The Politics of Redistribution and Sovereign Default*

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preliminary and incomplete - comments welcome

Abstract

This paper studies how redistributive 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 parties differ in their preferences for redistribution. Political turnover is the endogenous outcome of the electoral process. Fiscal policy faces a trade-off: On the one hand, the incumbent has incentives to finance redistribution via debt to avoid the distortionary effects of income taxation. On the other hand, the accumulation of external debt raises the interest rate and tightens the government budget constraint. It turns out that the party with a higher preference for redistribution is more prone to default and faces higher sovereign spreads, which reduce the fiscal space for redistribution and dampen the electoral support. The risk of losing power strengthens the disparities between the redistributive policies of the two parties.

Keywords: sovereign debt and default, inequality, political economy, fiscal policy

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

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1 Introduction

This paper studies how redistributive and electoral concerns shape sovereign default incentives. Three empirical observations are of key importance. First, government popularity is a significant predictor of debt crises in emerging economies suggesting that governments finance their spending by accumulating debt to remain in office (Herrera et al., 2020). Second, the credit boom is followed by a bust. Unemployment and income inequality increase and high sovereign interest rates reduce the government's fiscal space for redistributive policies. Third, in the course of the crisis, the government's popularity weakens whereas political opponents gain power and the risk of a political turnover increases (Mian et al., 2014). These political boom-bust cycles have been discussed by Dornbusch and Edwards (1991) and Dovis et al. (2016) and are illustrated in Figure 1 for recent default episodes in Argentina, Greece, and Uruguay.

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 households who differ in their idiosyncratic labor productivity and face unemployment risk. 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 labor supply of households. 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.

I consider a two-party system in which the parties differ in their preferences for redistribution. The left-wing party is assumed to care more about equity and imposes larger weights on the welfare of the low-income groups. In contrast, the right-wing party emphasizes efficiency and has a bias towards the high-income groups. When choosing fiscal policies, the incumbent 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 policies as well as stochastic idiosyncratic ideological aspects.

In a quantitative application of the theoretical model, I study the properties of optimal tax and debt policies and their interaction with electoral outcomes. In a first step, I abstract from political uncertainty and differences in political preferences and consider a benevolent

planner who weights the welfare of the income groups by their size. The optimal choice of the non-linear tax scheme and external debt is characterized by 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 external debt fosters default incentives, raising the interest rate on debt and tightening the government budget constraint. With growing debt, the rising sovereign spread reduces the fiscal space forcing the government to reduce the progressivity of the tax scheme. Consequently, the share of income held by the poorest quintile decreases whereas it increases for the top quintile. The higher tax burden reduces the agents' incentives to work such that unemployment increases dampening aggregate production. 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.

To understand the impact of political preferences I compare the policies of a left-wing and a right-wing government assuming that the incumbent remains in power forever. It turns out that the left-wing government finds it optimal to default at lower levels of debt and less adverse aggregate productivity realization than the right-wing government. The left-wing government implements a more progressive tax scheme, which endogenously dampens production and makes debt less sustainable. The larger sovereign default risk associated with this incumbent is reflected in higher interest rates restricting the accumulation of debt. The right-wing incumbent imposes a larger weight on the high-income groups and has lower incentives to default. The smaller sovereign spread makes the right-wing incumbent less borrowing-constrained than the left-wing incumbent.

If elections take place such that a political turnover may occur, the incumbent faces a bond price that reflects not only her own sovereign default risk but also the probability that the opponent gains power making the default decision in the next period. Compared to the situation without political uncertainty, the left-wing (right-wing) incumbent faces lower (higher) sovereign spreads because there is a positive probability that the opponent gains power who is less (more) likely to default. Thus, if a political turnover occurs with positive probability, interest spreads of right-wing and left-wing governments become more similar.

It turns out that in the model the left-wing party has a lower electoral support than the right-wing party. Her tax and default policy imply larger equity but lower efficiency and higher credit costs compared to the opponent such that not only the high-income groups but also the middle-income groups vote for the right-wing party. Importantly, the re-election probability of the left-wing incumbent is increasing in the issuance of new debt while it

is decreasing for the right-wing. The patterns of the interest spread and the re-election probability induce the left-wing incumbent to borrow more whereas the right-wing issues less debt. In terms of tax policies, the interaction between interest spreads and electoral outcomes encourages the left-wing (right-wing) incumbent to implement a more (less) progressive tax scheme compared to the situation without political uncertainty. Although sovereign spreads and electoral outcomes make debt and default policies of the two parties look similar, they raise the discrepancies between the left-wing and right-wing redistributive policies.

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. In a model of sovereign debt and default with two types of households differing in their (exogenous) income, Jeon and Kabukcuoglu (2018) show that higher income inequality raises sovereign default risk, which is in line with the empirical evidence documented in Aizenman and Jinjarak (2012). 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. Assuming an exogenous tax scheme, she finds that the degree of progressivity and the incentives of default are inversely related. Building on Ferriere (2015), Deng (2021) studies the optimal combination of non-linear income taxation and debt and argues that higher income inequality induces the government to choose a higher degree of redistribution in spite of larger sovereign spreads. Balke and Ravn (2016) introduce inequality through unemployment and find that during debt crises the government has to implement austerity measures such as income tax hikes and spending cuts. While most papers in this field of research assume that households are hand-to-mouth and do not have access to international financial markets, D'Erasmo and Mendoza (2016) and D'Erasmo and Mendoza (2021) differentiate between domestic and foreign creditors in a Bewley-type model. In their setup, distributional default incentives occur because the government uses debt and default to redistribute resources in response to idiosyncratic income shocks.

