Real exchange rate cycles around elections

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Abstract

We develop the implications of political budget cycles for real exchange rates in a two-sector small open economy with a cash-in-advance constraint. Policy makers are office motivated politicians. Voters have incomplete information on the competence and the opportunism of incumbents. Devaluation acts like a tax, and is politically costly because it can signal the government is incompetent. This provides incumbents an incentive to postpone a devaluation, and can lead to an overvalued exchange rate before elections. We compare the implied cycle of appreciated/depreciated exchange rates to empirical evidence around elections from Latin America.

JEL classification codes: E31, D72.

Key words: exchange rate overvaluation, seigniorage, political budget cycle, asymmetric information.

1 INTRODUCTION

What are the consequences of discretionary exchange rate policy on real exchange rates? The paper shows that office motivated politicians are tempted to provoke exchange rate overvaluation before elections. The paper also contributes to the evidence on opportunistic cycles, providing data on real exchange rate cycles around elections in Latin America.

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Though Alesina and Roubini (1997) emphasize partisan cycles, they recognize the influence of opportunistic cycles on budget deficits. Early evidence on political budget cycles in Tufte (1978) found they were the result of tax cuts, and spending sprees, before elections. We do not touch on the behavior of legislated taxes and spending as a source of budget deficits. We focus exclusively on the role of seigniorage, but our simple monetary model captures the empirical feature that deficits tend to grow before elections. An alternative political economy rationale for real exchange rate cycles is given by Bonomo and Terra (1999) and Alfaro (1999), who focus on interest groups and partisan factors.

Our treatment of political budget cycles follows the approach of Rogoff and Sibert (1988) and Rogoff (1990), in that cycles occur as the result of a signaling game between incumbents and forward-looking rational voters.[1] However, voters not only have asymmetric information regarding the competency of the incumbent, as in those papers. Voters are also assumed to have asymmetric information regarding the opportunism of politicians.

Following this extended asymmetric information approach, Stein and Streb (1999) have related the timing of devaluations to elections: because of the political costs that nominal exchange rate adjustments impose on the government, incumbents have an incentive to postpone devaluation until after elections. Given the finding by Mussa (1986) which traces short-run fluctuations of real exchange rates back to changes in nominal exchange rates, one would expect that devaluation cycles should translate into real exchange rate cycles around elections.

The case of Mexico is almost a text-book example of what we have in mind. As the graph from Goldfajn and Valdés (1999) shows, real exchange rates depreciated sharply in most presidential election years, falling after the elections took place.

<insert Figure 1>

We develop a two sector model with tradable and non-tradable goods that relates the timing of real depreciations to the political calendar. The economic setting is similar to the Calvo and Végh (1999) cash-in-advance model where temporarily low devaluation leads to an appreciated exchange rate and to a consumption boom of tradables under lack of credibility. Under symmetric information, the government has no incentive to pursue a tempo-

[1] In contrast, the traditional literature on political cycles, such as Nordhaus (1975) and Lindbeck (1976), assumed that voters were myopic in order to obtain the cycles.

rary stabilization. Under asymmetric information, however, the incumbent can be tempted to reduce the rate of devaluation before elections, exploiting a trade-off between devaluation now and devaluation later.

Section 2 below analyzes government policy under symmetric information. Consumption is subject to a cash-in-advance constraint, so devaluation acts as a consumption tax through its influence on nominal interest rates. The government pursues tax smoothing around elections, so there are no cycles. Section 3 assesses the effects of asymmetric information. Low devaluation today can lead to a consumption boom not only because of intertemporal substitution, but also because low devaluation today can signal low devaluation tomorrow. An opportunistic incumbent is tempted to pursue low devaluation before elections since this acts as a signal of competency. Section 4 draws the implications of the model for real exchange rates, and compares it to the evidence in a set of Latin American countries. Section 5 presents the conclusions.

2 POLICY UNDER SYMMETRIC INFORMATION

There is a two-sector small open economy. The economy has constant endowments of tradables and non-tradables, y_T and y_N. The endowment economy has a government sector. The government uses up a part y_G of the endowment of tradable goods to provide a constant amount of the public good g each period.[2]

As in Rogoff (1990), incumbents differ in their competency to provide for g. We work with a very simple two-period framework. Initially there is an exogenous probability ρ that the future incumbent will be competent (c), and $1-\rho$ it will be incompetent (nc). A competent incumbent requires $y_G^c < y_G^{nc}$. We then insert this economy into a political framework with elections where the probability ρ becomes endogenous.

To introduce money, there is a cash-in-advance constraint by which agents need cash in order to consume each period (Clower, 1967). The opportunity

[2] The assumption that the government only uses up tradables to provide for the public good g allows to separate the effects of fiscal policy on real exchange rates in two parts. While the time-path of spending will not affect the real exchange rate, changes in the time-path of taxes (and the debt/tax mix) will through the cash-in-advance constraint. Of course, total spending, which equals total taxes, will affect the real exchange rate.

cost of holding money is given by the nominal interest rate. Devaluation, through its effect on the nominal interest rate, acts as a tax on consumption. Since taxes are distortionary, there is an optimal rate of devaluation (Barro, 1979).

This two-sector framework with a cash-in-advance constraint allows to model real exchange rate movements, the key variable of interest in the paper. The real exchange rate q_t is the ratio of the price of tradables to non-tradables, P_T/P_N, in period t.

2.1 CONSUMERS

The economy is inhabited by a large number of identical individuals. The representative individual derives utility from the consumption of traded and nontraded goods. Let his or her lifetime utility be additive both across time and over tradable and non-tradable goods,

$$U = \sum_{t=1}^{2} \frac{u(c_{T,t}) + u(c_{N,t})}{(1+\delta)^{t-1}} \tag{1}$$

where c_T and c_N are traded and nontraded goods consumption, and δ is the subjective discount rate (the supply of the public good is constant at g, so it is not included in the utility function).

There are two assets in the economy, fiat money M_t with a zero nominal rate of return, and bonds B_t indexed to the nominal exchange rate E_t, so they bear no devaluation risk. By arbitrage, the nominal rate of return i_t on these bonds satisfies $1 + i_t = (1 + i^*)(1 + \varepsilon_t)$, where $\varepsilon_t \equiv (E_t - E_{t-1})/E_{t-1}$ is the rate of devaluation, and the world interest rate i_t^* is assumed constant.

Consumers have a cash-in-advance constraint. By the cash-in-advance constraint, consumers need to hold money within the period to make consumption expenditures:

$$M_t \geq C_t \tag{2}$$

where $C_t \equiv c_{T,t}P_{T,t} + c_{N,t}P_{N,t}$ is total consumption expenditure.

At the beginning of each period, consumers receive nominal income $Y_t \equiv y_{T,t}P_{T,t} + y_{N,t}P_{N,t}$ in the form of bonds. Consumers are subject to a "withdrawal penalty " when they discount bonds for cash, foregoing current interest i_t on those amounts.[3] Consumers' accumulation is thus given by

$$\Delta B_t = i_t B_{t-1} + Y_t - C_t - i_t M_t \tag{3}$$

We will use the domestic price of tradables as the economy's numeraire. The law of one price holds for tradable goods, and without loss of generality we can assume that the international price of tradables is 1. This is equivalent to $E = P_T$. Making use of this notational simplification, a representative consumer's accumulation in real terms is

$$\Delta b_t = i^* b_{t-1} + y_{T,t} + y_{N,t}/q_t - (c_{T,t} + c_{N,t}/q_t)(1 + i_t) \tag{4}$$

where $b_t \equiv B_t/E_t$ and we have made used of CIA constraint (2) assuming it is binding (as will be the case with positive interest rates). Our discrete time specification is equivalent to the continuous time specification in Calvo (1986), since the effective price of consumption is $(1 + i_t)P_{j,t}/E_t$.

