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ELECTORAL CYCLES IN INTERNATIONAL RESERVES: EVIDENCE FROM LATIN AMERICA AND THE OECD

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ABSTRACT

In Latin America there is ample evidence of exchange rate depreciations after elections. Hence, we turn to the behavior of international reserves over the 1980–2005 period to investigate if exchange rates are temporarily stabilized before elections. Using annual, quarterly, and monthly data to define the election year, we find that international reserves fall significantly before elections, which indeed suggests a policy of stabilizing exchange rates. The patterns observed in the region are not replicated in OECD countries. However, once we control for legislative checks and balances on executive discretion in countries with strong compliance with the law, the behavior of both regions becomes remarkably similar. We find that lower effective checks and balances can explain why reserves fall before elections in Latin America. The electoral cycles in reserves and exchange rates in Latin America can be interpreted in terms of the fiscal dominance of monetary policy.

Keywords: monetary policy, checks and balances, fiscal dominance, political budget cycles, temporal aggregation

JEL classification codes: D72, D78, H60

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RESUMEN

En Latinoamérica hay amplia evidencia de depreciaciones cambiarias después de elecciones. Por lo tanto, nos enfocamos en el comportamiento de las reservas internacionales en el período 1980-2005 para investigar si los tipos de cambio se estabilizan en forma temporaria antes de las elecciones. Usando datos anuales, trimestrales y mensuales para definir el año electoral, encontramos que las reservas internacionales caen significativamente antes de las elecciones, lo que sugiere una política de estabilización del tipo de cambio. Los patrones observados en la región no son replicados en los países de la OECD. Sin embargo, una vez que controlamos por los controles legislativos sobre el poder discrecional del Ejecutivo en países con fuerte cumplimiento de la ley, el comportamiento de ambas regiones se torna marcadamente similar. Encontramos que el efecto más bajo de aquellos controles puede explicar por qué las reservas caen antes de las elecciones en Latinoamérica. Los ciclos electorales en reservas y tipos de cambio en Latinoamérica pueden ser interpretados en términos de dominancia fiscal de la política monetaria.

Palabras clave: política monetaria, controles legislativos, dominancia fiscal, ciclo político presupuestal, agregación temporal.

Clasificación JEL: D72, D78. H60

I. INTRODUCTION

Ernesto Stein and Streb (2004) find a pattern where nominal exchange rate adjustments in Latin-American countries are postponed until after elections.[2] Nominal devaluations translate into depreciations of the real exchange rate after elections (Stein, Streb, and Piero Ghezzi 2005). Rodolfo Cermeño, Robin Grier, and Kevin Grier (2010) point out that, in contrast to the significant post-electoral depreciation of the real exchange rate, no significant pre-electoral effects have been detected in cross-country panels of Latin-American countries.[3]

If governments in Latin America tend to postpone exchange rate adjustments until after elections, there should be evidence of pre-electoral manipulation of monetary policy. In particular, if governments are putting their foot on the rate of devaluation during electoral periods, our conjecture is that there is an obvious variable to look at: international reserves. Central banks have to be willing to lose reserves in order to stabilize the exchange rate before elections.

To study electoral cycles in international reserves, we build a panel with forty-six countries — twenty-two from Latin America and twenty-four from the OECD (Organization for Economic Cooperation and Development) — that spans the 1980–2005 period (Appendix A reports the complete list of countries). The OECD is taken as a comparison group, since the previous evidence on electoral cycles in exchange rates only pertains to Latin America.[4]

Table 1 provides preliminary evidence on the behavior of international reserves around elections in constant US dollars (Appendix B shows

2 In their twenty-six country panel over the 1960–1994 period, the rate of devaluation rises significantly two to four months after elections, being concentrated one month after government changes.

3 In their country study of Mexico and the United States, Kevin Grier and Fausto Hernández-Trillo (2004) do find a significant pre-electoral appreciation, and post-electoral depreciation, of the Mexican peso.

4 International reserves may be a more appropriate indicator of monetary policy for Latin America, since central banks often target exchange rates. For OECD countries, on the other hand, the interest rate is instead the most usual indicator of the stance of monetary policy. Within OECD countries, we remove the observations since the launch of the euro, since in those European countries adopting a common currency there can be no manipulation of exchange rates around elections.

the behavior of exchange rates). We use annual, quarterly, and monthly frequency data: with annual data, the election year is defined as the calendar year of elections; with quarterly data, as the four quarters up to the election quarter; and with monthly data, as the twelve months up to the election month. The post-election year is the year that follows the election year, while normal years are periods that fall outside election and post-election years. The pattern is similar at all data frequencies: international reserves grow least in election years, and most in post-election years — though this last pattern partially fades out when we move from annual to quarterly and monthly data. However, the aggregate data mask very dissimilar behavior, especially in election years: in Latin America reserves fall sharply — and significantly — with respect to normal years, while in the OECD they grow more strongly — though this last feature is not statistically significant.

Table 1. Annual variation of real international reserves in election and non-election years

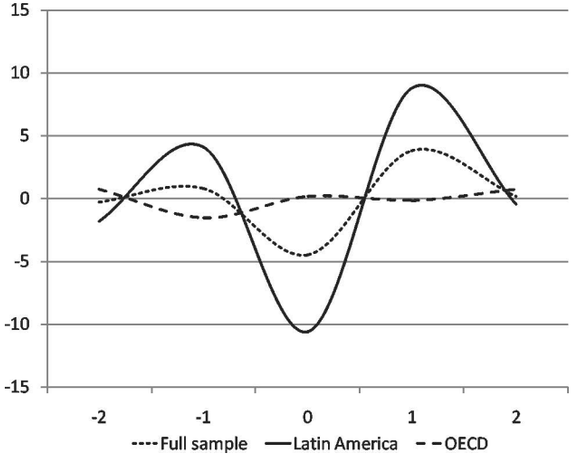
	Mean values				Differences	
	All years	Election years	Post-election years	Normal years	Election years versus normal years	Post-election years versus normal years
Full sample						
a	0.052	0.010	0.093	0.052	-0.043*	0.043*
	(0.328)	(0.351)	(0.324)	(0.313)	(0.03)	(0.02)
q	0.054	-0.002	0.078	0.065	-0.068**	0.014
	(0.767)	(0.687)	(0.826)	(0.781)	(0.03)	(0.03)
m	0.049	0.017	0.063	0.059	-0.044	0.006
	(1.517)	(1.285)	(1.571)	(1.622)	(0.03)	(0.04)
Latin America						
a	0.055	-0.052	0.142	0.063	-0.115***	0.084**
	(0.382)	(0.404)	(0.384)	(0.361)	(0.04)	(0.04)
q	0.055	-0.092	0.119	0.080	-0.171***	0.041
	(0.938)	(0.770)	(1.067)	(0.954)	(0.05)	(0.06)
m	0.054	-0.053	0.088	0.074	-0.125**	0.018
	(1.893)	(1.557)	(2.000)	(2.018)	(0.06)	(0.07)
OECD						
a	0.048	0.057	0.298	0.037	0.017	0.013
	(0.266)	(0.298)	(0.262)	(0.245)	(0.03)	(0.03)
q	0.052	0.063	0.613	0.048	0.013	-0.003
	(0.559)	(0.613)	(0.58)	(0.511)	(0.03)	(0.03)
m	0.045	0.067	1.044	0.043	0.022	0.002
	(1.040)	(1.044)	(1.141)	(0.954)	(0.03)	(0.03)

Note: Mean values: the annual variation (*a*) is measured by the log difference; the quarterly variations (*q*) are the log differences multiplied by four, while the monthly variations (*m*) are multiplied by twelve, to have comparable figures that represent annual changes. Standard deviations reported in parentheses. Differences between election/non-election years and normal years: estimated using a regression on dummies (normal year = base year). Robust standard errors in parentheses. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

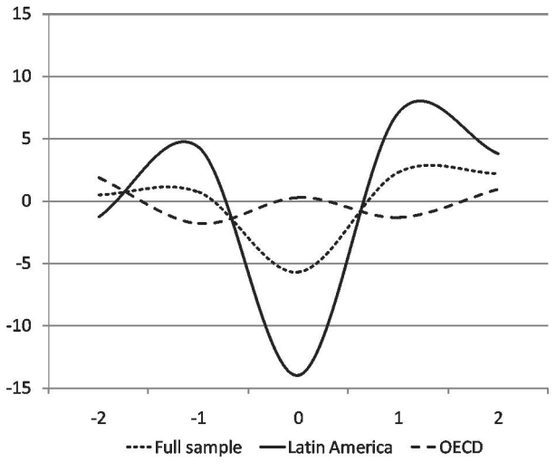
Figure 1 shows the behavior of the growth rate of real foreign exchange reserves in a five-year window centered in the election year (year 0). There is evidence of an electoral cycle in Latin America at all data frequencies, where the growth of reserves falls strongly in election years and rebounds the following year. The OECD, on the other hand, basically shows a flat line. Since the cycle is concentrated in the election and post-election years, in the econometric estimates below we focus on this time period.

