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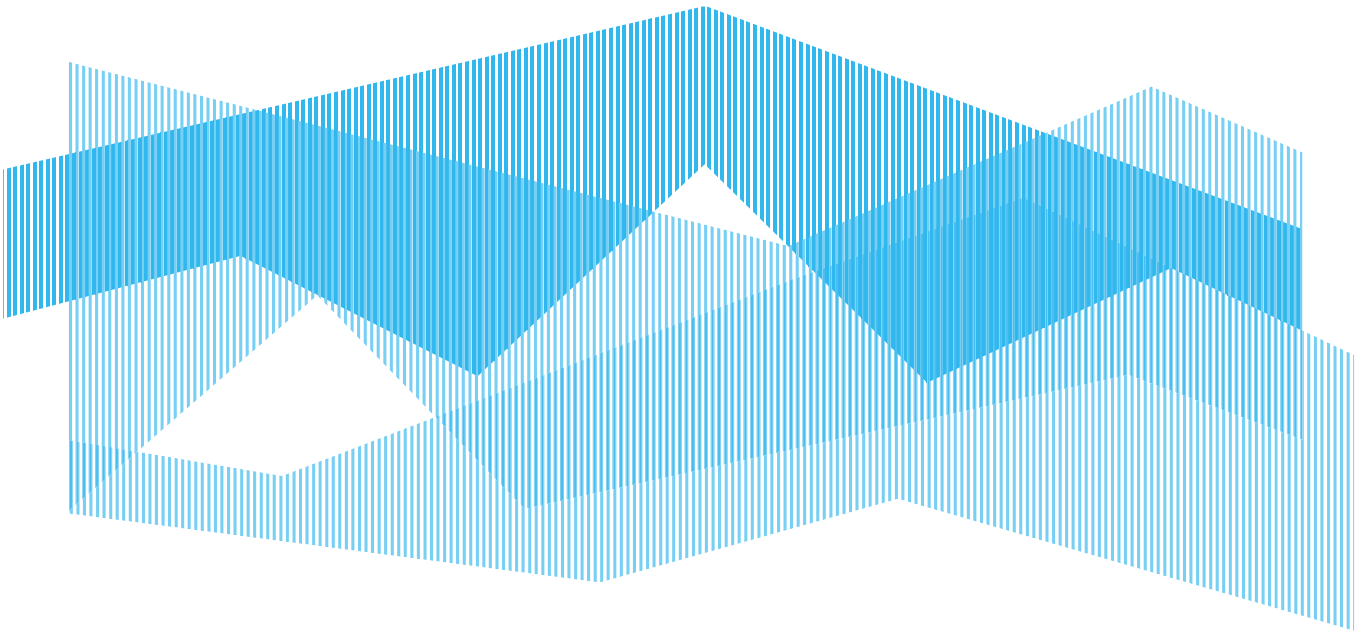

The Politics of Redistribution and Sovereign Default

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The Politics of Redistribution and Sovereign Default*

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Abstract

This paper studies how distributional and electoral concerns shape sovereign default incentives within a quantitative model of sovereign debt with heterogeneous agents and non-linear income taxation. The small open economy is characterized by a two-party system in which the left-wing party has a larger preference for redistribution than the right-wing party. Political turnover is the endogenous outcome of the electoral process. Fiscal policy faces a tradeoff: On the one hand, the government has incentives to finance redistribution via external debt to avoid distortionary income taxation. On the other hand, the accumulation of external debt raises the cost of borrowing. Quantitative findings suggest that the left-wing party implements a more progressive income tax, is more prone to default, and has a lower electoral support than the right-wing party due to worse borrowing conditions and the distortionary effects of income taxation. In equilibrium, electoral uncertainty raises sovereign default risk.

Keywords: sovereign debt and default, inequality, redistribution, political economy

JEL Codes: F34, H63, E62, F41, D72

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1 Introduction

This paper studies how distributional and electoral concerns shape sovereign default incentives. Two empirical observations are of key importance. First, not only credit booms but also government popularity are significant predictors of debt crises in emerging economies (Herrera et al., 2020). Second, the boom is followed by a bust. Unemployment and income inequality increase and high sovereign interest rates reduce the government's fiscal space for redistributive spending. These boom-bust cycles have been discussed by Dornbusch and Edwards (1991) and Dovis et al. (2016) and are illustrated in Figure 1 for the default episode in Argentina in the early 2000s.

How does income inequality, redistributive concerns, and the risk of losing power affect the government's fiscal policy choices and sovereign default risk? To answer this question, this paper develops a quantitative model of sovereign debt and default with heterogeneous agents and endogenous electoral outcomes. The theoretical framework considers a small open economy that is inhabited by infinitely-lived agents who face uninsurable idiosyncratic income and unemployment risks. The government raises a non-linear income tax and provides unemployment benefits. A tradeoff between equity and efficiency arises because redistributive policies foster income equality but distort the individual labor supply. The government can issue external debt to finance redistribution but international financial markets are incomplete and debt contracts are limited enforceable. Foreign creditors are risk-neutral and the bond price fulfills the expected-zero-profit condition reflecting the probability that a sovereign default takes place in the next period.

The economy is characterized by a two-party system in which the parties differ in their preferences for redistribution. The left-wing party is assumed to care more about redistribution and equity than the right-wing party. When choosing fiscal policies, the policymaker takes into account her re-election probability, which is an endogenous outcome of the electoral process. Building on the probabilistic voting approach, the individual voting behavior is determined by the economic benefits from the incumbent's and opponent's tax and debt policies as well as stochastic idiosyncratic ideological aspects.

In a quantitative application to the Argentine economy, I study the properties of optimal tax and debt policies and their interaction with electoral outcomes. The parties' preferences for redistribution are calibrated as to match the empirical distribution of consumption observed in Argentina before the default in 2002. In a first step, I assume that a government remains in office forever and abstract from electoral uncertainty to characterize the policies of a left-wing and a right-wing government and to highlight the role of political preferences. Optimal policy choices are shaped by the following tradeoff. On the one hand, policymakers

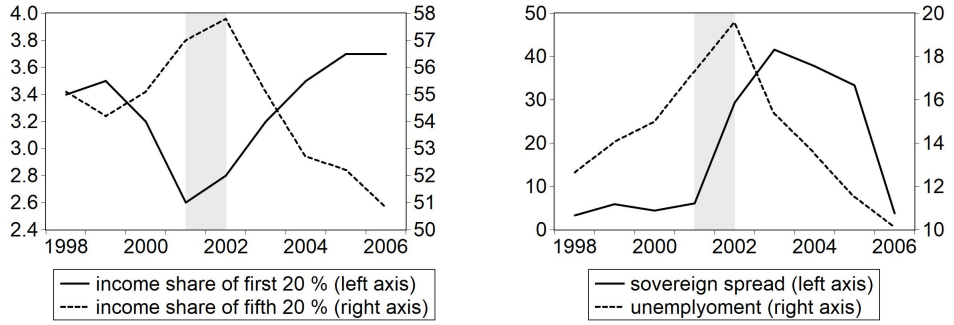

Figure 1. Inequality, Unemployment, and Default in Argentina; *The grey shaded area visualizes the default episode in 2001/2002. Annual data on income shares and the unemployment rate are taken from the World Development Indicators. The sovereign spread is measured by the country-specific EMBI Global.*

prefer to finance spending via debt to avoid the distortionary effects of income taxation. On the other hand, the accumulation of debt fosters default incentives and increases the interest rate. With growing debt, the rising sovereign spread reduces the fiscal space forcing the government to reduce the progressivity of the tax scheme. The higher tax burden discourages low-productivity agents to work such that unemployment increases. At the same time, public expenditures related to the provision of unemployment benefits rise. Lower production and higher spending endogenously reinforce default incentives. After a default, the government is able to reduce the tax burden and to improve redistribution because outstanding debt obligations are not repaid.

A larger political preference for redistribution affects sovereign default incentives through three mechanisms. First, the more progressive income tax distorts the individual labor supply and reduces aggregate production. The loss in efficiency makes a given level of debt less sustainable and raises the probability of a sovereign default. Second, a default relaxes the government's budget constraint facilitating a tax cut. The increase in net income is particularly beneficial for poor agents such that the left-wing government with a bias towards low-income groups is more prone to default. These two mechanisms are counteracted by the third mechanism: After a default, the government loses access to international financial markets and cannot borrow to provide insurance against income shocks. Financial autarky hurts low-income agents relatively more making a default more costly for the left-wing government. It turns out that the first two mechanisms quantitatively dominate the third one: For a given level of debt, the left-wing government is more likely to default. The larger sovereign default risk is reflected in a higher interest rate making the left-wing government more borrowing-constrained than the right-wing government.

In the second step, I allow for political turnover as the endogenous outcome of the electoral process. The model features three important mechanisms through which electoral uncertainty affects sovereign default incentives. *(i)* The *impatience channel*: The probability of losing power generates short-sighted governments who are more inclined to borrow today and to reduce resources for the future government. *(ii)* The *credit cost channel*: The bond price reflects not only the incumbent government's sovereign default risk but also the probability that the opponent gains power and makes the default decision in the next period. The impact of the opponent's default risk on the current credit cost shapes the incumbent's debt policy. *(iii)* The *popularity channel*: The incumbent's tax and debt policies affect her probability of being re-elected.

Quantitative findings suggest that the distortionary effects of income taxation create an electoral disadvantage for the left-wing government. The left-wing tax and default policies generate larger equity but lower efficiency such that not only high-income agents but also middle-income agents vote for the right-wing opponent. The popularity channel reduces the re-election probability of the left-wing incumbent making her endogenously short-sighted via the impatience channel. Moreover, compared to the situation without electoral uncertainty, for a given level of debt, the credit cost channel improves the borrowing conditions for the left-wing government because foreign creditors incorporate the probability that the right-wing opponent takes over who is less likely to default. The endogenous interaction of the impatience channel, the credit cost channel, and the popularity channel induces the left-wing incumbent to accumulate more debt compared to the situation without electoral uncertainty. On the other hand, the probability that the left-wing opponent gains power increases the interest rate for the right-wing incumbent via the credit cost channel making her more borrowing-constrained and fostering her default incentives. Simulation results suggest that electoral uncertainty increases sovereign default risk in equilibrium.

The popularity channel depends critically on the tradeoff between equity and efficiency, which is shaped by the distortionary impact of income taxation. With a smaller labor elasticity, individual labor supply responds less strongly to tax changes such that tax distortions are weaker and redistribution becomes less costly. Consequently, given political preferences, both governments implement more progressive income tax schemes and the electoral advantage of the right-wing government shrinks. If tax distortions are low, matching the empirically observed distribution of consumption in Argentina requires political preferences that are heavily biased towards high-income agents. In such an economy, the majority of the population prefers a larger degree of redistribution such that the left-wing rather than

the right-wing incumbent has an electoral advantage.

Related Literature. While the literature on sovereign debt and default initiated by Eaton and Gersovitz (1981), Aguiar and Gopinath (2006) and Arellano (2008) is large,[1] only few studies analyze the impact of distributional aspects on sovereign default risk. Ferriere (2015) studies the role of taxation in an economy with heterogeneous households who supply labor elastically and are subject to a linear tax function. She abstracts from political preferences and argues that income inequality has ambiguous effects on sovereign default risk because households at the bottom of the income distribution benefit from the tax cut in default but suffer from the missing insurance against income shocks in financial autarky. In a quantitative exercise she finds that the first effect dominates and that higher income inequality raises sovereign default risk. Jeon and Kabukcuoglu (2018) come to similar conclusions in a simpler model of sovereign debt and default with two types of households differing in their (exogenous) income. D'Erasmo and Mendoza (2021) build on D'Erasmo and Mendoza (2016) and differentiate between domestic and foreign creditors in a Bewley-type model with sovereign default risk. In their model, income inequality generates default incentives, similar to Ferriere (2015). Deng (2021) builds on Ferriere (2015) and studies the optimal combination of non-linear income taxation and debt. She argues that higher income inequality induces the government to choose a higher degree of redistribution in spite of larger sovereign spreads. Distributional default incentives are also present in Balke and Ravn (2016) who introduce inequality through unemployment and find that during debt crises the government is forced to implement austerity making default an attractive option. Bianchi et al. (forthcoming) allow for downward nominal wage rigidity and involuntary unemployment in a model of sovereign debt and default and highlight that fiscal stimulus mitigates unemployment and dampens the recession but comes at the cost of higher sovereign spreads. Prein (2022) extends the analysis by focusing on the role of long-run unemployment and skill loss. My paper builds on the aforementioned studies and introduces household heterogeneity, unemployment risk, and redistribution in a quantitative model of sovereign debt and default. The theoretical framework generates distributional default incentives as in Ferriere (2015) and D'Erasmo and Mendoza (2021) and a tradeoff between redistribution and sovereign spreads as in Deng (2021) and Bianchi et al. (forthcoming). However, whereas previous work abstracts from electoral uncertainty, my paper emphasizes the role of political preferences and the political consequences of progressive taxation and sovereign default.

