Elections, Capital Flows, and Politico Economic Equilibria

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We study an open economy where a pro labor and a pro business candidate compete in an election. The winner chooses taxes, which affect investment returns. Electoral outcomes depend on the size of the foreign debt, but the debt itself reflects expectations about the election. The resulting interaction is novel and has several implications. Elections are associated with increased volatility. Politico economic crises can occur. Inefficiencies vanish if the candidates commit to an appropriate tax policy, but such commitments have predictable effects on the election. Empirical evidence supporting the theory is discussed.
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That financial volatility is often strongly associated with electoral uncertainty and distributional conflict has been confirmed by several recent Latin American episodes. A prominent one 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. 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 the episode 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 (Juan Martinez and 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.

[PLEASE INSERT FIGURE 1 APPROXIMATELY HERE]

A second 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 almost four percent of GDP in 2005 alone.[1] Fears of expropriation proved warranted, as Morales announced, in May 2006, the nationalization of oil and gas contracts with multinational corporations. [2]

[1] 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, however, was not associated with electoral periods, which is the focus of this paper.

[2] "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)

It is not hard to find other examples in which elections appear to have disrupted capital flows. [3] 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 2000).

The 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 prospective 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 is 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." [4]

Hence understanding the links between international capital flows and elections may require a theory in which not only elections can affect international capital flows but also capital flows can affect electoral equilibria. This paper develops one such theory and finds that the interaction between elections and economic outcomes can have a drastic effect on the behavior of observable variables and may call for a rethinking of public policy.

We focus on a model of a small open economy in which entrepreneurs and workers elect a government. There are two electoral candidates, one "pro business" and the other "pro labor." In the benchmark version of the model, the winning candidate chooses a tax-transfer policy to redistribute income towards her representative constituent.

Expectations about the election matter for economic outcomes because, before the election, entrepreneurs have access to investment projects that can only be financed with the help of foreign lenders. Debt contracts, economic allocations and decisions, and the cost of credit, all depend on the probability distribution of the electoral outcome because the policy chosen by the winner determines the profitability of investments.

A more novel aspect of the model, relative to previous studies, is that debt contracts, in turn, affect electoral outcomes. In particular, a larger debt makes the pro business candidate *less* attractive to voters *relative to* the pro labor candidate. The reason is simple: a larger debt reduces the entrepreneurs' payoff conditional on a pro business victory while leaving unaffected that payoff conditional on a pro labor victory. As a consequence, natural assumptions about voting behavior imply that the probability of a pro business victory in the election must fall when the debt increases.

Hence the model implies that the size of the debt, the cost of credit, and the probability distribution of the electoral outcome are all determined simultaneously. We characterize the resulting *politico-economic* equilibria and its implications. One finding is that the politico-economic interaction may result in a multiplier effect that amplifies the response of endogenous variables

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[3] Korea in 1997-98 immediately comes to mind (Stephan Haggard 2000).

[4] "IMF Loan to Brazil also shields US Interests," New York Times, August 9, page C1. Another illustration is found in the Op-Ed page if 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)

to exogenous shocks. 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 useful lessons for policy. A pre electoral commitment binding the two candidates to implement a "market friendly" tax policy can lead to a Pareto improvement. But also, and more surprisingly, such a commitment has a nontrivial effect on the elections, favoring one of the candidates and hurting the other in a predictable manner.

Finally, the paper argues that the predictions of the model are consistent with a variety of empirical evidence. As already mentioned, the model suggests that electoral periods are generally associated with heightened financial volatility; such an association has, in fact, has been documented amply, as discussed by Martinez and Santiso (2003). More sharply, the model predicts that increases in the world interest rate should lead to higher credit spreads and an increase in the probability of an electoral victory by leftist candidates. We argue that existing empirical studies together with some new evidence presented here are generally supportive of both implications.

Previous theoretical efforts at understanding the interaction between politics and the volatility of international capital flows are hard to find.[5] One recent exception is Roberto Chang (2007), which presents an analysis of the links between financial crises and political crises. That paper, however, does not emphasize the 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 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 Yunyong 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 emphasized here: as already mentioned, the candidates in our model may want to be bound by a pre electoral agreement but cannot be constrained to honor any promises made before taking power.

The rest of the paper is organized as follows. Section I develops a benchmark model and identifies *economic* equilibria, which take the probability distribution of the electoral outcomes as exogenous. After arguing that voters' preferences, and hence the electoral probabilities, must depend on economic equilibria, Section II characterizes and discusses the nature of *politico economic* equilibria. Section III identifies implications for policy and welfare. Section IV sketches some extensions of the model, and discusses the theory's empirical relevance. Section V concludes.

I.   A Basic Model

We focus on a small open economy populated by a continuum of *entrepreneurs* and *workers* that 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 population is denoted by χ. There

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[5]Alberto Alesina and Guido Tabellini (1989) 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.

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. The winner of the elections arrives to power in period 1 and chooses taxes on domestic sources of income and a set of transfers to maximize the welfare of her typical constituent. Hence, if elected, the pro labor (resp. pro business) candidate will simply tax all capital income (resp. labor income) and redistribute it to the workers (resp. entrepreneurs). Obviously, these sharply contrasting policy outcomes reflect rather strong assumptions about the policy problem, but we will see later that those assumptions are only made to ease exposition and can be relaxed considerably.

Also for ease of exposition, a worker's life is rather trivial (for now). In period 1, the typical worker receives an endowment of e dollars, pays taxes to (or receives a subsidy from) the elected government, and consumes the remainder. And, as explained in subsection IV.A below, there is no essential loss in assuming further that $e = 0$, so that the worker's consumption will be zero if the pro business candidate wins the elections, and equal to any transfer received from the government in the event of a pro labor victory.

In contrast, entrepreneurs face a more involved problem, and their investment decisions are at the heart of the model. The representative entrepreneur has access to an investment project that requires an initial outlay of κ dollars at $t = 0$ and returns $R\kappa$ dollars in period 1, where R is an exogenous constant. The entrepreneur is risk neutral, maximizes expected consumption in period 1, and has no initial funds. To finance investment, the entrepreneur 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 consumption subject to providing foreign investors with an expected return no less than the world interest rate.[6] 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.

In the absence of other distortions, the investment would clearly be made if

$$(1) \qquad R > 1 + \rho$$

which we will assume. However, the contract problem is complicated by the possibility of taxation, since a labor victory in the elections results in the investment return being taxed away. A contract between the entrepreneur and foreign investors must therefore stipulate whether the project is undertaken and how the after tax return on the investment is distributed in period 1, contingent on the result of the elections and the associated tax policy.

The optimal contract is simple. From the viewpoint of the contract, taxes are the only source of uncertainty. Because of limited liability, the payment to the 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 the investment projects are to be financed at $t = 0$, outside investors must be paid at least their opportunity cost of funds, which requires that[7]

$$pd = (1 + \rho)\kappa$$

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

$$d = (\frac{1+\rho}{p})\kappa \tag{2}$$

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

$$R\kappa - d \geq 0$$

Inserting (2) into the previous inequality we obtain that it is necessary for the investment project will be undertaken that:

$$p \geq (1+\rho)/R \equiv p_{\min} \tag{3}$$

This completes the description of the economic setting, and would suffice to determine the economy's outcomes if the political equilibrium, summarized by the electoral probability p, were exogenous. Indeed, for a given p the equilibrium outcome must be as follows. If p is too low ($p < p_{\min}$), no investment projects are undertaken, and all agents receive a zero payoff. If p is large enough ($p > p_{\min}$), entrepreneurs and foreign lenders invest the κ dollars needed to develop every project. In that case, if the pro business candidate wins the election, foreign investors are repaid d, given by (2), in period 1, and entrepreneurs consume the difference, $R\kappa - d$; taxes are zero, and workers consume zero. In the event of a pro labor victory, investment returns are taxed away and given to the workers; each worker's consumption is then $\chi R\kappa/(1 - \chi)$, while entrepreneurs and foreign lenders are left with a zero payoff.