Figure 1. Annual rate of variation of international reserves around election years (in %)

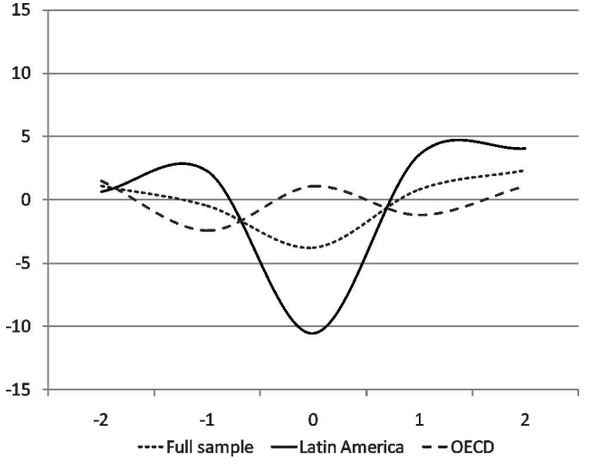
A. Annual frequency data



B. Quarterly frequency data



C. Monthly frequency data



Note: The five-year window is centered on the election year (year 0)

A difference between both regions is that the OECD is developed while Latin America is under development. In this regard, Axel Dreher and Roland Vaubel (2009) already study the behavior of international reserves in an annual panel of one hundred forty-nine countries over the 1975–2001 period, finding that the ratio of international reserves to trend GDP drops significantly before elections, a result that turns out to be driven by developing countries. Here we explore the reasons underlying this differential behavior by looking at the institutional framework.

While Adi Brender and Allan Drazen (2005) have pointed out that electoral cycles are a feature of new democracies (like most Latin American countries), not established democracies (like most OECD countries), Streb, Lema and Gustavo Torrens (2009) find electoral cycles even in established democracies of the OECD once they control for a channel suggested by Ludger Schuknecht (1996): checks and balances on executive discretion.[5] Hence, we analyze this channel, since an explanation for why reserves show no pattern in OECD countries might have to do with how checks and balances affect central bank independence.

Since monetary policy is typically delegated to a central bank, the degree of independence of the monetary authority is a crucial issue in political business cycles. If political constraints on executive discretion exist, the central bank may be insulated from the attempts by an executive incumbent to manipulate monetary policy in election years. Susanne Lohmann (1998a) shows the importance of veto players, represented by representatives of regional governments in the board of the Bundesbank not aligned with the federal government, for the independence of monetary policy in Germany. Philip Keefer and David Stasavage (2003) also stress the influence of veto players, and of the polarization between them, on central bank credibility and independence in a dataset with sixty-six countries from 1960 to 1989, where they find that inflation is lower — which indicates higher credibility — and the replacement of central bank governors less likely — which indicates higher independence — when there is a veto player and its preferences differ from those of the executive. Hence, we control for institutional constraints on executive discretion, drawing on the

5 Streb, Lema, and Torrens (2009) show that differences in effective checks and balances help explain why Torsten Persson and Guido Tabellini (2003: chapter 8) find that aggregate PBCs are stronger in countries with a presidential regime (rather than a parliamentary one), why Min Shi and Jakob Svensson (2006) find that aggregate PBCs are stronger in developing countries, and why Brender and Drazen (2005) find that aggregate PBCs are stronger in new democracies.

Witold Henisz (2002) political constraints index and the ICRG law and order index to build a proxy of the presence of checks and balances in countries with a strong degree of compliance with the law.

Section II describes the data and econometric specification. Section III compares the results of identifying the election year with annual, quarterly, and monthly data. Section IV controls for the effect of checks and balances on executive discretion when there is strong compliance with the law. Section V discusses a possible rationale for these electoral cycles in Latin America. Our approach differs from the monetary policy rationale provided by Dreher and Vaubel (2009) for why reserves may fall before elections. We instead link them to the fiscal dominance of monetary policy, by which fiscal expansions before elections are corrected through an inflation tax after elections. Section VI presents our final remarks.

II. ECONOMETRIC SPECIFICATION AND DATA

A. Econometric specification

Following the previous empirical literature on electoral cycles, the behavior of a policy variable y in country i and year t ($y_{i,t}$) can be described as follows:

$$y_{i,t} = \sum_{j=1}^{k} \beta_j y_{i,t-j} + \sum_{j=1}^{m} \gamma_j x_{j,i,t} + \delta E_{i,t} + \lambda z_{i,t} + \eta z_{i,t} E_{i,t} + \sum_{j=1}^{n} \phi_j t_{j,i,t} + \mu_i + \varepsilon_{i,t}, \quad (1)$$

where the variables $x_{j,i,t}$ belong to a set of m controls, $E_{i,t}$ is a dummy election variable, $z_{i,t}$ is a proxy variable for effective checks and balances conditioning the electoral policy manipulations, the variables $t_{j,i,t}$ belong to a set of *n* controls for time effects, μ_i is a specific country effect, and $\varepsilon_{i,t}$ is a random error term that is assumed independent and identically distributed. This specification represents a dynamic panel model, since the dependent variable is a function of its own lagged levels.

Our dependent variable is the first difference of the natural log of international reserves in constant dollars, which is a measure to the growth rate of real international reserves. As in the Shi and Svensson (2006) study of political budget cycles, we control for the growth rate of real GDP (using the first difference of the natural log of real GDP) to capture the effects of short-term economic fluctuations, and for real GDP per capita (using the natural log of real GDP per capita) to capture differences in the level of development.

We additionally employ as explanatory variables the first difference of the natural logs of trade openness and of external volatility. In this, we draw on Dreher and Vaubel's (2009) interesting empirical study on the behavior of foreign exchange reserves around elections. The log of international reserves relative to trend GDP is their dependent variable. They have four basic controls: the log of real GDP, as a proxy for the size of the economy; the sum of exports and imports as a share of GDP, as a measure of trade openness; the level of external debt in percent of GDP, to account for the risk of currency crises; and the standard deviation of the growth rate of exports, as a measure of external volatility. The proxy for trade openness turns out to be consistently significant in their study, and the proxy for external volatility is also significant a few times.

As to the number of lags of the dependent variable, we pick one lag in the annual estimates, four lags in the quarterly estimates, and twelve lags in the monthly estimates (please see Appendix C). The basic estimates are performed with STATA 10 using fixed effects (FE).[6] As to time effects, we introduce quinquennial dummies, and in the quarterly and monthly estimates we additionally control for seasonality in each country.

B. Variables in the dataset

Table 2 has the definition and sources of the socio-economic and political variables we use in our econometric estimates. The monetary and GDP data, as well as the data on exports and imports, are from the IMF's *International Financial Statistics.*[7] The population figures are from the *World Bank's World Development Indicators.*

The information on democratic periods is from the Polity IV Project. To define the relevant election dates, we use presidential elections in

6 The Hausman test that compares the results of using fixed effects (FE) and random effects (RE) estimators leads to mixed results: in several estimates, the null hypothesis that the extra orthogonality conditions imposed by the RE estimator are valid is rejected; in others, it is not. If the regressors are uncorrelated with the error term, the FE estimator is consistent, albeit inefficient. To follow a uniform criterion, we always use the FE estimator.

7 To construct monthly and quarterly GDP figures in real terms, we follow the Roque Fernández (1981) distribution procedure, available in MATLAB, using monthly and quarterly import series in constant terms; we follow a similar procedure to distribute nominal GDP (see Appendix D).

presidential countries and general legislative elections in parliamentary countries, following the regime classification in the Database of Political Institutions (DPI). The electoral calendar draws on the Center on Democratic Performance at Binghamton University, SUNY, for the 1994–2004 period, complemented by the 1993 Dieter Nohlen et al. *Enciclopedia electoral de América Latina y el Caribe* (San José, Costa Rica, Instituto Interamericano de Derechos Humanos), the Lijphart Elections Archive, and various web sources. When there are run-off elections, we count the second election as the moment of elections, so the second electoral round always falls within the election year.

Table 2. Definition of variables

Variable	Description	Source
Socio-economic variables		
f	Data frequency, where *f* = *m*, *q*, *a* (monthly, quarterly, annual)	
reserves_f	International reserves, *f* = *m*, *q*, *a*	IFS
real_reserves_f	Real international reserves (constant 2005 dollars, deflated by the US CPI index), *f* = *m*, *q*, *a*	AU
Δln(*real_reserves_f*)	First difference of the natural log of real international reserves	AU
gdp_a	Real GDP (2003 dollars), *f* = *a*	IFS
Δln(*gdp_f*)	First difference of natural log of real GDP, *f* = *m*, *q*, *a*	AU
n_a	Population, *f* = *a*	WDI
ln(*gdp_per_capita_f*)	Natural log of real GDP per capita, *f* = *m*, *q*, *a*	AU
openness_f	Ratio of exports and imports to GDP, *f* = *a*, *q*, *m*	AU
Δln(*openness_f*)	First difference of natural log of openness	AU
sd_exports_f	Standard deviation of exports in previous five years, *f* = *a*, *q*, *m*	AU
Δln(*sd_exports_f*)	First difference of natural log of standard deviation of exports	AU
Seasonal and temporal dummies		
*quinquennium*1	Dummy = 1 in 1980-1984 period, 0 otherwise	AU
*quinquennium*2	Dummy = 1 in 1985-1989 period, 0 otherwise	AU
*quinquennium*3	Dummy = 1 in 1990-1994 period, 0 otherwise	AU
*quinquennium*4	Dummy = 1 in 1995-1999 period, 0 otherwise	AU
quarter_country(*t*)	For each country, dummy = 1 in quarter *t*, 0 otherwise, *t* = 1,2, 3	AU
month_country(t)	For each country, dummy = 1 in month *t*, 0 otherwise, *t* = 1,...11	AU
Political variables		
demo	Dummy = 1 if Polity index 0 for a country in a given year	Polity IV
pres	Dummy = 1 if presidential country, 0 if parliamentary	DPI
date_election	Date (month and year) of presidential election or, in parliamentary countries, general election	SUNY & others
ele(0)	Dummy = 1 in election year, 0 otherwise	AU
ele(1)	Dummy = 1 in post-election year, 0 otherwise	AU
pbc	Dummy = 1 in election year, -1 in post-election year, 0 otherwise	AU
polcon3	Political constraints index POLCON3	H(2005)
law	ICRG Law and Order index	ICRG, H(2005)
compliance_dummy	Dummy = 1 for country if *law* ≥ 4 always, 0 otherwise	AU
checks	Effective checks and balances: *polcon3* * *compliance_dummy*	AU
ele_checks	Interaction term: *ele* * *checks*	AU
pbc_checks	Interaction term: *pbc* * *checks*	AU

Note: IFS refers to the IMF *International Financial Statistics*; AU to variables constructed by the authors; WDI to the World Bank *World Development Indicators*; Polity IV to the Polity IV Project; DPI to the Database of Political Institutions; SUNY to the Center on Democratic Performance, Binghamton University, SUNY; H(2005) to Henisz (2005); and ICRG to the International Country Risk Guide.

