank. If this is the case in our sample, then we should see no difference between the pre and post reform period.

The effect of CBR on RER uncertainty is less clear cut as it revolves around the relative predictability of governments vs. central bankers as well as the credibility of the undertaken reform. If an independent central bank's policy is more predictable than the government's, CBR should lower uncertainty. If the reform is not fully credible though, agents' expectations will be

a weighted average of the outcomes predicted for each policymaker, and the variance of the forecast errors may well increase. A finding that CBR reduces uncertainty would be evidence in favor of the idea that Latin American CBR was both credible and effective.

In the next two sections, we set out our statistical model of the real exchange rate and test whether the timing of elections and CBR play a significant role in the determination of real exchange rates in Latin America.

III. A Model of the Real Exchange Rate

A. Variables

Our sample is a panel of 9 Latin American countries from 1980-2000, encompassing forty presidential elections. These countries were chosen because their elections are conducted at regular intervals and thus their timing is exogenous to economic variables. In this way we avoid issues of simultaneity between the economy and the election date.⁴

Our real exchange rate data comes both from J.P. Morgan and the IMF's IFS.⁵ In these data, higher values of the index imply a higher real value of the currency under study. Thus, real appreciations are denoted by increases in the index.

To test whether post-election periods are more statistically correlated with real exchange rate depreciations, we construct an electoral dummy variable called *Post* with data from Georgetown's Political Database of the Americas, IFE's election guide, and Bienen & van de Walle (1991). *Post* is equal to one for the month of the election and the subsequent five months.⁶ Appendix 1 provides a list of election dates for all the countries in the sample. Based on the results discussed above in the literature, we would expect to find a negative and significant

coefficient on *Post*, reflecting the delayed real exchange rate depreciation that occurs after the election date.

As documented by Jácome (2001), each of the nine countries we studied has passed central bank reform legislation which granted some form of increased independence to the central bank. Appendix 1 provides the dates of central bank reform in each country. Rather than attempt to quantify the level of reform in these countries, we instead create a variable $Reform_{it}$, which is equal to 0 before reform was undertaken in country i and equal to 1 after that date.⁷ In addition, we interact this variable with *Post* to investigate whether the CBR has significantly changed the relationship between the political business cycle and the mean and conditional variance of the real exchange rate in Latin America.

We control for economic variables which affect the real exchange rate by following the empirical model of Goldfajn & Valdés (1999). They identify terms of trade, trade liberalization, government spending, and the international interest rate as important factors in the determination of the real exchange rate.

Shocks to the terms of trade, either through a fall in the price of exports or an increase in the price of imports, can have a negative income effect on small, open economies (see Diaz-Alejandro (1982)). For example, a rise in the price of imports can cause a reduction in a country's permanent income, which would reduce people's demand for non-tradables and cause a depreciation in the real exchange rate. On the other hand, Edwards (1989) identifies a possible substitution effect, in that production may move from the non-tradables to the tradables sector, resulting in an increase in the price of non-tradables and a real exchange rate appreciation. The effect of a terms of trade shock thus depends on whether the substitution effect is stronger

than the income effect. We use a terms of trade index from the World Bank's World Tables, where 1987 is equal to 100. The data is yearly and is divided by 12 and interpolated using July as the base month.

Goldfajn & Valdés use economic openness (measured as the sum of exports and imports as a percentage of GDP) as a proxy for trade liberalization. They argue that a reduction in import tariffs would bring about a fall in the price of non-tradables in order to bring the labor market back into equilibrium.⁸ We measure openness as the ratio of exports and imports to GDP. The trade data is available monthly from the IMF IFS CD-ROM. GDP figures are interpolated from yearly data from the same source.