Finally, in the borderline case $p = p_{\min}$, entrepreneurs are indifferent between investing or not. Equilibrium is then consistent with any number of the available projects being undertaken. Each entrepreneur gets a zero payoff unless he made an investment and the pro business candidate wins the election, in whose case his payoff is $R\kappa - d$; and letting ϕ denote the fraction of projects undertaken, each worker's payoff is $\phi\chi R\kappa/(1 - \chi)$ under a labor victory, and zero otherwise.

Several aspects of the equilibria just described, which we may call *economic equilibria given p,* warrant comment. First, there is a unique equilibrium for any given $p \neq p_{\min}$. All investment projects are undertaken if $p > p_{\min}$. Otherwise some or all projects may not be developed, which is inefficient since (1) holds.

Second, when investments are made, the associated debt d depends inversely on p, the probability of a pro business victory. Alternatively, if we define the *cost of credit* by the debt divided by the initial investment,

$$\text{cost of credit} = \frac{d}{\kappa} = (\frac{1+\rho}{p})$$

it follows that the cost of credit falls with p. 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.

Third, an increase in the debt, which may be caused by a fall in p or an increase in ρ, reduces the entrepreneurial payoff when a pro business government is elected. Since the entrepreneurs' payoff is always zero under a pro labor government, this means that, while entrepreneurs are always better off with a pro business government, the *relative* payoff to them of a pro business electoral victory decreases with the debt. A larger debt means that more of the benefits to entrepreneurs from a pro business victory are lost as compensation to foreign investors for the risk of expropriation.[8]

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[8]Note that limited liability is crucial for this result. In this setting, it means that the debt is repaid only when the

II. Politico Economic Equilibria

The preceding section discussed the economic outcomes for an exogenously given p. However, the assumption of an exogenous p is questionable in this model, as the payoffs that entrepreneurs and workers receive after the elections depend themselves on economic equilibria. It is more plausible to assume the probability p of a pro business victory as reflecting the expectations of entrepreneurs and workers about the implications of the election for their own welfare. This section develops the implications of such an alternative view.

We 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.

A. Voting Preferences and the Debt

A natural assumption is that 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. Hence, the probability of a pro business victory in the election must be a function

$$p = \Psi(E, W) \tag{4}$$

where E denotes the typical entrepreneur's payoff under a pro business government relative to his payoff under a pro labor government, W is the corresponding relative payoff for the typical worker, and Ψ is a function increasing in E and W, that takes values in the unit interval. That p is given by a function such as Ψ is not only plausible but can also be derived from more basic assumptions, as we do in the next subsection.

The key observation is that, in our model, E and W will depend on economic equilibria. To see this, suppose that all investment projects are in fact undertaken, and consider the voting decision faced by the typical entrepreneur at the time of the election. If debt contracts are consistent with economic equilibrium, the entrepreneurs' final consumption will be zero if the pro labor candidate wins, but $R\kappa - d$ if the pro business candidate is the winner. Hence, $E = R\kappa - d$: as already noted, the *relative* appeal of the pro business candidate to entrepreneurs *falls* with the debt d.

As for workers, recall that their final consumption is zero after a pro business victory and $\chi R\kappa/(1-\chi)$ after a pro labor victory, if all projects are developed. Hence $W = -\chi R\kappa/(1-\chi)$, and (4) implies:

$$p = \Psi(R\kappa - d, -\chi R\kappa/(1 - \chi)), \text{ if all projects are undertaken.} \tag{5}$$

If, instead, no investments are made, all agents have a zero payoff no matter the outcome of the election, so:

$$p = \Psi(0, 0) \equiv p_0, \text{ if there is no investment.} \tag{6}$$

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pro business government wins the election. But the logic is more general. Limited liability imposes a lower bound on the entrepreneur's payoff, and binds in states of nature that are unfavorable to the entrepreneur, that is, when a pro labor candidate is elected. In those states foreign lenders may have to lose money, so they have to be compensated when the pro business candidate is the winner. Hence an increase in the expected cost of financing will be allocated disproportionately to the states in which there is a pro business victory, reducing the entrepreneur's payoff in those states relative to the unfavorable states.

Finally, if some but not all projects are undertaken, entrepreneurs must be indifferent between investing or not, and payoffs will depend on the number of projects undertaken. Then it is easy to see (and will be derived formally in the next subsection) that[9] p can be any number between $\Psi(0, 0)$ and $\Psi(R\kappa - d, -\chi R\kappa/(1 - \chi))$:

(7) $p \in [p_0, \Psi(R\kappa - d, -\chi R\kappa/(1 - \chi))]$, if some but not all projects are undertaken.

A *politico economic equilibrium* can then be defined as a probability p and an economic equilibrium given p that satisfy (5)-(7). But in an economic equilibrium, the debt d is a function of p (recall (2)), and there is full, zero, or partial investment whenever $p > p_{\min}$, $p < p_{\min}$, or $p = p_{\min}$, so defining

$$
\begin{aligned}
\Gamma(p) &= \Psi([R - (\frac{1 + \rho}{p})]\kappa, -\chi R\kappa/(1 - \chi)), \text{ if } p > p_{\min} \\
&= p_0, \text{ if } p < p_{\min}, \\
&\in [p_0, \Psi(0, -\chi R\kappa/(1 - \chi))], \text{ if } p = p_{\min}
\end{aligned}
$$

fixed points of Γ in the interval $[0, 1]$ identify politico economic equilibria.

B.   Probabilistic Voting

Our maintained assumptions imply that the equilibrium correspondence Γ is continuous and maps $[0, 1]$ into itself. This ensures the existence of at least one politico economic equilibrium.[10]

Γ can plausibly take any shape as long as it is horizontal at p_0 for $p < p_{\min}$ and increasing in p for $p > p_{\min}$. To illustrate, and also to provide a theoretical justification for our assumptions on Ψ and Γ, we can derive them from probabilistic voting, as in Persson and Tabellini (2000). In particular, assume that a given entrepreneur, labeled i, votes pro business if

(8) $E \geq \delta + \eta_i^e$

where δ is an aggregate shock, common to all agents, and η_i^e is an independent, idiosyncratic shock, distributed i.i.d. across entrepreneurs. In other words, entrepreneur i is assumed to vote pro business as long as his relative payoff from a pro business government, E, dominates other considerations, not explicitly modeled but summarized by $\delta + \eta_i^e$, that affect the relative popularity of the two candidates. With this specification, the number of entrepreneurs that vote pro business, given E and δ, is $\chi Q^e(E - \delta)$, where Q^e is the cdf of η_i^e.

Modeling workers in a similar fashion, and with analogous notation, assume that worker j votes pro business if

$$W \geq \delta + \eta_j^w$$

where η_j^w is an idiosyncratic shock to worker j's preferences. This implies that the number of workers that vote pro business is $(1 - \chi)Q^w(W - \delta)$, where Q^w is the cdf of η_j^w.

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

$$\chi Q^e(E - \delta) + (1 - \chi)Q^w(W - \delta) > 0.5$$

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[9]Depending on the amount of investment, which will be pinned down in equilibrium.

[10]Formally, this is an application of Kakutani's fixed point theorem.

