Weak States And Steady States: The Dynamics of Fiscal Capacity*

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This Draft September 12, 2012.

Abstract

Investments in fiscal capacity – economic institutions for tax compliance – are an important feature of economic development. This paper develops a dynamic model to study such investments and their evolution over time. We contrast a social planner's investment path with paths where political constraints are important. Three types of states emerge in the long run: (1) a common-interest state where public resources are devoted to public goods, (2) a redistributive state where additional fiscal capacity is used for transfers, and (3) a weak state with no transfers and a low level of public goods provision. The paper characterizes the conditions for each type of state to emerge and the comparative statics within each regime. It also presents some preliminary evidence consistent with the theory.

*We are very grateful for the comments of Marco Battaglini who also discovered some errors in a first version of the paper. We thank two anonymous referees and the editors for useful suggestions.

1 Introduction

The growth of the state and its capacity to extract significant revenues from its citizens is one of the most striking features of the economic history over the last two centuries. Yet, in spite of its practical importance, economists have done little research on investments to improve the working of the state. Most public-finance models focus on the allocation of given tax raising powers, while the development of such powers is rarely studied in public finance. Instead, research on long-term investments in the state has been left to historians, such as historical sociologist Charles Tilly (see, e.g., Tilly, 1990), who is known for his work on European exceptionalism. in building strong states, arguing that war is a key influence in state development.[1]

The past century, for which we have more accurate data, has witnessed substantial increases in tax revenues raised by government. Maddison (2001) documents that France, Germany, the Netherlands and the UK raised an average of around 12% of GDP in tax revenue around 1910 and around 46% by the turn of the Millennium. Corresponding figures for the U.S. are 8% and 30%. Underpinning these substantial trends in revenue raised over the past century are a number of tax innovations, including the extension of the income tax to a wide population. To improve compliance, this required not only building a tax administration but also implementing withholding at source. Such investments in the state have enabled the kind of mass taxation now considered normal throughout much of the developed world.[2] But, as we show in the next section, the world is populated by a number of weak states that have yet to build their fiscal capacity in the way rich and high-taxing countries have done. In fact, the notion of weak states is becoming a salient theme in economic development – see, for example, Migdal (1988), Acemoglu (2005) and Besley and Persson (2011). It is now widely acknowledged that understanding persistent weakness requires a political-economics approach, where government incentives play a central role.[3]

The aim of this paper is to provide a basic theoretical framework for analyzing economic and political determinants of investments in fiscal capacity. The model we propose is stylized in many ways. By stripping away a number

[1] See also Brewer (1989), Hintze (1906), and Hoffman and Rosenthal (1997).

[2] See e.g., Slemrod and Yitzhaki (1997) for a review of the compliance literature in public finance.

[3] See Rice and Patrick (2008) for an overview of various empirical measures of state weakness.

of complicating factors, we are able to highlight some important aspects of the forces at work. Our model has only two groups, one of which is in power in each period. A turnover parameter determines the probability that the incumbent group will maintain its power until the next period. An incumbent government decides on three things: public goods, transfers and investments in future fiscal capacity. It faces an institutional constraint on its ability to discriminate transfer payments between the two groups.

In this framework, we build on earlier work – especially by Besley and Persson (2009, 2010) – on how politics and institutions shape investments in fiscal capacity. But this earlier work was confined to a two-period setting, thus limiting its scope to predict the long-run evolution of fiscal capacity. By contrast, the infinite-horizon model developed in this paper helps to cast light on how dynamic adjustments might lead to different patterns of long-run state development.

To home in the role of politics, we introduce two exogenous "political frictions". The first is the extent to which political institutions are cohesive (due to the presence of checks and balances); the second is the extent to which political decisions are myopic (due to political turnover). We show how these frictions combine to influence the path of the economy in comparison to a benevolent planner's desired path of state development. Even small frictions can have interesting dynamic implications.

Our model suggests that three kinds of states may emerge in the long run. If institutions are cohesive enough, state investments parallel the path chosen by a Pigouvian planner who maximizes social welfare. The state strengthens its fiscal powers over time and uses the higher revenue to expand the provision of public goods. Since the demand for such common-interest spending determines the size of the state and concomitant investments in tax raising power, we refer to this as a common-interest state.

If political institutions lack the cohesion of a common-interest state, two possibilities emerge. When the polity is stable, the state grows to a point where it has maximized state capacity. On its way there, however, the state becomes a vehicle for redistribution towards incumbent groups. Since the steady-state size of the state is pinned down by group interests rather than common interests, we refer to this as a redistributive state. If the lack of cohesion goes hand in hand with political instability, however, the steady state does not permit any redistribution. But now the equilibrium state is smaller in size and provides socially sub-optimal levels of public goods at all times. We refer to this case as a weak state.

While different in its motivation and scope, the model in our paper and the one in Battaglini and Coate (2007) share a number of common features. Their dynamic model also has three possible steady states, which are associated with different compositions and levels of government spending. But some of the results are different. First, while the focus in Battaglini and Coate (2007) is on the accumulation of public capital, we focus on accumulation of fiscal capacity. Their feasible levels of taxation are restricted only by static economic forces, rather than dynamic institutional forces. Second, the different steady states in Battaglini and Coate (2007) are mainly driven by the demand for public goods. Our analysis lays bare how political features – the cohesiveness and stability of political institutions – shape long-run outcomes. Third, Battaglini and Coate (2007) allow for distortionary taxation, while in this paper taxes are lump-sum. This allows us to derive simple, closed-form, and easily interpretable conditions for the emergence of the three types of state. In an online appendix, we generalize our model to allow for distortionary taxes. While closed-form solutions are no longer possible, we show that our results are without significant loss of generality.

The paper contributes to a burgeoning literature on dynamic public finance and political economy.[4] Increasingly, these models recognize that political issues may be important in understanding policy over time. Recently, Acemoglu et al (2008, 2011), Azzimonti (2011), Battaglini and Coate (2007, 2008), Bai and Lagunoff (2011), and Song, Storesletten and Zillibotti (2008), amongst others, have enhanced our understanding of dynamic political equilibria when governments turn over. This work typically relies on the notion of Markov Perfect dynamic political equilibrium developed in Krusell, Quadrini and Rios-Rull (1996). All of these papers, in turn, are related to the literature on public debt by Aghion and Bolton (1990), Alesina and Tabellini (1990) and Persson and Svensson (1989), who studied strategic debt issue in the wake of political turnover. Differently from the previous literature, our emphasis here is on the accumulation of specific capital which facilitates the ability to raise future taxes. This way, our approach is related to the seminal paper by Cukierman, Edwards, and Tabellini (1992) on how the use of seigniorage depends on the efficiency of the tax system, and how the strategic choice of the latter depends on factors like political stability and polarization.

The remainder of the paper is organized as follows. Section 2 discusses some facts on building fiscal capacity, in the times series as well as the cross

[4]See Golosov et al (2006) for a survey of the normative literature.

section. Section 3 formulates our model and characterizes its equilibrium. Section 4 describes the Pigouvian benchmark of a fully stable and cohesive political system. Section 5 contrasts this benchmark with a society facing political frictions, characterizing and discussing equilibria around the three possible steady states. Section 6 provides some empirical evidence in its favor of the theory. Section 7 concludes. Proofs are relegated to the appendix.

2 Background Facts

In this section, we discuss some background time-series and cross-sectional facts which motivate the model.

Fiscal Reforms Figure 1 gives a partial picture of fiscal-capacity investments *over time.* It plots the distribution of three kinds of investments for a sample of 44 countries, for which we have data in the period since 1800. Red lines demarcate the introduction of the income tax, blue lines the introduction of income-tax withholding, and green lines the adoption of a VAT. Although the sample is limited, it illustrates clearly how such investments have evolved over time. Income taxes began appearing in the middle of the 19th century and are fully prevalent in the sample in the interwar period. Withholding followed somewhat later and was not complete until after World War II. The VAT was lagging further behind, with adoption still incomplete by the end of the 20th century.

The changes illustrated in Figure 1 are all associated with investments in administrative structures that support tax collection.[5] Figure 2 looks at the historical picture over the last 100 years for a more limited sample of countries, using data from Mitchell (2007). This sample only includes a number of countries that existed already in 1900, where we are reasonably confident that the data are comparable across time and place.[6] The figure illustrates how the average tax take has increased over time from around 10% in national income to around 25% in the sample as a whole. Equally

[5] Aidt and Jensen (2009) study the factors, such as spending pressures and extensions of the franchise, behind the introdcution of the income tax in panel data for 17 countries from 1815 to 1939.

[6] The countries in this sample are Argentina, Australia, Brazil, Canada, Chile, Colombia, Denmark, Finland, Ireland, Japan, Mexico, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and the United States.

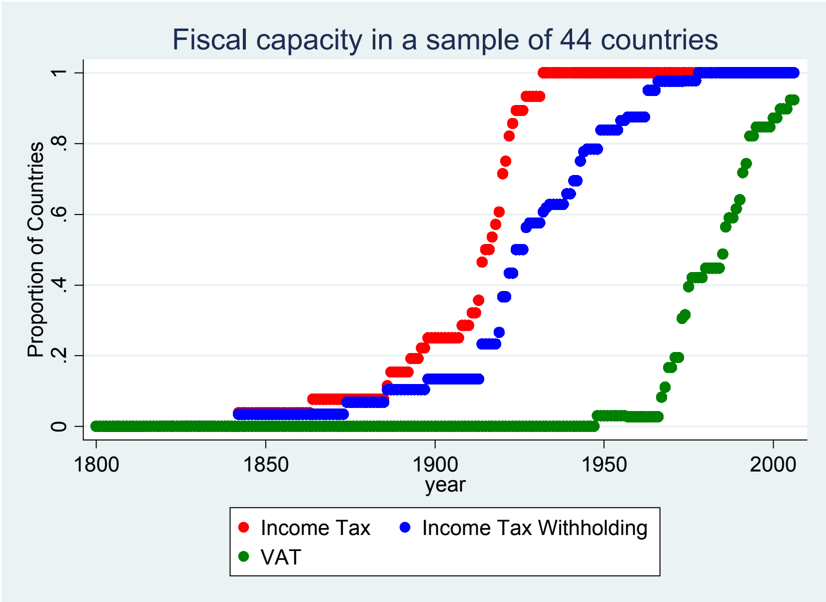

Figure 1: Evolution of Fiscal Capacity in 44 Countries

striking is the increasing reliance on income taxation which only made up about 5% of revenues in 1900 but about 50% by the end of the last century. The boosts in the level of the income tax share during the two world wars are also striking, as is the indication of a "ratchet effect".

