

# Electoral Uncertainty and the Volatility of International Capital Flows\*

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## Abstract

I study a small open economy in which elections affect and are affected by capital inflows. Two candidates, one favoring workers and another favoring entrepreneurs, run for office; the winner chooses taxes, which affect investment returns. A pro labor victory results in a "sudden stop" in investment and capital flows, reflecting a time inconsistency problem. The pro business candidate is free from time inconsistency but becomes less attractive to voters if the foreign debt is larger. Hence electoral outcomes depends on the size of the debt, which itself depends on expectations about the election. The model's politico economic equilibria has 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 contribute to financial stability but also, and perhaps more surprisingly, to the chances of a pro labor victory in the elections. A redistribution of wealth has ambiguous although predictable effects on politico economic outcomes.

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# Electoral Uncertainty and the Volatility of International Capital Flows

## 1. Introduction

Three recent Latin American episodes have underscored that financial volatility is often strongly associated with electoral uncertainty and distributional conflict. The first episode was the 2002 presidential election in Brazil. Figure 1 shows the behavior of the risk premia on Brazilian debt, as given by J.P. Morgan's Brazil EMBI spreads, between 2001 and 2005.<sup>1</sup> Clearly, the period was dominated by the run up in the spreads associated with the 2002 election: during the summer of 2002, Brazilian risk premia surpassed 2000 basis points. Figure 1 also plots the Global EMBI spread for the period to stress that Brazil's phenomena was driven by country specific factors. In fact, there is evidence that the spread movements were closely correlated with increases in the popularity among voters of the pro labor candidate, Lula de Silva (Javier Santiso 2003). That evidence and Figure 1 strongly suggest that politico economic issues are critical to understand the behavior of capital flows to Brazil since the millennium.

A second episode is given by the April 2006 Peruvian election. Figure 2 plots the difference between Peru's EMBI spread and the Global EMBI spread since January 2005. While not as dramatic as the Brazilian example, Figure 2 shows a drastic increase in Peru's risk premia starting around September 2005. The increase was associated with the ascent of a "populist" candidate, Ollanta Humala, as a leading contender in Peru's elections (see Luis Oganés and Andrés Ortiz 2005 for a discussion).

The third example is the December 2005 election in Bolivia, won by the leader of the peasants, Evo Morales. The Morales victory was preceded by the anticipation of populist economic measures and the collapse of international capital inflows: net FDI inflows fell by

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<sup>1</sup>Figures can be found at the end of the paper.

almost four percent of GDP in 2005 alone.<sup>2</sup> Fears of expropriation proved warranted, as Morales announced, in May 2006, the nationalization of oil and gas contracts with multinational corporations.<sup>3</sup>

It is not hard to find other examples in which elections seem to have disrupted capital markets.<sup>4</sup> And indeed some econometric evidence exists that supports the view that there is a systematic connection between elections and financial vulnerability (see, for instance, Matthieu Bussiere and Christian Mulder 1999).

The three Latin American cases just mentioned, and surely others, share some salient features. In each case, international capital inflows became dearer and more scarce in anticipation of an election. And each election was marked by a surge in the popularity of candidates regarded as less market friendly. Given this, one may have been not too surprised by the retreat of international inflows before the elections. After all, foreign investors are forward looking, and expected investment returns may be affected by policies to be enacted by the winner of an upcoming election. Hence it is natural for financial outcomes to be driven by expectations about future elections.

But another, less prominent feature of these cases is that the behavior of international capital flows may have, in turn, affected the electoral outcomes. This possibility seems to have been overlooked in the academic debate, yet was widely acknowledged, at least implicitly. The belief that financial variables may have affected elections was, perhaps, most clearly evident in statements about the political impact of international financial assistance packages. For instance, after the IMF approved a US\$ 30 bn. assistance package to Brazil in August 2002, the New York Times said "The IMF Loan was carefully structured to affect Brazil's upcoming elections."<sup>5</sup>

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<sup>2</sup>IMF data show that net FDI inflows, as percent of GDP, were 8.3 in 2000, 8.2 in 2001, 8.5 in 2002, 2.4 in 2003, 0.7 in 2004, and -3.0 in 2005. The fall in 2003 and 2004 may have been itself motivated by the political unrest surrounding the collapse of the Sánchez de Losada government at the end of 2003. This fall, however, was not associated with electoral periods, which is the focus of this paper.

<sup>3</sup>"Companies had been holding off on investments in Bolivia for some time, unnerved by growing talk of precisely the kind of step that Mr. Morales took this week. Foreign direct investment, much of which goes to energy and mining, fell to \$103 million in 2005, from \$1 billion in 1999." (NY Times, May 3 2006)

<sup>4</sup>Korea in 1997-98 immediately comes to mind (Stephan Haggard 2000).

<sup>5</sup>"IMF Loan to Brazil also shields US Interests," New York Times, August 9, page C1. Another illustration

Hence understanding the links between international capital flows and elections calls for a theory in which not only elections can affect international capital flows but also capital flows can affect electoral equilibria. This paper is an attempt to develop one such theory and to derive its implications for observable variables and for public policy.

I focus on a small open economy 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.

Entrepreneurs 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 *time inconsistency* or *capital levy problem*: given his social preferences, he cannot commit, before the elections, not to impose excessively high taxes on investment returns if elected. Hence, under conditions identified in the analysis, a pro labor victory in the elections results in a halt to external financing or, using Guillermo Calvo's (1998) term, a *sudden stop*. In contrast, the pro business candidate is assumed to be sufficiently biased in favor of entrepreneurs that, for the same reasons as Kenneth Rogoff's (1985) "conservative central banker," he can effectively commit to low capital taxes; hence a pro business victory results in low capital income taxes and the continuation of capital inflows. The analysis underscores that electoral uncertainty is in fact crucial to observe financial volatility. In the absence of elections, a sudden stop cannot be

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is found in the Op-Ed page of the NY Times at the time of the Bolivian case: "This is simply the way democracy sometimes works. Oil and gas nationalization has been the main political issue in Bolivia for the last several years. Mr. Morales, an Aymara Indian farmer, won a landslide victory in December on a promise to nationalize the gas industry. Now he's delivering on that promise he made to the country's nine million citizens... The majority of Bolivians support nationalization out of acute frustration over two decades of failed "neoliberal" policies by the International Monetary Fund, which tied sorely needed loans to privatization, debt reduction and relaxation of labor standards. " (William Powers, "All Smoke and No Fire in Bolivia," NY Times May 6) For the Peruvian election, however, the rise of Ollanta Humala in the polls is more of a mystery. See Ogan and Ortiz 2005.

observed: either investment projects do not get off the ground and foreign capital does not come at all, or the flow of foreign capital is stable.

Debt contracts, in turn, affect electoral outcomes, which is perhaps the most novel and consequential aspect of the model. A larger debt makes the pro business candidate *less* attractive to voters relative to the pro labor candidate. The reason is simple. If the pro labor candidate wins the elections, investments come to a halt; conversely, investment returns are reaped and debt payments made only after a pro business victory. Therefore a larger debt reduces the entrepreneurs' payoff conditional on a pro business victory while leaving unaffected that payoff conditional on a pro labor 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 multiplied 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. The model therefore explains why electoral periods may be associated with increased macroeconomic and financial sensitivity to exogenous shocks.

A related implication is that there may be multiple equilibria and associated self fulfilling politico economic crises. Heightened expectations of a pro labor victory increase the cost of credit, the debt problem, and the relative popularity of the pro labor candidate, and may lead to a shift from a good to a bad equilibrium. 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 useful lessons for policy. A pre electoral commitment by both candidates to implement a "market friendly" tax policy helps stabilizing capital flows by eliminating the pro labor candidate's time inconsistency problem. But also, 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.

Finally, the model allows for the analysis of the role of wealth redistribution on politico economic outcomes. This may be of interest because it has been argued that the recent resurgence of populism in Latin America can be explained by the failure of "Washington consensus" policies to reduce income and wealth inequality.<sup>6</sup> I identify precise conditions under which wealth redistribution does indeed reduce the probability of sudden stops and the cost of foreign credit. The result is that the impact of inequality on politico economic equilibrium is ambiguous and depends primarily on the distribution of exogenous political noise.

