

Electoral Uncertainty and the Volatility of International Capital Flows*

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First Draft: December 2002

Abstract

I study a small open economy in which electoral uncertainty affects and is affected by the volatility of capital inflows. Two candidates run for office; the winner chooses tax policy, which affects investment returns. A pro labor electoral victory results in a "sudden stop" in investment and capital flows, reflecting that the pro labor government makes suffers from a capital levy problem. The pro business candidate does not suffer from time inconsistency; however, a pro business government becomes less attractive when the cost of external credit and the foreign debt are larger. Hence the probability distribution of the electoral outcome depend on the size of the external debt, which itself depends on such a probability distribution. I characterize the model's politico economic equilibria and find several implications. Politico economic links exacerbate the responses of financial variables to exogenous shocks. Self fulfilling equilibria may exist. Policies that alleviate the pro labor candidate's commitment problem, such as pre electoral policy agreements, contribute not only to financial stability but also, and perhaps more surprisingly, to the chances of a pro labor victory in the elections.

*Comments are very welcome. I am indebted to Nouriel Roubini and Alfredo Thorne for useful discussions on the Brazilian experience. I acknowledge and thank the National Science Foundation's financial support. Of course, the views, errors, and shortcomings here are my sole responsibility.

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1. Introduction

It is undisputable that recent market volatility in Brazil cannot be fully understood without reference to its electoral outlook. While the Brazilian episode has been particularly prominent, it is not hard to find other examples in which elections seem to have disrupted capital markets: Korea in 1997-98 immediately comes to mind. And in fact, there is empirical evidence that supports the view that there is a systematic connection between elections and financial vulnerability (see, for instance, Bussiere and Mulder 1999).

This paper is a theoretical attempt to understand this problem and its implications. I develop a simple model of a small open economy, inspired by this year's Brazilian experience, in which entrepreneurs and workers are about to elect a government. There are two electoral candidates, one "pro business" and the other "pro labor," whose objectives are respectively biased towards entrepreneurs or workers.

In the model, the electoral outlook, summarized by the probabilities that one or the other candidate wins the election, affects economic outcomes. Entrepreneurs, in particular, are assumed to have access to an investment which can only be financed with the help of foreign lenders. The electoral outcome matters for the investment decision because the incoming government will choose tax policy and hence influence the profitability of the investment. Hence, debt contracts, economic allocations and decisions, and the cost of credit, will all depend on the probability distribution of the electoral outcome.

Crucially, the pro labor candidate suffers from a *capital levy problem*: given his social preferences, he cannot commit not to impose excessively high taxes on investment return. Hence, under conditions identified in the analysis, a pro labor victory in the elections results in a halt to external financing or, using Calvo's (1998) term, a *sudden stop*. In contrast, the pro business candidate is assumed to be sufficiently biased in favor of entrepreneurs that he can effectively commit to low capital taxes; hence a pro business victory results low capital income taxes and the continuation of capital inflows.¹ The analysis underscores that electoral uncertainty is in fact crucial to observe financial volatility. In the absence of elections, a sudden stop cannot be observed: either investment is not initiated and foreign capital does not come at all, or the flow of foreign capital is stable.

Not only does electoral uncertainty affect the debt problem, but also causation runs in the opposite direction. A larger debt makes the probusiness candidate *less* attractive to voters relative to the prolabor candidate. The reason is simple. If the prolabor candidate wins the elections, investments are halted; conversely, investment returns are reaped and debt payments made only after a probusiness victory. Hence a larger debt reduces the entrepreneurs' payoff conditional on a pro business victory while leaving unaffected the payoff conditional on a prolabor victory.

Hence, under natural assumptions on voting behavior, the model leads to the simultaneous determination of the size of the debt, credit spreads, and the probability distribution of the electoral outcome. I characterize the resulting *politico-economic* equilibria and its implications. One finding is that the response of endogenous variables to exogenous shocks may be magnified by the politico-economic links. An increase in the world interest rate, for instance, increases the cost of credit not only directly, but also through its effect on electoral outcomes and policy uncertainty, which determine the credit spread. A related implication is that there may be multiple equilibria. Heightened expectations of a pro labor victory may be self fulfilling, as they increase the cost of credit, the debt problem, and the relative popularity of the pro labor candidate. In such a case, the expectations of the world capital market are key in determining both capital inflows and political outcomes.

The analysis suggests a number of interesting lessons for policy. A pre electoral commitment by both candidates to implement a "market friendly" tax policy, as observed during the Korean experience of 1997-98, helps stabilizing capital flows by eliminating the pro labor candidate's time inconsistency problem. In addition,

¹The probusiness candidate is thus similar to Rogoff's "conservative central banker."

and more surprisingly, such a commitment has a nontrivial effect on the elections: the likelihood of a pro labor victory increases. The reason is, simply, that such an agreement makes the two candidates more similar to each other from the viewpoint of voters. More generally, I argue that any policy that helps overcoming the commitment problem of the pro labor candidate is likely to enhance international capital flows and, at the same time, to increase the probability of a pro labor victory in the elections. Hence, and in particular, the view that IMF packages or other financial assistance programs have a significant impact on domestic politics turns out to be justified in the context of this model. But, perhaps unexpectedly for that view's proponents, the main political beneficiaries are likely to be those parties perceived as least market friendly.

The interaction between politics and the volatility of international capital flows has been often identified as a prime area for research. Theoretical efforts at understanding such an interaction are, however, hard to find. In Chang (2002) I recently presented an analysis of links between financial crises and political crises. That paper, however, does not emphasize the important role of elections, which are central here. The modeling approach in this paper borrows many elements from the literatures on time consistency as well as political economics. For a masterful summary of both, see Persson and Tabellini (2000).

The paper proceeds as follows. Section 2 discusses the environment and private behavior, given economic policy and the probability distribution of electoral outcomes. Section 3 discusses economic equilibria, still taking as given the political outcome distribution. Section 4 then discusses how political outcomes and economic outcomes are determined simultaneously. Section 5 examines some policy implications, and Section 6 concludes.

