Elections and Exchange Rate Policy Cycles

by

Marco Bonomo and Cristina Terra

Graduate School of Economics, Fundação Getulio Vargas

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Address for correspondence: Praia de Botafogo 190, sala 1100, Rio de Janeiro, RJ, CEP: 22250-900. Tel: (5521) 2559-5826. Fax (5521) 2553-8821. E-mail: bonomo@fgv.br and terra@fgv.br
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Abstract

This paper presents a theoretical model based on the distributive effects of RER changes that generates RER electoral cycles of the type identified in Latin American countries: more appreciated RER before elections and more depreciated after elections. Typically, a RER depreciation favors exporters and import competing domestic industries, to the detriment of consumers. These RER cycles are generated by imperfect information on policymakers' preferences, which are concealed from voters with the help of an unstable macroeconomic environment. Exchange rate cycles result from the interplay between the electoral power of the nontradable sector and the tradable sector's ability to lobby the government.

1 Introduction

Recent empirical studies on Latin American countries' exchange rate policy have identified a new type of electoral cycle: the real exchange rate (RER) tends to be more appreciated than average in the months preceding elections and more depreciated than average in the months following elections. Frieden, Ghezzi and Stein (2001) present evidence of an exchange rate electoral cycle in a cross-country study based on 26 Latin American and Caribbean countries, while Bonomo and Terra (2001)[1] and Pascó-Fonte and Ghezzi (2001) portray similar evidence for Brazil and Peru, respectively.

This paper presents a theoretical model that generates real exchange rate cycles. In doing so, we have singled out the distributive effects of real exchange rate changes as the main ingredient leading to exchange rate policy cycles. Typically, a RER depreciation favors exporters and import competing domestic industries, to the detriment of nontradable sector workers. We argue that these exchange rate cycles can be explained by imperfect information on policymakers' preferences, which are concealed from voters with the help of an unstable macroeconomic environment.

More specifically, we posit that there are two possible types of policymakers whose preferences are a convex combination of the two sectors' preferences. We refer to the type which places a relatively higher weight on nontradable sector preferences as the nontradable type, the other being the tradable type. Our motivation is that the policymaker is benevolent, but subject to the influence of lobbying by the tradable sector. The more numerous nontradable sector has more difficulties in coordinating for lobbying activities because coordination is harder in a larger group and each individual has less incentive to do so. Tradable sector lobbying might tilt policymaker's preferences in their favor. We capture the random result of this interaction by assuming that the policymaker places a higher relative weight to the tradable sector's preferences with some exogenous probability.[2]

The policymaker may affect the equilibrium RER by choosing the level of expen-

[1] Bonomo and Terra (2001) use a Markov Switching Model to characterize statistically exchange rate disequilibrium regimes in Brazil.

[2] This distortion in policymakers' preferences appears in an explicit model of lobbying in Grossman

ditures on nontradable goods. Voters try to extract information about the policymaker's preferences by observing the real exchange rate. They elect the incumbent if the probability that her type is nontradable is higher than that of the opponent.

We also assume that there are exogenous shocks to the external sector, which cause economic policy to be observed with noise. Thus, a given real exchange rate is compatible with different combinations of policies and shocks. Therefore, it is not necessary that the tradable type of policymaker perfectly emulates the other type to stand a chance of being reelected. The policymaker will choose the exchange rate policy by weighting his immediate interests (the depreciated exchange rate raises the tradable sector's gain) against his long-run interests, which depend on his reelection (whose probability increases with a more appreciated RER). The incumbent of a tradable type may choose higher expenditures than his optimal full information level. He might do so to increase the probability that voters will believe that he is more likely to be a nontradable type than the opponent. The nontradable type chooses higher expenditures than his optimal full information level to increase the probability of differentiating himself from the tradable type. Hence, there will be a cycle in expenditures in case of reelection of the incumbent regardless of her type. This will, in turn, lead to an exchange rate electoral cycle.

There is a large and growing literature on political-economic cycles. Theoretical models in this literature fall basically into two categories: partisan and opportunistic models. In partisan models the cycles are generated by the interaction between nominal rigidities and the different parties' preferences over inflation and unemployment (Hibbs 1977, and Alesina 1987). Each type of prospective policymaker has an exogenous probability of winning the election, and expectations about economic policy choice after elections are calculated accordingly.

Opportunistic models rely only on policymakers' electoral motivations (Nordhaus 1975, Lindbeck 1976, Cukierman and Meltzer 1986, Rogoff and Sibert 1988, Persson and Tabelini 1990, Rogoff 1990, and Stein and Streb 1998). In particular, Rogoff and Sibert (1988) and Rogoff (1990) build a political budget cycle theory based on information asymmetry regarding government efficiency. Recently, Drazen (2001) extended this approach in a model which also includes monetary policy, but whose

and Helpman (1996).

fiscal policy is still the driving force behind political cycles.

Stein and Streb (2003) generate a nominal exchange rate cycle that works in the same way as a tax cycle (Rogoff and Sibert 1988, Stein and Streb 1998). They build on the same information asymmetry regarding the incumbent's competence, but they also add information asymmetry with respect to the incumbent's opportunism.[3] Ghezzi, Stein and Streb (2000) expand Stein and Streb (2003) by adding one more sector so that they can generate real exchange rate cycles. In those two papers the exchange rate dynamics reflects the tax dynamics, but is not central to the story.

Our approach is based on the distributive character of the real exchange rate. The election resolves the conflict between two sectors - producers of tradable and nontradable goods - which desire different real exchange rates. Although this feature has been extensively studied in other areas of political economy, such as trade policy, it has not been explicitly taken into account in the political-business cycle literature[4].

An interesting feature of our model is that the signal is noisy due to exogenous economic shocks.[5] The economic performance does not reveal the policymakers' actions, because it is also influenced by events beyond their control. This feature implies that exogenous economic shocks affect elections results systematically, which is another qualitative feature consistent with the empirical evidence (on the U.S., see Alesina and Rosenthal 1995; on the OECD countries see Lewis-Beck 1988). This empirical implication is also shared by Lohmann's (1998) opportunistic monetary model, where economic performance provides a noisy signal about the policymaker's competence.

[3] In an open version of Rogoff (1990), this additional asymmetry is also necessary in order to produce a signaling game. Otherwise, by observing the exchange rate, one could infer the investment, revealing the incumbent's competence level.

[4] Alfaro (1999) also develops a model focusing on the distributive effects of real exchange rate appreciation. However, her model aims to explain the political economy of exchange-rate-based stabilization programs, instead of electoral cycles.

[5] Another advantage of a noisy signal is that a large range of results is consistent with the equilibrium, each one leading to a different belief. Then, the equilibrium does not depend on the arbitrary specification of out of equilibrium beliefs, which is common in signaling models.

However, hers is not a signaling model, for in her model policy is chosen even before the policymaker gets to know her own type. As a consequence, economic policy is independent of the policymaker's type, and, in equilibrium, is perfectly inferred by voters.

Our model also generates a political budget cycle, thus offering one further motive for the fiscal cycle through its effect on the exchange rate. The political budget cycle is in line with existing empirical evidence in developing countries (on Mexico, see Gonzalez 2000; on Latin American countries, see Ames 1987, Kraemer 1997, and Mejía Acosta and Coppedge 2001; on sub-Saharan countries, see Block 2000; and see Schuknecht 1996 for a comprehensive study).

The plan for the remaining part of the paper is as follows. Section 2 develops the model of policy intervention in the exchange rate around electoral periods. Section 3 solves for the equilibrium of the model. Finally, conclusions are presented in section 4.

