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Abstract

This paper develops a stochastic dynamic politico-economic model of sovereign debt to analyze the interaction of sovereign default risk and political turnover. Two parties differ in their preferred size of public spending which is financed by taxes and external debt. Electoral outcomes are characterized by tradeoffs between the economic benefits from the incumbent's policies against idiosyncratic ideological aspects. Quantitative simulations replicate the typical empirical facts of emerging markets. Endogenous political turnovers increase the parties' discrepancies between debt and default policies. Debt crises are associated with adverse economic shocks and trigger political turnovers. Political turnovers generate defaults even without negative shocks.

Keywords: sovereign debt, default risk, political turnover, fiscal policy

JEL-Codes: E62, F34, F41, D72

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1 Introduction

The large-scale sovereign default of Argentina in 2001 was associated with substantial political instability. Hatchondo and Martinez (2010) argue that while the incumbent president Fernando de la Rua imposed severe austerity policies to fulfill the external debt obligations, his opponents campaigned for higher public spending. Having lost political support, de la Rua resigned in December 2001, and the newly appointed interim president Adolfo Rodriguez Saa immediately declared a sovereign default. More recently, the political and economic situation in Greece indicates a strong interaction between sovereign debt crises and political turnovers. This anecdotal evidence is supported by econometric studies suggesting that the possibility of a political turnover increases default risk (Manasse and Roubini, 2009; Goretti, 2005; Block and Vaaler, 2004).

To analyze the underlying economic mechanisms behind the empirical interaction of sovereign default risk and political turnover, this paper develops a stochastic dynamic politico-economic model of sovereign debt. The theoretical framework features endogenous default risk as well as endogenous electoral outcomes and allows to study several important questions. Specifically, how does the risk of losing office affect the current government's policy choices between external borrowing, taxation, and public spending? Do incumbents make use of strategic defaults to influence their re-election probability? How do the dynamic interactions of sovereign spreads and re-election probabilities affect debt and tax policies, and macroeconomic outcomes?

The model builds on the politico-economic theory on public debt surveyed in Persson and Tabellini (2000) and the recent quantitative macroeconomic models on sovereign debt and default initiated by Aguiar and Gopinath (2006) and Arellano (2008). Hatchondo et al. (2009) and Cuadra and Sapriza (2008) employ the basic framework of Arellano (2008) and introduce two parties that exogenously alternate in power. While these studies allow to study the quantitative impact of exogenous political uncertainty on sovereign default risk, they abstract from the dynamic interactions of fiscal policies and endogenous political turnovers. This paper attempts to fill this gap and analyzes the impact of endogenous electoral outcomes on the incumbent's policy choices between public spending, taxation, external borrowing, and default.

The theoretical framework considers a small open economy that is inhabited by

infinitely-lived households. Individuals belong to two groups that differ in their preferred size of public spending, but have identical preferences for private consumption and leisure. There is a two-party system in which each party cares about the welfare of one of the two groups. The incumbent government finances public spending by raising taxes and by issuing external debt. International financial markets are incomplete and sovereign debt is subject to default risk. I follow the probabilistic voting approach commonly used in the politico-economic literature and assume that the individual voting behavior is determined by a tradeoff between the economic benefits from the incumbent's and opponent's policies against stochastic idiosyncratic non-economic ideological aspects. Risk-neutral international lenders incorporate the default risk as well as the risk of a political turnover into their pricing decision and charge a country risk premium.

In a quantitative exercise, the theoretical framework is applied to the Argentine economy and is shown to replicate the empirical business cycle facts of a typical emerging market economy. In particular, political stability is positively correlated with production and negatively correlated with the sovereign interest spread. This indicates that a political turnover is more likely to occur in recessions and in times of high external credit costs. Moreover, as in Aguiar and Gopinath (2006) and Arellano (2008), consumption is more volatile than output, and interest rates as well as net exports are counter-cyclical. In line with the empirical evidence provided by Talvi and Vegh (2005), Ilzetzki and Vegh (2008), and Kaminsky et al. (2004), fiscal policy is pro-cyclical: Due to counter-cyclical interest rates, external debt becomes more expensive in bad times, so that the government finances public spending by higher taxation.

To highlight the importance of endogenous political turnover rates, I provide a comparison with the policy outcomes that would occur if political turnover rates were exogenously fixed as in Hatchondo et al. (2009) and Cuadra and Sapriza (2008). Employing a calibration that matches several empirical targets of the Argentine economy, exogenous political uncertainty is shown to have only minor effects on policy choices. In contrast, endogenous electoral outcomes increase the discrepancies between the debt and default policies of the two parties and create incumbency advantages. It turns out that the party which prefers lower public spending borrows more and defaults less often in order to increase its re-election probability. In contrast, the party with a preference for higher public spending is borrowing constrained, raises higher taxes and has larger incentives to default in order to enhance the probability of remaining in power. Event analyses suggest that default episodes are associated with

adverse productivity shocks. In bad economic states, higher sovereign interest spreads and higher taxes reduce political stability and may trigger a political turnover. In contrast, a political turnover may generate a sovereign default even in the absence of adverse economic shocks.

The paper is structured as follows. Section 2 discusses the related literature. Section 3 describes the model environment and defines the recursive equilibrium. In section 4 the model is applied to Argentina and policy functions, business cycle statistics and the dynamics around sovereign defaults, and political turnovers are analyzed. Section 5 concludes.

2 Related Literature

In closed economies, the interaction of political turnover rates and public debt has been extensively studied, see, e.g., Alesina and Tabellini (1990), Persson and Svensson (1989), and the excellent overview in Persson and Tabellini (2000). The major conclusion from this literature is that political uncertainty generates over-borrowing. Several papers extend the theoretical framework to open economy setups with external debt and default. Alesina and Tabellini (1989) assume that two government types randomly alternate in office. They show that uncertainty over fiscal policies fosters debt accumulation and raises sovereign spreads. While in Alesina and Tabellini (1989) political turnover rates are exogenous, Aghion and Bolton (1990) allow for endogenous electoral outcomes and consider a two-party system in which the left-wing party cares about the low-income group while the right-wing party cares about the higher income group. The theoretical framework implies that the left-wing party prefers higher public spending, is more indebted and is more willing to default than the right-wing party. The right-wing government affects the electoral outcomes in its favor if it accumulates large levels of external debt since the left-wing party is expected to default. Closely related, Chang (2007) shows in a two-period setting that political crises accompany financial crises and are triggered by self-fulfilling changes in the expectations of foreign lenders. Employing the probabilistic voting approach, Chang (2010) focuses on the link between international capital flows and elections. He shows that electoral periods may be associated with increased macroeconomic and financial sensitivity to exogenous shocks.[1]

[1] Dixit and Londregan (2000) and Guembel and Sussman (2009) consider politico-economic mechanisms to explain why governments repay their debt although creditors cannot punish default be-

The aforementioned papers study the interaction of political uncertainty and debt in stylized two-period frameworks. In contrast, Battaglini and Coate (2008), Yared (2010), Song et al. (2012), and Müller et al. (2014) develop fully dynamic politico-economic theories of public spending, taxation and debt. While Battaglini and Coate (2008) and Yared (2010) consider closed economies, Song et al. (2012) and Müller et al. (2014) consider fiscal policy in a world economy comprising of small open economies with intergenerational conflicts over debt, taxes and public goods. They show that the presence of young voters generates fiscal discipline and reduces debt accumulation. Like Battaglini and Coate (2008) and Yared (2010), Song et al. (2012) and Müller et al. (2014) abstract from sovereign default risk and risk premia.

Aguiar and Amador (2011) study the interaction of political economy frictions and sovereign default risk in a dynamic macroeconomic model. Their analysis considers limited enforceable debt contracts and focuses on self-enforcing equilibria that are supported by a punishment threat. Therefore, sovereign defaults do not occur in equilibrium. In contrast, the recent quantitative dynamic macroeconomic models of sovereign debt build on the classic contribution by Eaton and Gersovitz (1981) and explicitly allow for default in equilibrium. In these models, the government chooses optimally between repayment and default. Considering simple endowment economies, the seminal papers by Aguiar and Gopinath (2006) and Arellano (2008) show that the theoretical framework is able to explain the quantitative business cycle facts of a typical emerging market economy, in particular counter-cyclical interest rates and counter-cyclical net exports. Cuadra et al. (2010) consider an extension in which the government chooses between default, external debt and distortionary taxation. They show that counter-cyclical interest rates generate pro-cyclical fiscal policy.

The recent literature on sovereign default largely abstracts from political uncertainty. Notable exceptions are Hatchondo et al. (2009) and Cuadra and Sapriza (2008) who consider exogenous political turnover rates in quantitative models of sovereign debt. They show that political uncertainty increases debt accumulation and default risk. In contrast, Andreasen et al. (2011) show in a quantitative model of sovereign debt that endogenous political constraints reduce debt accumulation. While Hatchondo et al. (2009) and Cuadra and Sapriza (2008)) consider alternating government types, Andreasen et al. (2011) assume a single government who must achieve political support from the households before implementing fiscal programs. If no political support is reached, then the government is forced to default. It turns out that such a political

havior.

constraint lowers debt accumulation since the government is better off avoiding a default.

In this paper, I contribute to the recent literature on sovereign debt and develop a quantitative dynamic politico-economic model of sovereign default. Political turnover rates are endogenous outcomes of the individual voting behavior and affect the debt and default policies of incumbents. The theoretical framework allows to quantitatively analyze the dynamic interactions of fiscal policies, sovereign default risk, and political turnover, and their impact on macroeconomic outcomes.

3 The Model

3.1 Environment

The small open economy is inhabited by a continuum of infinitely-lived individuals belonging to two groups, $j = R, L$, of sizes χ and $1 - \chi$, respectively. There is a two-party system in which each party cares about the welfare of one of the two groups. The two groups have identical preferences over private consumption and leisure but differ in their preferred size of public spending. In addition, following the probabilistic voting approach, individuals differ in stochastic idiosyncratic ideological aspects that are unrelated to economic policy and affect preferences additively.

