# Democracy, State Capacity and Public Finance

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**Abstract**

The paper addresses how democracy can affect public finance and state capacity investment. We show that the effect of democracy on public policy can take two forms: direct and indirect. The direct effect transpires when increasing democracy leads to an increase in public expenditure which results in increased public goods provision and reduced political rent. The indirect effect emerges when increased democracy leads to a reduction in state capacity investment and, subsequently, to a reduction in public goods provision. Paradoxically, lower political rents deteriorate the incumbent's incentive to invest in state capacity, at the expense of public goods provision.

*JEL classification*: D72, H10, H40.

*Keywords*: democracy, state capacity investment, electoral competition, electoral bias, political inclusivity, political rents, public goods provision.

*Abbreviations*: none.

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# 1 Introduction

The state capacity, or the ability of governments, to delivery much desired public goods and services has been the focus of recent research. A pertinent issue of the current research is the need to distinguish between a state's capacity to ensure the requisite public goods that enable economic growth and development, and its will. Prevailing political institutions are assumed to dictate the state's will, while its ability to deliver goods and services is determined by the level of state capacity investment. This raises a subsequent question as to whether democracy and state capacity are complements or substitutes in the provision of public goods.

The purpose of the present paper is to address how democracy can affect public finance and state capacity investment. We contend that the effect of democracy on public finance takes two forms: direct and indirect. The direct effect transpires when increasing democracy leads to an increase in public expenditure which results in increased public goods provision and reduced political rent. Conversely, the indirect effect emerges when increased democracy leads to a reduction in state capacity investment and, subsequently, to a reduction in public goods provision. The paper highlights a central trade-off between the direct and indirect effects of democracy.

The present analysis is motivated by both conceptual and empirical puzzles highlighted in the recent literature. In an influential paper Besley & Persson (2014) argue that democratic regimes are well motivated to provide public goods, and that state capacity is an important means of achieving this. Ultimately, both public goods provision and state capacity are affected by and constrained without each other. Hence, public goods provision and state capacity are complements[1]. Hanson (2015), on the other hand, maintains that democracy increases public goods provision directly, but that state capacity is an alternative means of achieving public goods provision. Therefore, they are substitutes.

[1]Besley & Persson (2011, 2014) make an important distinction when assessing the provision of public goods. They argue that governments may have sufficient knowledge and understanding of good policies and practices, and the will to enact them, but may lack the ability.

Acemoglu & Robinson (2017) assert that capacity building by the state is a direct result of demands made on them by the citizenry. Dominant incumbents of "meek societies" are not incentivised to build capacity. Alternatively, Geloso & Salter (2020) argue that investing in state capacity is a form of rent-seeking behaviour. They show that both historically and more recently, countries with high state capacity but low development are largely depicted as highly centralised predatory states (for example, Soviet Union, Cuba and North Korea). In fact, in an influential paper Ross (2006) argues that in democracies, public services have no greater or more significant impact on human outcomes in than non-democracies. He argues that democracies do not direct resources to where they are most needed, but instead to the middle and upper classes.

The recent empirical literature reports mixed results and findings too. The first strand of the empirical literature contends that increased democracy and political inclusivity results in greater public goods provision. The second strand, on the other hand, shows less investment in fiscal capacity, at a cost to public goods provision, where there is greater political inclusivity. The first strand is well established, and many empirical studies have shown a significant impact of direct democracy on public spending (for example, Feld & Kirchgässner (2000); Besley & Case (2003); Feld & Matsusaka (2003))[2].

The second strand of the empirical literature examines a mixture of contemporary and historical evidence, while also accounting for both developed and developing economies. Hanson (2015) undertook an extensive cross-country empirical analysis focusing on developing economies and found that increasing political inclusivity and democracy results in an increase in public goods provision which compensates for the low state capacity in these economies. A recent empirical study by Besley & Reynal-Querol (2017) highlights that both states with powerful executives and countries with hereditary

[2]More recent papers extend the literature by focusing on voter preferences and how they affect the democracy–public spending nexus. They also reconsider the impact of direct democratic institutions on public expenditure at the local level by accounting for the institutional setting at both the state and local government levels (Galletta & Jametti, 2015). Finally, others have assessed the impact of fiscal decentralisation together with the levels of democracy on the size of government (Qiao et al., 2019).

rule are better at developing state capacity. Besley and Reynal-Querol argue this is because rulers are able pass on investments in state capacity to their chosen heirs. Similarly, Wintrobe (2000) and Gandhi (2008) find that increasing state capacity to increase public goods provision is also a tool used by dictators as it enables them to build loyalty. Dincecco & Katz (2014) and Dincecco et al. (2011), using historical data and data over a long period, find that centralised but limited (or non-absolutist) governments had greater fiscal capacity. Beramendi et al. (2019), using historical data, find similar results where there was intra-elite competition[3].

In this paper, we provide a unified framework to assess the direct and indirect effects of democracy. We outline a model which incorporates two complementary dimensions of democracy: (i) electoral contestability, and (ii) political inclusivity between citizens and elites. The model predicts that greater electoral contestability leads to higher private consumption, public goods provision and lower political rent. Greater political inclusivity has the same effect if, and only if, it is coupled with more engaged (or responsive) citizens. These capture the direct effect of democracy. Conversely, the model also predicts that greater democracy, accounting for these two elements, leads to lower investment in fiscal capacity, which relates to the indirect effect of democracy.

The direct and indirect effects are consistent with the first and second strands of the of the empirical literature, respectively. Hence, the model attempts resolve an important empirical puzzle, which is highlighted in the preceding discussion. It provides insights into the mixed empirical evidence, while showing how both can be true. In addition, the model outlined here provides some important insights into why investment in state capacity has plateaued in advanced democracies over the past several decades. Likewise, the present paper also partially explains why opposition parties that are unlikely to form governments in democracies make extreme promises regarding

[3]Others, focusing on historical evidence and developments, maintain that public finance institutions evolved in the late Middle Ages as government spending increased, in particular military expenditure (Schulze, 1995). Dincecco (2011) contends that an important step in the development of public finance institutions was the enhanced ability of national governments to raise taxes over the whole of a specific and well-defined territory.

public good provisions.[4].

The present analysis extends the existing literature in four ways. First, it distinguishes between the level of public goods provision and the ability to provide public goods. The ability to provide public goods requires fiscal capacity or the ability to raise revenue. It also requires operative capacity as the state attempts to minimise the cost of providing public goods. Therefore, we consider the determinants of the level of public goods provision separately from the state's investment in its ability to undertake this provision: notably fiscal and operative capacity. Second, we clearly distinguish between the incentives to invest in state capacity and to provide public goods. Since state capacity also depends on political institutions, the earlier focus on complements and substitutes can be misleading. We show that, while democracies are well incentivised to provide public goods, the investment in state capacity depends on the incumbent's ability to accrue political rents. This, in turn, prevails when there is a lack of electoral contestability. Similarly, political inclusivity either incentivises better public finance or greater state capacity investment, but not both. This effect is conditional on the relative responsiveness (or ideological homogeneity) of the citizens.