2 The Model

2.1 Nontradable sector and tradable sector

There are two non-storable goods in this model economy: a tradable and a nontradable good. Citizens are divided into two sectors: tradable and nontradable sectors. Citizens belonging to the (non)tradable sector are endowed each period with some amount of the (non)tradable good. Every citizen derives utility from the consumption of both tradable and nontradable goods, subject to her budget constraint. There are no financial markets, hence each period's expenditures in consumption must equal the endowment's value, minus taxes. All preferences, both of government and common citizens, are additively separable in time with discount factor β. This assumption will simplify some intertemporal relations making the consumers' problem time separable.

We assume consumers preferences are represented by a Cobb-Douglas per period utility function[6], in which a share α, $\alpha \in (0,1)$, of their endowment income is spent on tradable good consumption, and a share $(1-\alpha)$ on nontradable good consumption.

[6] We use Cobb-Douglas utility functions for expositional simplicity, but our result does not rely on this specific functional form. The necessary conditions are that the utility function is concave

A nontradable sector citizen chooses her consumption basket by maximimizing the per period utility function, subject to her budget constraint, which is her constant endowment E^N of nontradable goods. Her problem is represented by:

$$\max_{N_N, T_N} \alpha \ln N_{Nt} + (1-\alpha) \ln T_{Nt}$$

$$\text{s.t. } N_{Nt} + e_t T_{Nt} = E^N,$$

where e_t is the RER, defined as the ratio between the price of tradable and nontradable goods, N_{Nt} and T_{Nt} are the demands for nontradable and for tradable goods by a nontradable citizen.

The demand functions, given by:

$$N_N(e_t) = \alpha E^N \text{ and} \quad (1)$$

$$T_N(e_t) = (1-\alpha)\frac{E^N}{e_t},$$

yields the following indirect utility function:

$$V^N(e_t) = \overline{h} - (1-\alpha)\ln(e_t), \quad (2)$$

where $\overline{h} = \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha) + \ln E^N$. Note that this is a decreasing function of e_t.

We assume that in each period the government chooses how much to spend on nontradable sector goods, and, for simplicity, it finances its expenditures by taxing tradable sector citizens: $G_t = \tau_t$, where G_t and τ_t are expenditures and taxes per tradable sector citizen, respectively. We assume that the total amount of taxes is not immediately observable by the nontradable sector citizens.[7] For simplicity, we assume

and continuous. In Bonomo and Terra (2002) the results of this paper are generated under more general assumptions.

[7] Even if we assumed that taxes were equally paid by all citizens, expenditure policy would still affect the RER in the direction it does here. We believe that tradable sector citizens tend to pay

that government expenditures are all wasted[8].

Uncertainty is introduced in the tradable sector. The endowment of tradable good E_t^T each citizen in the sector receives is assumed to be a stochastic variable represented by u_t, where u_t is a log-normally distributed random variable with support on $[0, \infty)$. Then, the probability density of u is given by:

$$f(u) = \frac{\exp\left[-\frac{(\ln u - \mu)^2}{2\sigma^2}\right]}{u\sigma\sqrt{2\pi}}$$

where μ and σ are parameters.

Moreover, each citizen belonging to the tradable sector pays taxes, τ_t. Tradable sector consumers' problem can, thus, be represented by:

$$\max_{N_T, T_T} \alpha \ln N_{Tt} + (1-\alpha) \ln T_{Tt}$$

$$\text{s.t. } N_{Tt} + e_t T_{Tt} = e_t u_t - \tau_t,$$

where N_{Tt} and T_{Tt} are the demands for nontradable and for tradable good from the tradable citizen.

The resulting demand functions are:

$$N_T(e_t, u_t, \tau_t) = \alpha (e_t u_t - \tau_t) \tag{3}$$

$$T_T(e_t, u_t, \tau_t) = (1-\alpha)\left(u_t - \frac{\tau_t}{e_t}\right),$$

which yield the following indirect utility function:

$$V^T(e_t, u_t, \tau_t) = h + \ln(e_t u_t - \tau_t) - (1-\alpha)\ln(e_t), \tag{4}$$

relatively more taxes. However, the main reason why we assume that taxes are levied only on tradable sector citizens is that it is the simplest way to keep the informational asymmetry between the policymaker and nontradable sector citizen with respect to expenditure choice.

[8] Our results would not change if government expenditures enter the utility of both tradable and nontradable citizens symmetrically.

where $h = \alpha \ln \alpha + (1-\alpha)\ln(1-\alpha)$. This indirect utility function is increasing in the RER and decreasing in τ.

There is an upper bound to raising taxes, since they cannot exceed the tradable good endowment value. Therefore, we posit that government expenditures must lay in the interval $\left[0, \overline{G}\right]$, where $\overline{G} < (1-\alpha)\, nE^N$.[9] Given the equilibrium RER that will be derived in the next section, this condition ensures that tradable sector citizens have a positive net income.

2.2 Market equilibrium

As financial markets are assumed away, not only the nontradable, but also the tradable goods market must be in equilibrium[10]. Given the amount of expenditures chosen by the government and tradable goods endowments, RER must be such that both goods market are in equilibrium, that is:

$$G_t + N_T\left(e_t, u_t, \tau_t\right) + nN_N\left(e_t\right) = nE^N \tag{5}$$

$$T_T\left(e_t, u_t, \tau_t\right) + nT_N\left(e_t\right) = u_t \tag{6}$$

where n is the ratio between the number of nontradable and tradable sector citizens. By substituting equations 1 and 3 into the market equilibrium equations and solving

[9] Given the equilibrium conditions that will be derived below, this is the condition that ensures a positive net endowment for the tradable sector citizen.

[10] Since there are no financial markets and there is only one tradable good, the market equilibrium conditions for this economy match those of a closed economy. Note that the driving force in our story is the effect of the real exchange rate, that is, the relative prices, on different economic agents' utility. Hence, it is not related to intertemporal effects. The inclusion of financial markets could exacerbate the exchange rate cycle for the following reason. The RER overvaluation before elections would yield a current account balance lower than the equilibrium one, with a corresponding overborrowing (or underlending, depending on the case) abroad. Hence, after elections, the RER would have to depreciate even further, compared to the no financial makets case, in order cope with the country´s additional financial obligations (or lower financial revenues, whichever is the case).

either one of them, we obtain the equilibrium RER as a function of the exogenous variables:

$$e\left(G_t, u_t\right) = \frac{(1-\alpha)\left(nE^N - G_t\right)}{\alpha\left(u_t\right)}, \tag{7}$$

given that $G_t = \tau_t$, and all other variables are constant. The equilibrium RER is a negative function of expenditures level, that is, for a given realization of the trade shock u, the more the government spends on nontradable goods, the more appreciated is the equilibrium RER. The equilibrium RER is also a negative function of tradable goods endowments: the larger the realization of the tradable goods endowment, the lower its relative price, hence the more appreciated is the equilibrium RER.[11]

2.3 Policymakers' preferences

Policymakers' preferences are represented by a time-additive utility function. The period utility function is a weighted sum of the two sectors' utility functions:

$$\widetilde{v}_i^P\left(e_t, u_t, \tau_t\right) = \gamma_i V^N\left(e_t\right) + V^T\left(e_t, u_t, \tau_t\right), \text{ for } i = N, T. \tag{8}$$

We assume that there are two possible types of policymaker. This is captured by different relative weights on the nontradable sector utility function, represented by γ_i, $i = N, T$, in the politician's utility function represented by equation 8. Specifically, $\gamma_N > \gamma_T$, where γ_N is the relative weight for the politician that favors nontradable sector' interests relatively more.

In modeling preferences this way we intend to capture the preference of a policymaker who cares about social welfare but is subject to lobbying by the tradable sector. One underlying assumption is that there is no lobbying activity on the part of the nontradable sector because they have more difficulties in coordinating due to their larger number and the resulting lower stakes for each individual. The tradable sector offers contributions to the policymaker in return for a policy that favors its interests. Furthermore, the result of the lobbying activity is random.