This paper builds on the aforementioned studies because it analyzes the properties of the optimal non-linear income tax schedule in the presence of sovereign default allowing for idiosyncratic productivity shocks and unemployment risk. Whereas previous work abstracts from political uncertainty, this paper emphasizes the political consequences of progressive taxation and sovereign default by taking into account that the incumbent's policy choices affect the probability of remaining in office. With its focus on the politics of redistribution and sovereign default, the paper builds on the political economy literature on debt, sur-

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

veyed e.g. in Persson and Tabellini (2000). Specifically, in a two-period setting, Alesina and Tabellini (1989) show that political uncertainty increases debt and sovereign spreads. Aghion and Bolton (1990) develop a two-party system in which the left-wing party cares about the low-income group while the right-wing party favors the higher income group. They find that the left-wing party issues more debt and is more prone to default. In this paper, I derive similar conclusions within a quantitative model of sovereign debt and default with heterogeneous agents.

Aguiar and Amador (2011) and Dovis et al. (2016) study the interaction between 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. 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 building on Hatchondo et al. (2009) and Cuadra and Sapriza (2008) who explore the impact of political uncertainty on sovereign risk. While these papers assume that parties exogenously alternate in power, Scholl (2017), Chatterjee and Eyigungor (2019), and Prein and Scholl (2021) allow for endogenous political turnover. Scholl (2017) and Cotoc et al. (2022) show that left-leaning governments have a larger default risk and face worse borrowing conditions.[2]

This paper follows Scholl (2017) and models political turnover as the outcome of probabilistic voting. She assumes that households are identical with respect to their income but differ in their preferred size of public spending. In her setting, in order to raise the probability of remaining in office, the party with the larger preference for public spending issues more debt and is more likely to default. While Scholl (2017) abstracts from income inequality, this paper focuses on the conflict of interest between low- and high-income groups. To the best of my knowledge, the only papers that link inequality and political aspects are Andreasen et al. (2019) and Hermann and Scholl (2022) who introduce political constraints in models of sovereign debt and default with income inequality. They find that less redistribution and larger inequality reduce the political support and increase 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 concludes.

[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.

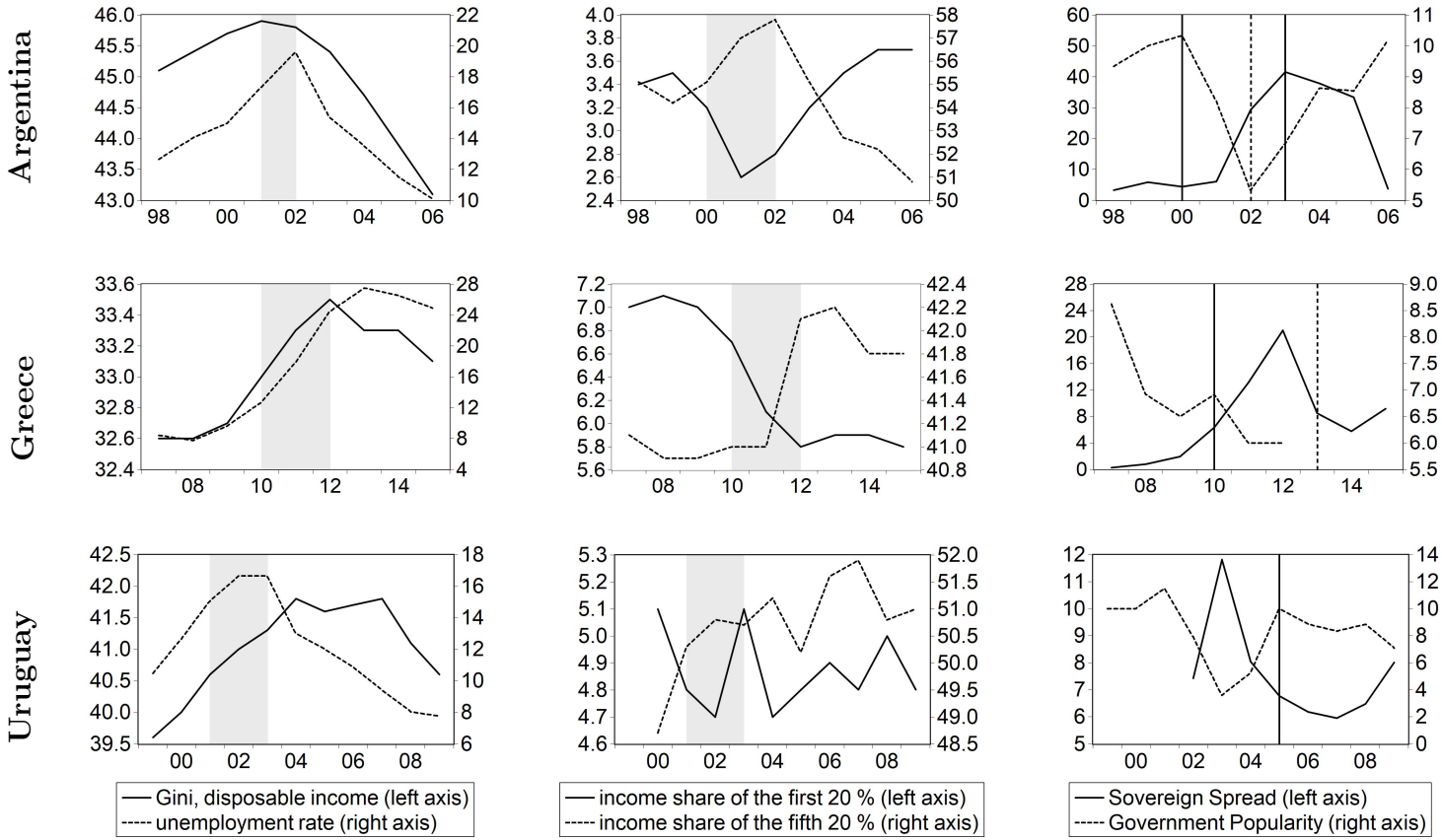

Figure 1. Inequality, Government Popularity, and Sovereign Default; *The grey shaded areas visualize default episodes in Argentina, Greece, and Uruguay. In the right panels, the vertical solid line visualizes a political turnover from a right-wing to a left-wing government whereas the vertical dashed line shows a political turnover from a right-wing to a center or left-wing government. Government popularity is a subindex of the International Country Risk Guide ICRG. The political leaning of a government is based on the Database of Political Institutions 2020, Cruz et al. (2021). The sovereign spread is measured by the country-specific EMBI Global for Argentina 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. The Gini is taken from the SWIID, Solt (2020). Income shares and the unemployment rate are taken from the World Development Indicators.*