The priors are that the future incumbent will be competent with probability ρ, and incompetent with probability $1 - \rho$. Hence, consumers face uncertainty as to future interest rates and real exchange rates. With no initial asset holdings, the inter-temporal budget constraint implies that, in each state of the world $h = c, nc$,

$$\Omega^h = \sum_{t=1}^{2} \frac{(c^h_{T,t} + c^h_{N,t}/q^h_t)(1 + i^h_t)}{(1 + i^*)^{t-1}} \tag{5}$$

[3] Cash is necessary for domestic transactions (not for imports or exports). Bonds can be exchanged for money balances within each period, so it is not necessary for consumers to hold money between periods. The differences between this timing of the cash-in-advance constraint and one where bonds cannot be exchanged for bonds in the period are discussed in Obstfeld and Rogoff (1996), and Nicolini (1998). To understand the general equilibrium implications of our cash-in-advance constraint, it may help to think of an intermediary that issues bonds to consumers and is in charge of distributing the endowments. The intermediary can use the cash proceeds from sales to consumers to cancel the bonds. This implies that the money stock can be redeemed at the central bank at the end of each period.

where $\Omega^h \equiv \sum_{t=1}^{2} \frac{(y_{T,t}+y_{N,t}/q_t^h)}{(1+i^*)^{t-1}}$, i.e. the present discounted value of endowments or gross wealth.[4]

The optimization problem of the consumer is to maximize (1), subject to constraints in (5). Since states $h = c, nc$ have probabilities $Pr(c) = \rho$, and $Pr(nc) = 1 - \rho$, expected utility is solved maximizing

$$L = \sum \Pr(h) \left(\sum_{t=1}^{2} \frac{u(c_{T,t}^h) + u(c_{N,t}^h)}{(1+\delta)^{t-1}} + \frac{\Omega^h - \sum_{t=1}^{2} \frac{(c_{T,t}^h + \frac{c_{N,t}^h}{q_t^h})(1+i_t^h)}{(1+i^*)^{t-1}}}{1/\lambda^h} \right) \tag{6}$$

With $\delta = i^*$, the first-order conditions for consumption are

$$\frac{u'(c_{j,1})}{(1+i_1)\frac{P_{j,1}}{E_1}} = \rho \frac{u'(c_{j,2}^c)}{(1+i_2^c)\frac{P_{j,2}^c}{E_2^c}} + (1-\rho)\frac{u'(c_{j,2}^{nc})}{(1+i_2^{nc})\frac{P_{j,2}^{nc}}{E_2^{nc}}} \tag{7}$$

for $j = T, N$.

Let $u(c_{j,t}) = \ln(c_{j,t})$, so the intertemporal elasticity of substitution is 1, as is the intratemporal one. Log preferences allow us to work with an explicit analytical solution The demand for tradables in the first period is, by (5) and (7),

$$c_{T,1} = \frac{W(\Omega^c, \Omega^{nc}, \rho)}{(1+i_1)P_{T,1}/E_1}, \text{ where}$$

$$W \equiv \frac{\frac{\Omega^c+\Omega^{nc}}{4} + \frac{(1-\rho)\Omega^c+\rho\Omega^{nc}}{4(1+i^*)} - \frac{\left(\left(\frac{\Omega^c+\Omega^{nc}}{2} + \frac{(1-\rho)\Omega^c+\rho\Omega^{nc}}{2(1+i^*)}\right)^2 - (1+\frac{1}{1+i^*})\Omega^c\Omega^{nc}\right)^{1/2}}{2}}{1+\frac{1}{1+i^*}} \tag{8}$$

$c_{T,1}$ varies inversely to the effective price of consumption $(1+i_t)P_{T,1}/E_1$, and directly with the measure of expected wealth $W(\Omega^c, \Omega^{nc}, \rho)$.[5] The demand for nontradables follows immediately, since $c_{T,t}P_{T,t} = c_{N,t}P_{N,t}$.

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[4]By non-satiation, no assets are left over at the end of t=2. The supra-indices on first period variables in (5) and (6) are for notational compactness, since first-period variables do not depend on second period state $h = c, nc$.

[5]The larger root of the quadratic equation does not lead to an economically sensible solution. Since $\partial W/\partial\rho > 0$, $\frac{\Omega^{nc}/2}{1+1/(1+r^*)} \leq W \leq \frac{\Omega^c/2}{1+1/(1+r^*)}$.

The second period demand for tradables is

$$c_{T,2}^{h} = \frac{(1+i^{*})}{(1+i_{2}^{h})P_{T,2}^{h}/E_{2}^{h}}\left(\frac{\Omega^{h}}{2} - W\right) \tag{9}$$

for $h = c, nc$. Since under a competent gross wealth is larger ($\Omega^{c} > \Omega^{nc}$), consumption is also larger ($c_{T,2}^{c} > c_{T,2}^{nc}$).

2.2 THE PUBLIC SECTOR

Government policy affects nominal interest rates and real exchange rates through the choice of the rate of devaluation.

The interest earnings consumers lose by holding on to cash accrues to the central bank as seigniorage revenue, $S_t = i_t M_t$. This is akin to the Federal Reserve Board's measurement of seigniorage as the nominal interest rate payments on government bonds avoided by the issue of non-interest bearing liabilities. Devaluation acts as a tax on consumption, rather than an income tax, since interest earnings are not taxed (Atkinson and Stiglitz, 1980).

The central bank transfers seigniorage to the government. Government debt accumulation thus follows

$$\Delta D_t = i_t D_{t-1} + G_t - S_t \tag{10}$$

where $G_t \equiv P_{T,t} y_G$. By (10), government debt increases when interest and non-interest government expenditure exceeds seigniorage.

Assuming (2) is binding, (10) becomes, in real terms,

$$\Delta d_t = i^{*} d_{t-1} + y_G - (c_{T,t} + c_{N,t}/q_t) i_t \tag{11}$$

where $d_t \equiv D_t/E_t$ and $q_t \equiv P_{T,t}/P_{N,t}$.

Distinguishing states $h = c, nc$, and aggregating (11) over time, the government's intertemporal budget constraint is:

$$\Gamma^{h} = \sum_{t=1}^{2} \frac{(c_{T,t}^{h} + c_{N,t}^{h}/q_{t}^{h}) i_t}{(1+i^{*})^{t-1}} \tag{12}$$

where $\Gamma^h \equiv \sum_{t=1}^{2} \frac{y_G^h}{(1+i^*)^{t-1}}$.[6] By (12), the present discounted value of non-interest government expenditure equals the present discounted value of tax revenues.

Instead of working with the devaluation rate ε_t , or interest rate i_t, define tax rates $\tau_t \equiv i_t/(1+i_t)$. Using (8), (9), and (12),

$$\tau_2^h = \frac{\Gamma^h/2}{\Omega^h/2 - W} - \frac{W}{\Omega^h/2 - W}\tau_1 \tag{13}$$

We now show that the coefficients in (13) are constant, so with a log specification there is a linear trade-off between current and future taxes. The key point will be that neither gross wealth Ω^h nor $W(\Omega^c, \Omega^{nc}, \rho)$ depend on the tax/debt mix.

By market clearing in the nontraded goods sector,

$$y_{N,t} = c_{N,t} \tag{14}$$

Combining consumers' and government's intertemporal constraints, (5) and (12), equilibrium condition (14) implies the following intertemporal equilibrium condition for tradables:

$$\sum_{t=1}^{2} \frac{c_{T,t}^h}{(1+i^*)^{t-1}} = \Omega_T - \Gamma^h \tag{15}$$

where $\Omega_T \equiv \sum_{t=1}^{2} \frac{y_{T,t}}{(1+i^*)^{t-1}}$, i.e. the present discounted value of the endowment of tradable goods. Substituting (8) and (9) into (15), and using (13) to simplify,

$$\Omega^h = 2\Omega_T - \Gamma^h \tag{16}$$

Thus gross wealth Ω^h only depends on government efficiency, not on the tax/debt mix. Ω^h is increasing in government competency, since higher competency implies lower non-interest government expenditures Γ. The intuition

[6] We assume initial debt is zero. In equilibrium, final debt will be zero. The same proviso made in footnote 4 applies to supraindices in (12).

for why competence affects gross wealth is that incompetent governments need to charge higher taxes, which will lead to lower real exchange rates, and hence to lower gross wealth in terms of tradables.

In what follows, we assume that differences in government competency are small in relation to wealth in tradables. More specifically, we assume that the following condition holds:

$$y_G^{nc} - y_G^c < \frac{\Omega_T}{2} + (\Omega_T - \Gamma^{nc}) \tag{17}$$

Under symmetric information, the government has no incentive to deviate from the policy of a benevolent government. A benevolent social planner maximizes the consumers indirect utility function V. Using fact that $c_{N,t} = y_{N,t} = y_N$,

$$V = (1 + \frac{1}{1+\delta}) \ln y_N + \ln \frac{W}{1+i_1} + \frac{\rho \ln \frac{(1+i^*)(\frac{\Omega^c}{2} - W)}{1+i_2^c} + (1-\rho) \ln \frac{(1+i^*)(\frac{\Omega^{nc}}{2} - W)}{1+i_2^{nc}}}{1+\delta} \tag{18}$$

By identity $1 - \tau_t \equiv 1/(1+i_t)$, and (13), welfare is maximized when the following FOC condition holds:

$$\frac{1}{1-\tau_1} = \frac{\rho W/(1+i^*)}{\Omega^c/2 - W} \frac{1}{1-\tau_2^c} + \frac{(1-\rho) W/(1+i^*)}{\Omega^{nc}/2 - W} \frac{1}{1-\tau_2^{nc}} \tag{19}$$

Denote by $\widetilde{\tau}_1$ the optimal tax rate that satisfies (19). This tax rate also implements the first best (as comparison with (25) below confirms), so discretionary policy faces no time inconsistency in the model.