The per-period utility in group j, net of idiosyncratic ideological aspects, is given by:

$$(1 - \alpha_j)u(c, l) + \alpha_j v(g),$$

where c and l denote consumption and labor supply, respectively. The per-period utility $u : \mathbb{R}^2_+ \to \mathbb{R}$ is continuous, twice differentiable in both arguments, strictly increasing in c, strictly decreasing in l, jointly strictly concave in c and l and satisfies the Inada conditions. g denotes a public good provided by the government. The per-period utility $v : \mathbb{R}_+ \to \mathbb{R}$ is continuous, twice differentiable, strictly increasing in g, strictly concave in g and satisfies the Inada conditions. $\alpha_j \in (0, 1)$ is a preference weight of the individuals in group j. Individuals in group R are assumed to have a lower preference for public goods than individuals in group L, $\alpha_R < \alpha_L$.

The individuals' budget constraint is given by:

$$(1 + \tau)c = y, \tag{1}$$

where τ denotes a consumption tax raised by the government. Output y is produced via a constant returns to scale production function $f(l)$, $f : \mathbb{R}_+ \to \mathbb{R}_+$, and is subject

to productivity shocks:

$$y = zf(l).$$

Productivity $z \in \mathcal{Z}$ is assumed to have a compact support, $\mathcal{Z} = [\underline{z}, \bar{z}] \subset \mathbb{R}_+$, and to follow a Markov process with a Markov transition function $\mu(z', z)$.
The public good is financed by external debt and taxes. The government has access to incomplete international financial markets where it can issue non-contingent one-period bonds $b' \in \mathcal{B} = [\underline{b}, \bar{b}] \subset \mathbb{R}$. Let q_j denote the bond price of a financial contract with face value b' if party j is in power. Debt contracts are not enforceable and the incumbent can choose to default on outstanding debt obligations. Foreign creditors are risk-neutral and borrow at the risk-free rate r_f. They have perfect information about the stochastic processes in the economy. We follow Arellano (2008) and assume that in case of a sovereign default the country suffers from direct output losses and a temporary exclusion from international financial markets.
Conditional on being in a good credit standing, the budget constraint of the government in power reads as:

$$g = \tau c + (1 - d)(b - q_j(b', z)b'), \tag{2}$$

where d is an indicator function which equals one if the incumbent defaults and zero otherwise.
The timing is as follows. With exogenous probability $\kappa > 0$ an election takes place at the end of the period. At the beginning of each period, the incumbent observes z and implements its policies given the distributions of the stochastic idiosyncratic ideological aspects. At the end of the period, the ideological aspects realize. If an election takes place, individual i in group j evaluates the tradeoff between the idiosyncratic ideological aspects against the expected economic benefit of having the incumbent instead of the opponent in power next period. The details of the electoral process and the distributional specifications of the ideological aspects are described in Section 3.2.4.

3.2 Recursive Equilibrium

3.2.1 The Private Sector

The private sector takes the public sector policies as given and maximizes expected discounted life-time utility subject to the budget constraint (1). Since all individuals

pay a uniform tax on consumption, the consumption and labor decisions are identical across individuals and groups and are described by the following optimality condition:

$$-\frac{u_l(c,l)}{u_c(c,l)} = \frac{zf_l(l)}{(1+\tau)}. \tag{3}$$

3.2.2 The Public Sector

Conditional on being in a good credit standing, the incumbent j faces the option to either fulfill the external debt obligations or to default:

$$V_j(b,z) = \max\left\{V_j^{nd}(b,z), V_j^d(z)\right\}, \tag{4}$$

where $V_j^{nd}(b,z)$ denotes the value function of incumbent j associated with debt repayment. $V_j^d(z)$ is the value function of incumbent j associated with default. Define $\beta \in [0,1]$ to be the time preference rate that is common for all individuals in the economy. The value function associated with debt repayment solves:

$$\begin{aligned} V_j^{nd}(b,z) = \max_{\tau,b'} \Big\{ & (1-\alpha_j)u(c,l) + \alpha_j \upsilon(g) + \beta(1-\kappa)\int_{z'} V_j(b',z')\mu(z',z)dz' \\ & + \beta\kappa\Big(P_j(b',z)\int_{z'} V_j(b',z')\mu(z',z)dz' \\ & + (1-P_j(b',z))\int_{z'} \overline{V}_j(b',z')\mu(z',z)dz'\Big)\Big\} \end{aligned} \tag{5}$$

subject to

$$\begin{aligned} & g = \tau c + b - q_j(b',z)b' \\ & (1+\tau)c = zf(l) \\ & -\frac{u_l(c,l)}{u_c(c,l)} = \frac{zf_l(l)}{(1+\tau)}. \end{aligned}$$

$P_j(b',z)$ denotes the re-election probability of incumbent j conditional on debt repayment. $P_j(b',z)$ is the endogenous outcome of the individual voting behavior and affected by the idiosyncratic ideological aspects that are described in Section 3.2.4. $\overline{V}_j(b,z)$ refers to the value function of party j if the opponent is in power and is defined below.

If the incumbent chooses to default, debt b is not repaid and the country loses its access to international financial markets and suffers from output losses, $h(z)f(l) \leq zf(l)$.

The value function solves:

$$
\begin{aligned}
V_j^d(z) = \max_{\tau} \Big\{ & (1-\alpha_j)u(c,l) + \alpha_j v(g) \\
& + \beta(1-\kappa)\Big(\theta \int_{z'} V_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} V_j^d(z')\ \mu(z',z)dz'\Big) \\
& + \beta\kappa\Big[P_j^d(z)\Big(\theta \int_{z'} V_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} V_j^d(z')\ \mu(z',z)dz'\Big) \\
& + (1-P_j^d(z))\Big(\theta \int_{z'} \overline{V}_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} \overline{V}_j^d(z')\ \mu(z',z)dz'\Big)\Big]\Big\}
\end{aligned} \tag{6}
$$

subject to

$$
\begin{aligned}
& g = \tau c \\
& (1+\tau)c = h(z)f(l) \\
& -\frac{u_l(c,l)}{u_c(c,l)} = \frac{h(z)f_l(l)}{(1+\tau)}.
\end{aligned}
$$

$\theta \in [0,1]$ is the exogenous probability of re-entering international financial markets. $P_j^d(z)$ is the outcome of the electoral process and denotes the re-election probability of incumbent j conditional on default. $\overline{V}_j^d(z)$ is defined below and refers to the value function of party j in financial autarky if the opponent is in power.
The default policy of incumbent j is given by

$$
d_j(b,z) = \begin{cases} 1 & \text{if } V_j^{nd}(b,z) < V_j^d(z) \\ 0 & \text{else.} \end{cases} \tag{7}
$$

Let $\mathcal{D}_j(b)$ denote the set of productivity realizations $z \in \mathcal{Z}$ for which default is optimal for the incumbent j:

$$
\mathcal{D}_j(b) = \{z \in \mathcal{Z} : d_j(b,z) = 1\}.
$$

The default probability of incumbent j is given by:

$$
\lambda_j(b',z) = \int_{\mathcal{D}_j(b')} \mu(z',z)dz'. \tag{8}
$$

If party j is not in power, the value $\overline{V}_j(b,z)$ depends on the optimal policy decisions of the opponent. Let $\overline{V}_j^{nd}(b,z)$ be the value function of party j if the opponent fulfills the outstanding debt obligations. $\overline{V}_j^d(z)$ is the value function of party j if the opponent defaults. Let $-j$ denote the opponent's optimal policies. Then, $\overline{V}_j^{nd}(b,z)$ and $\overline{V}_j^d(z)$

are given by:

$$\overline{V}_j^{nd}(b,z) = (1-\alpha_j)u(c_{-j},l_{-j}) + \alpha_j \upsilon(g_{-j}) + \beta(1-\kappa)\int_{z'} \overline{V}_j(b'_{-j},z')\mu(z',z)dz'$$
$$+ \beta\kappa\Big(P_{-j}(b'_{-j},z)\int_{z'} \overline{V}_j(b'_{-j},z')\mu(z',z)dz'$$
$$+ (1-P_{-j}(b'_{-j},z))\int_{z'} V_j(b'_{-j},z')\mu(z',z)dz'\Big), \tag{9}$$

and

$$\overline{V}_j^{d}(z) = (1-\alpha_j)u(c_{-j},l_{-j}) + \alpha_j \upsilon(g_{-j})$$
$$+ \beta(1-\kappa)\Big(\theta\int_{z'} \overline{V}_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} \overline{V}_j^{d}(z')\ \mu(z',z)dz'\Big)$$
$$+ \beta\kappa\Big[P_{-j}^{d}(z)\Big(\theta\int_{z'} \overline{V}_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} V_j^{d}(z')\ \mu(z',z)dz'\Big)$$
$$+ (1-P_{-j}^{d}(z))\Big(\theta\int_{z'} V_j(0,z')\ \mu(z',z)dz' + (1-\theta)\int_{z'} V_j^{d}(z')\ \mu(z',z)dz'\Big)\Big]. \tag{10}$$

$\overline{V}_j(b,z)$ is given by:

$$\overline{V}_j(b,z)(b,z) = \begin{cases} \overline{V}_j^{nd}(b,z) & \text{if } d_{-j}(b,z)=0 \\ \overline{V}_j^{d}(z) & \text{if } d_{-j}(b,z)=1. \end{cases} \tag{11}$$

3.2.3 Foreign Creditors

The incumbent borrows from a large number of identical infinitely lived risk-neutral foreign creditors. Foreign creditors have perfect information about the productivity realization as well as the distribution of the ideological voting aspects. They can borrow or lend from international capital markets at the constant risk-free rate r_f. Foreign creditors incorporate the risk of default as well as the re-election probability of the current incumbent j:

$$q_j(b',z) = \kappa\Big[P_j(b',z)\Big(\tfrac{1-\lambda_j(b',z)}{1+r^f}\Big) + (1-P_j(b',z))\Big(\tfrac{1-\lambda_{-j}(b',z)}{1+r^f}\Big)\Big] + (1-\kappa)\Big(\tfrac{1-\lambda_j(b',z)}{1+r^f}\Big). \tag{12}$$

3.2.4 Political Turnover

The re-election probabilities $P_j(b',z)$ and $P_j^d(z)$ are the endogenous outcomes of the electoral process. I follow the probabilistic voting approach[2] and assume that, in addition to the disagreement over the size of public spending, individuals and groups