Previous theoretical efforts at understanding the interaction between politics and the volatility of international capital flows are hard to find.<sup>7</sup> One recent exception is Roberto Chang (2005), which presents an analysis of the 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 masterful summaries of

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<sup>6</sup>"One big reason for populism's persistence is the extreme inequality in the region. That reduces the appeal of incremental reform and increases that of messianic leaders who promise a new world. " ( "The return of populism, " The Economist, April 12th 2006.)

<sup>7</sup>Alberto Alesina and Guido Tabellini (1999) study how political uncertainty affects capital formation and may generate capital flight in developing economies. Their model does not allow for feedback from financial equilibria to government changes. Such a feedback, in contrast, is a focus of our analysis and is responsible for several of our findings.

both, see Allan Drazen (2000) and Torsten Persson and Guido Tabellini (2000).

The model is consistent with the recent empirical work of Daron Acemoglu, Simon Johnson, James Robinson, and Yonyong Thaicharoen (2003) regarding the impact of institutions on macroeconomic volatility. Acemoglu et al. argued, in particular, that volatility is negatively related with a measure of constraints on the executive. Clearly, there is a close connection between that measure and the mechanisms emphasizes here: as already mentioned, a key distortion in my model is that candidates cannot be constrained to honor any promises made before taking power.

The paper proceeds as follows. Section 2 discusses the environment and individual behavior, given economic policy and the probability distribution of electoral outcomes. Section 3 discusses the determination of the elected government's policy and the associated economic equilibria, still taking as given the political outcome distribution. Section 4 then analyzes voting behavior and the simultaneous determination of political and economic outcomes. Section 5 examines some policy implications. Section 6 extends the analysis in two directions. In the base model, it is assumed that factor rewards are exogenous constants. This is dropped in subsection 6.1, where factor rewards are derived endogenously from a neoclassical production function. In subsection 6.2 the assumption that agents are either entrepreneurs or workers is dropped. Instead, it is assumed that all agents both work and invest, although they may differ in the size of the projects they may undertake. The results of the base model are extended to this case, which in addition allows for the analysis of the impact of wealth redistribution. Section 7 concludes.

## **2. The Environment**

Consider 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 is normalized to one, and the number of entrepreneurs as a fraction of the total population is denoted by  $\chi$ . 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 individual entrepreneurs and workers, who take 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  $\kappa$  dollars at  $t = 0$ . Immediately 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  $\lambda\kappa$  dollars must be added in order to keep the project alive; in that case the project returns  $R\kappa$  dollars at the end of period 1.<sup>8</sup>

Both  $\lambda$  and  $R$  are exogenous constants. This means, in particular, that the final return to investment,  $R$ , is independent of other aggregate variables. But this is only for ease of exposition: section 6 extends our analysis to the case in which  $R$  is derived, in general equilibrium, from a neoclassical production function.

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

The entrepreneur is assumed to design a loan contract that maximizes his expected final

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<sup>8</sup>The investment technology is hence a simplified version of that in Bengt Holmstrom and Jean Tirole (1997).



consumption subject to providing foreign investors with an expected return no less than the world interest rate.<sup>9</sup> Contracts are assumed to be fully enforceable but they must respect limited liability: at any point, the entrepreneur cannot pay more than he 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. The sequence of events is as follows:

[INSERT TIMELINE HERE]

Note that investors decide whether or not to continue the project immediately upon observing the outcome of the elections. In contrast, the electoral winner can enact tax policy only upon taking power, at the *end* of period 1.

A contract between the entrepreneur and foreign investors must stipulate whether the project is started, whether the project continues after observing the electoral outcome and, if so, how the after tax return on the investment is distributed. 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  $\tau = \tau_b$ . Then continuing the project is efficient if

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

We will focus on *sudden stop* equilibria in which this requirement is satisfied, and hence

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<sup>9</sup>Note that loan contracts are assumed to be endogenous and optimal, so nothing in the analysis depends on arbitrary assumptions about asset market imperfections.

investment projects and capital inflows continue after a pro business victory in the elections. In contrast, if the pro labor candidate wins the elections, in equilibrium he imposes such a large capital tax rate that it is efficient for projects to be discontinued.<sup>10</sup>

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 pro business candidate wins the election, or *debt* for short. If investment projects are to be financed at  $t = 0$ , outside investors must be paid at least their opportunity cost of funds, which requires that<sup>11</sup>

$$p(d - \lambda\kappa) = (1 + \rho)\kappa$$

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

$$d = \left(\lambda + \frac{1 + \rho}{p}\right)\kappa \quad (2.2)$$

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 pro business victory be nonnegative:

$$(1 - \tau_b)R\kappa - d \geq 0$$

(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 be made if:

$$p[(1 - \tau_b)R - \lambda] \geq 1 + \rho \quad (2.3)$$

Summarizing, if 2.3 holds, the entrepreneur and the foreign investors will agree to invest the  $\kappa$  dollars needed to start the project. In addition, if the pro business candidate wins the election, foreign investors will add  $\lambda\kappa$  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

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<sup>10</sup>That is, if  $\tau = \tau_L$  is the capital tax rate imposed by a pro labor government,  $(1 - \tau_L)R < \lambda$ .

<sup>11</sup>I make the usual assumption that outside investors are held to their reservation value.

investment project is cancelled with no further obligations.

Several aspects of this problem warrant comment. A pro labor victory is followed by an investment collapse and a halt in capital flows. Electoral uncertainty is, in fact, crucial for observing such a sudden stop. If the pro business 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 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.

For purposes of discussion, it may be 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:

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

If  $p$  were one, then this definition would give the world interest rate. Obviously, the difference between the cost of credit and the world interest rate is a natural measure of the credit spread. These definitions imply that the cost of credit and the spread fall with  $p$ .

Finally, note that an increase in the debt, which may be caused by a fall in  $p$ , reduces the entrepreneurial payoff when a pro business government is elected.

## 2.2. Workers

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  $W$  units of output.

The worker takes the return to labor  $W$  as given. Then his decision problem is summa-

rized by

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

where  $\gamma$  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  $U(\gamma)$  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

$$(1 - \gamma)W = H'(l(\gamma))$$

Clearly  $l(\gamma)$  is a decreasing function of  $\gamma$ . Finally, the envelope theorem yields  $U'(\gamma) = -Wl(\gamma) < 0$ : intuitively, workers' welfare falls with labor taxes.

As with  $R$ , the return to labor,  $W$ , will be taken to be an exogenous constant for now. Again, this is only for expositional purposes, and section 6 shows that  $W$  can be interpreted as the equilibrium wage in an economy with a neoclassical production function.

### 3. Exogenous Electoral Outcomes

This section studies government policy choices and the resulting *economic* equilibrium, taking the distribution of the electoral outcome (summarized by  $p$ ) as given. Particular attention is given to conditions under there is positive investment, as well as the relation between foreign debt and welfare. Also, we 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 number 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 does. The main consequence is that, under assumptions 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 he can credibly promise low capital taxes.

### 3.1. A pro business government

To analyze the decision problem of the pro business government, let  $\alpha$  denote the weight that it assigns to the welfare of entrepreneurs. Since, in a sudden stop equilibrium, investments are undertaken at  $t = 0$  and are continued after a pro business victory in the elections, the pro business government's problem is to maximize

$$\alpha \text{Max} \{0, (1 - \tau)R\kappa - d\} + (1 - \alpha)U(\gamma) \quad (3.1)$$

subject to

$$G \leq \tau RK + \gamma WL(\gamma). \quad (3.2)$$

where  $K = \chi\kappa$  and  $L(\gamma) = (1 - \chi)l(\gamma)$  denote the aggregate amount of capital and the aggregate labor supply function. The choice variables are the tax rates  $\tau$  and  $\gamma$  and assumed, for simplicity, to be restricted to the unit interval. The government takes the labor supply function  $L(\cdot)$ , the workers' welfare function  $U(\cdot)$ , the amount of capital  $K$ , 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; however, it makes little difference to the solution.