2. The Environment

I shall focus on a small open economy populated by a continuum of *entrepreneurs* and *workers* who elect a government during the timeframe of analysis. The size of the population will be normalized to one, and the number of entrepreneurs as a fraction of the total population will be denoted by χ . There is a preelectoral period ($t = 0$) and a post election period ($t = 1$), and only one good, which is freely traded and costs one unit of an international currency (*dollar*) in the world market.

Elections take place at the end of period 0. There is a "pro business" candidate and a "pro labor" opponent. At the end of period 1, the newly elected government

must pick a fiscal package (a combination of taxes on capital income and labor income) in order to finance an exogenous level of expenditure G .

In this section we study the environment and the behavior of entrepreneurs and workers, taking as given the probability of each candidate's electoral victory as well as the policy chosen by the electoral winner. The endogenous determination of these variables will be the central subject of later sections.

2.1. Entrepreneurs

The representative entrepreneur has access to an investment project that requires an initial outlay of I dollars at $t = 0$. After observing the electoral outcome at the beginning of period 1, the project can be discontinued at no further cost. If the project is nevertheless continued, an additional λI dollars need to be added in order to keep the project alive; in that case the project returns RI dollars at the end of period 2.²

The entrepreneur is risk neutral, maximizes expected consumption in period 2, and has no initial funds. To finance her investment, she seeks funding from the international capital market, represented here by a continuum of risk neutral foreign investors. The dollar safe interest rate between periods 0 and 1 is $\rho \geq 0$.

The entrepreneur is assumed to design a loan contract that maximizes her expected final consumption subject to providing foreign investors with an expected return no less than the world interest rate.³ Contracts are assumed to be fully enforceable but they must respect limited liability: at any point, the entrepreneur cannot pay more than she has then. It is easy to see that, in the absence of other distortions, the investment would be made if

$$R - \lambda \geq 1 + \rho.$$

However, the contracting problem is complicated by the possibility of taxation: the government may require taxes to be paid on the investment return. From the viewpoint of the contract, taxes are the only source of uncertainty, and their realization becomes known at the beginning of period 1, when the electoral outcome is realized. Hence a contract must stipulate whether the project is started and, after the electoral outcome is observed, whether the project is continued and, if so, how

²The investment technology is hence a simplified version of that in Holmstrom and Tirole (1997).

³Note that loan contracts are assumed to be endogenous and optimal, so nothing in the analysis depends on arbitrary assumptions about asset market imperfections.

the after tax return on the investment is distributed between the entrepreneur and the foreign investors.

To characterize the optimal contract, consider the investment continuation decision at the start of period 1. Suppose that the pro business candidate has won the election and is expected to impose a tax on capital income at rate τ . Then continuing the project is efficient if

$$(1 - \tau)R \geq \lambda \tag{2.1}$$

We will focus on equilibria in which this requirement is satisfied, and hence investment projects and capital inflows continue in the event of a pro business victory in the elections. In contrast, if the pro labor candidate wins the elections, in equilibrium she imposes such a large capital tax rate that it is efficient for projects to be discontinued.⁴

Because of limited liability, the payment to foreign investors after a pro labor victory can only be zero. Let D denote the payment promised to foreign investors if the probusiness candidate wins the election. If investment projects are to be financed at $t = 0$, outside investors must be paid at least their opportunity cost of funds, which requires that⁵

$$p(D - \lambda I) = (1 + \rho)I$$

where p denotes the probability that of a pro business victory. Hence the entrepreneur's debt obligation is:

$$D = \left(\lambda + \frac{1 + \rho}{p}\right)I \tag{2.2}$$

Finally, for the project to be started, the entrepreneur must expect a positive return. This requires, in particular, that the entrepreneur's payoff after a probusiness victory be nonnegative:

$$(1 - \tau)RI - D \geq 0$$

(In the event of a pro labor victory, the entrepreneur's payoff is zero, as the investment is discontinued.) Inserting 2.2 into the previous inequality we obtain that the initial investment will take place if:

$$p[(1 - \tau)R - \lambda] \geq 1 + \rho \tag{2.3}$$

⁴That is, the continuation condition 2.1 is violated.

⁵I impose, as usual, that outside investors are held to their reservation value.

Summarizing, if 2.3 holds, the entrepreneur and the foreign investors will agree to invest the I dollars needed to start the project. In addition, if the pro business candidate wins the election, foreign investors will add λI dollars to continue the project, in whose case they will be repaid D , as given by 2.2, at the end of period 1. In the event of a pro labor victory, the investment project is cancelled with no further obligations.

Two aspects of this problem are worth noting. A pro labor victory is followed by an investment collapse and a halt in capital flows (a *sudden stop*, to use Calvo's (1998) term). Electoral uncertainty is, in fact, crucial for observing sudden stops. If the probusiness candidate is sure to win the election, one would never observe investment projects to be discontinued. On the other hand, a sure pro labor victory in the elections result in no projects being started at all.

Perhaps more importantly, the amount of debt D depends inversely on p , the probability of a pro business victory. This reflects the fact that foreign investors lose money after a pro labor victory. To be compensated for that possible loss, they must make enough money when the pro business candidate wins the elections. Notably, an increase in p reduces the entrepreneurial payoff when a pro business government is elected.

2.2. Workers

To sharpen focus, I model workers as simply as possible. Workers produce and consume only at the end of period 1. The typical worker can produce final goods with a constant returns technology: each hour worked results in A units of output. Then his decision problem is summarized by

$$W(\gamma) = \text{Max } c - H(l) \text{ subject to } c \leq (1 - \gamma)Al$$

where γ denotes the tax rate on labor income, c consumption, l hours worked, and $H(\cdot)$ is a smooth, strictly increasing, strictly convex function.