The variables on checks and balances and compliance with the law are based on the Henisz (2005) POLCON dataset. The political constraints index POLCONIII (polcon3) takes into account the extent of alignment across the executive and legislative branches of government, and is designed to measure the political constraints facing the executive when implementing policy (Henisz 2002). This will affect the actual independence of monetary policy, since if the legislative branch is aligned with the executive branch, the central bank's decisions can be overruled.[8] Henisz (2002) derives POLCONIII in a spatial model under the assumption that the status quo policy is uniformly distributed over the policy space [0, 1]. We do not know the actual preferences of the central bank: the central bank might value monetary stability, but it might alternatively be subservient to the interests of the executive branch. Hence, the Henisz (2002) assumption of a uniform distribution of the status quo is appropriate, where the status quo is given by the central bank's actual preferences.

To construct a measure of the effective checks and balances that a legislature can impose on the executive, the political constraints index is multiplied by a dummy that identifies the countries that comply with the law: *checks=polcon3*compliance_dummy*. As a measure of compliance with the law, the variable *compliance_dummy* takes value 1 if the ICRG index on Law and Order, which measures the degree of rule of law based on a scale from 0 (low) to 6 (high) characterizing the strength and impartiality of the legal system and the general observance of the law, is larger than 4 in all years that are reported for a given country, and 0 otherwise.[9] This treatment implies treating compliance with the law as a fixed characteristic.

8 The polar cases are as follows. The minimum is 0, when the legislature is completely aligned with the executive branch, i.e., the party in the executive branch controls 100% of the legislative seats. The maximum is 2/3 with a single legislative chamber, when the legislature is completely independent from the executive, and 4/5 with two chambers, when both chambers are completely independent. The intermediate cases are as follows. If the party that heads the executive branch has a legislative majority, Henisz (2002) assumes that as this majority diminishes from holding all the legislative seats, the difficulty in satisfying the preferences of all coalition or faction members increases. Less alignment decreases the feasibility of policy change and implies more political constraints for the executive. Hence, this value is adjusted for the fractionalization of the legislature, which is the probability that two random draws from the legislature are from different parties. Something similar is done in case the opposition has a majority in the legislative branch, adjusting the value by 1 minus the fractionalization index. High fractionalization within each legislative branch increases (decreases) political constraints for an aligned (opposed) executive branch. The POLCONIII index is measured the 1st of January of each year, so it is predetermined in relation to elections that year.

9 TThough the cut-off point of 4 is arbitrary, a higher cut-off would lead to eliminate the United Kingdom as a country where there is compliance with the law, a lower one would lead to include Argentina. In Latin America, only Chile and Costa Rica have *compliance_dummy*=1; in the OECD, only Greece, Italy and Korea have *compliance_dummy*=0.

III. IDENTIFYING THE ELECTION YEAR WITH DIFFERENT DATA FREQUENCIES

The standard procedure in the literature on electoral cycles is to work with annual data. With annual data, the election year is typically the calendar year of elections. The problem with this approach is that it does not allow identifying the election year precisely: since elections can take place any moment between January and December, part of the election year may in fact fall in the previous calendar year.[10]

Streb, Lema, and Garofalo (2012) propose an alternative procedure to identify the election year. Using quarterly data, they define the election year as the four quarters up to the election quarter. We apply this same procedure to study the behavior of real foreign exchange reserves around elections. We also extend this procedure to monthly data, defining the election year as the twelve months up to the election month.

Table 3 displays fixed effect estimates of the rate of change of real international reserves using annual frequency data. In the full sample, column (1) shows that the growth rate falls in the election year and recovers afterwards. Though only the post-electoral effects are significant, both movements are symmetrical and can be represented by the variable pbc that takes value 1 in the election year and -1 in the post-election year (column 2). This behavior is driven by Latin American countries, where both pre- and post-electoral effects are statistically significant, and symmetric effects are not rejected by the data (columns 3 and 4). In OECD countries, on the other hand, there is no evidence whatsoever of a cycle (columns 5 and 6). The coefficient for pbc in the full sample (-0.044) is approximately the average of the coefficients for Latin America and the OECD.

10 Otros estudios sobre el mercado de trabajo uruguayo en base a estafuente de datos Dreher and Vaubel (2009), for instance, use annual data in their study of foreign exchange interventions. However, besides a typical election year dummy based on the calendar year of elections, they use as their preferred specification two variables that try to capture the twelve months before and after elections. First, an election year variable that measures what part of the election year falls the calendar year of elections and which the year before: when elections are in February, for example, it equals 2/12 that year and 10/12 the previous year. Second, they construct a post-election year variable with a similar procedure: when elections are in February, it equals 11/12 that year and 1/12 the following year.

Table 3. Variation of real international reserves around election year (identified with annual frequency data)

Frequency *f* = *a*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
∆ln(*real_reserves_f*(-1))	-0.0976*	-0.0981*	-0.1377**	-0.1351**	-0.1106	-0.1108
	(0.0549)	(0.0547)	(0.0604)	(0.0594)	(0.0735)	(0.0733)
ln(*gdp_per_capita_f*)	-0.4412***	-0.4417***	-0.4248**	-0.4328**	-0.1955	-0.1956
	(0.1145)	(0.1139)	(0.1757)	(0.1720)	(0.1259)	(0.1268)
∆ln(*gdp_f*)	1.1872*	1.1851*	1.3238	1.3115	0.5675	0.5834
	(0.6156)	(0.6142)	(0.7801)	(0.7745)	(0.6371)	(0.6285)
∆ln(*openness_f*)	-0.1995	-0.2021	0.0274	0.0191	-0.7277***	-0.7283***
	(0.1428)	(0.1424)	(0.1574)	(0.1545)	(0.1681)	(0.1681)
ln(*sd_exports_f*)	0.0048	0.0048	-0.0020	-0.0022	0.0066	0.0067
	(0.0060)	(0.0061)	(0.0093)	(0.0092)	(0.0072)	(0.0071)
ele(0)	-0.0423		-0.1144**		0.0188	
	(0.0285)		(0.0484)		(0.0261)	
ele(1)	0.0461*		0.0795**		0.0117	
	(0.0235)		(0.0360)		(0.0279)	
pbc		-0.0442**		-0.0997***		0.0050
		(0.0183)		(0.0287)		(0.0175)
constant	3.9388***	3.9437***	3.1586**	3.2080**	2.0487	2.0578
	(1.0205)	(1.0131)	(1.2937)	(1.2638)	(1.3004)	(1.3127)
Observations	917	917	447	447	470	470
Countries	46	46	22	22	24	24
R-squared	0.046	0.047	0.109	0.111	0.106	0.105
ele(0) = -*ele*(1)	0.919		0.584		0.455	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980 2005 period. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. We control for time effects using four quinquennial dummies. F-tests of hypotheses: p-values reported.

We prefer to carry out the estimates with annual data using FE, not GMM. When the time series observations *(T)* and the number of countries *(N)* are finite, FE and GMM estimators exhibit a negative asymptotic bias of order 1/*T* and 1/*N*, respectively (Alvarez and Arellano 2003). Given the dimension of our annual panels in Table 3, *T* is larger than *N* in the subsamples, so the asymptotic bias is lower using FE; while this is not the case for the full sample, the gain with GMM would be negligible and the

11 It is well known that when OLS is consistent, it is also efficient, while the Instrumental Variables (IV) estimator will be consistent but inefficient. In our case, since the bias of the FE estimator (an OLS estimator with dummies per group) is very small due to the length of the times series (*T* = 26), we decided not to carry out the estimates with GMM (a generalized version of the IV estimator with considerably higher standard errors) to not incur the efficiency costs.

standard errors higher.[11] For robustness, we turn instead to the estimates in Tables 4 and 5 with quarterly and monthly data, where *T* is much larger than *N* both in the full sample and the subsamples.

What do the higher frequency data reveal? First, we report the estimates with quarterly data in Table 4. The variable *ele*(0) takes value 1 in the four quarters up to the election quarter (quarters t = -3, -2, -1, 0), while *ele*(1) takes value 1 in the following four quarters (quarters t =1, 2, 3, 4). Post-electoral effects lose significance both in the full sample and Latin America (columns 1 and 3). Moreover, symmetry of pre- and post-electoral effects is now rejected for Latin America. Again, there is no evidence of cycles in OECD countries.