The optimal tax rate $\widetilde{\tau}_1$ depends on expected competency. Evaluating (19) at $\rho = 0$, $\widetilde{\tau}_1 = \Gamma^{nc}/\Omega^{nc}$; at $\rho = 1$, $\widetilde{\tau}_1 = \Gamma^c/\Omega^c$. By condition (17), $d\widetilde{\tau}_1/d\rho < 0$.[7] Therefore, the optimal tax rate is within the bounds $\Gamma^c/\Omega^c \leq \widetilde{\tau}_1 \leq \Gamma^{nc}/\Omega^{nc}$.

Since the ratio of non-interest government expenditure to gross wealth is between zero and one, the optimal interest rate is positive: $\widetilde{i}_1 = (1-\widetilde{\tau}_1)/\widetilde{\tau}_1 > 0$. This assures that the CIA constraint (2) is binding as assumed.

[7] Actually, the condition for $d\widetilde{\tau}_1/d\rho < 0$ is $(2\rho - 1)(y_G^{nc} - y_G^c) < \Omega_T/2 + \Omega_T - (\rho\Gamma^{nc} + (1-\rho)\Gamma^c)$. This condition is less stringent than (17), except at $\rho = 1$ where both are equal.

2.3 POLITICAL EQUILIBRIUM UNDER VOTING

We now look at the equilibrium under elections. Election are held at the end of the first period, so second period competency ρ becomes endogenous.

The decision of voters is assumed to revolve on the degree of competency of the alternative candidates (Persson and Tabellini 1990, 1997).

Furthermore, we assume future competency depends on current competency. Unlike Rogoff and Sibert (1988), we ignore the influence of other factors on future competency, since they do not affect the decision of voters in our reduced two-period framework.

$$y_{G,t+1}^{h} = y_{G,t}^{h} \tag{20}$$

The persistence of competency is crucial, because with forward-looking voters current competency matters only insofar as it affects future competency.

The priors are that each candidate is competent with probability r, and incompetent with probability $1-r$. Only the incumbent can reveal its current competency through the actions it carries out in the first period. To simplify notation, let χ henceforth denote first period competency, which will equal 0 when incumbent is incompetent ($h = nc$) and will equal 1 when incumbent is competent ($h = c$). If voters reelect a competent incumbent, they can assure that competency in the second period equals 1, which is better than chance $\rho = r$ that opposition candidate is competent. If they replace an incompetent incumbent, on the other hand, probability ρ rises from 0 to r. Indirect utility of voters $V(\tau_1, \chi, \rho)$ is increasing in future competency (this follows from $dV/d\rho$ by application of the envelope theorem). Voters will want to reelect a competent incumbent, and to oust an incompetent incumbent.

Let $\widetilde{\tau}_1(\chi, \rho)$ denote the optimal tax rate $\widetilde{\tau}_1$ when current competency is χ and expected future competency is ρ. Likewise, let $\Gamma(\chi, \rho)$ and $\Omega(\chi, \rho)$ denote government spending and gross wealth when competency is (χ, ρ). The sub-game perfect equilibrium policies are characterized in the following Proposition.

Proposition 1 *(symmetric information). There is a separating equilibrium. A competent incumbent picks $\widetilde{\tau}_1(1, 1)$. An incompetent incumbent picks $\widetilde{\tau}_1(0, r)$.*

Proof. By (19), a competent picks $\widetilde{\tau}_1(1, 1)$ to smooth taxes. Likewise, an incompetent that will not be reelected picks $\widetilde{\tau}_1(0, r)$.

Proposition 1 implies that a competent incumbent charges lower taxes in period one. To see this, note that $\widetilde{\tau}_1(1,1) \equiv \Gamma(1,1)/\Omega(1,1)$ and $\widetilde{\tau}_1(0,1) \equiv \Gamma(0,1)/\Omega(0,1)$. Since $\Gamma(1,1) < \Gamma(0,1)$ and $\Omega(1,1) > \Omega(0,1)$, this means that $\widetilde{\tau}_1(1,1) < \widetilde{\tau}_1(0,1)$. Furthermore, $\widetilde{\tau}_1(0,1) < \widetilde{\tau}_1(0,r)$ by fact that $d\widetilde{\tau}_1/d\rho < 0$. Hence, $\widetilde{\tau}_1(1,1) < \widetilde{\tau}_1(0,r)$, i.e. under symmetric information a competent incumbent that will be reelected charges lower taxes than an incompetent that will not.

3 POLICY UNDER ASYMMETRIC INFORMATION

This Section shows how asymmetric information affects equilibrium tax policies around elections. As in other political budget cycle models, opportunistic incumbents can be tempted to reduce taxes before elections for electoral reasons. Unlike other models, voters ignore both the degree of competence and the degree of opportunism of incumbent governments. In this setup, a partially pooling equilibrium arises where both competent incumbents and highly opportunistic incompetent incumbents pick low taxes before elections, leading to a political economy rationale for the consumption booms a la Calvo (1986) and Calvo and Végh (1999). In Section 4, we draw the implications of the model for real exchange rates.

3.1 TWO-DIMENSIONAL ASYMMETRIC INFORMATION

In the short run, some elements of government policy are less visible than others. We specifically assume that voters are not able to observe debt perfectly until the next period. This assumption leads to asymmetric information on the incumbent's competency.

We do assume that taxes (and the rate of devaluation) are highly visible. Voters will try to infer the competency of the incumbent from current taxes, so we are in a signaling game. If incompetent incumbents picked $\widetilde{\tau}_1(0,r)$, they would not be reelected on account of their incompetence. This gives them an incentive to mimic competent incumbents who set $\widetilde{\tau}_1(1,1)$, resorting to more debt to pay for current expenditure. As to the opposition candidate, the only information available is the exogenous prior r it is competent.

Candidates also differ in their opportunism, which in our model is reflected by how much the incumbent values sticking to power, beyond any commitment towards public welfare. Let $z_t = 1$ when candidate is incumbent, and $z_t = 0$ when not. Let k be the value of being in office. A candidate's utility is

$$Z = U + \sum_{t=1}^{2} \frac{z_t k}{(1+\delta)^{t-1}} \tag{21}$$

We assume there are two possible types of k. A non-opportunistic incumbent has $k = 0$, so its objective function Z is exactly the same as a representative consumer's. On the other hand, an opportunistic incumbent derives pleasure $k = K > 0$ from being in office.

It is not essential to have an incumbent with $k = 0$. Rather, what is important is that there be incumbents with low and high opportunism. High opportunism K is characterized more precisely in terms of willingness to produce budget cycles. Given the non-negativity restriction implied by the cash-in-advance constraint, our measure of high opportunism is the willingness to reduce the interest rate to zero.

Since opportunism is a characteristic of the utility function of the incumbent, it is private information. This very naturally leads to asymmetric information on opportunism. We assume that the voters' priors are that a candidate is opportunistic with probability s, and non-opportunistic with probability $1 - s$.

Consequently, as in Stein and Streb (1999) voters face double uncertainty. Voters not only do not know how competent the incumbent is, they also ignore how opportunistic it is. Due to asymmetric information on this trait, voters will not be sure just how far an incumbent is willing to go in order to be reelected.

3.2 THE SIGNALING GAME

The timing of the game is as follows. In the first period (before elections), candidates have private information on their set of characteristics. Voters start out with the priors that a candidate has a probability r of being competent and s of being opportunistic. The incumbent decides taxes, and then consumers decide the level of consumption. At the end of the first period, elections are held.

Due to our assumption that highly opportunistic incumbents are willing to reduce interest rates to zero, no separating equilibrium exists (Proposition 4 in Appendix). However, a partially pooling equilibrium exists.

The crucial issue for the partially pooling equilibrium is very simple: a non-opportunistic, incompetent, incumbent always picks $\widetilde{\tau}_1(0,r)$, and looses the elections. A (partially) pooling level of taxes $\tau_1^p < \widetilde{\tau}_1(0,r)$ can thus work as an informative signal of competency, as shown in Table 1.

Table 1 <insert here>

The priors are that incumbents are competent ($\chi = 1$) with probability r, and opportunistic ($k = K$) with probability s. Thus, from the viewpoint of voters the conditional probability that the incumbent is competent if τ_1^p is observed is $\theta = r/(r + (1 - r)s)$. As long as $s < 1$, θ will be higher than probability r that somebody elected at random is competent, because a non-opportunistic incompetent never sends that signal. Thus, voters that maximize expected utility will want to reelect an incumbent that delivers τ_1^p, and replace an incumbent with $\widetilde{\tau}_1(0,r)$.

For out of equilibrium values of taxes, we assume the following:

$$\begin{aligned} &\Pr(\chi = 1 : \tau_1 \leq \tau_1^p) = \theta \\ &\Pr(\chi = 1 : \tau_1 > \tau_1^p) = 0 \end{aligned} \tag{22}$$

As to the actual value of signal τ_1^p in a partially pooling equilibrium, denote by $\tau_1(\theta)$ the tax rate that implements consumption $\widetilde{c}_{T,1}(1,1)$ when reputation $\chi = \theta$. Considering consumer demand (8) under asymmetric information, and solving for tax rate $\tau_1(\theta)$:

$$1 - \tau_1(\theta) = \frac{\widetilde{c}_{T,1}(1,1)}{W(\theta)} \tag{23}$$

where $W(\theta) \equiv W(\Omega(1,1), \Omega(0,0), \theta)$, $\Omega(\chi, \chi)$ is net wealth when incumbent in periods one and two has competency χ, and θ is the probability that the incumbent is competent.