Third, in a recent extensive survey Piano (2019) highlights that existing literature tends to focus on the state's ability to provide public goods and how effectively the state raises revenues, rather than on the competition faced by incumbent governments. Indeed, he suggests "the implicit assumption is that these dimensions operate independently, which is to say, that changes in the ruler's ability to extract revenues and provide public goods, on the one hand, do not affect the degree of competitiveness it must face." (Piano, 2019, pp. 299). The present paper attempts to fill in this important gap in the literature by considering the effect of electoral competition. Building from these premises, we find that the effect of democracy on state capacity is opposite of its direct effect and what is argued by the aforementioned studies. Finally, there is a large volume of recent literature that focuses on economic and political inequality, and its impact on economic growth and

[4]We thank an anonymous referee for highlighting these additional implications of the model.

development outcomes[5]. We contribute to this literature by considering the political inclusivity between voters, and its implications on public finance and state capacity.

The remainder of the paper is organised as follows: Section 2 outlines the model, and the analysis and results are presented in Section 3. The concluding remarks and summary are presented in Section 4. All proofs are in the appendix.

# 2 Model

The key aspect of the model is the combination of electoral competition and investments in state capacity. This provides us with a unified framework for studying how democracy affects public finance directly, as well as indirectly through state capacity. That is, we can study how democracy, or the lack of it, contributes to political rents, public goods provision, taxation and private consumption, as well as gain further insights on the determinants of state capacity.

Before describing the timeline, let us first introduce the detailed characteristics of the model and define the key terms. The subscripts in our notation, where applicable, refer to a particular group of voters and the superscripts refer to a particular political party.

**Voters.** Suppose that there are two groups in the society: the elite ($e$) and the (disadvantaged) citizens ($d$). The total population is the sum of the people in these two groups: $N = n_e + n_d$. All voters have the same utility function, which has a logarithmic form and is additively separable between private consumption $c_i$ and public good $G$:

$$u_i = \ln(c_i) + \ln(G).$$

All voters are provided with the same, non-negative $G$. The voters in group $i$ have fixed per period income $w_i$ and taxes can be targeted. Hence, the

[5]For example: Acemoglu & Robinson (2000); Acemoglu (2005); Acemoglu & Robinson (2005); Persson & Tabellini (2009); Acemoglu et al. (2011); Acemoglu & Robinson (2017).

private consumption of voter type $i$ is

$$c_i = (1 - t_i)w_i,$$

where $i = \{e, d\}$ and $t \in [0, 1]$ is the tax rate.

**Political parties.** There are two political parties, which we label the incumbent ($I$) and the opponent ($O$). At the time of an election, both parties announce their electoral platforms, which are binding and must be implemented if the party is elected. The platforms consist of tax rates and public goods provision. Note that besides electoral issues, lack of democracy may also relate to lack of accountability and transparency, neither of which are considered here.

By setting tax rates $t_e^J$ and $t_d^J$, the governing party $J = \{I, O\}$ collects net tax revenue $\gamma(w_e n_e t_e^J + w_d n_d t_d^J)$, where $\gamma \in (0, 1]$ is fiscal capacity and measures how much of the taxes are not lost in the process of collecting them. The cost of public goods provision is given by $\alpha N G^J$, where $\alpha$ is an inverse measure of operative capacity. The public goods are nonexclusive (i.e. available to all), but subject to crowding (i.e. the cost is proportional to $N$).

If all the tax revenue is not spent on financing public goods, then party $J$ receives the excess in the form of political rent $R^J$. In a dictatorship or weak democracy, the political rent can be considered a direct financial gain, but in developed democracies this interpretation is less natural. Following the economics of bureaucracy literature (Migué & Bélanger, 1974; Wyckoff, 1990), however, the rent can be interpreted as organisational slack, also known as discretionary budget or fiscal residuum. That is, we can consider the political rent as an expenditure reserved for activities that benefit the ruling party and do not contribute towards the provision of public goods. Hence, the government's budget constraint is

$$\gamma \sum w_i n_i t_i^J = \alpha N G^J + R^J, \tag{1}$$

which both parties need to factor in their electoral platforms.

Whichever party wins the election, they will have access to the same state capacity and take $\gamma$ and $\alpha$ as given when announcing their electoral platforms. However, during their tenure and before the next election takes place, the incumbent may invest in state capacity, which improves fiscal and/or operative capacity from $\hat{\gamma}$ and $\hat{\alpha}$ to $\gamma$ and $\alpha$. The investment costs are given by $h(\gamma-\hat{\gamma})$ and $g(\hat{\alpha}-\alpha)$, where $h(\cdot)$ and $g(\cdot)$ are convex and increasing functions, $h(0) = h'(0) = g(0) = g'(0) = 0$, and $h(1-\hat{\gamma}) = g(\hat{\alpha}) = \infty$.

The state capacity investments are financed from the incumbent's existing political rents, $\hat{R}$, which is money that the incumbent was going to appropriate or deliberate slack in the current budget. We assume that this budget constraint is not binding in the equilibrium and $\hat{R} > g(\hat{\alpha}-\alpha) + h(\gamma-\hat{\gamma})$. The discount factor is $\delta \in (0, 1)$.

**Democracy and electoral competition.** The election is considered here broadly as the mechanism through which the ruling party is selected and which incorporates varying degrees of democracy. The two aspects of democracy considered in the model are the degree of equality among the voters as well as between the parties. We consider a probabilistic voting model, in which political influence per capita, $\pi_i$, may differ between the two groups of voters in favour of the elite, i.e. $\pi_e \geq \pi_d$. This can be interpreted as indicating that some votes have literally more weight than the others and the election mechanism itself is undemocratic and non-anonymous. Equally, political influence may reflect non-systemic factors such as the ability to persuade other voters or the expected turnout of the group.

When the voters compare the electoral platforms, there is a common bias, $b \geq 0$, in favour of the incumbent $I$. There is also an individual bias, $\varepsilon \lesseqgtr 0$, which can either be in favour of or against the incumbent, and which is the key feature of the probabilistic voting models in general. The voters are myopic and consider only the current consequences of the electoral platforms. A member of group $i$ will vote for $I$ if and only if

$$u_i^I - u_i^O + b > \varepsilon,$$

where $u_i^J$ represent the maximal consumption-based utility that the members of group $i$ would enjoy under the policies of party $J$.

The common bias is known to the parties as well, but only the individuals themselves know $\varepsilon$. The parties treat the individual biases as independent and identically distributed random variables that are drawn from a uniform distribution, which has zero mean and finite variance.[6] Let $F_i(\cdot)$ be the associated cumulative distribution function of members of group $i$ over the range of $\varepsilon$. We assume $F_i(\cdot)$ to be continuous with $F_i(0) = 1/2$. Hence, the probability that a member of group $i$ votes for $I$ is given by $Pr(\varepsilon < u_i^I - u_i^O + b) = F_i(x_i^I)$, where $x_i^I$ denotes the critical value $x_i^I \equiv u_i^I - u_i^O + b$ for group $i$. Party $O$ gets the vote with probability of $F_i(x_i^O) = F_i(-x_i^I) = 1 - F_i(x_i^I)$.