2 The Model

I consider a small open economy that is inhabited by infinitely-lived households 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 differ with respect to their 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 $x_i \overset{i.i.d.}{\sim} N(\varepsilon_i, \sigma_{x_i})$. ε_i is the average idiosyncratic productivity in income group i and the standard deviation is given by σ_{x_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 c_i and n_i denote consumption and labor time, respectively. The per-period utility is continuous, twice differentiable in both arguments, strictly increasing in c_i, strictly decreasing in n_i, jointly strictly concave in c_i and n_i and satisfies the Inada conditions.

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

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

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 $\alpha_{i,j}(\varepsilon_i) > 0$ denote the welfare weight of party j on income group i. I assume that party R (L) imposes welfare weights that are increasing (decreasing) in group i's average idiosyncratic productivity, $\alpha'_{i,R}(\varepsilon_i) > 0$ ($\alpha'_{i,L}(\varepsilon_i) < 0$). Hence, party L is left-wing and cares more about equity whereas party R is right-wing and favors efficiency.

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 temporarily excluded from international financial markets and faces direct output losses 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:

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

$g_i(x_i)$ denotes the probability density function of idiosyncratic productivity in income group i. On the left-hand side, the first part refers to the income tax revenues earned by the government. The second part are the expenditures related to the provision of unemployment benefits. 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:

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

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

The timing is as follows. At the beginning of each period the incumbent 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 The Private Sector

An agent in income group i takes the job opportunity if the utility of being employed is larger than the utility of being unemployed. If the agent is unemployed, 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 household's budget constraint (2).

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 government's tax policies and aggregate productivity.

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

2.2.2 Public Sector

Conditional on being in a good credit standing, the incumbent $j = R, L$ 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. 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 is defined as:

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

subject to

(1), (2), (3), (5), (6).

$P_j^r(b', z)$ denotes the re-election probability of incumbent j and will be derived in the next section. $\overline{V}_j(b', z')$ refers to incumbent j's value function if the opponent comes into power. By choosing the tax scheme and new debt issuance the incumbent affects the distribution of net income and her probability of being re-elected by the population. If the opponent comes into power, she inherits the debt level chosen by the current incumbent.

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

tional financial markets. The value function is given as:

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

$h(z) \leq z$ denotes the exogenous output cost hitting the economy 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.

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:

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

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

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

2.2.3 Voting

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 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. For an agent in income group i, the expected economic benefit of party L over party

R in power is defined as:

$$B_{i,L}(b',z) \equiv \frac{\int W_{i,L}(b',z')f(z',z)dz' - \int W_{i,R}(b',z')f(z',z)dz'}{\int W_{i,R}(b',z')f(z',z)dz'} \tag{11}$$

with

$$\begin{aligned} W_{i,j}(b,z) = &\int_{\mathcal{X}_i(z,\lambda_j,\tau_j)} u(c_{i,j},n_{i,j})g(x_i)dx_i + \int^{\mathcal{X}_{i,j}(z,\lambda_j,\tau_j)} u(s,0)g(x_i)dx_i \\ &+ \beta\kappa \int W_{i,j}(b'_j,z')f(z',z)dz' \\ &+ \beta(1-\kappa)\Big[\Big(P^r_j(b'_j,z)\int W_{i,j}(b'_j,z')f(z',z)dz' \\ &+ (1-P^r_j(b'_j,z))\int W_{i,-j}(b'_j,z')f(z',z)dz'\Big)\Big], \quad j=R,L. \end{aligned} \tag{12}$$

$-j$ denotes the opponent. $c_{i,j}$, $n_{i,j}$ and b'_j denote optimal consumption and labor of an individual in group i if party j is in power and implements τ_j, λ_j and b'_j. Note that the agent in group i forms expectation regarding the realization of idiosyncratic productivity in (12) and regarding the realization of aggregate productivity in (11).

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 gets re-elected if it gets more than 50 percent of the votes in the population,

$e_L(b', z) > \frac{1}{2}$:

$$\begin{aligned} P_L(b', z) &= \text{prob}\left(\omega < \frac{\sum_i \mu_i B_{i,L}(b', z)}{\sum_i \mu_i \phi_i}\right) \\ &= \frac{1}{2} + \Omega\left(\frac{\sum_i \mu_i \phi_i B_{i,L}(b', z)}{\sum_i \mu_i \phi_i}\right) \end{aligned} \tag{13}$$

The election probability of party R equals $(1 - P_L(b', z))$. Clearly, with her borrowing choice b' (and the implied tax scheme) the incumbent can affect her re-election probability by affecting the economic benefits of the individuals in the different income groups. 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 and the probability of re-election equals 50 percent.

2.2.4 Foreign Creditors

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

$$q_j(b', z) = \kappa\frac{(1 - \zeta_j(b', z)}{1 + r^f} + (1 - \kappa)\Big[P_j^r(b', z)\Big(\frac{1-\zeta_j(b', z)}{1 + r^f}\Big) + (1-P_j^r(b', z))\Big(\frac{1-\zeta_{-j}(b', z)}{1 + r^f}\Big)\Big]. \tag{14}$$

The bond price equation reflects the risk of default associated with incumbent j, $\zeta_j(b', z)$, as well as the probability $(1-P_j^r(b', z))$ that the opposition $-j$ comes into power making the default decision next period.