Our view of what underlies this uncertainty is the following. For the lobbying to be successful, it is necessary that politician and lobbyists reach an agreement, which occurs under certain favorable conditions. These conditions may be related

[11] Note that when the trade shock tends to zero the exchange rate tends to infinity.

to momentary financial needs of the politician, or whether the individuals involved knew each other previously and trust each other, for no formal contract sets the deal, etc. If the lobbying is successful, the politician will tilt her preferences in favor of the tradable sector. In Appendix A we provide a derivation of these preferences which is in line with the interpretation above.

Once an aggreement is reached, it is more likely to be renewed in the next period. Conversely, if there is no aggreement because the conditions are not favorable, those same conditions are likely to prevent the agreement to be attained in the following period. That is to say, the conditions for a successful lobby should not change too radically from one period to the other, for there is stability in the identity of government officers and lobbyists, as well in the government members' financial needs. Some persistence in preferences before and after elections is the condition we need to explain the policy cycle. To simplify, we assume that preferences do not change at all around elections, and that in between elections both the incumbent and the opponent are independently assigned to favor the tradable sector with probability p^T.[12]

Using the fact that expenditures equal taxes, and substituting the equilibrium RER derived from market equilibrium conditions (equation 7) in the citizens indirect utility functions (equations 2 and 4), the policymaker's utility function (equation 8) can be rewriten as:

$$\begin{aligned} V_i^P(G_t, u_t) &= \gamma_i \ln \alpha + \gamma_i \ln E^N - (1+\gamma_i)(1-\alpha)\ln\left(nE^N - G_t\right) + \\ &\quad + \ln\left[(1-\alpha)\,nE^N - G_t\right] + (1+\gamma_i)(1-\alpha)\ln(u_t)\,. \end{aligned} \tag{9}$$

If we take expectations of equation 9 with respect to the trade shock, we can get the policymaker's expected utility in a period:

[12] We could just as well have assumed that preferences followed a two-period moving average process, or that preferences followed a Markov process. In both cases preferences would change every period, but with some persistence, and our results would be maintained.

$$F_i(G_t) = E\left[V_i^P(G_t, u_t)\right] = \int_0^{\infty} V_i^P(G_t, u_t) f(u) du \tag{10}$$
$$= h^i + \ln\left[(1-\alpha) nE^N - G\right] - (1+\gamma_i)(1-\alpha)\ln\left(nE^N - G\right),$$

for $i = N, T$, where:

$$h^i = \gamma_i \ln\alpha + \gamma_i \ln E^N + (1+\gamma_i)(1-\alpha)\mu.$$

Nontradable sector citizens always prefer higher expenditures, because the latter produces a more appreciated real exchange rate. Tradable sector citizens prefer lower expenditures, because it results in a more depreciated exchange rate and less taxes to be paid. Therefore the policymaker's indirect utility function may be non-monotonic in expenditures G_t.

It is important to point out that the fact that only tradable sector citizens are taxed is not necessary for the result that they prefer lower expenditures than nontradable sector citizens. If nontradable sector citizens were also to pay taxes, they would have one motive to dislike expenditures, but they would still want higher expenditures due to their effect on the equilibrium RER. They would prefer higher expenditures compared to tradable sector citizens as long as nontradable sector citizens do not outnumber tradables sector ones by too large a margin. In this model, using Cobb-Douglas utility function, the restriction is that the ratio between nontradable and tradable sector citizen cannot exceed 2.

2.4 Elections and the timing of events

We assume that each sector is composed of identical individuals, so they will have the same voting preferences. We also assume that nontradable sector citizens are more numerous ($n > 1$), hence the median voter is a nontradable sector citizen.

Elections are held every other period, and there are two candidates: the incumbent and the opponent. The lobbying process establishing whether each politician favors the tradable sector are resolved in the alternate periods, when both incumbent and opponent are independently assigned to favor the tradable sector with probability

p^T. The government, knowing its own type, chooses an expenditure level. Then, the tradable good endowment is realized, resulting in a certain equilibrium RER. The median voter observes the exchange rate, but not the expenditure level, and then votes[13].

We summarize the timing of events is as follows:

Pre-electoral period (t^*):

The incumbent and the opponent's preferences are randomly assigned, and the incumbent sets G_{t^*}. u_{t^*} is realized after the choice of G_{t^*} determining $e_{t^*} = e(G_{t^*}, u_{t^*})$.

Without observing G_{t^*}, or the incumbent and the opponent types, the median voter (a nontradable sector voter) observes e_{t^*} and then votes.

Post-electoral period ($t^* + 1$):

The term of the winner of the election spans two periods, and the winner chooses G_{t^*+1}.

3 Equilibrium

In this section we analyze a game between the policymaker, the opponent, and the median voter. We compute the Perfect Bayesian Equilibrium for the dynamic Bayesian game. The equilibrium is composed of the incumbent's and the median voter's strategies and beliefs. Our assumptions allow us to break our problem into a sequence of identical two-period stage games[14]. Hence, they also allow us to restrict our analysis to equilibria in which strategies prescribe the same actions in every stage game, that is, actions which are independent from results in previous stage games.

In the stage game the incumbent's strategy is the expenditure level chosen by each type of policymaker for the periods before and after elections. It can be represented by $G^* = \left\{G^N, G^N_{+1}, G^T, G^T_{+1}\right\}$, where G^i and G^i_{+1} is the expenditure level for the

[13] The median voter is a nontradable sector citizen who must observe the relative price to trade, but does not bear a direct impact from expenditure or tax level.

[14] The assumptions of no financial markets, non-storable goods, time separable utility, and that politicians preferences are independently drawn every two periods, imply that the action's effects on future payoffs do not depend on actions taken before the pre-electoral period (see also footnote 17).

period before and after elections, respectively, for type i policymaker, which can be either of nontradable ($i = N$) or tradable ($i = T$) types. The median voter's strategy is the choice of a candidate in the election period, given the observed real exchange rate. It can be represented by the function $vo(\hat{e})$, which equals inc when the voter opts for the incumbent, or opp when the vote casts a ballot for the opponent, given the observed real exchange rate $\hat{e}$.

We start by finding the equilibrium of a complete information version of the game, which will serve as a benchmark.

3.1 Equilibrium under full information

In the complete information version of the game voters know the incumbent's and the opponent's type. The optimal strategy for the median voter is to vote for the incumbent when the latter is of the nontradable type, and to vote for the opponent otherwise, for any observed exchange rate. Therefore, economic policy will not affect the reelection probability. Since expenditures policy have no intertemporal effects, they will be chosen each period so as to maximize the policymaker's per period expected utility; that is, G^i should maximize $F_i(G_t)$, defined in equation 10, subject to $G^i \in [0, \overline{G}]$. In the case of an interior solution, the optimal expenditure level will be given:

$$G^{i*} = \left(nE^N\right) \frac{1 - (1 + \gamma_i)(1 - \alpha)^2}{1 - (1 + \gamma_i)(1 - \alpha)}, \quad i = N, T. \tag{11}$$

It is easy to check that if γ_N is such that the solution for the nontradable type of policymaker is interior, we will have $G^{N*} > G^{T*}$. Otherwise the desired expenditure level for both candidates will be zero and the problem becomes trivial. The following assumption ensures that this will be true.