Tax Patterns by Income and Time Period But the historical experience of the (predominantly) rich countries in the samples behind Figures 1 and 2 gives an incomplete picture. On the whole, poor countries have much lower tax intakes. To illustrate this, the left panel of Figure 3 plots the overall tax take as a share of GDP from Baunsgaard and Keen (2010) against the log of GDP per capita from the Penn World Tables, both measured around the year 2000, and distinguishes observations by income. The right panel exposes the same relationship, using the time-series data from Mitchell (2007) to plot five-year averages of the tax share over the twentieth century against national income, and distinguishes observations by time period. The cross-section and time-series patterns are strikingly similar. Higher-income countries today raise much higher taxes than poorer countries raise today and what they raised themselves at an earlier lower income level. Both compar-

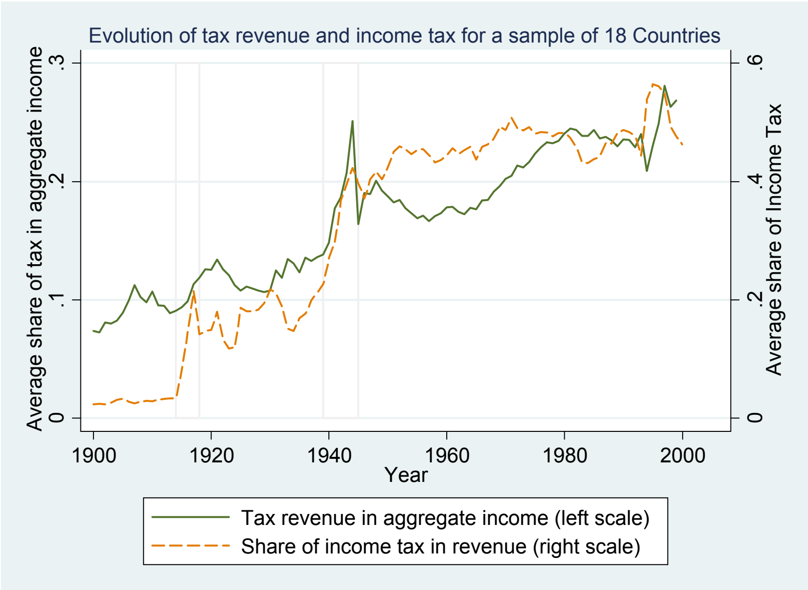

Figure 2: Taxes and share of income tax over time

isons indicate that the currently rich countries have made larger investments in fiscal capacity. Moreover, the tax share in GDP of today's developing countries does not look very different from the tax take 100 years ago in the now developed countries.

To probe further into tax differences across countries, it is interesting to look at the relative uses of different types of taxes, differentiated by the investments required for them to be collected. Arguably, trade taxes and income taxes are two opposite polar cases. Collecting trade taxes only requires being able to observe trade flows at major shipping ports. Although trade taxes may encourage smuggling, this is a much easier proposition than collecting income taxes, which requires major investments in enforcement and compliance structures throughout the entire economy. We can thus obtain an indication of fiscal-capacity investments by holding constant total tax revenue, and ask how large a share of it is collected from trade taxes and income taxes, respectively.

These shares are plotted against each other in Figure 4.[7] Again, we re-

[7]Other taxes not included in either trade or income taxes include indirect taxes such as VAT, property and corporate taxes.

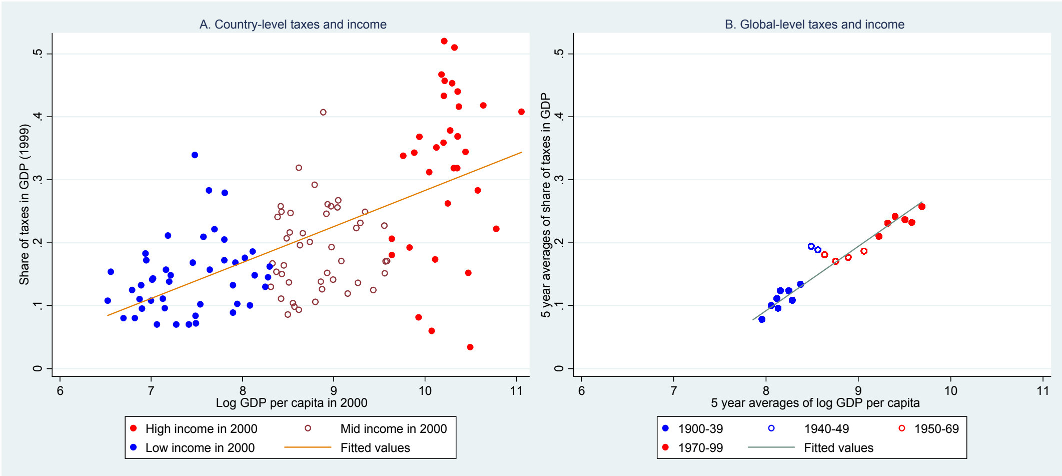

Figure 3: Tax revenue and GDP per capita

port the cross-sectional pattern for the year 2000, based on contemporaneous data from Baunsgaard and Keen (2010), as well as the time-series pattern over the last 100 years based on historical data from Mitchell (2007). The income-tax share is displayed on the vertical axis, and the trade-tax share on the horizontal axis. We observe a clear negative correlation: countries that rely more on income taxes on average rely less on trade taxes. The left panel also shows a striking pattern by income: high-income countries depend more on income taxes, while middle-income and, especially, low-income countries depend more on trade taxes. The right panel of Figure 4 shows that the move from trade to income taxes has also been a feature of the historical development of tax systems. Again, the cross-sectional and time-series patterns look strikingly similar with a similar slope of the regression lines.

Figure 5 zooms in on the income tax, plotting the relationship between the share of income taxes in total taxes and income per capita, in the current cross section as well as the historical time series. The left panel separates the observations into three groups by tax take: countries that raise more than 25% of taxes in GDP, countries that raise 15-25% of taxes in GDP, and countries that raise less than 15%. The countries in the high-tax group again look markedly different, raising much more of their tax revenues in the form of income taxes. The right panel again colors observations by time period. The historical trend in this sample of older nations and the pattern in the

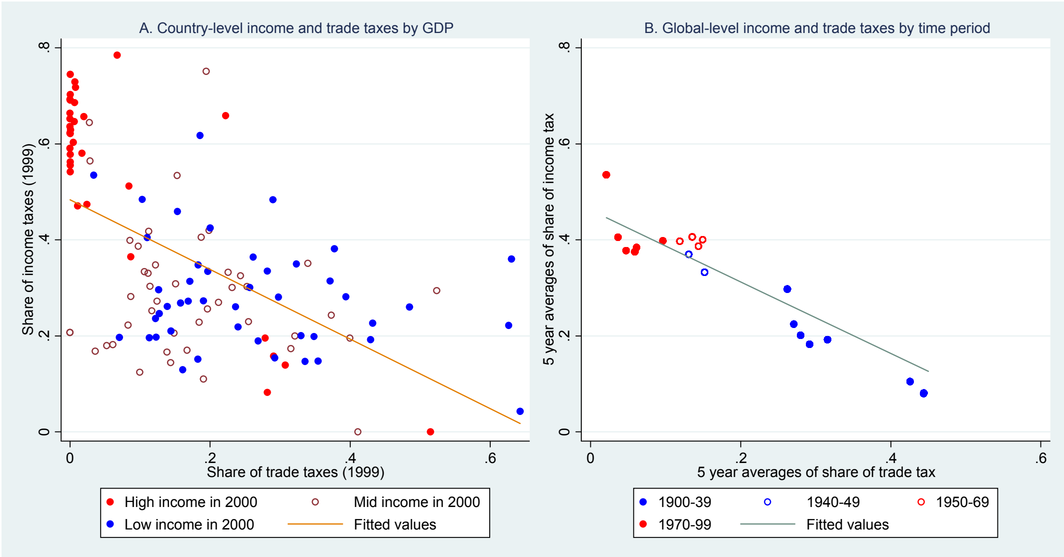

Figure 4: Income taxes and trade taxes

world today is again very similar.

Taken together, these data clearly illustrate both the changing level and pattern of taxation. The model that we present in the next section is geared towards a better understanding of the forces that underlie these patterns, in particular the time-series evolution of taxation.

3 The Model

This section lays out the model and discusses its core assumptions.

Basics The population of an economy is divided into two groups: A and B, where each group comprises half the population. Time is measured discretely with an infinite horizon, with time periods denoted by $s = \{1, 2, ...\}$. At any given date s, one group is the incumbent government, denoted by $I_s \in \{A, B\}$. The other group makes up the opposition, denoted by $O_s \in \{A, B\}$. At the beginning of each period, a peaceful transition of power, so that $I_s = I_{s-1}$, occurs with exogenous probability γ. With probability $1 - \gamma$ the incumbent remains in power so that $I_s = I_{s-1}$. These probabilities are

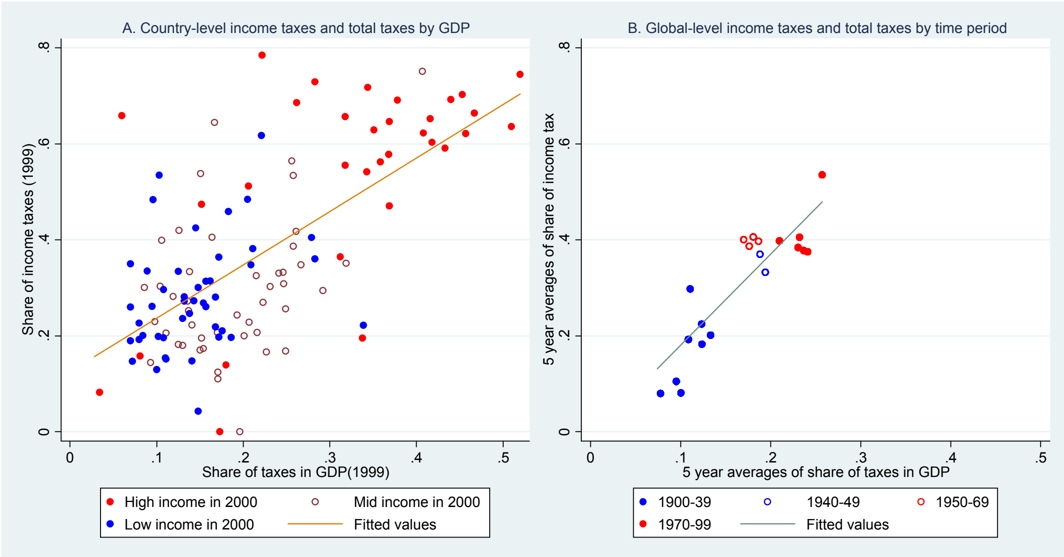

Figure 5: Income taxes and total taxes

independently and identically distributed over time.[8]

Preferences and Production Opportunities Individuals begin each period with income ω, which can be costlessly transformed into either private consumption or a public good. In each period s, individuals in group J value their own private consumption x_s^J and the (non-durable) public good g_s by the quasi-linear function:

$$\alpha V\left(g_s\right) + x_s^J \ ,$$

where $V\left(\cdot\right)$ is an increasing, twice-differentiable strictly concave function, which satisfies the usual Inada conditions. All individuals discount the future at a rate of δ.