Let $\bar{\delta}$ be the value of δ that yields equality in the previous expression. Then, given E and W, the probability of a pro business victory, $\Psi(E, W)$, is just the probability that $\delta \leq \bar{\delta}$, which is easily calculated after specifying a cdf for δ. It is then immediate that Ψ must be increasing in E and W, as postulated in our discussion.[11]

It is also clear that the equilibrium correspondence Γ will depend not only on the economic parameters of the model, but also on exogenous political noise. In particular, the shape of Γ will in general depend on the shape of the distribution functions Q^e, Q^w, and the cdf of δ.

C. Equilibrium, Volatility, and Crises

It is straightforward to solve the model after assigning values to its parameters. Given the discussion of the preceding subsection and the highly stylized nature of the model, however, calibrating or estimating the parameters on the basis of empirical data appears premature. Instead, here we discuss possible qualitative behavior.

Start with Figure 2, which plots the equilibrium correspondence Γ against p on the unit square. There is a single politico economic equilibrium given by point A, where Γ intersects the 45 degree line. Since $p > p_{\min}$, all investment projects secure foreign financing and are developed.

[PLEASE INSERT FIGURE 2 HERE]

This equilibrium may seem qualitatively similar to that in the case of exogenous p but, in fact, the interaction between economic equilibria and politics makes its analysis very different. To see this, consider the implications of an increase in the world interest rate ρ. The graph of Γ shifts downwards because a larger ρ 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. This is depicted in Figure 3, where a new equilibrium is given by point B. The figure 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 ρ, 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 must increase the cost of credit and the debt d, which itself will push p down even more, and so on. Such a chain reaction is given by the shift from A' to B.

[PLEASE INSERT FIGURE 3 HERE]

Hence the interaction between finance and politics implies the existence of *multiplier effects* that can 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, the reaction of the economy to exogenous shocks may be even more drastic than suggested by Figure 3. This is illustrated by Figure 4, which summarizes the possible equilibrium implications of an increase in the interest rate ρ under a different assumption about the shape of the equilibrium correspondence Γ. The initial equilibrium is given by point A. As in Figure 3, and for the same reasons, the higher interest rate pushes the graph of Γ downwards. Here, however, not only the initial equilibrium shifts to B, but other equilibria appear. At C, for instance,

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[11] The argument has to be slightly modified if $p^e = p_{\min}$. In that case, for an entrepreneur that does invest, $E = R\kappa - d$, while $E = 0$ for an entrepreneur that does not invest. As for the typical worker, and recalling that ϕ denotes the fraction of entrepreneurs that do invest, $W = W(\phi) = -\phi\chi R\kappa/(1 - \chi)$. The pro business candidate then wins the election if $\chi[\phi Q^e(R\kappa - d - \delta) + (1 - \phi)Q^e(-\delta)] + (1 - \chi)Q^w(W(\phi) - \delta) > 0.5$. A straightforward continuity argument now implies that p must be p_0 if $\phi = 0$, $\Psi(R\kappa - d, -\chi R\kappa/(1 - \chi))$ if $\phi = 1$, or any number in between if $\phi \in (0, 1)$, as claimed.

the value of p can be much lower, and consequently the debt and cost of credit much higher, than at B.

[PLEASE INSERT FIGURE 4 HERE]

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, such as C in Figure 4. One can interpret such a shift between equilibria as a politico economic self fulfilling crisis.[12] Again, these implications reflect the interaction between electoral uncertainty and the debt, as there would be a unique outcome absent such interaction.[13]

In addition to allowing for the analysis of economic shocks, the model is amenable to study the impact of purely political shocks. Here, such shocks would be represented by shifts in the voting function Ψ. If the latter is derived from probabilistic voting, in particular, Ψ (and hence Γ) would shift in response to changes in the variances of the shocks δ, η_i^e, or η_i^w. For example, it is easy to show that a mean preserving spread in distribution of the aggregate shock to voting, δ, would result in a downward shift of Γ, as in Figures 3 and 4. Intuitively, a higher variance in δ would make entrepreneurs less likely to base their votes only on economic payoffs, favoring the pro labor candidate. The qualitative effect would be similar to that of a higher world interest rate depicted in Figures 3 and 4. Appealingly, the model implies that purely political shocks affect not only electoral probabilities but also economic outcomes.

Finally, there may be politico economic equilibria with no investment or less than full investment, which is clearly inefficient. Two (different) equilibrium correspondences illustrating such outcomes are depicted in Figure 5. At A, the equilibrium p equals p_0, and there is no investment. At B, $p = p_{min}$, and some investments are not made. In addition, there are no other equilibria.[14] Figure 5 may thus capture the case of economies too poor to attract international capital. But the model sheds light on what it means to be "too poor". Both configurations in Figure 5 are more likely if p_{min} is large, given p_0. This requires that the return on domestic projects, R, be not large relative to the world interest rate ρ or, in other words, that investments be not that productive. But also, for the cases of Figure 5 to obtain, the correspondence Γ must in each case remain below the 45 degree line for p in $(p_{min}, 1]$. This requires that the voters' support for the pro business candidate be not large enough to compensate investors for the probability of expropriation. In this sense, the inability of the economy to attract foreign financing is also an implication of weak political fundamentals.

[PLEASE INSERT FIGURE 5 HERE]

Summarizing, 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.

III. Welfare and Policy

Suppose that there is a unique equilibrium with positive investment, as depicted in Figure 2. In the (likely) case that the equilibrium p is less than one, there is room for a Pareto improvement,

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[12]See Paul Masson (1999) for a discussion of such an interpretation.

[13]When multiple equilibria exist, local equilibrium behavior depends on which equilibrium one is looking at. In Figure 4, for example, a small increase in the world interest rate ρ will result in an *increase* in p if the initial equilibrium is D and there are no jumps across equilibria. Ruling out this possibility requires taking a stand on equilibrium selection. One may note, in particular, that D is unstable under conventional adjustment dynamics.

[14]Note that, while Figure 5 depicts cases of unique equilibrium, in general equilibria with full investment may coexist with equilibria with partial or no investment.

assuming that workers are risk averse (an assumption that has not been ruled out). This is because there is no uncertainty in the economic fundamentals, yet the worker's final consumption is uncertain.

To identify the possibilities, recall that in the equilibrium of Figure 2 the typical worker ends up consuming $\chi R\kappa/(1-\chi)$ with probability $(1-p)$, and zero with probability p. Let ce denote the corresponding certainty equivalent level of consumption, which must be strictly less than $(1-p)\chi R\kappa/(1-\chi)$ because of risk aversion. Before the elections, the two candidates could agree to transfer ce to each worker at the end of period 1, financing the transfer with a tax on capital income, independently of which candidate emerges as is the election's winner. Assuming that the agreement is perfectly credible, entrepreneurs and foreign investors would no longer face any uncertainty about taxes. To participate in the investment, it would then be enough for foreign lenders to be repaid $(1+\rho)\kappa$: the cost of credit would fall to the world rate of interest. And the payoff to the entrepreneur would be:

$$R\kappa - \frac{(1-\chi)}{\chi}ce - (1+\rho)\kappa \quad > \quad R\kappa - \frac{(1-\chi)}{\chi}[(1-p)\chi R\kappa/(1-\chi)] - (1+\rho)\kappa$$
$$= \quad [pR - (1+\rho)]\kappa$$

and hence strictly larger than his payoff in the equilibrium of Figure 2.

Hence a commitment to a common tax-transfer policy before the elections can remove the inefficiency associated with uncertain consumption. While the policy just described makes entrepreneurs better off and leaves workers the same, it is obvious that one can alternatively transfer more than ce to each worker while still improving the payoff to entrepreneurs too. In other words, there are lots of common tax-transfer policies that make both workers and entrepreneurs strictly better off.