The density function $f_i$ is constant and negatively linked to the variance of the distribution. Hence, $f_i$ is a measure of the group's ideological homogeneity. It represents the number of swing voters at the margin and summarises the group's responsiveness to the electoral platforms. As is commonly known from the earlier literature (Persson & Tabellini, 2000; Gehlbach, 2021), more responsive groups become ideal targets for the parties and the equilibrium platforms are closer to their bliss point. We assume that for both groups, the variances of the individual biases are sufficiently wide such that corner solutions are ruled out for any common bias $b$ and $F_i(x_i^J) \in (0, 1)$ in equilibrium.

Finally, since some votes count more than the others, winning an election in its broad meaning cannot be considered as a simple matter of achieving the majority. As such, we define the probability that party $J$ wins the election as

$$P^J = \frac{\sum \pi_i n_i F_i(x_i^J)}{\sum \pi_i n_i},$$

which is the same as the expected share of the total political support.

The connections with the earlier theoretical models are as follows. Electoral competition is based on the probabilistic voting models of Lindbeck &

[6] The results are qualitatively the same for any symmetric, single-peaked distribution as long as it is not too steep. This is required because $b > 0$ leads to an asymmetric equilibrium, where $F_i(\cdot)$ is convex and the second-order conditions may not hold. As such, the assumption of a uniform distribution simplifies the analysis and notation, as well as freeing us from having to keep track of the requirements regarding the shape of $F_i(\cdot)$.

Weibull (1987); Dixit & Londregan (1996); Persson & Tabellini (1999) and Lizzeri & Persico (2004). Within this framework, the effect of party bias on political rents has been studied earlier by Polo (1998) and the notion of (disparity in) political influence follows from Deacon (2009).

The incorporation of state capacity follows from Besley & Persson (2009) with a few key differences. Like them, we use a two-period model to allow for investment in state capacity in as simple a way as possible. The second stage of our model shows the direct, "static" effect of democracy on policy outcomes, whereas the first stage shows the indirect, "dynamic" effect of democracy on the investments in state capacity, and subsequently on policy outcomes. However, fiscal capacity in our model concerns the state's capacity in collecting tax revenue rather than the maximum tax rate, the latter being endogenous to electoral competition in our model. Furthermore, we do not consider the state's legal capacity to enforce property rights, but instead consider its operative capacity in the provision of public goods and services. Most importantly, electoral competition in our model endogenises the political control.

**Timing.**

- Stage 1: The incumbent holds office and decides how much to invest in future state capacity $\gamma$ and $\alpha$.
- Stage 2: A new election takes place. Given $\gamma$ and $\alpha$, the parties propose electoral platforms consisting of $t_e^J, t_d^J$ and $G^J$, and which determine $R^J$. The winner's platform is implemented.

We solve the game by backward induction and first derive the equilibrium electoral platforms followed by the incumbent's optimal state capacity investments. The main interest is in how democracy (or the lack of it) affects state capacity and policy outcomes, each of which have several dimensions as defined below.

**Democracy.** i) Political inclusivity, $\pi_d/\pi_e \leq 1$;[7] ii) Electoral contestability, which inversely related to the incumbent's advantage, i.e. bias $b$.

[7] It is worth noting that the political inclusivity index can be compared to the selectorate theory found in the political science and political economy literature (see De Mesquita

**State capacity.** i) Fiscal capacity, $\gamma$; ii) Operative capacity, which is inversely related to $\alpha$.

**Public finance and policy outcomes.** i) Consumption disparity between the voters, $c_e/c_d \geq 1$; ii) Public goods provision, $G$; iii) Political rents, $R$.

In addition to the above factors, a central role in our results will be played by the densities $f_i$, which measure the ideological homogeneity of the groups and determine their relative responsiveness to the platforms. Given its interaction with inclusivity in particular, the reader may prefer to consider relative responsiveness as a third dimension of democracy.[8] We will not do that as we prefer to maintain a distinction between institutional and behavioural factors in this respect. Nevertheless, it will become clear that just as behaviour, in general, depends on institutional constraints, so the effects of democracy depend on how voters respond.[9]

# 3 Analysis

## 3.1 Stage 2

To set a benchmark for the electoral platforms, let us first consider the problem of a Utilitarian social planner in Stage 2. The planner's problem is to choose $t_e$, $t_d$ and $G$ to maximise

$$W = \sum n_i u_i(c_i, G) = n_e \ln((1 - t_e)w_e) + n_d \ln((1 - t_d)w_d) + N \ln(G),$$

subject to the budget constraint $\gamma \sum w_i n_i t_i = \alpha N G$. This is a straightforward optimisation problem and we omit the proof of the following benchmark

et al. (2005)). This theory argues that the selectorate ($s$) can influence who eventually forms government, otherwise known as the winning coalition ($w$). The likelihood of any selectorate member being included in the winning coalition is $w/s$. Crucially this ratio influences the government's spending habits, particularly their optimal expenditures on public goods, and the selectorate benefits directly from greater public goods provision.

[8] Note that the comparative statics of responsiveness are parallel to those of inclusivity.

[9] We thank an anonymous referee for encouraging us to highlight the key role of responsiveness.

result.

**Proposition 1.** *Assuming interior solution, the social planner's optimal choice leads to equal private consumption for both groups,*

$$c^* = \frac{\sum n_i w_i}{2N}, \tag{2}$$

*and public consumption given by*

$$G^* = \frac{\gamma \sum n_i w_i}{2\alpha N}. \tag{3}$$

We see from Proposition 1 that the social planner's choice involves no consumption disparity and everyone's private consumption is half of the average income. Since there are no political rents, the remaining half of the total income is spent on public goods. Hence, public goods provision is efficient with respect to private consumption as well as total income.

Next, we move on to the electoral competition. The parties take $\gamma$ and $\alpha$ as given, since they are chosen by the incumbent in Stage 1. Hence, party $J$ chooses $t_e^J, t_d^J$, and $G^J$ to maximise

$$\Pi^J = P^J R^J = \frac{\sum \pi_i n_i F_i(x_i^J)}{\sum \pi_i n_i} \left(\gamma \sum w_i n_i t_i^J - \alpha N G^J\right),$$

where $R^J$ follows from the budget constraint (1); and $x_i^J = u_i^J - u_i^K + b^J$, where $J, K = \{I, O\}$, $J \neq K$, $i = \{e, d\}$, $b^I = b, b^O = -b$. The equilibrium is characterised by the first-order conditions

$$\frac{\partial \Pi^J}{\partial t_i^J} = -\frac{w_i}{c_i^J} \frac{\pi_i n_i f_i}{\sum \pi_i n_i} R^J + P^J \gamma w_i n_i = 0, \tag{4}$$

and

$$\frac{\partial \Pi^J}{\partial G^J} = \frac{1}{G^J} \frac{\sum \pi_i n_i f_i}{\sum \pi_i n_i} R^J - P^J \alpha N = 0, \tag{5}$$

where $1/c_i^J$ and $1/G^J$ are the marginal utilities of private and public consumption, and $f_i$ is the density function of $\varepsilon$ in group $i$. As shown by Proposition 2 in the appendix, our assumptions on the distributions $F_i(\cdot)$ ensure the optimality of solutions. All proofs are also found in the appendix.