2.2.5 Definition of the Recursive Equilibrium

The recursive equilibrium is defined as

1. a set of policy functions for consumption $c_{i,j}(b, z, x_i)$, $c_{i,j}^d(z, x_i)$, labor supply $n_{i,j}(b, z, x_i)$, $n_{i,j}^d(z, x_i)$, and the employment threshold value $\chi_i(z, \lambda_j, \tau_j)$ $i = 1, ..., N$, $j = R, L$,

2. a set of policy functions $b'_j(b, z)$, $\tau_j(b, z)$, $\tau_j^d(z)$, $\lambda_j(b, z)$, $\lambda_j^d(b, z)$ 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 $V_j(b,z)$, $V_j^r(b,z)$, $V_j^d(z)$, $\overline{V}_j(b,z)$, $\overline{V}_j^r(b,z)$, and $\overline{V}_j^d(z)$, $j = R, L$

such that

1. taking as given the incumbent tax and debt policies, consumption $c_{i,j}(b,z,x_i)$, $c_{i,j}^d(z,x_i)$ and labor supply $n_{i,j}(b,z,x_i)$, $n_{i,j}^d(z,x_i)$ satisfy the household's budget constraint (2) and the household's optimality condition (5). The threshold value $\chi_i(z,\lambda_j,\tau_j)$ fulfills (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 $V_j(b,z)$, $V_j^r(b,z)$, $V_j^d(z)$ and the default policy $d_j(b,z)$ solve (7), (9), (10), and (10). $b_j'(b,z)$, $\tau_j(b,z)$ and $\lambda_j(b,z)$ solve (9). $\tau_j^d(z)$ and $\lambda_j^d(z)$ solve (10),

3. bond prices $q_j(b',z)$ fulfill equation (14) such that risk-neutral foreign creditors earn zero expected profits,

4. the election probabilities $P_L(b',z)$ and $P_L^d(z)$ fulfill equation (13), and $P_R(b',z) = 1 - P_L(b',z)$, $P_R^d(z) = 1 - P_L^d(z)$,

5. given the tax and debt policies of the opponent $-j$, $\overline{V}_j^r(b,z)$, $\overline{V}_j^d(z)$, and $\overline{V}_j(b,z)$ solve

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

and

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

with

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

3 Quantitative Analysis

3.1 Functional Forms and Parameterization

In this section, I specify the functional forms and choose the parameter values. Table 1 provides an overview of the (preliminary) parameter choices.

The utility function takes the GHH-form as suggested by Greenwood et al. (1988):

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

where $\gamma > 0$ refers to the parameter of relative risk aversion and $\frac{1}{\psi}$ denotes the intertemporal labor elasticity. $\frac{1}{\psi}$ is set to 2.22, which is a standard value in the literature, see, e.g., Cuadra et al. (2010). The parameter of relative risk aversion takes the value of 2 and the annual world risk-free interest rate r_f is calibrated to 4 percent.

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

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

with ε is i.i.d. $N(0, \sigma_\varepsilon^2)$. The autocorrelation is set to 0.66 and the standard deviation equals 0.014.

I consider the quintiles of the income distribution such that $\mu_i = 0.20$. Average idiosyn-

cratic productivity ε_i is set to match the share of income held by group i. The standard deviation of idiosyncratic productivity is assumed to be equal in each income group and is chosen to be $\sigma_x = 0.30$. The unemployment benefit s is calibrated to match the average unemployment rate in the economy.

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 its average idiosyncratic productivity ε_i:

$$\alpha_{ij} = \mu_i + \alpha_j(\tilde{\varepsilon} - \varepsilon_i), \qquad j = R, L.$$

$\tilde{\varepsilon}$ is the median income in the population. α_R is assumed to be strictly positive such that the welfare weights α_{iR} are increasing in income. In contrast, α_L is assumed to be strictly negative implying that party L places a larger weight on the low-income groups. In the benchmark parameterization, $\alpha_R = 0.05$ and $\alpha_L = -0.05$ but variations are considered to explore the impact of the strength of the political conflict on sovereign default risk, the distribution of net income, and aggregate outcomes.

To abstract from differences in group-specific ideologies I assume that $\phi_i = \phi$ 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 parameterization, Ω is set to 20 but it is varied in the robustness analysis. κ is set equal to 0.75 so that on average every four years an election takes place. To understand the policy choices of incumbent governments I also consider $\kappa = 0$ such that elections occur every period.

If the government defaults and the economy is in financial autarky, the economy is hit by direct output cots:

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

with $\eta \in (0, 1)$. I assume that the direct output costs equal 3 percent implying a default penalty η of 0.97. The rate of time preference β takes the value 0.8. The parameters β and η affect the size of the risk premium and external debt. I assume that with a probability $\theta = 0.25$ the economy is allowed to re-enter international financial markets after a default. The average exclusion duration of four years line is in line with the empirical evidence documented in Gelos et al. (2011).

Table 1. Benchmark Parameterization

Parameter			
Risk free rate	r_f	0.04	standard value
Risk aversion	γ	2	standard value
Time preference	β	0.8	debt service
Labor elasticity	$\frac{1}{\psi}$	2.22	standard value
Population	μ_i	0.30	quintiles of income
Idio. productivity	ε_i	$[0.7; 1.1; 1.5; 2.2; 2.5]]$	income shares
	σ_x	0.20	idio. income risk
Preference weight	α_R	-0.05	
	α_L	0.05	
Unemployment benefit	s	0.45	unemployment rate
Re-entry probability	θ	0.25	Gelos et al. (2011)
Default penalty	η	0.97	default risk/sovereign premium
Agg. productivity	ρ_z	0.66	persistence and
	σ_v	0.014	volatility of GDP
Popularity	$[-\frac{1}{2\Omega}; \frac{1}{2\Omega}]$	$\Omega = 20$	turnover rate

3.2 The Impact of Political Preferences on Sovereign Default Risk and Redistribution

In a first step, I assume that no elections take place, $\kappa = 1.0$, such that the incumbent faces no political uncertainty and remains in office forever. The resulting theoretical framework is similar to the one studied by Deng (2021) who, however, does not allow for unemployment risk and does not differentiate between different government types.