[2] A detailed description is provided in Persson and Tabellini (2000).

differ in stochastic ideological aspects that are unrelated to economic policy. If an election takes place, individual i in group j evaluates the tradeoff between the idiosyncratic ideological aspects against the expected economic benefit of having party j instead of the opponent $-j$ in power next period. To do so, each individual i in group j compares the expected continuation values associated with the two parties.
In the following, the expected economic benefits of group j as well as the ideological aspects are expressed relative to the expected continuation value of having party j in power. This normalization ensures that the impact of the ideological aspects on the expected economic benefits is comparable across population groups.
Conditional on a good credit standing, group j's expected economic benefit of having party j rather than the opponent $-j$ in power next period is defined as:

$$W_j(b', z) \equiv \frac{\int_{z'} V_j(b', z')\mu(z', z)dz' - \int_{z'} \overline{V}_j(b', z')\mu(z', z)dz'}{\int_{z'} V_j(b', z')\mu(z', z)dz'}.$$

Group j's expected economic benefit of having the opponent $-j$ rather than party j in power next period is defined as:

$$\overline{W}_j(b', z) \equiv \frac{\int_{z'} \overline{V}_j(b', z')\mu(z', z)dz' - \int_{z'} V_j(b', z')\mu(z', z)dz'}{\int_{z'} V_j(b', z')\mu(z', z)dz'} = -W_j(b', z).$$

Define δ_{ij} to be an idiosyncratic ideological bias of individual i in group j towards party R. In addition, the general popularity of party R is given by ω. δ_{ij} is assumed to be distributed according to an uniform mean-zero distribution with density ϕ_j. ω follows an uniform mean-zero distribution with density Ω. ω as well as δ_{ij} are uncorrelated over time.
Given the specifications of the normalized ideological aspects and the normalized expected economic benefits, the individual voting behavior can now be described. In the following, consider the re-election probability of party L. Individual i in group L votes for party L if the expected economic benefit of having party L instead of party R in power is larger than the ideological bias towards party R, $\delta_{iL} + \omega$:

$$W_L(b', z) > \delta_{iL} + \omega.$$

Similarly, individual i in group R votes for party L if the expected economic benefit of having party L instead of party R in power is larger than the ideological bias towards party R, $\delta_{iR} + \omega$:

$$\overline{W}_R(b', z) > \delta_{iR} + \omega.$$

Using the assumption that the idiosyncratic ideological bias δ_{ij} is uniformly distributed on the interval $[-\frac{1}{2\phi_j}; \frac{1}{2\phi_j}]$, the total vote share for party L is given by:

$$\pi_L(b', z, \omega) = \frac{1}{2} + \chi\phi_R \overline{W}_R(b', z) + (1-\chi)\phi_L W_L(b', z) - (\chi\phi_R + (1-\chi)\phi_L)\omega.$$

A party is assumed to gain power if its total vote share exceeds $\frac{1}{2}$. Since ω is uniformly distributed on the interval $[-\frac{1}{2\Omega}; \frac{1}{2\Omega}]$, the probability that party L wins the election is given as:

$$\begin{aligned} P_L(b', z) &\equiv \underset{\omega}{Prob}\Big[\pi_L(b', z, \omega) > \frac{1}{2}\Big] \\ &= \frac{1}{2} + \Omega\Big(\frac{\chi\phi_R \overline{W}_R(b', z) + (1-\chi)\phi_L W_L(b', z)}{\chi\phi_R + (1-\chi)\phi_L}\Big). \end{aligned} \tag{13}$$

The term $\chi\phi_R + (1-\chi)\phi_L$ represents the average ideology in the population. The election probability of party L depends on the densities ϕ_R and ϕ_L: The higher ϕ_j, the less ideological is group j and the larger is the impact of party L's economic policies on its re-election probability.[3]

If the country is in a bad credit standing, the country is excluded from international financial markets and faces the exogenous re-entry probability θ. In a bad credit standing, the re-election probability of party L is given by:

$$P_L^d(z) = \frac{1}{2} + \Omega\Big(\frac{\chi\phi_R \overline{W}_R^d(z) + (1-\chi)\phi_L W_L^d(z)}{\chi\phi_R + (1-\chi)\phi_L}\Big), \tag{14}$$

with

$$\begin{aligned} W_j^d(z) \equiv &\Big[\theta\Big(\int_{z'} V_j(0, z')\ \mu(z', z)dz' - \int_{z'} \overline{V}_j(0, z')\ \mu(z', z)dz'\Big) \\ &+ (1-\theta)\Big(\int_{z'} V_j^d(z)\ \mu(z', z)dz' \\ &- \int_{z'} \overline{V}_j^d(z)\ \mu(z', z)dz'\Big)\Big] \\ &\times \frac{1}{\Big(\theta\int_{z'} V_j(0, z')\ \mu(z', z)dz' + (1-\theta)\int_{z'} V_j^d(z)\ \mu(z', z)dz'\Big)} \end{aligned}$$

and $\overline{W}_j^d(z) \equiv -W_j^d(z)$.

[3]The analysis here assumes interior solutions.

3.2.5 Definition of the Recursive Equilibrium

Definition *The recursive equilibrium is defined as*

1. *a set of policy functions for private consumption* $c_j(b,z)$, $c_j^d(z)$ *and labor supply* $l_j(b,z)$, $l_j^d(z)$, $j = R, L$,

2. *a set of policy functions for the incumbent j's borrowing policy* $b'_j(b,z)$, *government consumption* $g_j(b,z)$, $g_j^d(z)$, *tax policy* $\tau_j(b,z)$, $\tau_j^d(z)$, *and the default policy* $d_j(b,z)$, $j = R, L$,

3. *election probabilities* $P_j(b',z)$, $P_j^d(z)$, $j = R, L$,

4. *the price function for bonds* $q_j(b',z)$, $j = R, L$,

5. *a set of value functions* $V_j(b,z)$, $V_j^{nd}(b,z)$, $V_j^d(z)$, $\overline{V}_j(b,z)$, $\overline{V}_j^{nd}(b,z)$, *and* $\overline{V}_j^d(z)$, $j = R, L$

such that

1. *taking as given the incumbent policies, private consumption* $c_j(b,z)$, $c_j^d(z)$ *and labor supply* $l_j(b,z)$, $l_j^d(z)$ *satisfy the household's budget constraint (1) and the household's optimality condition (3),*

2. *taking as given the bond price function* $q_j(b',z)$, *the optimal policies of the private sector, and the optimal policies of the opponent, party j's value functions* $V_j(b,z)$, $V_j^{nd}(b,z)$, $V_j^d(z)$ *and the default policy* $d_j(b,z)$ *solve (4), (5), (6), and (7).* $b'_j(b,z)$, $g_j(b,z)$ *and* $\tau_j(b,z)$ *solve (5).* $g_j^d(z)$ *and* $\tau_j^d(z)$ *solve (6).* $\overline{V}_j^{nd}(b,z)$, $\overline{V}_j^d(z)$, *and* $\overline{V}_j(b,z)$ *solve (9), (10), and (11),*

3. *bond prices* $q_j(b',z)$ *fulfill equation (12) such that risk-neutral foreign creditors earn zero expected profits,*

4. *the election probability* $P_L(b',z)$ *fulfills equation (13), and* $P_R(b',z) = 1 - P_L(b',z)$*; the election probability* $P_L^d(z)$ *fulfills equation (14), and* $P_R^d(z) = 1 - P_L^d(z)$.

4 Quantitative Analysis

4.1 Data

In the quantitative analysis I apply the theoretical framework to Argentina. The first column of Table 2 reports business cycle statistics for the Argentine economy.

The annual real series for GDP, consumption, government consumption, exports and imports are taken from the World Bank Indicators. Debt statistics are taken from the World Bank International Debt Statistics. The series are seasonally adjusted and range from 1994 to 2012. The interest rate series is the JP Morgan Emerging Markets Bond Index (EMBI Global) for Argentina. Net exports are given as a percentage of output. Output, private and government consumption are in logs. All series are detrended using the Hodrick-Prescott filter with a smoothing parameter of 100.

I follow the empirical literature[4] and consider the International Country Risk Guide ICRG index to measure the risk of a political turnover. The ICRG index is published on an annual basis by the Political Risk Services Group and considers three subcategories of risk: political, financial, and economic. A separate index is constructed for each of the three subcategories. The political risk index is based on 100 points and includes 12 weighted variables covering political and social attributes.[5] High values of the political index reflect high political stability while low values indicate higher political risk. Figure 1 shows the pattern of the aggregate political risk index (solid line, left axis) together with the subindex that measures government stability (dotted line, right axis) between 1994 and 2012. It is evident that the large-scale default of Argentina in 2001 was associated with substantial political risk and instability.

The first column of Table 2 summarizes the business cycle properties of the Argentine economy. As reported by Aguiar and Gopinath (2006), Arellano (2008), Neumeyer and Perri (2005), and Uribe and Yue (2006), the interest rate spread and net exports are negatively correlated with GDP. Moreover, consumption is more volatile than output. The business cycle statistics indicate that the sovereign interest spread is negatively correlated with the ICRG index of political risk. This finding is in line with the empirical literature which reports econometric evidence that political stability lowers sovereign spreads, see e.g., Hatchondo and Martinez (2010), Goretti (2005), Block and Vaaler (2004), and Manasse and Roubini (2009). Moreover, political stability is positively correlated with GDP.

[4]For an excellent overview see Hatchondo and Martinez (2010).

[5] The variables are: government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality.