The indirect utility function $W(\gamma)$ gives the representative worker's welfare as a function of the tax rate on labor income. The optimal choice of labor effort will be denoted by $l = L(\gamma)$ and given by the first order condition

$$(1 - \gamma)A = H'(L(\gamma))$$

Clearly L is a decreasing function of γ . Finally, the envelope theorem yields $W'(\gamma) = -AL(\gamma) < 0$: workers' welfare falls with labor taxes, as intuitively obvious.

3. Exogenous Electoral Outcomes

This section studies government policy choices and the resulting *economic* equilibrium, taking the distribution of the electoral outcome as given. Particular attention is given to conditions under there is positive investment, as well as the relation between foreign debt and welfare. Also, I shall identify the conditions under which the economic equilibrium is of the sudden stop type.

A natural but key assumption is that the winner of the elections can only set policy after the elections, that is, at the end of period 1. Effectively, this means that the winning candidate must take as given the amount of investment projects still alive. In addition, I assume that the objectives of each candidate are given by a weighted average of the welfare of entrepreneurs and workers. However, the objective function of the pro business candidate assigns a larger weight to entrepreneurs than the pro labor candidate's function. The main consequence is that, under assumptions to be spelled out below, a pro labor candidate suffers from a *capital levy* problem of the type emphasized in the time inconsistency literature. In contrast, the pro business candidate is assumed to be sufficiently biased in favor of investors that it can credibly promise low capital taxes.

3.1. A pro business government

To analyze the decision problem of the pro business government, let α denote the weight that it assigns to entrepreneurs' welfare. Suppose that investment projects are undertaken at $t = 0$, and are continued after a pro business victory in the elections. Then the pro business government's problem is to maximize

$$\alpha \text{Max} \{0, (1 - \tau)RI - D\} + (1 - \alpha)W(\gamma) \quad (3.1)$$

subject to

$$G \leq \tau\chi RI + (1 - \chi)\gamma AL(\gamma). \quad (3.2)$$

The choice variables are the tax rates τ and γ and assumed, for simplicity, to be restricted to the unit interval. The government takes the optimal labor choice function $L(\cdot)$, the workers' welfare function $W(\cdot)$, the return on investment RI , and the amount of debt D as given.

This problem is standard except for the presence of the foreign debt D in the objective function. This distortion reflects the assumption that the government's objectives do not include the well being of foreign investors. To characterize the solution, it is convenient to study the optimal choice in two separate regions of

the choice space: tax pairs that give domestic entrepreneurs a zero payoff, and tax pairs that give entrepreneurs a positive payoff.

(i) Domestic entrepreneurs will have a zero payoff if $(1 - \tau)RI - D \leq 0$, that is, if

$$\tau \geq \hat{\tau} = \frac{RI - D}{RI}$$

Clearly, if the optimal solution is in this region, it must also minimize the use of the labor tax, as further increases in τ do not affect the government's objective function and help decrease the labor tax rate. Intuitively, once the domestic entrepreneur's income has been totally expropriated, increases in the capital tax rate only affect the foreign investors' payoff, which the government ignores. It follows that the optimal choice must be to use only capital taxes if $\chi RI \geq G$, that is,⁶

$$\tau_e = G/\chi RI \text{ and } \gamma_e = 0 \quad (3.3)$$

If $\chi RI < G$, the solution is to expropriate capital income and finance the rest with labor taxes:

$$\tau_e = 1 \text{ and } \gamma_e = T\left(\frac{G - \chi RI}{1 - \chi}\right) \quad (3.4)$$

where $T(z)$ is the minimum labor tax rate needed to raise z dollars.⁷

Finally, if the optimal policy gives entrepreneurs a zero payoff, the government's objective function takes the value $(1 - \alpha)W(\gamma_e)$.

(ii) The interesting case, of course, is when the optimal policy gives entrepreneurs a positive payoff, which requires $\tau < \hat{\tau}$. The easiest way to characterize that case is to use the government budget constraint 3.2 to eliminate τ from the objective, which can then be written as

$$\alpha \frac{1 - \chi}{\chi} \gamma AL(\gamma) + (1 - \alpha)W(\gamma) \equiv V(\gamma)$$

up to a constant. This is to be maximized by choice of γ ; then τ is given by the budget constraint 3.2.

The derivative of V is

$$V'(\gamma) = \left(\frac{\alpha}{\chi} - 1\right) AL(\gamma) + \alpha \left(\frac{1 - \chi}{\chi}\right) \gamma AL'(\gamma)$$

⁶Strictly speaking, the definition below assumes that $\tau_e \geq \hat{\tau}$. If not, the solution lies in the region in which $\tau \leq \hat{\tau}$.

⁷That is, $T(z)$ is the minimum γ in $[0, 1]$ such that $\gamma AL(\gamma) = z$. This will be well defined if $\gamma AL(\gamma)$ is strictly concave and attains a maximum in $(0, 1)$, which I assume. In addition, I assume that $G/(1 - \chi)$ is below that maximum.

Observe that V' must be negative if α is less than χ . In other words, a government with a low α will suffer from the capital levy problem: *ex post*, that government will find it optimal to finance as much of G as possible by taxing capital income.

Hence we need to assume that $\alpha > \chi$, that is, that the pro business government is biased in favor of entrepreneurs. To proceed, define γ^* to be the labor tax rate at which $V'(\cdot)$ vanishes, that is

$$-\frac{\gamma^* L'(\gamma^*)}{L(\gamma^*)} = \frac{\alpha - \chi}{\alpha(1 - \chi)} \quad (3.5)$$

Then, if $G \leq (1 - \chi)\gamma^*AL(\gamma^*)$, the tax choice ⁸

$$\tau_b = 0 \text{ and } \gamma_b = T\left(\frac{G}{1 - \chi}\right)$$

is optimal in the region in which $\tau \leq \hat{\tau}$.