Assumption The problem for the nontradable type of policymaker (in the absence of strategic motivations) has an interior solution, that is, $0 < G^{N*} < \overline{G}$.[15]

[15] The constraining assumption for the particular specification of preferences we are using is $G^{N*} > 0$, since an unconstrained optimal G^{N*} will be always less than $(1 - \alpha) nE^N$, which is the upper bound for $\overline{G}$. Then it is always possible to define $\overline{G}$ smaller but close enough to $(1 - \alpha) nE^N$ in such

For later reference we define $F_i^j = F_i(G^{j*})$. Then, it is clear that $F_i^i \geq F_i^j$ for every i, j. Our assumption ensures that the inequalities are strict. A proposition in Appendix B formalizes the equilibrium.

3.2 Equilibrium under asymmetric information

In the period following an election, there is no strategic behavior. The reason is that in the next period there will be political bargains determining the policymaker's new preferences. We assume that the outcome of such bargains are independent from the incumbent's performance[16]. Thus, $\left\{G_{+1}^N, G_{+1}^T\right\} = \left\{G^{N*}, G^{T*}\right\}$, where G^{i*} is the expenditure level that maximizes $F_i(.)$. Note that these expenditure levels correspond to the equilibrium strategies for the incumbent under full information. From now on we focus on the policymaker's strategy in the period preceding elections.

We start by solving the voter's problem and calculating the incumbent's reelection probability, which will be a function of the chosen expenditure level.

3.2.1 The voter's problem

The median voter, being of the nontradable type, would like to vote for the policymaker who favors his interests, but now he does not know the politician's type. He compares the (updated) probability of the incumbent being of the nontradable type to that of the opponent (which will always be p^N, as the voter does not have any extra information about the opponent). If the updated probability is larger than or equal to p^N, nontradable sector voters will vote for the incumbent, and she will be reelected. Otherwise the opponent will win the election. Let ρ be the median voter's

a way that the restriction is not binding. On the other hand, in order to guarantee that $G^{N*} > 0$ we should impose $\gamma_N > \frac{1}{(1-\alpha)^2} - 1$.

[16] Hence, the expenditure level chosen in a period following elections will not affect the probability of reelection in the next stage game.

conjecture that the incumbent is of the nontradable type, and vo his vote. Then:

$$vo = \begin{cases} inc, & if\ \rho \geq p^N \\ opp, & otherwise \end{cases}.$$

This voter behavior is optimal, for it maximizes his expected utility, given that she is of the nontradable sector.

How do voters form their belief ρ? The only information they have is the RER, which depends on the economic policy chosen by the incumbent, and on the supply shock in the tradable sector according to equation 7. Given the limit we imposed on expenditures and the lognormality assumption for the trade endowment, it is clear from this equation that any level of exchange rate could result from a given policy, and that is true for any expenditure level chosen. Then every positive level for the RER is necessarily in the equilibrium path. As a consequence, the median voter's belief is generated by the updating of his prior belief over the incumbent's type using Bayes's rule. Thus, the updated probability may be represented by:[17]

$$\begin{aligned} \rho &= \Pr\left(t_i = N \left| e_t = \hat{e}\right.\right) = \\ &= \frac{p^N \times g(e_t = \widehat{e}\,|t_i = N\,)}{p^N \times g(e_t = \widehat{e}\,|t_i = N\,) + (1 - p^N) \times g(e_t = \widehat{e}\,|t_i = T\,)}, \end{aligned} \tag{12}$$

where t_i represents the incumbent's type, which may be nontradable (N) or tradable (T), $\hat{e}$ is the observed real exchange rate, and $g(.\,|.\,)$ is the conditional density function of e given the policymaker's type. It is clear that the voter will vote for the incumbent, that is $\rho \geq p^N$, if and only if:

$$g(e_t = \widehat{e}\,|t_i = N\,) \geq g(e_t = \widehat{e}\,|t_i = T\,). \tag{13}$$

This rule is intuitive. The voter revise upwards his prior that the government is of the nontradable type if and only if it is more likely that the observed exchange rate was generated by the nontradable type policy than by the tradable type.

[17] The assumption that politicians' preferences are independently drawn every two periods make the voter's updated beliefs independent from actions taken by the incumbent before the latest draw.

3.2.2 Reelection probability

Now we can calculate the incumbent's reelection probability as a function of the chosen expenditure level. To do so, it is necessary to specify the incumbent's actions prescribed by equilibrium strategy in the period before election $\left\{G^N, G^T\right\}$, which will be used by the voter to update his beliefs.

A chosen expenditure level G and a realized trade shock u will determine the observed real exchange rate, i.e., $\widehat{e} = e\left(G, u\right)$. Therefore, the conditional density function of $\widehat{e}$ given the policymaker's type $g(.\,|.)$ is equal to the density function of the trade shock v that would yield $\widehat{e}$ when the expenditure level is the one chosen by this type in equilibrium. That is, $g(e_t = \widehat{e}\,|t_i) = f\left(v\,|e\left(G^i, v\right) = \widehat{e}\right)$.

Then, we can write the conditions for reelection in equation 13 as:

$$f\left(w\,|e\left(G^N, w\right) = \widehat{e}\right) \geq f\left(v\,|e\left(G^T, v\right) = \widehat{e}\right). \tag{14}$$

Note that if there is an equilibrium in which the two type of policymakers choose the same policy, it prescribes that the median voter reelects the incumbent for any observed value for the RER.

In the case of a "different-policies" equilibrium, with $G^N > G^T$, the exchange rate has a cutoff level $\tilde{e}$, such that whenever the observed exchange rate is more appreciated than $\tilde{e}$ ($\hat{e} \leq \tilde{e}$) the median voter reelects the incumbent[18].[19] The exchange rate cutoff point is the exchange rate level for which:

$$f\left(w\,|e\left(G^N, w\right) = \widetilde{e}\right) = f\left(v\,|e\left(G^T, v\right) = \widetilde{e}\right),$$

where $e\left(\cdot\right)$ is defined by equation 7. Thus, the exchange rate cutoff level is given by:

$$\tilde{e} = \left(\frac{1-\alpha}{\alpha}\right)\sqrt{\left(nE^N - G^N\right)\left(nE^N - G^T\right)}\exp\left(1 - \frac{\mu}{\sigma}\right). \tag{15}$$

[18] Appendix C shows that, with lognormal density function for the trade shock, there will be a cutoff level for the exchange rate to guide the voting rule.

[19] For a generic form for the trade shock density function, the voting rule is based on a cutoff level for the RER if the density function is is single-peaked and if points with the same density can only occur at the maximum value of the density function.

Figures 1 and 2 illustrate the median voter's decision. In Figure 1 the horizontal axis shows the observed exchange rate level and the vertical axis represents the probability density function of the trade shock which would generate that observed exchange rate level for a given expenditure level $f\left(u\left|e\left(G,u\right)=\widehat{e}\right.\right)$. Figure 2 replicates the curve of figure 1 for the equilibrium expenditure levels: G^N and G^T, with $G^N > G^T$. The intersection of the curves determine the exchange rate cutoff level $\widetilde{e}$. For an exchange rate $\widehat{e}$ lower than $\widetilde{e}$, the density of the trade shock that, combined with the expenditure level G^N, would generate $\widehat{e}$ $\left(f\left(w\left|e\left(G^N,w\right)=\widehat{e}\right.\right)\right)$ is higher than the equivalent density for the expenditure level G^T $\left(f\left(v\left|e\left(G^T,v\right)=\widehat{e}\right.\right)\right)$, as in equation 14. In this case the incumbent will be reelected. Conversely, if the exchange rate level is higher than $\widetilde{e}$, the compatible trade shock density is higher for the expenditure level G^T, violating equation 14, and the incumbent is not reelected.