The effect of a permanent increase in the size of government can have two different effects on the price of non-tradables. Increased government spending can cause a real exchange rate appreciation if the government increases overall demand for non-tradable goods. If new government spending instead goes toward imported goods (Goldfajn & Valdes use the example of imported military equipment), then the increased expenditures will be associated with a real exchange rate depreciation. We measure the size of government with monthly data on general government expenditures as a percentage of GDP from the IMF-IFS CD-ROM.

We measure the international interest rate with the 3 month US Treasury bill rate in secondary markets, which is taken from the St. Louis Fed's FRED database and is reported monthly over the sample. As Goldfajn & Valdés point out, changes in the international interest can have both short run and long run effects on the real exchange rate. If we assume that savings are inelastic in the short run, then a fall in the international interest rate will translate into increased capital inflows into developing countries. In the long run however, when savings

should be more elastic, the result of a lower international rate should mean a drop in net foreign assets.

Finally, we include lagged RER values on the right hand side of our models to capture any persistence in the series. This is especially important in our case because unmodeled serial correlation can cause spurious findings conditional heteroskedasticity. We also consider several lags of the economic control variables as nothing in the theories specify the exact timing of the relationships. Basically, we want to let the baseline model fit the data as well as possible in order to make the test for the existence of effects from elections or CBR as stringent and credible as possible. We also allow for possible individual effects in both the conditional mean and conditional variance equations.

B. Statistical Model

Our statistical model allows for the effects of the economic variables on the real exchange rate to occur with a lag. It also allows for both conditional and unconditional heteroskedasticity and conditional cross-sectional correlation of the error terms. Equations 1 - 3 below present the general model.⁹

$$R_{it} = \alpha_i + \sum_{j=1}^N \beta_j (R_{it-j}) + \sum_{j=1}^N \beta_j^* (\text{tot}_{it-j}) + \sum_{j=1}^N \beta_j \text{GD}_j (\text{open}_{it-j}) + \sum_{j=1}^N \beta_j \text{\$}_j (\text{gov}_{it-j}) + \sum_{j=1}^N \beta_j \text{J}_j (\text{tbill}_{t-j}) \quad (1)$$

$$+ \gamma \text{Post}_{it} + \epsilon_{it}$$

$$h_{it} = \alpha_i + \sum_{j=1}^p \beta_j \epsilon_{it-j}^2 + \sum_{j=1}^q \beta_j \epsilon_{it-j} + 2 \text{Post}_{it} \quad \text{For all } i = 1 - N \quad (2)$$

$$h_{ikt} = \alpha_i + \sum_{j=1}^p \beta_j \epsilon_{kt-j} + \sum_{j=1}^q \beta_j \epsilon_{ikt-j} \quad \text{For all } i \dots k \quad (3)$$

Here i indexes countries and t indexes time. R is the real exchange rate, tot is terms of trade, $open$ is our openness variable, gov is government spending, $tbill$ is the US treasury bill rate, and $Post$ is the dummy for the post election period. The error terms are assumed to be distributed multivariate normal with mean zero and variance H_t . The diagonal elements of H_t are given in equation 2 and the off-diagonal elements in equation 3.

The key coefficients testing for electoral effects on the RER process are α and β . If politicians purposefully delay putting off needed real exchange rate depreciations until after elections, then α will be negative and significant. If elections create additional RER uncertainty, then β will be positive and significant.

Since the general model potentially involves estimating a large number of parameters and theory is not precise on the correct lag structure, we pre-test for the existence of individual effects in the conditional mean and conditional variance and for the appropriate number of lags of the economic variables. We test and find pervasive and significant individual effects in the mean, and two outliers that are significant (Ecuador and Venezuela) in the variance. We difference the data to eliminate the individual effects in the conditional mean, and include dummy variables for Ecuador and Venezuela in the conditional variance equation.

We also test for the best fitting lag structure of the independent variables and find that four lags of RER growth, and 3-month moving averages of terms of trade, openness, and government spending is appropriate.¹⁰ We call these moving average variables $totma$, $openma$, and $govma$, respectively. The U.S. t-bill rate is contemporaneously related to the growth in the RER.