If $G > (1 - \chi)\gamma^*AL(\gamma^*)$, the optimal choice in the region in which $\tau \leq \hat{\tau}$ involves a positive capital tax rate. The optimal tax on labor is then given by 3.5 and the tax rate on capital income is given by the budget constraint 3.2:

$$\gamma_b = \gamma^* \text{ and } \tau_b = \frac{G - (1 - \chi)\gamma^*AL(\gamma^*)}{\chi RI}$$

For τ_b just defined not to exceed $\hat{\tau}$,

$$G \leq \hat{\tau}RI + (1 - \chi)\gamma^*L(\gamma^*) = \chi(RI - D) + (1 - \chi)\gamma^*AL(\gamma^*) \quad (3.6)$$

Finally, the solution of the overall problem is (τ_b, γ_b) if it implies a higher value for the pro business objective function than the optimal choice when the entrepreneur is given a zero payoff. This requires that:

$$\alpha \{(1 - \tau_b)RI - D\} + (1 - \alpha)W(\gamma_b) \geq (1 - \alpha)W(\gamma_e) \quad (3.7)$$

Summarizing, if the pro business candidate wins power, and assuming 3.6 and 3.7 are satisfied, taxes will be given by (τ_b, γ_b) , assuming that investment projects are continued after the election. Observe that entrepreneurial payoff in this equilibrium is given by $(1 - \tau_b)RI - D$, and hence falls with the amount of debt.

⁸I assume that V is well behaved, so that V increases for $\gamma < \gamma^*$ and decreases for $\gamma > \gamma^*$. This is satisfied, for instance, if H is a CRRA function, as I assume in my computations later.

3.2. A pro labor government

The pro labor government is assumed to be biased in favor of workers, in the sense that its objective function puts weight less than χ on the welfare of entrepreneurs. As already mentioned, this implies that, if the pro labor government arrives to power and investments are kept alive, the pro labor government will minimize reliance on labor taxes. But this cannot be an equilibrium if the after tax return on investment is negative.

Given any positive amount of continuing investment, the capital tax rate chosen by the pro labor government must be at least as large as τ_e , as given by 3.3 or 3.4. The reason is that τ_e is the capital tax rate that minimizes labor taxes when all investments are continued; if some investments are discontinued, minimizing labor taxes will generally require a larger τ .

Hence the after tax return on investment will be negative as long as $(1 - \tau_e)R < \lambda$. I assume that this condition holds, which amounts to

$$\frac{G}{\chi I} > R - \lambda \quad (3.8)$$

If 3.8 holds, the tax rate chosen by a pro labor government will be too large to warrant the continuation of investment. The only equilibrium outcome in the event of a prolabor victory must then involve a sudden stop. In that case, the labor tax rate is determined by the fiscal constraint when capital income is zero:

$$\gamma_L = T\left(\frac{G}{1 - \chi}\right)$$

and the tax rate is any τ_L such that $(1 - \tau_L)R < \lambda$. For concreteness, I set $\tau_L = 1$.

Note that, in an equilibrium with positive initial investment, γ_L will equal γ_b (if $G \leq (1 - \chi)\gamma^*AL(\gamma^*)$) or $\gamma_L > \gamma_b$ (if $(1 - \chi)\gamma^*AL(\gamma^*) < G < \chi(RI - D) + (1 - \chi)\gamma^*AL(\gamma^*)$). That is, a pro business government delivers at least as much welfare to workers as a pro labor one, and is strictly better for workers if government expenditures are sufficiently large. This is not unexpected, given the time inconsistency problem faced by the pro labor candidate.

3.3. Economic Equilibrium and Investment

Given p , an *economic equilibrium* is defined in the natural way, as a description of behavior of individual workers, entrepreneurs, and foreign investors, and aggregate economic outcome, and a policy choice for both the pro business government and the pro labor government such that:

- (i) Given policy choices, the behavior of each individual is optimal for her;
 - (ii) The aggregate economic outcome is that implied by individual behavior;
- and
- (ii) Given the aggregate outcome, each policy choice is optimal for the respective kind of government.

As mentioned earlier, our focus is on equilibria with sudden stops: projects do start at $t = 0$ and are continued at $t = 1$ if and only if the pro business government wins the elections. As we have argued, 3.8 must hold. In addition, 3.7 and 3.6 must clearly hold; replacing the amount of debt D by the expression 2.2, one obtains:

$$p[(1 - \tau_b)R - \lambda] \geq (1 + \rho) + p \frac{1 - \alpha}{\alpha I} (W(\gamma_e) - W(\gamma_b)) \quad (3.9)$$

and

$$p[R - \lambda] \geq (1 + \rho) + \frac{p}{\chi I} (G - (1 - \chi)\gamma^* AL(\gamma^*)) \quad (3.10)$$

The minimum value of p that satisfies the last two expressions, say p_{\min} , is the minimum probability of a probusiness electoral victory that is necessary for positive investment. Notice that these conditions are stronger than 2.3 and have a different interpretation: in particular, 3.9 reflects the fact that, if foreign debt is too large, even a probusiness government will be tempted to tax all capital income, as this would affect mostly foreign investors.

The conclusion is that, if 3.8 holds and p is at least as large as p_{\min} , there is a sudden stop economic equilibrium. A particular and important feature of the equilibrium is that the amount of debt D increases, and entrepreneurial welfare conditional on a pro business victory falls, if p falls, that is, if the probability of a pro labor victory increases.

It is useful to examine polar cases. If $p < p_{\min}$, the probability of a pro business electoral victory is too small to warrant investments to be started. Neither investment nor capital inflows will be observed. If $p = 1$, on the other hand, sudden stops are not observable.

Finally, note that p_{\min} depends on parameters of the environment in intuitive ways. It is smaller, for instance, the larger the bias α of the pro business candidate. More interestingly, p_{\min} increases with the world interest rate ρ . This reflects not only that the foreign debt is repaid only if there is a pro business victory but also that a low p implies a larger D , which increases the temptation of even a pro business government to expropriate capital income.