Given the above analysis, wherever $e(G,u)\leq\widetilde{e}$ the incumbent is reelected. Hence, given $\widetilde{e}$ and the incumbent's actual policy G, it is possible to retrieve a cutoff level for the trade shock $\widetilde{k}$ such that, for any shock greater than $\widetilde{k}$ an exchange rate more appreciated than $\widetilde{e}$ results, and the incumbent is reelected. $\widetilde{k}$ is implicitly defined by:

$$\tilde{e}=e\left(G,\widetilde{k}\right). \tag{16}$$

Substituting equations 15 and 7 into equation 16, we get an explicit expression for $\widetilde{k}$:

$$\widetilde{k}\left(G,G^N,G^T\right)=\frac{\left(nE^N-G\right)\exp\left(\frac{\mu}{\sigma}-1\right)}{\sqrt{\left(nE^N-G^N\right)\left(nE^N-G^T\right)}}. \tag{17}$$

Figure 3 maps the exchange rate cutoff level $\widetilde{e}$ (in the vertical axis) into a trade shock cutoff level k (in the horizontal axis), for a given expenditure level G. We depict two curves, the upper curve corresponding to a lower expenditure level G', which yields a higher trade shock cutoff level k'.

Now we can explicitly evaluate the reelection probability that results from a current policy G in a context where equilibrium policy of the incumbent is given by $\left(G^N,G^T\right)$. Whenever the trade shock is larger than $\widetilde{k}$, the resulting exchange rate will be more appreciated than $\widetilde{e}$, and the incumbent will be reelected. Then the probability of reelection is the probability that the trade shock is greater than $\widetilde{k}$, as shown in figure 4. It is given by:

$$\pi\left(G, G^N, G^T\right) = \int_{\frac{(nE^N - G)\exp\left(\frac{\mu}{\sigma}-1\right)}{\sqrt{(nE^N - G^N)(nE^N - G^T)}}}^{\infty} \frac{\exp\left[-\frac{(\ln s - \mu)^2}{2\sigma^2}\right]}{s\sigma\sqrt{2\pi}} ds, \tag{18}$$

which is clearly a decreasing function of G.

Figure 4 illustrates the probability of reelection, which is the area under the density function to the right of k. It is clear from the figure that a lower expenditure level G' leads to a higher trade shock cutoff level k', resulting in a lower reelection probability.

The following proposition formalizes the computation of the reelection probability, as ilustrated above.

Proposition 1 *Assume that $G^N > G^T$. Then, the incumbent's reelection probability, given the equilibrium strategy, can be written as:*

$$\pi\left(G, G^N, G^T\right) = \int_{\frac{(nE^N - G)\exp\left(\frac{\mu}{\sigma}-1\right)}{\sqrt{(nE^N - G^N)(nE^N - G^T)}}}^{\infty} \frac{\exp\left[-\frac{(\ln s - \mu)^2}{2\sigma^2}\right]}{s\sigma\sqrt{2\pi}} ds. \tag{19}$$

3.2.3 The incumbent's strategy

The expenditures level chosen by the incumbent not only affects her contemporaneous utility, but also the reelection probability. Reelection probability is an important component of next period's expected gains - the elected government first term in office. In equilibrium, expenditures will be chosen to solve[20]:

$$\max_G \left\{ \begin{array}{c} F_i(G)+ \\ +\beta \left[\pi\left(G, G^T, G^N\right) + \left(1-\pi\left(G, G^T, G^N\right)\right) p^i\right] F_i^i + \\ +\beta\left(1-\pi\left(G, G^T, G^N\right)\right)\left(1-p^i\right) F_i^j \end{array} \right\} \tag{20}$$

s.t. $0 \leq G \leq \overline{G}$,

where β is the incumbent's discount rate $F_i(.)$ is given by 10, and $F_i^j = F_i\left(G^{j*}\right)$. The first term is the contemporaneous expected utility maximization. The second term represents the expected utility for the next period. On the one hand, the incumbent will be reelected with probability $\pi\left(G, G^T, G^N\right)$, and with probability $\left(1-\pi\left(G, G^T, G^N\right)\right).p^i$ an opponent also identified with the same interests wins the election. In both cases the expenditure level next period is G^{i*}. On the other, with probability $\left(1-\pi\left(G, G^T, G^N\right)\right).\left(1-p^i\right)$ the opponent wins the election and represents the other sector's interests, in which case expenditures will equal G^{j*}. The probability of this incumbent being reelected, $\pi\left(G, G^T, G^N\right)$, is given by equation 19.

[20] This formulation - where the policymaker is indiferent between being reelected and having an opponent of the same type elected - is consistent with the policymaker's prefererences defined in section 2.3 as primitives. If we take those preferences as derived from Appendix A, this is not true anymore when the incumbent is of the tradable type, since in this case the election of a tradable type of opponent will not give her as much utility as her reelection. The reason is that she favors the tradable sector only to receive a contribution from this sector. Since she will not receive the contribution if she is not reelected, she will have less utility if she looses the election. As a consequence, the incentives for distorting full information policy in order to increase the probability of reelection will be higher, exacerbating the cycles.

Problem 20 can be rewritten as:

$$\max_{G}\left\{\begin{array}{c} F_i\left(G\right)+\beta.\pi\left(G,G^T,G^N\right)\left(1-p^i\right)\left(F_i^i-F_i^j\right)+ \\ +\beta\left[p^iF_i^i+\left(1-p^i\right)F_i^j\right]\end{array}\right\} \tag{21}$$

$$\text{s.t. } 0\leq G\leq\overline{G},$$

which makes it clear that a higher reelection probability increases welfare for the incumbent. Since $\pi(.)$ is strictly increasing in G, it is trivial that any equilibrium strategy for the incumbent must prescribe $G^i > G^{i*}$, when $F_i^i > F_i^j$.[21] The latter is guaranteed by our assumption.

Proposition 2 *Any equilibrium strategy must prescribe for both types of incumbent a pre-election expenditure level strictly greater to that under full information. Therefore, an equilibrium strategy must prescribe for each type of incumbent a strictly greater level of expenditure before than after elections.*

Corollary 3 *In an equilibrium, when the incumbent is reelected, the real exchange rate is on average more appreciated before than after elections.*

3.2.4 Equilibrium

The following proposition formalizes the equilibrium and its existence.

Proposition 4 *There is a perfect Bayesian equilibrium in pure strategies. In any Perfect Bayesian equilibrium, players strategies should satisfy the following conditions: i) an incumbent of type i will choose an action $G^i\in[0,\overline{G}]$ such that $G^i\in G^i(G^T,G^N)$ (where $G^i(.,.)$ is defined as the solution of problem 21) before election, and expenditure level $G^i_{+1}=G^{i*}$ (where G^{i*} is defined in equation 11) after the election; ii) the median*

[21] One would wonder if the lower bound on G would prevent the existence of the strict inequality. However, the functional forms we are using imply that $G^i<(1-\alpha)\,nE^N$ for each i. Then it is always possible to define a non-binding level for $\overline{G}$.

voter will vote for the incumbent if the observed exchange rate is not greater than $\widetilde{e}(G^T, G^N)$*, and* $\widetilde{e}(G^T, G^N)$ *is defined by:*

$$\widetilde{e}(G^T, G^N) = \{e' : f\left(w \mid e(G^N, w) = e'\right) = f\left(v \mid e(G^T, v) = e'\right)\}.$$

In this equilibrium the incumbent is reelected with probability $\pi(G^i, G^T, G^N)$*, if he is of the type i (where* $\pi(.)$ *is given by equation 19).*

Proof. See Appendix D. ■

An equilibrium in which both policymakers choose the same policy cannot exist. If actions prescribed for the two types were the same, for every exchange rate level compatible with equilibrium, the median voter would attribute probability p^N to the event of a nontradable type incumbent. Then the tradable type incumbent would have an incentive to choose G^{T*}. Similarly, the nontradable type would choose G^{N*}. Since $G^{T*} < G^{N*}$, this cannot be a "same-policy" equilibrium[22].