The parameter α shapes the marginal value of public goods. It parame-

[8] This modeling assumption is different from that in Battaglini and Coate (2007, 2008). There the probability that a legislator will be in the coalition in the following period is given by $\frac{q}{n}$, where q is the size of the minimum winning coalition and n the number of legislative districts. This probability does not depend on whether a given legislator is in the coalition or in the opposition. In our case, γ and $(1-\gamma)$ give the probability that a group will be in power in the following period if they are in opposition or the incumbent, respectively.

trizes common interests and could, for example, represent an external threat which requires spending on an army.

Policies and Institutions An incumbent enters period s with an accumulated stock of fiscal capacity τ_s. Variable τ_s represents the maximal share of private income that can be taxed away, or simply *fiscal capacity.* As discussed in Besley and Persson (2012), and as shown in the online appendix, such a formulation can be given microeconomic foundations in a setting where individuals can avoid taxation by moving their activities from a formal to an informal (and untaxed) sector.

Fiscal capacity depreciates at rate d in each period and the investment cost for one unit of fiscal capacity is constant at c. Throughout, we postulate:

Assumption 1: $\omega > c\left[\frac{1}{\delta} - (1-d)\right]$.

Taxation has an upper bound $\bar{\tau} < 1$, which may be interpreted as the highest *technologically* feasible tax rate – as opposed to the highest *institutionally* feasible tax rate, which is τ_s. In a slightly richer model, $\bar{\tau}$ could be the peak of the Laffer curve. In the online appendix, we present a model where taxes are distortionary, in which case $\bar{\tau}$ is endogenously determined.[9] We assume that $\bar{\tau}$ is sufficiently high that institutional constraints, rather than the exogenous technological limit, constrain the emergence of redistributive states. In particular, we assume:

Assumption 2: $\alpha V_g\left((\omega - cd)\,\bar{\tau}\right) < 1$

In each period, the incumbent makes tax and spending decisions. She chooses a feasible tax rate $t_s \leq \tau_s$, which is non-discriminatory across groups, and divides the resulting revenue between public goods g_s, state capacity investments $\tau_{s+1} - \tau_s(1-d)$, and non-negative transfers. The per-capita transfer to the incumbent's group in period s is r_s^I, while that to the opposition group is r_s^O.

No binding agreements can be made between the incumbent and opposition groups about the future use of these transfers, beyond the constraints imposed by political institutions.[10] In particular, these restrict the degree

[9] This is also the case in Battaglini and Coate (2007).

[10] This absence of commitment is the friction in the model that premits the kind of inefficient equilibria discussed below.

to which transfers can discriminate between the two groups. Specifically, incumbents are institutionally required to transfer at least $\sigma \in [0,1]$ units of consumption to the opposition for each unit of consumption they transfer to their own group. This gives the following constraint:

$$r_s^O \geq \sigma r_s^I \ . \tag{1}$$

It is most useful to work with the parameter $\theta = \frac{\sigma}{1+\sigma} \in [0, 1/2]$. Throughout, we interpret a higher value of the opposition's share of transfers, θ, as reflecting more cohesive, or representative, political institutions. Real-world counterparts of a high θ may be e.g., more protection of opposition groups through a system of constitutional checks and balances, or more equal representation though a proportional electoral system. If $\theta = 1/2$, then transfers are shared equally across the two groups.[11]

Period-s Policy Incumbents are fully representative of their group, putting equal weight on the welfare of all group members. A budget in period s is a tax rate, t_s, a level of public good provision g_s, a pair of transfers $\{r_s^I, r_s^O\}$ and a future level of fiscal capacity τ_{s+1}. The government budget constraint is:

$$t_s\omega \geq g_s + c\left(\tau_{s+1} - (1-d)\,\tau_s\right) + \frac{r_s^I + r_s^O}{2} \ , \tag{2}$$

where the left-hand side is tax revenue and the right-hand side is public spending.

Solving for transfer levels to each group is straightforward. Any incumbent will set the highest feasible transfer to her own group and the lowest feasible transfer to the opposition. Using the institutional constraint (1) and (2), this implies:

$$x_s^J = (1-t_s)\,\omega + r_s^J = (1-t_s)\,\omega + \beta^J\left[t_s\omega - g_s - c\left(\tau_{s+1} - (1-d)\,\tau_s\right)\right] \ ,$$

where $\beta^I \equiv 2(1-\theta)$ and $\beta^O \equiv 2\theta$. Since $\beta^I \geq 1$, the incumbent group maximizes its private consumption, given public goods and fiscal capacity investments, by setting $t_s = \tau_s$.

Given an inherited level of fiscal capacity τ_s, we can now write the indirect

[11] We contrast this parameter with the assumptions of Battaglini and Coate (2007, 2008), where there is no institutional limit on the ability of the minimum winning coalition to redistribute in its favour, which would mirror $\sigma = \theta = 0$.

utility of group J in period s as:

$$W\left(\tau_s, g_s, \tau_{s+1}, \beta^J\right) = \begin{array}{c} \alpha V\left(g_s\right) + \beta^J\left[\tau_s\omega - g_s - c\left(\tau_{s+1} - \left(1-d\right)\tau_s\right)\right] \\ + \left(1-\tau_s\right)\omega \ . \end{array} \tag{3}$$

Note that the indirect utility function is identical for the two groups, except for the transfer share β^J. This symmetry is exploited in the solutions below.

Dynamic Optimization We study a Markovian decision problem of the incumbent, where τ is the single state variable (conditional on the group that holds power), using a particular equilibrium concept detailed below.

Exploiting the indirect utility function in (3), we can formalize the incumbent's policy problem as a dynamic optimization problem. Let $U^J\left(\tau\right)$ be the net present value of lifetime utility of group J entering a period with state capacity τ, where $J \in \{I, O\}$. The value function of the incumbent, $U^I\left(\tau\right)$, can be defined recursively from:

$$U^I\left(\tau\right) = \max_{\tau', g}\left[W\left(\tau, g, \tau', 2\left(1-\theta\right)\right) + \delta Z^I\left(\tau'\right)\right] \tag{4}$$

$$\text{subject to } \tau\omega \geq g + c\left(\tau' - \left(1-d\right)\tau\right) \tag{5}$$

$$\text{and } \tau' \leq \bar{\tau} \ . \tag{6}$$

From now on, we thus suppress time subscripts and let τ' denote the state capacity left for the following period. $Z^I\left(\tau'\right)$ is the incumbent's continuation value, defined as

$$Z^I\left(\tau'\right) \equiv \left(1-\gamma\right)U^I\left(\tau'\right) + \gamma U^O\left(\tau'\right) \ . \tag{7}$$

Owing to the symmetry of the groups, the value function $U^I\left(\tau\right)$ and the continuation value $Z^I\left(\tau'\right)$ apply to whichever group (A or B) that holds the incumbency.

We denote the policy functions that solve the incumbent's problem by $\tau' = T\left(\tau\right)$ and $g = G\left(\tau\right)$. Using these, the opposition's value function can be defined recursively from:

$$U^O\left(\tau\right) = W\left(\tau, G\left(\tau\right), T\left(\tau\right), 2\theta\right) + \delta Z^O\left(T\left(\tau\right)\right) \ , \tag{8}$$

where $Z^O(\tau')$ is the opposition's continuation value, defined as

$$Z^O(\tau') \equiv \gamma U^I(\tau') + (1-\gamma) U^O(\tau') \ . \tag{9}$$

Here, (8) recognizes that policy is governed by $G(\tau)$ and $T(\tau)$, and that political power alternates with probability γ of the opposition becoming the next government. By the symmetry assumption, (7) and (9) are identical except for the probability weights γ and $1-\gamma$ on the future status of the group.

Equilibrium Armed with these preliminaries, we state our equilibrium concept.

Definition: *A Symmetric Markov Perfect Equilibrium (SMPE) of the dynamic state capacity game is an initial level of fiscal capacity, $\tau_0 > 0$, and a set of functions $U^I(\tau)$, $U^O(\tau)$, $G(\tau)$, and $T(\tau)$ that satisfy the following conditions:*

1. *Given τ_0 and $U^0(\tau)$, $U^I(\tau)$ satisfies (4) to (7). $G(\tau)$ and $T(\tau)$ are the corresponding policy functions for g and τ'.*
2. *Given τ_0, $U^I(\tau)$, $G(\tau)$ and $T(\tau)$, $U^O(\tau)$ satisfies (8) and (9).*

In addition to Markov perfection, this definition imposes symmetry: both groups use the same strategies $\{G(\tau), T(\tau)\}$. Infinite-horizon dynamic games often have many equilibria. This is true in models with similar characteristics to ours, for example in dynamic programming problems with time-inconsistent preferences.[12] We refine our equilibrium definition by restricting attention to limits of economies of finite horizon S, as $S \to \infty$. All equilibria are therefore unique. This equilibrium concept has been used elsewhere (see for example Krusell, Kuruscu and Smith (2002) and Caballero and Yared (2010)). In the online appendix, we compare this approach to other possible solution methods. We discuss refining the Markov Perfect Equilibrium by restricting attention to concave value functions $U^0(\tau)$, $U^I(\tau)$.[13] In the appendix, we also discuss equilibria that depart from the assumption of Markov perfection and allow decision rules to depend on entire histories.[14]

[12] See Krusell and Smith (2003), for example.