With its focus on the politics of redistribution and sovereign default this paper is related to Aguiar and Amador (2011) and Dovis et al. (2016) who study the interaction between

[1] A recent survey of the literature is provided by Martinez et al. (2022).

political frictions, external debt, and redistribution in fully dynamic neoclassical models. Their settings give rise to boom-bust cycles in which the incumbent government issues new debt to finance redistribution. The boom is followed by a bust and austerity. Tran-Xuan (2022) builds on Werning (2007) and Bhandari et al. (2017) and studies the optimal design of austerity accounting for distributional effects. These papers, however, focus on self-enforcing equilibria such that default does not occur in equilibrium. In contrast, I allow for default as an equilibrium outcome and study how distributional and electoral concerns shape sovereign default incentives and the design of fiscal policy. My paper builds on Cuadra and Sapriza (2008) and Hatchondo et al. (2009) who explore the role of electoral uncertainty in quantitative models of sovereign debt and default in which different types of policymakers exogenously alternate in power. Cuadra and Sapriza (2008) highlight that electoral uncertainty generates short-sighted governments who are more inclined to borrow and to default. Hatchondo et al. (2009) consider a patient and an impatient policymaker and argue that in a politically stable economy the patient policymaker chooses debt levels that would lead an impatient policymaker to default. In contrast, if the probability of political turnover is high, political instability induces the patient policymaker to borrow less as her bond price reflects the probability that the impatient policymaker gains power who is more likely to default. The mechanisms highlighted by Cuadra and Sapriza (2008) and Hatchondo et al. (2009) are also present in my model and I refer to them as the impatience channel and the credit costs channel. In my model, however, these channels are endogenously generated by the interaction between political preferences and the popularity channel. Whereas in Cuadra and Sapriza (2008) and Hatchondo et al. (2009) both parties face the same exogenous probability of political turnover, the contribution of my paper is to derive party-specific election probabilities and political instability as the endogenous outcome of the electoral process.

With its focus on electoral outcomes, the paper is related to Scholl (2017), Chatterjee and Eyigungor (2019), Prein and Scholl (2021), and Cotoc et al. (2022) who allow for endogenous election probabilities in quantitative models of sovereign debt and default.[2] Specifically, I model political turnover as the outcome of probabilistic voting as in Scholl (2017) who builds on the political economy literature on public debt, e.g., Persson and Svensson (1989), Alesina and Tabellini (1990), and Aghion and Bolton (1990). In Scholl (2017), households are identical with respect to their income and the left-wing party has a larger preference for unproductive spending than the right-wing party. As a result, the left-wing government is more likely to default and faces larger sovereign spreads generating an electoral

[2]Novelli (2021) and Azzimonti and Mitra (2022) analyze the role of political constraints in the form of legislative bargaining in models of external debt. Dixit and Londregan (2000) studies the political aspects of governments' incentives to repay debt.

disadvantage. Cotoc et al. (2022) assume that the incumbent's re-election probability is an increasing function in government spending. They estimate left-wing and right-wing election probabilities using macroeconomic and political data and show that economies in which left-wing governments are more frequently elected face worse borrowing conditions due to higher sovereign default risk. My paper comes to similar conclusions as the aforementioned papers but contributes by exploring the endogenous interaction between income inequality, electoral outcomes, and sovereign default risk. To the best of my knowledge, only Andreasen et al. (2019) and Hermann and Scholl (2022) link inequality and political aspects in quantitative models of sovereign default. They assume that fiscal policy requires the support of the majority of households and find that larger inequality tightens the political constraint and raises sovereign default risk. These papers abstract from the distortionary impact of taxation on labor supply and do not allow for political turnover; both aspects are the focus of this paper.

The rest of the paper is organized as follows. Section 2 lays out the model. Section 3 discusses the calibration and presents the quantitative findings. Section 4 summarizes the main predictions of the model and discusses to what extent they are supported by empirical evidence. Finally, Section 5 concludes.

2 The Model

I consider a small open economy that is inhabited by infinitely-lived agents who differ in their labor productivity and cannot insure against unemployment and income risks. The government provides unemployment benefits, raises a non-linear income tax, and issues external debt. International financial markets are incomplete and debt contracts are limited enforceable. Risk-neutral foreign creditors provide credit to the government taking into account the risk of a sovereign default. The political system is characterized by two parties, which differ in their preferences for redistribution. When making fiscal policy choices, the incumbent takes into account her re-election probability, which is endogenously determined in the electoral process. Building on the probabilistic voting approach, the individual voting behavior is described by the economic benefits from the incumbent's and opponent's policies as well as stochastic idiosyncratic ideological aspects.

2.1 Environment

The infinite-horizon small open economy is inhabited by heterogeneous agents who have a common rate of time preference $\beta \in (0,1)$ but differ with respect to their labor productivity. There are $i = 1, ..., N$ income groups of size $\mu_i > 0$, $\sum_i \mu_i = 1$. In each income group i there

is a continuum of agents with idiosyncratic productivity x_i drawn i.i.d. from a distribution X_i. Let ε_i denote the average idiosyncratic productivity of income group i. In addition, as in Scholl (2017), individuals differ in stochastic idiosyncratic ideological aspects that are unrelated to economic policy and affect preferences additively.[3]

The per-period utility of an agent in income group i, net of ideological aspects, is given by $u(c_i, n_i)$, where consumption c_i produces utility and labor n_i generates disutility. Agents do not have access to financial markets and cannot insure against their income risk. Following Gomes et al. (2001), at the beginning of each period, an agent in income group i receives a job opportunity specifying her income y_i:

$$y_i = z x_i n_i. \tag{1}$$

z is an aggregate productivity shock with a transition probability $f(z', z)$. If the agent takes the job opportunity, she is employed and pays a non-linear tax $T(y_i)$ on her income:

$$c_i = y_i - T(y_i) = \lambda y_i^{1-\tau}. \tag{2}$$

The income tax $T(y_i)$ is defined as in Heathcote et al. (2017). The parameter τ specifies the degree of progressivity of the tax schedule whereas the parameter λ determines the average tax level. If $\tau = 1$, the tax system is characterized by full redistribution and all agents receive λ. If $\tau = 0$, agents have to pay a proportional income tax of $(1 - \lambda)$.

If the agent refuses the job opportunity, she is unemployed and receives an unemployment benefit $s \geq 0$, which is assumed to be exogenous. When deciding about the job opportunity, the agent compares her utility of being employed versus unemployed. Let $\overline{x}_i$ denote the threshold value for employment such that an agent in income group i accepts the job opportunity whenever her idiosyncratic productivity x_i is at least as large as $\overline{x}_i$.

The economy is characterized by a two-party system. The parties $j = R, L$ differ with respect to the welfare weights on income groups $i = 1, ..., N$. Let $\alpha_{i,j} > 0$ denote the welfare weight of party j on income group i. Party L (left-wing) is assumed to care more about equity than party R (right-wing).

The party in office chooses the degree of progressivity τ and the level λ of the tax scheme. Moreover, 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 $q_j(b', z)$ denote the bond price if party j is in office. International debt contracts are not enforceable and the government can choose to default. After a default, the country is in financial autarky and re-gains access to international financial markets with an exogenous probability

[3] I follow the probabilistic voting approach, see, e.g., Persson and Tabellini (2000).

θ. In financial autarky, the economy is hit by direct output costs, $h(z) \leq z$, as in Arellano (2008). International debt contracts are offered by risk-neutral foreign creditors who borrow at the risk-free rate r^f. They have perfect information about aggregate productivity and the distribution of idiosyncratic productivity and the ideological bias.

If the economy is in a good credit standing, the government budget constraint reads as:

$$\sum_i \mu_i \Big[\int^{\overline{x}_i} s \, dX_i(x_i) - \int_{\overline{x}_i} T(z x_i n_i) \, dX_i(x_i) \Big] = b - q_j(b', z) b'. \tag{3}$$

The left-hand side of the budget constraint displays the difference between expenditures related to the provision of unemployment benefits and revenues from the income tax. The right-hand side reflects the repayment of debt $b < 0$ and the issuance of new debt $b' < 0$ at price $q_j(b', z)$.

If the economy is in a bad credit standing, the government budget constraint is given by:

$$\sum_i \mu_i \Big[\int^{\overline{x}_i} s \, dX_i(x_i) - \int_{\overline{x}_i} T(z x_i n_i) \, dX_i(x_i) \Big] = 0. \tag{4}$$

In financial autarky, the government needs to balance expenditures and revenues.

The timing is as follows. At the beginning of each period the incumbent government observes aggregate productivity and the distribution of idiosyncratic productivity and chooses tax and debt policies. With an exogenous probability $(1 - \kappa) \in (0, 1)$ an election takes place at the end of the period and the idiosyncratic ideological shocks realize.[4] In the electoral process, an agent in income group i votes for the incumbent j if the expected economic benefit of having the incumbent j rather than the opponent $-j$ in power next period exceeds the ideological bias.

2.2 Recursive Equilibrium

2.2.1 Private Sector

An agent in income group i takes the job opportunity if her utility of being employed is larger than her utility of being unemployed. If the agent is employed, the agent's choices c_i and n_i are determined by the optimality condition

$$-\frac{u_{n_i}}{u_{c_i}} = (1 - \tau) \lambda (z x_i n_i)^{-\tau} z x_i, \tag{5}$$

together with the agent's budget constraint (2).

[4] This assumption follows Scholl (2017) and Cotoc et al. (2022).

If the agent is unemployed, her income is given by the unemployment benefit: $c_i = s$, and $n_i = 0$. The threshold value for employment $\overline{x}_i$ solves:

$$u(c_i(z, \overline{x}_i, \lambda, \tau), n_i(z, \overline{x}_i, \lambda, \tau) = u(s, 0). \tag{6}$$

In the following we refer to income group i's threshold value as $\mathcal{X}_i(z, \lambda, \tau)$ to highlight the dependency of the unemployment rate on the government's tax policy and aggregate productivity.

2.2.2 Public Sector

Conditional on being in a good credit standing, the incumbent government $j = R, L$ solves:

$$V_j(b, z) = \max \left\{ V_j^r(b, z), V_j^d(z) \right\}, \tag{7}$$

where $V_j^r(b, z)$ denotes the value function if incumbent j repays the outstanding debt b. $V_j^d(z)$ refers to the value function if incumbent j defaults.

The value function associated with debt repayment is defined as:

$$\begin{aligned} V_j^r(b, z) = \quad & \max_{\tau, \lambda, b'} \Big\{ \sum_i \alpha_{i,j} \Big[\int_{\mathcal{X}_i(z,\lambda,\tau)} u(c_i, n_i)\, dX_i(x_i) + \int^{\mathcal{X}_i(z,\lambda,\tau)} u(s, 0)\, dX_i(x_i) \Big] \\ & + \beta\kappa \int V_j(b', z') f(z', z) dz' \\ & + \beta(1-\kappa) \Big[P_j(b', z) \int V_j(b', z') f(z', z) dz' \\ & + (1 - P_j(b', z)) \int \overline{V}_j(b', z') f(z', z) dz' \Big] \Big\} \\ & \text{subject to} \\ & (1),\ (2),\ (3),\ (5),\ (6). \end{aligned} \tag{8}$$

Let $\tau_j(b, z)$, $\lambda_j(b, z)$, and $b'_j(b, z)$ denote the associated policy functions of incumbent j. $P_j(b', z) \in (0, 1)$ denotes the re-election probability of incumbent j in case an election takes place and will be derived in the next subsection. $\overline{V}_j(b', z')$ refers to incumbent j's value if the opponent comes into power and is defined later in the text. In equation (8), the probability of losing power $(1 - \kappa)P_j(b', z)$ reduces the discount factor and generates short-sighted governments who are more inclined to borrow today and to reduce resources for the future government. In the following, I refer to this mechanism as the *impatience channel*.

In case of a default, the government is punished by a temporary exclusion from interna-

tional financial markets. The value function of incumbent j is given as:

$$
\begin{aligned}
V_j^d(z) = \quad & \max_{\tau,\lambda} \Big\{ \sum_i \alpha_{i,j} \Big[\int_{\mathcal{X}_i(z,\lambda,\tau)} u(c_i, n_i)\, dX_i(x_i) + \int^{\mathcal{X}_i(z,\lambda,\tau)} u(s,0)\, dX_i(x_i) \Big] \\
& + \beta\kappa \Big(\theta \int V_j(0,z')\, f(z',z) dz' + (1-\theta) \int V_j^d(z')\, f(z',z) dz' \Big) \\
& + \beta(1-\kappa) \Big[P_j^d(z) \Big(\theta \int V_j(0,z')\, f(z',z) dz' + (1-\theta) \int V_j^d(z')\, f(z',z) dz' \Big) \\
& + (1-P_j^d(z)) \Big(\theta \int \overline{V}_j(0,z') f(z',z) dz' + (1-\theta) \int \overline{V}_j^d(z') f(z',z) dz' \Big) \Big] \Big\} \qquad (9) \\
& \text{subject to} \\
& (1),\ (2),\ (4),\ (5),\ (6),\ \text{and } z = h(z).
\end{aligned}
$$

Let $\tau_j^d(z)$ and $\lambda_j^d(z)$ denote the associated policy functions of incumbent j in default. With probability $\theta \in (0,1)$ the economy regains access to international financial markets. $P_j^d(z)$ refers to the re-election probability of the incumbent in default if an election takes place. $\overline{V}_j^d(z')$ refers to the incumbent's value if the opponent comes into power and the economy remains in financial autarky.