While we have shown that Pareto improving pre electoral agreements exist, we have not singled out which one may actually obtain. The exact choice would have distributional consequences, and it would presumably be determined by negotiations between the two electoral candidates.

More strikingly, 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 so the two candidates would be seen as more equal to each other. The probability of a pro business victory would change to $p_0 = \Gamma(0,0)$.

The analysis then suggests that, while beneficial tax-transfer policies are available, it may be difficult for the two candidates to reach an agreement with regard to such policies. In the case depicted in Figure 2, the pro business candidate's chances of victory would be hurt by a pre electoral agreement; more generally, such an agreement would hurt the electoral odds of one of the contenders in a predictable manner. This may help explaining why the policies are not observed often.

In the case of a unique equilibrium with less than full investment, as depicted in Figure 5, the analysis is somewhat different. Suppose no projects are undertaken, as in point A. If the two candidates agree on a common policy to impose a tax $T \geq 0$ on each project and transfer the proceeds to workers, it is easy to see that full investment will take place if the tax does not entirely confiscate the project surplus, that is, if $T < [R - (1+\rho)]\kappa$. This policy would make both workers and entrepreneurs better off, as they all would have a zero payoff otherwise. And since the payoffs of workers and entrepreneurs would not depend on the electoral outcome, the probability of a pro business electoral victory would remain at p_0. From this viewpoint, neither candidate would have an incentive to block a preelectoral agreement. However, since the value of T determines the distribution of the gains between entrepreneurs and workers, reaching a consensus for a common tax-transfer policy would remain hard.

Finally, consider the case of multiple politico economic equilibria, as when Γ is given by the solid line in Figure 4. Our discussion implies that there are always common tax-transfer agree-

ments that make both workers and entrepreneurs better off than in any one of the equilibria, although the set of beneficial policy alternatives depends on the equilibrium that would prevail without a pre electoral agreement. In every case, however, any common tax-transfer policy implies that the equilibrium p will change to p_0, since such a policy would erase any *economic* differences in payoffs associated with the election.

IV. Discussion

A. Extensions and Interpretations

To help exposition, we imposed several assumptions that can be relaxed substantially. For example, allowing the worker's endowment e to be strictly positive requires only minor adjustments. Roughly, ensuring that the entrepreneur's payoff after a pro business electoral victory be nonnegative would require $R\kappa - d + (1 - \chi)e/\chi \geq 0$, since in that event each entrepreneur would receive a proportional share of the workers' endowments. Noting that the inequality can be written as $R^*\kappa - d \geq 0$, with $R^* = R + [(1 - \chi)/\chi]e/\kappa$, the rest of the analysis would proceed as before, except that R^* would replace R in the definition of $p_{\min}$ and Ψ.

Likewise, it is not necessary to assume that each candidate cares *only* about her typical constituent. Suppose instead that the pro labor candidate, if elected, chooses a tax-transfer policy to maximize a weighted sum of the consumption of entrepreneurs and workers, with weights λ and $(1 - \lambda)$ respectively, where $0 < \lambda < 1$. Then the pro labor candidate will, if elected, still expropriate the whole investment income and transfer it to the workers if $\lambda < \chi$, that is, if the pro labor candidate's relative preference for workers is larger than the number of workers in the population [15]. Correspondingly, the pro business candidate will expropriate all of the workers' endowments (if any) and transfer the proceeds to the entrepreneurs if the weight that she assigns to the latter exceeds the number of entrepreneurs. So what is needed for our results is that each candidate have *some* bias in favor of her typical constituent, not that her preferences be extreme.

It is not too hard to add production and distortionary taxation to the model. Such an extension yields insight about the interaction between elections and commitment problems that may affect the two candidates. Assume that workers are not endowed with goods but, rather, with time that they can enjoy as leisure or use to produce goods in period one. The typical worker produces Al goods if he works l hours, and pays a proportional tax γ on labor income, so that the worker's decision problem is to choose consumption c and labor effort l to solve

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

where H is an increasing, smooth, convex function. Clearly, the worker's utility, $U(\gamma)$, and his labor supply, $l = L(\gamma)$, will be both decreasing in the tax rate γ.

Now, the elected government is assumed to have to pay for an exogenous expenditure G with the revenue from capital and labor income taxes. Letting τ denote the tax rate on capital income, the government's budget constraint is now

$$G = \chi\tau R\kappa + (1 - \chi)\gamma AL(\gamma)$$

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[15]To see this, suppose that investment projects have been undertaken, and that the pro labor candidate has won the election. Then she will maximize

$$\lambda[Max\{0, R\kappa - d - \tau\}] + (1 - \lambda)[e + \chi\tau/(1 - \chi)]$$

where τ is the tax collected from (or transfer to, if negative) the representative entrepreneur, and feasibility requires $R\kappa \geq \tau \geq -(1 - \chi)e/\chi$. This is a linear problem, and the pro labor government will set τ to its maximum feasible value of $R\kappa$ if $\lambda < \chi$.

assuming that investment projects have been undertaken. If the elected government objective function assigns weight λ to entrepreneurs, she will choose tax rates γ and τ in the unit interval to maximize

$$\lambda[Max\{0, (1-\tau)R\kappa - d\}] + (1-\lambda)U(\gamma)$$

subject to the previous budget constraint, where d is the debt of the typical entrepreneur.

In this setting, it can be shown that, if the elected government has a pro labor bias (given again by $\lambda \leq \chi$), it will finance G with only capital income taxes if feasible, resorting to labor taxes only if $G > \chi R\kappa$. The crucial observation is that investment decisions are made in advance of the election, while the labor supply decision is made after the election. This means that, at the time the tax rates are chosen, labor taxes are distortionary but capital income taxes are not. A classical capital levy argument then applies if $\lambda = \chi$, implying that capital taxation dominates labor taxation; a bias in favor of workers ($\lambda < \chi$) works in the same direction. On the other hand, if the government is biased in favor of entrepreneurs ($\lambda > \chi$), the capital levy problem is offset by redistributive motives, so that G will be financed at least partly by labor taxes. In particular, one can show that, if λ is sufficiently larger than χ, the optimal policy is to pay for the government expenditure G out of labor taxes alone if feasible.

The implication is that our main arguments can be extended to this scenario if one accepts the assumption that the pro labor candidate is biased in favor of workers and the pro business candidate biased towards entrepreneurs [16]. In addition to showing (again) that the analysis does not require extreme assumptions on the candidates' preferences, this extension suggests that interactions between elections and financial outcomes can emerge naturally if the election winner faces a public finance problem and the two candidates have different views about how to allocate the associated tax burden. Hence electoral and financial volatility may be more likely to appear together if fiscal balance is an issue around the election.

Finally, note that G can be interpreted as a public debt repayment falling due after the election. In this sense, the politico-economic interactions emphasized by the model can be related to a public debt problem. On the other hand, our model does not explain where the public debt may have come from in the first place, nor other sovereign debt issues, such as the government's decision to default. Introducing such issues more explicitly is desirable but better left for future research, as it would require going beyond this paper's scope and would most probably only add to the complexity of the links between elections and financial equilibria that constitute our main focus.

B. Empirical Dimensions

The basic insight of our model is that economic equilibria affect and are affected by electoral equilibria. As mentioned in the Introduction, the existence of such an interaction is suggested by several recent electoral episodes in Latin America. In this subsection we discuss whether and how one might obtain more systematic relevant evidence.