[13] This approach is employed by Battaglini and Coate (2007) and Battaglini, Nunnari and Palfrey (2012), for example.

[14] See for example Acemoglu, Golosov and Tsyvinski (2008, 2011).

We are interested in paths of policy that satisfy these conditions, i.e., the properties of the policy functions $G(\tau)$ and $T(\tau)$ along the equilibrium path. We now turn to the study of these.

Characterization of the Equilibrium First, observe that the first-order conditions for g and τ' of the incumbent's problem defined by (4) to (6) are given by:

$$\alpha V_g(g) = \lambda + 2(1-\theta) \ , \tag{10}$$

where λ is the Lagrange multiplier on the budget constraint (5) and

$$c\alpha V_g(g) \leq \delta Z_\tau^I(\tau') \ , \tag{11}$$

wherever $Z^I(\tau')$ is differentiable. Equation (11) holds with equality as long as the technological constraint on taxes (6) is not binding. Where $Z^I(\tau')$ is not differentiable, the first order condition with respect to τ' becomes

$$\lim_{t \nearrow \tau'} \delta Z_\tau^I(t) \geq c\alpha V_g(g) \geq \lim_{t \searrow \tau'} \delta Z_\tau^I(t) \ . \tag{12}$$

We have $\lambda = 0$ whenever the public good is at $\hat{g}$ defined by:

$$\alpha V_g(\hat{g}) = 2(1-\theta) \ . \tag{13}$$

Public goods never exceed $\hat{g}$, since their marginal value would then be lower than the value of transfers to the incumbent group. If $\theta = 1/2$, then $\hat{g}$ is at the Lindahl-Samuelson optimum for the public good, $\alpha V_g(\hat{g}) = 1$. If $g < \hat{g}$, then g is determined by (5) holding with equality. In this case, the non-negativity constraint on transfers is binding and the incumbent allocates *all* tax revenues to public-good provision or the accumulation of fiscal capacity.

The following sections give a complete analysis of the equilibrium. Here, we outline its main features. The choices $T(\tau)$ and $G(\tau)$ are (weakly) increasing in τ. There is a cutoff point $\tau = \widetilde{\tau}$, at and above which government expenditures coincide with $\hat{g}$, as defined in (13). Above $\widetilde{\tau}$, the incumbent optimally makes transfers and we refer to such a situation as a *redistributive regime*. If, on the other hand, $\tau < \widetilde{\tau}$, transfers are zero and public goods are provided at a lower level $g < \hat{g}$, given by (5) holding with equality. To capture this fact, we call such a situation a *common-interest regime,* as all tax revenues are devoted to public goods inclusive of fiscal capacity.[15]

In the redistributive regime, (11) becomes

$$2c\,(1-\theta) \leq \delta Z_{\tau}^{I}\,(\tau')\,. \tag{14}$$

4 The Pigouvian Benchmark

To derive the solution preferred by a Pigouvian planner in this setting, we postulate $\theta = \frac{1}{2}$, $\gamma = 0$. In other words, the planner values each group equally – the equivalent of fully cohesive institutions in our model – and she is not replaced.[16] The resulting problem boils down to a more or less standard dynamic-programming problem, with the value function (4) written as:

$$U^{I}\,(\tau) = \max_{\tau',g} \left\{ \alpha V\,(g) + \omega - g - c\,(\tau' - (1-d)\,\tau) + \delta U^{I}\,(\tau') \right\}$$
$$\text{subject to} \quad \omega\tau \geq g + c\,(\tau' - (1-d)\,\tau)\ .$$

The solution is given in Proposition 1. To analyze steady states, let $\left\{g^{S}, \tau^{S}\right\}$ denote the steady-state levels of public goods spending and fiscal capacity in a steady state of type S. In the planning case, $S = P$.

Proposition 1 *An economy governed by a Pigouvian planner ($\theta = \frac{1}{2}$, $\gamma = 0$) has a unique, stable, steady state with public-good provision and fiscal capacity*

$$\alpha V_{g}\left(g^{P}\right) = \frac{\delta\omega}{\delta\omega - [1 - \delta\,(1-d)]\,c} > 1 \quad \textit{and} \quad \tau^{P} = \frac{g^{P}}{\omega - cd} < \widetilde{\tau}. \tag{15}$$

The economy cannot be in the redistributive regime for any period $s > 0$. If $\tau_0 > \widetilde{\tau}$, the economy immediately jumps to $\tau_1 < \widetilde{\tau}$.

Proof. Appendix A ■

Steady state investment in fiscal capacity is at a level that is sufficient to support public-goods provision, but no transfers are provided. The steady-state level of public goods is determined by the cost of fiscal capacity and the value of public goods, α. If fiscal capacity were costless, the planner would

[15] Battaglini and Coate (2007) use the terms "minimum winning coalition" and "unanimity", respectively, for the parallel regimes that arise in their paper.

[16] The assumption $\gamma = 1$ is not required to arrive at the Pigouvian solution if $\theta = \frac{1}{2}$, as will be apparent in the following section.

accumulate sufficient fiscal capacity to fund the optimal level of public goods as by the Lindahl-Samuelson rule where $\alpha V_g(g) = 1$. However, that level of public goods requires recurrent expenditures to maintain the stock of fiscal capacity. We can interpret cd as the incremental cost of maintaining fiscal capacity. Factoring in this cost means that public goods are provided below the Lindahl-Samuelson level in the long run.

Cross-sectionally, the steady-state planning solution would predict a larger steady-state government whenever common interests and the demand for public goods (α) are stronger, private income and productivity (ω) is higher, and the costs of fiscal capacity investment (c) or depreciation of fiscal capacity (d) are lower.

The dynamics of the planning solution are simple. An economy with an initial level below τ^P converges monotonically to this level from below. If it begins above $\widetilde{\tau}$, then the economy cannot be in the redistributive regime for any longer than a single period. In that regime, fiscal capacity is so high that the government can provide public goods at the Lindahl-Samuelson level defined by $\alpha V_g(\hat{g}) = 1$, and tax at an even higher rate than necessary. Because fiscal capacity is reversible and can be transformed into private consumption, the planner finds it optimal to rebate fiscal capacity back to citizens by an equal transfer to each group and revert to the common-interest regime.

Figure 6 illustrates the time path of the economy.[17] It plots the decision rule $\tau_{s+1} = T(\tau_s)$. State capacity converges to τ^P.

5 Political Economics

Having defined and analyzed the Pigouvian benchmark, we now show that when $\theta < 1/2$ and $\gamma > 0$, three possible long-run outcomes exist, one of which mirrors the planning outcome. Two key conditions, which we now introduce, govern the behavior of the economy over time. We first is:

The Cohesiveness Condition: $2(1-\theta) \leq \frac{\delta\omega}{\delta\omega - [1-\delta(1-d)]c}$.

As the right-hand side of this condition is above unity, it holds as long as θ is close enough to one half – i.e., political institutions are sufficiently cohesive.

[17] All figures were derived from simulations with the following parameter values: $\omega = 3$, $c = 1$, $d = 0.2$, $\delta = 0.95$, $\alpha = 0.7$. γ and θ vary from figure to figure, in Figure 6 $\theta = \frac{1}{2}$. Figures were qualitatively similar for other parameter values.

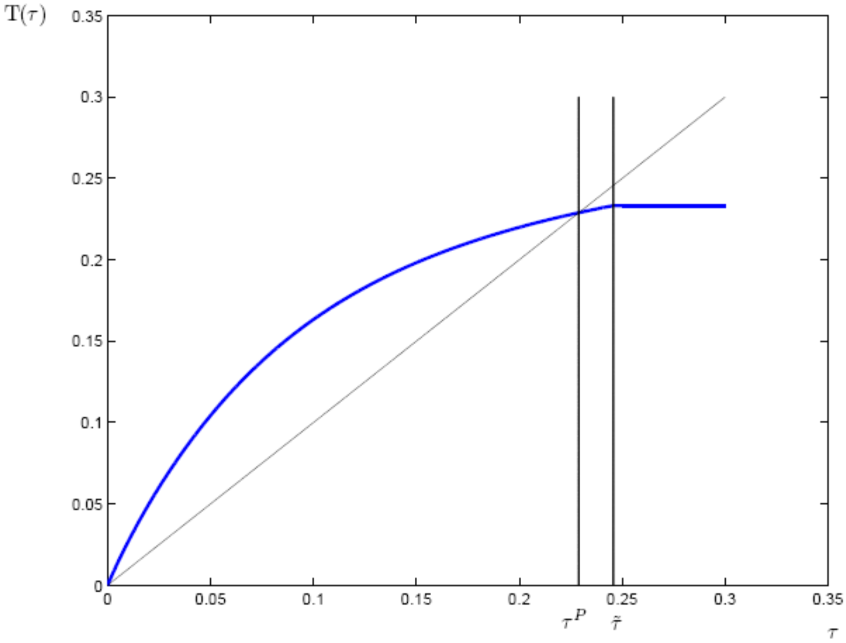

Figure 6: The Pigouvian Planner

Given Assumption 1, the condition will fail for θ close enough to zero. It also holds when c and d are large, which means a low demand for public goods, all else equal. The second condition is:

The Stability Condition: $2\left[(1-\gamma)(1-\theta)+\gamma\theta\right] > \frac{\frac{2(1-\theta)c}{\delta}+\omega}{(1-d)c+\omega}$.

This will hold only if θ and/or γ is close enough to zero – i.e., when political institutions are not very cohesive, there has to be sufficient political stability for the condition to hold. The term $\phi \equiv (1-\gamma)(1-\theta)+\gamma\theta$ has a simple interpretation as a "stability" parameter. It gives the incumbent's expected portion of next-period's transfers, i.e. the confidence an incumbent has that she will benefit from the spoils of redistribution in the following period.

Figure 7 shows the parameter values when these conditions pass or fail in $(1-\gamma,\theta)$ space. The cohesiveness condition is described by a vertical line (the border between the white and the dark-gray region). The stability condition is described by an upward-sloping curve (between the white and light-gray region). This curve starts from a positive value of $1-\gamma$ at $\theta = 0$ and coincides with the cohesiveness condition as $1-\gamma$ reaches a value of 1 (i.e., as γ goes to 0).