The following proposition summarises the properties of the equilibrium electoral platforms.

**Proposition 3.** *The equilibrium platforms are characterised by*

$$\frac{c_e^J}{c_d^J} = \frac{\pi_e f_e}{\pi_d f_d}, \tag{6}$$

$$G^J = \frac{\gamma \sum c_i n_i}{\alpha N}, \tag{7}$$

$$R^J = \gamma \left( \sum w_i n_i - 2 \sum c_i n_i \right), \tag{8}$$

*as well as*

$$\mathcal{F}_J \equiv -\pi_i f_i R^J + \gamma c_i^J \sum \pi_i n_i F_i(x^J) = 0, \tag{9}$$

*where*

$$x^J = 2 \ln \left( \left( \sum \pi_i n_i + 4 \sum \pi_i n_i f_i \right) c_i^J - \pi_i f_i \sum w_i n_i \right) \\ - 2 \ln (\pi_i f_i \sum w_i n_i) + b^J \tag{10}$$

*and which implicitly defines the equilibrium tax rates $t_i^J$.*

Equation (6) in Proposition 3 indicates that the consumption disparity between the elite and citizens is increasing with the disparity in, what Deacon (2009) calls, their *effective* political influence. The latter concerns both the relative political influence and the groups' responsiveness to the policies, i.e. the product $\pi_i f_i$. Hence, within-group ideological homogeneity strengthens, and heterogeneity weakens the group's effective political influence and subsequent private consumption. Furthermore, consumption disparity is independent of the electoral bias, which, as we will see, affects the groups' absolute level of private consumption.

Equation (7) is the usual Samuelsonian condition of efficient public goods provision. Hence, the amount public goods provided is socially optimal *relative* to private consumption. Unlike the social planner's choice, however, there will be underprovision in absolute terms.

Since the consumption disparity is independent of group size, we can further observe that if, and only if, the elite have greater effective political influence, $\pi_e f_e > \pi_d f_d$, then there is less aggregate private consumption,

$$\sum c_i n_i = c_e n_e + c_e \frac{\pi_d f_d}{\pi_e f_e} n_d,$$

and, by extension, public consumption when the size of the elite group becomes relatively smaller.

As another benchmark, we can further consider the case of perfect electoral contestability, for which a closed-form solution can be obtained. If $b = 0$, then in the symmetric equilibrium $t_i^I = t_i^O, G^I = G^O, x_i^I = x_i^O = 0$, and $P^I = P^O = 1/2$. Then, we obtain the following result from Proposition 3.

**Corollary 1.** *If $b = 0$, then in the symmetric equilibrium both platforms are characterised by*

$$\frac{c_e^{**}}{c_d^{**}} = \frac{\pi_e f_e}{\pi_d f_d}, \tag{11}$$

$$G^{**} = \frac{\gamma \sum n_i w_i}{2\alpha N} \Delta \tag{12}$$

*and*

$$R^{**} = \gamma \sum n_i w_i (1 - \Delta), \tag{13}$$

*where*

$$\Delta \equiv \frac{4 \sum \pi_i n_i f_i}{4 \sum \pi_i n_i f_i + \sum \pi_i n_i} \in (0, 1).$$

From Corollary 1, we observe that $G^{**}$ is always less than $G^*$ when the variance of the individual bias is positive and $f_i$'s are finite. Subsequently, the platforms are associated with positive rents (13) even with perfect electoral contestability and their size likewise depends on the variance of the individual bias.

We now turn to the key results regarding the direct effect of democracy on the equilibrium policy outcomes.

**Theorem 1.** *The incumbent's provision of public goods, $G^I$, is increasing with electoral contestability (i.e. decreasing with the bias $b$) while the tax* *rates $t_i^I$, political rents $R^I$ and probability of winning the election $P^I$ are decreasing. Electoral contestability has the opposite effect on the opponent's electoral platform and probability of winning.*

Theorem 1 establishes that the effect of contestability, as expected, is negative on the incumbent's equilibrium tax rate. While Proposition 3 shows that the ratio between public and private consumption is socially optimal, Theorem 1 indicates that the incumbent offers more of both types of consumption when contestability increases. This is because the electoral bias allows the incumbent to overtax (relative to the equilibrium tax rate between identical parties) and enjoy higher rents. It comes as no surprise that levelling the playing field through electoral contestability must, in equilibrium, increase the opponent's political rents and probability of winning, while decreasing their proposed public goods provision. That is, the platforms converge towards those described in Corollary 1. While the incumbent's provision of public goods, for example, is increasing in electoral contestability, it never reaches the socially optimal level as $G^{**} < G^*$.

Figure 1 presents an example[10] of how the incumbent's and opponent's public goods provision changes with electoral contestability (their respective rents and probability of winning move in the opposite direction). When contestability is low ($b = 2.7130$) and the incumbent's win is nearly certain, the opponent is forced to offer the socially optimal level of public goods, i.e. $G^O = G^*$. At the same time, the incumbent's public goods provision, $G^I$, is about 27% less than under perfect contestability ($b = 0$). When contestability increases and $b$ approaches zero, the provision levels converge. However, the socially optimal level is about 58% higher than what the parties propose under perfect contestability.

**Theorem 2.** *Public goods provision by both parties is increasing and their political rents are decreasing with inclusivity ($\pi_d/\pi_e$) if, and only if, the citizens are more responsive to the electoral platforms ($f_d > f_e$). Furthermore, the incumbent's probability of winning is increasing with inclusivity if, and*

[10]We use the following input values in the example: $\pi_e = 1, \pi_d = 3/4, n_e = n_d = 1/2, f_e = 1/2, f_d = 1/3, w_e = w_d = 1, \gamma = 3/4, \alpha = 2$.

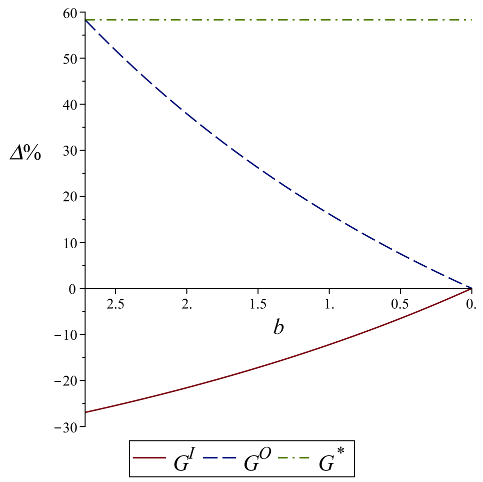
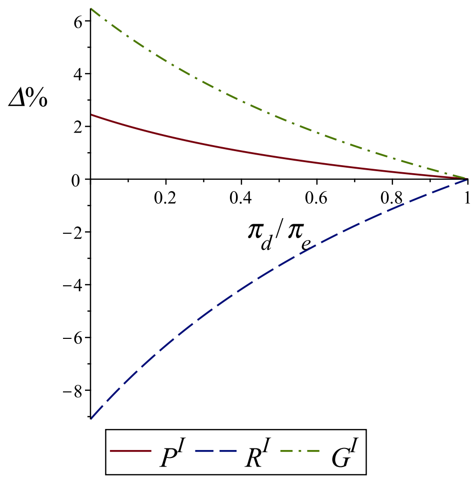



Figure 1: The percentage change in $G^I, G^O$ and $G^*$ as compared to $b = 0$.