Table 4. Variation of real international reserves around election year (identified with quarterly frequency data)

Frequency *f* = *q*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Δln(*real_reserves_f*(-1))	-0.0238	-0.0235	-0.0275	-0.0254	-0.0525	-0.0525
	(0.0307)	(0.0307)	(0.0407)	(0.0404)	(0.0446)	(0.0446)
ln(*gdp_per_capita_f*)	-0.5123***	-0.5068***	-0.6142**	-0.6133**	-0.2759*	-0.2771*
	(0.1414)	(0.1398)	(0.2328)	(0.2243)	(0.1474)	(0.1461)
Δln(*gdp_f*)	1.9639*	1.9796*	1.9774	2.0056	2.1995*	2.1925*
	(1.0645)	(1.0626)	(1.3619)	(1.3565)	(1.2572)	(1.2517)
Δln(*openness_f*)	-0.0153	-0.0149	0.0594	0.0589	-0.4173	-0.4168
	(0.2510)	(0.2504)	(0.2684)	(0.2666)	(0.4604)	(0.4616)
Δln(*sd_exports_f*)	-0.0075	-0.0078	0.0219	0.0231	-0.0734	-0.0733
	(0.0574)	(0.0574)	(0.0780)	(0.0780)	(0.0811)	(0.0815)
ele(0)	-0.0728**		-0.1618***		0.0055	
	(0.0296)		(0.0390)		(0.0344)	
ele(1)	0.0160		0.0313		-0.0022	
	(0.0259)		(0.0400)		(0.0336)	
pbc		-0.0436**		-0.0980***		0.0050
		(0.0195)		(0.0263)		(0.0234)
constant	3.9543***	3.8973***	3.9278**	3.8922***	2.5134*	2.5247*
	(1.0556)	(1.0416)	(1.3944)	(1.3412)	(1.2986)	(1.2843)
Observations	3,639	3,639	1,790	1,790	1,849	1,849
Countries	45	45	21	21	24	24
R-squared	0.115	0.115	0.126	0.125	0.134	0.134
ele(0) = -*ele*(1)	0.152		0.037		0.947	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980.I 2005.IV period. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. Four lags of the dependent variable are included (only first lag reported). We control for time effects using four quinquennial dummies, and for seasonal effects using country-dummies for the first, second and third quarters. F-tests of hypotheses: p-values reported. Guyana is dropped from the estimates because of insufficient data.

Table 5 reports the estimates with monthly data. The variable ele(0) takes value 1 in the twelve months up to the election month (month t = -11, -10, -9, …, 0), while the variable *ele*(1) takes value 1 in the following twelve months (month t = 1, 2, 3, …, 12). The main difference with the previous estimates is that columns (1) and (2) do not show any pattern for the full sample. This is not because pre-electoral effects are not highly significant in Latin America, but rather because the fact that nothing at all happens in OECD countries now leads the overall results not to be significant.

Table 5. Variation of real international reserves around election year (identified with monthly frequency data)

Frequency *f* = *m*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Δln(*real_reserves_f*(-1))	-0.0796**	-0.0795**	-0.0868**	-0.0861**	-0.0682	-0.0682
	(0.0302)	(0.0303)	(0.0392)	(0.0391)	(0.0398)	(0.0398)
ln(*gdp_per_capita_f*)	-0.6075***	-0.6029***	-0.7598***	-0.7572***	-0.2322	-0.2360
	(0.1531)	(0.1513)	(0.2550)	(0.2455)	(0.1484)	(0.1500)
Δln(*gdp_f*)	1.4808**	1.4802**	0.2061	0.2151	5.4178***	5.4218***
	(0.7315)	(0.7315)	(0.9082)	(0.9105)	(1.0181)	(1.0231)
Δln(*openness_f*)	-0.1453	-0.1445	0.0481	0.0495	-0.7128***	-0.7134***
	(0.2591)	(0.2587)	(0.3307)	(0.3298)	(0.2018)	(0.2019)
Δln(*sd_exports_f*)	0.4802*	0.4764*	0.4207	0.4145	0.5049**	0.5075**
	(0.2717)	(0.2711)	(0.3877)	(0.3866)	(0.2148)	(0.2120)
ele(0)	-0.0477		-0.1377***		0.0305	
	(0.0300)		(0.0378)		(0.0403)	
ele(1)	-0.0056		-0.0028		-0.0103	
	(0.0280)		(0.0413)		(0.0391)	
pbc		-0.0215		-0.0700***		0.0207
		(0.0191)		(0.0228)		(0.0267)
constant	3.9507***	3.8368***	3.5604***	3.6376***	1.8894	1.8574
	(0.9675)	(0.9561)	(1.2311)	(1.1848)	(1.1443)	(1.1642)
Observations	10,665	10,665	5,204	5,204	5,461	5,461
Countries	44	44	21	21	23	23
R-squared	0.121	0.120	0.134	0.134	0.115	0.115
ele(0) = -*ele*(1)	0.215		0.038		0.725	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980.1-2005.12 period. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. Twelve lags of the dependent variable are included (only first lag reported). We control for time effects using four quinquennial dummies, and for seasonal effects using country-dummies for each of the first eleven months. F-tests of hypotheses: p-values reported. Guyana and Luxembourg are dropped from the estimates because of insufficient data.

In summary, the results in this section indicate that there are significant reductions in real international reserves in Latin America, a pattern that is even more significant when we go from annual to quarterly and monthly frequency data. Nothing of the sort happens in OECD countries. Consequently, at first blush it does not seem appropriate to group all these countries together.

Though the patterns for the election year are quite similar at all data frequencies, Table 4 with quarterly data provides our preferred estimates because the behavior of reserves does not change immediately the month after election, especially when there is an interlude between the month of elections and the month the new administration takes office — as is typical in Latin America where presidential systems predominate. Quarterly data are more likely to capture the effects that linger after elections, until the new term in office starts.[12]

IV. CONTROLLING FOR EFFECTIVE CHECKS AND BALANCES

We now turn to a potentially omitted factor that has turned out to be important to reconcile the differential behavior of Latin America and the OECD in political budget cycles, namely the presence of legislative checks and balances in countries with strong rule of law (Streb, Lema, and Garofalo 2012). There is a big difference between the regions due to the weaker effective checks and balances that the executive faces in Latin America.

Though Keefer and Stasavage (2003) study the role of veto players in monetary policy using cross-country panels, their focus is the independence of central banks and the credibility problems of monetary policy, without touching its specific role in relation to electoral cycles. Since the lack of veto players can create particularly strong credibility problems in election years, we now control for this.

Once we control for effective checks and balances, there is a noteworthy change: the behavior of both regions follows a similar pattern. We first describe in Tables 6 to 8 the results of using different data frequencies to define the election year. We then compare them in Table 9, and elaborate on the empirical implications of effective checks and balances.

12 The analysis of what happens within the quarters and months of the election and post-election years is beyond the aims of this paper. Instead, our focus is on how the use of different frequency data to define the election year affects the estimates.

With annual data, Table 6 shows that in both regions the post-electoral increases in reserves are significant, and the variable *pbc* that treats the pre- and post-electoral effects symmetrically is not rejected by the data. Additionally, the interaction of *checks* with *pbc* is significant in the full sample and in the OECD. However, annual data do not allow capturing the election year very precisely.

Table 6. Effective checks and balances and variation of real international reserves around election year (identified with annual frequency data)

Frequency *f* = *a*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Δln(*real_reserves_f*(-1))	-0.0995*	-0.0984*	-0.1615**	-0.1581**	-0.1057	-0.1102
	(0.0578)	(0.0572)	(0.0673)	(0.0656)	(0.0755)	(0.0740)
ln(*gdp_per_capita_f*)	-0.4660***	-0.4732***	-0.5403***	-0.5532***	-0.2070	-0.2020
	(0.1213)	(0.1214)	(0.1831)	(0.1789)	(0.1285)	(0.1301)
Δln(*gdp_f*)	1.2319*	1.2272*	1.3455	1.3309	0.7194	0.6976
	(0.6266)	(0.6224)	(0.8330)	(0.8252)	(0.6430)	(0.6405)
Δln(*openness_f*)	-0.1532	-0.1600	0.0988	0.0876	-0.6682***	-0.6630***
	(0.1414)	(0.1394)	(0.1502)	(0.1461)	(0.1562)	(0.1559)
Δln(*sd_exports_f*)	0.0015	0.0016	-0.0047	-0.0048	0.0066	0.0066
	(0.0065)	(0.0064)	(0.0108)	(0.0105)	(0.0077)	(0.0075)
ele(0)	-0.1104**		-0.1181**		-0.0165	
	(0.0493)		(0.0540)		(0.0972)	
ele(1)	0.0987***		0.0684*		0.1619**	
	(0.0342)		(0.0355)		(0.0761)	
ele(0)_checks	0.2617**		0.0735		0.0729	
	(0.1149)		(0.1428)		(0.2048)	
ele(1)_checks	-0.1983**		0.0748		-0.3488**	
	(0.0807)		(0.1023)		(0.1552)	
pbc		-0.1054***		-0.0973***		-0.0836*
		(0.0273)		(0.0295)		(0.0477)
pbc_checks		0.2339***		0.0098		0.2012**
		(0.0614)		(0.0820)		(0.0930)
checks	-0.0546	-0.0358	-0.1926	-0.1482	0.1875	0.1023
	(0.1947)	(0.1926)	(0.1136)	(0.0931)	(0.3930)	(0.3867)
constant	4.1477***	4.2067***	3.9198***	3.9996***	2.1045	2.0977
	(1.0670)	(1.0620)	(1.3263)	(1.2919)	(1.2967)	(1.3137)
Observations	860	860	410	410	450	450
Countries	45	45	21	21	24	24
R-squared	0.063	0.064	0.120	0.121	0.115	0.111
ele(0) = -*ele*(1)	0.855		0.484		0.324	
ele(0)_*checks* = -*ele*(1) *checks*	0.683		0.432		0.380	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980 2005 period. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. We control for time effects using four quinquennial dummies. F-tests of hypotheses: p-values reported. Barbados is dropped from the estimates because of insufficient data.