Since $\theta < 1$ in a partially pooling equilibrium, $\tau_1(\theta) < \widetilde{\tau}_1(1,1)$. To assure that $\widetilde{\tau}_1(\theta) \geq 0$, we assume in addition to (17) that $2y_G^c > y_G^{nc}$ also holds.[8]

[8] If $\tau_1(\theta) < 0$ were possible, there would be a corner solution with $\tau_1^p = 0$ due to the non-negativity of interest rates required by the cash in advance constraint. It would

A competent incumbent is willing to choose $\tau_1(\theta)$, since it can implement its optimal policy and get reelected at the same time. Given the way voters update beliefs (see (22)), in a partially pooling equilibrium the incumbent only needs to show the probability it is competent is above the average r to get reelected. A lower tax rate would not increase the chances of reelection, it would merely lead to a cyclical distortion that reduces the welfare of consumers.

A highly opportunistic incumbent was characterized above by the willingness to pick $\tau_1 = 0$, i.e. to go to extremes to get reelected. Hence, an incompetent incumbent with high opportunism will of course be willing to pick $\tau_1(\theta) > 0$. Summarizing,

Proposition 2 *(asymmetric information) There is a partially pooling equilibrium. A competent incumbent, and an opportunistic, incompetent, incumbent pick $\tau_1^p = \tau_1(\theta)$. A non-opportunistic, incompetent incumbent picks $\widetilde{\tau}_1(0, r)$.*

Political budget cycles arise with positive probability. A proportion $(1-r)$ of incumbents are incompetent, and of these a proportion s are "highly" opportunistic, so in the partially pooling equilibrium cycles occur with probability $(1-r)\ s$.

Note that if there were no highly opportunistic incumbents ($s = 0$), the equilibrium would be separating, and there would be no political budget cycle. However, the usual assumption in political science is that political candidates are highly opportunistic, so what one must in any case justify is why $s < 1$. Also note that it is not strictly necessary for there to be non-opportunistic incumbents. It is enough for there to be types with low opportunism k that are not willing to deviate to τ_1^p.

What happens if one applies equilibrium dominance arguments? Say voters expect $\tau_1^p = \tau_1(\theta)$, but the incumbent picks $0 \leq \tau_1 < \tau_1(\theta)$. If one applies the Cho-Kreps intuitive criterion to out-of-equilibrium beliefs, a lower tax rate is dominated in equilibrium for an incompetent incumbent: given the behavior of voters, it can assure its reelection with $\tau_1(\theta)$, while a lower tax rate would only increase the cyclical distortion due to the budget cycle.

be straightforward to generalize the analysis to cover that case: we would need to posit $\tau_1^p = Max[0,\ \tau_1(\theta)]$ in a semi-separating equilibrium, and the rest of the analysis would go through.

For the same reason, competent incumbents have no temptation to deviate either.[9]

While Proposition 2 asserts there is a partially pooling equilibrium, this does not establish that it is unique. One can rule out a signal τ_1^p larger than $\tau_1(\theta)$: given beliefs in (22), $\tau_1(\theta)$ would not hurt a competent incumbent's chances of reelection, and it would also allow it to implement the optimal consumption profile. Hence, partially pooling signals $\tau_1^p > \tau_1(\theta)$ would not do. However, signals τ_1^p smaller than $\tau_1(\theta)$ but larger or equal to 0 might also work as partially pooling signals, even though they distort the optimal time profile of consumption.

In the analysis that follows in Section 4, we stick to equilibrium solution in Proposition 2 of $\tau_1^p = \tau_1(\theta)$. A lower partially pooling signal would in any case make cycles more widespread that Proposition 2 asserts, since both competent and incompetent incumbents would charge exceedingly low taxes before elections.

4 EMPIRICAL IMPLICATIONS AND EVIDENCE

The implications of the model are drawn in terms of the behavior of average real exchange rates before and after elections. We cannot derive the implications of the model in terms of what happens to real exchange rates in a given episode, since the competency and opportunism of candidates are not observable attributes that we can control for. Instead, we study the consequences for a given distribution of opportunistic and competent incumbents.

After deriving the implications of discretionary government policy for the behavior of exchange rates, we compare the implications to empirical evidence around elections drawn from a set of Latin American countries.

4.1 EMPIRICAL IMPLICATIONS

The trade-off between current and future taxes in (13) implies that a government that reduces devaluation before elections must resort to a higher rate

[9] Besides, deviations cannot lead to an alternative signal that only competent incumbents would send. As remarked before, no separating equilibrium exists because of the assumption that political candidates with high opportunism are willing to reduce taxes to zero before elections (Proposition 4 in Appendix).

of devaluation afterwards. This is similar to the inflation now/inflation later dilemma (Sargent and Wallace, 1981). While this policy does not pay off under symmetric information, it can under asymmetric information.

The implications of the model for nominal exchange rates are similar to the one sector model in Stein and Streb (1999): under asymmetric information, governments tend to postpone devaluations until after elections, causing an exchange rate cycle (Proposition 5 in Appendix).

What does the model imply in terms of real exchange rates? By fact that $c_{T,t}P_{T,t} = c_{N,t}P_{N,t}$,

$$q_t \equiv \frac{E_t}{P_{N,t}} = \frac{c_{N,t}}{c_{T,t}} \tag{24}$$

Since $c_{N,1} = c_{N,2} = y_N$, the real exchange rate q_t is inversely related to $c_{T,t}$.

Under symmetric information, a competent completely smooths taxes by Proposition 1, so $c_{T,t}$ is flat and $\widetilde{q}_2(1,1) = \widetilde{q}_1(1,1)$. Similarly, an incompetent tries to smooth consumption: plugging demand equations (8)-(9) into F.O.C. (19),

$$\frac{1}{\widetilde{c}_{T,1}(0,r)} = \frac{r}{\widetilde{c}_{T,2}(0,1)} + \frac{(1-r)}{\widetilde{c}_{T,2}(0,0)} \tag{25}$$

Using the equality in (24) and the constancy of c_N, $\widetilde{q}_1(0,r) = r\widetilde{q}_2(0,1) + (1-r)\widetilde{q}_2(0,0)$. These two results imply that under symmetric information the real exchange rate is constant in expected value around elections.

Under asymmetric information, a competent incumbent sets $\widetilde{\tau}_1(\theta)$ to implement $\widetilde{c}_{T,1}(1,1)$, according to Proposition 2. Since $q_t = c_{N,t}/c_{T,t}$, real exchange rates are the same as under symmetric information: $q_1^p = \widetilde{q}_1(1,1)$, and $q_2^p(1,1) = q_1^p$. Likewise, an incompetent incumbent that is not opportunistic reveals its type, so $\widetilde{q}_1(0,r) = r\widetilde{q}_2(0,1) + (1-r)\widetilde{q}_2(0,0)$. On the other hand, an incompetent, opportunistic incumbent mimics a competent incumbent before elections, leading to q_1^p which is more appreciated than $\widetilde{q}_1(0,r)$. In the second period, consumption has to fall, provoking a more depreciated exchange rate $q_2^p(0,0)$. Putting these three results together, one has that $E(q_2) - E(q_1) = s(q_2^p(0,0) - q_1^p) > 0$.

The previous results establish

Proposition 3 *Under symmetric information, real exchange rates are constant in expected value around elections. Under asymmetric information, average real exchange rate depreciate after elections.*

Proposition 3 contains the main analytical result of the paper, the behavior of real exchange rates under asymmetric information: office-motivated politicians tend to provoke exchange rate overvaluation before elections. In our model, overvaluation is due to the distortion of fiscal fundamentals, which requires an exchange rate correction after elections.

Our model is similar to the Calvo and Végh (1999) two-sector model with a cash-in-advance constraint in that a lower rate of devaluation leads to a consumption boom of tradables, and to an appreciation of the real exchange rate. Unlike Calvo and Végh, not only intertemporal substitution is at work. A low signal τ_1^p raises the expectations of current and future competency from $(0, r)$ to (θ, θ) due to fact that $\theta > r$. Using (23), one can observe that, for a given tax rate τ_1, a higher reputation θ gives an added boost to current consumption due to the upward revision of expected wealth from $W(\Omega(0,1), \Omega(0,0), r)$ to $W(\Omega(1,1), \Omega(0,0), \theta)$. Hence, the fact that lower taxes today may signal lower taxes tomorrow introduces a reputation effect into the model.

4.2 EVIDENCE

We now look at the behavior of real exchange rates around elections in Latin American countries, comparing their behavior to the predictions of Proposition 3. Though Proposition 3 does not distinguish between elections and government changes, in the empirical work we do make this distinction.