Existing empirical studies reviewed by Martinez and Santiso (2003) have found that the cost of credit for emerging markets, typically measured by J.P. Morgan's Emerging Markets Bond Indices (EMBI), increases during electoral periods. More recently, Paul Vaaler, Burkhard Schrage, and Steven Block (2005) have documented that emerging markets bond spreads increase before elections in which a right wing incumbent is expected to be replaced by a left wing opponent

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[16]To see this, assume that G is exactly equal to $\chi R\kappa$. So, if the pro labor government wins the election, she will finance G out of capital taxes only, so that $\tau = 1$ and $\gamma = 0$. In contrast, if the pro business government is the winner, and her λ is large enough relative to χ, she will pay G out of labor taxes alone, so that γ will be some $\gamma^* > 0$, and τ will be zero. The analysis of sections 2 and 3 then carries over with minimal amendments. In particular, the optimal contract is exactly the same. The main change is that the worker's payoff under a pro business government relative to that under a pro labor government is $W = U(\gamma^*) - U(0) < 0$, but this is still independent of p so that the rest of our previous arguments apply.

and, conversely, spreads fall if a leftist incumbent is expected to lose an election to a right wing challenger. This evidence is clearly in line with our theoretical model's prediction that the cost of international credit must increase if p, the probability of a pro business victory in the elections, falls.

The evidence just mentioned, however, does not suffice to conclude that there is an *interaction* between the cost of credit and p. And, in fact, the applicability of that evidence to our setting may be debatable, since in our model credit spreads and electoral probabilities are both endogenous variables. This implies that, if our model is to be taken as a null hypothesis, regressions of spreads on electoral probabilities may suffer from a simultaneous equations bias that Vaaler et al. (2005) and others did not correct for.

One way to correct for simultaneity would involve specifying, identifying, and estimating the parameters of a structural system of equations associated with the solution of our theoretical model. This exercise would be informative in understanding the workings of the model in detail and assessing correctly the quantitative implications of alternative policy experiments. But it may also be, at this point, overly ambitious given our paper's scope and the highly stylized nature of our model.

A more modest but still useful approach is to check whether some of the implications of the reduced form of the model are borne by the data. In particular, our model implies that increases in the world interest rate, which is exogenous from the perspective of the countries under study, should lead to (i) increases in the cost of credit applicable to those countries and (ii) higher chances of a pro labor victory in the elections.[17]

Is there evidence in favor of (i) and/or (ii)? The availability of EMBI data has resulted in a number of recent studies which are generally supportive of (i). An influential and relatively recent reference is Vivek Arora and Martin Cerisola (2001), which showed that increases in the Federal Funds target rate has strong positive effects on emerging markets bond spreads. Arora and Cerisola's finding has been echoed by Peter Tillman (2004), Olcay Culha, Fatih Ozatay, and Gulbin Sahinbeyoglu (2006), and Martin Uribe and Vivian Yue (2006).

In contrast, we could not find any empirical study relevant to (ii), which is the more novel of the two predictions. While developing a fully fledged study is beyond the scope of this paper, we took an initial look in the context of a data set on recent presidential elections that took place between 1975 and 2004 in eighteen Latin American countries. The data set is described in detail in an Appendix at the end of the paper, and comes from the Database of Political Institutions, the Polity IV Project, the Penn World Table, the Federal Reserve, and Philip Lane and Gian Maria Milesi Ferreti's External Wealth of Nations database.

[PLEASE INSERT TABLE 1 HERE]

Table 1 summarizes estimated probit regressions in which each election is taken as an observation. In column 1, the dependent variable is set to one if a left wing candidate won the election and zero if not. The regressor of interest is the change in the Federal Funds rate in the preceding twelve months [18]; lagged per worker GDP growth and an index of democracy are also included as control regressors. There is no evidence that any of the regressors has a significant impact on the probability of a leftist victory. In particular, while the sign of the Federal Funds rate coefficient is negative, contrary to the theory, its p-value is high, as are the other p-values. In addition, the log likelihood and pseudo R-squared coefficient indicate a rather poor fit.

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[17]To be sure, if multiple equilibria exist the two implications obtain provided one rules out jumps across equilibria as well as equilibria which, like D in Figure 4, are unstable under standard adjustment dynamics.

[18]Using levels instead of changes of the Federal Funds rate in the regressions below results in coefficients that are insignificantly different from zero. But it may be more appropriate to work with changes in the Funds rate instead of levels because ρ in our model corresponds to the real world interest rate, not the nominal one. Since our data set spans thirty years, Fed Funds rate is likely to be a poor proxy for the real rate. In contrast, with inflation sluggish in the short run, increases in the Fed Funds rate are hopefully more closely correlated with high real rates.

Some plausible changes in the specification result, however, in more supportive evidence. In particular, Vaaler et al. (2005) treated election results differently according to whether an incumbent was reelected or not. While such a distinction cannot be justified by our model, which is restricted to a single election, it could emerge if we extended our model to allow candidates to participate in multiple elections. For this reason, and also to make our results comparable with those of Vaaler et al., column 2 describes the same regression as column 1, except that the dependent variable is equal to one if a left wing candidate won and replaced the incumbent. The coefficient on the Federal Funds rate is now positive, agreeing with the theoretical presumption, and its p-value falls to a more reassuring 13.3 percent. The other p-values also fall, and the measures of fit improve substantially.

It is also arguable that attention should focus not on the effects of just the world interest rate but those of its interaction with foreign investment. In fact, our model predicts that the impact of higher world interest rates on the voters' evaluation of the candidates depends on the induced change on total payoffs, which is affected by the size of the initial investments financed by foreigners. To capture this, columns 3 and 4 describe, respectively, the same regressions as in columns 1 and 2 except that the regressor of interest is the increased cost of foreign capital caused by higher world interest rates, as proxied by the change in the Federal Funds rate multiplied by the previous year's change in the ratio of FDI inflows [19] to GDP. The estimated coefficients of the increased cost of capital have the expected signs and their p-values are now both below five percent. The measures of fit also improve relative to columns 1 and 2.

Summarizing, while the column 1 regression yields unconvincing results, estimating the regressions in columns 2, 3, and 4 results in coefficients whose signs accord well with the model and whose p-values are close to conventional levels of significance. Clearly, the results are not overwhelming, probably reflecting the small size of the sample (only a hundred and one observations). It would be desirable to redo the analysis with more data. Our sample size, however, is limited by the fact that presidential elections happen only every so many years. Perhaps as a result, the fit of the regressions, as measured by pseudo R-squareds, is only fair.

Yet the evidence as at least suggestive of the view that increases in the world interest rate lead to an increased likelihood of an electoral victory by the left. This implication is not an obvious one, but it falls out of our model in a natural way, and in this sense the empirical exercise here clearly suggests that the interaction between economic equilibria and political equilibria may be a feature of actual data. At the same time, our regressions indicate that further refinements of the theory and of its empirics should include a more explicit treatment of reelections and of interactions between the world interest rate and investment flows.

To get a sense of the economic significance of the estimated results, Table 2 elaborates on the column four regression and computes the impact on the predicted probability of an electoral victory by the left implied by a 50 basis points increase[20] in the Federal Funds rate. At the average sample values of the explanatory variables, the first row shows that the likelihood of a leftist victory increases by 76 basis points. The estimated impact increases substantially if the country is more democratic. The second row of Table 2, for example, shows that the impact is basis points with a value of 7.36 (instead of the average sample value, 6.78) of the democracy index. The third row shows that the impact is smaller if per capita GDP has been growing faster. Finally, the fourth row shows that the impact increases to 151 basis points if capital inflows have been larger (that is, if the change in the FDI liabilities/GDP ratio has been 1.59 instead of 1.03).

[PLEASE INSERT TABLE 2 HERE]

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[19]We use FDI inflows and not debt inflows here because, for the countries in our sample, the latter is dominated by public debt. Hence FDI is a better empirical counterpart of the model's investment flows, which reflect private decisions.