Tables 7 and 8 show the growth of reserves around elections using quarterly and monthly data. As mentioned above, we prefer the estimates with quarterly frequency data, because it is more likely that the election quarter coincides with the inauguration of the new administration. As in the previous section, the significance of the post-electoral effects vanishes. However, pre-electoral effects become more significant. Though the estimates for OECD countries by themselves are usually not statistically significant, the behavior of both regions is remarkably similar, especially so with quarterly data. This justifies focusing on the estimates for the full sample, since they are more efficient than those for each separate region. Unlike what happened in the previous section, the results for the full sample are also more significant than those of the subsamples.

Table 7. Effective checks and balances and variation of real international reserves around election year (identified with quarterly frequency data)

Frequency *f* = *q*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Δln(*real_reserves_f*(-1))	-0.0211	-0.0215	-0.0225	-0.0232	-0.0527	-0.0527
	(0.0318)	(0.0319)	(0.0425)	(0.0425)	(0.0446)	(0.0445)
ln(*gdp_per_capita_f*)	-0.5060***	-0.5099***	-0.6557***	-0.6608***	-0.2713*	-0.2724*
	(0.1415)	(0.1429)	(0.2250)	(0.2288)	(0.1424)	(0.1398)
Δln(*gdp_f*)	2.3562**	2.3245**	2.5500*	2.5192*	2.1619	2.1930
	(1.0813)	(1.0848)	(1.4514)	(1.4503)	(1.3049)	(1.3581)
Δln(*openness_f*)	0.0034	0.0061	0.0896	0.0932	-0.3624	-0.3657
	(0.2528)	(0.2532)	(0.2706)	(0.2705)	(0.4887)	(0.4924)
Δln(*sd_exports_f*)	-0.0159	-0.0170	0.0096	0.0073	-0.0728	-0.0720
	(0.0579)	(0.0578)	(0.0819)	(0.0816)	(0.0779)	(0.0771)
ele(0)	-0.1749***	-0.1854***	-0.1690***	-0.1799***	-0.1585	-0.1473
	(0.0418)	(0.0423)	(0.0452)	(0.0458)	(0.1033)	(0.0984)
ele(1)	0.0401		0.0430		-0.0383	
	(0.0459)		(0.0454)		(0.1548)	
ele(0)_checks	0.4058***	0.4230***	0.2002*	0.2372*	0.3814*	0.3545*
	(0.1024)	(0.1051)	(0.1126)	(0.1346)	(0.2144)	(0.2018)
ele(1)_checks	-0.0708		-0.1480		0.0908	
	(0.1040)		(0.1696)		(0.3196)	
checks	-0.1420	-0.1612	-0.2349*	-0.2827**	-0.0287	-0.0117
	(0.1567)	(0.1576)	(0.1178)	(0.1098)	(0.2787)	(0.2637)
constant	3.9082***	3.9497***	4.0739***	4.1170***	2.4901*	2.4927**
	(1.0420)	(1.0519)	(1.3193)	(1.3394)	(1.2289)	(1.1996)
Observations	3,433	3,433	1,639	1,639	1,794	1,794
Countries	44	44	20	20	24	24
R-squared	0.119	0.119	0.127	0.127	0.135	0.135
ele(0) = -*ele*(1)	0.046		0.077		0.364	
ele(0)_*checks* = -*ele*(1)_*checks*	0.032		0.775		0.298	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980.I 2005.IV period. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. Four lags of the dependent variable are included (only first lag reported). We control for time effects using four quinquennial dummies, and for seasonal effects using country-dummies for the first, second and third quarters. F-tests of hypotheses: p-values reported. Barbados and Guyana are dropped from the estimates because of insufficient data.

Table 8. Effective checks and balances and variation of real international reserves around election year (identified with monthly frequency data)

Frequency *f* = *m*	Full sample		Latin America		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Δln(*real_reserves_f*(-1))	-0.0816**	-0.0816**	-0.0882**	-0.0882**	-0.0702*	-0.0700*
	(0.0310)	(0.0310)	(0.0403)	(0.0403)	(0.0399)	(0.0400)
ln(*gdp_per_capita_f*)	-0.5707***	-0.5720***	-0.7325**	-0.7355**	-0.2519	-0.2492
	(0.1622)	(0.1628)	(0.2693)	(0.2712)	(0.1506)	(0.1503)
Δln(*gdp_f*)	1.4556*	1.4523*	0.0679	0.0610	5.2432***	5.2550***
	(0.7727)	(0.7738)	(0.9703)	(0.9704)	(1.0247)	(1.0289)
Δln(*openness_f*)	-0.2077	-0.2072	-0.0182	-0.0171	-0.7189***	-0.7201***
	(0.2672)	(0.2674)	(0.3435)	(0.3438)	(0.2066)	(0.2066)
Δln(*sd_exports_f*)	0.4881*	0.4880*	0.4161	0.4148	0.5376**	0.5368**
	(0.2861)	(0.2858)	(0.4031)	(0.4027)	(0.2255)	(0.2242)
ele(0)	-0.1476***	-0.1511***	-0.1493***	-0.1550***	-0.1027	-0.0767
	(0.0385)	(0.0370)	(0.0423)	(0.0407)	(0.1175)	(0.1080)
ele(1)	0.0133		0.0224		-0.0817	
	(0.0487)		(0.0433)		(0.1931)	
ele(0)_checks	0.3749***	0.3837***	0.1903	0.2237	0.2907	0.2396
	(0.1020)	(0.1023)	(0.1736)	(0.2101)	(0.2393)	(0.2159)
ele(1)_checks	-0.0322		-0.1260		0.1637	
	(0.1107)		(0.1743)		(0.3988)	
checks	-0.1529	-0.1608	-0.2679**	-0.3122**	0.0122	0.0398
	(0.1959)	(0.1954)	(0.1275)	(0.1193)	(0.3973)	(0.3919)
constant	3.7194***	3.7401***	3.4281**	3.6033**	2.1049*	2.0137*
	(1.0052)	(1.0123)	(1.2608)	(1.2725)	(1.1359)	(1.1400)
Observations	9,968	9,968	4,771	4,771	5,197	5,197
Countries	43	43	20	20	23	23
R-squared	0.124	0.124	0.138	0.138	0.118	0.118
ele(0) = -*ele*(1)	0.062		0.081		0.496	
ele(0)_*checks* = -*ele*(1)_*checks*	0.042		0.702		0.420	

Note: The variation of real international reserves is the first difference of the natural log of real international reserves. FE estimates. Data cover the 1980.1-2005.12 period. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered by country, in parentheses. Twelve lags of the dependent variable are included (only first lag reported). We control for time effects using four quinquennial dummies, and for seasonal effects using country-dummies for each of the first eleven months. F-tests of hypotheses: p-values reported. Barbados, Guyana, and Luxembourg are dropped from the estimates because of insufficient data.

To interpret the impact of effective checks and balances on electoral cycles in real international reserves, Table 9 reports the results of our simulations using the coefficient estimates from the full sample. Row (iv) shows the net impact of electoral cycles taking into account the mean values of effective checks and balances in the full sample and in each region. The message is loud and clear: the differences in effective checks and balances can indeed explain why the unconditional regressions in Section III show an electoral cycle in international reserves in Latin America, but not in

the OECD. The message is also consistent across data frequencies: lower effective checks and balances in Latin America can explain the fall in reserves before election in the region.

Table 9. Impact of effective checks and balances on electoral cycles in real international reserves

	All	Latin America	OECD
Values of effective checks and balances			
polcon3	0.428	0.379	0.474
compliance dummy	0.516	0.091	0.891
checks	0.244	0.037	0.427
Annual frequency data (Table 6, coefficients column 2)			
(i) coefficient *pbc*	-0.105	-0.105	-0.105
(ii) coefficient *pbc_checks*	0.234	0.234	0.234
(iii) *checks* * coefficient *pbc_checks*	0.057	0.009	0.1
(iv) net impact =(i)+(iii)	-0.048***	-0.097***	-0.006
Standard error	0.016	0.025	0.014
Quarterly frequency data (Table 7, coefficients column 2)			
(i) coefficient *ele*	-0.185	-0.185	-0.185
(ii) coefficient *ele_checks*	0.423	0.423	0.423
(iii) *checks* * coefficient *ele_checks*	0.103	0.016	0.181
(iv) net impact =(i)+(iii)	-0.082***	-0.169***	-0.004
Standard error	0.027	0.039	0.028
Monthly frequency data (Table 8, coefficients column 2)			
(i) coefficient *ele*	-0.151	-0.151	-0.151
(ii) coefficient *ele_checks*	0.384	0.384	0.384
(iii) *checks* * coefficient *ele_checks*	0.094	0.014	0.164
(iv) net impact =(i)+(iii)	-0.057**	-0.137***	0.013
Standard error	0.028	0.035	0.034

Note: Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

For example, according to our preferred specification that uses quarterly frequency data to identify the election year, real international reserves fall 8% in election years in the full sample, while the differences between the mean values of effective checks and balances in both regions can explain why the fall is 17% in Latin America and nothing in the OECD. Thus, the conditional regression for the full sample in Table 7 can track the unconditional regressions in Table 4 for the full sample and both sub-samples. We now turn to an interpretation of these cycles.