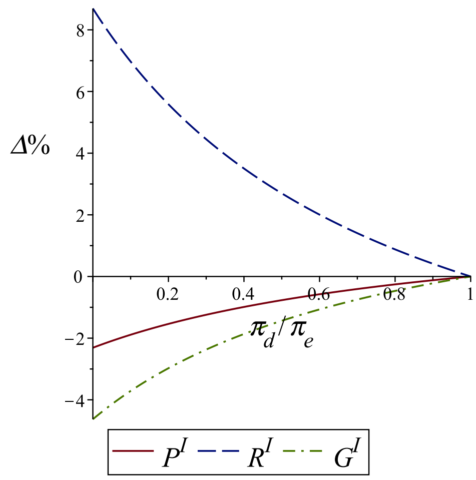
*only if, there is imperfect electoral contestability* $(b > 0)$ *and the citizens are more responsive than the elite* $(f_d > f_e)$.

Theorem 2 shows that the effects of inclusivity are conditional upon the groups' relative responsiveness. If the citizens are more responsive to the electoral platforms due to their greater density of individual bias, then an increase in inclusivity makes the whole population more responsive. This forces both parties to increase their proposed public goods provision and decrease their rents. The opposite happens if the elite are more responsive. From this perspective the parties would prefer changes that make the average population less responsive, as it increases the scope for political rents. If there is no electoral bias, then inclusivity does not affect the probability of winning and both parties gain or lose from it equally. However, as soon as the election is less than perfectly contestable, increased inclusivity shifts the probability of winning in the incumbent's favour if the citizens are more responsive, and in the opponent's favour if they are not. This is because in the first case the population becomes more responsive to the electoral bias, and in the latter case, the overall effect of the bias decreases. To sum up, to increase public consumption and decrease rents through higher inclusivity it is both necessary and sufficient that the citizens are more responsive.

Figure 2 illustrates how the relative responsiveness of the two groups




(a) $f_e > f_d$




(b) $f_d > f_e$

Figure 2: The percentage change in $P^I, R^I$ and $G^I$ as compared to $\pi_d = \pi_e$.

yields the opposite outcomes. In both cases we have $f_e = 1/2$, but in Figure 2(a) we have $f_d = 1/3$ and in Figure 2(b) we have $f_d = 2/3$.[11] In terms of $P^I, R^I$ and $G^I$, we see how an increase in inclusivity $\pi_d/\pi_e$ leads to completely opposite changes in the two cases.

To sum up the findings on the direct effects of democracy, the effect of contestability is unambiguously positive on both private and public consumption. While inclusivity leads to more equal private consumption, its effect on public consumption is positive if, and only if, the disadvantaged citizens are more responsive to the electoral platforms. Whether the latter requirement holds in reality may be a cause for concern.

## 3.2 Stage 1

To provide a benchmark for the state capacity investments, we again begin by considering the problem of a Utilitarian social planner. The planner does not want to leave any excess after the state capacity investments and needs to consider the optimal intertemporal consumption path when deciding the tax rates and public goods provision in the preceding period. Thus, subject

[11]The other input values used in the example are: $\pi_e = 1, \pi_d \in [0, 1], n_e = n_d = 1/2, w_e = w_d = 1, b = 1/2, \gamma = 3/4, \alpha = 2$.

to the budget constraint

$$\hat{\gamma} \sum w_i n_i \hat{t}_i = \hat{\alpha} N \hat{G} + g(\hat{\alpha} - \alpha) + h(\gamma - \hat{\gamma}),$$

the planner's problem in the preceding period is to choose $\hat{t}_e, \hat{t}_d, \hat{G}, \alpha$ and $\gamma$ to maximise intertemporal social welfare,

$$\hat{W} + \delta W = n_e \ln(\hat{c}_e) + n_d \ln(\hat{c}_d) + N \ln(\hat{G}) + \delta N(\ln(c^*) + \ln(G^*)),$$

where $\hat{c}_i = (1 - \hat{t}_i) w_i$, and $c^*$ and $G^*$ are given by Proposition 1. Again, this is a straightforward optimisation problem and we omit the proof of the following proposition.

**Proposition 4.** *The social planner's optimal state capacity investments are implicitly determined by*

$$g' \alpha = h' \gamma = \frac{\delta}{2} \left( \hat{\gamma} \sum w_i n_i - g(\hat{\alpha} - \alpha) - h(\gamma - \hat{\gamma}) \right).$$

Now, we go on to consider state capacity investments in the context of electoral competition. The new $\gamma$ and $\alpha$ that materialise after the next election are at the disposal of the election winner. The following lemma is the first step in establishing the indirect effect of democracy on public finance.

**Lemma 1.** *The equilibrium tax rates and winning probabilities are independent of $\alpha$ and $\gamma$, while $G^J$ is increasing in $\gamma$ and decreasing in $\alpha$ and $R^J$ is increasing in $\gamma$ and independent of $\alpha$.*

Knowing that state capacity has a positive effect on public consumption, what remains to be addressed is how democracy affects state capacity.

Let us now consider the incumbent who can invest some of the political rents it has gained after implementing the previous electoral platform. The incumbent chooses $\gamma$ and $\alpha$ to maximise

$$\hat{\Pi}^I = \hat{R} - g(\hat{\alpha} - \alpha) - h(\gamma - \hat{\gamma}) + \delta P^I R^I, \tag{14}$$

where $P^I R^I$ is the expected equilibrium political rent in Stage 2. The effect of democracy on the state capacity investments is established in the following two theorems.

**Theorem 3.** *There is no investment in operative capacity and the outcome is independent of electoral contestability and political inclusivity.*

While it may come as a surprise that the incumbent has no incentive to improve operative capacity – after all, this would increase public consumption – this is the case because, first of all, the equilibrium public good *expenditure* is independent of $\alpha$ and the investment does not contribute towards political rents. Second, operative capacity does not give the incumbent any advantage over the opponent, since both parties have access to the same $\alpha$ and the probability of winning is independent of it.

To some extent, the outcome of Theorem 3 is model specific. The assumed log utility function makes the model tractable, but as with the Cobb–Douglas utility function, the equilibrium expenditure shares become independent of $\alpha$ (and $\gamma$). With a different utility function, such as the more general CES form, this is no longer the case, and the parties need to reoptimise the expenditures for each $\alpha$. Unfortunately, tractability then becomes an issue.

Based on numerical simulations and analysing an otherwise simplified model with CES utility, we conjecture that the effect of $\alpha$ on the incumbent's expected rent can either be positive or negative. The sign of this effect and the subsequent incentive to invest (or disinvest) in operative capacity depends, in particular, on the degree of substitutability between public and private consumption. However, this effect will be further dampened by the lack of electoral contestability or a division of political influence that makes the electorate less responsive as a whole.