The government chooses to default if the value of default is larger than the value of repaying debt. Incumbent j's default policy is given by:

$$
d_j(b,z) = \begin{cases} 1 & \text{if } V_j^r(b,z) < V_j^d(z) \\ 0 & \text{else.} \end{cases} \qquad (10)
$$

The associated default set is defined as:

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

such that incumbent j's default probability of party j can be calculated as

$$
\zeta_j(b',z) = \int_{\mathbb{D}_j(b')} f(z',z) dz'. \qquad (11)
$$

If the opponent $-j$ is in power and makes her optimal policy choices, party j's value is given by:

$$
\overline{V}_j(b,z) = \begin{cases} \overline{V}_j^r(b,z) & \text{if } d_{-j}(b,z) = 0 \\ \overline{V}_j^d(z) & \text{if } d_{-j}(b,z) = 1. \end{cases} \qquad (12)
$$

$\overline{V}_j^r(b', z')$ is defined as:

$$\begin{aligned}\overline{V}_j^r(b,z) = &\sum_i \alpha_{i,j}\Big[\int_{\mathcal{X}_i(z,\lambda_{-j},\tau_{-j})} u(c_{i,-j}(b,z,x_i), n_{i,-j}(b,z,x_i))\; dX_i(x_i) \\ &+ \int^{\mathcal{X}_i(z,\lambda_{-j},\tau_{-j})} u(s,0)\; dX_i(x_i)\Big] \\ &+ \beta\kappa \int \overline{V}_j(b'_{-j}(b,z), z') f(z', z) dz' \\ &+ \beta(1-\kappa)\Big[P_{-j}(b'_{-j}(b,z), z) \int \overline{V}_j(b'_{-j}(b,z), z') f(z', z) dz' \\ &+ (1 - P_{-j}(b'_{-j}(b,z), z)) \int V_j(b'_{-j}(b,z), z') f(z', z) dz'\Big], \end{aligned} \tag{13}$$

where $c_{i,-j}(b,z,x_i)$ and $n_{i,-j}(b,z,x_i)$ denote optimal consumption and labor of an individual in group i if opponent $-j$ is in power and implements $\tau_{-j}(b,z)$, $\lambda_{-j}(b,z)$, and $b'_{-j}(b,z)$.

In default, party j's value of having opponent $-j$ in power is defined as:

$$\begin{aligned}\overline{V}_j^d(z) = &\sum_i \alpha_{i,j}\Big[\int_{\mathcal{X}_i(h(z),\lambda^d_{-j},\tau^d_{-j})} u(c^d_{i,-j}(z,x_i), c^d_{i,-j}(z,x_i))\; dX_i(x_i) \\ &+ \int^{\mathcal{X}_i(h(z),\lambda^d_{-j},\tau^d_{-j})} u(s,0)\; dX_i(x_i)\Big] \\ &+ \beta\kappa\Big(\theta\int \overline{V}_j(0,z')\; f(z',z)dz' + (1-\theta)\int \overline{V}^d_j(z')\; f(z',z)dz'\Big) \\ &+ \beta(1-\kappa)\Big[P^d_{-j}(0,z)\Big(\theta\int \overline{V}_j(0,z')\; f(z',z)dz' + (1-\theta)\int \overline{V}^d_j(z')\; f(z',z)dz'\Big) \\ &+ (1-P^d_{-j}(0,z))\Big(\theta\int \overline{V}_j(0,z') f(z',z)dz' + (1-\theta)\int \overline{V}^d_j(z') f(z',z)dz'\Big)\Big]. \end{aligned} \tag{14}$$

$c^d_{i,-j}(z,x_i)$ and $n^d_{i,-j}(z,x_i)$ denote optimal consumption and labor of an individual in group i if opponent $-j$ is in power and implements $\tau^d_{-j}(z)$, $\lambda^d_{-j}(z)$.

2.2.3 Electoral Outcomes

As in Scholl (2017), an agent in income group i votes for party L if the expected economic benefit of having party L rather than party R in power next period is larger than her idiosyncratic ideological bias. To evaluate the economic benefit, the agent forms expectations regarding future policies using the parties' policy functions $\tau_j(b,z)$, $\lambda_j(b,z)$, $b'_j(b,z)$, $d_j(b,z)$, $\tau^d_j(z)$, and $\lambda^d_j(z)$, $j = R, L$, given b' and z. To ensure that the size of the ideological shocks are comparable across income groups, group i's expected economic benefit and the ideological aspects are normalized and expressed relative to the expected continuation value of having

party R in power.

Conditional on a good sovereign credit standing and given b' and z, the agent's expected economic benefit of party L over party R in power is defined as:

$$B_{i,L}(b',z) \equiv \frac{\int W_{i,L}(b',z')f(z',z)dz' - \int W_{i,R}(b',z')f(z',z)dz'}{\int W_{i,R}(b',z')f(z',z)dz'} \tag{15}$$

with

$$\begin{aligned} W_{i,j}(b,z) = &\int_{\mathcal{X}_i(z,\lambda_j,\tau_j)} u(c_{i,j}(b,z,x_i), n_{i,j}(b,z,x_i))\; dX_i(x_i) + \int^{\mathcal{X}_{i,j}(z,\lambda_j,\tau_j)} u(s,0)\; dX_i(x_i) \\ &+ \beta\kappa \int W_{i,j}(b'_j(b,z),z')f(z',z)dz' \\ &+ \beta(1-\kappa)\Big[\Big(P_j(b'_j(b,z),z)\int W_{i,j}(b'_j(b,z),z')f(z',z)dz' \\ &+ (1-P_j(b'_j(b,z),z))\int W_{i,-j}(b'_j(b,z),z')f(z',z)dz'\Big)\Big], \quad j=R,L. \end{aligned} \tag{16}$$

$-j$ denotes the opponent. $c_{i,j}(b,z,x_i)$ and $n_{i,j}(b,z,x_i)$ denote optimal consumption and labor of an individual in group i if party j is in power and implements $\tau_j(b,z)$, $\lambda_j(b,z)$, and $b'_j(b,z)$. Note that the agent in group i forms expectations regarding the realization of idiosyncratic productivity in equation (16) and regarding the realization of aggregate productivity in equation (15).

An agent in income group i votes for party L if

$$B_{i,L}(b',z) \geq \delta_i + \omega.$$

δ_i denotes the idiosyncratic ideological bias of an individual in group i towards party R and is uniformly distributed on the interval $[-\frac{1}{2\phi_i}, \frac{1}{2\phi_i}]$. ω refers to the general popularity of party R and is uniformly distributed on the interval $[-\frac{1}{2\Omega}, \frac{1}{2\Omega}]$. δ_i and ω are assumed to be uncorrelated over time.

Party L's vote share in income group i can be calculated as:

$$\begin{aligned} \pi_{i,L} &= \text{prob}\Big(\delta_i < B_{i,L}(b',z) - \omega\Big) \\ &= \frac{1}{2} + \phi_i\Big(B_{i,L}(b',z) - \omega\Big). \end{aligned}$$

The overall vote share for party L is the sum over all income groups:

$$e_L(b',z) = \sum_{i=1} \mu_i \pi_{i,L} = \sum_{i=1} \mu_i \Big[\frac{1}{2} + \phi_i \Big(B_{i,L}(b',z) - \omega\Big)\Big].$$

Party L needs more than 50 percent of the votes in the population to get elected, $e_L(b',z) > \frac{1}{2}$:

$$\begin{aligned} P_L(b',z) &= \text{prob}\left(\omega < \frac{\sum_i \mu_i B_{i,L}(b',z)}{\sum_i \mu_i \phi_i}\right) \\ &= \frac{1}{2} + \Omega\left(\frac{\sum_i \mu_i \phi_i B_{i,L}(b',z)}{\sum_i \mu_i \phi_i}\right). \end{aligned} \tag{17}$$

The election probability of party R equals $(1 - P_L(b',z))$. Equation (17) shows that with her borrowing choice $b'_j(b,z)$ and the implied tax scheme $(\tau_j(b,z), \lambda_j(b,z))$ incumbent j affects her re-election probability via the expected economic benefits of the individuals in the different income groups. In the following, I refer to this mechanism as the *popularity channel*. Clearly, electoral outcomes depend on the densities ϕ_i and Ω. If agents in income group i are more ideological (lower ϕ_i), the less important are their economic benefits for their voting decisions. In addition, the larger the popularity shocks (lower Ω), the smaller the impact of economic aspects on electoral outcomes. If voting decisions are purely driven by ideological aspects, the election probability of each party equals 50 percent.

In default, the election probability depends on aggregate productivity only, $P_L^d(z)$, and is determined by equation (17) in which the economic benefit of party L over party R is replaced by the corresponding value in default, $B_{i,L}^d(z)$.

2.2.4 Foreign Creditors

Foreign creditors are risk-neutral and perfectly informed about the distribution of aggregate and idiosyncratic productivity and the ideological shocks. The expected-zero-profit condition implies:

$$q_j(b',z) = \kappa\Big(\frac{1-\zeta_j(b',z)}{1+r^f}\Big) + (1-\kappa)\Big[P_j(b',z)\Big(\frac{1-\zeta_j(b',z)}{1+r^f}\Big) + (1-P_j(b',z))\Big(\frac{1-\zeta_{-j}(b',z)}{1+r^f}\Big)\Big]. \tag{18}$$

The bond price equation (18) reflects the risk of default associated with incumbent j, $\zeta_j(b',z)$, defined in equation (11), as well as the probability $(1-P_j(b',z))$ that the opponent $-j$ comes into power making the default decision next period, defined in equation (17). The impact of the opponent's default risk on the current credit cost shapes the incumbent's debt policy.

In the following, I refer to this mechanism as the *credit cost channel*.

The formal definition of the recursive equilibrium is provided in the Appendix.

3 Quantitative Analysis

3.1 Calibration and Model Fit

To facilitate comparisons with the previous literature, I apply the model to Argentina and calibrate the parameters to replicate the distribution of income and consumption and the unemployment rate, among other targets. One period in the model corresponds to one year. Annual data on real GDP, real private consumption, the unemployment rate, and the income shares by quintiles are taken from the World Development Indicators. The series for output and unemployment start in 1980, for private consumption in 1987, and for the income shares in 1991. The interest rate is the JP Morgan Emerging Markets Bond Index (EMBI Global) for Argentina and begins in 1994.

In the following, I specify the functional forms and describe the calibration targets. For the statistics I follow the literature and consider data prior to the default event. Table 1 provides an overview of the parameter choices.

The annual world risk-free interest rate r_f is set to 4 percent. The utility function takes the GHH-form as suggested by Greenwood et al. (1988):

$$u(c,n) = \frac{\left(c - \frac{n^{1+1/\psi}}{1+1/\psi}\right)^{1-\gamma}}{1-\gamma},$$

where $\gamma > 0$ refers to the parameter of relative risk aversion and ψ denotes the labor elasticity. The parameter of relative risk aversion takes the standard value of 2. In the benchmark calibration, the labor elasticity ψ is set to the value of 2, which is commonly used in the macroeconomic literature, see, e.g., Cuadra et al. (2010) and Arellano and Bai (2017). I provide a detailed discussion of ψ in Section 3.5 because the labor elasticity affects the degree of distortions generated by income taxation and, therefore, the optimal tax progressivity and electoral outcomes.

Aggregate productivity is described by an AR(1) process:

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

with υ is $\overset{i.i.d.}{\sim} N(0, \sigma_\upsilon^2)$. The autocorrelation ρ_z is set to 0.74, which corresponds to the estimated value based on linearly detrended real GDP in Argentina between 1980 and 2001.

The standard deviation is calibrated to replicate the empirical volatility of real GDP.

I consider the quintiles of the income distribution such that $\mu_i = 0.20$. Idiosyncratic productivity in group i is assumed to be normally distributed, $x_i \overset{i.i.d.}{\sim} N(\varepsilon_i, \sigma_{x_i})$. ε_i denotes the average idiosyncratic productivity in income group i and the standard deviation is given by σ_{x_i}. ε_i is set to match the share of pre-tax income held by income group i. σ_{x_i} is calibrated to match the volatility of the unemployment rate. The unemployment benefit s is chosen as to replicate the average unemployment rate in Argentina between 1980 and 2001.

The most important parameters are those related to the political preferences of the two parties and the electoral process. The preference weight imposed by party j on income group i's utility is specified as a function of income group i's average idiosyncratic productivity ε_i:[5]

$$\alpha_{ij} = \frac{\varepsilon_i^{\alpha_j}}{\sum_i \varepsilon_i^{\alpha_j}}, \qquad j = R, L.$$

I assume that $\alpha_R > \alpha_L$ so that party R has a lower preference for redistribution than party L. α_R and α_L are calibrated to match the empirical distribution of consumption. I employ the consumption shares by quintiles reported by Andreasen et al. (2019) on the basis of the 1996 wave of the National Survey of Household Consumption. For the benchmark labor elasticity $\psi = 2$, the resulting values for α_R and α_L imply that party L's welfare weights on the first three income groups are larger than those of party R, $\alpha_{iL} > \alpha_{iR}$, for $i = 1, 2, 3$, and $\alpha_{iL} < \alpha_{iR}$, for $i = 4, 5$.