We do not review the evidence on nominal exchange rates here. Besides the casual evidence in Stein and Streb (1998), drawn from episodes in Israel and Latin America, there is systematic evidence from developing countries that devaluations tend to be delayed until after elections (Gavin and Perotti, 1997), or until after government changes (Edwards, 1994, Klein and Marion, 1997), or both. In this last regard, Stein and Streb (1999) find that the rate of devaluation rises 2-4 months after presidential elections, and that this can be explained by the fact that government changes take place 1-3 months after elections. That is, the timing of larger devaluations is concentrated one month after government changes (see also Ghezzi, Frieden and Stein, 1998, who look at parliamentary elections as well).

In relation to real exchange rates, there are less studies on the influence of electoral factors. Noteworthy is a paper by Bonomo and Terra (1999), which shows that in Brazil the probability of having an appreciated exchange rate is higher in the months preceding an election, while the probability of having a depreciated exchange rate is higher in the months succeeding elections.

In what follows, we apply the methodology adopted by Stein and Streb (1999) for nominal exchange rates, to present the evidence on the behavior of real exchange rates around elections. The sample is reduced to 17 countries in Latin America. We use multilateral real exchange rates, which were taken from the database put together by Goldfajn and Valdez (1999). To make the level of the real exchange rate comparable across countries, we normalize the real exchange rate in each country so that the (geometric) average is 100. The data on the electoral calendar is taken from Nohlen (1993) and the Lijphart Elections Archive on the World Wide Web.

The multilateral real exchange rate EP^*/P in the Goldfajn and Valdés data set is defined as the relative cost of a common basket of goods measured in domestic currency, where EP^* and P are the prices of the common basket abroad and at home, respectively. Note that EP^* is a weighted average of the price levels of the trading partners. The domestic price level can be written as a geometric average of tradables and non-tradables, $P = (PT)^{\alpha}(PN)^{1-\alpha}$, and the same holds for the basket abroad, $P^* = (PT^*)^{\alpha*}(PN^*)^{1-\alpha*}$. Unlike Goldfajn and Valdés (1999), our interpretation does not rely on short-run deviations of tradables from purchasing power parity, but rather on the effect of macroeconomic policy on the relative price of non-tradables. Assuming that PN^*/PT^* is exogenous, that the proportions of non-tradables are equal at home and abroad, and that the law of one price holds for tradables, the percentage changes in the multilateral real exchange rate EP^*/P are a fraction of the percentage changes in the real exchange rate q: $dln(EP^*/P)/dt = (1-\alpha)dln(q)/dt$. Hence, the real exchange rate q and the multilateral real exchange rate EP^*/P are perfectly correlated.

We consider the behavior of multilateral real exchange rates by looking through a 19-month window centered on elections. For each episode, month 0 corresponds to the month of the election, month –1 the month prior to the election, and so on. We then average, for each of the 19 months in the window (-9 through 9), the level of the real exchange rate across all episodes. For the purposes of the figures that follow, we normalize the month by month averages so that they are 100 at time 0 (the date of election).

Figure 2 shows the pattern of the real exchange rate around presidential elections. In the figures, an increase represents a depreciation.

<**insert Figure 2**>

There is a cumulative 3% appreciation in the months preceding an election, followed by a much steeper depreciation after elections have taken place. As with the nominal exchange rate, the real depreciation, which totals 6%, occurs in months 2 through 4. From month 5 onwards, the real exchange rate returns to the pattern of gradual appreciation. In terms of the implications of the model, we observe an appreciated real exchange rate prior to elections, followed by a depreciated rate afterwards. This is exactly what the model predicts under asymmetric information.

The pattern is even clearer if, instead of elections, we consider the behavior of real exchange rates around constitutional government changes (Figure 3). In this case, most of the depreciation (almost 7%) occurs in month 1, and the appreciation resumes in month 3, returning to the starting point by month 9.

<**insert Figure 3**>

The preceding figures show a very clear picture of the average behavior of real exchange rates around major political events. The timing of real depreciations is after elections. The timing is most closely associated to a change in government, with most of the depreciation happening a month after the change.

To verify if the patterns in Figures 2 and 3 are statistically significant, we ran some simple regressions with the change in real exchange rates as the dependent variable. Our goal is not to present a complete model of real exchange rate behavior, only to see if the timing of elections and constitutional government changes affect the real exchange rate. Table 2 presents the results of introducing dummies before and after elections and government changes.

<**insert Table 2**>

The results in Table 2 show that the dummies are highly significant both after elections and after government changes.

In Table 3 in the Appendix, we look at the timing in much more detail, using monthly dummies for the 19 month window centered first around elections, and then around government changes. When regressing the changes in the real exchange rates against monthly dummies around elections, we found the dummies two and four months after elections positive and highly significant. That is, exchange rate depreciations are postponed until after elections. In the case of real exchange rate movements around constitutional government changes, we found the dummy one month before government changes highly significant and negative, and the dummy one month after changes highly significant and positive. That is, exchange rates tend to get overvalued before government changes, and depreciations are concentrated one month after the changes. Both sets of regressions back the message of Figures 2 and 3.

4.3 THE INFLUENCE OF OTHER ELECTORAL FACTORS

In the formal analysis above, competency was the sole defining issue of elections. An above average reputation of competency got an incumbent reelected. We recognize, however, that in many elections the outcome of elections depends on other factors as well. We briefly discuss here a special way of incorporating these factors (more general formulations would lead to more fundamental changes in the model).

Say different elections have different salient issues. For example, during the Bush-Clinton campaign the defining issue was the management of the domestic economy, while during the Reagan-Carter campaign the salient issue was the ability to manage an international crisis. Some factors may be beyond the manipulation of the government, e.g. "being" a hawk or a dove, making the outcome of elections random.

Formally, this can be represented with voters that have lexical preferences. Say that with probability ϕ the defining issue of the election is fiscal management. With probability $1-\phi$ the defining issue is exogenous. If there is no incumbency bias, there is a 50% chance the incumbent will be preferred to the opponent. In that case, an incumbent that produces low devaluation before elections has a probability of reelection of $\phi+(1-\phi)/2$, since it can lose if judged unfavorably on non-fiscal matters which turn out to be the salient issue of the campaign. On the other hand, an incumbent that produces high devaluation only has a $(1-\phi)/2$ probability of being reelected.

Viewed in this light, the model allows for a phenomenon mentioned by Edwards (1994), one of the first to address the issue of the timing of devaluations. Edwards mentioned the classic rule of "devalue immediately and blame it on your predecessors" as a possible explanation of why devaluations happened early on in the term in office. The model points out a sense in which it may be exactly true that the blame was due to the predecessors: the political budget cycle before elections.

5 CONCLUSIONS

Cycles of appreciated exchange rates, punctuated by devaluations that lead to depreciated exchange rates, are common (Goldfajn and Valdés, 1999). The paper contends that some of these episodes are politically motivated, and provides a political economy rationale for exchange rate overvaluation.

Why delay exchange rate adjustments? A reason pointed out long ago by Cooper (1971) is that devaluations impose sizable political costs on governments in developing countries. We model one channel for these political costs: incompetent governments have to raise more seigniorage in order to provide the same level of public goods as competent governments. Thus, higher devaluation leads the incumbent to pay the political cost of reduced chances of reelection. This gives incumbents an incentive to postpone nominal devaluation until after elections, producing exchange rate overvaluation before elections.

The signaling game puts the implications of Calvo (1986) and Calvo and Végh (1999) on temporary stabilization in a political setting, providing a reason to pursue a temporary stabilization. An opportunistic incumbent is willing to reduce devaluation before elections if that can help its chances of getting reelected. By the informational asymmetries, voters may not know if it is a temporary stabilization (which would be the case if the devaluation rate were unsustainable) or a permanent improvement. Furthermore, low devaluation leads to a consumption boom for two concurrent reasons: intertemporal substitution, and a positive reputation effect by which low devaluation now can signal low devaluation in the future.

The channel of exchange rate overvaluation we emphasize is not related to short-run deviations of the price of tradables from purchasing power parity, but rather to unsustainable macroeconomic policies. The influence of political budget cycles on real exchange rates can be reinforced by hikes in transfers and cuts in legislated taxes that push disposable income up before elections: with fixed exchange rates the price of tradables will be given, but the price of non-tradables will rise due to increased demand. While a sticky price model can capture additional features of the short-run dynamics, our simple flexible price approach is perfectly consistent with the logic in Mussa (1986) that nominal exchange rate fluctuations are the driving force in short-run real exchange rate fluctuations.

We only looked into the phenomenon of exchange rate overvaluation in Latin America. However, we expect the same factors to be at work wherever discretionary exchange rate policy is mixed up with the incentives to be reelected.