4.2 Functional Forms and Calibration

To calibrate the model to the Argentine economy on an annual basis, I specify functional forms and choose parameter values. Table 1 summarizes the set of parameters. I follow Greenwood et al. (1988) and employ the following per-period GHH-utility functions:

$$u(c,l) = \frac{\left(c - \frac{l^{1+\psi}}{1+\psi}\right)^{1-\gamma}}{1-\gamma},$$
$$v(g) = \frac{g^{1-\gamma}}{1-\gamma},$$

where $\gamma > 0$ denotes the parameter of relative risk aversion and $\frac{1}{\psi}$ is the intertemporal labor elasticity. This specification implies that the marginal rate of substitution between private consumption and labor is independent of consumption. I follow Cuadra et al. (2010) and set $\frac{1}{\psi}$ to 2.22. The parameter of relative risk aversion is chosen to be equal to 2. The annual world risk-free interest rate r_f is set to 4 percent which is a standard value in quantitative business cycle studies.
As in Cuadra et al. (2010) the production function is assumed to be linear in labor, $f(l) = l$. I follow Arellano (2008) and assume that in case of default the government is hit by asymmetric output costs:

$$h(z) = \begin{cases} \eta E(z) & \text{if } z > \eta E(z) \\ z & \text{else,} \end{cases}$$

with $\eta \in (0,1)$. I set the default penalty η equal to 0.9758 and assume that the rate of time preference β takes the value 0.78. The parameterizations of β and η are set to match a default probability of 2.68 percent[6] and external debt service payments equal to 2.61 percent of GDP. Following Gelos et al. (2011), the probability θ of re-entering financial markets is set to 0.25 which implies an exclusion duration of four years.
Productivity shocks are assumed to follow an AR(1) process:

$$\log(z') = \rho_z \log(z) + \varepsilon,$$

with ε is i.i.d. $N(0, \sigma_\varepsilon^2)$. The parameters of the productivity shock process are set as to match the autocorrelation and standard deviation of the Argentine real GDP series.

[6] Argentina had default episodes in the 1950s, the 1980s and 2001 between 1900 and 2010.

The crucial parameters are the ones that specify the conflict of interest between the two parties α_j, the ideological aspects ϕ_j as well as the general popularity shocks Ω. The preference parameters α_j, $j = R, L$, are set to $\alpha_R = 0.35$ and $\alpha_L = 0.6$ to match the empirically observed average ratio of government consumption to private consumption of 20.46 percent. In the benchmark scenario, I focus on the role of general popularity shocks rather than differences in ideology across population groups. Accordingly, I assume $\phi_R = \phi_L$, and that the two groups in the population are of equal size $\chi = 0.5$.[7] I set κ equal to 0.25 so that on average every four years elections take place. In the benchmark calibration Ω is chosen so that the average re-election probability of party R is 55 percent (in case an election takes place). The associated value for Ω is 70 which corresponds to popularity shocks of ± 0.71 percent of expected life-time utility. To analyze the impact of popularity shocks on policy choices and macroeconomic outcomes, I vary the parameterization of Ω. Moreover, I study the role of differences in the ideological strength across population groups.

4.3 Results

4.3.1 Exogenous Political Turnover

In a first step, I abstract from endogenous political turnover rates and assume that the election probability is exogenously set, $P_j(b', z) \equiv \overline{P}$. The resulting theoretical framework is similar to the one studied by Hatchondo et al. (2009) who, however, consider an endowment economy and abstract from the dynamic interactions of endogenous production, tax policies, and sovereign default risk.

I compare two scenarios. The first scenario is characterized by $\overline{P} = 1$ so that political turnovers do not take place and there is no political uncertainty. This setup is closely related to Cuadra et al. (2010) who study the cyclical properties of fiscal policies in economies that are subject to sovereign default risk. The second scenario assumes $\overline{P} = 0.50$ so that a party has a 50 percent probability of being elected, if elections take place. Given the calibration of κ, the implied annual political turnover rate is 12.5 percent which is line with the calibration of Hatchondo et al. (2009). Figure 2 plots the policy functions of party R and party L for $\overline{P} = 1$ (dashed line) and $\overline{P} = 0.5$ (solid line). The black (grey) lines refer to the policy functions if party L (party R) is in power.

Consider the economy without political uncertainty first. The upper row of Figure 2

[7] The levels of ϕ_R and ϕ_L are irrelevant as can be seen from equation (13).

plots the bond price $q_j(b', z)$ as a function of b' for two types of productivity shocks z (5 percent below and above the trend). It is evident that, first, the bond price is decreasing in the level of external debt. For low levels of debt the government always repays and the bond price is equal to the inverse of the risk-free rate. Higher external debt makes repayment less attractive and default incentives rise. Since foreign creditors incorporate the default probability in their pricing decision, they charge larger risk premia. Second, the bond price is an increasing function in the productivity shock. A country that experiences an adverse economic shock is less able to repay its external debt so that the sovereign risk premium increases. The borrowing function $b'_j(b, z)$ reflects the pattern of the bond price and reveals that the economy is borrowing constrained in bad times. A comparison of the policy functions associated with party R and party L reveals that party L faces higher credit costs and is more borrowing constrained than party R, because the higher preference for public goods imply larger tax distortions and a higher default risk.

Now consider the economy with an exogenous election probability $\overline{P} = 0.5$. The policy functions show that party R, if in office, faces larger risk premia compared to the scenario without political uncertainty. The reason is that foreign creditors incorporate the probability of a political turnover in the pricing decision and account for the higher default risk in case party L gains power. In contrast, if party L is the incumbent, it has to pay lower risk premia compared to the situation without political uncertainty, because there is a positive probability that party R is in office next period. The borrowing policies of the two parties reflect the pattern of the bond price: Exogenous political uncertainty makes party R more and party L less borrowing constrained.

Table 2 summarizes the business cycle statistics for the economy with exogenous political turnover rates. The business cycle statistics are based on average values over 1000 simulations of 18 years.[8] The simulated series are detrended using the Hodrick-Prescott filter with a smoothing parameter of 100. As it is well known from Arellano (2008), Aguiar and Gopinath (2006), and Cuadra et al. (2010), the model is able to replicate the main empirical business cycle facts of a typical emerging market economy. In particular, consumption is more volatile than output, and interest rates as well as net exports are counter-cyclical. In line with the empirical evidence provided by Talvi and Vegh (2005), Ilzetzki and Vegh (2008), and Kaminsky et al. (2004), fiscal

[8] I choose a simulation horizon of 18 years to match the time period of the empirical data. Simulations of longer horizons generate very similar results for all scenarios.

policy is pro-cyclical: Due to counter-cyclical interest rates, external debt becomes more expensive in bad times, so that the government finances its public spending by higher taxation. Since I assume only moderate differences in the preferences of the two parties to match the empirical private-to-public consumption ratio, the impact of exogenous political uncertainty on the overall business cycle statistics is minor.

4.3.2 Endogenous Political Turnover

To study the impact of endogenous political turnover rates on debt and default policies, Figure 3 plots the policy functions of the two parties (solid lines) assuming equal ideological strength $\phi_R = \phi_L$ and low popularity shocks for two productivity realizations (5 percent below and above the trend). For comparison, the dashed lines show the policy functions associated with exogenous political turnover rates, $\overline{P} = 0.50$. The black (grey) lines refer to the policy functions of party L (party R).

The figure shows that the endogenous election probability $P_j(b', z)$ strongly depends on the borrowing choice b' as well as the productivity realization z. For low productivity, the election probabilities of party R and party L converge to 50 percent if borrowing becomes sufficiently large. The underlying reason is that for high external debt and adverse productivity shocks both parties would default on their debt obligations if they were in power. Since the default probabilities of the two parties do not substantially differ, the election probabilities reflect the equal sizes of the two population groups. In contrast, for low and intermediate values of borrowing, the election probability of party R is substantially above 50 percent, since party R faces lower credit costs than party L, so that the economic benefit of having party R in power instead of party L is large. For low levels of borrowing, party R can increase its re-election probability by issuing more external credit: Larger levels of debt substantially increase the default risk of party L which reduces the expected economic benefit of having party L in office. This finding is in line with the analytical implications of the two-period framework considered by Aghion and Bolton (1990).

The optimal borrowing decision $b'_j(b, z)$ reflects the endogenous credit costs $q_j(b', z)$ and the endogenous election probability $P_j(b', z)$. Compared to exogenous political uncertainty, party R is less willing to default which results in lower risk premia and higher borrowing while party L is more willing to default at lower levels of debt. Party L becomes more and party R less borrowing constrained compared to the scenario with exogenous political turnover rates.

For high productivity, the default risk is low implying small risk premia for both par-

ties. Still, sovereign default risk is larger for party L implying higher credit costs so that the election probabilities of party R and L significantly differ. The disparity between the election probabilities of the two parties is shrinking as borrowing decreases, because for low levels of external debt and high productivity realizations both parties find it optimal to repay rather than to default. Smaller differences in default risks across parties imply election probabilities closer to 50 percent.

The analysis of the policy functions reveals that, in contrast to exogenous political turnover rates, endogenous political turnover rates generate substantial discrepancies between the debt and default policies of the two parties. Clearly, economic aspects are more crucial for electoral outcomes if popularity shocks are small. This is confirmed by the policy functions shown in Figure 4 which distinguishes high popularity shocks (dashed lines), low popularity shocks (dashed-dotted line) and the benchmark calibration (solid lines). For smaller popularity shocks the impact of the parties' economic policies on their election probabilities is greater and the differences between the parties' policies are substantial.

Table 2 summarizes the simulation results for the economy that is characterized by endogenous political turnover rates. The variable PS denotes political stability and measures the re-election probability of the current incumbent, $\kappa P_{\text{inc}}(b', z)$. The statistics show that the theoretical framework replicates the main empirical cyclical facts. Political stability is positively correlated with output and negatively correlated with the sovereign spread. This indicates that a political turnover is more likely in recessions and in times of high external credit costs. These correlations are in line with the econometric evidence that suggests that the likelihood of a political turnover and the risk of a sovereign default interact (Hatchondo and Martinez, 2010; Manasse and Roubini, 2009; Goretti, 2005; Block and Vaaler, 2004).

The average re-election probability of party R amounts to 55 percent for the benchmark calibration and increases as the size of the popularity shocks decreases. If popularity shocks are small, individual voting behavior is more affected by economic aspects and reflects the fact that party R faces lower credit costs and is less borrowing constrained. The increasing re-election probability of party R implies a decreasing number of political turnovers and, consequently, the volatility of output and consumption decreases. To raise its re-election probability, party R increases its borrowing and defaults less. Therefore, the average debt share is larger and the default frequency drops as the size of the popularity shocks decreases.