The analysis shows that the electoral competition provides no clear incentive to invest in operative capacity. As such, some other factor is required (both in theory and reality) to provide the incumbent with an incentive to do so. This would be the case if, for example, operative capacity were partially exclusive to the incumbent and the opponent would be restricted to some higher cost of public goods provision $\alpha' \in (\alpha, \hat{\alpha}]$. However, when such a factor is absent, the society may get stuck with its initial level of operative capacity and be forced to rely on exogenous factors, such as general economic development, for any further improvement. Yet, that is not the case with regards to fiscal capacity, especially as it has a direct effect on the incumbent's ability to appropriate future rents.

**Theorem 4.** *The investment in fiscal capacity is decreasing with electoral contestability. The investment is increasing with inclusivity if there is perfect electoral contestability* ($b = 0$) *and the elite are more responsive to the electoral platforms* ($f_e > f_d$)*, or if the elite are sufficiently more responsive* ($f_e - f_d > \sum \pi_i n_i/(2\pi_d n_d)$)*. Furthermore, the investment is decreasing with inclusivity if there is perfect electoral contestability* ($b = 0$) *and the citizens are more responsive to the electoral platforms* ($f_d > f_e$)*, or if the citizens are sufficiently more responsive* ($f_d - f_e > \sum \pi_i n_i/(2\pi_e n_e)$)*.*

We know from Theorem 1 that contestability has a positive direct effect on public finance from the voters' point of view. However, the above result presents a key trade-off in this respect. Since public consumption is increasing in fiscal capacity, and the investment in fiscal capacity is decreasing with contestability, the indirect effect of contestability goes in the opposite direction. Figure 3 presents an example[12] of how an increase in bias $b$ leads the incumbent to choose higher fiscal capacity $\gamma^I$. When contestability is low, the incumbent invests more in fiscal capacity than the social planner would. The incumbent's investment is monotonically decreasing in contestability and the two levels coincide in this case when $b = 1.3917$. Any further increase in contestability (i.e. a decrease in $b$), means that $\gamma^I < \gamma^*$ and the incumbent's chosen level of fiscal capacity is less than the planner's.

In Figure 4, we decompose the total effect of electoral contestability on public goods provision into its direct and indirect effects. $G^I_{de}$ represents the direct effect and is constructed such that the incumbent chooses $\gamma$ in Stage 1 as if $b = 0$. $G^I_{ie}$ represents the direct effect and is constructed such that the incumbent chooses the electoral platform in Stage 2 as if $b = 0$. $G^I_{te}$ shows the total effect of electoral contestability such that the incumbent

[12]In the example, we use input values $\pi_e = 1, \pi_d = 3/4, n_e = n_d = 1/2, f_e = 1/2, f_d = 1/3, w_e = w_d = 1, \alpha = \hat{\alpha}, \delta = 9/10$ and the functional form $h(\gamma - \hat{\gamma}) = (\gamma - 1/2)^2$.

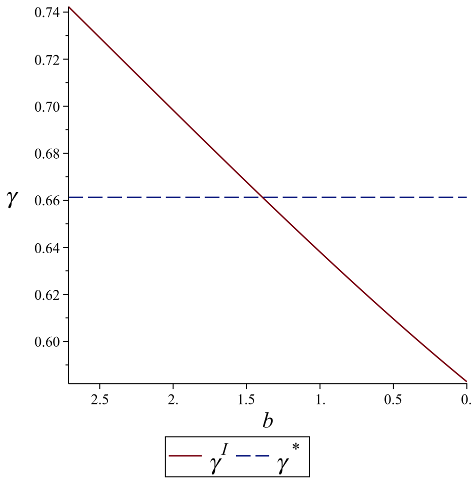
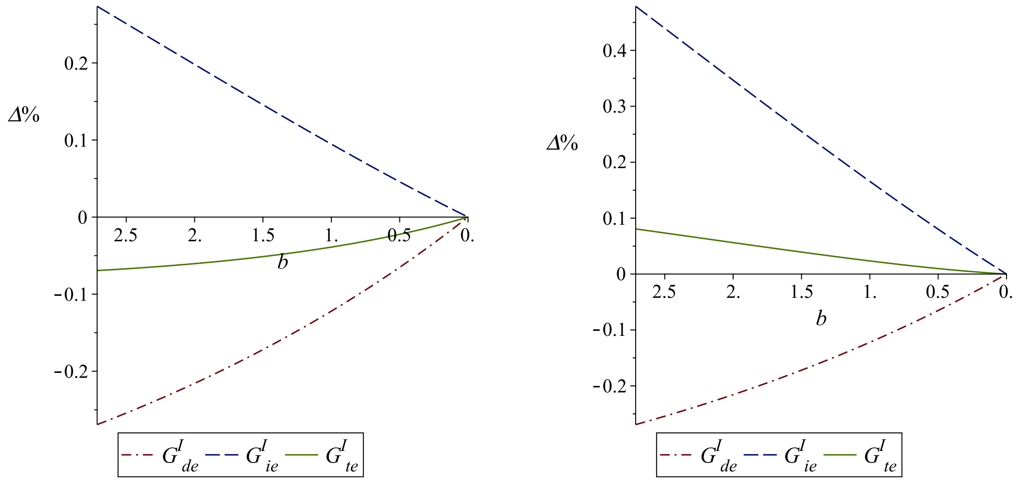



Figure 3: The incumbent's and social planner's choice of $\gamma$ and electoral contestability (as an inverse function of $b$).

freely optimises in both stages. All of these are shown in comparison to the case of perfect electoral contestability ($b = 0$).

We see in both subfigures the positive direct effect and negative indirect effect of contestability. However, which of the two will dominate depends on factors outside the election, in particular on the discount factor and investment costs. Using the same input values as we did in Figure 3, we see that in Figure 4(a) the direct effect dominates and the total effect is to increase contestability. Indeed, when contestability is very low ($b = 2.7130$) and the incumbent's win is nearly certain, the resulting public goods provision is nearly 7% lower than when $b = 0$. In Figure 4(b), however, we have kept the other parameter values unchanged but halved the investment costs. Now, the indirect effect becomes dominant and the total effect of contestability is negative. A very low level of contestability ($b = 2.7130$) results to more than 8% higher public goods provision than perfect contestability.

Similarly, we saw earlier that the direct effect of inclusivity can go both ways and depends on the relative responsiveness of the groups. What further complicates the issue with respect to the investment in fiscal capacity is that the incumbent's equilibrium rent and probability of winning move in opposite directions if there is electoral bias. However, as long as the difference in




(a) High cost of fiscal capacity investment (b) Low cost of fiscal capacity investment

Figure 4: The direct ($de$), indirect ($id$), and total effect ($te$) of electoral contestability on $G^I$ as compared to $b = 0$.

the groups' responsiveness is large enough, the change in the equilibrium rent dominates and the indirect effect of inclusivity through state capacity investment is opposite to its direct effect on public consumption. As in the case of electoral contestability, whether the direct or indirect effect dominates also depends on other factors (i.e. $\delta$ and $h(\cdot)$).