To abstract from differences in group-specific ideologies I assume that ϕ_i takes the same value for all income groups. The size of the general popularity shock Ω determines the importance of economic benefits in the individual voting decisions. If $\Omega = 0$, the electoral outcome is completely determined by popularity shocks such that the election probability of each party amounts to 50 percent. In the benchmark calibration, Ω is chosen to replicate party L's share of being in office between 1984 and 2001, which is calculated from the Database of Political Institutions 2020, Cruz et al. (2021).[6] κ is set to 0.75 so that on average elections take place every four years. To understand the policy choices of incumbent governments, I also consider $\kappa = 0$ such that elections occur every period and $\kappa = 1$ such that electoral uncertainty is eliminated.

If the government defaults, the economy enters financial autarky. I assume that with a probability $\theta = 0.25$ the economy is allowed to re-enter international financial markets after

[5]The specification is similar to the one used by Deng (2021).

[6]This data base classifies the parties as right-wing, left-wing, or center. I group center and left-wing as L and right-wing as R. In Argentina, a political turnover from L to R took place in 1990. The right-wing government remained in office until a left-wing government took over in 2001 who stayed in office for only two years. Overall, between 1984 and 2001, a left-wing (right-wing) party was in power for 8 (10) years.

a default. The average exclusion duration of four years is in line with the empirical evidence documented in Gelos et al. (2011). In financial autarky, the economy is hit by direct output cots as in Arellano (2008):

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

with $\eta \in (0, 1)$. The direct output costs η and the rate of time preference β are calibrated to match an annual default probability of 3 percent and the volatility of consumption in non-default episodes.

Table 2 evaluates the model fit based on simulated time series of non-default episodes. Overall, the model provides a good description of the Argentine data. In particular, the model replicates the empirical distribution of income and consumption as well as the average unemployment rate. The volatility of real GDP and the volatility of consumption are well matched. The sovereign spread is underestimated because an annual default probability of 3 percent is targeted. Moreover, as is common for this type of model, the volatility of the spread is understated.

Table 1. Calibration

		Benchmark $\psi = 2$	Low Elasticity $\psi = 1.5$	Source/Target
Risk free rate	r_f	0.04	0.04	standard value
Risk aversion	γ	2	2	standard value
Time preference	β	0.8	0.8	volatility of consumption
Population	μ_i	0.20	0.20	income quintiles
Idio. productivity	ε_i	$[0.6; 1.1; 1.45; 1.85; 2.9]$	$[0.53; 1.045; 1.35; 1.8; 3.05]$	income shares by quintile
	σ_x	0.30	0.30	volatility of unemployment
Preference weight	α_R	1.3	1.9	consumption shares by quintile
	α_L	0.7	1.3	
Unemployment benefit	s	0.50	0.43	unemployment rate
Re-entry probability	θ	0.25	0.25	Gelos et al. (2011)
Default penalty	η	0.97	0.96	annual default probability of 3 %
Agg. productivity	ρ_z	0.74	0.74	persistence
	σ_υ	0.012	0.015	volatility of real GDP
Popularity	Ω	10	10	share of party L in office

3.2 Political Preferences and Sovereign Default Risk

In a first step, I focus on how political preferences affect tax policies and default incentives. To this end, I assume that no elections take place, $\kappa = 1.0$, such that the incumbent government faces no electoral uncertainty and remains in office forever.[7] Figure 2 displays the policy functions associated with incumbent R and incumbent L.

Let us first analyze the choices of incumbent R (dashed lines). The upper right panel of Figure 2 plots the bond price $q_R(b', z)$. For low levels of borrowing, the bond price is equal to the inverse of the risk-free rate since there is no risk of a sovereign default (shown in the upper left panel). As the government issues more debt, the bond price falls, reflecting the rising likelihood of a default in the next period. Foreign creditors account for the higher default probability and demand a larger sovereign premium. The borrowing function $b'_R(b, z)$ shows that the bond price endogenously restricts the government's borrowing choice. The tax policy reflects the pattern of the bond price and highlights the following tradeoff. On the one hand, the policymaker prefers to finance redistributive spending via debt to avoid the distortionary effects of income taxation. On the other hand, the accumulation of debt fosters default incentives, and increases the interest rate. Larger credit costs force the government to lower λ_R such that the level of the tax increases. Moreover, the progressivity τ_R falls, i.e., the policymaker can afford less redistribution.[8] The lower progressivity decreases the agents' incentives to work particularly among the poor such that unemployment increases, which dampens aggregate production. At the same time, public expenditures related to the provision of unemployment benefits increase. Lower production and higher spending endogenously reinforce default incentives. After a default, the government is able to reduce the tax burden and to raise redistribution because outstanding debt obligations are not repaid.

Let us now turn to the optimal policy choices of incumbent L who imposes larger weights on the welfare of agents in the low and middle-income groups than R. There are three mechanisms through which a higher preference for redistribution affects sovereign default incentives. First, the more progressive income tax distorts the individual labor supply and lowers aggregate production. The loss in efficiency makes a given level of debt less sustainable and raises the probability of a sovereign default. Second, defaulting on all outstanding debt obligations allows the government to reduce the tax burden and to provide more redistribution. The increase in net income is particularly beneficial for poor agents such that

[7] The resulting theoretical framework is similar to the ones studied by Ferriere (2015) and Deng (2021) who, however, do not allow for unemployment risk.

[8] In a related paper, Cuadra et al. (2010) show that the dynamics of the sovereign spread generates procyclical fiscal policy, in line with empirical evidence provided by Talvi and Vegh (2005) and Ilzetzki and Vegh (2008).

Table 2. Model Fit

	Data	Benchmark	$s = 0$	Low Elasticity	
	(1)	(2)	(3)	(4)	(5)
mean (unemployment)	12.61	12.59	0.00	10.51	12.91
mean(spread)	5.17	3.16	3.34	3.19	3.05
share of L in office	44.44	43.01	43.57	43.21	52.44
mean election probability	49.91	50.94	50.81	50.88	50.19
mean income share of					
lowest 20 %	3.92	3.80	3.53	3.79	3.75
second 20 %	8.48	8.17	8.16	8.65	8.23
third 20 %	13.37	13.64	13.92	13.23	12.74
fourth 20 %	21.23	21.87	22.29	21.55	21.19
highest 20 %	53.02	52.52	53.10	52.77	53.08
Gini, income	44.61	44.45	45.10	44.33	45.44
mean consumption share of					
lowest 20 %	7.60	7.77	4.86	8.45	8.00
second 20 %	11.40	11.09	11.31	12.01	11.16
third 20 %	17.10	15.95	16.63	15.99	15.22
fourth 20 %	23.30	22.49	23.37	22.31	22.02
highest 20 %	43.52	43.32	43.83	41.25	43.60
Gini, consumption	32.84	32.48	36.00	30.37	32.82
std(y)	7.05	7.01	5.71	7.37	6.64
std(c)/std(y)	1.03	1.06	1.01	1.03	1.04
std(unemployment)/std(y)	0.33	0.16	0.00	0.22	0.23
std(spread)	4.44	1.98	2.27	2.13	2.14

Notes: Annual data on real GDP, real private consumption, the unemployment rate, and the income shares by quintiles are taken from the World Development Indicators. The series for output and unemployment start in 1980, for private consumption in 1987, and for income shares in 1991. The interest rate is the JP Morgan Emerging Markets Bond Index (EMBI Global) for Argentina and begins in 1994. The average election probability and party L's share of being in office between 1984 and 2001 is calculated from the Database of Political Institutions 2020, Cruz et al. (2021). This database classifies the parties as being right-wing, left-wing, or center. I group center and left-wing as L and right-wing as R. Between 1984 and 2001, a left-wing (right-wing) party was in power for 8 (10) years. The Gini of market income is derived from the SWIID, Solt (2020), 1980-2001. Consumption shares by quintiles and the Gini of consumption are taken from Andreasen et al. (2019) and refer to the 1996 wave of the National Survey of Household Consumption. I simulate the model for 300,000 periods and select non-default episodes with a minimum length of 20 years. Statistics refer to mean values. The benchmark shown in column (2) assumes $\psi = 2$ and the calibration given in Table 1. Column (3) assumes $s = 0$ keeping all other parameters as in the benchmark. Column (5) assumes $\psi = 1.5$ and the associated re-calibration shown in Table 1. Column (4) keeps all parameters as in (5) but assumes $\alpha_R = 1.3$ and $\alpha_L = 0.7$.

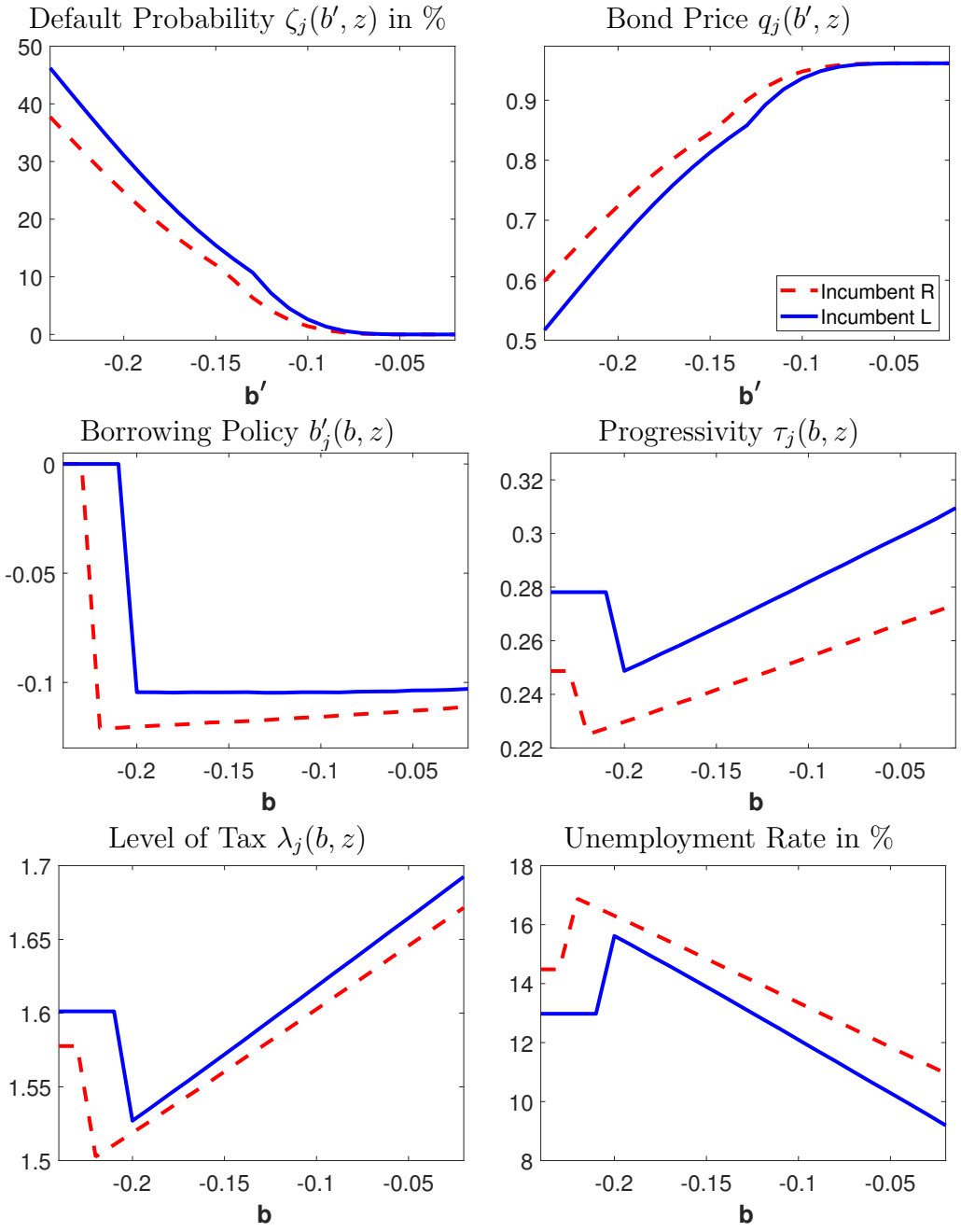

Figure 2. Policy Functions: No Elections, $\kappa = 1$; *The figure shows the policy functions associated with incumbent R (dashed lines) and incumbent L (solid lines) in the absence of electoral uncertainty. The figure assumes that aggregate productivity is* 2.12 *percent below its trend.*

incumbent L who imposes larger welfare weights on low-income groups has greater incentives to default than R. These two mechanisms are counteracted by the third mechanism: After a default, the government loses access to international financial markets and cannot borrow to provide insurance against income shocks. Financial autarky hurts poor agents relatively more than rich agents making a default more costly for incumbent L. The upper left panel of Figure 2 displays the parties' default probabilities and reveals that the first two mechanisms quantitatively dominate the third one: For a given level of debt, incumbent L is more likely to default than R. The larger default risk is reflected in a lower bond price $q_L(b', z)$. In turn, the higher sovereign premium endogenously imposes a tighter borrowing-constraint on incumbent L such that for growing debt it has to reduce progressivity at a faster rate than incumbent R and the difference between τ_L and τ_R decreases.[9]