How large is the incumbency advantage? To answer this question, I compare the

average probability of a party to remain in power with the average probability of a party to come into power. It turns out that there is an incumbency advantage: The probability $P_j(b', z)$ conditional on being in power is larger than the probability $P_j(b', z)$ conditional on not being in power. The simulation results show that the incumbency advantage is the largest for the smallest popularity shocks and amounts up to 2 percentage points.

While the theoretical framework is able to replicate important business cycle facts like counter-cyclical interest rates, pro-cyclical fiscal policy and the correlations between political stability and sovereign risk, it performs less well in matching the empirical mean and volatility of the sovereign interest spread. As in most quantitative models of sovereign debt and default, the mean and the standard deviation are too low compared to the data.

4.3.3 The Dynamics of Default and Political Turnover

To analyze the dynamic interactions of sovereign debt, default, and political turnover, I perform two event analyses. First, I consider default events and study whether they are associated with political turnovers. Second, I consider situations in which party L comes into office and study the impact of the political turnover on debt and default policies.

Figure 5 shows the dynamics of the economy three years prior and three years after a default taking place at $t = 0$. Default episodes are collected for a model simulation of 10 000 years. The panels show the average percentage deviations from trend for productivity, output, consumption and public spending. The tax rate, the sovereign spread, and political stability are shown in levels. 'R in Power' shows the percentage of cases where party R is the incumbent. The solid lines refer to the benchmark calibration. The dashed lines consider high popularity shocks while the dashed-dotted lines assume low popularity shocks.

The event study suggests that a default occurs if the economy is hit by a severe adverse productivity shock. Prior to the default, debt as share of output increases. The foreign creditors incorporate the default risk in their pricing decision such that the sovereign interest spread raises. The higher credit costs make the economy borrowing constrained so that the incumbent government raises the tax rate to finance public spending. Prior to the default, party R is holding office in the majority of cases. However, high external debt and high sovereign spreads decrease the political stability. At the time of the default, $t = 0$, the share of cases in which party R is the incumbent

substantially drops. This indicates that a default event tends to be associated with a political turnover in which party L comes into office.

Figure 6 plots the dynamic pattern of the economy three years prior and three years after a political turnover takes place. The model is simulated for 10 000 years and episodes are considered in which party R is in power and no default takes place prior to $t=0$. At date $t=0$ party L comes into office. The panels show the average percentage deviations from trend for productivity, output, consumption, and public spending during the default episodes. The tax rate, the sovereign spread, and political stability are shown in levels. The variable 'Default Decision' shows the percentage of cases in which a default takes place. The solid lines refer to the benchmark calibration. The dashed lines consider high popularity shocks while the dashed-dotted lines assume low popularity shocks.

The event study shows that prior to a political turnover, party R accumulates external debt which raises the sovereign interest spread. Since external debt becomes more expensive, public spending decreases prior to $t=0$. The decrease in public spending together with the increase in the sovereign spread adversely affects political stability. At date $t = 0$ party L comes into power and increases the tax rate in order to raise public spending. The tax distortions decrease output and increases the external debt burden. This raises the likelihood of a default: Depending on the size of the popularity shocks, a default occurs in 4 to 9 percent of all cases. Interestingly, the default occurs although the economy is not hit by adverse productivity shocks. Therefore, these defaults can be viewed as politically motivated.

4.3.4 Idiosyncratic Ideology

The analysis so far has assumed that the two population groups do not differ in their ideological strength. In this section, I relax this assumption. In particular, I consider the benchmark calibration and vary the ratio of the densities of the idiosyncratic ideological bias $\frac{\phi_R}{\phi_L}$ between 0.80 and 1.20. A ratio below (above) one implies that the population group represented by party R is less (more) ideological than the population group represented by party L.

Figure 7 considers a productivity realization of 5 percent below the trend and plots the policy functions for party R (left column) and party L (right column). The solid line refers to the benchmark $\frac{\phi_R}{\phi_L} = 1$. The grey dashed-dotted lines consider $\frac{\phi_R}{\phi_L} = 0.80$ while the grey dashed lines refer to $\frac{\phi_R}{\phi_L} = 0.90$. The black dashed-dotted lines are associated with $\frac{\phi_R}{\phi_L} = 1.20$, and the black dashed lines refer to $\frac{\phi_R}{\phi_L} = 1.10$.

Clearly, if population group R is less ideological than group L, the economic policies of party R have a larger impact on electoral outcomes: The election probability of party R increases as $\frac{\phi_R}{\phi_L}$ decreases. To raise its re-election probability, party R borrows more and is less willing to default compared to the benchmark $\frac{\phi_R}{\phi_L} = 1$. Interestingly, also party L defaults less often in order to gain the votes of the less ideological group R. The reverse holds, if population group L is less ideological.

The business cycle statistics summarized in Table 3 reflect the pattern of the policy functions. If population group R becomes less ideological, the re-election probability of party R increases from 55 percent to 74 percent. If, in contrast, group L becomes less ideological, the re-election probability of party L raises from 45 percent to 60 percent. Interestingly, the cyclical correlations between output and political stability and between the sovereign spread and political stability become negative as group L becomes less ideological. The reason is intuitive: If group L is less ideological, party L is more often in power. Positive productivity shocks, however, increase the election probability of party R, and a political turnover becomes more likely.

5 Conclusions

In this paper, I have developed a stochastic dynamic politico-economic model of sovereign debt that features endogenous default risk as well as endogenous political turnover rates to analyze the interactions of electoral outcomes, fiscal policy, and sovereign spreads, and their impact on macroeconomic outcomes.

Quantitative findings suggest that the theoretical framework rationalizes the empirical business cycle facts of a typical emerging market economy. In particular, political stability is positively correlated with production and negatively correlated with the sovereign interest spread. This indicates that a political turnover is more likely to occur in recessions and in times of high external credit costs. Moreover, sovereign interest spreads are counter-cyclical, fiscal policy is pro-cyclical, and consumption is more volatile than output.

Endogenous political turnover rates increase the discrepancies between the debt and default policies of the two parties. The party which prefers lower public spending borrows more and defaults less often in order to increase its re-election probability. In contrast, the party with a preference for higher public spending is borrowing constrained, raises higher taxes and has larger incentives to default in order to enhance the probability of remaining in power. Event analyses suggest that default episodes

are associated with adverse productivity shocks. In bad economic times, the increasing sovereign interest spread and higher taxes reduce political stability and may trigger a political turnover. In contrast, a political turnover may generate default episodes even in the absence of adverse economic shocks.

In this paper, I have abstracted from aspects regarding domestic debt. It seems to be a particularly promising avenue for future research to explore the dynamic interactions of electoral outcomes, austerity policies, and domestic default risk.

A Numerical Algorithm

The model is solved by using value function iteration. The numerical algorithm builds on Hatchondo et al. (2010) and employs cubic spline interpolations. I approximate the equilibrium as the equilibrium of the finite-horizon economy and iterate simultaneously on the value, the bond price functions, and election probabilities.

Given the preference specification, the household's optimality condition (3) yields optimal labor supply as a function of the tax rate τ:

$$l = \left(\frac{z}{1+\tau}\right)^{\frac{1}{\psi}}. \tag{15}$$

Equation (15) and the budget constraints (1) and (2) allow to express optimal private and public consumption as functions of the decision variables b' and τ.

The following algorithm is used to solve the model. I define evenly distributed grid vectors for bond holdings $b \in [\underline{b}, \bar{b}]$ and productivity realizations $z \in [\underline{z}, \bar{z}]$.

Let $V_{j(0)}(b,z)$, $V^{nd}_{j(0)}(b,z)$, and $V^{d}_{j(0)}(z)$ denote the initial guesses for the value functions. For every grid point $(b,z) \in [\underline{b}, \bar{b}] \times [\underline{z}, \bar{z}]$ and given the initial guesses $V_{j(0)}(b,z)$, $V^{nd}_{j(0)}(b,z)$, and $V^{d}_{j(0)}(z)$, I find candidate values for $\tau_{j(0)}$, $b'_{j(0)}$, and $\tau^{d}_{j(0)}$ via (6), (5), and (4) by employing a global search procedure. These candidate values are then taken as initial guesses for the FORTRAN optimization routine BCPOL from the IMSL library to find the optimal values. $\overline{V}^{nd}_{j(0)}(b,z)$, $\overline{V}^{d}_{j(0)}(z)$, and $\overline{V}_{j(0)}(b,z)$ solve (9), (10), and (11). Given the initial guess, equations (8) and (12) determine the default probability $\lambda_{j(0)}(b'_{(0)}, z)$ and the bond price function $q^{b}_{j(0)}(b'_{(0)}, z)$, respectively. The election probability $P_{L(0)}(b', z)$ fulfills equation (13), and $P_{R(0)}(b', z) = 1 - P_{L(0)}(b', z)$. The election probability $P^{d}_{L(0)}(z)$ fulfills equation (14), and $P^{d}_{R(0)}(z) = 1 - P^{d}_{L(0)}(z)$. Expected continuation values are computed using gauss-hermite quadrature points and weights. To evaluate the expected continuation values for policies and productivity realizations that do not lie on the grid, I employ cubic spline interpolations using the FORTRAN CSDEC routine from the IMSL library. The solutions found at each grid point are used to update the value functions $V_{j(0)}(b,z)$, $V^{nd}_{j(0)}(b,z)$, and $V^{d}_{j(0)}(z)$. The algorithm is iterated until the value functions and policy functions converge.