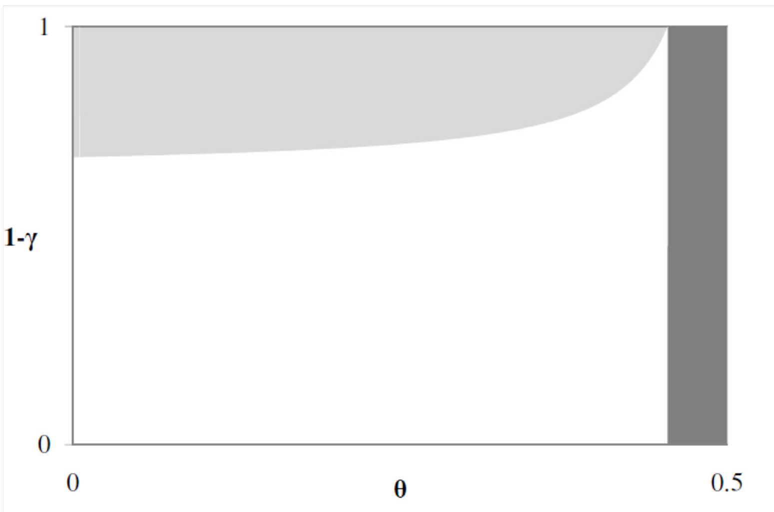

Figure 7: Steady states for different political parameters

Three possible long-run outcomes correspond to the three sets of parameter constellations depicted in Figure 5. If the cohesiveness condition holds, we have a common-interest steady state. When the stability condition holds, we have a redistributive steady state. When none of the conditions hold, we have a steady state with neither redistribution nor optimal public-good provision. We refer to this as a weak steady state, since political institutions are non-cohesive and political turnover is high.

In Figure 7, the cohesiveness and stability conditions are mutually exclusive and cannot hold simultaneously. While Figure 7 demonstrates this fact visually for specific values of the parameters $\{c, \omega, d, \delta\}$, this is a more general result, as can be seen by writing the cohesiveness condition as

$$2\delta(1-\theta)(\omega+(1-d)c)-\delta\omega \leq 2(1-\theta)c$$

and the stability condition as

$$2\delta\phi(\omega+(1-d)c)-\delta\omega > 2(1-\theta)c.$$

Given that $1-\theta \geq \frac{1}{2}$ and $\phi \leq \frac{1}{2}$, the two conditions are indeed mutually exclusive.

5.1 A Common-Interest Steady State

First, consider the situation when the cohesiveness condition holds. The resulting common-interest steady state, $S = C$, has $\tau^C < \widetilde{\tau}$. Tax capacity converges to a level in the common-interest regime, and thus $\alpha V_g\left(g^C\right) > 2(1-\theta)$. In fact, as summarized in Proposition 2, the steady state is identical to the steady state chosen by a Pigouvian planner, so that $\left\{\tau^C, g^C\right\} = \left\{\tau^P, g^P\right\}$.[18]

Proposition 2 *A common-interest steady state exists if and only if the cohesiveness condition holds. The steady state is as in the Pigouvian solution described in Proposition 1. This steady state with $\tau^C = \tau^P$ is unique and globally stable. An economy beginning at any level of state capacity will converge to the common-interest steady state and may remain in the redistributive regime for no longer than one period.*

Proof. Appendix A ■

[18] This steady state parallels Battaglini and Coate's (2007) type-2 equilibrium.

In effect, this dynamic path is identical to the path a Pigouvian planner would follow.[19] Thus, we do not require $\theta = 1/2$ but only the weaker cohesiveness condition, for the planning steady state to be implemented. At the Pigouvian level of public goods, no incumbent government would wish to divert resources towards transfers. Since fiscal capacity is costly and depreciates, this level of public goods is less than the Lindahl-Samuelson optimum and hence a fully benevolent government is not necessary to sustain the planner's solution. Because fiscal capacity is costly to maintain – i.e., the tax system has recurrent compliance costs – the planning outcome becomes sustainable as a political outcome if θ is close enough to $\frac{1}{2}$.

As a result, the within-regime comparative statics from the last subsection are valid also here. In particular, among countries in the common-interest regime, we should see higher long-run fiscal capacity the higher is the demand for public goods and the richer is the economy, *ceteris paribus.*

The rationale for Proposition 2 is straightforward and provides some intuition regarding the cohesiveness condition. When the cohesiveness condition holds, the economy will remain in the common interest regime for all periods $s > 0$. The economy is then in the common-interest regime indefinitely, and the value of being in opposition is identical to that of being in power. The problem is now virtually identical to that of the Pigouvian planner. The only difference is that the cutoff point $\widetilde{\tau}$ is lower in the political equilibrium described in this section. The Pigouvian planner's steady state exists in a political economy equilibrium if $\widetilde{\tau}$ is sufficiently high to allow for this steady state.

The cohesiveness condition ensures that this is the case. The Pigouvian steady state has $\alpha V_g\left(g^P\right) = \frac{\delta\omega}{\delta\omega - [1-\delta(1-d)]c}$, while $\alpha V_g\left(\hat{g}\right) = 2\left(1-\theta\right)$. The cohesiveness condition ensures that $g^P < \hat{g}$ by comparing these two marginal values.

5.2 A Redistributive Steady State

Next, consider the situation when the stability condition holds while the cohesiveness condition does not. We now characterize a steady state $S = R$, where the economy is in the redistributive regime indefinitely with $\tau^R > \widetilde{\tau}$.

[19] One exception is that the cutoff for the redistributive regime $\widetilde{\tau}$ is lower in this case. But as in the case of the Pigouvian planner, the economy will not remain in this regime for more than one period along the equilibrium path.

As the following Proposition states, a unique redistributive steady state exists at $\tau^R = \bar{\tau}$ and $g^R = \hat{g}$, whenever the stability condition holds.[20]

Proposition 3 *A redistributive steady state exists if the stability condition holds. A unique redistributive steady state* $\left\{\tau^R, g^R\right\} = \{\bar{\tau}, \hat{g}\}$ *exists and is locally stable.*

Proof. Appendix A ■

Here, the steady state has maximal fiscal capacity, public-goods provision is at $\hat{g}$, and the residual tax revenue is used as transfers. Hence public goods provision is below that in the Pigouvian optimum since institutions are not sufficiently cohesive to sustain that level even if the fiscal capacity to fund it exists. The dynamics of fiscal capacity follows the path in Figure 8.[21]

The current marginal value to the incumbent of accumulating fiscal capacity, if the economy were to remain in the redistributive regime indefinitely, is

$$2\delta\phi\left[(1-d)\,c+\omega\right]-\delta\omega.^{22}$$

Once in the redistributive regime, the marginal cost of accumulating additional fiscal capacity is $2\,(1-\theta)\,c$. If the stability condition holds, the former is greater than the latter, and incumbents wish to accumulate fiscal capacity without a bound in the redistributive regime. They are constrained only by technological factors, which restrict τ to $\bar{\tau}$. This gives a redistributive steady state at $\tau = \bar{\tau}$. At the same time, failure of the cohesiveness condition to hold implies that if the economy is temporarily in the common-interest regime,

[20] This equilibrium parallels, but is not identical to Battaglini and Coate's (2007) type-1 equilibrium. In our model the marginal cost and benefit of fiscal capacity accumulation cannot equalize in the redistributive regime, unless the stability condition holds with equality. This is due to the lump-sum nature of taxation in our model. For some $\{\theta, \gamma\}$ values the equilibrium described here leads to non-concave value functions and the equilibrium is thus qualitatively different than those characterized in Battaglini and Coate (2007), who restrict attention to concave equilibria.

[21] The figure is plotted for $\gamma = \theta = 0.2$. Other parameter values that ensure that the stability condition holds yield similar policy functions.

[22] This result relies on the fact that the policy function $T\,(\tau)$ is flat in the redistributive regime and incumbents are unable to influence their successor's choice of fiscal capacity through marginal changes in fiscal capacity accumulation. This is true for limits of finite-horizon economies, but not generally. See the characterization of concave equilibria in the online appendix for cases when the policy function is not flat in the redistributive regime. Bataglini, Nunnari and Palfrey (2012) analyse a model where influencing ones successors plays a greater role in steady state determination.

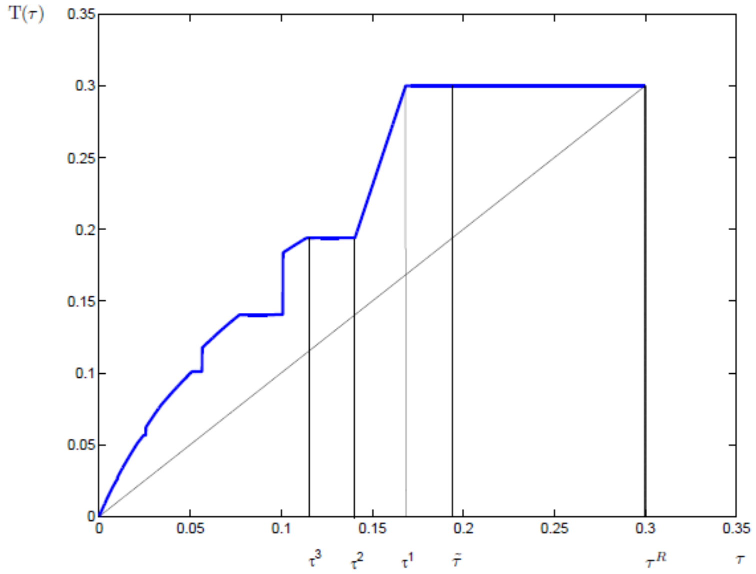

Figure 8: A Redistributive State

fiscal capacity accumulates and the redistributive regime is reached before a common-interest steady state is feasible.[23]

This equilibrium has features that are often ascribed to powerful predatory states where a group uses the state to make maximal transfers to itself. Since the stability condition is associated with low cohesiveness θ and low turnover γ, transfers are skewed towards an entrenched incumbent group. If there were a shift in power, the new incumbent would be happy to maintain existing fiscal capacity, as she can expect to continue supporting her own group for a long time.

If α is low or θ is low, then this long-run equilibrium will also be associated with a lower level of public goods than the common-interest state. In other words, the redistributive steady-state is consistent with a large state, in terms of tax take, along with a low level of common-interest spending.