The discount factor of state capacity investment ($\delta$) relates directly to the political environment. It captures, not only the lapse of time after which the investment bears fruit, but also the risk faced by the incumbent. Specifically, the risks due to political cycles and instability. For example, if it is an established democracy with regular and more predictable elections in contrast to politically instable scenarios, such as those depicted by civil wars and coups. Even in established democracies, the emergence of populist movements can challenge the preferences of established political parties, leading, perhaps, towards more short-sighted actions. Indeed, we have seen in Besley & Reynal-Querol (2017) that countries with hereditary rule are better at developing state capacity, as they have more longevity and stability.

On the other hand, as the incumbent government tries to improve fiscal capacity during their tenure, the marginal cost of fiscal capacity investment ($h(\cdot)$) is increasing. Arguably, the next government may be facing even steeper marginal costs. This an important insight to understanding why state capacity investment has plateaued in advanced democracies in recent decades. After the low-hanging fruit have been picked, subsequent improvements in capacity in the future become harder to achieve.

Figure 5 provides an example[13] of how the relative responsiveness of the groups affects the investment. When $f_e = 1/2 > f_d = 1/3$ and the elite are more responsive to the electoral platforms, fiscal capacity $\gamma^e$ is increasing in inclusivity $\pi_d/\pi_e$. The opposite happens to $\gamma^d$, where $f_d = 2/3 > f_e = 1/2$ and the citizens are more responsive.

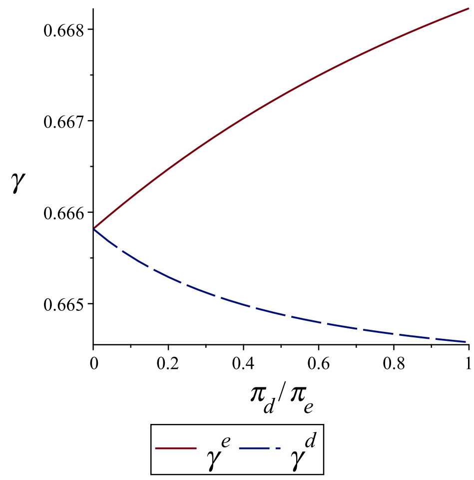



Figure 5: The incumbent's choice of $\gamma$ as a function of $y$ and when $f_e \gtrless f_d$.

No investment in operative capacity is clearly an underinvestment problem of electoral competition, but the case is more nuanced with respect to fiscal capacity. Contestability and inclusivity affect the level of state capacity investment in fiscal capacity, but in general there can be over- or underinvestment as compared to the Utilitarian benchmark. An example of this can be seen in Figure 3 by comparing the incumbent's investment $\gamma^I$ to the social planner's choice $\gamma^S$.[14] We can see how there is underinvestment for

[13]In the example, we use the functional form $h(\gamma - \hat{\gamma}) = (\gamma - 1/2)^2$ and the other input values are $\pi_e = 1, \pi_d \in [0, 1], n_e = n_d = 1/2, w_e = w_d = 1, b = 3/2, \alpha = \hat{\alpha}, \delta = 9/10$.

[14]The planner's investment in the example is second best in the sense that we assume the planner does not invest in operative capacity either and $\alpha = \hat{\alpha}$.

high levels of contestability (low $b$ and $\gamma^S > \gamma^I$) and overinvestment for low levels of contestability (high $b$ and $\gamma^I > \gamma^S$).

The issue of under- vs. overinvestment is not only a matter of the level of contestability. To see this, consider the incumbent's optimal investment in the absence of electoral bias ($b = 0$). Combining the first-order condition (28) with (13) yields

$$-g' + \frac{\delta}{2} \sum n_i w_i (1 - \Delta) = 0.$$

A comparison with Proposition 4 shows that whether the incumbent invests more than the planner depends on

$$\frac{\delta}{2} \sum n_i w_i (1 - \Delta) \gtrless \frac{\delta}{2\gamma} \left( \hat{\gamma} \sum w_i n_i - g(\hat{\alpha} - \alpha) - h(\gamma - \hat{\gamma}) \right)$$

$$\leftrightarrow \gamma \sum n_i w_i (1 - \Delta) \gtrless \hat{\gamma} \sum w_i n_i - g(\hat{\alpha} - \alpha) - h(\gamma - \hat{\gamma}),$$

and, hence, ultimately on the size of $\Delta$ and the variance of the individual biases. Thus, we conclude the analysis with the following observation.

**Corollary 2.** *The incumbent's investment in fiscal capacity can be larger or smaller than that of the Utilitarian social planner.*

A valid criticism of the model is that state capacity investment plays no role in the election. In defence of the model, note first that operative and fiscal capacity do not affect the voters' income. Their effect will only be materialised through future electoral platforms that have yet to be proposed. Furthermore, while the voters could consider how the parties invest in state capacity, it is not immediately clear how they would do this.

On one hand, rewarding the incumbent for their past investment in the election stage is problematic. In a repeated game between the incumbent and voters such an outcome could potentially be sustained. Similarly, our assumption regarding the parties' commitment to their platforms can be justified from this perspective.[15] However, unlike the parties, the voters are

[15]We thank an anonymous referee for raising this issue.

numerous, anonymous, and possibly short-lived in comparison to the time lag of state capacity investments and how often such opportunities arise. As such, they have an incentive to ignore the past state capacity investments even if there is an expectation of repeated interaction between the incumbent and the electorate.

On the other hand, if the state capacity investment were to become part of the electoral platforms of the parties, then evaluating the platforms would require much from the voters. Even in the stylised of context of our model, assessing the long-run effects of economic policy is not simple arithmetic of "more state capacity is better" as indicated by Corollary 2. Furthermore, the voters would not only need to consider how state capacity would be used by the parties in the future, but also the probability of a particular party of winning, given how their fellow citizens are likely to vote.

If the voters put some positive weight on state capacity, it is clear that there would be more of it, and our model shows that in one form or another, this is necessary for an increase in operative capacity in particular. As such, we conclude by noting that the inclusion and role of state capacity investment in electoral competition is an important open question for subsequent research. This is not only a difficult question for theoretical modelling but also for democracy.

# 4 Concluding Remarks

The purpose of the present paper is to study the determinants of state capacity investment and public finance with respect to democracy. The present analysis considers two specific and crucial aspects of democracy. That is, we consider political inclusivity and electoral contestability – both important hallmarks of democracy. The paper provides a unified framework to the study the direct and indirect effects of democracy by combining state capacity investment and probabilistic voting. We extend the existing literature, first, by considering these two crucial aspects of democracy and, second, by distinguishing two elements of state capacity; fiscal and operative capacity.