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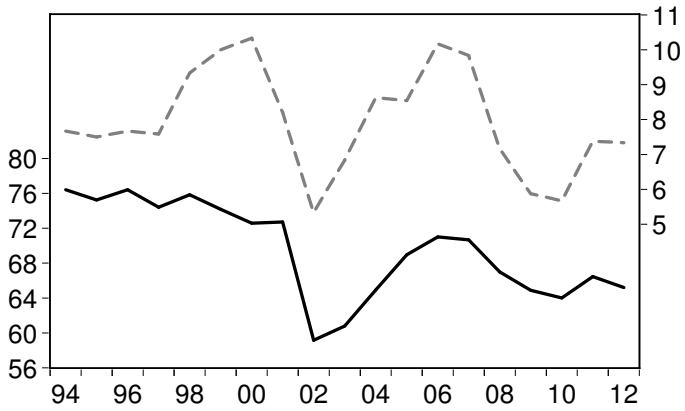

Figure 1: The ICRG Index of Political Risk

Table 1: Calibration

Parameter			Target
Risk free rate	r_f	0.04	standard value
Risk aversion	γ	2	standard value
Time preference	β	0.78	external public debt service
Labor elasticity	$\frac{1}{\psi}$	2.22	standard value
Preference weight	α_R	0.35	
	α_L	0.60	government-consumption ratio
Population	χ	0.50	equal group size
Re-entry probability	θ	0.25	Gelos et al. (2011)
Default penalty	η	0.9758	default frequency
Productivity	ρ_z	0.66	autocorrelation of GDP
	σ_ε	0.0155	standard deviation of GDP
Election Probability	κ	0.25	elections every four years
Idiosyncratic Ideology	$\phi^R = \phi^L$		
Average Popularity	$[-\frac{1}{2\Omega}; \frac{1}{2\Omega}]$	$[-0.0071; 0.0071]$	re-election probability of party R

Table 2: Business Cycle Statistics

	Argentine Data	Endogenous Political Turnover				Exogenous Political Turnover		
		popularity shocks				$\overline{P} = 0.50$	$\overline{P} = 1.00$	
		small	low	benchmark	high		R in power	L in power
$\sigma(y)$	6.29	5.00	5.89	6.22	6.34	6.33	4.86	4.77
$\sigma(c)/\sigma(y)$	1.11	1.07	1.19	1.22	1.23	1.23	1.05	1.04
$\sigma(g)/\sigma(y)$	0.63	1.35	1.25	1.25	1.23	1.23	1.32	1.29
$\sigma(s)/\sigma(y)$	1.71	0.23	0.25	0.24	0.23	0.23	0.32	0.32
$\sigma(PS)$	5.29	3.47	2.85	1.24	0.25	–	–	–
$\rho(c, y)$	0.98	0.99	0.98	0.98	0.98	0.98	0.99	0.99
$\rho(g, y)$	0.76	0.91	0.47	0.29	0.23	0.23	0.96	0.97
$\rho(\tau, y)$	–	-0.56	-0.65	-0.67	-0.69	-0.69	-0.49	-0.46
$\rho(nx/y, y)$	-0.89	-0.65	-0.58	-0.53	-0.51	-0.45	-0.57	-0.55
$\rho(s, y)$	-0.79	-0.32	-0.32	-0.27	-0.27	-0.26	-0.33	-0.29
$\rho(y, PS)$	0.80	0.09	0.32	0.49	0.49	–	–	–
$\rho(s, PS)$	-0.88	-0.32	-0.67	-0.71	-0.71	–	–	–
P_R|in power	–	97.85	64.48	55.23	51.01	–	–	–
P_R|not in power	–	95.93	62.98	54.90	50.96	–	–	–
P_L|in power	–	4.07	37.02	45.10	49.04	–	–	–
P_L|not in power	–	2.15	35.52	44.72	48.99	–	–	–
$E(s)$	11.71	2.03	2.63	2.77	2.70	2.70	2.77	2.77
$E(g/c)$	20.46	17.81	19.41	20.69	21.17	21.41	17.68	25.23
$E(b/y)$	-2.61	-3.37	-2.73	-2.67	-2.66	-2.68	-2.68	-2.68
Default Probability	2.68	1.85	2.31	2.51	2.36	2.36	2.48	2.48

The simulation results are averages over 1000 simulations of 18 years (100 years where the first 82 are cut off). The series are HP-filtered with a smoothing parameter of 100. y denotes production, c and g are private and public consumption, respectively. τ refers to the tax rate, b denotes external debt. nx is the trade balance. s denotes the interest spread. PS measures the political stability and refers to the re-election probability of the incumbent, $\kappa P_{inc}(b', z)$. Probabilities, political stability, the sovereign spread and shares are given in percent. The benchmark calibration assumes $\Omega = 70$. High popularity shocks refer to $\Omega = 20$ while low and small popularity shocks refer to $\Omega = 110$ and $\Omega = 125$, respectively.

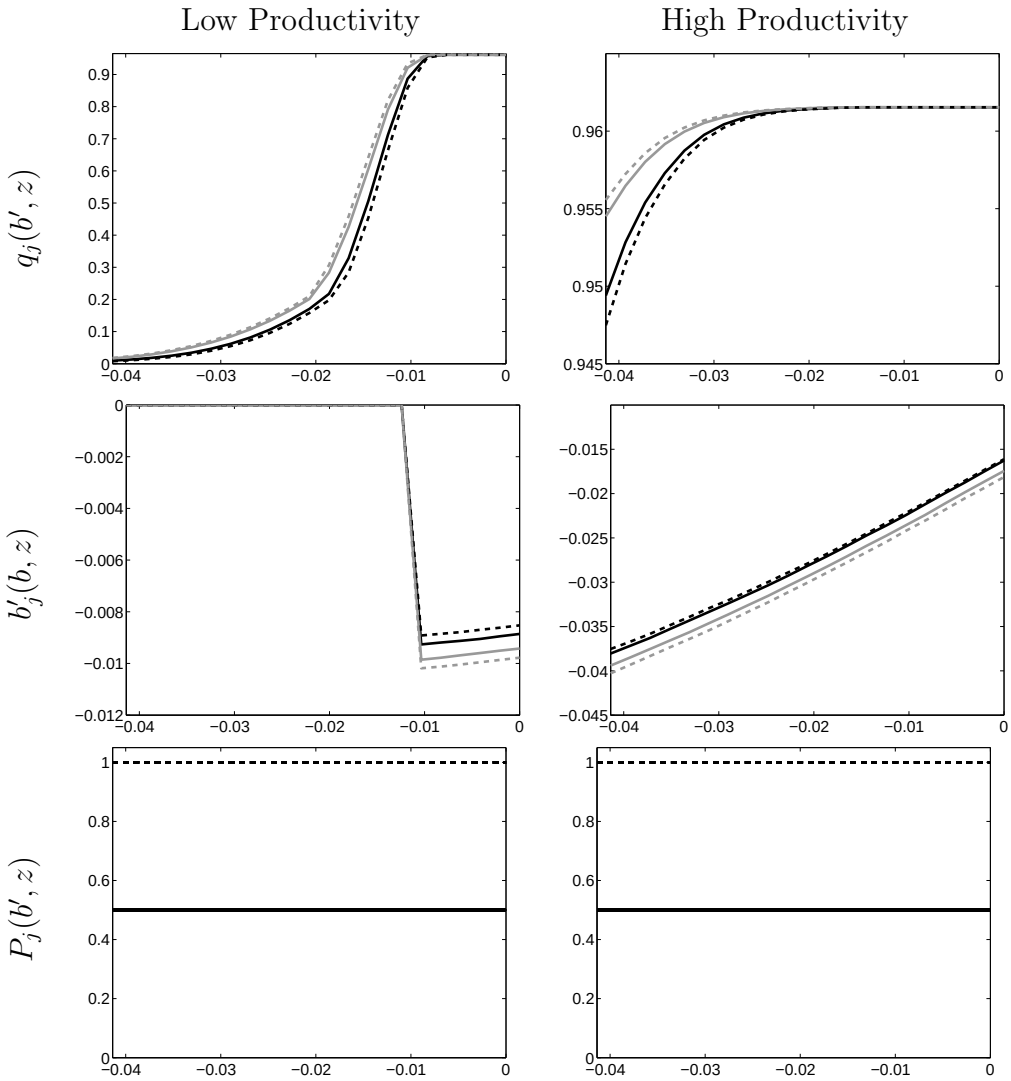

Figure 2: Policy Functions: Exogenous Political Turnover Rates; *The figure shows the policy functions associated with exogenous election probabilities $\overline{P} = 1$ (dashed lines) and $\overline{P} = 0.5$ (solid lines). The black lines refer to the policy choices of party L while the grey lines refer to the policy choices of party R. High productivity refers to 5 percent above the trend while low productivity refers to 5 percent below the trend.*