We also find that an ARMA(1,1) process adequately describes the conditional variance

and that an MA(1) describes the conditional covariance. Thus, the specific model that we estimate is:

$$\ln(R_{it}) = \alpha_0 + \sum_{j=1}^4 (\alpha_j) \ln(R_{it-j}) + \alpha_5 \ln(\text{totma}_{it}) + \alpha_6 \ln(\text{openma}_{it}) \quad (1')$$

$$+ \alpha_7 \ln(\text{govma}_{it}) + \alpha_8 \ln(\text{tbill}_t) + \beta \text{Post}_{it} + \epsilon_t$$

$$h_{it} = N_0 + N_1 \epsilon_{t-1}^2 + N_2 h_{it-1} + N_3 \epsilon_t + N_4 \text{Ven}_t + 2 \text{Post}_{it} \quad \text{For all } i = 1 - N \quad (2')$$

$$h_{ikt} = M + (\epsilon_{t-1} \epsilon_{t-1}) \quad \text{For all } i \dots k \quad (3')$$

After examining this model, we continue by adding a dummy for CBR in each country along with and interaction variables between CBR and the electoral dummies. This changes equations (1') and (2') to the following:

$$\ln(R_{it}) = \alpha_0 + \sum_{j=1}^4 (\alpha_j) \ln(R_{it-j}) + \alpha_5 \ln(\text{totma}_{it}) + \alpha_6 \ln(\text{openma}_{it}) \quad (1'')$$

$$+ \alpha_7 \ln(\text{govma}_{it}) + \alpha_8 \ln(\text{tbill}_t) + \beta \text{Post}_{it} + \gamma \text{Post}_{it} * \text{Reform}_{it} + \delta \text{Reform}_{it} + \epsilon_t$$

$$h_{it} = N_0 + N_1 \epsilon_{t-1}^2 + N_2 h_{it-1} + N_3 \epsilon_t + N_4 \text{Ven}_t + 2 \text{Post}_{it} + \rho \text{Reform}_{it} \quad (2'')$$

$$+ \rho \text{Post}_{it} * \text{Reform}_{it} \quad \text{For all } i = 1 - N$$

With this model we can test whether the timing of CBR is significantly partially correlated with direct changes in the RER process and whether or not it has any influence on how elections affect the RER process.

IV. Results

Table 1 presents the results of estimating equation (1') via Least Squares. The coefficient on *Post*, is negative, sizeable (around -14) and significant at the 0.01 level, supporting the argument that politicians seek to delay potentially politically costly real exchange rate depreciations until after an election.

The terms of trade and openness variables are both negative and significant at the .10 level, indicating that improvements in the terms of trade and greater openness are both associated with decreases in the real exchange rate. Changes in the t-bill rate are positively and significantly correlated with real exchange rate appreciations, while government spending does not have a significant effect in this specification.

These initial results confirm and extend what others have argued about how elections can distort the evolution of exchange rates. Even when considering the real exchange rate, exogenous election dates, and a statistical model for the evolution of the RER we find that there is significant post electoral RER depreciation. We are interested though in whether these OLS residuals show evidence of conditional heteroskedasticity and cross-sectional dependence and whether or not changes in the legal status of a nation's central bank affects the finding of post-electoral RER depreciation.

To test for conditional heteroskedasticity we take the squared residuals from Table 1 and

regress them on various numbers of lags of the squared residuals. The R^2 of these regressions multiplied by the sample size is distributed as a P^2 statistic which we can use to test the null hypothesis of no autocorrelation in the squared residuals. At one lag the value of the P^2 statistic is 16.26, which is significant at the 0.001 level. At five (ten) lags the calculated P^2 is 30.37 (41.46), also significant at the 0.001 level. Thus there is evidence of significant and persistent autocorrelation in these squared residuals. Cermeño & Grier (2003) present monte carlo evidence showing that the estimator employed below is strongly preferred to least squares on mean squared error grounds.¹¹