4. Politico Economic Equilibrium

We are now ready to analyze the joint determination of the electoral outcome and the economic equilibrium. The crucial step is to recognize that the probability p of a pro business victory must reflect the expectations of entrepreneurs and workers about the implications of the election for their own welfare. I will first argue that the chances of the probusiness candidate must *fall* with the amount of the debt, D . But in an economic equilibrium D depends, in turn, on p . Hence the outcome of this model is naturally given by its *politico economic equilibria*, that is, a probability p and an economic equilibrium that are mutually consistent.

4.1. Analysis

Consider the voting decision faced by the typical entrepreneur at the time of the election. Assuming that her debt contract is consistent with the sudden stop economic equilibrium of the previous section, her final consumption will be zero if the pro labor candidate wins, but $(1 - \tau_b)RI - D$ if the probusiness candidate is the winner. Hence the entrepreneur will be more likely to vote for the probusiness candidate the larger $(1 - \tau_b)RI - D$, and, in particular, the less the debt she owes. The intuition is that, while the entrepreneur is better off with a probusiness government than with a prolabor one, a larger debt reduces the relative appeal of the former, as some of the benefits are appropriated by foreign investors.

As for workers, their final consumption is $W(\gamma_b)$ after a pro business victory and $W(\gamma_L)$ after a pro labor victory. As seen in the previous section, these quantities depend only on exogenous parameters. Hence the voting decision of a typical worker is not affected by the debt.

Given the preferences of entrepreneurs and workers about the two candidates, it is plausible to assume that, other things equal, the probability of a probusiness victory in the election is decreases with the debt D , that is

$$p = \Gamma(D) \tag{4.1}$$

where Γ is a *decreasing* function which will generally depend on the model's parameters and takes values in the unit interval. Such a function can be in fact derived from more basic assumptions, as we do in the next subsection.

A *politico economic equilibrium* can be now defined as a probability p and an economic equilibrium given p such that p is given by 4.1, where the debt D is determined by the economic equilibrium.

Now it is straightforward to characterize politico economic equilibria in which sudden stops may happen. Recall that, in a sudden stop economic equilibrium, the debt D is a function of p (recall 2.2). Using this fact in the preceding equation, we see that p must satisfy the equation

$$\begin{aligned} p &= \Gamma\left(\left(\lambda + \frac{1 + \rho}{p}\right)I\right) \\ &\equiv \Psi(p) \end{aligned} \tag{4.2}$$

A fixed point of Ψ that lies in the interval $[p_{\min}, 1]$ identifies a politico economic equilibrium. In such an equilibrium, the economic outcome displays sudden stops.

The existence of an equilibrium depends on the shape of the function Γ . Existence is guaranteed, in particular, if Ψ is continuous on $[p_{\min}, 1]$, $\Psi(1) < 1$, and $\Psi(p_{\min}) \geq p_{\min}$. Whether these conditions hold depend on implicit or explicit assumptions about voting behavior. For instance, under deterministic voting, that is, if each voter votes for the candidate that maximizes her economic welfare, then Ψ must exhibit jumps. On the other hand, assuming that voting behavior is probabilistic easily ensures the continuity of Ψ ; hence we shall assume probabilistic voting in the next subsection. The assumption that $\Psi(1) < 1$ is the weakest of the three. It means that even if foreign investors are most optimistic about the electoral outcome, so that the credit spread is zero, a probusiness victory in the elections cannot be a sure bet. On the other hand, the assumption that $\Psi(p_{\min}) \geq p_{\min}$ seems relatively strong. It says that if foreign investors are pessimistic and demand a high spread on the debt, the chances of a probusiness electoral victory must be sufficiently large. In effect, this requires the probusiness candidate to have enough support independently of the size of the debt.

If $\Psi(p_{\min}) < p_{\min}$ fails, there may or may not be an equilibrium. But if there is an equilibrium, and the other two assumptions on Ψ hold, then there must be more than one. More generally, it is easy to see that equilibrium need not be unique, since Ψ is an increasing function and can cut the 45 degree line several times in the interval $[p_{\min}, 1]$. The intuition is simple. If investors are pessimistic about the chances of a probusiness victory, the debt D will increase. As I have argued, this makes the pro labor candidate relatively more attractive, and leads to a reduction in p , which can be self fulfilling. Observe that if there are multiple equilibria, the size of the debt, the electoral outcome, the cost of credit, and economic welfare are all subject to the volatility of market psychology.

4.2. A Probabilistic Voting Version

It is straightforward and useful to compute particular versions, after assigning values to the parameters of the model, and making further assumptions about voting behavior. I will focus on a benchmark set of parameters chosen to illustrate some aspects of the model. I emphasize that this is not intended as a "calibration" exercise but, rather, as an investigation into the model's properties.

For the benchmark, I assume that the world interest rate (ρ) is three percent, that R is 2.5, and λ is one. The before tax potential return on the domestic investment, net of the continuation requirement λI , is hence $(RI - \lambda I)/I = 50$ percent. The size of the initial investment, I , is normalized to one.

The entrepreneurial class is set to 25 percent of the population, while α is set to 75 percent. Hence the probusiness candidate assigns entrepreneurs a weight three times as large as their population size.

Government expenditure G is set to 0.4. Workers' preferences are given by the function H , which I assume to be of the CRRA form $l^{1+\nu}/(1+\nu)$; the benchmark value of ν is 2. Finally, I choose A to be 1.2 times the minimum value that would equate G and the maximum revenue from labor taxes. This is just to simplify computations, as it ensures that G can in fact be financed with only labor taxes.⁹

These parameter values suffice to calculate the economic outcomes that do not depend on D or p . The tax rate on capital income is zero if the probusiness candidate wins, and it is one after a prolabor victory. In contrast, the tax rate on labor income is 29.66 percent independently of the electoral outcome. This reflects that, if the probusiness candidate wins the elections, his choice is not to tax capital income, given his high bias towards entrepreneurs. On the other hand, if the prolabor candidate wins, investments are not continued. Either way, the government expenditure ends up being financed solely by taxes on workers. Capital inflows are one before the election; after the election, an additional inflow of one is observed in the event of a pro business victory, while a pro labor victory results in zero additional inflows.