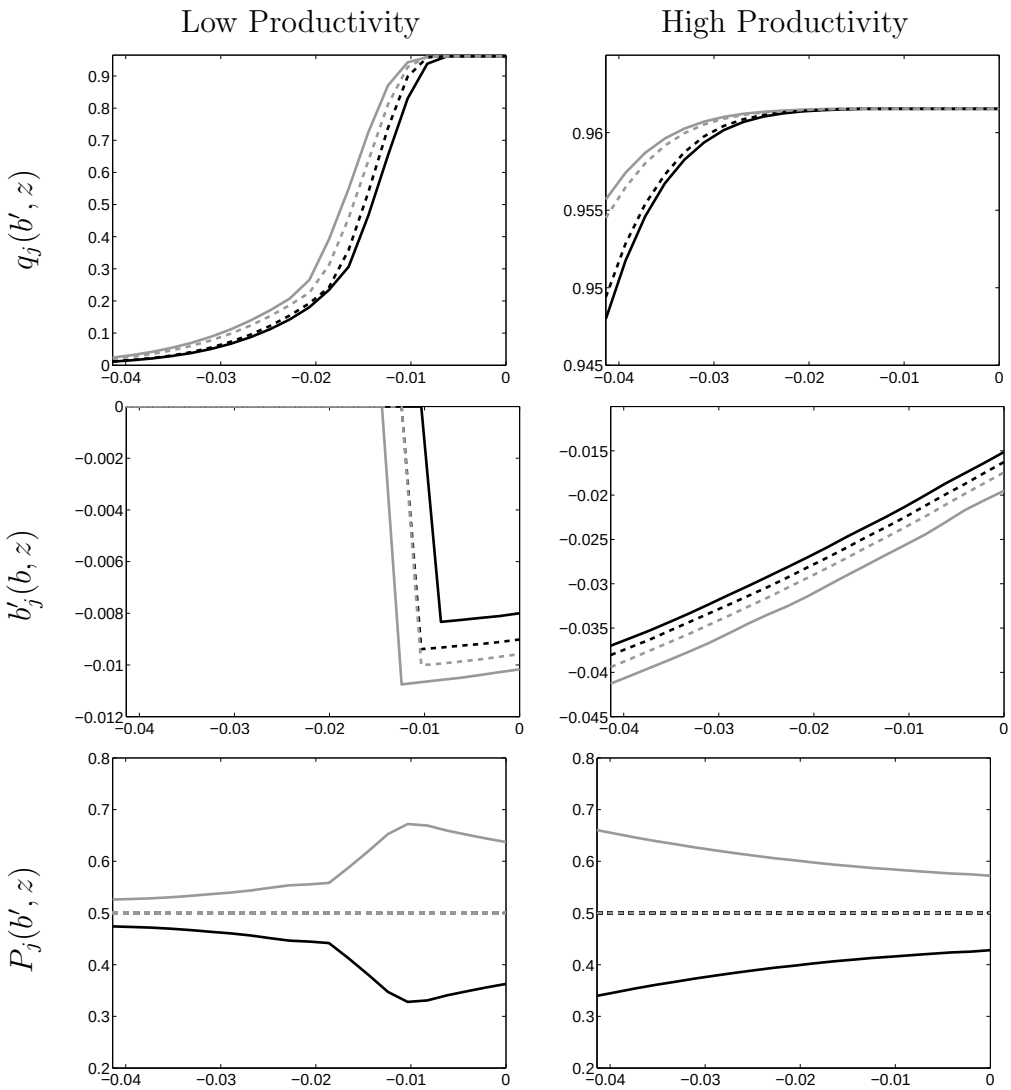

Figure 3: Policy Functions: Endogenous versus Exogenous Political Turnover Rates; *The figure shows the policy functions associated with exogenous election probabilities $\overline{P} = 0.5$ (dashed lines) and endogenous election probabilities (solid lines). The black lines refer to the policy choices of party L while the grey lines refer to the policy choices of party R. For illustration, the figures assumes low popularity shocks. High productivity refers to 5 percent above the trend while low productivity refers to 5 percent below the trend.*

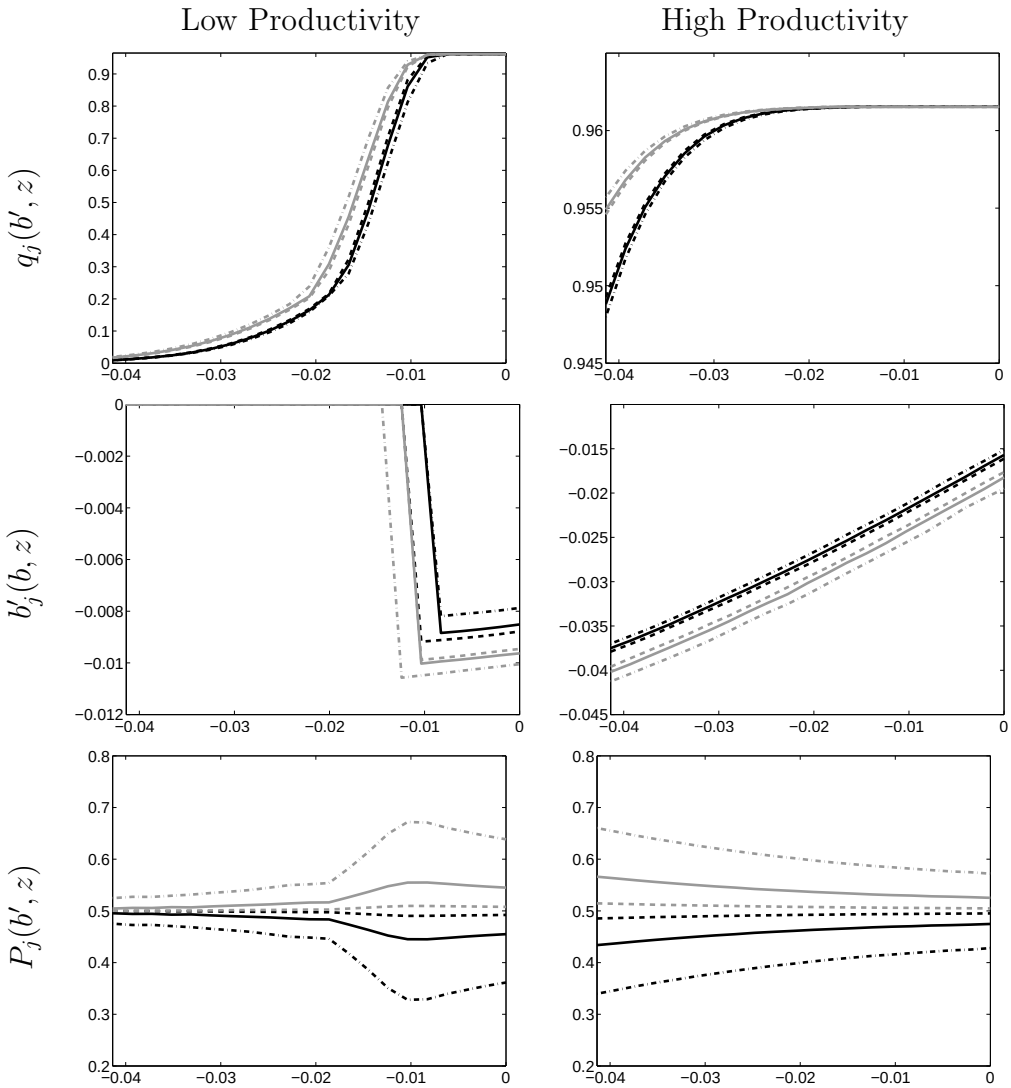

Figure 4: Policy Functions: Endogenous Political Turnover Rates and Popularity Shocks; *The figure shows the policy functions associated with endogenous election probabilities and compares the benchmark calibration (solid lines) with the calibrations with low popularity shocks (dashed-dotted lines) and high popularity shocks (dashed lines). The black lines refer to the policy choices of party L while the grey lines refer to the policy choices of party R. High productivity refers to 5 percent above the trend while low productivity refers to 5 percent below the trend.*

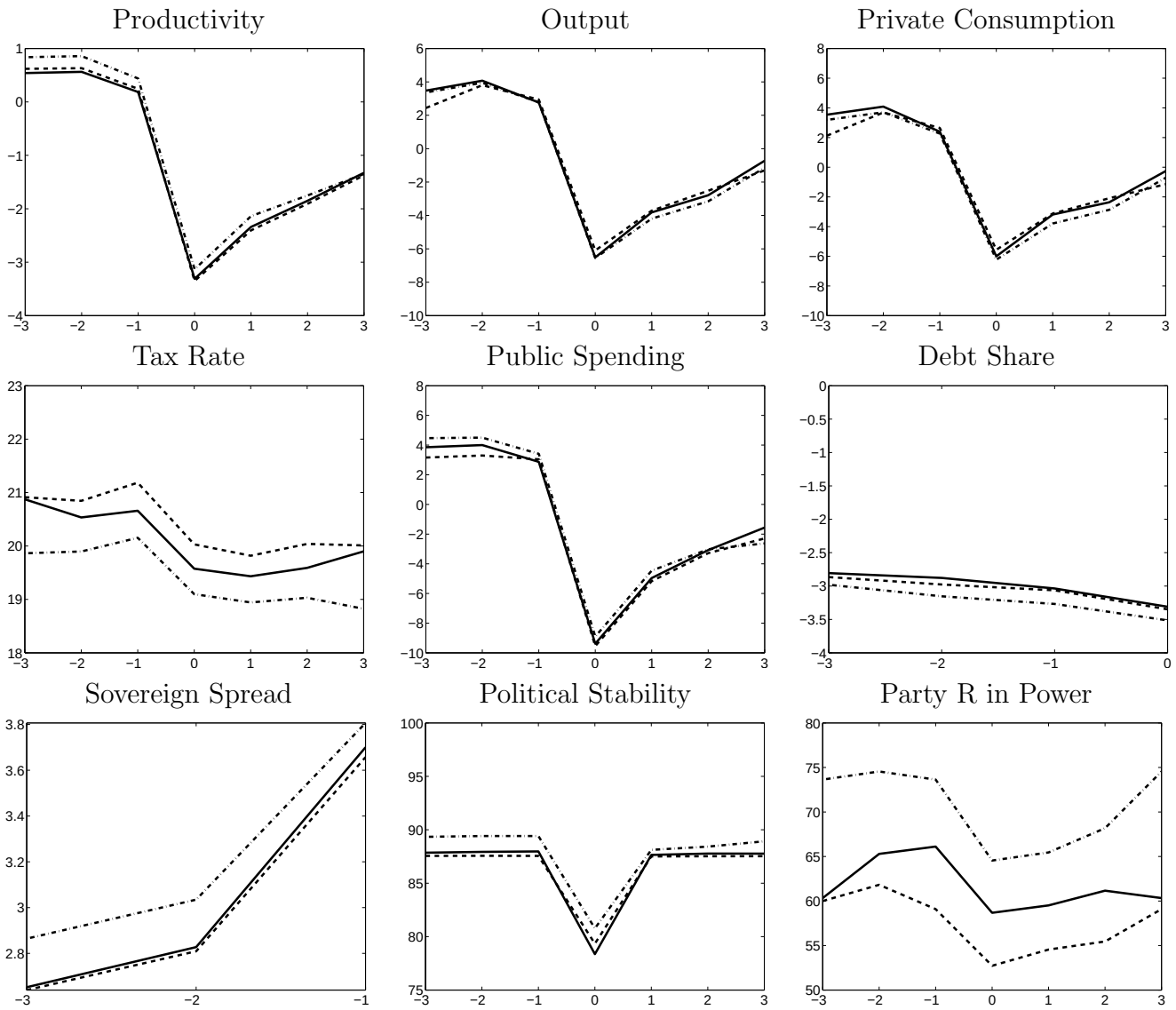

Figure 5: Default Event; *The figures plot the dynamics prior and after a default taking place at date $t = 0$. The model is simulated for 10 000 years and the default episodes are collected. The panels show the average percentage deviations from trend for productivity, output, consumption and public spending. The tax rate, sovereign spread, and political stability are shown in levels. 'R in Power' refers to the percentage of cases where party R is the incumbent. The solid lines refer to the benchmark calibration. The dashed (dashed-dotted) lines consider high (low) popularity shocks.*