To develop intuition for the solution, suppose that  $\alpha$  were equal to  $\chi$ , that is, that the pro business candidate were to give the same weight to each entrepreneur and worker. Then,

from 3.1, the problem would amount to maximizing

$$\chi(1 - \tau)RK + (1 - \chi)U(\gamma)$$

subject to 3.2. This is a standard public finance problem: it entails maximizing average welfare subject to raising enough revenue through capital and labor taxes. And, crucially, at the time of the government's decision, labor taxes are distortionary but capital taxes are not, which means that the government will try to cover its expenditures through capital taxes and avoid labor taxes. But this means that it could not have been optimal for investments to have continued after the elections. This is, of course, a typical capital levy problem.

The pro business candidate avoids the capital levy problem, however, under the natural assumption that  $\alpha > \chi$ , that is, that he is biased in favor of entrepreneurs. Under that assumption, which is maintained hereon, the pro business candidate has a redistributive motive that offsets the capital levy problem, just like Rogoff's (1985) "conservative central banker" solves the time inconsistency problem in monetary policy.

The formal argument is as follows. In equilibrium, the tax pair chosen by the pro business government must give domestic entrepreneurs a non zero payoff. Use the government budget constraint 3.2 to eliminate  $\tau$  from the objective, which can then be written as

$$V(\gamma) = \frac{\alpha}{\chi}\gamma WL(\gamma) + (1 - \alpha)U(\gamma)$$

up to a constant. This is to be maximized by choice of  $\gamma$ ; then  $\tau$  is given by the budget constraint 3.2.

The derivative of the previous expression is

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

which must be negative if  $\alpha$  is less than or equal to  $\chi$ . This confirms that a government

with a low  $\alpha$  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. This is not the case under the assumption that  $\alpha > \chi$ .

To proceed, define  $\gamma^*$  to be the labor tax rate at which  $V'(\cdot)$  vanishes.<sup>12</sup> Then, if  $G \leq \gamma^*WL(\gamma^*)$ , the tax choice<sup>13</sup>

$$\tau_b = 0 \text{ and } \gamma_b = T(G)$$

is optimal, where  $T(z)$  is the minimum labor tax rate needed to raise  $z$  dollars.<sup>14</sup>

If  $G > \gamma^*WL(\gamma^*)$ , the optimal choice requires a positive capital tax rate. The optimal tax on labor is then  $\gamma^*$  and the tax rate on capital income is given by the budget constraint 3.2:

$$\gamma_b = \gamma^* \text{ and } \tau_b = \frac{G - \gamma^*WL(\gamma^*)}{RK}$$

For the pair  $(\tau_b, \gamma_b)$  to give entrepreneurs a positive payoff, the following must hold:

$$G \leq \chi(R\kappa - d) + \gamma^*WL(\gamma^*) \quad (3.3)$$

Finally, optimality requires  $(\tau_b, \gamma_b)$  not to be dominated by tax rates that give entrepreneurs a zero payoff. Let  $(\tau_e, \gamma_e)$  minimize labor taxes subject to the budget constraint 3.2 and the constraint that entrepreneurs receive a zero payoff.<sup>15</sup> Then optimality requires:

$$\alpha \{(1 - \tau_b)R\kappa - d\} + (1 - \alpha)U(\gamma_b) \geq (1 - \alpha)U(\gamma_e) \quad (3.4)$$

Summarizing, if the pro business candidate wins power, and assuming 3.3 and 3.4 are

<sup>12</sup>That is:

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

<sup>13</sup>I 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.

<sup>14</sup>That is,  $T(z)$  is the minimum  $\gamma$  in  $[0, 1]$  such that  $\gamma WL(\gamma) = z$ . This will be well defined if  $\gamma WL(\gamma)$  is strictly concave and attains a maximum in  $(0, 1)$ , which I assume. In addition, I assume that  $G$  is below that maximum.

<sup>15</sup>One can show that  $\tau_e = G/RK$  and  $\gamma_e = 0$  if  $RK \geq G$ , and  $\tau_e = 1$  and  $\gamma_e = T((G - RK))$  if not.

satisfied, taxes will be given by  $(\tau_b, \gamma_b)$ . Entrepreneurial payoff in this equilibrium is given by  $(1 - \tau_b)R\kappa - d$  and hence, as already mentioned, falls with the amount of debt.

### 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  $\chi$  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 resort to capital taxes before imposing any 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  $\tau_e$ , as defined in the previous subsection. The reason is that  $\tau_e$  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  $\tau$ .

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

$$G > (R - \lambda)K \tag{3.5}$$

If 3.5 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 pro labor 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:

$$\gamma_L = T(G)$$

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

Notably, in an equilibrium with positive initial investment,  $\gamma_L$  will be greater than or



equal to  $\gamma_b$ . 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.<sup>16</sup>

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

If the equilibrium displays sudden stops, as we have argued, 3.5 must hold. In addition, 3.3 and 3.4 must clearly hold; replacing the amount of debt  $d$  by the expression 2.2, one obtains

$$p[R - \lambda] \geq (1 + \rho) + \frac{p}{\chi\kappa}(G - \gamma^*WL(\gamma^*)) \quad (3.6)$$

and

$$p[(1 - \tau_b)R - \lambda] \geq (1 + \rho) + p\frac{1 - \alpha}{\alpha\kappa}(U(\gamma_e) - U(\gamma_b)). \quad (3.7)$$

The minimum value of  $p$  that satisfies the last two expressions, say  $p_{\min}$ , is the minimum probability of a pro business electoral victory that is consistent with positive investment.<sup>17</sup>

The conclusion is that, if 3.5 holds and  $p$  is at least as large as  $p_{\min}$ , there is a sudden stop economic equilibrium. In such an equilibrium, projects do start at  $t = 0$  and are continue at

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<sup>16</sup>See e.g. Persson and Tabellini (2000) for a discussion.

<sup>17</sup>Notice that these conditions are stronger than 2.3 and have a different interpretation: in particular, 3.7 reflects the fact that, if foreign debt is too large, even a pro business government will be tempted to tax all capital income, as this would affect mostly foreign investors.

$t = 1$  if and only if the pro business government wins the elections. Tax policy is given by  $(\tau_b, \gamma_b)$  if the pro business candidate is elected, and by  $(\tau_L, \gamma_L)$  if the pro labor candidate emerges as the winner.

Our derivation implies that neither  $(\tau_b, \gamma_b)$  nor  $(\tau_L, \gamma_L)$  depend on  $p$  or  $d$ . In contrast, we have seen that the amount of debt  $d$  increases, and entrepreneurial welfare conditional on a pro business victory falls, if  $p$  falls.

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  $\alpha$  of the pro business candidate. More interestingly,  $p_{\min}$  increases with the world interest rate  $\rho$ . 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 endogenize  $p$  and 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 pro business 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. Voting Preferences and the Debt

Consider the voting decision faced by the typical entrepreneur at the time of the election. Assuming that his debt contract is consistent with the sudden stop economic equilibrium of the preceding sections, his final consumption will be zero if the pro labor candidate wins, but  $(1 - \tau_b)R\kappa - d$  if the pro business candidate is the winner. Hence the *relative* appeal of the pro business candidate to entrepreneurs *falls* with the debt  $d$ . The intuition is that, while the typical entrepreneur is always better off with a pro business government than with a pro labor one, a larger debt means that more of the benefits from a pro business victory are lost as compensation to foreign investors.

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

If the likelihood that each agent votes for the pro business candidate increases with that agent's payoff under a pro business administration relative to his payoff under a pro labor administration, then the probability of a pro business victory in the election must decrease with the debt  $d$ , that is

$$p = \Psi(d) \tag{4.1}$$

where  $\Psi$  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

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

A fixed point of  $\Gamma$  that lies in the interval  $[p_{\min}, 1]$  identifies a sudden stop politico economic equilibrium.