Figure 2 displays the policy functions associated with incumbent R (dashed red lines) and incumbent L (solid blue lines). The black dotted lines refer to the policy choices of a benevolent planner who places the same weight on all income groups. The figure assumes that aggregate productivity is 3 percent below its trend.

Let us first analyze a benevolent planner who weights the welfare of the income groups by their size, i.e. $\alpha_j = 0$ such that $\alpha_{ij} = \mu_i$. The upper left panel of Figure 2 plots the bond price $q_j(b', z)$ as a function of the borrowing choice b'. 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. As the planner 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 $b'_j(b, z)$ (upper right panel) shows that the bond price endogenously constraints the government's borrowing choice. The tax policy reflects the pattern of the bond price. As the credit costs increase, the government has to lower λ such that the level of the tax increases. Moreover, the policymaker reduces the degree of progressivity τ, i.e., the policy maker can afford less redistribution. Consequently, the

share of income held by the poorest quintile decreases whereas it increases for the top quintile. The higher tax burden reduces the agents' incentives to work 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 reinforces 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 party R and L who differ in their political preferences. Since incumbent L imposes a larger weight on the welfare of the low-income groups, she implements a larger degree of progressivity and provides more redistribution. In the absence of elections and political turnovers, the bond price is determined by the incumbent's default probability. It turns out that for a given level of borrowing, incumbent L faces a lower bond price and thus higher credit costs than incumbent R. The reason is that incumbent L implements a tax scheme that is biased towards equity but reduces efficiency. Therefore, she finds it optimal to default at lower levels of debt to be able to redistribute income to the poor households. The higher sovereign premium endogenously imposes a tighter borrowing constraint on incumbent L such that for growing debt she has to increase the tax burden and reduce progressivity at a faster rate than incumbent R. These tax policies are reflected in the income shares held by the poorest and richest income groups.

3.3 The Impact of Political Uncertainty on Sovereign Default Risk and Redistribution

To study how political uncertainty affects the incumbents' policy choices, I assume that elections take place with an exogenous probability $(1-\kappa)$. When choosing her optimal policies, the incumbent incorporates the impact of her choices on her re-election probability. The blue solid lines in Figures (3) and (4) assume that the population votes on the government every year, $\kappa = 0$. To facilitate a comparison with the scenario in which incumbents do not face any political uncertainty, the dotted black lines refer to $\kappa = 1$. The figures assume that aggregate productivity is 3 percent below its trend.

With elections taking place every period, the bond price 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 bond price function in Figure (3) shows that, for a given level of borrowing, incumbent R faces larger spreads compared to the scenario in which she remains in office with certainty. The bond price incorporates the probability that party L is elected into office in the next period who is more likely to default. In contrast, incumbent L pays a lower sovereign premium, because there is a positive probability that