[20]On top of the average value of the Fed Funds change in the sample, which is 0.02 percent.

V.   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 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 may lead to Pareto improvement but also have non trivial and predictable effects on electoral outcomes. The model delivers predictions that are broadly consistent with available evidence, although admittedly a more thorough exploration of the empirical implications remains to be done.

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 several issues, such as the role of reputation, that may be cumbersome or intrinsically hard.

Another useful extension of this paper, already mentioned, would be to allow for public debt and its determination. As mentioned at the end of subsection IV.A, 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).

Data Appendix

The data set underlying the regressions in Table 1 was constructed with yearly data on executive elections between 1975 and 2004 for 18 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Panama, Paraguay, Peru, Uruguay, and Venezuela. There are 101 elections in this group. The dependent variable in regressions (1) and (3) is a binary one that equals unity in an election in which the new executive comes from the left, zero otherwise. In regressions (2) and (4), the dependent variable is one if the incumbent was not reelected and the new executive comes from the left, and zero otherwise. Both variables were taken from the *Database of Political Institutions*. The variable "Change in the Federal Funds Rate" is the year to year change of the average monthly Federal Funds rate for the period ending in the month of the corresponding election; it is taken from *Federal Reserve Board's* database. To construct the variable "Change in External Debt Burden due to changes in Fed Funds rate" we used Lane and Milesi Ferreti's *External Wealth of Nations* data to compute each year's ratio of FDI inflows relative to GDP; we then multiplied the change in that ratio during the year previous to each election by "Change in the Federal Funds Rate." The democracy index was taken from the *Polity IV Project*. Finally, the variable "Lagged per capita GDP growth " is the percentage change in PPP adjusted GDP per worker's growth in the year before each election, and taken from the *Penn World Tables*. More

details, including the data set and the programs associated with the computations, are available at the AER web site.