"Different-policies" equilibrium Let $\overline{e}^i$ and $\overline{e}^i_{+1}$ be the average RER before election and after election, respectively, when the incumbent is of type i, and let $\pi^T = \pi(G^T, G^T, G^N)$ and $\pi^N = \pi(G^N, G^T, G^N)$. The dynamics of the exchange rate is generated by the election of a policymaker of the same type of the incumbent (including reelection) or of a different type. The matrix:

$$P = \begin{pmatrix} \left[\pi^T + \left(1-\pi^T\right)p^T\right] & \left[\left(1-\pi^T\right)p^N\right] \\ \left(1-\pi^N\right)p^T & \pi^N + \left(1-\pi^N\right)p^N \end{pmatrix} = \begin{pmatrix} P^T \\ P^N \end{pmatrix} \tag{22}$$

represents the probabilities associated with those transitions. The first row P^T represents the transition probabilities between an incumbent of tradable type before election to incumbents of a tradable type and a nontradable type after election, respectively. Similarly, the second row P^N represents the transition probabilities when the incumbent's type is nontradable.

[22] We avoid the terms pooling and separating equilibrium, used in earlier versions, because types cannot be perfectly inferred from observed signals even when different types of policymakers choose different policies.

Let ΔE represent the matrix of the changes in conditional average levels of exchange rates after elections:

$$\Delta E = \begin{pmatrix} \overline{e}_{+1}^T - \overline{e}^T & \overline{e}_{+1}^N - \overline{e}^T \\ \\ \overline{e}_{+1}^T - \overline{e}^N & \overline{e}_{+1}^N - \overline{e}^N \end{pmatrix} = \begin{pmatrix} \Delta E^T \\ \\ \Delta E^N \end{pmatrix}. \tag{23}$$

The first row ΔE^T is composed of the changes in average level when the incumbent is tradable and the elected policymaker is tradable and nontradable, respectively. The second row ΔE^T has the equivalent vector for a nontradable incumbent. Note that all terms are positive, with exception of $\overline{e}_{+1}^N - \overline{e}^T$, which corresponds to the situation where a tradable incumbent is replaced by a nontradable policymaker.

When the incumbent is of the tradable type, the average devaluation, $\Delta\overline{e}^T$, is given by the following inner product:

$$\Delta\overline{e}^T = P^T.\Delta E^{T\prime}.$$

Note that, on the one hand, the sign of $\Delta\overline{e}^T$ depends on parameter values, since the second term of ΔE^T may be negative. On the other, if the incumbent is of the nontradable type, average devaluation after elections equals:

$$\Delta\overline{e}^N = P^N.\Delta E^{N\prime}.$$

As both terms are positive, there will be an average exchange rate depreciation when the incumbent is of the nontradable type.

Finally, the unconditional average RER devaluation after elections is given by:

$$\begin{aligned} \Delta\overline{e} &= p^T \Delta\overline{e}^T + p^N \Delta\overline{e}^N \\ &= p^T P^T.\Delta E^T + p^N P^N.\Delta E^N. \end{aligned}$$

The first term can be negative, but the second term is always positive.

As an illustration we compute equilibrium results for a set of parameter values, using two different values for the relative weight to nontradable sector utility ($\gamma_N = 4$ and $\gamma_N = 3$). The results are shown in Table 1. In the first two columns we present the results for $\gamma_N = 4$. The nontradable type of incumbent chooses higher expenditures before elections in order to signal his type. Thus, when a nontradable incumbent is reelected the exchange rate will depreciate 1%, on average. There will be an even higher exchange rate depreciation, 11% on average, when a tradable type of policymaker is reelected. This type chooses minimum expenditures level after elections, but a higher and positive level before elections, so as to reduce her chance of being singled out as a tradable type and increase her probability of reelection.

The nontradable type of incumbent has a higher probability of being reelected than the tradable one (92% against 73%)[23]. There is an exchange rate depreciation when the nontradable type of incumbent is succeeded by a nontradable, and an even stronger average depreciation when he is succeeded by a tradable type of policymaker. As a result, there is an expected 6.8% exchange rate depreciation conditioned to the incumbent be of nontradable type. When the incumbent is of the tradable type, there is a RER depreciation when he is succeeded by a policymaker of her own type, but there is a RER appreciation when his successor is of the nontradable type. There is still a 1% expected RER depreciation conditioned to a tradable type incumbent. Unconditional average depreciation of 3.9% after elections is then generated.

One may find unintuitive the fact that in our numerical example the probability of reelection for the tradable type of incumbent is also larger than 50%. That is, even when the incumbent is tradable, with more than 50% probability, the likelihood that the exchange rate was generated by a non-tradable incumbent policy is tipically

[23]One may find unintuitive the fact that in our example the probability of reelection for the tradable type of incumbent is also larger than 50%. This results from the skewness of the trade shock distribution, which is assumed to be lognormal. The cutoff trade shock level is certainly at a point to the right of the peak of the distribution for the tradable incumbent. However, it may happens, as in our example, that the probability of a trade shock higher than that level is superior to 50%. In other words, in this case, even when the incumbent is tradable, with more than 50% probability, the likelihood that the exchange rate was generated by a non-tradable incumbent policy is higher than the likelihood that it was generated by a tradable incumbent policy.

slightly higher than the likelihood that it was generated by a tradable incumbent policy. On the other hand, for those less likely realizations where the tradable incumbent is not reelected, the likelihood that the observed exchange rate was generated by a tradable type of incumbent is substantially higher than the likelihood that it was generated by a non-tradable incumbent. Those results are due to the skewness of the trade shock distribution[24].

We also show how the relative weight to nontradable sector utility γ_N affects the characteristics of generated exchange rate cycle. With a smaller value for γ_N a 2.4% average exchange rate appreciation is generated when the incumbent is of the tradable type. Nevertheless, it is more than compensated by the exchange rate depreciation of 6.1% generated by a nontradable sector incumbent. As a result the unconditional mean of the exchange rate depreciation is 1.8%.[25]

4 Concluding Remarks

In this paper we developed a theoretical model based on the distributive conflict over macroeconomic policy which generates a political-economic cycle. The model is focused on the exchange rate, whose management is the bone of contention between the tradable and nontradable sector. However, our approach can be generalized to other conflicts that either have no or little effect on aggregate economic activity. A good example is the struggle over the allocation of budget appropriations among social groups. While one group, say industrialists, count on its ability to pressure

[24] The cutoff trade shock level is certainly at a point to the right of the peak of the distribution for the tradable incumbent. However, it may happens, as in our example, that the probability of a trade shock higher than that level is superior to 50%.

[25] For some parameter values the model generates average appreciations after elections. The driving force is the substantial appreciation that may occur when a tradable type of incumbent is defeated by a nontradable opponent. In those cases, this effect outweighs the devaluation that occurs in the three other possible configurations: tradable type of incumbent reelected and nontradable type of incumbent followed by either type.

government officials at smoke-filled rooms, other groups, such as consumers, command an electoral majority. This type of approach to political cycles has been advocated by Drazen (2001).

Another innovative feature of our approach is that economic policy is not observed by voters, given that macroeconomic performance results from both policy and exogenous shocks. This way of modelling the influence of policy on elections results has a further realistic implication: exogenous shocks also affects elections through their effect on macroeconomic performance.

Finally, while our model emulates a two-party system, we think that it is also perfectly applicable to multiparty system because the latter, as a rule, give rise to coalition governments, and such governments render the voter's problem of knowing the actual type of the policymaker even more accute. Therefore, as Latin America features both two-party and multiparty systems, our model provides a valid theoretical representation of political-economic cycles in the countries of the region.