V. HOW TO INTERPRET THESE ELECTORAL CYCLES?

Dreher and Vaubel (2009) study the behavior of the ratio of international reserves to trend GDP in a large cross-country panel, finding significant drops during election years in developing countries, something which resembles the pattern found in Section III. The motivation for Dreher and Vaubel's (2009) study is the political business cycle in which monetary policy is more expansionary before elections. In this context, they expect a sale of foreign exchange reserves in order to avoid the depreciation of the exchange rate. The rationale they provide is through the portfolio balance approach: if the sale of the reserve currency is sterilized by both central banks, the net effect is an increase in reserve currency bonds and a decrease in domestic currency bonds, which raises the domestic rate of monetary expansion consistent with exchange rate stability (Dreher and Vaubel 2009: 757).[13]

The motivation for this study is different. While William Nordhaus (1975) kicks off the literature on electoral cycles in economic policy, pointing to political business cycles where there is a stimulative monetary policy before elections, and contractive policy afterwards, Drazen (2001) concludes, in his review of twenty-five years of evidence, that monetary policy has a passive role of accommodating active fiscal policy, which he considers is the main impulse behind electoral cycles. Hence, Drazen (2001) proposes instead a framework of passive monetary policy and active fiscal police, where central banks follow a policy of "laying low" during elections, expanding money supply to accommodate the fiscal stimulus and avoid an increase of interest rates. We agree with Drazen's (2001) view that active fiscal policy may be a key element that accompanies monetary cycles.

Working with this same sample of Latin American and OECD countries, Streb, Lema, and Garofalo (2012) indeed uncover a manipulation of fiscal policy before elections, with a budget deficit that increases significantly in both regions. Stronger fiscal cycles in Latin America can be explained by the fact that the executive incumbents face lower effective

13 They resort to a model with imperfect asset substitutability because monetary policy is completely ineffective in the Mundell-Fleming model with perfect capital mobility: expansive monetary policy simply leads to lower reserves, and does not affect the money supply, when there is a fixed exchange rate.

checks and balances on their discretionary power. While Streb, Lema, and Garofalo (2012) emphasize a budgetary channel for political budget cycles, since the legislature must authorize budget expenditures and debt, an additional channel is pointed out by Mercedes Haga (2012): if the central bank is not independent, it will accommodate expansive fiscal policy, exacerbating electoral cycles in fiscal policy.

In the context of the Mundell-Fleming model in a small open economy, fiscal expansions under perfect capital mobility should in principle lead to a gain in reserves, rather than to a loss, when exchange rates are fixed (see, e.g., Rudiger Dornbusch 1980: chapter 10). The evidence in Latin America does not fit this pattern at all. This may be due to the fact that, over the period we analyze, economic policy in Latin America has had differential features from that of OECD countries. On the one hand, only Latin American countries show a compensating fiscal adjustment after elections (Streb, Lema, and Garofalo 2012). On the other hand, there are also significant exchange rate adjustments after elections in Latin America (see Table A2), so they may be playing a role in these post-electoral fiscal adjustments. These features do not point to passive monetary policy, but rather to the fiscal dominance of monetary policy.

Indeed, the process of losses of reserves before elections and depreciations after elections can be linked to Stein and Streb (1998), who put the perverse monetarist arithmetic of Thomas Sargent and Neil Wallace (1981) in a political economy setting, a logic that also applies to the episodes of temporary stabilizations in Guillermo Calvo and Carlos Végh (1999): in order to appear more competent when there is asymmetric information on policy decisions, the government can temporarily lower the inflation tax before elections by resorting to debt, but this will imply more inflation after elections.[14] Stein and Streb (2004) link these episodes of temporary stabilizations to a more general pattern of exchange rate cycles, where the rate of devaluation is lowered before elections and raised afterwards by opportunistic incumbents. They interpret this manipulation as part of a political budget cycle by which fiscal expansions before elections are

14 TAn alternative to incurring debt in the financial market is for the government to resort to the central bank, temporarily running down international reserves, which is precisely what our data here show. The loss of reserves may also be affected by the behavior of private agents, if not all financial assets in domestic currency are for transaction purposes: if agents expect monetary authorities to devalue after elections, the switch from domestic to foreign currency will exacerbate the fall of reserves.

corrected through an inflation tax after elections, placing their approach within the framework of political budget cycles proposed by Kenneth Rogoff and Anne Sibert (1988). While Stein and Streb (2004) are not able to uncover significantly lower rates of depreciation before elections, the significant increases in the budget deficit mentioned above indicate other forms of expansionary fiscal policy before elections.

In summary, the behavior of Latin America over this period can be interpreted in terms of the fiscal dominance of monetary policy. The pattern of a loss of reserves before elections seems to point to some episodes of unsustainable exchange rate policies. Devaluations after elections provide higher government revenues through the inflation tax that the central bank collects. The impact of depreciations on the budget surplus may be even larger because of the behavior of other government revenues: Gabriela Romaniello (2010) finds that in Uruguay depreciations lead to an increase of the primary surplus because government revenues are more linked to the prices of tradables than expenditures, a relative price effect that can be expected to hold for most countries in our region. Of course, depreciations can also be used to wipe out, in real terms, the nominal increase of government expenditure before elections.

VI. FINAL WORDS

We study the behavior of a variable that has been overlooked in the literature on electoral cycles: international reserves. Our motivation is the pattern of exchange rate cycles in Latin America, in which the rate of devaluation increases after elections, leading to a depreciation of the real exchange rate. If countries in the region try to stabilize their currencies before elections, this should show in the behavior of international reserves.

The data indeed show that in Latin American countries there is a clear cycle where international reserves fall before elections. The behavior of international reserves in this region is strikingly different from OECD countries, where nothing happens; if anything, reserves grow slightly more than average in election years. Dreher and Vaubel (2009), motivated by the use of stimulative monetary policy before elections, already find that foreign exchange reserves fall before elections in developing countries.

We try to explain these differences in the behavior of international reserves by looking at the influence of checks and balances in countries with strong compliance with the law. After controlling for effective checks and balances, the behavior of both regions becomes remarkably similar: lower effective checks and balances can explain why international reserves fall significantly before elections in Latin America, but not in the OECD.

Stronger political budget cycles in Latin America seem to be accompanied by the fiscal dominance of monetary policy. Though other factors have to be studied as well, the fall of international reserves helps to finance expansionary fiscal policy before elections, and the rise in the rate of devaluation after elections helps to correct the budget deficit.

APPENDIX

A. Countries included in the study

Table A1. List of countries, number of elections, and available data in the 1980-2005 period

Latin America*	*ele*(0) >0	*demo* 0	Data frequency	OECD**	*ele*(0) >0	*demo* 0	Data frequency
Argentina	5	1983	*a,q,m*	Australia	10	All	*a,q,m*
Barbados	6	All	*a,q,m*	Austria	7	All	*a,q,m*
Bolivia	7	1982	*a,q,m*	Belgium	7	All	*a,q,m*
Brazil	4	1985	*a,q,m*	Canada	7	All	*a,q,m*
Chile	4	1989	*a,q,m*	Denmark	9	All	*a,q,m*
Colombia	6	All	*a,q,m*	Finland	6	All	*a,q,m*
Costa Rica	6	All	*a,q,m*	France	6	All	*a,q,m*
Dominican Republic	7	All	*a,q,m*	Germany	8	All	*a,q,m*
Ecuador	6	All	*a,q,m*	Greece	9	All	*a,q,m*
El Salvador	5	1984	*a,q,m*	Iceland	6	All	*a,q,m*
Guatemala	6	1986	*a,q,m*	Ireland	8	All	*a,q,m*
Guyana	5	All	*a*	Italy	6	All	*a,q,m*
Honduras	7	1982	*a,q,m*	Japan	9	All	*a,q,m*
Jamaica	6	All	*a,q,m*	Korea	5	1988	*a,q,m*
Mexico	4	1988	*a,q,m*	Luxembourg	5	All	*a,q*
Nicaragua	4	1990	*a,q,m*	Netherlands	8	All	*a,q,m*
Panama	5	1989	*a,q,m*	New Zealand	9	All	*a,q,m*
Paraguay	6	1989	*a,q,m*	Norway	7	All	*a,q,m*
Peru	6	1980 1999, 2002	*a,q,m*	Portugal	9	All	*a,q,m*
Trinidad-Tobago	7	All	*a,q,m*	Spain	7	All	*a,q,m*
Uruguay	5	1985	*a,q,m*	Sweden	7	All	*a,q,m*
Venezuela	5	All	*a,q,m*	Switzerland	6	All	*a,q,m*
				United Kingdom	6	All	*a,q,m*
				United States	7	All	*a,q,m*

Note: The 296 elections during the 1980 2005 period are reduced to 282 elections when the condition *demo*0 is imposed. The symbols *a*, *q*, and *m* denote annual, quarterly, and monthly frequency data. * Barbados, Guyana, Jamaica and Trinidad-Tobago have parliamentary systems, the rest presidential systems; Mexico, a member of the OECD since 1994, is included in Latin America. ** Korea and the United States have presidential systems, the rest parliamentary systems.