The existence of an equilibrium depends on the shape of the function  $\Gamma$ . Existence is guaranteed, in particular, if  $\Gamma$  is continuous on  $[p_{\min}, 1]$ ,  $\Gamma(1) < 1$ , and  $\Gamma(p_{\min}) \geq p_{\min}$ . Whether these conditions hold depend on implicit or explicit assumptions about voting behavior. For instance, under deterministic voting, that is, if each agent votes for the candidate that maximizes his economic welfare, then  $\Gamma$  must exhibit jumps. On the other hand, assuming that voting behavior is *probabilistic* easily ensures the continuity of  $\Gamma$ ; hence we shall assume probabilistic voting in the next subsection. The assumption that  $\Gamma(1) < 1$  is the weakest of the three. It means that even under the strongest possible degree of investor optimism about the electoral outcome, so that the cost of foreign credit (as defined in section 2) is equal to the international interest rate, a pro business victory in the elections cannot be a sure bet. On the other hand, the assumption that  $\Gamma(p_{\min}) \geq p_{\min}$  seems relatively strong. It says that if investors are pessimistic and the cost of foreign credit is high, the chances of a pro business electoral victory must be sufficiently large. In effect, this requires the pro business candidate to have enough support independently of the size of the debt.

If  $\Gamma(p_{\min}) < p_{\min}$  fails, there may or may not be an equilibrium. But if there is an equilibrium, and the other two assumptions on  $\Gamma$  hold, then there must be more than one. More generally, it is easy to see that equilibrium need not be unique, since  $\Gamma$  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 pro business 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. Probabilistic Voting

One way to derive the political outcome function  $\Gamma$  is suggested by Persson and Tabellini's (2000) discussion of probabilistic voting. In particular, assume that a given entrepreneur, labeled  $i$ , votes pro business if

$$(1 - \tau_b)R\kappa - d \geq \delta + \eta_i \tag{4.3}$$

where  $\delta$  is an aggregate shock, common to all entrepreneurs, and  $\eta_i$  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 entrepreneur receives, in equilibrium, after a pro business victory, and his payoff after a pro labor 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 pro business, given  $d$  and  $\delta$ , is  $\chi Q((1 - \tau_b)R\kappa - d - \delta)$ , where  $Q$  is the cdf of  $\eta_i$ .

Workers could be modeled in a similar fashion. However, the electoral outcome only affects workers through the tax rates  $\gamma_b$  and  $\gamma_L$ , which do not depend on  $p$  or  $d$ . Hence one can just assume that each worker votes pro business with some fixed probability  $s$ .

Now, assuming majority rule, the pro business candidate wins the elections if the number of pro business votes exceeds one half of the population, that is,

$$\chi Q((1 - \tau_b)R\kappa - d - \delta) + (1 - \chi)s > 0.5$$

Let  $\bar{\delta}$  be the value of  $\delta$  that yields equality in the previous expression (note that  $\bar{\delta}$  depends on  $d$  and hence on  $p$ ). Then, given  $p$ , the probability of a pro business victory,  $\Gamma(p)$ , is just

the probability that  $\delta \leq \bar{\delta}$ , which is easily calculated after specifying a cdf for  $\delta$ .

### 4.3. Implications for Volatility and Crises

It is now straightforward to solve the model after assigning values to its parameters. One could, in principle, calibrate or estimate the parameters on the basis of empirical data. Given the limitations of the model, however, I believe that such an attempt would be premature. Instead, I discuss some elementary computations to illustrate the qualitative behavior of the model. For example, Figure 3 plots  $\Gamma$  as a function of  $p$  on the interval  $[p_{\min}, 1]$  for a benchmark set of parameters.<sup>18</sup> There is a single politico economic equilibrium is given by point A, where  $\Gamma$  intersects the 45 degree line.

To assess the impact of adverse external shocks, Figure 4 depicts the implications of an increase in the world interest rate  $\rho$ .<sup>19</sup> The graph of  $\Gamma$  shifts downwards because a larger  $\rho$  increases the debt  $d$  for any  $p$ , which reduces the relative entrepreneurial payoff of a pro business government, and makes the pro business candidate less attractive in the elections. The new equilibrium is given by point B.

Figure 4 helps stressing that the change from point A to point B reflects the interaction of financial forces and political forces. If financial contracts did not react to the increase in  $\rho$ , the effect on the equilibrium would simply be given by a shift from A to A'. The height of A' would then reflect the new, lower probability of a pro business electoral victory. But now we know that a fall in that probability will increase the cost of credit and the debt  $d$ ,

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<sup>18</sup>The MATLAB programs that produce Figures 3, 4, and 5 are available on request. In Figure 3, the world interest rate ( $\rho$ ) is two percent,  $R$  is 2.8, and  $\lambda$  is one. The size of the initial investment,  $\kappa$ , is normalized to one. The entrepreneurial class is set to 20 percent of the population, while  $\alpha$  is set to 80 percent. 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  $\nu$  is 2. Finally, I choose  $W$  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. Given these parameter values,  $\tau_b = 0$ , while  $\gamma_b = \gamma_L = 0.368$ . Also,  $p_{\min} = 0.61$ .

Finally, Figure 3 assumes that  $\eta_i$  is normal, with mean zero and standard deviation equal to 8 percent of  $R\kappa$ .  $\delta$  is also assumed to be normal with mean zero and standard deviation equal to 20 percent of  $R\kappa$ . Finally,  $s = 0.58$ .

At A,  $p = 0.952$ , with an implied cost of credit of 7.1 percent.

<sup>19</sup>In Figure 4,  $\rho$  increases to 8 percent.

which itself will push  $p$  down even more, and so on. Such a chain reaction is given by the shift from A' to B.

Hence the interaction between finance and politics implies the existence of *multiplier effects* that magnify the impact of exogenous shocks to the economy. Such multiplier effects may help account for the apparent volatility of emerging economies in electoral periods.

In fact, under some conditions, the reaction of the economy to exogenous shocks may be even more violent than that suggested by Figure 4. This is illustrated by Figure 5, that summarizes the equilibrium implications of an increase in the interest rate  $\rho$  under slightly different parameter assumptions.<sup>20</sup> The initial equilibrium is given by point A. As in Figure 4, and for the same reasons, the higher interest rate pushes the graph of  $\Gamma$  downwards. Here, however, not only the initial equilibrium shifts to B, but a second equilibrium, given by C, emerges and implies a much lower value of  $p$ , and consequently a much higher debt and cost of credit, than at B.

The lesson is that, even if an increase in the world interest rate has moderate effects on economic and political outcomes when the economy remains in a "good" equilibrium, it may also have *catastrophic* effects, if the shock results in a shift to a new and significantly worse equilibrium. One can interpret such a shift between equilibria as a politico economic self fulfilling crisis.<sup>21</sup> Again, these implications reflect the interaction between electoral uncertainty and the debt.

Finally, one of the advantages of assuming probabilistic voting is that it allows for the introduction of purely political shocks in a natural way, by changing the variances of the shocks  $\delta$ ,  $\eta_i$ , or the value of  $s$ . In this model, such shocks affect not only  $p$  but also economic variables in a straightforward way. For example, an increase in the standard deviation of the aggregate shock to voting,  $\delta$ , results in a downward shift of  $\Gamma$ , as in Figures 4 and 5. Intuitively, a higher variance in  $\delta$  makes entrepreneurs less likely to base their votes only

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<sup>20</sup>In Figure 4,  $\rho$  changes from zero to seven percent. The other change is on the distribution of political noise. The standard deviation of  $\delta$  is 18 percent of  $R\kappa$  and  $s$  falls to 0.5.

<sup>21</sup>See Paul Masson (1999) for a discussion of such an interpretation.

on economic payoffs; this favors the pro labor candidate. The qualitative effect is similar to that of a higher world interest rate depicted in Figures 4 and 5.

Summarizing, sudden stop equilibria imply that the economy's reaction to shocks may be magnified by the interaction between politics and financial contracts. Self fulfilling politico economic crises are possible. And politico economic outcomes change in response to not only economic but also purely political shocks.

## 5. Policy Aspects

The welfare analysis of this model is complicated by the heterogeneity of the population and 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's inability to commit not to expropriate capital income if elected. One would guess, therefore, that superior outcomes may be attainable under policies that 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 policies may have a significant 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.<sup>22</sup> 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,

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

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<sup>22</sup>A prominent example of such an agreement is given by the Korean 1997-98 electoral period. See Haggard (2000) for a discussion.



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  $d = [\lambda + (1 + \rho)]\kappa$ : the cost of credit would fall to the world rate of interest.