6 APPENDIX

Proposition 4 *(asymmetric information) A separating equilibrium does not exist.*

Proof. In a separating equilibrium, voters reelect incumbents that pick a low tax τ_1^s (to be defined shortly) which signals the incumbent is competent. Voters do not reelect incumbents that pick a high tax $\widetilde{\tau}_1(0,r)$ which signals the incumbent is incompetent. For out of equilibrium values of τ_1, we assume the following updating scheme for beliefs:

$$\begin{aligned} &\Pr(\chi = 1 : \tau_1 \leq \tau_1^s) = 1 \\ &\Pr(\chi = 1 : \tau_1 > \tau_1^s) = 0 \end{aligned} \tag{26}$$

To assure that the best an incompetent can do is to pick $\widetilde{\tau}_1(0,r)$, signal τ_1^s will be defined by the condition that an incompetent, opportunistic incumbent does not desire to deviate to τ_1^s. This condition can be characterized in terms of the temptation to signal:

$$T(\tau_1^s \mid k,\chi) \equiv B(\tau_1^s \mid k) - C(\tau_1^s \mid \chi) \tag{27}$$

The benefit of signaling, $B(\tau_1^s \mid k) \equiv k/(1+\delta)$, is the expected utility of being in office in the second period. By (21), this benefit is zero for the non-opportunistic and positive for the opportunistic,

The cost of signaling, $C(\tau_1^s \mid \chi) \equiv V(\widetilde{\tau}_1(\chi,r),\chi,r) - V(\tau_1^s,\chi,\chi)$, is the difference between indirect utility when an incumbent with competency χ picks $\widetilde{\tau}_1(\chi,r)$ and is replaced by opposition candidate that is competent with probability r, and when it signals with τ_1^s and is reelected to office (note that $V(\tau_1,\chi,\rho)$ denotes indirect utility with taxes τ_1 and competency (χ,ρ) in periods 1 and 2).

In a separating equilibrium, the temptation to signal must be zero, or negative, for an incompetent, opportunistic incumbent:

$$T(\tau_1^s \mid K, 0) \equiv B(\tau_1^s \mid K) - C(\tau_1^s \mid 0) \leq 0 \tag{28}$$

We apply the convention that an incompetent will not signal if exactly indifferent. Thus, a competent incumbents picks $\tau_1^s = \widetilde{\tau}_1(1,1)$ if an incompetent incumbent that is opportunistic has $T(\widetilde{\tau}_1(1,1) \mid K, 0) \leq 0$. Otherwise, a competent incumbent must pick a lower τ_1^s such that for an opportunistic incompetent $T(\tau_1^s \mid K, 0) = 0$.

Competent incumbents have lower signaling costs. To see this, consider signal $\tau_1^s(\chi, \chi)$, optimal if incumbent with competency χ is in office both periods (in equilibrium, τ_1^s will not necessarily take this value). Computing indirect utility at that point, $C(\tau_1^s \mid \chi)$ can be broken down into two terms:

$$\begin{aligned} C(\tau_1^s \mid \chi) = {} & [V(\widetilde{\tau}_1(\chi, r), \chi, r) - V(\widetilde{\tau}_1^s(\chi, \chi), \chi, \chi)] \\ & + [V(\widetilde{\tau}_1^s(\chi, \chi), \chi, \chi) - V(\tau_1^s, \chi, \chi)] \end{aligned} \tag{29}$$

The first term in brackets in (29) captures the wealth effects of different levels of competency: it is a fixed cost for an incompetent incumbent, since ρ in the second period would fall from r to 0 if signal were $\tau_1^s = \widetilde{\tau}_1^s(0,0)$; it is a fixed benefit for a competent incumbent, since ρ in the second period would jump from r to 1 if signal were $\tau_1^s = \widetilde{\tau}_1^s(1,1)$.

The second term in brackets in (29) has to do with the costs of the cyclical distortion in the optimal time path of taxes. This term is always positive, except at $\tau_1^s = \widetilde{\tau}_1^s(\chi, \chi)$ where it is zero. By (23), the values of $\widetilde{\tau}_1^s(\chi, \chi)$ where signaling costs of type χ are at a minimum are determined as follows: $1 - \widetilde{\tau}_1^s(1,1) = \widetilde{c}_{T,1}(1,1)/W(1)$, so $\widetilde{\tau}_1^s(1,1) = \widetilde{\tau}_1(1,1)$ since reputation coincides with actual competency; $1 - \widetilde{\tau}_1^s(0,0) = \widetilde{c}_{T,1}(0,0)/W(1)$, so $\widetilde{\tau}_1^s(0,0) > \widetilde{\tau}_1(0,0)$ since reputation overstates actual competency. Hence, $\widetilde{\tau}_1^s(0,0) > \widetilde{\tau}_1^s(1,1)$, i.e. a competent reaches its minimum signaling cost to the left of an incompetent.

Differentianting $C(\tau_1^s \mid \chi)$, taking into account that a separating signal is characterized by the expectation that wealth is $W(1,1)$ when deciding first period consumption,

$$\frac{dC(\tau_1^s \mid \chi)}{d\tau_1^s} = \frac{1}{1 - \tau_1^s} - \frac{W(1,1)/(1+i^*)}{\frac{\Omega(\chi,\chi)}{2} - W(1,1)} \frac{1}{1 - \tau_2(\chi, \chi)} \tag{30}$$

By further differentiation of (30), one can show signaling costs are concave. Starting at $\widetilde{\tau}_1(1,1)$, the marginal cost of decreasing taxes (i.e. $-dC/d\tau_1^s$) is lower for a competent incumbent.

Due to the fixed benefit, and the lower marginal costs of reducing taxes, competent incumbents always have lower signaling costs, as depicted in Figure 4.

<insert Figure 4>

However, the requirement that interest rates be positive in equilibrium leads to rule out signals $\tau_1^s < 0$. Since we assumed at the outset that an incompetent incumbent with high opportunism K was willing to pick $\tau_1 = 0$, that rules out a separating equilibrium where the required $\tau_1^s < 0$.

To guarantee the existence of a separating equilibrium, one would have to assume opportunism is not too high. However, to assume that political opportunism is bounded would run contrary to the usual presumptions in political science, where the wish to stay in power is seen as the driving force in political careers.[10]

Proposition 5 *Under symmetric information, the average rate of devaluation falls after elections. Under asymmetric information, the average rate of devaluation rises after elections if $s \geq 1/2$.*

Proof. Under symmetric information, incumbents set taxes according to FOC (19).

A competent incumbent picks $\widetilde{\tau}_1(1,1) = \widetilde{\tau}_2(1,1)$. Since $1 + \varepsilon_t = 1/((1-\tau_t)(1+i^*))$, $\widetilde{\varepsilon}_1(1,1) = \widetilde{\varepsilon}_2(1,1)$. An incompetent sets $\widetilde{\varepsilon}_1(0,r) = \alpha\widetilde{\varepsilon}_2(0,1) + (1-\alpha)\widetilde{\varepsilon}_2(0,0)$, where weights are the coefficients in (19), which add up to 1 (proof omitted). Furthermore, $\alpha < \rho$. Consequently, $\widetilde{\varepsilon}_1(0,r) > \widetilde{\varepsilon}_2(0,r)$, where $\widetilde{\varepsilon}_2(0,r) \equiv \rho\widetilde{\varepsilon}_2(0,1) + (1-\rho)\widetilde{\varepsilon}_2(0,0)$. Putting these two facts together, devaluation falls on average after elections.

Under asymmetric information, we assume that the proportion of incumbents with high opportunism is a majority $s \geq 1/2$. This condition will suffice to demonstrate that the rate of devaluation rises after elections.

[10] The results are much stronger than what Proposition 4 asserts. No separating equilibrium would exist even if there were no restriction on the range of signals, because of the fact that non-opportunistic incumbents are not willing to reduce taxes beyond a certain point (Streb, 1999). The reason is that the temptation to reduce taxes of competent incumbents that are non-opportunistic is $T(\tau_1^s \mid 0,1) \equiv -C(\tau_1^s \mid 1)$, so they will not reduce taxes beyond the point where $C(\tau_1^s \mid 1) = 0$. That is, when $C(\tau_1^s \mid 1) > 0$ at required τ_1^s, τ_1^s will not be picked by a competent incumbent that is not opportunistic.

Incompetent incumbents that are not opportunistic set $\widetilde{\varepsilon}_1(0,r) > \widetilde{\varepsilon}_2(0,r)$, by results above. By Proposition 2, competent incumbents pick $\tau_1^p = \tau_1(\theta)$. Though $c_1 = \widetilde{c}_1(1,1)$, tax revenues fall since $\tau_1(\theta) < \widetilde{\tau}_1(1,1)$, so competent incumbents have to charge higher taxes in the future. This implies that $\varepsilon_2^p(1,1) > \varepsilon_1^p$.