[23] When the stability condition holds with equality, the incumbent is indifferent between redistribution and fiscal capacity accumulation in the redistributive regime. Accordingly, he is indifferent between any level of fiscal capacity in the redistributive regime. Thus any $\tau \in [\tilde{\tau}, \bar{\tau}]$ is consistent with steady state. An ergodic distribution with cycles among values of fiscal capacity in this region is also consistent with equilibrium.

In terms of predictions, this case gives a role for political institutions to influence fiscal capacity investments. A country with weaker political institutions (lower θ), all else equal, has a different distribution of expenditure with a higher share going to transfers at the expense of public goods. Naturally, the same shift applies for a country with a lower demand for public goods (lower α).

5.3 A Weak State

Finally, consider what happens when neither the cohesiveness nor the stability conditions hold. In other words, we look at a state, which combines a lack of checks and balances (low θ) with high political instability (γ much above zero). The following proposition describes the outcome in such a state, which is illustrated in Figure 9.[24]

Proposition 4 *If neither the cohesiveness nor the stability conditions hold, then a unique, globally stable steady state exists at $\tau^W = \widetilde{\tau}$.*

Proof. Appendix A ■

The logic of fiscal underdevelopment in this setting is simple. The state is insufficiently cohesive to accumulate enough fiscal capacity to provide anything near the Lindahl-Samuelson level of the public good. Also, it never reaches (or remains in) the redistributive regime. Due to the high rate of political turnover, incumbents' myopia gives them insufficient incentives to build (or retain) high levels of fiscal capacity even for the purpose of future redistribution. We observe a weak state with low capability of raising revenue. Thus, the model again suggests a role of political institutions, proxies for θ and γ, to influence fiscal capacity investments.

5.4 Discussion

The three-way classification of states suggested by the theory has relevance for contemporary discussions of state building. An interesting finding is that α, the demand for public goods, does not determine which regime the state

[24] This corresponds to a type-3 equilibrium in Battaglini and Coate (2007).

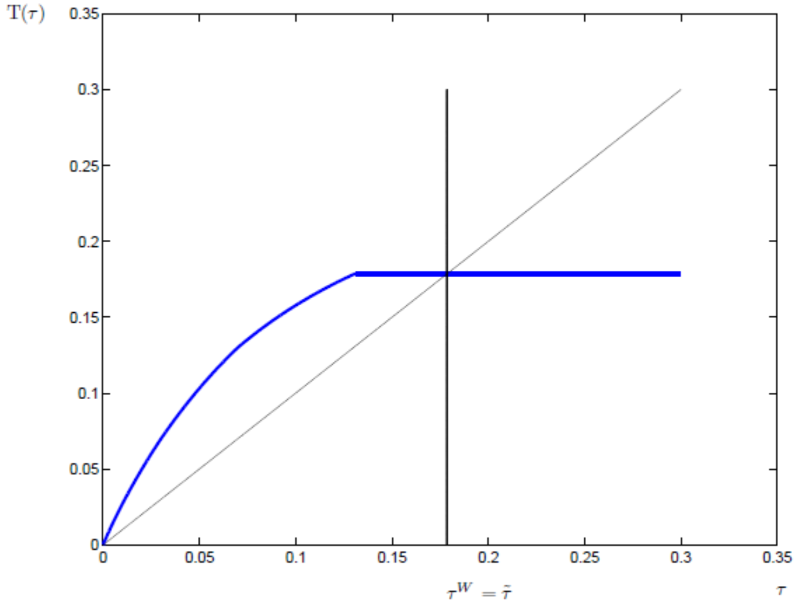

Figure 9: A Weak State

ends up in, although it does determine the equilibrium size of the common-interest state and the dynamic path towards equilibrium.[25] A claim, as in Herbst (2000), that African countries could break the weak-state trap by fighting wars is not supported the model. Even though (the risk of) war could indeed raise the level of public spending, this regime would not be sustainable unless accompanied by a rise in θ. In a similar vein, the weak-state trap could explain the observation by Centeno (1997) that Latin America may be an exception to the Tilly hypothesis. In our model, wars lead to sustainable state development only where θ is high enough.

The cohesiveness condition appears to have the paradoxical implication that a country with a lower cost of fiscal capacity building is more likely to be a weak or redistributive state. (To see this, observe that the left hand side of the condition is increasing in c.) But making sense of this is straightforward. Countries with lower costs of investing in fiscal capacity will have a higher demand for public goods in the Pigouvian optimum, but this demand is realized in the political equilibrium only with greater institutional cohesiveness. If investment costs fall as part of the development process, then a country may need to strengthen its institutions for the higher demand to give way to greater spending on public goods.

Finally, we make a few remarks on welfare. As we have already noted, when the cohesiveness condition holds, the social optimum (by the Utilitarian criterion) obtains, such that the outcome is Pareto efficient. The redistributive-state outcome is also Pareto efficient. If there is a failure of political resource allocation, it is distributive with one group tending to benefit more than another from holding office. This is clearest in the limit as γ goes to zero. But the welfare economics of weak states is somewhat different, raising the possibility of Pareto-inefficient policy choices, what Besley and Coate (1998) call "political failure".[26] The two groups could, in principle, get together and make themselves better off by picking more state capacity and restricting the use of transfers. However, this would not be incentive compatible in the present model. Specifically, groups cannot commit to abstain from using a future hold on power to redistribute in their own favor, beyond the institutional commitments entailed in θ, and weak states are weak precisely because they have a low value of θ. This suggests that political re-

[25] This contrasts with Battaglini and Coate (2007) and reflects the fact that in our model fiscal capacity (our state variable) can be deployed either as transfers or public goods, whereas their state variable is public capital.

[26] See also the wider discussion of these issues in Acemoglu (2003).

form could be potentially valuable and it would be interesting to investigate the conditions under which such reform could be (credibly) undertaken (see Besley and Persson (2011, Ch. 7) for an attempt in that direction).

6 Some Evidence

Core predictions of the model concern how parameters α, θ and γ shape the levels of fiscal capacity that countries choose over time. More cohesive political institutions (higher θ) within a country, due to a political reform, will shift the steady state towards higher fiscal capacity. A greater demand for public goods (higher α) should have a similar effect. Moreover, we expect higher political stability (lower γ) to raise the level of fiscal capacity. While finding clean empirical proxies for these parameters is not straightforward, we can use some measures to obtain a first glimpse at the patterns in the data.

Data and specification To assess the empirical relevance of the ideas developed in our model, we report evidence from a panel of countries over the twentieth century with variables measured at 5 year intervals – these are the same countries that underlie the right panels of the motivating figures in Section 2.[27] We thus have a panel with 18 countries over 20 time periods.

As a proxy for fiscal capacity, we use realized taxes relative to national income.[28] Data for the ratio of tax revenues to aggregate income is obtained from Mitchell (2007). We denote this variable by $y_{c,s}$ for country c at date s. Its overall mean is 0.18 with a standard deviation of 0.1. As shown in Figure 3, however, the mean goes up from 0.07 in the period 1900-1904 to 0.27 in the period 1995-1999.

The basic empirical specification, we use is of the form:

$$y_{c,s} = f_s + f_c + bx_{c,s} + \varepsilon_{c,s} \ ,$$

where $x_{c,s}$ is a vector of proxies for the factors highlighted by the theory, f_s

[27] The list of countries is in footnote 6.

[28] In our model all fiscal capacity is always utilized but in more sophisticated models with an excess burden in the tax level, this may not be the case. But as mentioned earlier we have developed an extension of the model for this case, which is available in the online appendix.

time fixed effects (for each five year period), f_c country fixed effects, and $\varepsilon_{c,s}$ the error term. We estimate robust standard errors clustered by country.

How do we proxy three main variables suggested by the theory? For α, we use the incidence of war from the Correlates of War (COW) database. This seems reasonable, given that a war typically constitutes a major shock to the demand for public spending. The underlying dummy variable, which is averaged over each five-year period, is equal to one in years where a country is engaged in an external conflict. For the twentieth century this would include participation in the major world wars. Our measure of cohesiveness, θ, is from the Polity IV data base, namely the executive constraints variable (xrconst). Specifically, we construct a dummy for years in which this variable is greater than 5 on a scale that ranges between 1 and 7.[29] Again, we average this dummy over each five-year window. To capture political stability, we use the inverse of the Polity IV measure that indicates how open is the process of executive recruitment. This variable ranges from 1 to 4, and we create a dummy variable for the highest value and average it over five-year periods.[30] Since a less open process is likely to generate more stability, this measure should be thought of as a proxy for $(1 - \gamma)$.[31]

Results The estimates are shown in Table 1. In column (1) we pool all of the observations across countries and time. We find that being involved in an external war is positively correlated with our proxy for fiscal capacity: a five year period of war is associated with an 8.5% higher tax to income ratio. Political stability is not correlated with taxation in this specification. However, having cohesive institutions is positively correlated with fiscal capacity: a five-year period of cohesive institutions is associated with an 8.6% higher tax to income ratio.

As the 20th century was a period of strong common trends, column (2) adds time dummies to the specification in column (1). The results become even stronger than in column (1) and political stability, as measured through openness of executive recruitment, is now positively correlated with fiscal capacity. A five-year period of stability is now associated with a 14.6% higher

[29] The results are robust to using any cut off in the 5-7 range.

[30] The results are broadly the same if we instead use a cutoff of 3.

[31] Note that our theory relates the expected rate of turnover–not its realization at a given point in time–to fiscal capacity. We therefore include a variable that measures the expected stability of government rather than the actual rate of turnover.

tax to income ratio. Adding in the time dummies also explains a great deal more of the variation in the data with an R^2 of 0.51 rather than 0.16.

Table 1 here

But a specification like that in columns (1) and (2) could be criticized for relying mainly on cross-sectional identification. Fixed country-level factors – including geography, culture and history – could shape the incentives to create fiscal capacity (for example by affecting the cost c) and this might lead to spurious correlations with our measures of α, θ and $1 - \gamma$. In column (3), we include country fixed effects to lessen this concern. The earlier results are essentially robust, with war and cohesiveness of institutions remaining positively correlated with the tax to income ratio, albeit with a smaller correlation for cohesiveness. We also lose statistical significance of political stability, as in column (1). This specification explains 82% of the variation in fiscal capacity.