3.3 Electoral Uncertainty and Sovereign Default Risk

To study how electoral uncertainty affects the incumbents' policy choices, I assume that elections take place with an exogenous probability $(1 - \kappa)$. The outcome of the electoral process is the endogenous re-election probability $P_j(b', z)$. Recall that in the model, there are three important mechanisms through which electoral uncertainty affects sovereign default incentives. *(i)* The *impatience channel*: The probability of losing power reduces the discount factor in equations (8) and (9) and generates short-sighted governments who are more inclined to borrow today and to reduce resources for the future government. *(ii)* The *credit cost channel*: The bond price given in equation (18) reflects not only the incumbent's sovereign default risk but also the probability that the opponent gains power and makes the default decision in the next period. The impact of the opponent's default risk on the current credit cost shapes the incumbent's debt policy. *(iii)* The *popularity channel*: The incumbent's tax and debt policies affect her probability of being re-elected, see equation (17). In the following, I explore how these channels interact with the parties' political preferences for redistribution and how they shape tax and debt policies.[10]

Figures 3 and 4 display electoral outcomes, sovereign default risks, and policy functions associated with incumbent L (left panels) and R (right panels) for the range of equilibrium

[9] These findings are in line with Ferriere (2015) who considers linear taxation in a model of sovereign debt and default with heterogeneous agents. She abstracts from political preferences by focusing on the social planner and argues that income inequality has ambiguous effects on sovereign default risk because households at the bottom of the income distribution benefit from the tax cut in default but suffer from the missing insurance against income shocks in financial autarky. Deng (2021) highlights the tradeoff between redistribution and sovereign spreads.

[10] Previous research has studied the first two channels in quantitative models of sovereign default in which different types of policymakers exogenously alternate in power, see, e.g., Cuadra and Sapriza (2008) and Hatchondo et al. (2009). Scholl (2017) adds endogenous political turnover but abstracts from inequality and the role of redistributive policies.

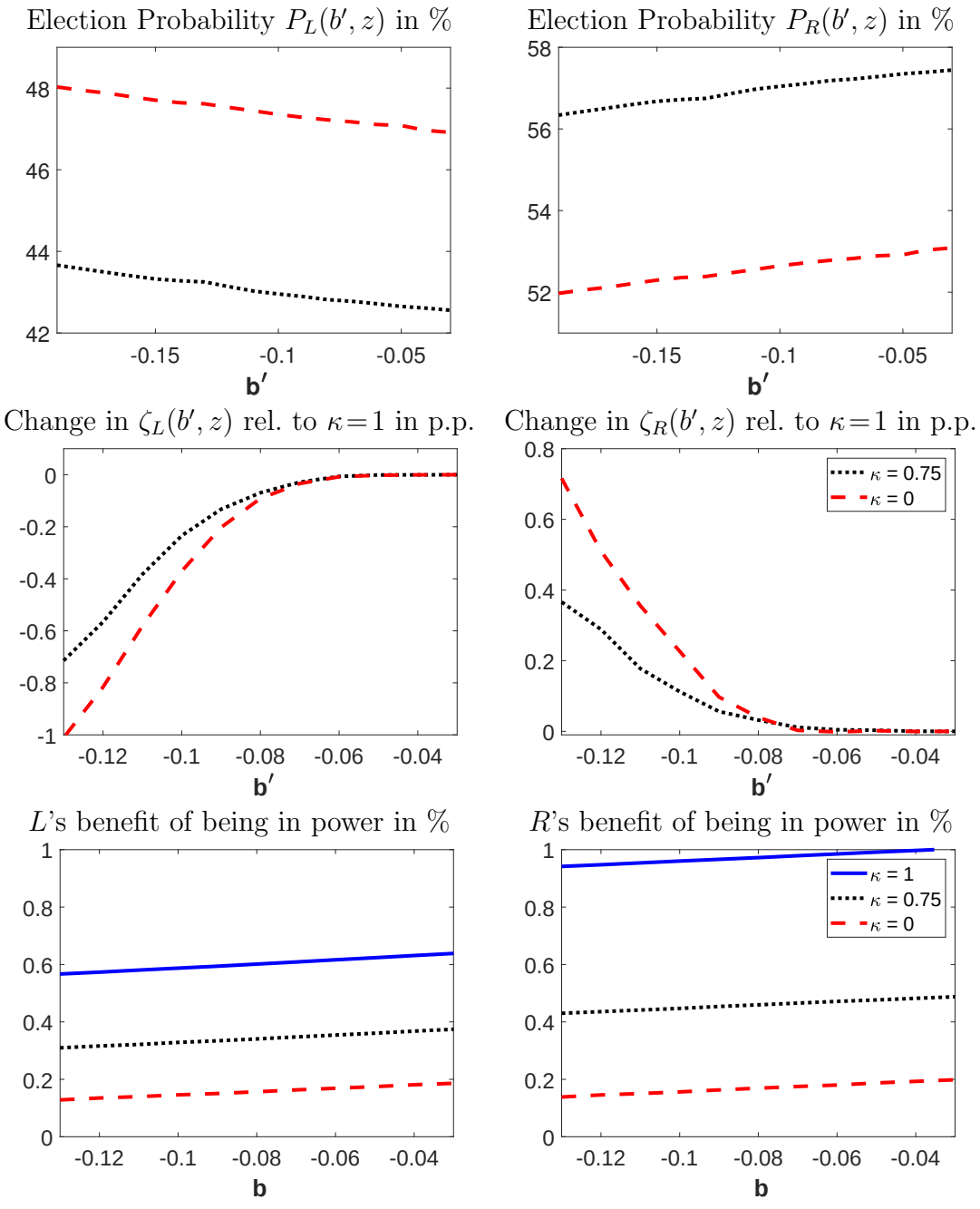

Figure 3. Electoral Outcomes and Default Risk; *The first row of the figure shows the re-election probability of incumbent L (left panel) and R (right panel). The second row displays the percentage increase in incumbent L's and R's default probability relative to the situation without electoral uncertainty* $\kappa = 1$. *The outcomes for* $\kappa = 0$ *and* $\kappa = 0.75$ *are displayed as dashed and dotted lines, respectively. The last row displays the relative benefit of incumbent L and R of being in power, which is calculated as* $(V_j(b, z) - \overline{V}_{-j}(b, z))/V_j(b, z)$. *The figure assumes that aggregate productivity is* 2.12 *percent below its trend and focuses on the range of equilibrium debt levels.*

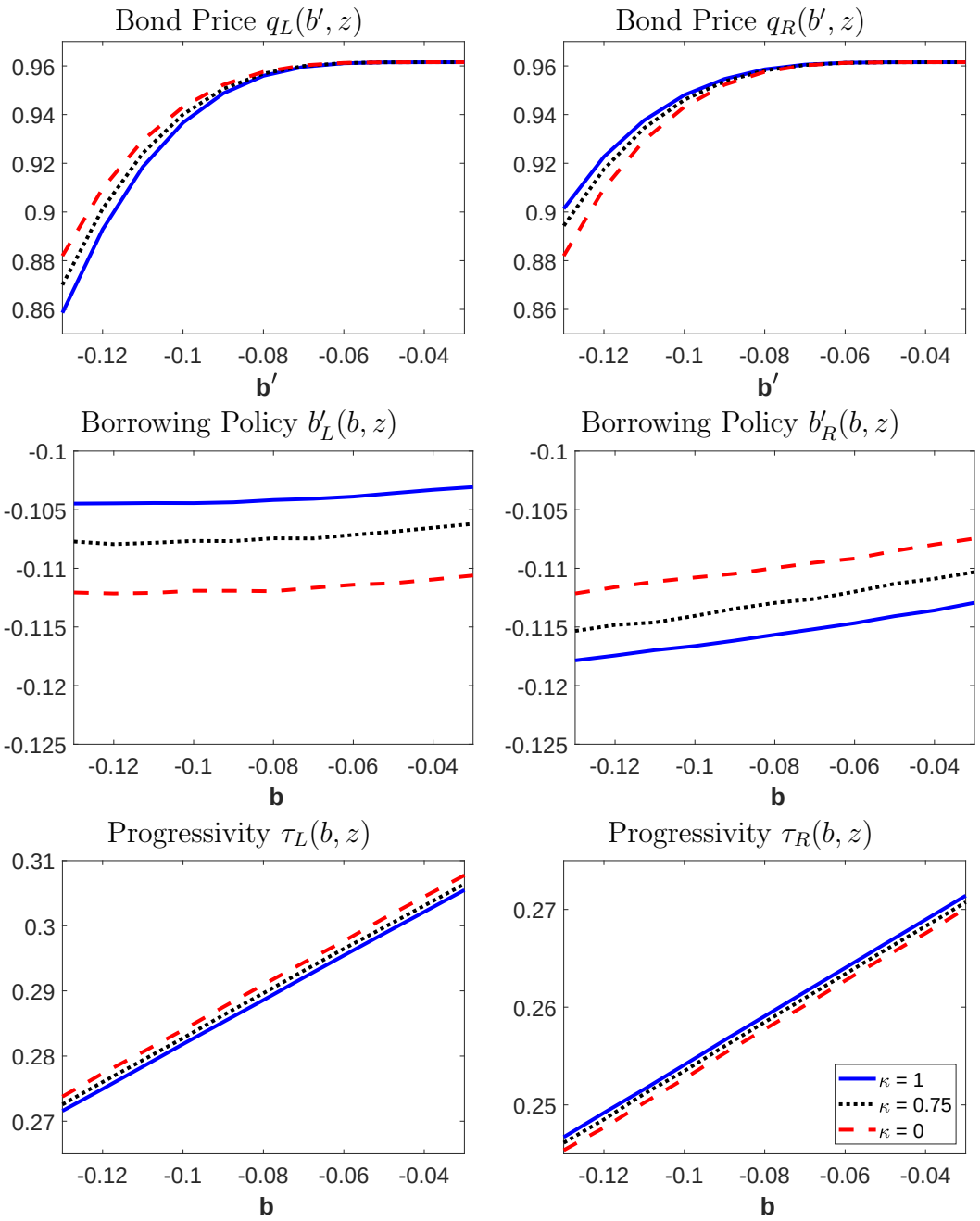

Figure 4. Policy Functions: Electoral Uncertainty; *The figure shows the policy functions associated with incumbent L (left panels) and R (right panels).* $\kappa = 0$ *and* $\kappa = 0.75$ *are displayed as dashed and dotted lines, respectively. The scenario without elections,* $\kappa = 1$*, is shown by the solid lines. The figure assumes that aggregate productivity is* 2.12 *percent below its trend and focuses on the range of equilibrium debt levels.*

debt levels. With $\kappa = 0$ (dashed lines) elections take place every year. $\kappa = 0.75$ (dotted lines) implies that the population votes every four years on average. To facilitate a comparison with the scenario in which governments do not face any electoral uncertainty, the solid lines refer to $\kappa = 1$.

Inspecting the re-election probability $P_j(b', z)$ (first row of Figure 3) reveals that for every level of b', incumbent L has a lower probability of being re-elected than incumbent R, in spite of imposing larger welfare weights on low and middle-income groups, $\alpha_{iL} > \alpha_{iR}$, for $i = 1, 2, 3$, and $\alpha_{iL} < \alpha_{iR}$, for $i = 4, 5$. The previous subsection has shown that for a given level of debt, incumbent L is more prone to default, which raises the sovereign premium and makes the issuance of new debt more costly. Together with the larger distortion implied by the more progressive left-wing income tax, not only agents in the high-income groups but also those in the middle-income group have an economic benefit of party R being in office such that R's re-election probability is larger than 50 %. Hence, the interaction between tax progressivity and credit costs shapes the popularity channel and creates an electoral advantage for party R. The lower re-election probability makes incumbent L more short-sighted than R via the impatience channel. Thereby, L's re-election probability is increasing in b' because the shrinking difference between τ_L and τ_R dampens party R's electoral advantage. Qualitatively, the mechanisms are the same with elections taking place every year, $\kappa = 0$, or on average every four years, $\kappa = 0.75$. Quantitatively, however, the re-election probability of incumbent L is substantially lower if $\kappa = 0.75$ because individuals take into account that electoral outcomes have persistent effects.

The second row of Figure 3 displays by how much electoral uncertainty changes the parties' default probabilities in p.p. For a given level of debt, the risk of a political turnover increases party R's default probability relative to $\kappa = 1$ and this effect is more pronounced if elections takes place every year and debt is higher. This finding is driven by the credit cost channel. The incumbent faces a bond price that reflects the election probability of the opponent. Since party L is characterized by a higher default risk and comes into power with positive probability, for a given b', incumbent R faces a lower bond price compared to the situation without electoral uncertainty. In turn, the higher credit costs make debt repayment more expensive and raises R's default probability relative to $\kappa = 1$. In contrast, the likelihood of a political turnover lowers the current credit costs of incumbent L and reduces L's probability to default. Note, however, that also in the presence of electoral uncertainty, the level of R's default probability is still smaller (or equal) than L's default probability.