In Table 2, we control for conditional heteroskedasticity and cross sectional dependence, by estimating the system of equations 1', 2' and 3' given above via maximum likelihood. To test the significance of our estimated covariance model we can compare the maximized value of the likelihood function here to that obtained in Table 1. This likelihood ratio test yields a calculated Chi-square statistic of 1,666, which means that we can reject at the .001 level the null hypothesis that there is no conditional heteroskedasticity or cross-sectional dependence in these data.¹²

The striking finding of Table 2 is that once we model the conditional heteroskedasticity and cross-sectional dependence in the residuals, we find no evidence of electoral effects in the mean equation. We do find however, evidence of a positive relationship between the post election dummy and the conditional variance. *Post* has a large (coefficient of almost 1000 compared to an intercept of around 200) positive and significant effect on the conditional variance of RER growth. That is to say, we find that uncertainty over the future value of the real exchange rate increases dramatically during the post election period.

This is a specific example of a general point, namely that if variables affect the

conditional variance, but this effect is ignored in the estimation they can often be spuriously significant in the conditional mean equation.¹³ What we find is that outliers are clustered around elections and when this is not considered in the estimation process, it seems like the mean of the process is influenced by elections.

We also find that, compared to Table 1, the macro variables have a more significant relationship with the RER, though some coefficients have changed signs. Openness and the U.S T-bill rate are negative and significant at the 0.01 level while terms of trade and government spending are positive and significant at the 0.01 level.

In Table 3 we add our Reform dummy and its interaction with Post in both the conditional mean and conditional variance equations, estimating equations 1", 2" and 3" shown above. These four new variables are jointly significant at the 0.001 level and 3 of them are individually significant at the 0.05 level.

Again we see a relatively dramatic change in the results. Once reform is considered, the location of the effect of elections on the RER process shifts back to the conditional mean and away from the conditional variance. Neither Post nor Post*Reform are significant in the conditional variance equation, while Post (Post*Reform) is negative (positive) and significant in the conditional mean equation. In addition the reform variable is positive and significant in the conditional mean equation and negative and significant in the conditional variance equation. The signs and significance levels of the macro variables are generally unchanged from what was reported in Table 3.

From Table 3 we can see the following results: (1) Ceteris Paribus, CBR is associated with a lower average rate of RER depreciation and significantly less RER uncertainty. (2) the

immediate post election period is associated with increased rates of RER depreciation in the pre reform data, but this effect is more than completely erased in the post reform observations. (3) Once the change in the effect of elections on RER growth is allowed to change in the pre and post reform periods, there is no longer any evidence that elections create additional RER uncertainty.

In sum, our results clearly show that CBR is correlated with the real exchange rate process in these 9 countries. This is true both directly and in terms of how elections affect the real exchange rate. CBR has on average wiped out electorally motivated RER depreciations, reduced the average rate of RER depreciation and lowered RER uncertainty.

V. Discussion

In this paper we investigate the interaction between exchange rate depreciations and elections. Our work extends existing research on the subject in three ways: (1) we emphasize the real, instead of the nominal, exchange rate, which arguably is the relevant economic variable; (2) we use a statistical model which both allows for conditional heteroskedasticity and cross correlation in the errors and allows us to test for electoral effects on exchange rate uncertainty; and (3) we investigate the role of CBR on the relationship between elections and RER depreciation and the evolution of the RER in general.

We find that real depreciations were significantly delayed until after elections in the pre-CBR data and that the adoption of new CB legislation more than eliminates the effect. We also find that CBR is significantly partially correlated with reduced RER uncertainty and lower average depreciation. This is new evidence in favor of the proposition that legal central bank

independence has real economic effects and adds up to a policy suggestion that central bank reform accompany democratic reforms in order to mitigate any tendency for elections to create exchange rate instability.