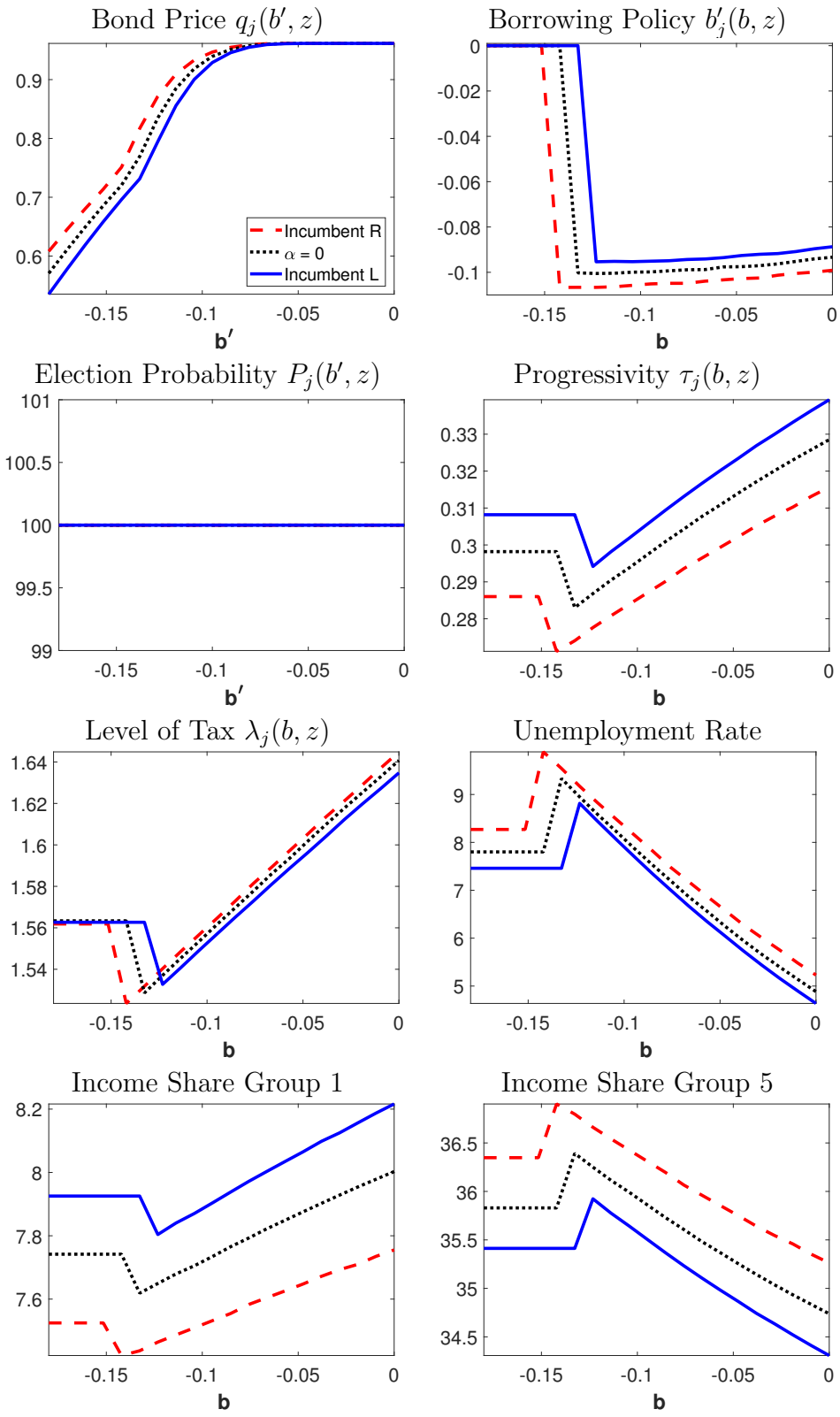

Figure 2. Policy Functions: No Elections, $\kappa = 1$; *The figure shows the policy functions associated with incumbent R (dashed red lines) and incumbent L (solid blue lines) if they remain in office forever. The black dotted lines refer to the policy choices associated with a benevolent planner who places the same weight on all income groups. The figure assumes that aggregate productivity is 3 percent below its trend.*

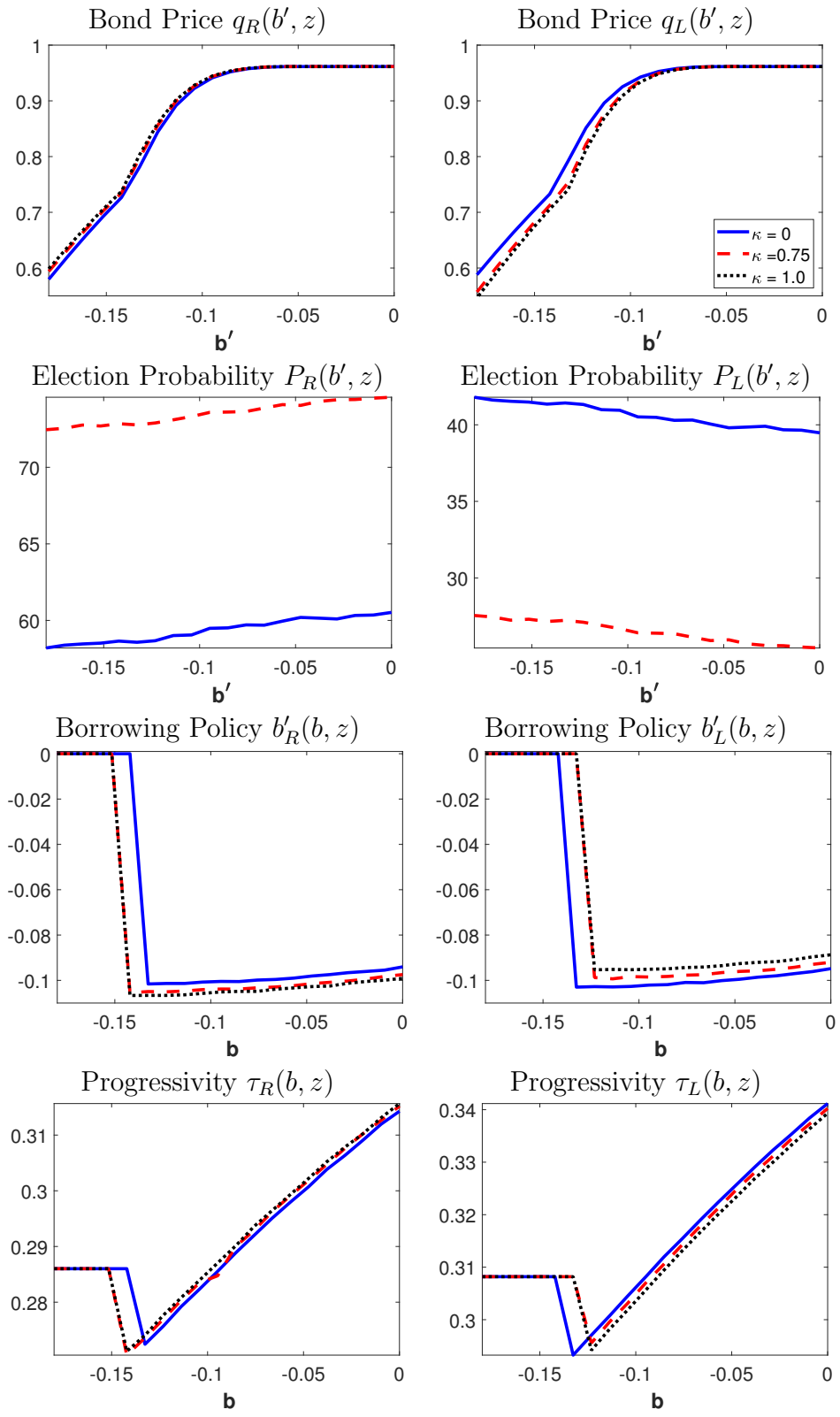

Figure 3. Policy Functions: Elections; *The figure shows the policy functions associated with incumbent R (left panels) and L (right panels).* $\kappa = 0$ *and* $\kappa = 0.75$ *are shown as the blue solid and red dashed lines, respectively. The scenario without elections* $\kappa = 1$ *is displayed by the dotted black lines. The figure assumes that aggregate productivity is 3 percent below its trend.*