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Appendix

A Lobby and policymaker's preferences

This appendix shows how lobbying by the tradable sector may tilt a politician's utility function towards the preferences of that sector, which is represented in equation 8 by a lower value given to the weight on the nontradable sector utility function, γ_i. We are inspired by Persson and Tabellini (2000, chapter 7) in this derivation. The tradable-sector lobby offers a politician a contract promising to pay the contribution schedule $c(G)$, conditional on the chosen spending level. The contribution schedule is designed so as to maximize trabable sector citizens welfare. The government's objective function is a weighted average of society's welfare and the contribution received, as in:

$$v(G) = W(G) + \theta c(G), \tag{26}$$

where θ is a measure of the government's nonbenevolence, for it is the weight he places on the contribution received from the lobby. The welfare function $W(G)$ is assumed to be a weighted average of the utility of the two types of citizens:

$$W(G) = \gamma F^N(G) + F^T(G),$$

There is a random matching between a politician and the lobbist from the tradable sector. The matching happens with probability p. In this case the tradable lobby gives a contribution proportional to the gain they will achieve with the change of policy. Hence, the contribution is given by the following per capta value:

$$c(G) = b\left[F^T(G) - F^T(G^*)\right], \tag{27}$$

where G^* is the spending level that the government would choose in case of no contribution and b is a constant that will be optimally chosen by the lobbist. Then G^* maximizes the welfare function $W(G)$, subject to the restriction that $G^* \in [0, \overline{G}]$. We assume that there is an interior solution[26], which in this case is given by:

$$G^{i*} = nE^N \frac{1 - (\gamma+1)(1-\alpha)^2}{1 - (\gamma+1)(1-\alpha)}.$$

[26] The condition for an interior solution is that we should impose $n > \frac{1}{(1-\alpha)^2} - 1$.

If G is chosen instead, the tradable sector will gain:

$$\begin{aligned} F^T(G) - F^T(G^*) &= \ln\left((1-\alpha) nE^N - G_t\right) - (1-\alpha)\ln\left(nE^N - G_t\right) \\ &\quad - \ln\left((1-\alpha) nE^N - G_t^*\right) - (1-\alpha)\ln\left(nE^N - G_t^*\right). \end{aligned}$$

Substituting the value of the contribution in equation 27 into the government's objetive function represented by 26, we have that, in the case of a successful lobby, the government's utility will be given by:

$$W(G) + \theta b\left[F^T(G) - F^T(G^*)\right],$$

which yields:

$$W^L(G) = \gamma F^N(G) + (1+\theta b) F^T(G). \tag{28}$$

The optimally chosen spending level $G^L(b)$ is defined as:

$$G^L(b) = \arg\max_G \ \gamma F^N(G) + (1+\theta b) F^T(G). \tag{29}$$

The optimal ratio b is chosen so as to maximize the tradable citizen welfare, net of the contribution made. It is then define as:

$$b^L = \arg\max_b \ F^T\left(G^L(b)\right) - b\left[F^T\left(G^L(b)\right) - F^T(G^*)\right]. \tag{30}$$

b^L satisfies the following first order condition:

$$\left(1-b^L\right) F^{T\prime}\left(G^L(b)\right) \frac{dG^L\left(b^L\right)}{db} = F^T\left(G^L\left(b^L\right)\right) - F^T(G^*). \tag{31}$$

It is easy to show that $b^L \in (0,1)$. Consider the difference between the left and the right hand side of the equation as a function of b:

$$L(b) = (1-b) F^{T\prime}\left(G^L(b)\right) \frac{dG^L(b)}{db} - F^T\left(G^L(b)\right) - F^T(G^*).$$

Suppose $b=1$. It is easy to check that $G^L(1)$ is preferable to G^* for the tradable sector, for the function the policymaker maximizes to choose $G^L(1)$, given by equation 28, assigns more weight to the tradable sector utility than $W(G)$, which is the maximized function that yields G^*. Hence, the second term of $L(b)$ is positive. As the first term is zero when $b=1$, we have that $L(1) < 0$. When $b=0$, $G^L(0) = G^*$, and the second term of $L(b)$ is zero. The first term is positive, yielding a positive value for $L(0)$. As $L(.)$ is a continuous function, the intermeditate value theorem assures us that there is a $b \in (0,1)$ such that $L(b) = 0$ and the condition 31 is satisfied.

The optimal contract will then pay:

$$b^L \left[F^T(G) - F^T(G^*)\right],$$

where $b^L \in (0,1)$, defined in by equation 31. To simplify notation, let $g^L \equiv G^L\left(b^L\right)$.

The politician utility function in the case of a sucessful lobbying will be:

$$v(G) = \gamma F^N(G) + \left(1 + \theta b^L\right) F^T(G), \tag{32}$$

and the tradable sector net per capita gain will be:

$$\left(1 - b^L\right) F^T\left(g^L\right) + b^L F^T(G^*). \tag{33}$$

In case the lobby is unsucessful, since the politician will not receive a contribution, she will not distort her preferences by increasing the relative weight on the tradable sector's preference. Then the politician's welfare function will be given by:

$$W(G) = \gamma F^N(G) + F^T(G), \tag{34}$$

We could then normalize the weight on the tradable sector as 1 and represent the preferences in terms of the relative weight on the nontradable sector. Any politician will have preferences given by:

$$v_i(G) = \gamma^i F^N(G) + F^T(G), \tag{35}$$

where the $\gamma_T = \frac{\gamma}{(1+\theta b^L)}$ and $\gamma_N = \gamma$. Thus, we call the politician which set a deal with the lobby group, a nontradable type. Otherwise she will be of a tradable type. Obviously $\gamma^N > \gamma^T$, as in the text.

B Equilibrium under full information

Proposition 5 *In the complete information version of the game there is only a subgame perfect equilibrium. In this equilibrium, players will choose the following strategies: i) a tradable type of incumbent will choose expenditure level G^{*N}, both before* *and after election, where G^{N*} is the expenditure level in the set $\left[0, \overline{G}\right]$ that maximizes V_N^P; ii) a nontradable type incumbent will choose expenditure level G^{T*}, both before and after election, where G^{T*} is the expenditure level in the set $\left[0, \overline{G}\right]$ that maximizes V_T^P; iii) $G^{N*} \geq G^{T*}$; iv) the median voter will vote for the incumbent if she is of the nontradable type, or if the opponent is of the tradable type, and for the opponent, otherwise.*

Proof. The complete information case may be solved by backward induction. At the period after election the policymaker actions will not affect her future utility, and she will choose the expenditure level that maximizes the expected value of her current indirect utility function, represented by equation 9. Let G^{N*} and G^{T*} be the argument that maximizes $E\left[V_i^P(G,u)\right]$, for $i = N, T$, that is, for the policymaker that favors nontradable and tradable sectors, respectively. Given the concavity of V_i^P in G, $G^{N*} \geq G^{T*}$.

When voting, citizens know this, and the median voter strictly prefers electing a nontradable type policymaker. If the incumbent is nontradable and the opponent is tradable, she votes for the incumbent, if the reverse is true she votes for the opponent, and if both the incumbent and the opponent are of the same type, the median voter is indifferent between them. To untie, we suppose the incumbent is reelected.

At the period before elections, the policymaker knows her reelection is independent of her pre-election choice of expenditures. The tradable type policymaker chooses expenditures so as to maximize:

$$E\left\{V_T^P(G_t,u_t) + \beta\left[pV_T^P\left(G^{N*},u_t\right) + (1-p)\,V_T^P\left(G^{T*},u_t\right)\right]\right\},$$

where β is the intertemporal discount rate. It is clear that maximizing the expected intertemporal utility function is equivalent to maximizing expected pre-election utility. She will choose minimum expenditures level G^{T*}.