Table 1: A LS model of RER growth

$$\ln(R_{it}) = 1.25 + .06 \ln(R_{it-1}) - .12 \ln(R_{it-2}) - .03 \ln(R_{it-3}) - .07 \ln(R_{it-4}) -$$

(0.9) (2.9) (5.6) (1.3) (3.3)

$$.17 \ln(\text{tot}_{ma}) - .04 \ln(\text{open}_{ma}) + .007 \ln(\text{gov}_{ma}) + 0.07 \ln(\text{tbill}) - 13.7 \text{Post}$$

(1.7) (1.8) (0.7) (3.9) (3.2)

LLF = -12334; N=9, T=247

Table 2: A model of RER growth controlling for conditional heteroskedasticity and cross-sectional dependence

$$\ln(R_{it}) = -4.03 - .035 \ln(R_{it-1}) - .10 \ln(R_{it-2}) - .12 \ln(R_{it-3}) + .03 \ln(R_{it-4})$$

(6.0) (1.1) (3.6) (5.4) (1.4)

$$+ .13 \ln(\text{tot}_{ma}) - .05 \ln(\text{open}_{ma}) + .019 \ln(\text{gov}_{ma}) - .02 \ln(\text{tbill}) - 2.22 \text{Post}$$

(2.6) (4.6) (3.2) (3.2) (0.7)

$$h_{it} = 187.5 + 1.4 g_{it-1}^2 + .29 h_{it-1} + 966.6 \text{Post} + 1800.4 \text{Ec} + 98.8 \text{Ven}$$

(6.8) (14.4) (9.6) (5.2) (6.3) (1.7)

$$h_{ijt} = 161.2 + .14 g_{it-1} g_{jt-1}$$

(6.8) (2.5)

Maximized Log-Likelihood = - 11510

N=9, T=247; Numbers in parentheses are asymptotic t-statistics

Table 3: A model of RER growth controlling for conditional heteroskedasticity and cross-sectional dependence with dummies for CBR

$$\ln(R_{it}) = -7.10 - .021 \ln(R_{it-1}) - .11 \ln(R_{it-2}) - .13 \ln(R_{it-3}) + .02 \ln(R_{it-4})$$

(9.1) (0.7) (3.9) (6.3) (0.9)

$$+ .09 \ln(\text{tot}_{ma}) - .05 \ln(\text{open}_{ma}) + .013 \ln(\text{gov}_{ma}) - .02 \ln(\text{tbill})$$

(1.9) (5.7) (2.7) (2.3)

$$- 12.93 \text{Post} + 22.9 \text{Post*Reform} + 11.9 \text{Reform}$$

(3.1) (4.4) (9.2)

$$h_{it} = 230.3 + 1.4 G_{it-1}^2 + .27 h_{it-1} + 217.8 \text{Post} + 319.0 \text{Post*Reform} - 87.9 \text{Reform}$$

(5.2) (15.2) (9.0) (0.8) (1.1) (2.5)

$$+ 1789.7 \text{Ec} + 187.8 \text{Ven}$$

(5.8) (3.3)

$$h_{ijt} = 160.5 + .16 G_{it-1} G_{jt-1}$$

(6.8) (2.9)

Maximized Log-Likelihood = - 11438

N=9, T=247; Numbers in parentheses are asymptotic t-statistics

Appendix: Presidential Elections and Central Bank Reform in Latin America, 1980-2000