The last row of Figure 3 compares incumbent j's value of being in power, $V_j(b, z)$, relative to having the opponent making the decisions, $\overline{V}_j(b, z)$. Both parties benefit from being in

Table 3. The Impact of Electoral Uncertainty on Sovereign Default Risk

	endogenous office		R in office			L in office		
	$\kappa=0.75$	$\kappa=0$	$\kappa=1$	$\kappa=0.75$	$\kappa=0$	$\kappa=1$	$\kappa=0.75$	$\kappa=0$
mean(τ)	0.27	0.27	0.25	0.25	0.25	0.29	0.29	0.29
mean(b/y)	-4.43	-4.48	-4.29	-4.25	-4.19	-4.60	-4.66	-4.80
mean(spread)	3.16	3.33	3.06	3.11	3.28	3.18	3.22	3.36
mean (P_j)	50.94	50.13	100.0	56.98	52.57	100.0	42.96	47.44
share L in office	43.01	47.54	0.00	0.00	0.00	100.0	100.0	100.0

Notes: Statistics are based on non-default episodes with a minimum length of 20 years. 'R (L) in office' refers to simulations in which party R (L) remains in office.

office as it allows them to choose optimal policies in line with their political preferences. However, incumbent L's benefit is smaller because the higher sovereign premium imposes a tighter borrowing-constraint.[11]

Figure 4 shows the bond price $q_j(b', z)$, the optimal borrowing policy $b'_j(b, z)$, and the optimal progressivity $\tau_j(b, z)$ of incumbent L (left panels) and R (right panels). The bond price reflects the election probabilities and the default risks of the two parties. Importantly, in comparison to the situation without electoral uncertainty, the endogenous probability of a political turnover decreases party R's bond price, which is further reduced by the endogenous increase in R's default probability. In contrast, the probability that R takes over raises party L's bond price.

The optimal borrowing choices of L and R are affected by the pattern of the bond price and the election probability. For a given level of debt, incumbent L issues less debt than R, however, she borrows more compared to the situation without electoral uncertainty. This finding is driven by the three channels discussed above. The endogenous election probability makes incumbent L short-sighted providing incentives to borrow more (impatience channel). In addition, the credit cost channel increases incumbent L's bond price relaxing her borrowing-constraint, compared to the situation in which she would remain in power with certainty. In addition, the popularity channel induces incumbent L to issue more debt. In contrast, incumbent R has an electoral advantage, i.e., R is less impatient than L. Moreover, the fall in the bond price makes incumbent R more constrained in her borrowing decision compared to the situation without electoral uncertainty. Thus, the impatience and credit cost channels induce incumbent R to borrow less. Moreover, incumbent R can reduce her credit costs and raise her electoral advantage by issuing less debt compared to the situa-

[11] The parties' benefit of being in power is positive for all combinations of b and z.

tion without electoral uncertainty (popularity channel). Overall, the endogenous interaction of the impatience, credit cost and popularity channels reduces the differences between the parties' borrowing policies. The optimal tax policy shows that for a given level of debt, incumbent L benefits from a relaxed borrowing-constraint and implements a more progressive income tax compared to the situation without electoral uncertainty. In contrast, incumbent R faces worse borrowing conditions and reduces tax progressivity compared to the situation without electoral uncertainty.

These findings are in line with Scholl (2017) who als reports that the left-wing government has worse borrowing conditions creating an electoral advantage for the right-wing opponent. However, there is one important difference. Scholl (2017) abstracts from redistributional concerns and assumes that the parties differ in their preference for wasteful spending. In her setup, the right-wing re-election probability is a hump-shaped function in b'. In equilibrium, the right-wing government affects electoral outcomes in its favor by borrowing more compared to the situation without electoral uncertainty because the left-wing government is expected to default. Within a two-period endowment economy without tax distortions Aghion and Bolton (1990) come to similar conclusions. Here, however, redistribution and the distortionary effects of income taxation play a crucial role. For lower levels of debt, the difference between τ_R and τ_L is larger and makes the right-wing party more attractive to middle-income agents who suffer from the distortionary effects of redistribution.

The first two columns of Table 3 summarizes the equilibrium properties of the simulated time series associated with non-default episodes considering $\kappa = 0.75$ and $\kappa = 0$, respectively. Importantly, the model suggests that party L is less likely to be in office than party R. In the benchmark economy, $\kappa = 0.75$, the share of party L in office amounts to 43 % and the average progressivity is 0.27. If elections occur every year, the share of party L in office rises to 47 % and the sovereign spread increases from 3.16 to 3.33 %

To study how electoral uncertainty affects sovereign default risk in equilibrium, non-default episodes are simulated in which ideological shocks occur such that incumbent R or incumbent L remains in office. Table 3 reports the properties of the simulated time series for the economy without electoral uncertainty, $\kappa = 1$, and with electoral uncertainty, $\kappa = 0.75$ and $\kappa = 0$. In line with the policy functions, government R chooses a less progressive tax scheme than L. It turns out that in equilibrium, electoral uncertainty raises the sovereign spread for both parties. For R this is due to the direct effect of the credit cost channel: The probability that party L comes into power also raises R's interest rate. In equilibrium, the higher sovereign spread reduces incumbent R's debt. In contrast, for incumbent L the increase in the sovereign spread is driven by a general equilibrium effect. The previous analysis has shown that for a given level of debt, electoral uncertainty lowers incumbent L's

interest rate making her less borrowing-constrained. L borrows more in comparison to the situation without electoral uncertainty ($\kappa = 1$) and, in equilibrium, the larger level of debt raises L's sovereign spread.

Figure 5 displays the properties of a typical default event. To this end, the model is simulated for 300,000 periods and all default events are collected. I consider simulations in which party R (L) remains in power but faces electoral uncertainty ($\kappa = 0.75$). The dynamics of the economy are shown four years prior and four years after a default if party R (dashed lines) or party L (solid lines) is in office. The panels present the average pattern of aggregate productivity, output, and consumption as percentage deviations from trend, debt as share of output in percent, the sovereign spread in percent, the unemployment rate in percent, the degree of tax progressivity, the level of the tax, and the incumbent's re-election probability in percent.

A sovereign default is triggered by a negative shock to aggregate productivity, which decreases aggregate output and consumption. Incumbent L is more prone to default and defaults at less negative productivity realizations than R. Prior to the default, debt as share of output increases, which is slightly more pronounced if party L is in power. The popularity channel implies that incumbent L can raise her re-election probability by accumulating more debt. Quantitatively, however, this effect is small such that the re-election probability is hardly affected. In response to growing debt, the sovereign spread rises and lowers the fiscal space for redistribution. Low aggregate productivity and less redistribution raise the unemployment rate. At the same time, public expenditures related to the provision of unemployment benefits increase. Lower production and higher spending endogenously reinforce default incentives. In default, the government does not repay the outstanding debt allowing an increase in tax progressivity.

3.4 The Role of Unemployment

This subsection explores how unemployment and the provision of unemployment benefits affect tax policies and default incentives. To this end, I consider a counterfactual economy in which there is no unemployment and unemployment benefits are not provided, $s = 0$. All other parameters are the same as in the benchmark economy.

Figure 6 displays the re-election probability $P_j(b', z)$, the bond price $q_j(b', z)$, the optimal borrowing policy $b'_j(b, z)$, and the optimal progressivity $\tau_j(b, z)$ for incumbent L (left panels) and incumbent R (right panels) and compares the counterfactual economy without unemployment (dashed lines) with the benchmark economy (solid lines). Elections take place every four years on average, $\kappa = 0.75$.

Given b', the counterfactual economy is characterized by lower bond prices implying that

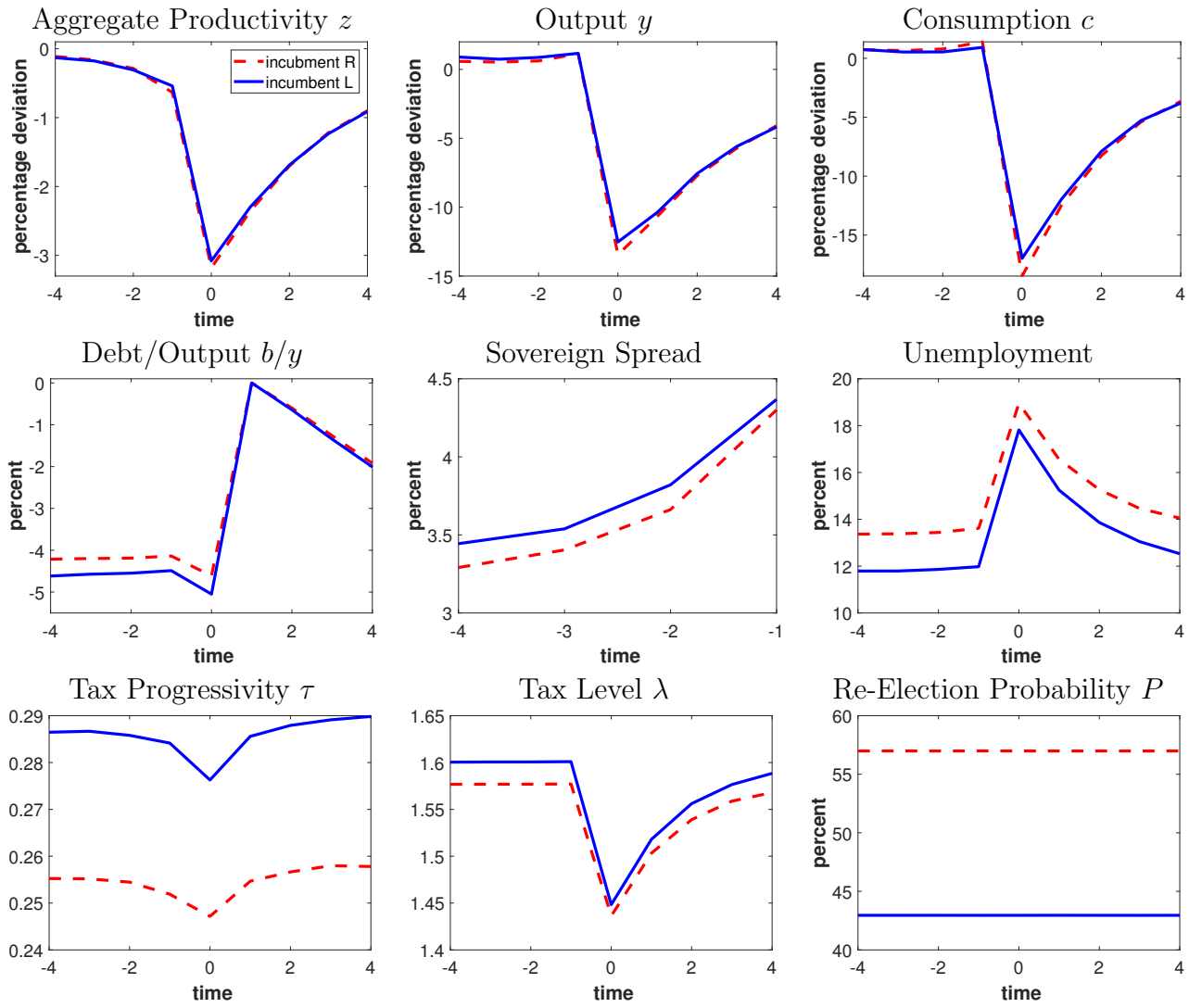

Figure 5. Default Event; *The figure shows the average dynamics in default events. The model is simulated for 300,000 periods and the default events are collected. The figure considers simulations in which incumbent R (dashed lines) or L (solid lines) remains in power but faces electoral uncertainty* ($\kappa = 0.75$).

both parties are more likely to default in the absence of unemployment. This finding can be explained by the redistributive incentives to default. Agents who refuse the job opportunity and are unemployed in the benchmark economy become poorer in the counterfactual economy because they do not receive unemployment benefits. The larger income inequality increases sovereign default incentives in the counterfactual economy. By not repaying debt, the government can reduce the tax burden and provide more redistribution, which is particularly beneficial for low-productivity agents. This effect is more pronounced for incumbent L as she impose a larger welfare weight on agents in the low-income groups who face larger unemployment risks.

The higher interest rates impose tighter borrowing-constraints such that both parties issue less debt in the counterfactual economy than in the benchmark economy. In the absence of unemployment benefits, the government redistributes only via the income tax scheme inducing both parties to implement a larger degree of progressivity. Importantly, the difference between τ_L and τ_R becomes smaller. With higher debt, larger credit costs limit the fiscal space for redistribution and reduce the progressivity of the tax scheme. Compared to the benchmark economy the decrease in τ_j turns out to be much weaker in the counterfactual economy because without unemployment benefits, the government has lower expenditures relaxing the government budget constraint.