Finally, in column (4) we add income per capita as a control. This addresses concerns that we may be picking up a confounding time-varying factor, which simultaneously generates growth and modernization of the economy, leading to a greater tax take. Indeed, a variety of theoretical approaches to higher tax take have made this the sole channel whereby development affects taxation (see Besley and Persson, 2012 for further discussion). Column (4) suggests, however, that the expected correlations based on our politico-economic approach hold up when we control for income levels. Indeed, income per capita is not significant in this regression, while the proxies for the main variables suggested by our theory are.

We should emphasize that these results are suggestive at best. While it is somewhat demanding to identify effects only from within-country variation, we don't find it compelling to think of political institutions or war as exogenous. Finding a more convincing approach – perhaps by exploiting natural experiments in history – may be the way forward. But it is encouraging that the correlations in the data form an empirical pattern that is consistent with our basic theoretical approach.

7 Conclusions

Development of state capacities, such as the capability to raise taxes, is an important feature of economic development. This paper puts forward a dynamic approach to studying investments in state capacity. It gives a transparent sense of how two dimensions of political decision making – cohesiveness and stability – impact on state development. One specific result is the possibility of weak states, where the low capacity to raise revenue reflects a combination of non-cohesive institutions and political instability.

Our analysis suggests possible directions for future theoretical research. The model assumes no growth in the private economy (constant ω), nor does it permit technological change in the creation of fiscal capacity (constant c). It would be interesting to allow for either or both. We have also abstracted from other kinds of investments by government to improve private economic outcomes, such as investments in legal capacity. Introducing legal capacity, as in Besley and Persson (2009), would obviously add a second state variable.

Similarly, it would be interesting and challenging to introduce public debt in our framework. Credibility of public debt would hinge, in part, on sufficient incentives to invest in future fiscal capacity to support debt repayment, given other priorities. If repayment was credible, a government would be able to use debt finance to accelerate its accumulation of fiscal capacity. Moreover, lack of credibility in debt issue might impose a further burden on weak states.

Ideally, we should also endogenize the exogenous parameters: cohesiveness and stability in the political system (θ and γ). Full-fledged dynamic analyses of political and economic institution building, or of economic institutions and political violence (an important source of instability in Besley and Persson, 2011), are interesting but difficult tasks.

A Proofs of propositions

A.1 Proposition 1

The first-order conditions of the Pigouvian planner's problem are

$$\alpha V_g(g) = \lambda + 1, \tag{16}$$

where $\lambda \geq 0$ is the Lagrange multiplier on (5) and

$$(\lambda + 1) c = \delta U_\tau(\tau') = \delta [(\lambda' + 1)[c(1-d) + \omega] - \omega].$$

The second equality utilizes the envelope theorem and λ' denotes the multiplier in the following period. This is a linear difference equation in λ:

$$\lambda' + 1 = \frac{(\lambda + 1) c}{\delta [c(1-d) + \omega]} + \frac{\omega}{c(1-d) + \omega}. \tag{17}$$

This equation has a unique steady state at

$$\lambda^P = \frac{[1 - \delta(1-d)] c}{\delta\omega - [1 - \delta(1-d)] c}$$

where $\lambda^P > 0$ iff $\omega > c\left[\frac{1}{\delta} - (1-d)\right]$, which holds by Assumption 1.

When $\lambda > 0$, (5) holds with equality and the economy is in the common-interest regime. Thus the economy has a unique steady state in the common-interest regime with

$$\alpha V_g\left(g^P\right) = \lambda^P + 1 = \frac{\delta\omega}{\delta\omega - [1 - \delta(1-d)] c}, \tag{18}$$

as claimed in the proposition.

Consider an economy beginning in the redistributive regime, so that $\lambda_0 = 0$. (17) gives:

$$\lambda_1 = \frac{c/\delta + \omega}{c(1-d) + \omega} - 1$$

so that

$$0 < \lambda_1 < \lambda^P.$$

Then, (16) yields

$$1 = \alpha V_g(\hat{g}) < \alpha V_g(g_1) < \alpha V_g\left(g^P\right).$$

The economy jumps immediately to a level of fiscal capacity below $\widetilde{\tau}$, but above the steady state, and then gradually converges to the steady state.

Using (5) we obtain

$$\tau^P = \frac{g^P}{\omega - cd}.$$

The refinement that equilibrium is the limit of a finite horizon economy was not used in this proof. Nevertheless, the contraction mapping theorem, as outlined in Stokey, Lucas and Prescott (1989) for example, shows that the value function from a finite horizon economy of this nature converges to a unique concave function $U^I(\tau)$.

A.2 Proof of Proposition 2

Focussing on equilibria that are limits of finite-horizon economies, we begin in period S and proceed via backward induction. In each period s, we solve for the decision rules $G^s(\tau_s)$ and $T^s(\tau_s)$ and the corresponding value functions $U^{I,s}(\tau_s)$, $U^{O,s}(\tau_s)$, $Z^{I,s}(\tau_s)$, $Z^{O,s}(\tau_s)$.

In period S, future fiscal capacity has no value so that $T^S(\tau_S) = \tau_{S+1} = 0$. Then $G(\tau_S) = \min\{\tau_S(\omega + (1-d)c), \hat{g}\}$: all tax revenues are used to finance public expenditures up to the level $\hat{g}$. Remaining revenues are allocated to transfers.

$G(\tau_S)$ is increasing in τ_S and there is a cutoff $\widetilde{\tau}_S = \frac{\hat{g}}{\omega+(1-d)c}$, above which transfers occur. The marginal value of fiscal capacity for group J when entering period S with fiscal capacity of τ_S is

$$U_\tau^{J,S}(\tau_S) = \begin{cases} \alpha V_g(g_S)(\omega + (1-d)c) - \omega & \forall \tau_S < \widetilde{\tau}_S \\ \beta^J(\omega + (1-d)c) - \omega & \forall \tau_S > \widetilde{\tau}_S \end{cases},$$

so that the marginal expected present value of fiscal capacity in period S for the period $S-1$ incumbent is:

$$\delta Z_\tau^{I,S}(\tau_S) = \begin{cases} \alpha\delta V_g(g_S)(\omega + (1-d)c) - \delta\omega & \forall \tau_S < \widetilde{\tau}_S \\ 2\delta\phi(\omega + (1-d)c) - \delta\omega & \forall \tau_S > \widetilde{\tau}_S \end{cases}. \tag{19}$$

$Z^{I,S}(\tau_S)$ is concave and strictly concave for all $\tau_S < \widetilde{\tau}_S$. As the cohesiveness condition holds,

$$\begin{aligned}\alpha c V_g\left(g_{S-1}\right) &\geq 2(1-\theta) c \\ &\geq 2(1-\theta) \delta(\omega+(1-d) c)-\delta \omega \\ &\geq 2 \delta \phi(\omega+(1-d) c)-\delta \omega\end{aligned}$$

and there exists a value $\hat{\tau}_S \leq \widetilde{\tau}_S$ such that $\delta Z_\tau^{I,S}\left(\hat{\tau}_S\right)=2(1-\theta) c$.

Consider the problem of the $S-1$ incumbent. Given (19), the incumbent's optimal decision rules outlined in (5), (10) and (11) imply functions $T^{S-1}\left(\tau_{S-1}\right)$ and $G^{S-1}\left(\tau_{S-1}\right)$ that are strictly increasing for $\forall \tau_{S-1}<\widetilde{\tau}_{S-1}$. They have $T^{S-1}\left(\tau_{S-1}\right)=\hat{\tau}_S$ and $G^{S-1}\left(\tau_{S-1}\right)=\hat{g}$, $\forall \tau_{S-1} \geq \widetilde{\tau}_{S-1}$. $\widetilde{\tau}_{S-1}$ is the lowest level of fiscal capacity τ_{S-1} at which the choice $\left\{\hat{g}, \hat{\tau}_S\right\}$ is feasible:

$$\widetilde{\tau}_{S-1}=\frac{\hat{g}+c \hat{\tau}_S}{\omega+(1-d) c}.$$

The policy functions $T^{S-1}\left(\tau_{S-1}\right)$ and $G^{S-1}\left(\tau_{S-1}\right)$ thus described imply that

$$\delta Z_\tau^{I, S-1}\left(\tau_{S-1}\right)=\begin{cases}\alpha \delta V_g\left(g_{S-1}\right)(\omega+(1-d) c)-\delta \omega & \forall \tau_{S-1}<\widetilde{\tau}_{S-1} \\ 2 \delta \phi(\omega+(1-d) c)-\delta \omega & \forall \tau_{S-1}>\widetilde{\tau}_{S-1}\end{cases}.$$

Similarly, in any period $s<S-1$, a cutoff $\widetilde{\tau}_s$ exists above which redistribution occurs and a unique value $\hat{\tau}_{s+1}$ will be chosen. Moreover once an incumbent exits the redistributive regime, the economy will be in the common-interest regime in all subsequent periods, because $\hat{\tau}_s<\widetilde{\tau}_s$ $\forall s$.

Because no redistribution occurs in any period $s>0$, the continuation values of the incumbent and opposition are equal for all $\tau_s<\widetilde{\tau}_s$.We can then characterize the infinite horizon limit of this economy with the value function $U^I(\tau)$, defined recursively via

$$U^I(\tau)=\max_{\tau', g}\left\{\alpha V\left(g_s\right)+\beta^J\left[\tau_s \omega-g_s-c\left(\tau_{s+1}-(1-d) \tau_s\right)\right]+\delta U^I\left(\tau'\right)\right\} \tag{20}$$

$$\text{subject to } \omega \tau \geq g+c\left(\tau'-(1-d) \tau\right).$$

This is now a standard recursive problem. The contraction mapping theorem implies that a finite horizon economy converges to a unique such concave function value function $U^I(\tau)$. This maximization leads to an Euler equation as in (17) and therefore to identical dynamics and an identical steady state at $\tau^C = \tau^P$.

The problem when $\theta < \frac{1}{2}$ differs from that of the Pigouvian planner only in the following respects. $\hat{g}$ is given by (13) and increases with θ. $\hat{\tau}$, the level of fiscal capacity chosen by an incumbent in the redistributive regime is defined implicitly by

$$\delta U_\tau^I(\hat{\tau}) = 2(1-\theta)c$$

and is therefore increasing in θ. When $\theta < \frac{1}{2}$, Figure 6 would differ only in that the flat region in $T(\tau)$ for $\tau > \widetilde{\tau}$ is lower.