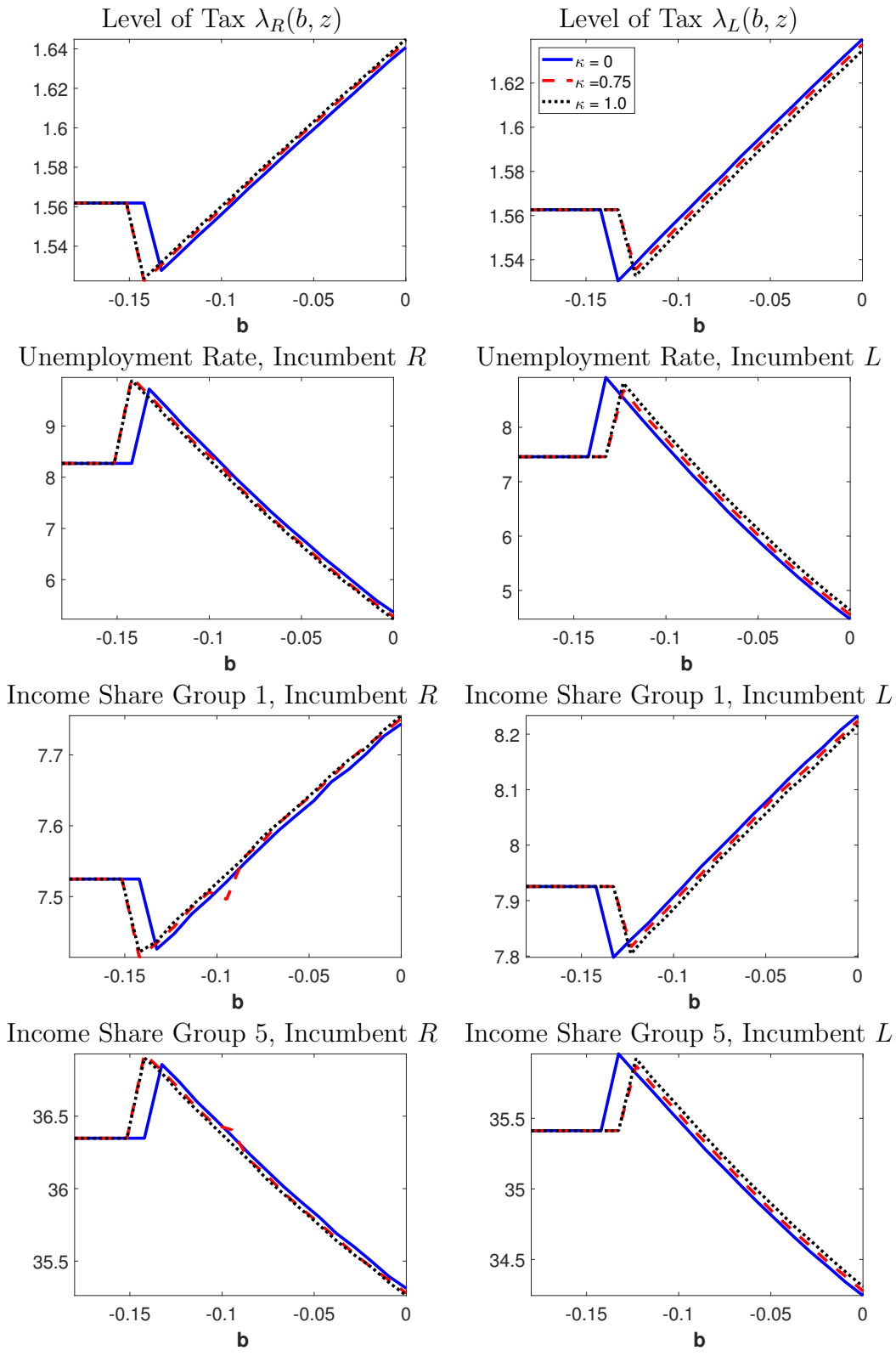

Figure 4. Policy Functions: Elections; *The figure shows the policy functions associated with incumbent R (left panels) and L (right panels).* $\kappa = 0$ *and* $\kappa = 0.75$ *are shown as the blue solid and red dashed lines, respectively. The scenario without elections* $\kappa = 1$ *is displayed by the dotted black lines. The figure assumes that aggregate productivity is 3 percent below its trend.*

party R gains power in the next period who is less prone to default.

The election probability $P_j^r(b', z)$, $j = R, L$, depends on the borrowing choice b' and the aggregate productivity z. Interestingly, for every level of b', incumbent L has a lower probability of being re-elected than incumbent R. The reason is that incumbent L's tax and default policy reduces the economy's efficiency and raises credit costs such that agents in the middle-income group have an economic benefit if party R is in office. However, incumbent L can raise her re-election probability by issuing more debt to finance redistribution.

The optimal borrowing choices of R and L are driven by the bond price and the election probability. With elections taking place every period, incumbent L faces lower credit costs making her less constrained in her borrowing choices, compared to the situation in which she would remain in power with certainty ($\kappa = 1$). In addition, she has an incentive to issue more debt to remain in office. Therefore, incumbent L borrows more compared to the situation without political uncertainty. In addition, incumbent L has lower incentives to default. In contrast, the probability of losing office raises incumbent R's credit costs, restricting her debt issuance and inducing her to default at lower levels of debt.

The optimal tax policies and the income shares held by the different income groups (Figures (3) and (4)) reveal that incumbent L (R) implements a more (less) redistributive tax policy compared to the situation in which governments remain if office with certainty. While the risk of losing power make the parties' debt and default policies more similar, it increases the disparities in their redistributive policies.

The dashed red lines in Figures (3) and (4) show the policy functions if elections take place very four years on average ($\kappa = 0.75$). Qualitatively, the mechanisms are the same as with $\kappa = 0$. Note, however, that the re-election probability of party L is substantially lower than the re-election probability of party R. Individuals take into account that their voting outcome has a persistent effect and are therefore less likely to vote for party L who faces higher credits costs and has a smaller fiscal space.

3.4 Redistribution and Sovereign Default

In this section, I study the properties of a typical default event. To this end, the model is simulated for 300,000 periods and the default events are collected. I consider simulations in which incumbent R (L) remains in power but faces political uncertainty because elections take place at the end of every period ($\kappa = 0$). Figure 5 displays the dynamics of the economy four years prior and four years after a default if party R (dashed red lines) or party L (solid blue lines) is in office. The panels show the average pattern of aggregate productivity in percent, the incumbent's re-election probability in percent, debt service payments as percentage share of output, the degree of progressivity, the sovereign spread in percent and

the unemployment rate in percent.