As to incompetent incumbents who mimic τ_1^p, they have to charge even larger future taxes: if an incompetent picks a devaluation rate ε_1^p which is lower than rate $\widetilde{\varepsilon}_1(0,r)$ required to smooth consumption, in the next period its rate of devaluation $\varepsilon_2^p(0,0)$ will be larger than the rate of devaluation $\widetilde{\varepsilon}_2(0,0)$ that would have obtained if an incompetent had succeeded a non-opportunistic incompetent incumbent. This result can be formally established by differentiation of (13):

$$\frac{d\tau_2(0,0)}{d\tau_1} = -\frac{W}{\Omega^{nc}/2 - W} + \frac{\Gamma^{nc}/2 - \tau_1\Omega^{nc}/2}{(\Omega^{nc}/2 - W)^2}\frac{\partial W}{\partial \rho}\frac{d\rho}{d\tau_1} \tag{31}$$

The first term represents the direct effect of an increase in current taxes, while the second term represents a reputation effect which is not present under symmetric information. Taking into account that first period taxes higher than τ_1^p lead to a negative reputation effect by which ρ falls from θ to r, and that $\Gamma^{nc}/\Omega^{nc} \geq \tau_1$, one can see that the second term is negative. Hence, $d\tau_2(0,0)/d\tau_1 < 0$, i.e. the trade-off between current and future taxes also holds under asymmetric information for incompetent incumbents.

To establish that under asymmetric information the average rate of devaluation rises after elections, as asserted in Proposition 5, it must be true that

$$\begin{aligned} &r\varepsilon_2^p(1,1) + (1-r)((1-s)\widetilde{\varepsilon}_2(0,r) + s\varepsilon_2^p(0,0)) \\ &\qquad > r\varepsilon_1^p + (1-r)((1-s)\widetilde{\varepsilon}_1(0,r) + s\varepsilon_1^p) \end{aligned} \tag{32}$$

Since $\varepsilon_2^p(1,1) > \varepsilon_1^p$, a sufficient condition for the average rate of devaluation to rise after elections is

$$(1-s)\widetilde{\varepsilon}_2(0,r) + s\varepsilon_2^p(0,0) - (1-s)\widetilde{\varepsilon}_1(0,r) - s\varepsilon_1^p > 0 \tag{33}$$

Under the assumption that $s \geq 1/2$, a sufficient condition for (33) to hold is

$$\varepsilon_2^p(0,0) - \varepsilon_1^p > \widetilde{\varepsilon}_1(0,r) - \widetilde{\varepsilon}_2(0,r) \quad (34)$$

Using the identities above, $\widetilde{\varepsilon}_1(0,r) - \widetilde{\varepsilon}_2(0,r) = (\rho - \alpha)(\widetilde{\varepsilon}_2(0,0) - \widetilde{\varepsilon}_2(0,1))$. Since $\rho - \alpha < 1$, (34) holds if

$$\varepsilon_2^p(0,0) - \varepsilon_1^p > \widetilde{\varepsilon}_2(0,0) - \widetilde{\varepsilon}_2(0,1) \quad (35)$$

The RHS of (35) is decreasing in ρ, and the LHS of (35) is increasing in ρ (proofs omitted). Therefore, it suffices to demonstrate that (35) holds at $\rho = 1$.

Note that at $\rho = 1$, $\varepsilon_1^p = \widetilde{\varepsilon}_1(1,1)$ and $\widetilde{\varepsilon}_2(0,1) = \widetilde{\varepsilon}_1(0,1)$ by FOC (19). It is straightforward to see that $\widetilde{\varepsilon}_1(1,1) < \widetilde{\varepsilon}_1(0,1)$, applying remarks after Propositon 1. By trade-off between present and future taxes, we know that $\varepsilon_2^p(0,0) > \widetilde{\varepsilon}_2(0,0)$. Therefore (35) is satisfied. This in turn implies, going backwards in the chain of reasoning, that the rate of devaluation rises on average after elections. Proposition 5 generalizes the results of the one-sector model in Stein and Streb (1999) to a two-sector framework.[11]

Regressions with monthly dummy variables

<insert Table 3>

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[1] ALESINA, A. and ROUBINI, N. (1997), *Political Cycles and the Macroeconomy (*Cambridge, MA: MIT Press).

[11] A slight difference arises between both papers due to the fact that in this paper gross wealth Ω depends on competency. Low current taxes τ_1^p signal higher competency , so besides the direct effect, τ_1^p boosts consumption indirectly thanks to a higher reputation θ that raises W. That is, despite log preferences, consumption not only depends on current taxes, but also on taxes expected in the future. Another difference is that Stein and Streb (1999) not only consider the log case, where the intertemporal elasticity of substitution $\sigma = 1$, but also the cases where $0 < \sigma < 1$. This paper only considers the simpler case $\sigma = 1$, since the result that under asymmetric information the average rate of devaluation rises after elections holds in all cases.

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Table 1. Signals picked by different types of incumbents

	$\chi=1$	$\chi=0$
$k=0$	$\tilde{\tau}_1(0,r)$	τ_1^p
$k=K$	τ_1^p	τ_1^p

Table 2. Changes in the real exchange rate

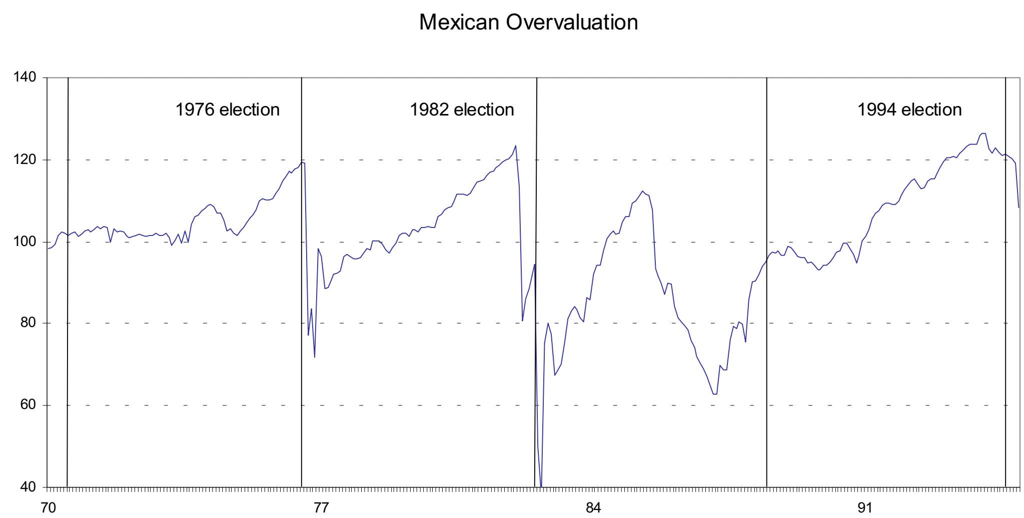
	Presidential election		Government change	
	OLS	FE	OLS	FE
Months 1 – 3 before presidential election	-.0021 (-.623)	-.0023 (-.654)		
Months 2 – 4 after presidential election	.0173 (4.953)***	.0172 (4.897)***		
Months 4 – 6 before government change			.0004 (0.096)	.0003 (0.086)
Months 0 – 2 after government change			.0239 (6.299)***	.0239 (6.264)***
Constants	-.0009 (-1.146)	-.0009 (-1.129)	-.0011 (-1.475)	-.0011 (-1.469)
No. of Observations	7337	7337	7337	7337

Note: t-statistics in parenthesis (3, 2 and 1 asterisk denote significance at 1%, 5% and 10%).

Table 3. Changes in the real exchange rate

	Presidential elections		Government changes	
	OLS	FE	OLS	FE
-9	-.0080 (-1.355)	-.0083 (-1.397)	-.0039 (-.598)	-.0041 (-.623)
-8	-.0025 (-.417)	-.0027 (-.460)	-.0008 (-.127)	-.0010 (-.153)
-7	-.0084 (-1.419)	-.0086 (-1.459)	-.0103 (-1.575)	-.0104 (-1.597)
-6	-.0112 (-1.894)*	-.0114 (-1.933)*	-.0034 (-.521)	-.0036 (-.546)
-5	.0066 (1.112)	.0063 (1.066)	.0030 (.456)	.0028 (.429)
-4	.0022 (.378)	.0020 (.334)	-.0004 (-.061)	-.0006 (-.087)
-3	-.0041 (-.703)	-.0044 (-.744)	.0092 (1.424)	.0091 (1.394)
-2	-.0028 (-.485)	-.0031 (-.528)	-.0081 (-1.247)	-.0083 (-1.270)
-1	-.0011 (-.191)	-.0014 (-.235)	-.0189 (-2.908)***	-.0190 (-2.927)***
0	-.0047 (-.802)	-.0050 (-.842)	.0013 (.205)	.0012 (.179)
1	-.0033 (-.555)	-.0035 (-.596)	.0588 (9.062)***	.0586 (9.014)***
2	.0264 (4.434)***	.0261 (4.379)***	.0097 (1.502)	.0096 (1.472)
3	.0083 (1.388)	.0080 (1.339)	-.0031 (-.484)	-.0033 (-.508)
4	.0154 (2.574)***	.0151 (2.521)**	-.0023 (-.357)	-.0025 (-.383)
5	-.0072 (-1.189)	-.0074 (-1.233)	.0073 (1.119)	.0071 (1.090)
6	.0031 (.513)	.0028 (0.466)	-.0153 (-2.353)**	-.0154 (-2.373)**
7	-.0044 (-.727)	-.0047 (-.771)	-.0037 (-.569)	-.0039 (-.593)
8	-.0110 (-1.812)*	-.0112 (-1.853)*	.0008 (.117)	.0006 (.090)
9	.0006 (.096)	.0003 (.051)	.0001 (.019)	-.0000 (-.007)
Constants	-.0001 (-.103)	-.0000 (-.013)	-.0004 (-.534)	-.0004 (-.482)
No. of Observations	7337	7337	7337	7337

Note: t-statistics in parenthesis (3, 2 and 1 asterisk denote significance at 1%, 5% and 10%).