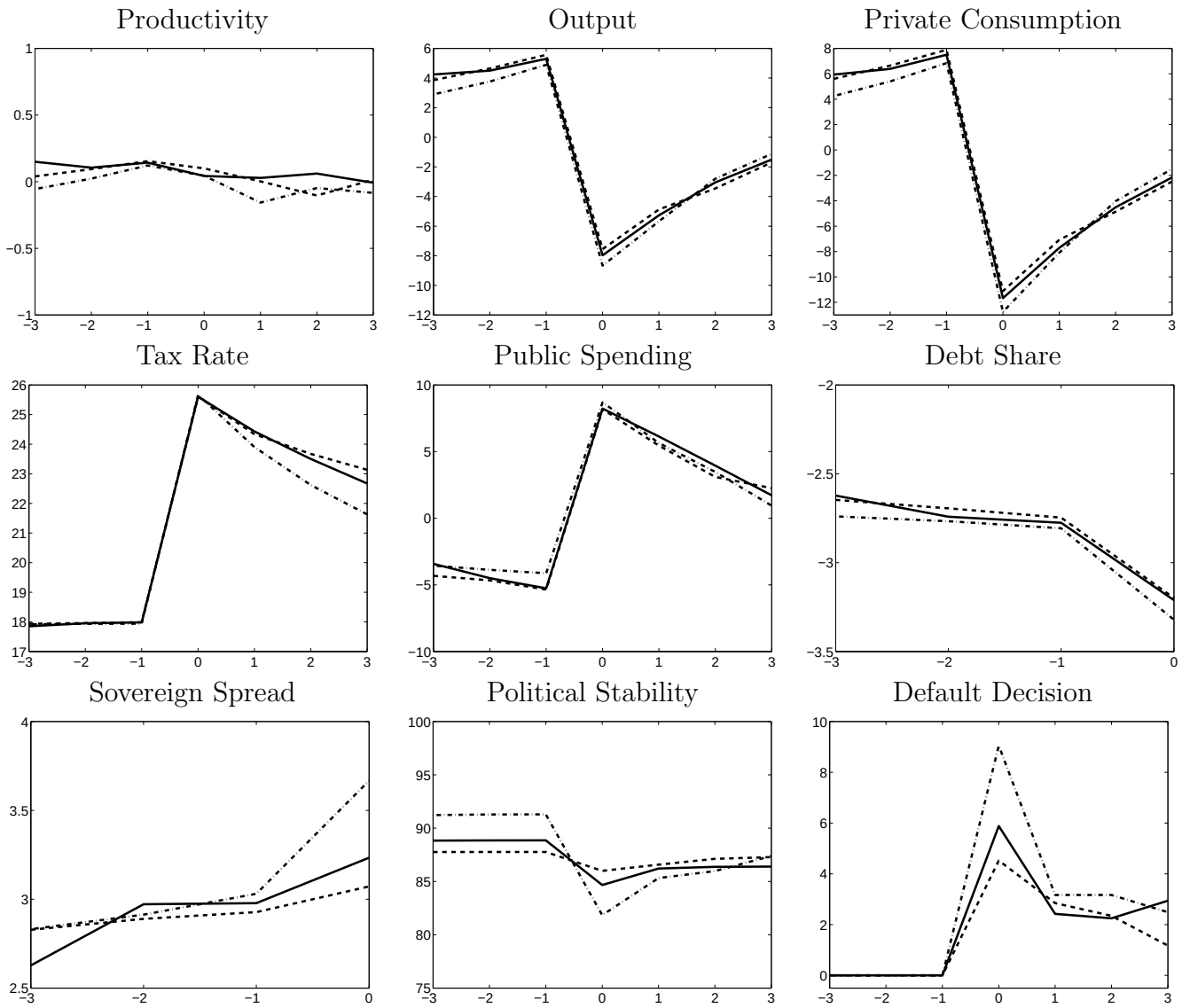

Figure 6: Political Turnover Event; *The model is simulated for 10 000 years and episodes are considered in which party R is in power and no default occurs until a political turnover takes place at date* $t=0$. *The panels show the average percentage deviations from trend for productivity, output, consumption and public spending. The tax rate, sovereign spread, and political stability are shown in levels. 'Default Decision' refers to the percentage of cases in which a default takes place. The solid lines refer to the benchmark calibration. The dashed (dashed-dotted) lines consider high (low) popularity shocks.*

Table 3: The Impact of Ideology

	Idiosyncratic Ideology ϕ_R/ϕ_L				
	0.80	0.90	1.00	1.10	1.20
$\sigma(y)$	5.26	5.88	6.22	6.31	6.14
$\sigma(c)/\sigma(y)$	1.11	1.19	1.22	1.23	1.22
$\sigma(PS)$	2.86	2.91	1.25	0.79	2.36
$\rho(y, PS)$	0.03	0.42	0.49	-0.47	-0.55
$\rho(s, PS)$	-0.65	-0.72	-0.70	0.67	0.73
P_R|in power	74.26	64.22	55.23	47.17	39.84
P_R|not in power	73.85	63.92	54.90	46.78	39.42
P_L|in power	26.15	36.08	45.10	53.22	60.58
P_L|not in power	25.74	35.78	44.77	52.83	60.16
$E(s)$	2.71	2.70	2.72	2.74	2.75
$E(g/c)$	18.21	19.41	20.69	21.69	22.82
$E(b/y)$	-2.72	-2.70	-2.67	-2.66	-2.63

The simulation results are averages over 1000 simulations of 18 years (100 years where the first 82 are cut off). The series are HP-filtered with a smoothing parameter of 100. y denotes production, c and g are private and public consumption, respectively. τ refers to the tax rate, b denotes external debt. nx is the trade balance. s denotes the sovereign interest spread. PS measures the political stability and refers to the re-election probability of the incumbent, $\kappa P_{inc}(b', z)$. Results refer to the benchmark calibration and different ideological strengths.

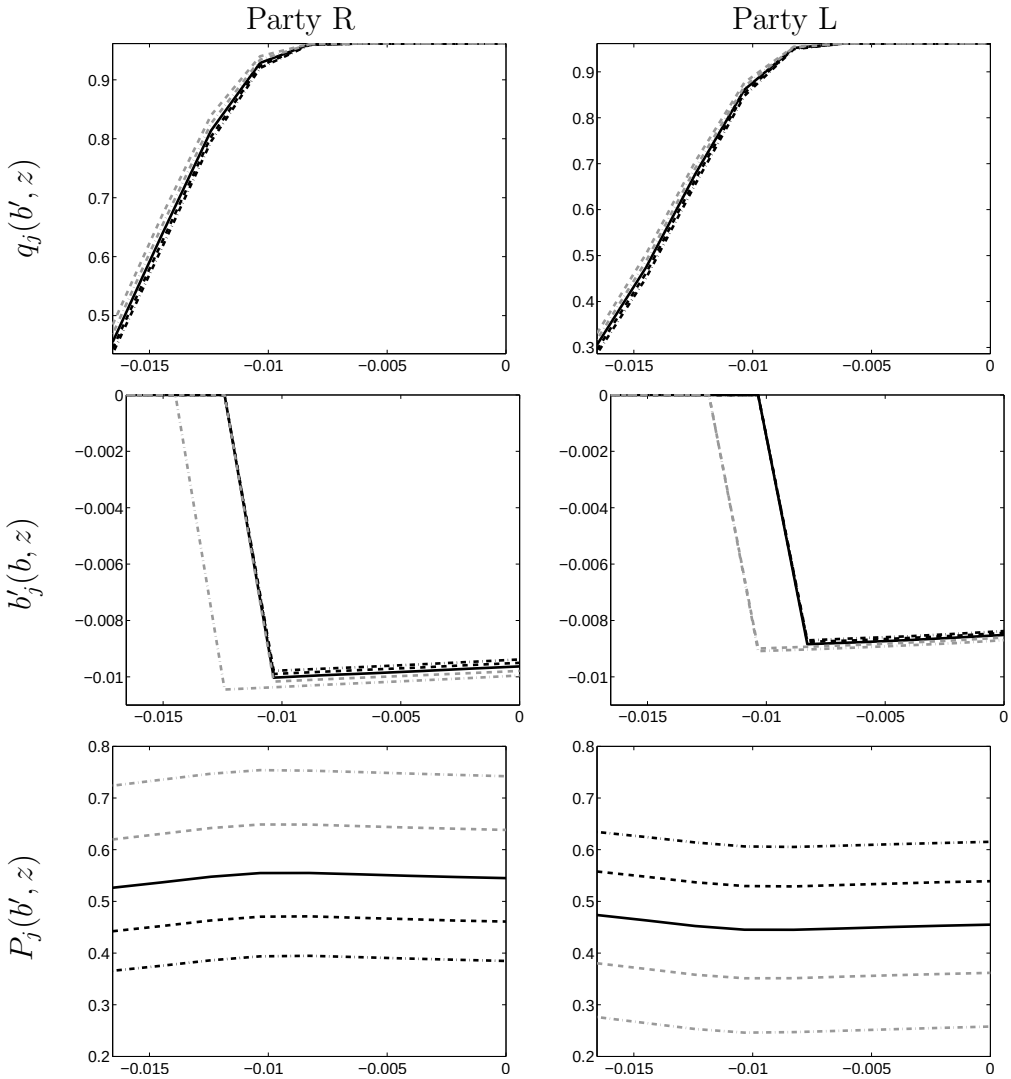

Figure 7: Policy Functions: Endogenous Political Turnover Rates and Ideology; *The figure shows the policy functions associated with endogenous election probabilities and compares the benchmark calibration* $\frac{\phi_R}{\phi_L} = 1.00$ *(solid lines) with* $\frac{\phi_R}{\phi_L} = 0.80$ *(dashed-dotted grey lines), with* $\frac{\phi_R}{\phi_L} = 0.90$ *(dashed grey lines), with* $\frac{\phi_R}{\phi_L} = 1.10$ *(dashed black lines), and with* $\frac{\phi_R}{\phi_L} = 1.20$ *(dashed-dotted black lines). Productivity is 5 percent below the trend.*

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