B. Behavior of exchange rates around elections

For comparative purposes, we report here the behavior of nominal exchange rates around elections in our full sample and in two regions under study, Latin America and the OECD.

Previous studies using monthly data find that in Latin America the rate of devaluation rises after elections. When quarterly and monthly

data are used to define the election year, Table A2 shows that the rate of devaluation in Latin America is indeed largest in the post-election year. The annual data show instead that the devaluation rate is largest in election years, but because elections take place between January and December, they conflate pre- and post-election behavior.[15] For that reason, quarterly and monthly data are more precise than annual data. In contrast to Latin America, where there is a significant surge in the depreciation rate after elections, no such pattern is manifest in OECD countries. However, the depreciation rate in the OECD is lower in election years (and significantly so with quarterly frequency data).

Table A2. Annual variation of the nominal exchange rate in election and non-election years

	Mean Values				Differences	
	All years	Election years	Post-election years	Normal years	Election years versus normal years	Post-election years versus normal years
Full sample						
a	0.136	0.149	0.124	0.135	0.015	-0.01
	(0.44)	(0.60)	(0.40)	(0.36)	(0.04)	(0.03)
q	0.128	0.116	0.142	0.135	-0.015	0.014
	(0.55)	(0.59)	(0.67)	(0.48)	(0.02)	(0.03)
m	0.131	0.115	0.144	0.138	-0.017	0.014
	(0.85)	(0.74)	(1.09)	(0.79)	(0.02)	(0.02)
Latin America						
a	0.258	0.326	0.263	0.229	0.101	0.035
	(0.60)	(0.88)	(0.56)	(0.46)	(0.09)	(0.06)
q	0.247	0.271	0.310	0.229	0.046	0.091*
	(0.74)	(0.84)	(0.96)	(0.61)	(0.05)	(0.05)
m	0.250	0.267	0.326	0.236	0.043	0.093*
	(1.14)	(1.03)	(1.58)	(1.01)	(0.04)	(0.05)
OECD						
a	0.020	0.016	0.015	0.026	-0.012	-0.012
	(0.13)	(0.13)	(0.12)	(0.12)	(0.01)	(0.01)
q	0.019	0.007	0.014	0.030	-0.023*	-0.015
	(0.24)	(0.26)	(0.22)	(0.24)	(0.01)	(0.01)
m	0.020	0.007	0.013	0.025	-0.018	-0.012
	(0.38)	(0.39)	(0.38)	(0.37)	(0.01)	(0.01)

Note: Mean values: the annual variation (*a*) is measured by the log difference; the quarterly variations (*q*) are the log differences multiplied by four, while the monthly variations (*m*) are multiplied by twelve, to have comparable figures that represent annual changes. Standard deviations reported in parentheses. Differences between election/non-election years and normal years: estimated using a regression on dummies (normal year = base year). Robust standard errors in parentheses. Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.

15 The rate of devaluation is larger in election years than in normal years, though the difference decreases as we go from annual to quarterly and monthly data. A possible explanation are failed attempts to stabilize exchange rates before elections, such as the Primavera Plan in Argentina that was abandoned shortly before the impending elections, when the central bank ran out of international reserves and credit in February 1989.

C. Choice of optimal number of lags of the dependent variable

To choose the optimal number of lags, we took as a reference point the lags that maximized the value of the F statistic for the whole sample. This points to no lags for annual data, five lags for quarterly data, and four lags for monthly data (Table A3). The Akaike statistic continues to decline slowly as the number of lags increase.

Table A3. Determination of number of lags for ΔIn (real_reserves_f)

Panel A. Annual frequency data

	Year	0	1	2	3	4
Statistic	R2	0.055	0.056	0.064	0.07	0.081
	F	**5.890**	5.167	5.704	5.624	5.646
	Akaike	574.1	574.4	568.0	563.6	**553.1**

Panel B. Quarterly frequency data

	Quarter	0	1	2	3	4	5	6
Statistic	R2	0.023	0.026	0.028	0.032	0.042	0.046	0.046
	F	5.075	4.954	4.82	4.786	5.403	**5.537**	5.131
	Akaike	-2698.9	-2681.1	-2684.0	-2672.6	-2690.1	-2718.3	-2715.6
	Quarter	7	8	9	10	11	12	
Statistic	R2	0.046	0.045	0.043	0.044	0.043	0.047	
	F	4.875	4.470	4.357	4.104	4.036	4.069	
	Akaike	-2725.6	-2732.5	-2782.2	-2803.9	-2839.4	**-2860.0**	

Panel C. Monthly frequency data

	Month	0	1	2	3	4	5	6
Statistic	R2	0.017	0.023	0.028	0.033	0.036	0.038	0.04
	F	4.615	4.918	4.903	4.941	**5.067**	4.998	4.882
	Akaike	-19850.8	-19878.1	-19892.5	-19898.3	-19877.5	-19857.0	-19863.2
	Month	7	8	9	10	11	12	
Statistic	R2	0.041	0.041	0.041	0.044	0.044	0.052	
	F	4.826	4.772	4.655	4.755	4.605	4.914	
	Akaike	-19881.1	-19832.4	-19792.1	-19810.5	-19780.7	**-19911.7**	

Note: In bold, the values that maximize the F statistic and minimize the Akaike statistic.

To follow a uniform criterion with the different data frequencies, we settled on one annual lag, four quarterly lags and twelve monthly lags.

D. Distribution of annual GDP at quarterly and monthly frequency

We disaggregate annual GDP data at quarterly and monthly frequency in the IMF *International Financial Statistics* (IFS) using import data.

Real GDP and imports in constant dollars are I(1) series, while their first differences are I(0). In general, the residuals of the unrestricted regression in levels of real GDP against real imports follow a random walk, but when the first differences of these variables are used the null of a random walk can be rejected according to the Augmented Dickey-Fuller (ADF) tests in Table A4.

Table A4. Augmented Dickey-Fuller tests in levels and first differences for GDP, imports, and residuals of regressions

Country	GDP	GDP	Imports	Imports	Residual	Residual
Argentina	-0.0461	-3.279 **	-1.014	-3.193 **	-0.347	-4.736 ***
Australia	2.838	-2.849 *	0.327	-3.517 ***	-2.407	-2.917 **
Austria	1.023	-4.321 ***	-0.394	-4.095 ***	-2.481	-3.87 ***
Barbados	0.293	-2.589 *	0.214	-3.944 ***	-1.545	-2.938 **
Belgium	1.151	-4.566 ***	-0.748	-2.873 **	-1.531	-3.956 ***
Bolivia	3.027	-1.754	-1.431	-4.077 ***	1.971	-1.523
Brazil	0.409	-5.22 ***	-0.212	-3.212 **	-2.458	-5.649 ***
Canada	1.83	-2.947 **	0.817	-3.866 ***	-2.032	-2.283
Chile	2.232	-2.567 *	0.664	-2.759 *	-2.248	-2.277
Colombia	0.806	-2.806 *	-0.0312	-2.942 **	-1.999	-3.221 **
Costa Rica	3.064	-2.841 *	1.244	-3.716 ***	-3.174 **	-4.406 ***
Denmark	1.075	-4.265 ***	-0.684	-4.73 ***	-2.429	-4.086 ***
Dom. Rep.	2.427	-2.882 **	0.0406	-4.532 ***	-2.163	-3.394 **
Ecuador	1.04	-4.621 ***	1.667	-3.627 ***	-2.711 *	-7.101 ***
El Salvador	0.965	-2.701 *	1.312	-5.03 ***	-2.032	-3.436 ***
Finland	0.759	-2.265	-0.0144	-4.22 ***	-3.194 **	-1.988
France	0.606	-3.456 ***	-0.327	-4.69 ***	-3.399 **	-3.184 **
Germany	-0.445	-3.414 **	-0.306	-4.304 ***	-2.732 *	-3.376 **
Greece	5.676	-2.277	-0.36	-3.157 **	-2.575 *	-2.149
Guatemala	3.434	-1.530	1.917	-4.347 ***	-2.374	-2.51
Guyana	0.143	-2.599 *	-1.021	-3.407 **	-1.397	-4.122 ***
Honduras	2.078	-4.501 ***	1.417	-3.353 **	-2.611 *	-4.918 ***
Iceland	2.061	-2.952 **	0.774	-2.903 **	-2.678 *	-4.454 ***
Ireland	5.468	-1.293	-0.0648	-6.961 ***	-2.103	-1.426
Italy	-0.808	-4.062 ***	-0.268	-4.412 ***	-2.709 *	-3.394 **
Jamaica	-0.72	-3.292 **	-0.199	-4.766 ***	-2.03	-3.563 ***
Japan	-1.713	-2.675 *	-0.182	-4.879 ***	-3.76 ***	-2.692 *
Korea	1.235	-4.956 ***	-1.693	-7.219 ***	-3.635 ***	-3.9 ***
Luxembourg	0.508	-4.698 ***	-0.253	-3.872 ***	-2.178	-4.71 ***
Mexico	0.892	-4.639 ***	0.998	-4.194 ***	-3.603 ***	-4.933 ***
Netherlands	0.747	-3.291 **	0.0002	-4.673 ***	-2.826 *	-3.058 **
New Zealand	1.784	-3.848 ***	1.024	-3.587 ***	-2.047	-4.103 ***
Nicaragua	1.194	-2.337	0.252	-3.952 ***	-1.708	-2.857 *
Norway	1.368	-2.602 *	0.048	-3.492 ***	-2.246	-2.682 *
Panama	1.384	-2.647 *	-0.726	-3.068 **	-1.521	-3.173 **
Paraguay	-1.02	-4.515 ***	-0.956	-3.686 ***	-1.301	-5.61 ***
Peru	0.705	-2.872 **	-0.0958	-3.434 ***	-0.755	-3.02 **
Portugal	0.201	-2.661 *	-0.682	-5.278 ***	-2.148	-2.733 *
Spain	3.051	-2.909 **	0.653	-3.752 ***	-2.919 **	-3.078 **
Sweden	2.119	-2.786 *	0.14	-3.827 ***	-2.662 *	-2.416
Switzerland	-0.18	-3.365 **	-0.198	-3.862 ***	-2.771 *	-3.457 ***
Trinidad-Tobago	3.608	-1.423	-1.539	-4.497 ***	-0.539	-2.626 *
United Kingdom	1.943	-3.177 **	0.488	-4.09 ***	-2.543	-2.897 **
United States	1.88	-3.196 **	1.586	-4.246 ***	-2.524	-4.697 ***
Uruguay	-0.277	-3.008 **	-0.887	-2.668 *	-2.723 *	-4.892 ***
Venezuela	-1.015	-4.303 ***	-3.187 **	-4.847 ***	-1.177	-4.392 ***