A sovereign default is triggered by a negative shock to aggregate productivity, which decreases aggregate production. Incumbent L is more prone to default and defaults at less negative productivity realizations than incumbent R. Prior to the default, debt service payments as share of output increase. The higher credit costs reduce the fiscal space such that the government reduces redistribution and inequality increases. The higher tax burden and low aggregate productivity raise unemployment dampening aggregate production even further. At the same time, public expenditures related to the provision of unemployment benefits increase. Lower production and higher spending endogenously reinforce the risk of a sovereign default and increases the sovereign spread. Importantly, the left-wing government experiences a stronger increase in the sovereign spread than the right-wing government. After the default, the government is able to reduce the tax burden and to raise redistribution because outstanding debt obligations are not repaid.

These default dynamics are broadly in line with the empirical evidence. Woo et al. (2013) document that fiscal contractions increase income inequality mainly via unemployment. Agnello and Sousa (2014) find empirical support that income inequality rises during fiscal consolidations.

4 Conclusions

This paper has developed a quantitative model of sovereign debt with heterogeneous agents and non-linear income taxation to explore how redistributive 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 debt to avoid the distortionary effects of income taxation. On the other hand, the accumulation of external debt raises the interest rate and tightens the government budget constraint. Importantly, an incumbent with a higher preference for redistribution is more prone to default and faces higher interest rates, which reduce her fiscal space for redistribution and dampen her electoral support. The paper shows that the risk of losing power strengthens the disparities between the redistributive policies of the two parties.

The next step is to go beyond the mechanisms and to calibrate the theoretical framework to an economy of interest in order to assess the quantitative dimensions of the interplay between income inequality, electoral outcomes, and sovereign default risk.

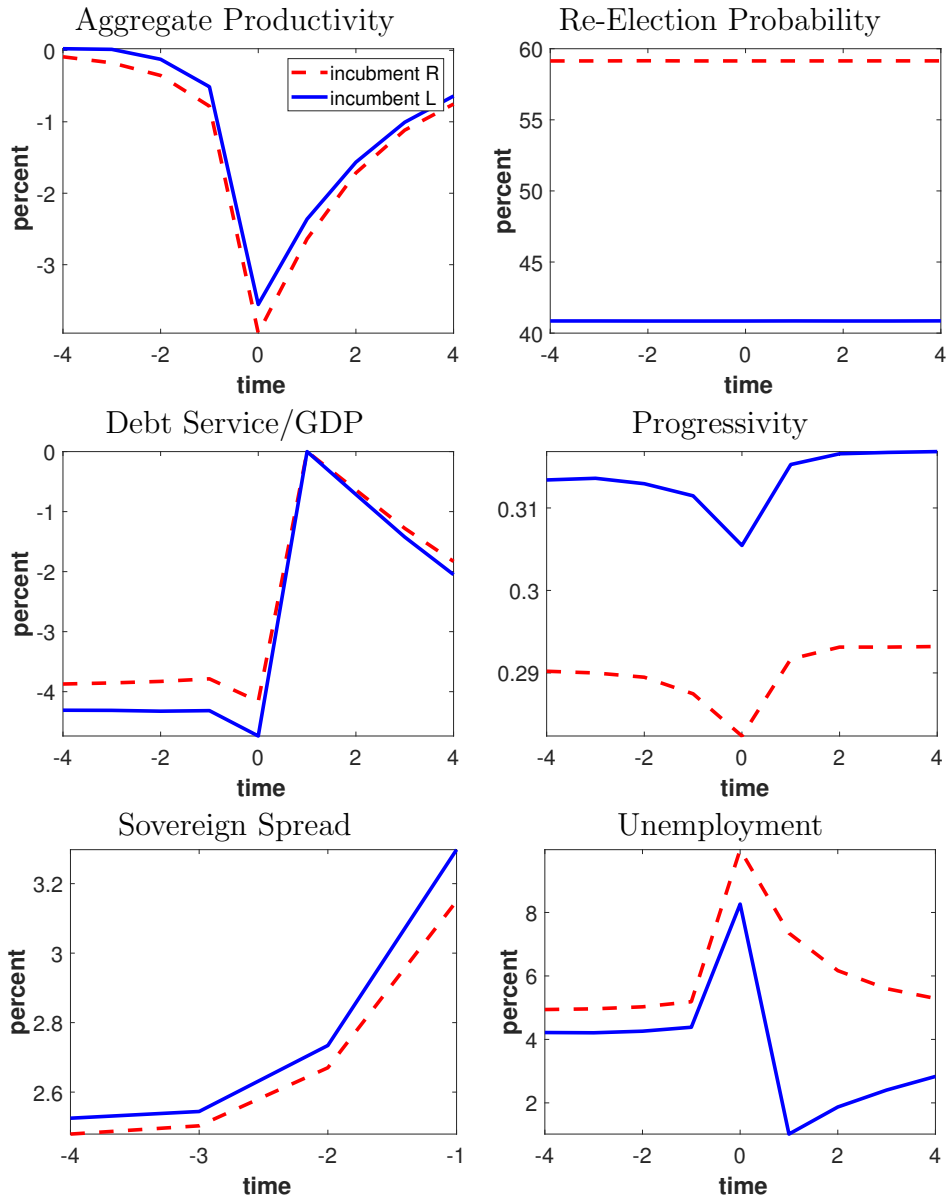

Figure 5. Default Event, $\kappa = 0$; *The figure shows the average dynamics in default events. The model is simulated for 300,000 periods and the default events are collected. The figure considers simulations in which incumbent R (L) remains in power but faces political uncertainty because elections take place at the end of every period* ($\kappa = 0$)

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