Recall that due to the distortive effects of the progressive income taxation agents in the middle-income group have an economic benefit of having party R rather than L in power such that R's re-election probability is larger than 50 %. However, in the counterfactual economy, the smaller discrepancy between τ_R and τ_L reduces party R's electoral advantage. Moreover, as tax progressivity reacts less to debt, the parties' re-election probabilities are less responsive to the borrowing policy.

Column (3) of Table 2 summarizes the long-run equilibrium properties of the counterfactual economy. While the empirical features of the income distribution are matched, the counterfactual economy cannot replicate the consumption share of the lowest 20 % of the distribution. The overstatement of consumption inequality suggests that default incentives are exaggerated in the counterfactual economy. Thus, unemployment is an important feature to replicate the consumption shares of the poorest agents and to give a reasonable account of distributional default incentives.[12]

[12] I proceed similarly as Bianchi et al. (forthcoming) who calibrate the ratio of consumption of unemployed to employed.

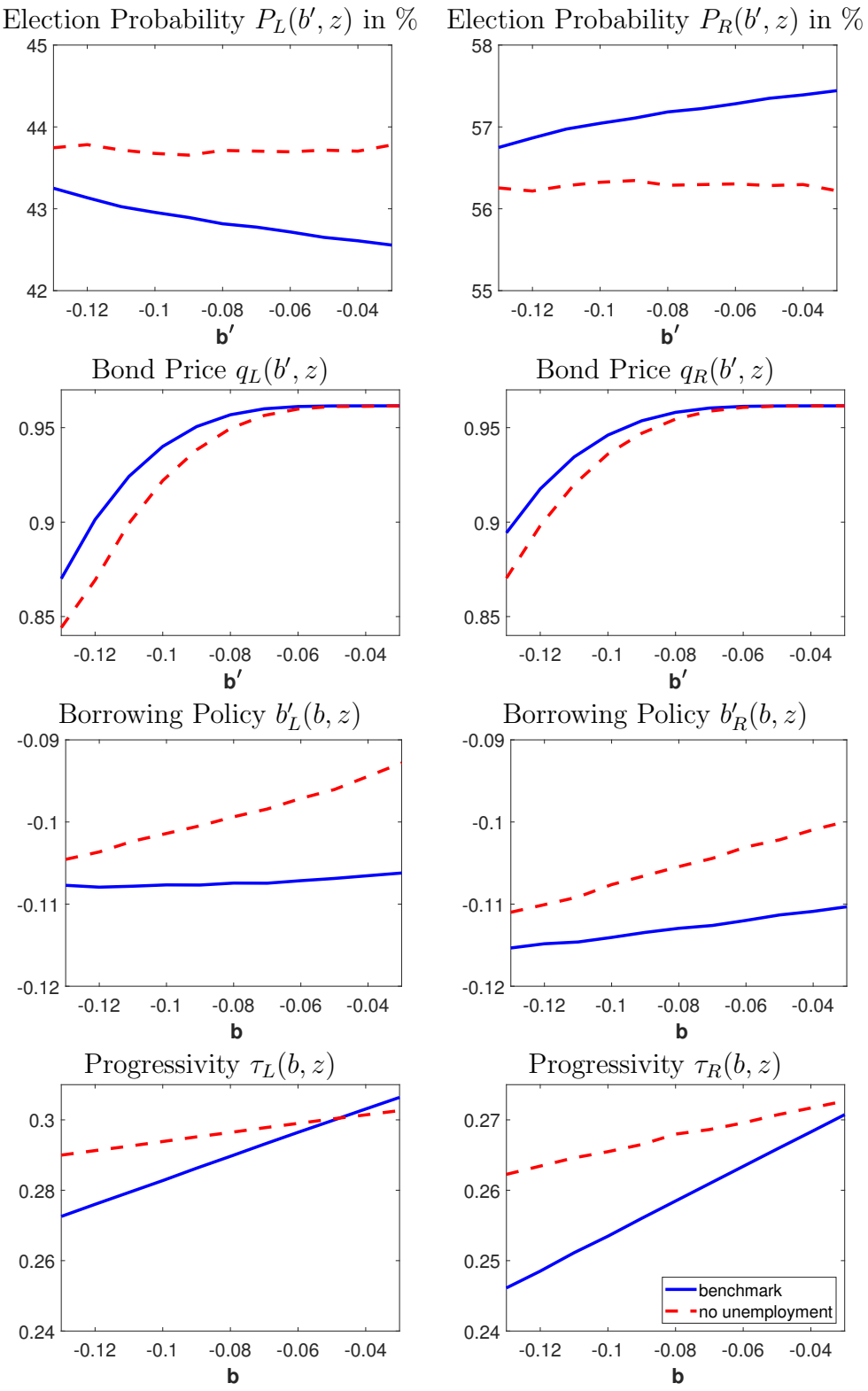

Figure 6. Policy Functions: No Unemployment; *The figure shows the policy functions associated with incumbent L (left panels) and R (right panels) for $\kappa = 0.75$. The solid lines refer to the benchmark economy whereas the dashed line refer to the model in which unemployment is eliminated, $s = 0$, and all other parameters are kept at the benchmark. The figure assumes that aggregate productivity is* 2.12 *percent below its trend and focuses on the range of equilibrium debt levels.*

3.5 The Role of Tax Distortions

The tradeoff between equity and efficiency critically depends on the elasticity of labor ψ because (in the absence of capital) this parameter determines the severeness of the distortions induced by progressive income taxation. The benchmark economy assumes $\psi = 2$, which is a standard value chosen in the macroeconomic literature. In the following, the model is analyzed for a lower elasticity of labor supply, $\psi = 1.5$.

If the labor elasticity is smaller, agents respond less strongly to changes in the tax rate such that the volatility of production decreases. Therefore, to facilitate a comparison with the benchmark specification, the model is re-calibrated to replicate the distribution of income and consumption, the average unemployment rate, the volatility of production, and the annual default probability in Argentina. To match these targets, the average idiosyncratic productivity ε_i and the volatility of aggregate productivity σ_z are adjusted. Moreover, the direct default cost is raised in order to replicate the default probability. In a first step, the political preference parameters α_R and α_L are kept at their benchmark values, such that $\alpha_{iL} > \alpha_{iR}$, for $i = 1, 2, 3$, and $\alpha_{iL} < \alpha_{iR}$, for $i = 4, 5$. In a second step, α_R and α_L are adjusted to match the empirically observed distribution of consumption and the associated Gini coefficient. Table 1 summarizes the parameter values associated with $\psi = 1.5$. Column (5) of Table 2 shows the model fit of the re-calibrated model. All targets are well matched such that the outcomes are comparable to the benchmark economy.

Figure 7 displays the re-election probability $P_j(b', z)$, the bond price $q_j(b', z)$, the optimal borrowing policy $b'_j(b, z)$, and the optimal progressivity $\tau_j(b, z)$ for incumbent L (left panels) and R (right panels) for $\kappa = 0.75$. The dashed lines refer to the re-calibrated model in which political preferences are kept as in the benchmark economy, $\alpha_{iL} > \alpha_{iR}$, for $i = 1, 2, 3$, and $\alpha_{iL} < \alpha_{iR}$, for $i = 4, 5$. The lower labor elasticity reduces the adverse effect of progressive income taxation on production such that both parties find it optimal to raise τ_j and to redistribute more compared to the benchmark economy shown in Figure 4. Moreover, the lower distortions reduce the electoral advantage of party R. However, column (4) of Table 2 reveals that the benchmark political preferences cannot replicate the empirical distribution of consumption: Consumption shares at the bottom of the distribution are overestimated while they are underestimated at the top.

Therefore, to replicate the observed consumption inequality in a less distortive environment, the preference parameters α_R and α_L have to be increased, such that both parties are heavily biased towards high-income groups. Moreover, compared to R, party L imposes a larger weight on all income groups except for the highest income group, $\alpha_{iL} > \alpha_{iR}$, for $i = 1, 2, 3, 4$, and $\alpha_{iL} < \alpha_{iR}$, for $i = 5$. The associated policy functions are shown as dashed lines in Figure 7. By construction, the implemented degree of progressivity is close to one

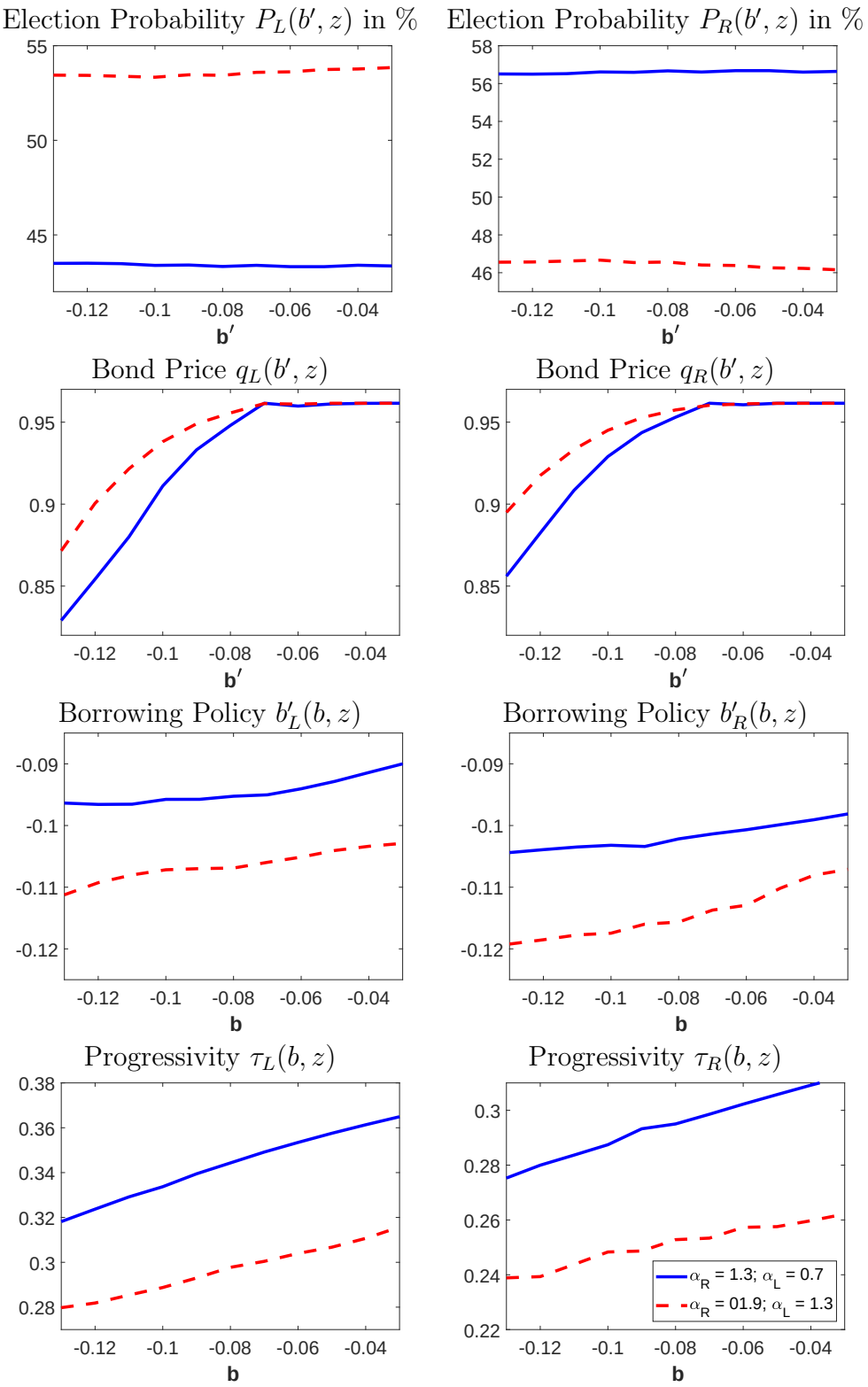

Figure 7. Policy Functions: Labor Elasticity; *The figure shows the policy functions associated with incumbent L (left panels) and R (right panels) for* $\psi = 1.5$ *and* $\kappa = 0.75$. *The dashed lines refer to the re-calibrated model in which the political preference parameters are adjusted to* $\alpha_R = 1.9$ *and* $\alpha_L = 1.3$. *The solid lines refer to the re-calibrated model in which political preferences are kept at their benchmark values* $\alpha_R = 1.3$ *and* $\alpha_L = 0.7$. *The figure assumes that aggregate productivity is* 2.12 *percent below its trend and focuses on the range of equilibrium debt levels.*

in the benchmark economy with $\psi = 2$. The main predictions of the model are robust with respect to the labor elasticity. Incumbent L implements a more progressive tax scheme and is more prone to default compared to R. As a result, incumbent L faces a lower bond price implying a tighter borrowing-constraint. However, it turns out that with a low labor elasticity, the majority of individuals prefer a larger degree of redistribution such that incumbent L has an electoral advantage as she implements a more progressive tax scheme. This finding is reflected in the long-run properties of the model reported in column (5) of Table 2: The share of party L in office is 52.4 % in the economy with lower tax distortions.