Finally, $\widetilde{\tau}$ is defined as

$$\widetilde{\tau} = \frac{\hat{g} + c\hat{\tau}}{\omega + (1-d)c},$$

and is increasing in $\hat{\tau}$ and $\hat{g}$ and therefore in θ.

We have seen that if the cohesiveness condition holds, a unique equilibrium emerges with a unique steady state at τ^P. We now show that the cohesiveness condition is also a necessary condition for an equilibrium with τ^P as its steady state. The steady state level of public goods is as in (18):

$$\alpha V_g\left(g^P\right) = \frac{\delta\omega}{\delta\omega - [1-\delta(1-d)]c}.$$

If the cohesiveness condition failed to hold,

$$\frac{\delta\omega}{\delta\omega - [1-\delta(1-d)]c} < 2(1-\theta),$$

implying $g^P > \hat{g}$, which is a contradiction to the incumbent's first-order condition (10).

A.3 Proof of Proposition 3

Again, we focus on limits to finite horizon equilibria. In period S, the incumbent's problem is as in the proof of Proposition 2, giving a marginal continuation value for the $S-1$ incumbent as in (19). Now, however, the stability condition holds so that

$$\delta Z_\tau^{I,S}(\tau_S) > 2\delta\phi(\omega + (1-d)c) - \delta\omega > 2(1-\theta)c \quad \forall \tau_S.$$

This set of inequalities and (11) imply a cutoff level of fiscal capacity in period $S-1$ above which redistribution occurs and $\tau_S = \bar{\tau}$ is chosen. The cutoff level $\widetilde{\tau}$ is defined by

$$\widetilde{\tau} = \frac{\hat{g} + c\bar{\tau}}{\omega + (1-d)\,c}.$$

We can now assess the value of fiscal capacity for group J in period $S-1$, when in the redistributive regime:

$$U_\tau^{J,S-1}(\tau_{S-1}) = \beta^J(\omega + (1-d)\,c) - \omega \quad \forall \tau_{S-1} > \widetilde{\tau},$$

and therefore

$$Z_\tau^{I,S-1}(\tau_{S-1}) = 2\phi(\omega + (1-d)\,c) - \omega \quad \forall \tau_{S-1} > \widetilde{\tau}.$$

The period $S-2$ decision rule is then also $G^{S-2}(\tau_{S-2}) = \hat{g}$ and $T^{S-2}(\tau_{S-2}) = \bar{\tau}\ \forall \tau > \widetilde{\tau}$. This analysis holds similarly for any $s < S-1$ as well. For any s, incumbents chose $\tau_{s+1} = \bar{\tau}$ if in the redistributive regime in period s.

In contrast to the solution for the common-interest state and the weak state, we cannot show analytically that the finite horizon economy converges to unique value functions $U^I(\tau)$ and $U^O(\tau)$ and unique policy functions $G(\tau)$ and $T(\tau)$. (The finite horizon problem could potentially converge to a number of policy functions $G^s(\tau)$ and $T^s(\tau)$ that cycle over time.) But we have shown that regardless of convergence, these policy functions will all be characterized by $T^s(\tau_s) = \bar{\tau}$, $\forall \tau_s > \widetilde{\tau}, s$. Will thus have a (stable) steady state at $\tau^R = \bar{\tau}$.

Although we are not able to show analytically that the finite horizon economy converges to stable policy functions as $S \to \infty$, numerical simulations showed that this was indeed the case. Simulations converged smoothly to unique policy functions for the wide range of parameter values with which we experimented. The resultant value functions were not concave for all parameter values. Thus the limiting equilibrium gives a different outcome from a refinement based on concave equilibria. We discuss alternative equilibrium concepts (such as concave equilibrium) in the online appendix.

To conclude the proof of Proposition 3, we note that as $T^s(\tau) = \bar{\tau}\ \forall \tau_s > \widetilde{\tau}$, $\bar{\tau}$ is the only redistributive steady state that could arise.

Figure 8 shows the policy function $T(\tau)$ from simulations when stability condition holds. As expected the policy function is flat at $T(\tau) = \bar{\tau}$ for

$\tau > \widetilde{\tau}$.

There is an additional region $\tau \in [\tau^1, \widetilde{\tau}]$, in the common-interest regime, where $T(\tau) = \bar{\tau}$ as well. This arises because directly to the left of $\widetilde{\tau}$, the combination of $\tau' = \bar{\tau}$ and $g = \hat{g}$ is no longer affordable. But the marginal value of fiscal capacity at $\bar{\tau}$ is $2\delta\phi(\omega + (1-d)c) - \delta\omega$ and is strictly larger than the marginal value of the public good, which is approximately $2(1-\theta)c$. Incumbents in this region therefore choose $T(\tau) = \bar{\tau}$, but choose lower levels public good provision. τ^1 in Figure 8 is the point at which the marginal value of public goods equals the marginal value of fiscal capacity when choosing $T(\tau) = \bar{\tau}$. Implicitly, τ^1 is defined as

$$c\alpha V_g\left((\omega + (1-d)c)\tau^1 - c\bar{\tau}\right) = 2\delta\phi(\omega + (1-d)c) - \delta\omega.$$

In following segment $\tau \in [\tau^2, \tau^1]$, $T(\tau)$ is linear and $G(\tau)$ is constant at $g^1 \equiv (\omega + (1-d)c)\tau^1 - c\bar{\tau}$. The marginal value of fiscal capacity is constant at $2\delta\phi(\omega + (1-d)c) - \delta\omega$, for any choice $T(\tau) \in (\widetilde{\tau}, \bar{\tau}]$. Increasing public good provision above $g^1 \equiv (\omega + (1-d)c)\tau^1 - c\bar{\tau}$ would decrease the marginal value of public goods below this value. Thus in the region $\tau \in [\tau^2, \tau^1]$ any increase in τ translates directly into increases in τ'.

All additional flat segments of the policy function $T(\tau)$ reflect choices of fiscal capacity at points of non-differentiability of the value function $Z^I(\tau)$. For example, in the flat region $\tau \in [\tau^3, \tau^2]$, $T(\tau) = \widetilde{\tau}$. The value function is non-differentiable at $\widetilde{\tau}$ as

$$\begin{aligned}
\lim_{t \nearrow \widetilde{\tau}} Z^I_\tau(t) &= 2\delta(1-\theta)(\omega + (1-d)c) - \delta\omega \\
&> \lim_{t \searrow \tau'} Z^I_\tau(t) = 2\delta\phi(\omega + (1-d)c) - \delta\omega.
\end{aligned}$$

A.4 Proof of Proposition 4

In an economy of horizon S, the period S incumbent faces the same problem as in the proof of Proposition 2, and the period $S-1$ incumbent's continuation value is as in (19). By assumption the stability condition does not hold, so that

$$\begin{aligned}
\alpha c V_g(g_{S-1}) &\geq 2(1-\theta) \\
&> 2\delta\phi(\omega + (1-d)c) - \delta\omega
\end{aligned}$$

The period $S-1$ incumbent will therefore chose to enter the common interest regime in the following period. Here, as in the proof of Proposition 2, the $S-1$ incumbent's marginal continuation value is

$$\delta Z_{\tau}^{I,S-1}\left(\tau_{S-1}\right)=\begin{cases}\alpha\delta V_g\left(g_{S-1}\right)\left(\omega+\left(1-d\right)c\right)-\delta\omega & \forall\tau_{S-1}<\widetilde{\tau}_{S-1}\\ 2\delta\phi\left(\omega+\left(1-d\right)c\right)-\delta\omega & \forall\tau_{S-1}>\widetilde{\tau}_{S-1}\end{cases},$$

and the economy cannot be in the redistributive regime for any $s>0$.

As in Proposition 2, the problem can now be characterized as in (20). In this case, however, the cohesiveness condition does not hold, so that the Pigouvian steady state can never be reached as $g^P>\hat{g}$:

$$\alpha V_g\left(g^P\right)=\frac{\delta\omega}{\delta\omega-\left[1-\delta\left(1-d\right)\right]c}<2\left(1-\theta\right)=\alpha V_g\left(\hat{g}\right).$$

The steady state is then at $\widetilde{\tau}$, as there

$$\begin{aligned}\lim_{t\nearrow\widetilde{\tau}}\delta Z_{\tau}^{I}\left(t\right) &= 2\delta\left(1-\theta\right)\left(\omega+\left(1-d\right)c\right)-\delta\omega\geq \\ &\geq c\alpha V_g\left(\hat{g}\right)=2\left(1-\theta\right)c \\ &\geq \lim_{t\searrow\widetilde{\tau}}\delta Z_{\tau}^{I}\left(t\right)=2\delta\phi\left(\omega+\left(1-d\right)c\right)-\delta\omega.\end{aligned}\tag{21}$$

The inequalities hold because the cohesiveness and stability conditions both fail to hold.

$\widetilde{\tau}$ is then defined via the budget constraint as

$$\widetilde{\tau}=\frac{\hat{g}}{\omega-cd}.$$

Figure 9 characterizes the policy function $T\left(\tau\right)$. For $\tau\geq\widetilde{\tau}$, $\alpha V_g\left(g\right)=2\left(1-\theta\right)c$, and (21) implies that $T\left(\tau\right)=\widetilde{\tau}$. The discussion above implies that $T\left(\tau\right)<\widetilde{\tau}\ \forall\tau<\widetilde{\tau}$, as shown in Figure 9, and the steady state at $\widetilde{\tau}$ is unique and stable.

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Table 1: Explaining Fiscal Capacity

	(1)	(2)	(3)	(4)
War	0.085**	0.103**	0.075**	0.067***
	(0.036)	(0.043)	(0.022)	(0.020)
Stability	0.063	0.141**	0.052	0.080**
	(0.052)	(0.058)	(0.031)	(0.031)
Cohesiveness	0.086***	0.094***	0.045**	0.058*
	(0.023)	(0.024)	(0.027)	(0.035)
Income Per Capita				– 0.003
(thousands $US)				(0.010)
Country Fixed Effects	No	No	Yes	Yes
Time Fixed Effects	No	Yes	Yes	Yes
Number of observations	300	300	300	290
Adjusted R^2	0.164	0.509	0.822	0.848

Notes: Dependent variable is ratio of tax to aggregate income from Mitchell (2007). Independent variables explained in the text. Fixed effects added as indicated. Standard errors in parentheses (clustered by country): * significant at 10%, ** significant at 5%, *** significant at 1%.