Sources: Goldfajn and Valdés (1999) and Lijphart Elections Archive.

Figure 1.

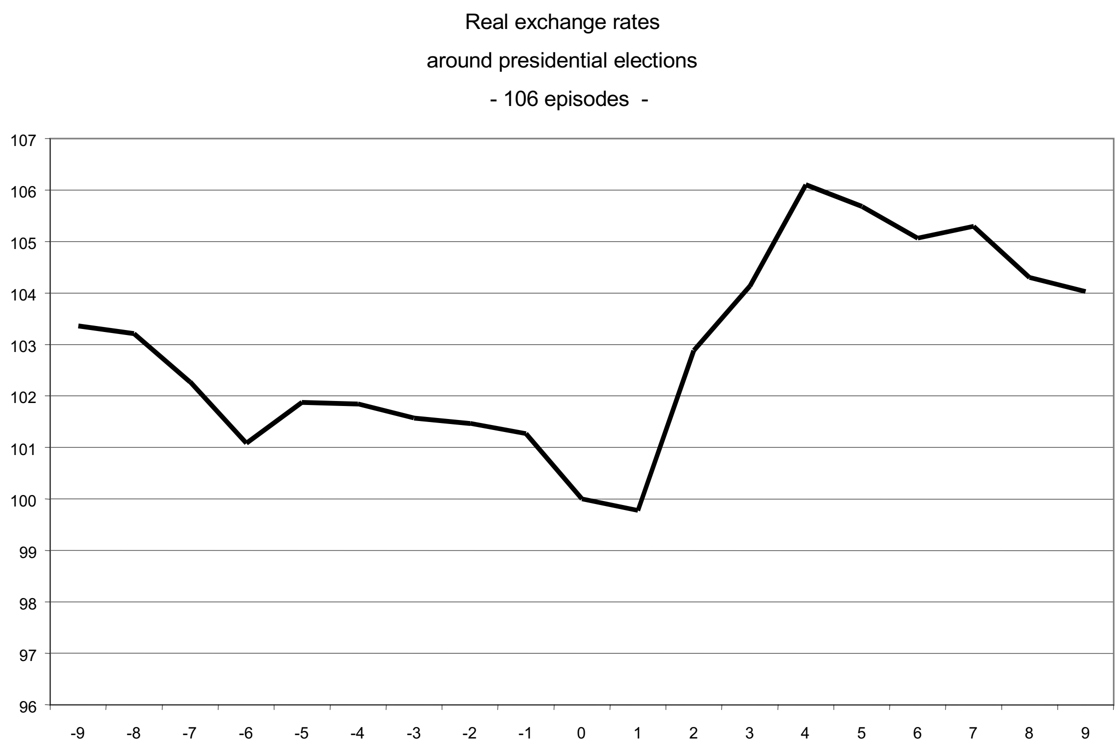


Figure 2.

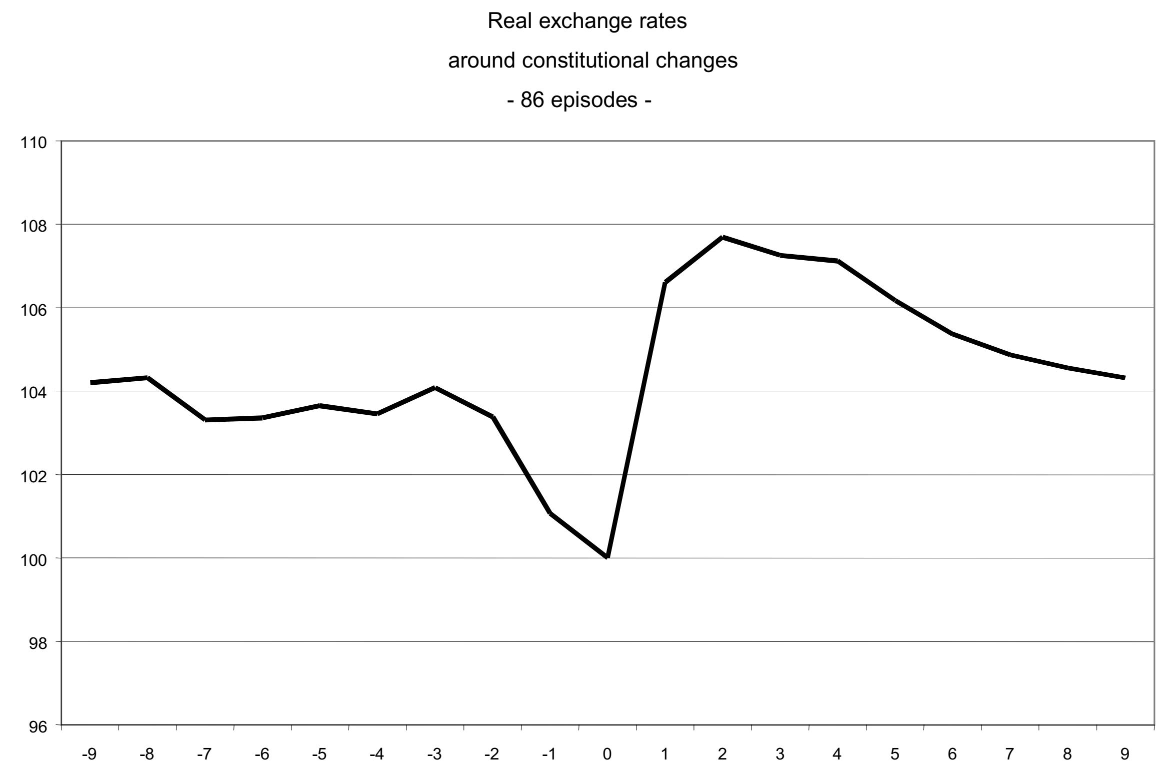


Figure 3.

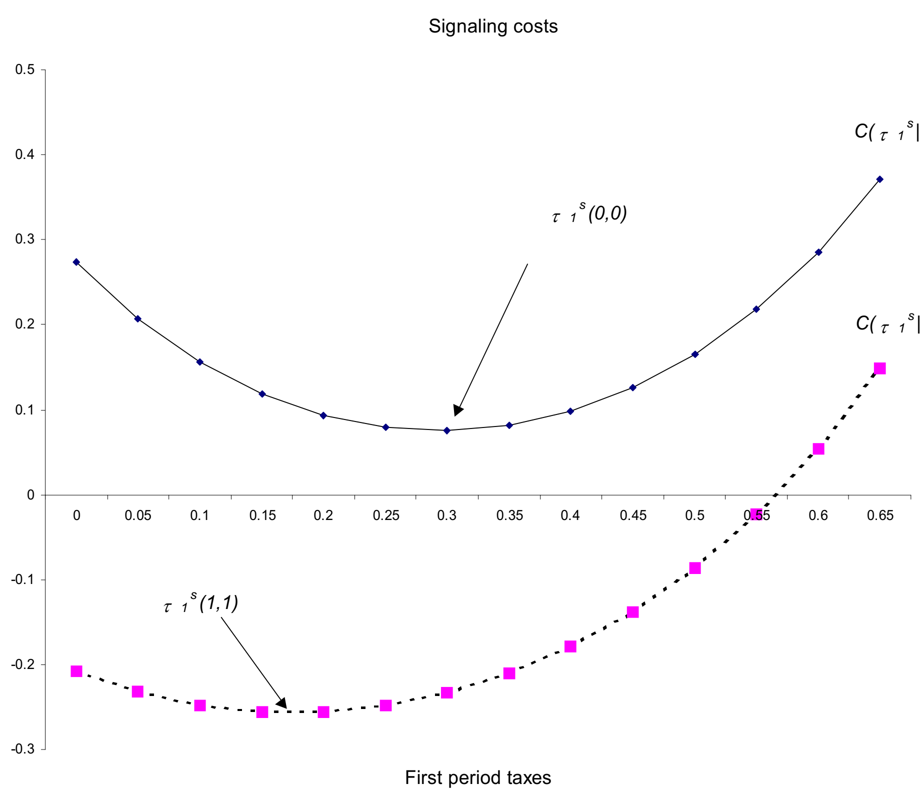


Figure 4.