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 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 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 typical entrepreneur's final payoff would no longer depend on who wins the election. Hence he 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 here 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.<sup>23</sup>

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<sup>23</sup>The impact of the August 2002 support package to Brazil on the upcoming elections was quickly recognized but poorly understood. Clearly, the leftist candidates (Lula da Silva and Gomes) were more negative

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.<sup>24</sup>

Conversely, the analysis implies that the pro business candidate's electoral chances will be hurt by the policies under discussion. This suggests that it may be difficult for the two candidates to reach an agreement with regard to such policies, which may help explain why the policies are not observed often.

## 6. Extensions

### 6.1. Neoclassical Production

We have so far assumed that the final return on investment,  $R$ , and the return to working,  $W$ , are exogenous constants. But it is not too hard to extend the analysis to allow for  $R$  and  $W$  to be determined as equilibrium factor rewards in an economy with a neoclassical production function.

To do this, let us assume now that neither entrepreneurs nor workers produce goods directly. Instead, at the end of period 1, entrepreneurs sell the services of whatever capital they have accumulated, and workers sell labor, in competitive factor markets in which the rental rate of capital is  $R$  and the wage rate is  $W$ .

Production of the single good takes place at the end of period 1 in a competitive sector in which aggregate output is given by

$$Y = F(K, L) = Lf(k)$$

where  $F$  denotes a neoclassical production function,  $k = K/L$ , and  $f$  is the intensive produc-

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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).

<sup>24</sup>Thus, for instance, Lula da Silva's 2002 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.

tion function.<sup>25</sup> Recall that  $K$  and  $L$  denote the aggregate values of capital and labor after the elections. Our focus remains on a sudden stop equilibria, in which  $K = \chi\kappa$  if the pro business candidate wins the elections, and  $K = 0$  if the pro labor candidate is the winner.

Regardless of the electoral outcome, rental rates and wages must be given by conventional marginal conditions:

$$\begin{aligned} R &= f'(k) \\ W &= f(k) - kf'(k) \end{aligned} \tag{6.1}$$

On the other hand, labor supply is determined by

$$H'(L/(1 - \chi)) = (1 - \gamma)W \tag{6.2}$$

where  $\gamma$  is the labor tax rate. Now 6.1 and 6.2 jointly determine the equilibrium wage and the aggregate labor supply, given  $\gamma$  and  $K$ .

In a sudden stop equilibrium,  $\gamma$  will equal  $\gamma_b$  or  $\gamma_L$  depending on the electoral outcome. Also,  $K$  will equal  $\chi\kappa$  after a pro business victory and 0 after a pro labor victory. Hence factor rewards, in addition to labor effort, will depend on the electoral outcome. This is the main change with respect to the case in which  $R$  and  $W$  are constant. However, the analysis is essentially the same.

If the pro business candidate wins the elections, his decision problem is still to maximize 3.1 subject to 3.2, except that now  $W$  and  $l(\gamma)$  are given by 6.1 and 6.2, given  $K = \chi\kappa$ . Following the same steps as in section 3.1 one can show that the pro business candidate overcomes the capital levy problem only if  $\alpha > \chi$ . The reason is, of course, the same as in the simpler case: at the time taxes are set, labor taxes are distortionary but capital taxes are not.

Because  $W$  and  $R$  are now endogenous, the solution is now more complicated than before. For concreteness, focus on the case in which  $\tau_b = 0$  (this must be the solution if  $\alpha$

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<sup>25</sup>  $f : \mathbb{R}_+ \rightarrow \mathbb{R}_+$  is assumed to be smooth, strictly increasing and strictly concave.

is sufficiently close to one). In that case, the labor tax rate  $\gamma_b$  is determined by 6.1 , 6.2, and the government budget constraint:

$$G = \gamma WL \tag{6.3}$$

with  $K = \chi\kappa$ . If the solution is denoted by  $(W_b, L_b, \gamma_b)$ , then the capital rental rate after a pro business electoral victory is given by  $f'(\chi\kappa/L_b)$ . This quantity plays the same role as  $R$  did in the simpler version of the model.<sup>26</sup>

If the pro labor candidate wins the election, the capital levy problem implies that  $\tau_L = 1$ , that is, that any capital income will be expropriated. Anticipating this, all investment projects are discontinued, and  $K = 0$ . This implies that the wage falls to  $W_L = f(0)$ . Then the labor supply,  $L_L$ , and the labor tax rate,  $\gamma_L$ , are determined by 6.2 and 6.3.<sup>27</sup>

Having identified post election outcomes, the rest of the analysis proceeds essentially without change. The main novelty is that the capital levy problem of the pro labor candidate becomes worse. One can show that if the pro labor candidate wins the election, the labor tax rate is higher, and the wage rate and the worker's after tax income smaller, than under a pro business victory. This is because capital vanishes after a pro labor victory, and because capital and labor are complementary inputs in production.

## 6.2. A Distribution of Types

We have kept a strict distinction between classes: some agents are entrepreneurs, others workers. But our analysis also applies to settings in which the differences are not so sharp. Here we will assume that, instead of having workers and entrepreneurs, the economy is populated by a continuum of agents, each of which is both an entrepreneur and a worker.

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<sup>26</sup>In particular, for investment to get off the ground it is necessary that  $p(R - \lambda) = p(f'(\chi\kappa/L_b) - \lambda) \geq (1 + \rho)$ . This replaces 3.7 and 3.6 for  $\alpha$  large enough.

<sup>27</sup>Note that the existence of this kind of equilibrium requires that there be enough potential labor tax revenue to finance  $G$ . It is necessary, in particular, that  $f(0) > 0$ , that is, that capital be not essential in production.

Also, the condition 3.5 is replaced by  $G/\chi\kappa > R_e - \lambda$ , where  $R_e$  is the equilibrium rental rate if  $K = \chi\kappa$  and  $\gamma = 0$ .

This version turns out to be useful to assess the effects of wealth inequality and redistribution on politico economic outcomes. As mentioned in the Introduction, this question is of interest since it has been argued that the increase in politico economic volatility in Latin America can be blamed on persistent inequality.

Assume that all agents are identical except for the size of their projects,  $\kappa$ , and it will prove convenient to index agents by  $\kappa$ . A typical agent  $\kappa$  has access to a project of fixed size  $\kappa$ . The investment technology is the same as in the basic model. So, in a sudden stop equilibrium, agent  $\kappa$  borrows  $\kappa$  dollars from the world market. If the pro business candidate wins the elections, the project is continued (at cost  $\lambda\kappa$ ), and at the end of period 1 it yields  $R\kappa$  dollars, out of which taxes and the foreign debt must be repaid; if the pro labor candidate is the election winner, the project is just cancelled. In addition, and regardless of the election outcome, at the end of period 1 agent  $\kappa$  also works  $l(\kappa)$  hours, earning  $Wl(\kappa)$  dollars, and must pay labor taxes. For simplicity, we restore the assumption that  $R$  and  $W$  are both constant.

Project size,  $\kappa$ , is distributed according to a cdf  $F : [0, \infty) \rightarrow [0, 1]$ , with density  $f$ .  $F(\kappa)$  can be interpreted as the fraction of the population with project size equal to or less than  $\kappa$ .

Finally, I assume that agent  $\kappa$  maximizes the expected value of  $c(\kappa) - H(l(\kappa))$ , as in subsection 6.2, where the final consumption of agent  $\kappa$  is

$$c(\kappa) = (1 - \gamma_b)Wl(\kappa) + (1 - \tau_b)R\kappa - d(\kappa)$$

if the pro business wins the election, and

$$c(\kappa) = (1 - \gamma_L)Wl(\kappa)$$

if the pro labor government wins the election.

This setting reduces to the basic one because the labor supply decision is separable from the investment decision. Regardless of the electoral outcome, optimal labor supply is given

by the maximization of  $c(\kappa) - H(l(\kappa))$  subject to relevant one of the two previous equations. The solution requires:

$$(1 - \gamma)W = H'(l(\kappa))$$

just as in the basic model. Hence  $l(\kappa)$  is equal to the same  $l(\gamma)$  in subsection 2.2, independently of  $\kappa$ . In other words, the labor supply decision depends only on the labor tax rate, so all agents supply the same amount of labor. It also follows that agent  $\kappa$ 's realized welfare is given by

$$U(\gamma_b) + (1 - \tau_b)R\kappa - d(\kappa)$$

if the pro business candidate wins the election, and  $U(\gamma_L)$  in the alternative case, where  $U(\cdot)$  is the same as in subsection 2.2.