Similarly, the nontradable policymaker chooses expenditures so as to maximize:

$$E\left[V_N^P(G_t,u_t) + \beta V_N^P\left(G^{N*},u_t\right)\right].$$

Note that this type of policymaker is always reelected. Here, again, optimal policy will be the one that maximizes current utility, which is maximum expenditures level G^{N*}. ■

C Proof to Proposition 1

Using the RER definition in equation 7 to calculate the shocks w and v in equation 14, we get that:

$$w(\widehat{e}) = \frac{(1-\alpha)\left(nE^N - G^N\right)}{\alpha\widehat{e}} < \frac{(1-\alpha)\left(nE^N - G^T\right)}{\alpha\widehat{e}} = v(\widehat{e}), \text{ given that } G^N > G^T.$$

The shock is log-normally distributed, hence, its density function has an unique maximum point, which we will denote x. Given that $w(\widehat{e}) < v(\widehat{e})$ and that x is the shock that maximizes the density function, we have that:

$$\text{if } w(\widehat{e}) < v(\widehat{e}) \leq x \qquad \text{then } f(w(\widehat{e})) < f(v(\widehat{e})) \text{ and} \qquad \text{(Case A)}$$

$$\text{if } x \leq w(\widehat{e}) < v(\widehat{e}) \qquad \text{then } f(w(\widehat{e})) > f(v(\widehat{e})). \qquad \text{(Case B)}$$

On the one hand, for low observed RERs that yield $x \leq w(\widehat{e})$ case A is true, and so is condition 14. The incumbent will be reelected. On the other, for high observed RERs that yield $w(\widehat{e}) < v(\widehat{e}) \leq x$ case B is true. In this case the incumbent is not reelected.

Finally, we have to investigate the case when $w(\widehat{e}) < x < v(\widehat{e})$. We know that when $x = v(\widehat{e})$ case B is true, that is, $f(w(\widehat{e})) - f(v(\widehat{e})) < 0$, whereas when when $w(\widehat{e}) = x$ case A is true, that is $f(w(\widehat{e})) - f(v(\widehat{e})) > 0$. Furthermore, in this regions $f(w(\widehat{e}))$ is strictly increasing in $w(\widehat{e})$ because $w(\widehat{e}) < x$ and $f(v(\widehat{e}))$ is strictly decreasing in $v(\widehat{e})$ because $x < v(\widehat{e})$. Therefore, $f(w(\widehat{e})) - f(v(\widehat{e}))$ is strictly decreasing in $\widehat{e}$. The will be a value for the observed RER, $\widetilde{e}$, such that:

$$f(w(\widetilde{e})) = f(v(\widetilde{e})),$$

and,

$$\begin{aligned} f(w(\widehat{e})) &< f(v(\widehat{e})) \text{ for } \widehat{e} > \widetilde{e} \\ f(w(\widehat{e})) &> f(v(\widehat{e})) \text{ for } \widehat{e} < \widetilde{e}. \end{aligned}$$

D Proof to Proposition 4

Let $G^i\left(G^T, G^N\right)$ be the set of solutions to problem 21. Given that it is the solution set to the maximization of a continuous function over a compact set, it is an upper hemi-continuous correspondence. Then the existence follows from an application of the

Kakutani's fixed point theorem to the hemicontinuous correspondence vector $G^* = \begin{pmatrix} G^N(G^T, G^N) \\ G^T(G^T, G^N) \end{pmatrix}$.

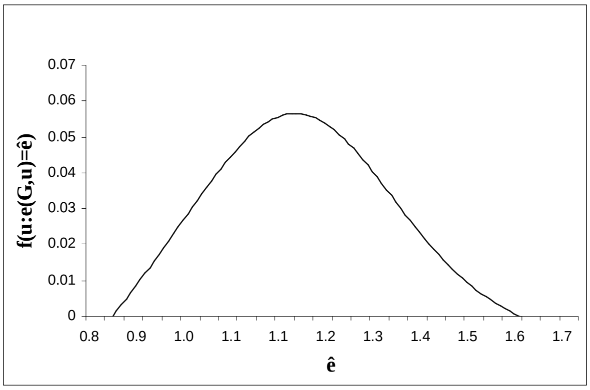

Figure 1: Trade shock conditional density function

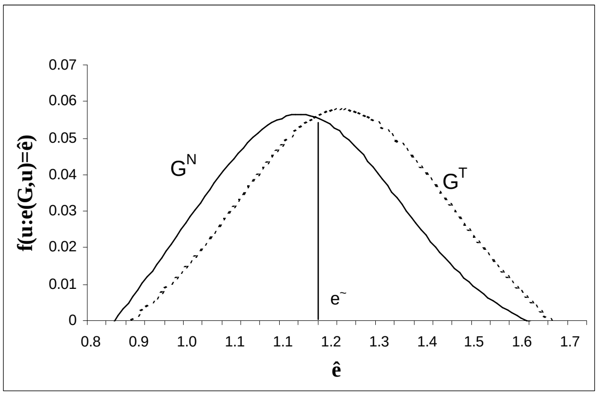

Figure 2: Voting rule

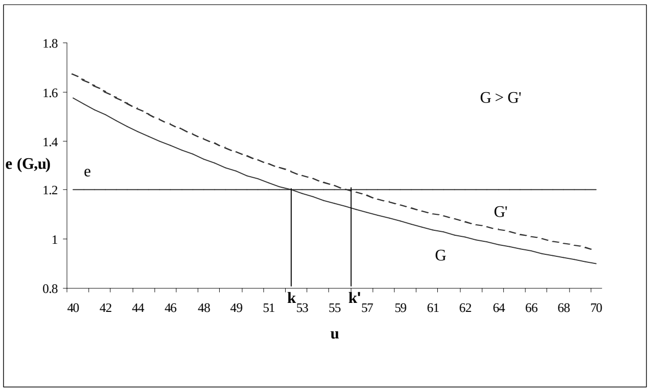

Figure 3: Real Exchange Rate

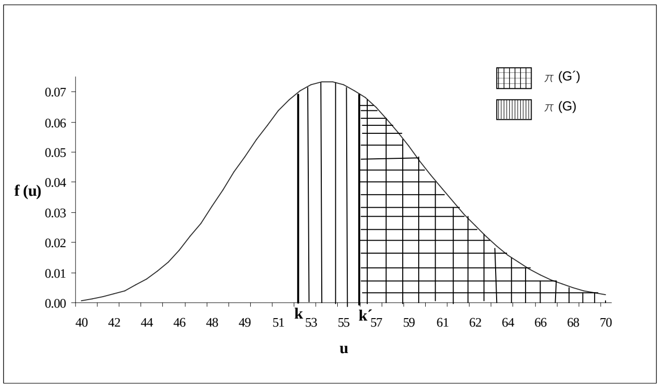

Figure 4: Reelection probability

Table 1: Numerical Examples

$\alpha = 0.3$, $E^N = 25$, $n = 2$, $\mu = 4$, $\sigma = 1$, $p^N = 0.5$, $\gamma_T = 1$

		$\gamma_N = 4$		$\gamma_N = 3$	
Policymaker's type		**N**	**T**	**N**	**T**
Optimal pre-electoral exp.	G^i	29.2	4.4	26.7	5.5
Optimal post-electoral exp.	G^i_{+1}	29	0	17.3	0
Reelection probability	π^i	92%	73%	91%	74%
Average pre-electoral RER	$\overline{e}^i$	1.03	2.26	1.14	2.36
Average post-electoral RER	$\overline{e}^i_{+1}$	1.04	2.48	1.16	2.48
Average depreciation	$\Delta\overline{e}^i$	6.8%	1%	6.1%	-2.4%
Average ex-ante depreciation	$\Delta\overline{e}$	3.9%		1.8%	