More importantly, the value of p_{\min} can be computed now, and is 78.95 percent for the benchmark. Recall that this is the minimum p that is consistent with initial investment and a sudden stop economic equilibrium.

To proceed further, I derive the political outcome function Ψ as suggested by Persson and Tabellini's (2000) discussion of probabilistic voting. In particular, I

⁹The condition 3.8 is satisfied under the assumptions of this subsection.

assume that a given entrepreneur, labeled i , votes probusiness if

$$(1 - \tau_b)RI - D \geq \delta + \eta_i \quad (4.3)$$

where δ is an aggregate shock, common to all entrepreneurs, and η_i is an independent, idiosyncratic shock, distributed i.i.d. across entrepreneurs. The interpretation is the following: the LHS is the difference between the economic payoff that the entrepreneurs receives, in equilibrium, after a probusiness victory, and his welfare after a prolabor victory (which is zero). The RHS represents the effect of other considerations, not explicitly modeled, that affects the relative popularity of the two candidates.

With this specification, the number of entrepreneurs that vote probusiness, given D and δ , is $\chi Q((1 - \tau_b)RI - D - \delta)$, where Q is the cdf of η_i . For the benchmark, I assume that Q is normal, with mean zero and standard deviation equal to one percent of RI .

While workers could be modeled in a similar fashion, I assume that each one votes probusiness with a fixed probability s , since workers are indifferent about the electoral outcome. Now, assuming majority rule, it follows that the probusiness candidate wins the elections if the number of probusiness votes exceeds one half of the population, that is,

$$\chi Q((1 - \tau_b)RI - D - \delta) + (1 - \chi)s > 0.5$$

Let $\bar{\delta}$ be the value of δ that yields equality in the previous expression (note that $\bar{\delta}$ depends on D and hence on p). Then the probability of a probusiness victory is just the probability that $\delta \leq \bar{\delta}$, which is easily calculated after specifying a cdf for δ . I assume that δ is also distributed normally, with mean zero and standard deviation equal to 8 percent of RI . Then the function Ψ is calculated in a straightforward way.

For the benchmark parameters, the solution is portrayed in Figure 1. The solid line is the graph of Ψ , and the broken line is the 45 degree line; an intersection identifies a politico economic equilibrium. Under the benchmark assumptions, there is only one equilibrium, in which the pro business candidate wins the elections with about 98.48 percent probability.

For purposes of discussion, it is useful to have a measure of the cost of credit for this country. A reasonable definition is given by the debt amount net of continuation costs, divided by the initial investment:

$$\text{cost of credit} = (D - \lambda I)/I - 1 = [(1 + \rho)/p] - 1$$

If p were one, then this definition would give the world interest rate.

The benchmark equilibrium implies a cost of credit of 4.59 percent. Equivalently, the credit spread is 159 basis points. Note that the cost of credit reflects not only the world interest rate, but the risk of a pro labor victory, which would imply high taxes on the investment income. As p is endogenous, the model implies that small exogenous shocks may be reflected in much bigger changes in the cost of credit. To see this, suppose that ρ is slightly larger than three percent: the cost of credit would increase not only due to the direct effect of a larger ρ but also because of the equilibrium fall in p .

In addition, local arguments may understate the reaction of the economy to exogenous shocks. To see this, I assume in Figure 2 that the world interest rate is not three but seven percent. This has two main effects on the graph: p_{\min} is higher (about 82 percent), and the graph of Ψ shifts downwards. The previous equilibrium shifts and p drops to 96.98 percent. The cost of credit increases to 10.33 percent; the spread increases to 333 basis point. So, even locally, the endogenous change in p significantly magnifies the effect of a higher interest rate.

In addition, a second equilibrium emerges in which p is 83.13 percent, and the implied cost of credit is 28.71 percent. This change is due mostly to a larger spread, now more than 2100 basis points, which in turn reflects the possibility of a new, self fulfilling, pessimistic equilibrium.

The lesson is that an increase in the world interest rate may have moderate effects on economic and political outcomes, if the economy remains in a "good" equilibrium. But it may also have *catastrophic* effects, if the shock results in new and significantly worse equilibria. These implications reflect the interaction between electoral uncertainty and the debt.

In this model, purely political shocks affect p and, therefore, the cost of credit and the size of the external debt. To illustrate, Figure 3 departs from the benchmark case in that the standard deviation of the aggregate shock to voting, δ , is not 8 but 10 percent of RI . Intuitively, this makes entrepreneurs less likely to base their votes only on economic payoffs, favoring the pro labor candidate. Figure 3 reveals that the qualitative effect is similar to that of a higher world interest rate. There are two equilibria, both of which imply a lower p , and a larger debt and cost of credit than in the benchmark. The effects on the debt and the cost of credit are due solely to the equilibrium increase in political risk. Note that politico economic links imply a multiplier effect. The increase in the standard deviation of δ would push down p if D were kept fixed; however, D must change in response to a lower p , which leads to further changes in p , as so on. This is reflected, in particular, in

the relatively large fall in the value of p associated with the "good" equilibrium: p falls to 93.35 percent, and the cost of credit increases to 10.34 percent, an increase of 575 basis points in the credit spread.¹⁰

5. Policy Aspects

The welfare analysis of this model is complicated by the heterogeneity of the population, as well as the existence of several distortions. On the other hand, it is clear that equilibria that display the sudden stop phenomena cannot be efficient: with positive probability, the domestic investment is initiated but is discontinued. This is a response, essentially, to the pro labor candidate inability to commit not to expropriate capital income if elected. One would guess, therefore, that superior outcomes may be attainable under policies that somehow alleviate this commitment problem. I will argue that such a conjecture is valid, as one should have expected from the literature on time inconsistency. On the other hand, the model yields new insights, in particular that such policy measures may have a significantly and predictable effect on electoral outcomes.