Since labor supply depends only on the labor tax rate and utility is linear in final consumption, the analysis of the investment project can be treated separately and its solution is the same as in subsection 2.1.<sup>28</sup> In particular, agent  $\kappa$ 's debt will be a linear function of his project size:

$$d(\kappa) = \left[ \lambda + \frac{(1 + \rho)}{p} \right] \kappa$$

Now, consider the policy problem of the pro business candidate if elected. Let  $\alpha(\kappa)$  denote the weight of agents of type  $\kappa$  in his objective function. Then his problem is to maximize:

$$\int [U(\gamma) + (1 - \tau)R\kappa - d(\kappa)]\alpha(\kappa)d\kappa$$

subject to

$$G \leq \tau RK + \gamma Wl(\gamma)$$

where

$$K = \int \kappa f(\kappa)d\kappa$$

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<sup>28</sup>The assumption of limited liability here means that labor income cannot be expropriated to pay foreign investors in the event of project failure.

is the aggregate amount of capital, and we have used the fact that the aggregate labor supply is  $l(\gamma)$ .

It is easy to see that the solution to the maximization problem is unchanged if the objective function is replaced by

$$\beta(1 - \tau)RK + (1 - \beta)U(\gamma)$$

where

$$\beta = \frac{\tilde{K}}{\tilde{K} + K}$$

can be interpreted as an implicit weight to capital owners, and

$$\tilde{K} = \int \kappa \alpha(\kappa) d\kappa$$

is an aggregate of capital weighted by the candidate's policy preferences.

Now a comparison of the resulting maximization problem with that in section 3 reveals that the two problems are essentially the same, with  $\beta$  a measure of the policy bias of the pro business candidate.<sup>29</sup> Here, the capital levy problem emerges if  $\beta \leq 1/2$ . So a sudden stop equilibrium requires that  $\beta > 1/2$ , and that the pro labor candidate have a bias in the opposite direction. Under that assumption, the analysis of section 3 applies virtually without change.

Note that  $\beta > 1/2$  is equivalent to  $\tilde{K} > K$ , which requires  $\alpha(\cdot)$  to dominate  $f(\cdot)$  stochastically to first order. In other words,  $\beta > 1/2$  means that the objective function of the pro business candidate must assign disproportionately large weight to wealthier agents (those with larger project sizes).

The analysis of this version of the model, hence, is basically the same as in the original version. However, this version allows one to consider the effects of wealth redistribution on a politico economic equilibrium.

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<sup>29</sup>More precisely, the ratio  $\tilde{K}/K$  plays the role of the ratio  $\alpha(1 - \chi)/\chi(1 - \alpha)$  in the basic model.

Consider the effects of a mean preserving spread in the distribution of project size,  $f$ . Such a change does not affect  $K$  nor  $\beta$ , and consequently the individual decision problems (as analyzed in section 2) and the policy problems of the two candidates (as studied in section 3) remain also unaltered, given  $p$ . The economic equilibria for given  $p$  must then be the same. So, if the mean preserving spread is to change the politico economic equilibrium, it must be because of its effect on the voting function  $\Gamma(p)$  discussed in section 4.

Assume probabilistic voting, as in subsection 4.2. Then agent  $\kappa$  votes pro business if

$$\begin{aligned} & (1 - \tau_b)R\kappa - d(\kappa) + U(\gamma_b) - U(\gamma_L) \\ = & [(1 - \tau_b)R - \lambda - \frac{(1 + \rho)}{p}]\kappa + U(\gamma_b) - U(\gamma_L) \geq \delta + \eta_\kappa \end{aligned}$$

If  $Q$  is the cdf of  $\eta_\kappa$ , given  $\delta$ , the probability that agent  $\kappa$  votes pro business is  $\Lambda(\kappa) \equiv Q([(1 - \tau_b)R - \lambda - (1 + \rho)/p]\kappa + U(\gamma_b) - U(\gamma_L) - \delta)$ . Hence, given  $\delta$ , the pro business candidate wins the election if

$$\int \Lambda(\kappa)f(\kappa)d\kappa > 0.5$$

Since  $\Lambda$  is linear and increasing in  $\kappa$ , a mean preserving spread of  $f$  reduces the RHS of the preceding inequality if  $\Lambda$  is concave, which requires  $Q$  to be concave. In such a case, clearly the voting function  $\Gamma(p)$  must shift downwards. If the initial politico economic equilibrium is given by a unique fixed point of  $\Gamma$ , as in Figure 3, the mean preserving spread will reduce the equilibrium value of  $p$ , and increase the cost of external credit and the foreign debt.

This analysis shows that an increase in wealth inequality (a mean preserving spread in the distribution of project size) may be associated with both more expensive foreign credit and an increase in the probability of a pro labor victory. Hence it provides some justification for recent claims. However, the analysis also makes clear that such a conclusion is sensitive to assumptions about the distribution of exogenous political noise. The opposite result obtains if  $Q$  is convex.



## 7. Final Remarks

This paper has shown that a model in which international capital flows affect and are affected by electoral uncertainty delivers significant implications for observable variables and for policy. In particular, such an interaction may result in sudden stops, magnified responses to exogenous shocks, and self fulfilling crises at electoral times. Policies that allow electoral candidates to pre commit not to expropriate capital returns do stabilize capital inflows, but also have predictable effects on electoral outcomes. Reducing wealth inequality has ambiguous but predictable effects on the politico economic equilibria.

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 attract any foreign funds. At the other extreme, a politically mature country, that is, one in which policy is expected to be favorable to investment regardless of electoral outcomes, will benefit from strong and stable capital inflows. The model thus suggests that financial flows may display marked volatility as a country develops politically. But we also found that the political development process may itself 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. Such a dynamic extension would also make the model more amenable to empirical calibration or estimation, and therefore enhance its applicability to specific, real world episodes. On the other hand, extending the analysis of this paper to multiperiod settings would require dealing with issues, such as the role of reputation, that may be cumbersome or intrinsically hard.

Another useful extension of this paper would be to allow for public debt and its determination. By just reinterpreting  $G$  as the amount of government debt repayments due, the model in this paper can be used to discuss the impact of a large public debt. Such a reinterpretation, however, would not be helpful to understand how the incumbent government chose the size of the public debt in the first place, and how that choice may have interacted

with electoral considerations. Perhaps one could gain some mileage by merging the analysis in this paper with the literature on the strategic role of public debt, as discussed by Drazen (2000) or Persson and Tabellini (2000).

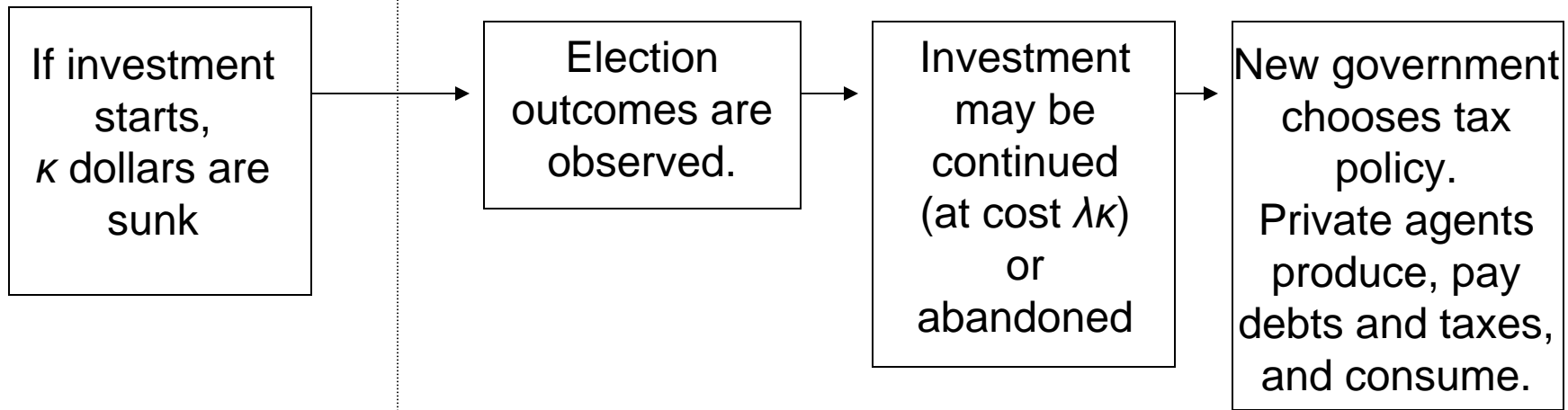
More generally, the model in this paper was built upon a number of strong assumptions, some of which may be peripheral (like the ones discussed in section 6), but others crucial. Examining which ones are which appears as a fascinating agenda for future research.