Note: Statistical significance: *** p<0.01, ** p<0.05, * p<0.10.

Hence, we follow the approach proposed by Fernández (1980) when the residuals of the regressions in levels are non-stationary, but the first differences are stationary. The methodology is to apply the distribution technique of Frank Denton (1971) to construct a high frequency series from a low frequency series, which is solved by minimizing a quadratic loss function, using the sum of the squares of the differences between the first differences of the series to be estimated and the first differences of the high frequency series, subject to the constraint that the sum of the variations of the estimated high-frequency series must add up to the actual annual variation. To distribute yearly real GDP on a monthly basis, Table A5 reports the coefficients of the restricted regressions of real GDP against imports in dollars, deflated by the US CPI. The procedure to distribute yearly real GDP on a quarterly basis is similar.[16]

16 MATLAB package http://www.mathworks.com/matlabcentral/fileexchange/loadFile.do?objectId=15597, developed by E. Quilis, is used to estimate the coefficients.

Table A5. Regression of real GDP against imports in dollars (deflated by the US CPI)

Country		Constant	Slope	Base	Country		Constant	Slope	Base
Argentina	Coef	17215.72	3.46	2003	Ireland	Coef	1387.68	0.61	2005
	t	26.76	**9.34**			t	7.49	**4.25**	
Australia	Coef	22811.00	1.00	2005	Italy	Coef	95939931.11	1117.92	2005
	t	19.65	**3.63**			t	33.96	**4.30**	
Austria	Coef	105279.16	4.63	2005	Jamaica	Coef	28728.04	0.23	2003
	t	29.75	**3.69**			t	40.04	1.52	
Barbados	Coef	158.24	0.48	2003	Japan	Coef	14600716.46	107.14	2005
	t	7.03	**4.04**			t	21.55	**2.37**	
Belgium	Coef	678907.73	5.93	2005	Korea	Coef	5582269.76	902.93	2005
	t	14.81	1.74			t	5.79	**6.64**	
Bolivia	Coef	1953.00	2.30	2003	Mexico	Coef	275303.29	13.61	2003
	t	21.51	**2.77**			t	31.65	**8.41**	
Brazil	Coef	29898.47	2.28	2003	Netherlands	Coef	28762.98	0.75	2005
	t	8.51	1.90			t	14.90	**3.54**	
Canada	Coef	31331.95	1.17	2005	New Zealand	Coef	4548.12	0.80	2005
	t	17.85	**5.26**			t	20.16	**2.93**	
Chile	Coef	1025048.05	529.52	2003	Nicaragua	Coef	2781.21	6.67	2003
	t	15.48	**7.33**			t	12.93	**3.44**	
Colombia	Coef	4877738.44	2525.23	2003	Norway	Coef	449254.98	24.29	2005
	t	17.91	**5.67**			t	15.01	1.68	
Costa Rica	Coef	114152.59	228.08	2003	Panama	Coef	243.17	1.18	2003
	t	10.94	**5.00**			t	6.60	**5.30**	
Denmark	Coef	61478.45	2.70	2005	Paraguay	Coef	772820.10	1697.85	2003
	t	28.41	**3.09**			t	12.55	**2.25**	
Dom. Republic	Coef	7395.37	22.98	2003	Peru	Coef	7173.45	4.41	2003
	t	8.13	**4.91**			t	15.52	**4.31**	
Ecuador	Coef	337.41	0.37	2003	Portugal	Coef	1069992.28	73.38	2005
	t	9.96	**3.17**			t	21.35	**2.56**	
El Salvador	Coef	3267.68	5.37	2003	Spain	Coef	3934441.99	119.00	2005
	t	13.80	**3.40**			t	25.64	**4.39**	
Finland	Coef	26466.21	2.86	2005	Sweden	Coef	97606.06	2.89	2005
	t	21.55	**4.34**			t	30.96	**3.87**	
France	Coef	376829.83	2.70	2005	Switzerland	Coef	21682.60	0.37	2005
	t	32.54	**3.05**			t	36.75	**2.50**	
Germany	Coef	152256.81	0.82	2005	Trinidad and Tobago	Coef	2010.92	0.09	2003
	t	23.83	**2.61**			t	13.06	1.80	
Greece	Coef	1830118.09	121.45	2005	United Kingdom	Coef	41553.40	0.41	2005
	t	19.16	1.95			t	27.66	**3.56**	
Guatemala	Coef	4933.85	4.03	2003	United States	Coef	313831.91	2.30	2005
	t	20.58	**3.79**			t	26.65	**5.96**	
Honduras	Coef	2727.92	5.94	2003	Uruguay	Coef	13177.74	26.40	2003
	t	10.16	**2.60**			t	24.24	**8.90**	
Iceland	Coef	18104.39	39.04	2005	Venezuela	Coef	5426383.12	1367.08	2003
	t	13.46	**4.19**			t	15.54	**6.09**	

Note: t-statistic in bold indicates coefficients that are significant at 10% level or more (only 6 of the 44 countries have coefficients that are not significant at these levels). There is insufficient monthly data for Guyana and Luxembourg.

As to nominal GDP, it is first deflated by the CPI and then distributed using imports in dollars, deflated by the US CPI. The use of the CPI to deflate the nominal series is dictated by its availability on a quarterly and monthly basis. With our quarterly and monthly estimates of real GDP, the CPI is used to construct the nominal GDP series. The annual sum of the estimates of nominal GDP differ from the original series, so we apply a correction factor using the ratio between the estimated nominal GDP and the nominal GDP reported by the IFS to divide the estimated series. This correction factor insures that the annual sum of the estimated series adds up to the actual annual figure; to make sure there were no jumps in the series, we reviewed the annual correction factors, finding them practically constant for each country.

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CARACTERIZACIÓN Y ESTIMACIÓN DEL RIESGO CAMBIARIO CREDITICIO EN ECONOMÍAS PARCIALMENTE DOLARIZADAS[1]

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RESUMEN

Algunas economías emergentes presentan un alto grado de dolarización en el sistema bancario tanto del lado de los créditos como de los depósitos. Esto genera un riesgo específico en el sistema bancario. El riesgo cambiario crediticio se estima como la pérdida esperada derivada del hecho de prestar en moneda extranjera a agentes que tienen sus ingresos en moneda local. El propósito de este trabajo es cuantificar ese riesgo como el precio de una opción por un nocional equivalente al monto del préstamo y discutir las implicaciones para la estabilidad financiera que se derivan del hecho que los bancos se encuentren emitiendo implícitamente estas opciones. En términos generales, se argumenta que el riesgo agregado resultante en la economía se puede disminuir con el desarrollo de un mercado de opciones de monedas. A los efectos de la valuación de la opción, se asume que el tipo de cambio sigue un proceso de Lévy. La profundidad en los mercados considerados en la valuación depende de las monedas involucradas. La mejor alternativa es la existencia del precio de opciones que se coticen en un mercado a los efectos de calibrar el modelo y poder entonces obtener precios para los precios de ejercicio y los plazos necesarios. Este es el caso del mercado EUR/USD. Si el mercado no es líquido, y ese es el caso del mercado USD/UYU, la falta de precios de mercado de las opciones implica tener que utilizar otras alternativas metodológicas. La metodología elegida consiste en estimar la probabilidad histórica, obteniendo de este modo una medida de riesgo neutral a partir de la Transformada de Esscher.

Palabras Clave: Riesgo cambiario crediticio, estabilidad financiera, valuación de opciones.

Clasificación JEL: G21, G13

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