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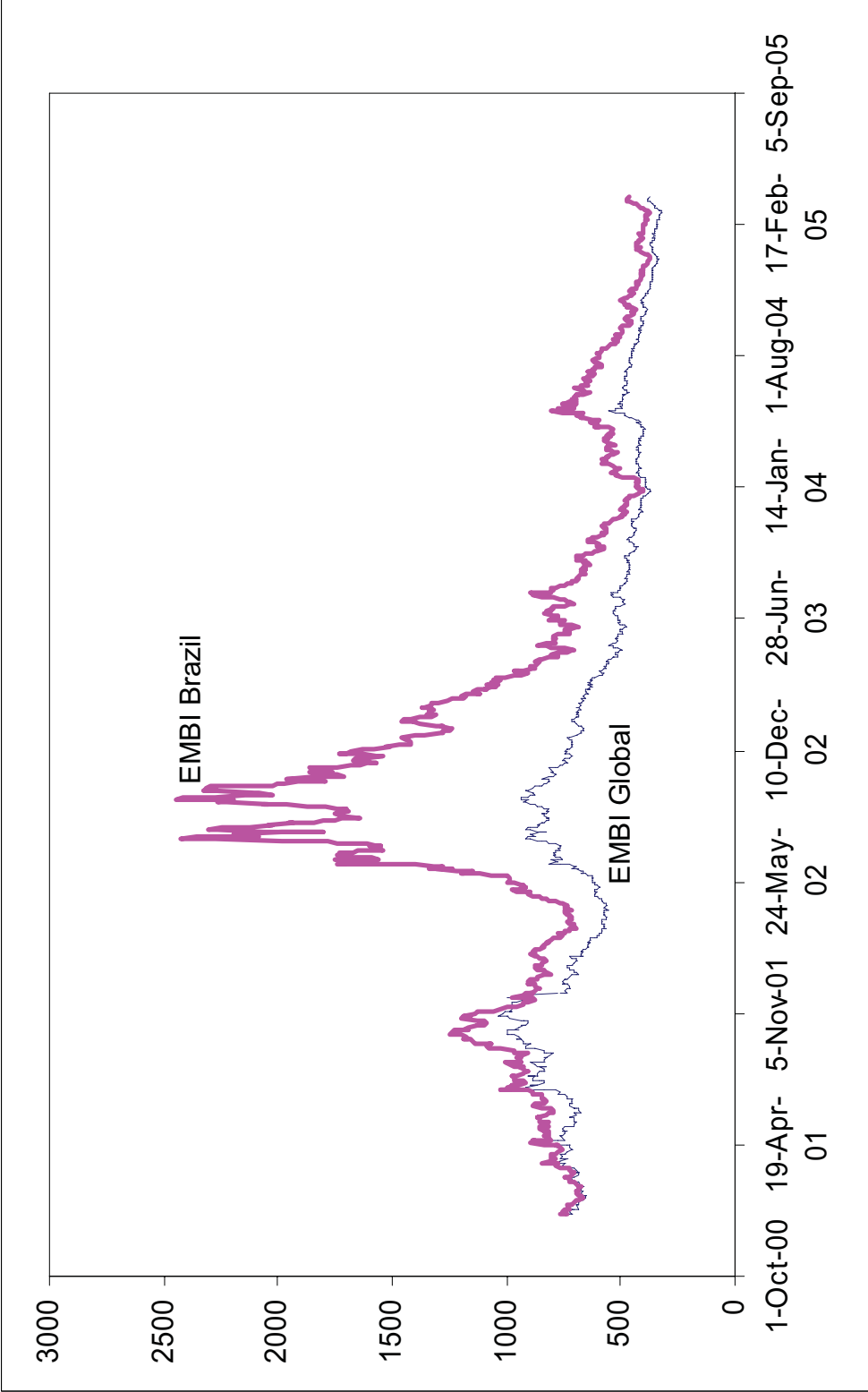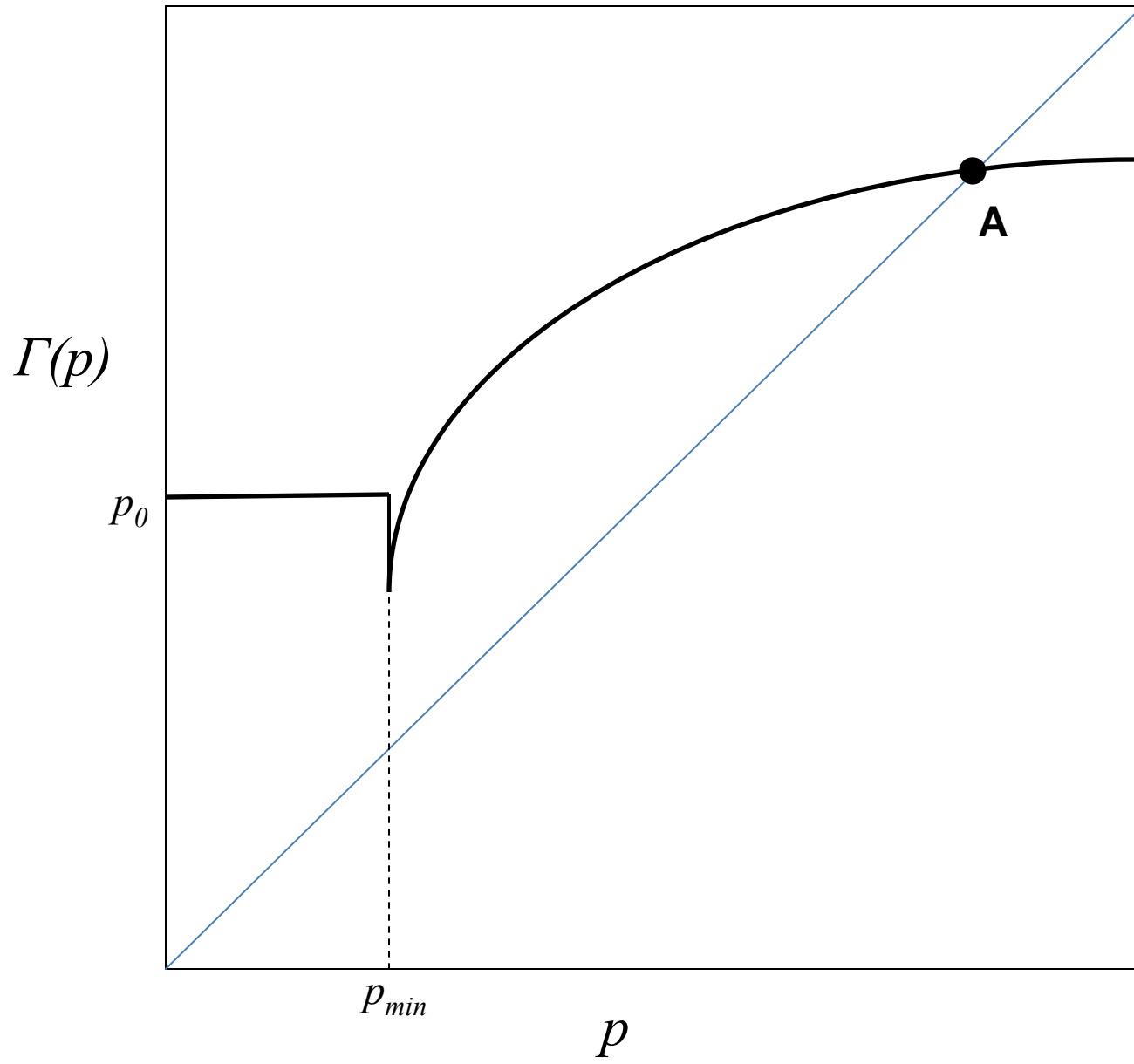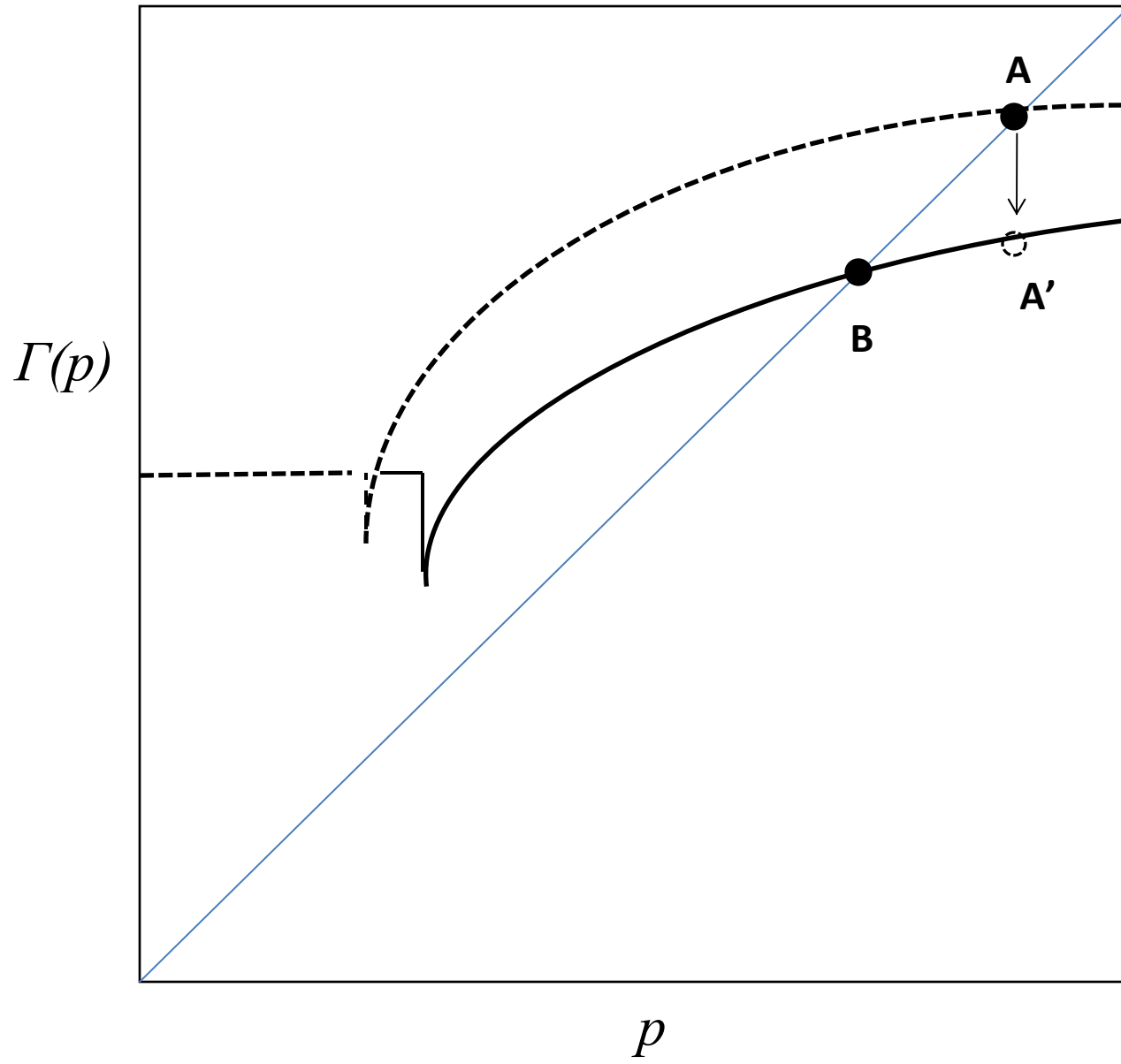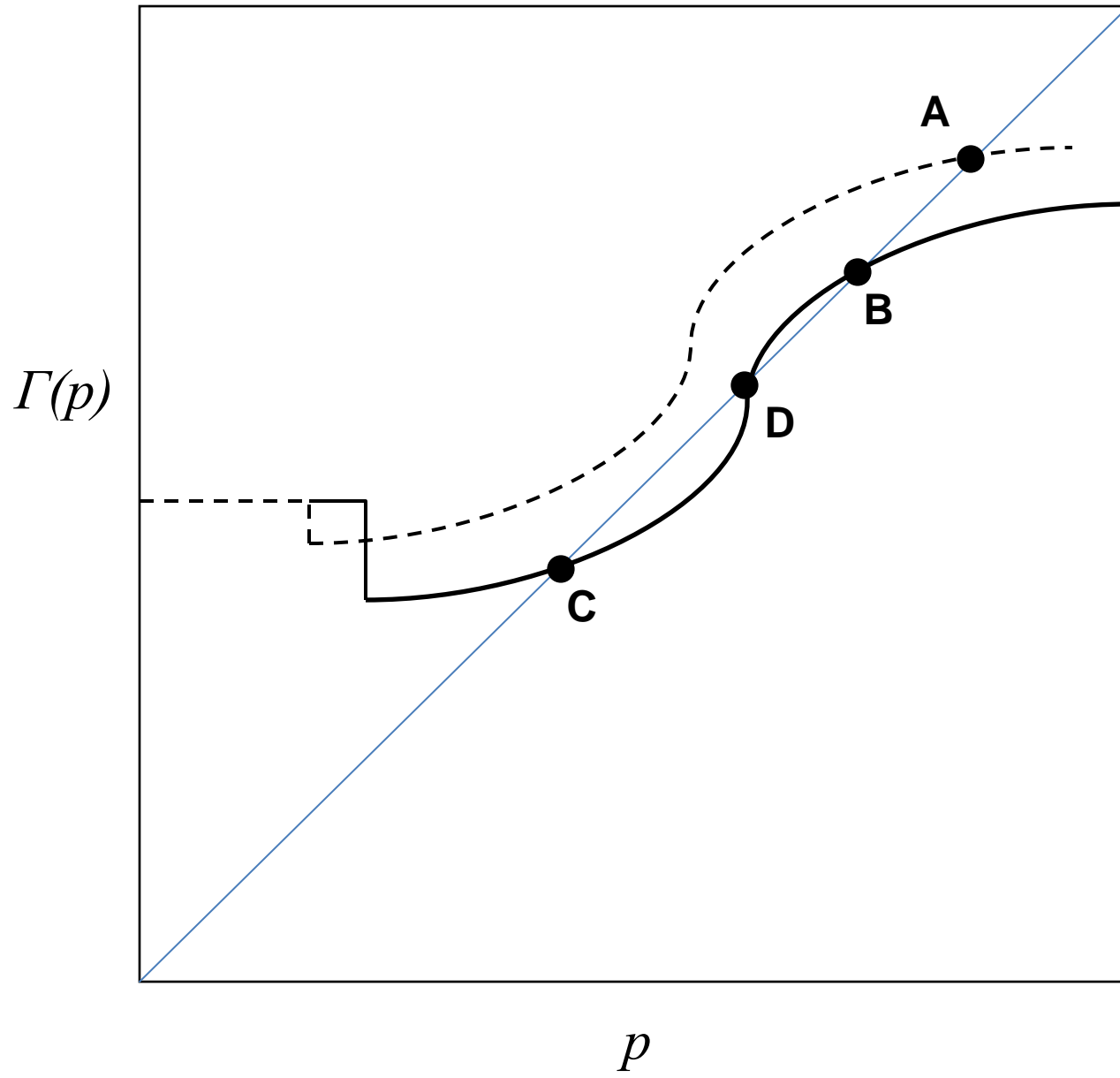Figure 1: EMBI Spread, Brazil vs Global, 2001-05