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t = 0

t = 1



Sequence of Events

Figure 1: EMBI Spread, Brazil vs Global, 2001-05

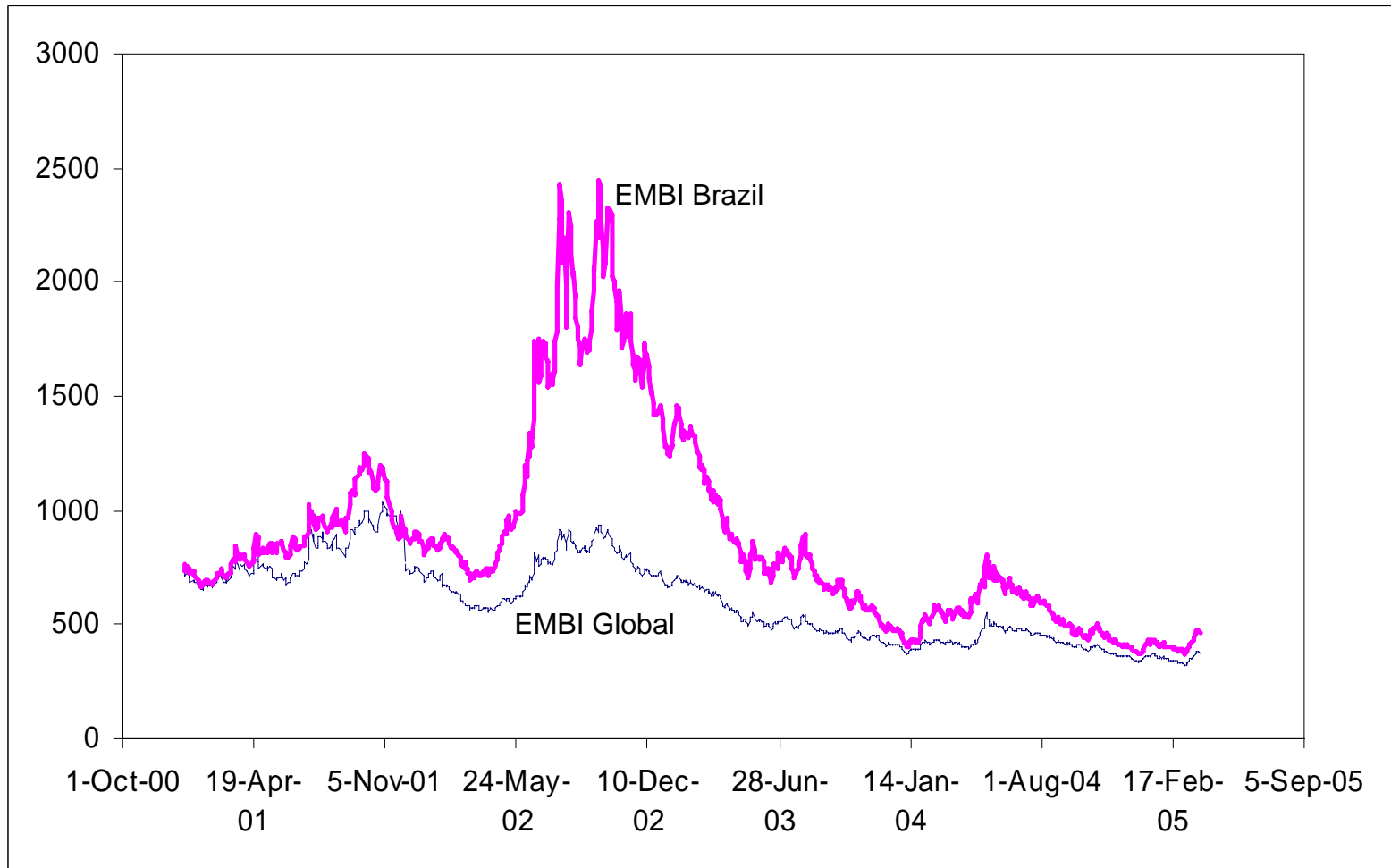