<u>Country</u>	<u>Election Date</u>	<u>Runoff Date</u>	<u>CB Reform Date</u>
Brazil	1 /1985	n.a.	10/ 1988
	11/ 1989	12/1989	
	10/ 1994	n.a.	
	10/ 1998	n.a.	
Chile	12/ 1989	n.a.	10/ 1989
	12/ 1993	n.a.	
	12/ 1999	1/ 2000	
Colombia	5/ 1982	n.a.	8/ 1991
	5/ 1986	n.a.	
	5/ 1990	n.a.	
	5/ 1994	n.a.	
	5/ 1998	6/ 1998	
Costa Rica	2/ 1982	n.a.	11/ 1995
	2/ 1986	n.a.	
	2/ 1990	n.a.	
	2/ 1994	n.a.	
	2/ 1998	n.a.	
Ecuador	1/ 1984	5/ 1984	5/ 1992
	1/ 1988	5/ 1988	
	4/ 1992	7/ 1992	
	5/ 1996	7/ 1996	
	5/ 1998	7/ 1998	
Mexico	7/ 1982	n.a.	12/ 1993
	7/ 1988	n.a.	
	8/ 1994	n.a.	
	8/ 2000	n.a.	
Peru	5/ 1980	n.a.	1/ 1993
	4/ 1985	n.a.	
	4/ 1990	6/ 1990	
	4/ 1995	n.a.	
	4/ 2000	5/ 2000	
Uruguay	11/ 1984	n.a.	3/ 1995
	11/ 1989	n.a.	
	11/ 1994	n.a.	
	10/ 1999	n.a.	

<u>Country</u>	<u>Election Date</u>	<u>Runoff Date</u>	<u>CB Reform Date</u>
Venezuela	12/ 1983	n.a.	12/1992
	12/ 1988	n.a.	
	12/ 1993	n.a.	
	12/ 1998	n.a.	
	7/ 2000	n.a.	

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Notes

1. Carlos Menem in Argentina, Alberto Fujimori in Peru, and Fernando Henrique Cardoso in Brazil are recent examples of this phenomenon.
2. For evidence on a negative relationship between inflation and CBI, see Alesina & Summers (1993), Alesina (1998), Grilli et.al. (1991) and Cukierman et.al. (1992).
3. For more on the theory of CBI, see Cukierman & Lippi (1999), Franzese (1999, 2001), Guzzo & Velasco (1999) and Keefer & Stasavage (1999). See Berger et.al. (2001) for a good summary of the theory and empirical evidence on CBI.
4. Several of the countries in the sample have experienced a transition from military to civilian rule during the 1980-2000 time period, which could potentially create a situation of reverse causation. That is, a military government may be handing back the reins of government to civilians because the economy is in a bad state. Haggard & Kaufman (1995) point to the initial democratic elections in Brazil and Uruguay as two cases where economic problems may have sped up the process of democratization. In results not reported in this paper, we investigated this possibility by creating a separate POST dummy for the these two cases and found that it (the supplemental dummy) was insignificant in all specifications.
5. For 7 of the 9 countries (all but Costa Rica and Uruguay) in the sample, we use monthly trade-weighted real exchange rate data from J.P. Morgan www.jpmorgan.com/MarketDataInd/Forex/currIndex.html (Data retrieved 10/01/02). We were able to add Costa Rica and Uruguay using the IMF-IFS CD-ROM. The correlation coefficient between the two RER measures for countries which appear in both datasets ranges from .94 to .99.
6. In the case of run-off elections, *Post* is equal to one for the month of the run-off and the subsequent five months.
7. Brazil (October 1988), Chile (October 1989), Colombia (August 1991), Costa Rica (November 1995), Ecuador (May 1992), Mexico (December 1993), Peru (January 1993), Uruguay (March 1995), and Venezuela (December 1992).
8. They also point out that “this result depends on the assumption that the cross price elasticities of excess demand of nontradables with respect to both exportables and importables are positive.”
9. This type of model was first proposed by Cermeño & Grier (2002), who also present simulation evidence on the good small sample properties of the estimator we employ here.
10. The 3 month moving average includes the second through fourth lags of the variables.
11. Engle (1982) shows in the univariate case that while least squares is still the best linear estimator in this setting, it can be extremely inefficient compared to the non-linear estimator accounting for the conditional heteroskedasticity.

12. The critical value at the .005 level with 9 degrees of freedom is 21.96.
13. See Vilasuso (2001).