To begin, suppose that, before the elections, the two candidates agree on a common tax policy to be implemented at the end of period 1, independently of who is the winner. (A prominent example of such an agreement is given by the Korean 1997-98 electoral period.) Assuming that the agreement is perfectly credible, entrepreneurs and foreign investors no longer face any uncertainty about taxes. And if the tax policy is such that the after tax return on the investment is profitable, that is,

$$[(1 - \tau)R - \lambda] \geq 1 + \rho \tag{5.1}$$

then the investment will take place and continued with probability one: no sudden stops would be observed. To participate in the investment, it is enough for foreign lenders to be repaid $D = [\lambda + (1 + \rho)]I$: the cost of credit would fall to the world rate of interest, and the spread would be zero.

Hence a commitment to a common tax policy before the elections may remove the inefficiency associated with sudden stops in investment. The intuition is essentially the same as in the literature on time inconsistency: the key is that the agreement eliminates the commitment problem of the pro labor candidate. Note that, for this argument, one does not need to specify the exact tax agreement, as long as taxes respect 5.1 and the fiscal budget constraint. Since the exact

¹⁰The value of p in the bad equilibrium is 83.11 percent.

choice of taxes would have distributional consequences, they would presumably be determined by negotiations between the two electoral candidates.

What is *not* evident from previous literature is that the tax commitment would have nontrivial consequences on the electoral outcome. From the viewpoint of voters, the results of the elections would no longer imply different economic outcomes, and hence candidates would be seen as more equal to each other. In the probabilistic model of subsection 4.2, in particular, the results of the election would no longer determine the typical entrepreneur's final payoff. Hence she would act as if the LHS of 4.3 were zero; the implication would be a greater likelihood of a *pro labor* victory.

Other policies aimed at alleviating the pro labor candidate's inability to commit to low capital taxes can be analyzed in a similar way. As suggested by the time inconsistency literature, such policies may improve economic outcomes and, in our model, lead to a lower cost of credit and more stable capital flows. But they also affect political equilibria: in our model, they will generally favor the pro labor candidate. This finding is particularly relevant and provides justification for the view, often associated with the political left, that international financial packages not only affect the economy but may also have a significant impact on domestic politics as well. But my analysis suggests that leftist candidates are not hurt but, on the contrary, benefit politically from those packages.¹¹

The same reasoning implies that leftist candidates would be well served by finding ways to overcome their commitment problems. In so doing, they would benefit the population at large but also, and much less obviously, enhance their own chances at being elected. Thus, for instance, Lula da Silva's pre electoral pledges that he would pursue "market friendly" policies can be seen not only as an attempt to appease international investors but also as a way to increase his probability of victory.

¹¹The impact of the August 2002 support package to Brazil on the upcoming elections was quickly recognized but poorly understood. For instance, the New York Times said "The IMF Loan was carefully structured to affect Brazil's upcoming elections." (IMF Loan to Brazil also shields US Interests, New York Times, August 9, page C1) Clearly, the leftist candidates (Lula da Silva and Gomes) were more negative about the package than the official candidate (Serra): "Both of the leading candidates are chafing at what they perceive as an intrusion on Brazil's sovereignty and on their ability to fulfill campaign promises." (Brazilians find political cost for help from IMF, The New York Times, August 11, page A3).

6. Final Remarks

The analysis is consistent with the belief that financial instability is most likely to be observed in emerging economies. A country in which investment prospects are too poor or the political structure too adverse to markets will not receive any foreign funds. At the other extreme, if there is enough political stability, in the sense that policy is expected to be favorable to investment regardless of electoral outcomes, capital inflows will be strong and stable. The model thus suggests that financial flows may display marked volatility as a country develops politically. In turn, the political development process may be affected by financial volatility. One interesting avenue for research may be to study such a politico-economic interaction in a truly dynamic model of development and growth.

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Figure 1: Politico Economic Equilibria (World rate: 3 percent)