Figure 2

Figure 3

Figure 4

Figure 5
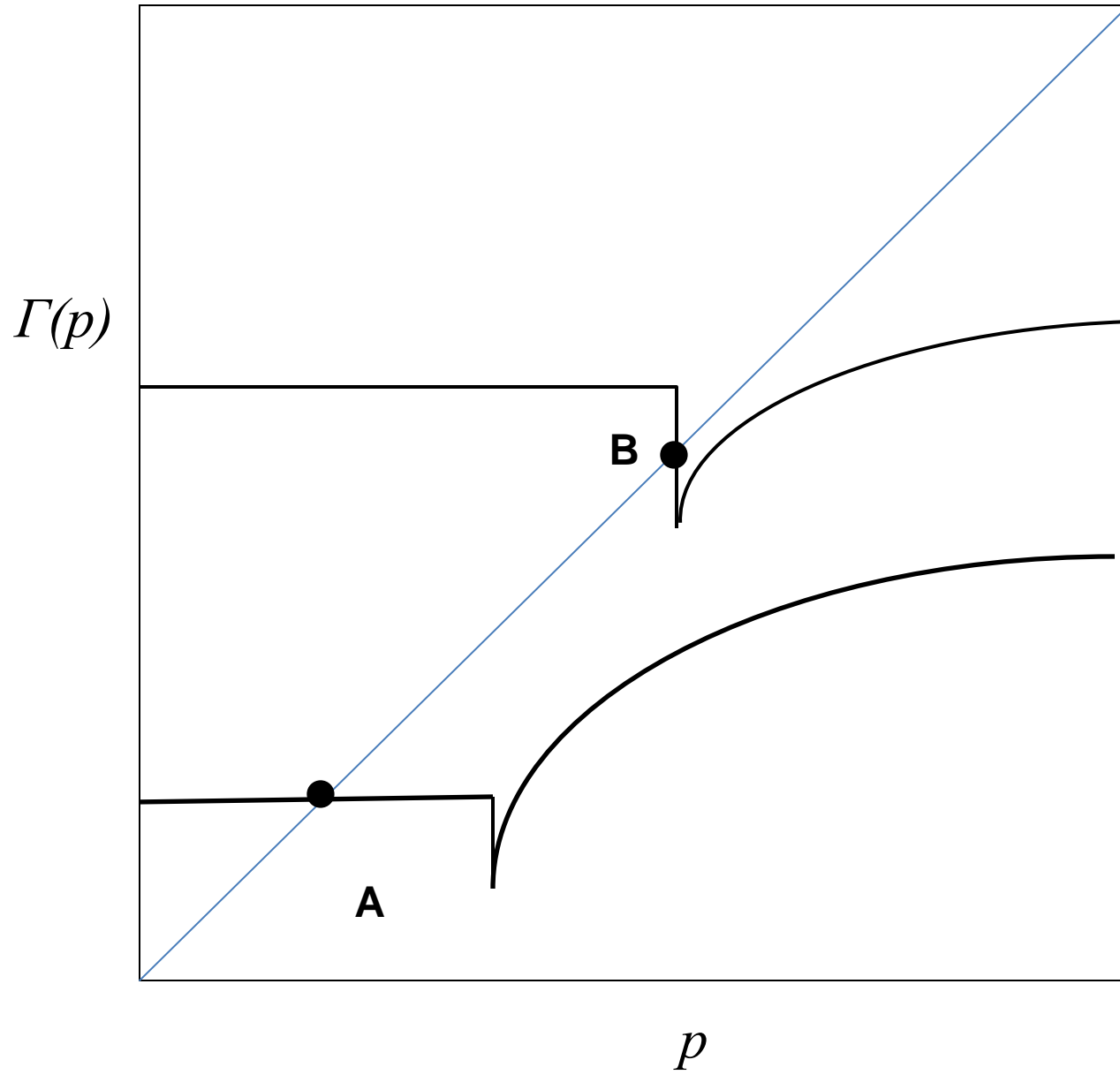
Table 1: Probit estimates

	(1)	(2)	(3)	(4)
Constant	-1.021	-3.405	-1.037	-3.501
	(0.007)	(0.002)	(0.010)	(0.003)
Change in Federal Funds Rate	-0.071	0.194		
	(0.355)	(0.133)		
Change in External Debt Burden Due to change in Fed Funds Rate			0.071	0.117
			(0.045)	(0.048)
Democracy Index	0.034	0.265	0.039	0.284
	(0.507)	(0.039)	(0.459)	(0.040)
Lagged per Capita GDP Growth	-0.005	-0.060	-0.010	-0.053
	(0.881)	(0.134)	(0.741)	(0.184)
Log Likelihood	-52.26	-29.32	-50.94	-28.17
Pseudo R-squared	0.01	0.16	0.04	0.19

Notes: In columns (1) and (3) the dependent variable is one if a left wing candidate wins the election, zero if not. In columns (2) and (4) the dependent variable is one if a left wing candidate wins the election and replaces an incumbent, zero if not. See Appendix for an explanation of the other variables. The number of observations is 101. Numbers in parentheses are p-values.

Table 2: Predicted Probabilities

Change in Capital Inflows	Democracy Index	Lagged per capita GDP Growth	Change in Predicted Probability
1.03	6.78	-0.39	0.757
1.03	7.36	-0.39	0.959
1.03	7.36	0.46	0.901
1.59	7.36	-0.39	1.517

Notes: The last column is derived from the estimates in column (4) of Table 1, and gives the estimated change in the predicted probability of a left wing electoral victory due to a 50 basis point increase in the Fed Funds rate.