Figure 2: EMBI Peru Minus EMBI Global, 2005-6

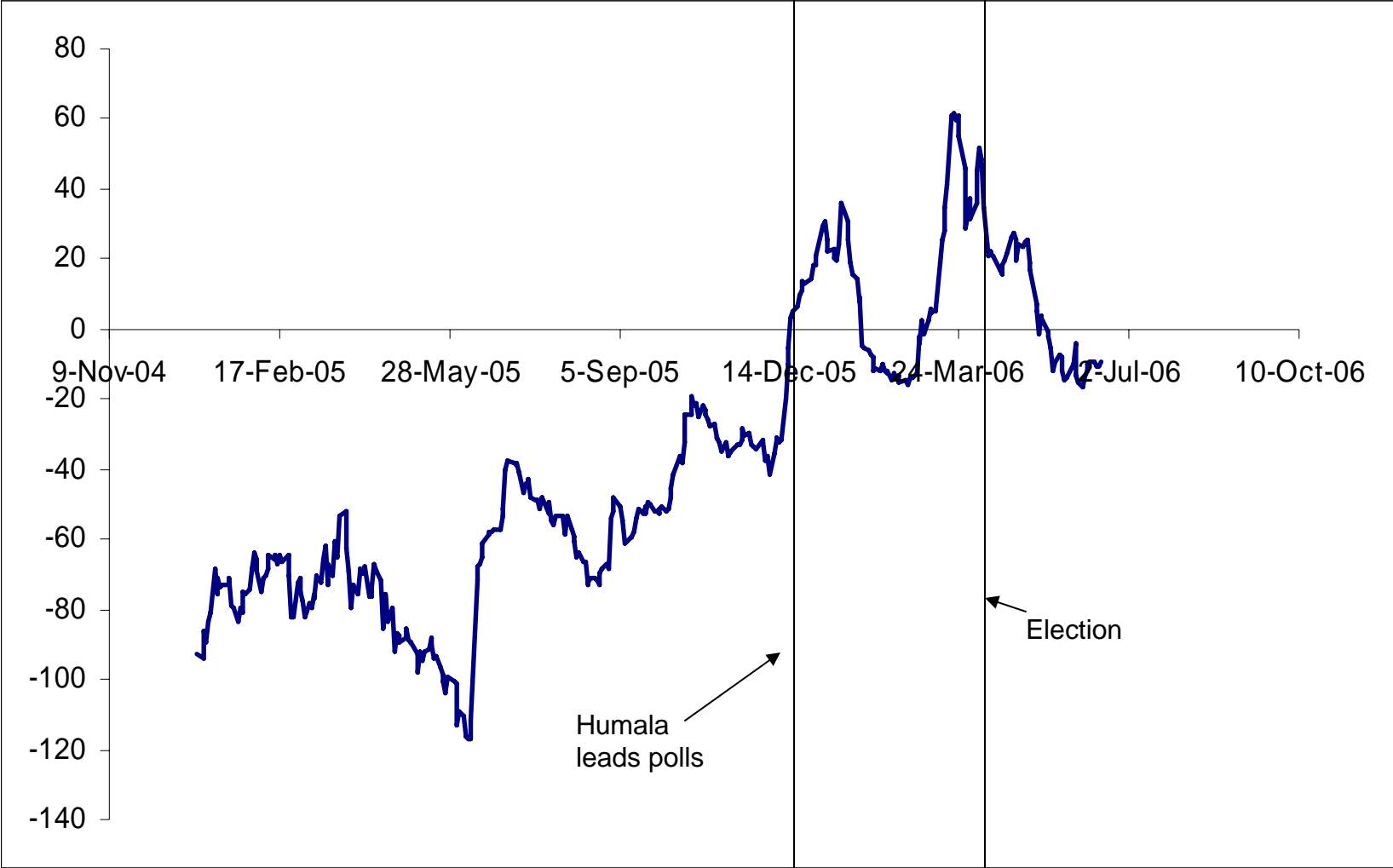


Figure 3

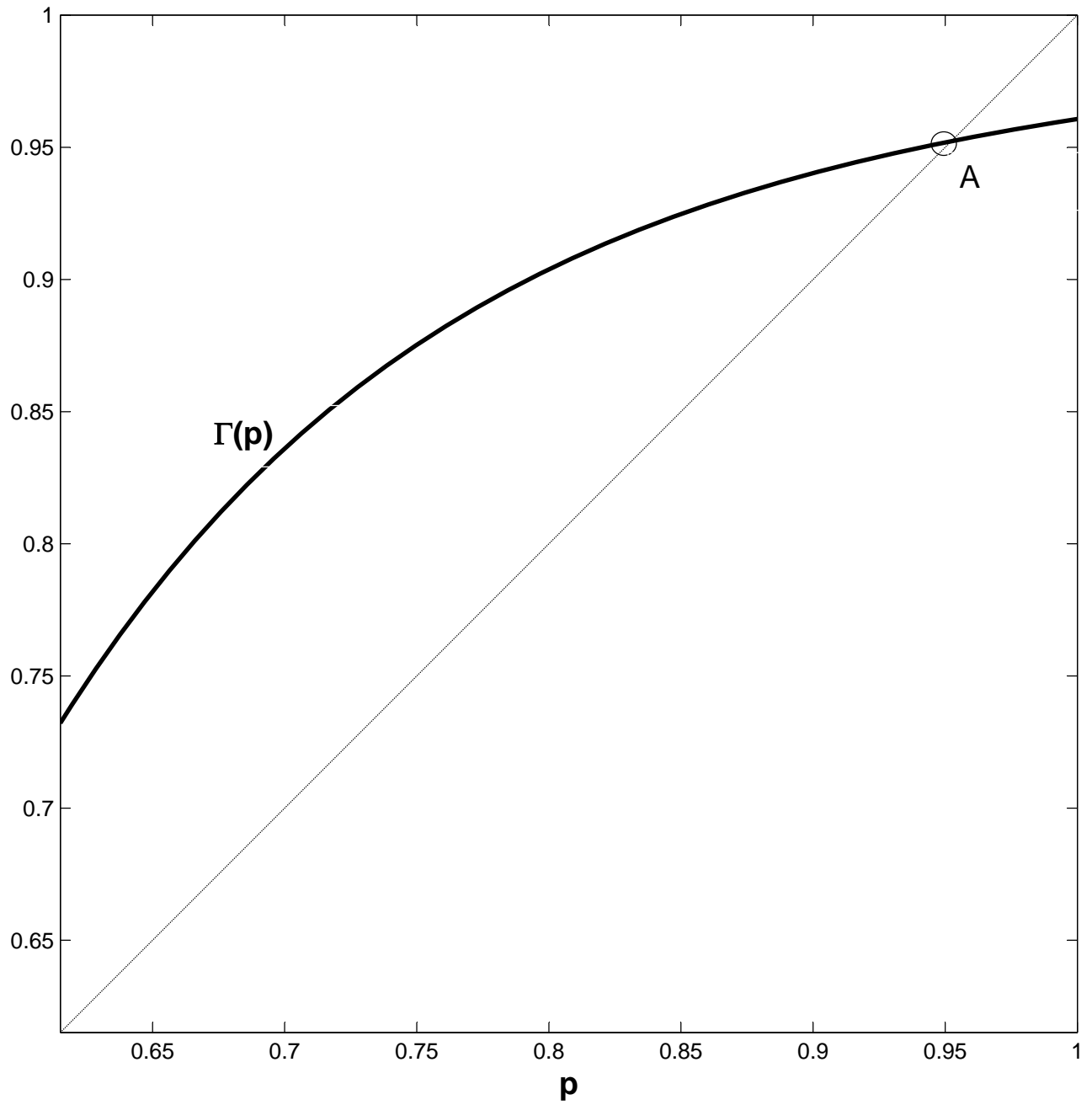


Figure 4

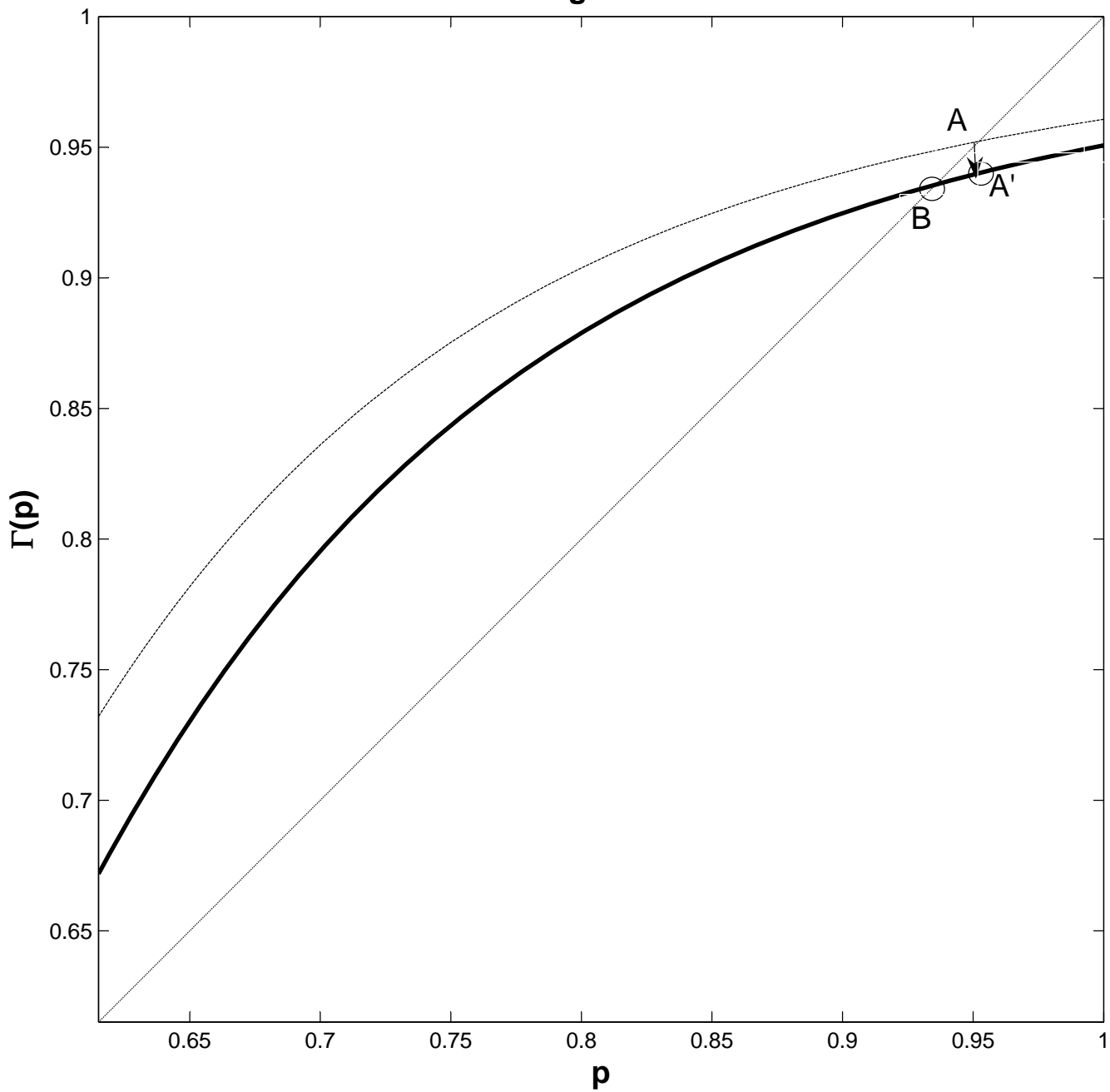




Figure 5