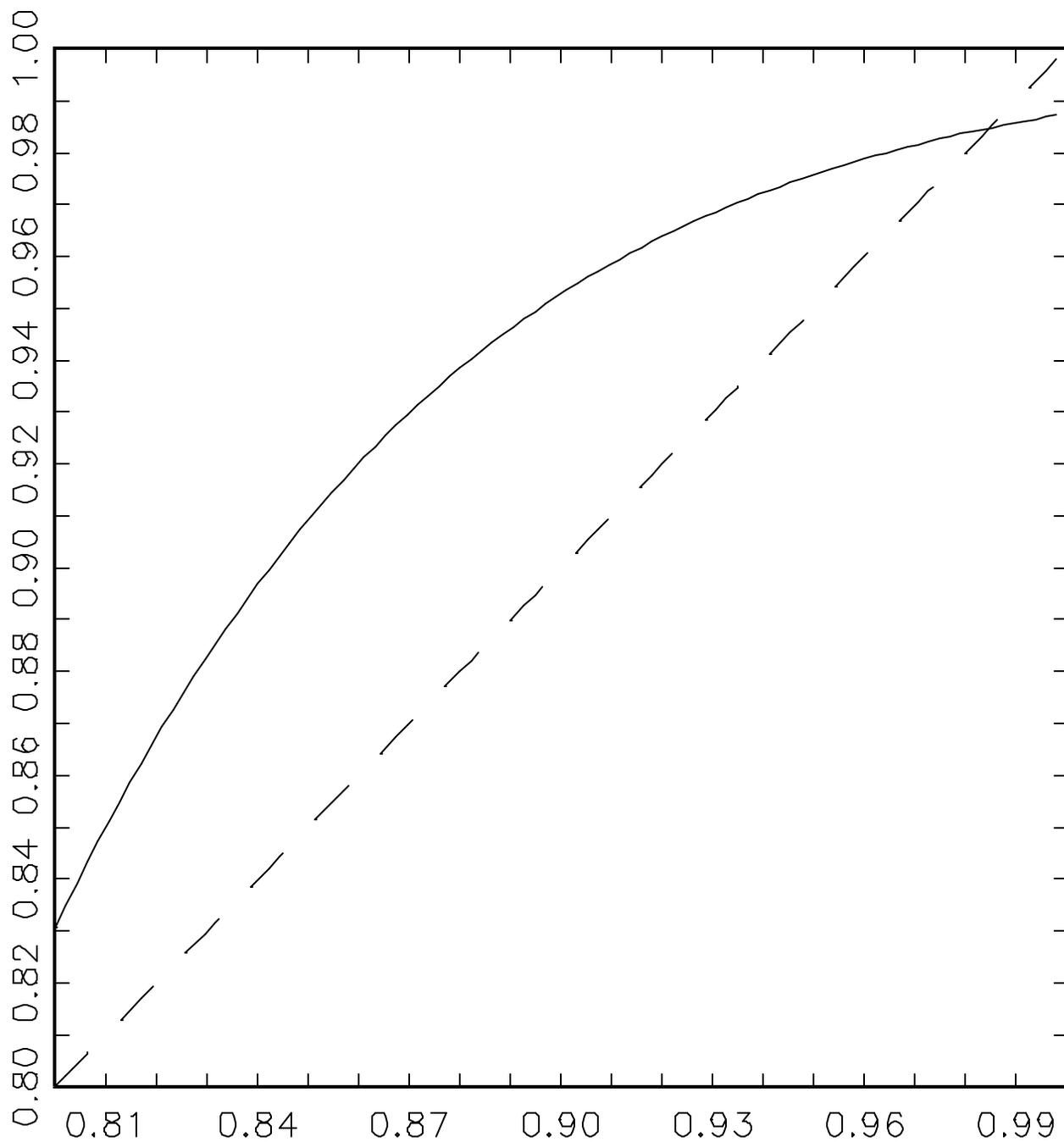


Figure 2: Politico Economic Equilibria (World rate: 7 percent)

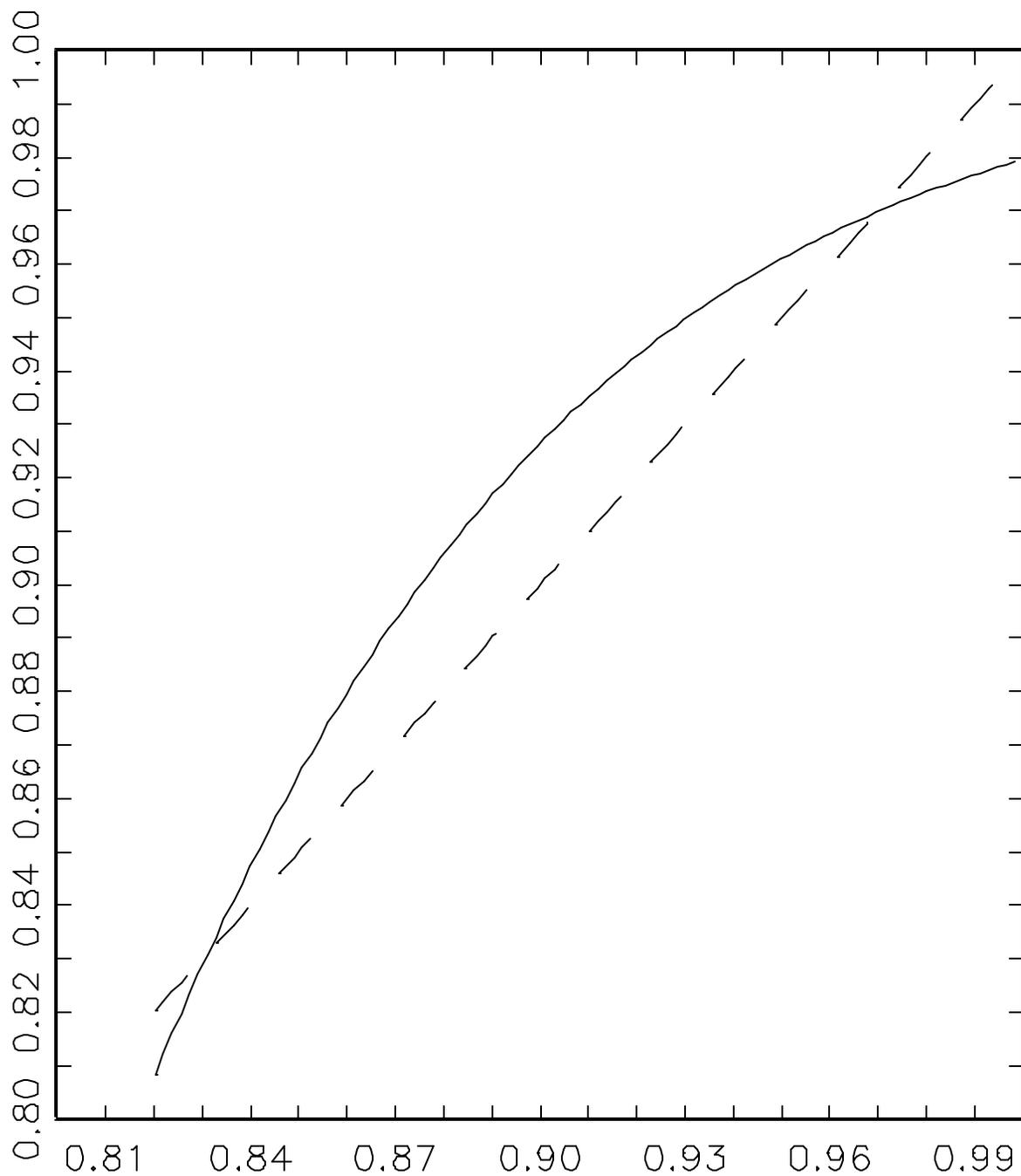


Figure 3: Increased voting uncertainty (World rate: 3 percent)