4 Discussion

In this section, I summarize the main predictions of the model and discuss to what extent they are supported by empirical evidence.

In the absence of electoral uncertainty, the tradeoff between equity and efficiency and its interaction with sovereign debt lies at the heart of the model: Governments have incentives to finance redistributive spending via debt to avoid the distortionary effects of income taxation. The link between inequality and sovereign debt finds empirical support in Tran-Xuan (2022) documenting a significant positive correlation between external debt-to-GDP ratios and pre-tax income inequality for a large sample of 120 countries between 1985 and 2015.

However, the accumulation of debt raises default risks, which is reflected in worsening borrowing conditions, limiting the issuance of new debt and reducing the government's fiscal space for redistributive spending. The model predicts that in the run-up to a default, the increase in the sovereign spread is accompanied by a decrease in tax progressivity and an increase in unemployment. In the aftermath of the default, the relaxed government budget constraint allows to raise redistribution. These patterns are in line with typical default episodes experienced in several countries. Figure 8 considers Argentina, Ecuador, Greece, and Uruguay as examples and illustrates that debt crises are characterized by a surge in sovereign spreads, income inequality, and unemployment.

The model highlights that for a given level of debt, the government's distributional incentives to default are larger if income inequality is high or if political preferences for redistribution are strong. Such a positive correlation between income inequality and spreads is documented in Deng (2021). In a sample of 36 countries covering the time period 1954-2017, she finds a positive correlation between income inequality and government bond yields, controlling for debt-to-GDP ratios and per capita income. Aizenman and Jinjarak (2012) come to similar conclusions and highlight the negative interaction between income inequality and the government's fiscal space. Jeon and Kabukcuoglu (2018) focus on credit ratings and

report them to be lower in more unequal countries.

The model emphasizes the impact of political preferences on sovereign default risk. Left-wing governments who are more biased towards redistribution are more likely to default and face worse borrowing conditions than right-wing governments. This theoretical prediction finds empirical support in Cotoc et al. (2022) who analyze the link between the political orientation of governments and sovereign spreads by combining information on the political affiliation from the Database of Political Institutions (Cruz et al. (2021)) with macroeconomic and fiscal data. They define left-propensity as the fraction of time that an economy is governed by a left-wing government and show that the left-propensity of an economy is positively correlated with the level and the volatility of its sovereign spread. This empirical finding is in line with a large political economy literature reporting that left-wing governments are punished by financial markets, see, e.g., Sattler (2013) and the references therein.

The theoretical framework highlights the role of electoral uncertainty and predicts that a right-wing government faces an increase in the sovereign interest rate if the left-wing opponent is expected to come in power (credit cost channel). Moreover, political instability increases sovereign spreads. Considering a sample of developing economies from 1987 to 1999 and using data on presidential elections and credit ratings of different agencies, Block and Vaaler (2004) report that credit ratings indeed tend to decrease in election years. Moreover, previous research has argued that in 2002 the increase in the Brazilian spread was driven by the election probability of the left-wing opponent, see Goretti (2005) and Chang (2010). Hatchondo and Martinez (2010) and Trebesch (2019) document that political risk as measured by the the International Country Risk Guide (ICRG) increases sovereign spreads and delays debt restructurings.

In the model, for a given level of debt, the higher sovereign interest rate makes the left-wing incumbent more constrained in the issuance of new debt. Using Argentina's default event as an example, Hatchondo and Martinez (2010) report some empirical evidence in support of this theoretical prediction. They illustrate that governments who were associated with higher sovereign default risks have issued less debt after the default. However, in the model, electoral uncertainty introduces the impatience channel making both governments more short-sighted. Moreover, via the credit cost channel electoral uncertainty reduces the differences between the borrowing conditions faced by right-wing and left-wing incumbents. As a result, borrowing policies become more similar across parties. This may explain why there is a lack of clear empirical evidence of how the political orientation of governments affect the level of sovereign debt. Pancrazi and Prosperi (2020) highlight that political conflicts per-se are not a significant determinant of the empirical cross-country heterogeneity in debt.

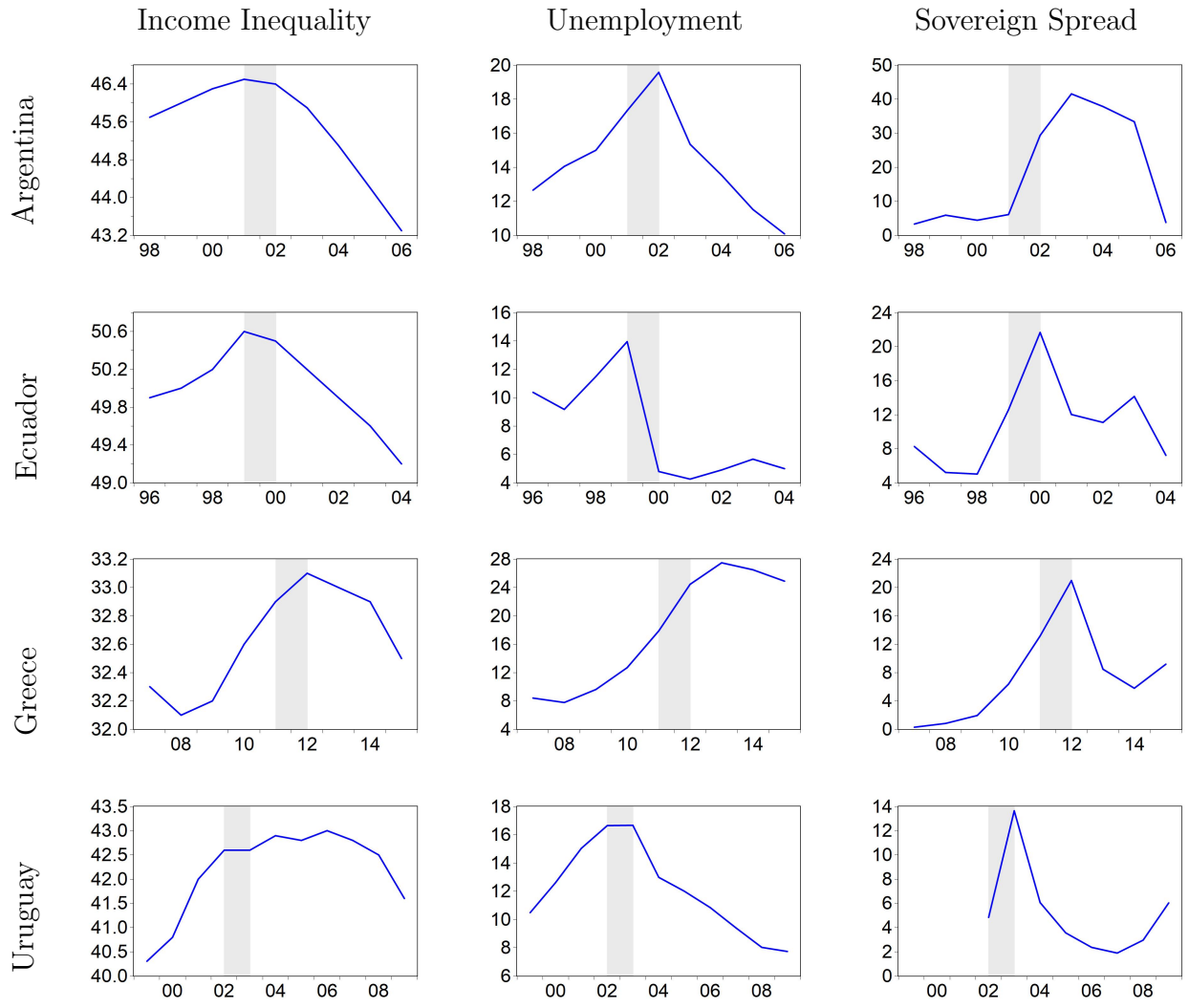

Figure 8. Inequality, Unemployment, and Sovereign Default; *The grey shaded areas visualize default episodes in Argentina 2001/2002, in Ecuador 1999, in Greece 2011, and in Uruguay 2003. The Gini of disposable income is taken from the SWIID, Solt (2020). Annual data on the unemployment rate is taken from the World Development Indicators. The sovereign spread is measured by the country-specific EMBI Global for Argentina, Ecuador, and Uruguay. For Greece the spread is calculated as the difference between the interest rate on 10-year Greek government bond and the German counterpart.*

Instead, the interaction between political conflicts and the transparency of institutions is key in explaining the observed debt levels across countries.

In the model, political turnover is the endogenous outcome of the electoral process and tax and debt policies affect governments' re-elections probabilities (popularity channel). Cotoc et al. (2022) find empirical evidence that left-wing governments can gain votes by increasing public spending. This is in line with the political economy literature, e.g., Shin (2016) analyzes 197 lower chamber elections in 31 OECD countries between 1980 and 2013 and reports that incumbent parties can increase their vote shares with expansionary welfare spending. However, Shin (2016) also shows that high levels of taxation reduce the electoral benefits, which is in line with the electoral disadvantage of the left-wing government predicted by the model due to the distortionary effects of income taxation. While the model links the parties' tax policies with their re-election probabilities, the predicted responsiveness of electoral outcomes to changes in debt are quantitatively small. Therefore, the model generates a rather constant re-election probability prior and after a default (see Figure 5). The experiences made in countries such as Argentina and Greece, however, indicate that political turnovers are more likely to occur during debt crises.

5 Conclusions

This paper has developed a quantitative model of sovereign debt with heterogeneous agents and non-linear income taxation to explore how distributional and electoral concerns shape sovereign default incentives.

The paper emphasizes the tradeoff of fiscal policy in the presence of sovereign default risk. On the one hand, the government has incentives to finance redistribution via external debt to avoid distortionary income taxation. On the other hand, the accumulation of external debt raises the cost of borrowing. Debt crises are associated with surging unemployment and high sovereign interest rates reducing the fiscal space for redistribution and triggering a default. The analysis suggests that the left-wing government implements a more progressive income tax, is more prone to default, and has a lower electoral support than the right-wing opponent due to worse borrowing conditions and the distortionary effects of income taxation. In equilibrium, electoral uncertainty raises sovereign default risk.

The main theoretical predictions are in line with the empirical evidence indicating that income inequality fosters sovereign default risk, that left-wing governments face higher credit costs, and that sovereign spreads increase if a left-wing policymaker is expected to come into power. There is, however, less clear empirical evidence on the interaction between the government's political orientation and the level of sovereign debt. Moreover, while the paper

provides first insights on the distributional and electoral determinants of sovereign default risk, it abstracts from many relevant aspects such as the role of long-term debt, domestic creditors, and wealth inequality. These issues are important avenues for future research.

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A Appendix: Definition of the Recursive Equilibrium

The recursive equilibrium is defined as

1. a set of policy functions for consumption $c_{i,j}(b,z,x_i)$, $c^d_{i,j}(z,x_i)$, labor supply $n_{i,j}(b,z,x_i)$, $n^d_{i,j}(z,x_i)$, and the employment threshold value $\chi_i(z,\lambda_j,\tau_j)$ $i=1,...,N$, $j=R,L$,
2. a set of policy functions $b'_j(b,z)$, $\tau_j(b,z)$, $\tau^d_j(z)$, $\lambda_j(b,z)$, $\lambda^d_j(b,z)$ and the default policy $d_j(b,z)$, $j=R,L$,
3. election probabilities $P_j(b',z)$, $P^d_j(z)$, $j=R,L$,
4. the price function for bonds $q_j(b',z)$, $j=R,L$,
5. a set of value functions $V_j(b,z)$, $V^r_j(b,z)$, $V^d_j(z)$, $\overline{V}_j(b,z)$, $\overline{V}^r_j(b,z)$, and $\overline{V}^d_j(z)$, $j=R,L$

such that

1. given incumbent j's fiscal policies, consumption $c_{i,j}(b,z,x_i)$, $c^d_{i,j}(z,x_i)$ and labor supply $n_{i,j}(b,z,x_i)$, $n^d_{i,j}(z,x_i)$ satisfy the household's budget constraint (2) and the household's optimality condition (5). The threshold value $\chi_i(z,\lambda,\tau)$ fulfills equation (6),
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 $-j$, party j's value functions $V_j(b,z)$, $V^r_j(b,z)$, $V^d_j(z)$ and the default policy $d_j(b,z)$ solve (7), (8), (9), and (10). $b'_j(b,z)$, $\tau_j(b,z)$ and $\lambda_j(b,z)$ solve (8). $\tau^d_j(z)$ and $\lambda^d_j(z)$ solve (9),
3. bond prices $q_j(b',z)$ fulfill equation (18) such that risk-neutral foreign creditors earn zero expected profits,
4. the election probabilities $P_L(b',z)$ and $P^d_L(z)$ fulfill equation (17), and $P_R(b',z) = 1-P_L(b',z)$, $P^d_R(z)=1-P^d_L(z)$, together with equations (15) and (16),
5. given the tax and debt policies of the opponent $-j$, $\overline{V}^r_j(b,z)$, $\overline{V}^d_j(z)$, and $\overline{V}_j(b,z)$ are given by equations (12), (13), and (14).