We find that the direct effect of democracy on public finance is different from its indirect effect through state capacity investment. This is a novel theoretical result and sheds light on the mixed empirical findings. Greater electoral contestability leads to higher levels of public goods provision and lower political rents, but it deteriorates the incumbent's incentive to invest in state capacity. Likewise, increased political inclusivity between voters leads to higher public goods provision and lower political rents if, and only if, the citizens are more responsive to the electoral platforms. However, its effect on state capacity will then be negative. Conversely, if the effect of inclusivity on state capacity investment is positive, then public goods provision will decline and rents increase through its direct effect on the electoral platforms. Finally, we find that operative capacity is unaffected by either inclusivity or contestability.

While there is sufficient empirical evidence depicting the theoretical results outlined here, specific country examples can be found too. The best example is Sri Lanka following independence. Sri Lanka established a thriving parliamentary democracy between 1956 and 1977. The high electoral participation led to a broad provision of public services, including (notably) schools and health services. The highly competitive political party system meant that parties competed to provide and expand social welfare programmes. The revenue base was from an agrarian-based export economy, but the strain of the social welfare programmes was such that the state's fiscal capacity did not grow fast enough to support the spending. This was a turning point politically, and resulted in the return of the United National Party to power in 1977 with a platform of economic liberalisation. The ensuing high levels of unemployment and the sense of social exclusion were conducive to the onset of the civil war that waged for much of the next two decades (Abeyratne, 2004).

It is also well established that some non-democracies invest more readily in state capacities for the provision of public goods. There are a number of examples of high performing autocratic states, such as the East Asian economies, where the ruling regimes have actively engaged in growth-promoting spending. South Korea, starting as a military dictatorship, and Taiwan, have heavily invested in public services such as education and health. Indeed, South Korean health outcomes rank with those of Canada, which is a more established democracy.


## Acknowledgements

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# Appendix A Proofs

**Proposition 2.** *The Hessian matrix of* $\Pi^J$ *is negative definitive in any interior point* $x_i^J$ *where* $F_i(x_i^J) > 0$.

*Proof of Proposition 2.* The Hessian matrix of $\Pi^J(t_i^J, t_j^J, G^J)$ is

$$\mathbf{H} = \begin{pmatrix} \mathcal{F}_{ii} & \mathcal{F}_{ij} & \mathcal{F}_{ig} \\ \mathcal{F}_{ij} & \mathcal{F}_{jj} & \mathcal{F}_{jg} \\ \mathcal{F}_{ig} & \mathcal{F}_{jg} & \mathcal{F}_{gg} \end{pmatrix},$$

where the second partial derivatives are given by

$$\begin{aligned} \mathcal{F}_{ii} &\equiv -P_{ii}R^J - 2P_iR_i < 0 & \mathcal{F}_{ij} &\equiv -P_iR_j - P_jR_i < 0 \\ \mathcal{F}_{jj} &\equiv -P_{jj}R^J - 2P_jR_j < 0 & \mathcal{F}_{ig} &\equiv P_iR_g + P_gR_i > 0 \\ \mathcal{F}_{gg} &\equiv -P_{gg}R^J - 2P_gR_g < 0 & \mathcal{F}_{jg} &\equiv P_jR_g + P_gR_j > 0 \end{aligned} \tag{15}$$

with

$$
\begin{aligned}
&P_i \equiv \frac{w_i}{c_i^J}\frac{\pi_i n_i f_i}{\sum \pi_i n_i} > 0 && P_{ii} \equiv \frac{w_i}{c_i^J} P_i > 0 && R_i \equiv \gamma w_i n_i > 0 \\
&P_j \equiv \frac{w_j}{c_j^J}\frac{\pi_j n_j f_j}{\sum \pi_i n_i} > 0 && P_{jj} \equiv \frac{w_j}{c_j^J} P_j > 0 && R_j \equiv \gamma w_j n_j > 0 \\
&P_g \equiv \frac{1}{G^J}\frac{\sum \pi_i n_i f_i}{\sum \pi_i n_i} > 0 && P_{gg} \equiv \frac{1}{G^J} P_g > 0 && R_g \equiv \alpha N > 0
\end{aligned}
$$

and $i, j = \{e, d\}, i \neq j$.

Let $D_s$ be the $s$th-order principal minor of $\mathbf{H}$. If $D_1 < 0, D_2 > 0$ and $D_3 < 0$, then $\mathbf{H}$ is negative definite. It follows directly from (15) that $D_1 = \mathcal{F}_{ii} < 0$.

Note that $F_i(x_i^J) > 0$ and the first-order conditions (4) and (5) imply $R^J > 0$ and that

$$
\frac{R^J}{P^J} = \frac{R_i}{P_i} = \frac{R_j}{P_j} = \frac{R_g}{P_g} \tag{16}
$$

Using (16), it follows that

$$
\begin{aligned}
D_2 = \begin{vmatrix} \mathcal{F}_{ii} & \mathcal{F}_{ij} \\ \mathcal{F}_{ij} & \mathcal{F}_{jj} \end{vmatrix} &= \mathcal{F}_{ii}\mathcal{F}_{jj} - (\mathcal{F}_{ij})^2 \\
&= P_{ii}P_{jj}\left(R^J\right)^2 + 2(P_{ii}P_jR_j + P_{jj}P_iR_i)R^J > 0.
\end{aligned}
$$

Finally, we use (16) to simplify the following determinants:

$$
\begin{aligned}
\begin{vmatrix} \mathcal{F}_{jj} & \mathcal{F}_{jg} \\ \mathcal{F}_{jg} & \mathcal{F}_{gg} \end{vmatrix} =& \mathcal{F}_{jj}\mathcal{F}_{gg} - (\mathcal{F}_{jg})^2 \\
=& P_{jj}P_{gg}\left(R^J\right)^2 + 2(P_{jj}P_gR_g + P_{gg}P_jR_j)R^J > 0,
\end{aligned} \tag{17}
$$

$$
\begin{vmatrix} \mathcal{F}_{ij} & \mathcal{F}_{jg} \\ \mathcal{F}_{ig} & \mathcal{F}_{gg} \end{vmatrix} = \mathcal{F}_{ij}\mathcal{F}_{gg} - \mathcal{F}_{jg}\mathcal{F}_{ig} = \mathcal{F}_{ij}P_{gg}R^J > 0, \tag{18}
$$

and

$$
\begin{vmatrix} \mathcal{F}_{ij} & \mathcal{F}_{jj} \\ \mathcal{F}_{ig} & \mathcal{F}_{jg} \end{vmatrix} = \mathcal{F}_{ij}\mathcal{F}_{jg} - \mathcal{F}_{ig}\mathcal{F}_{jj} = \mathcal{F}_{ig}P_{jj}R^J > 0. \tag{19}
$$

By substituting (17), (18) and (19), we obtain

$$
\begin{aligned}
D_3 = &\begin{vmatrix} \mathcal{F}_{ii} & \mathcal{F}_{ij} & \mathcal{F}_{ig} \\ \mathcal{F}_{ij} & \mathcal{F}_{jj} & \mathcal{F}_{jg} \\ \mathcal{F}_{ig} & \mathcal{F}_{jg} & \mathcal{F}_{gg} \end{vmatrix} = \mathcal{F}_{ii} \begin{vmatrix} \mathcal{F}_{jj} & \mathcal{F}_{jg} \\ \mathcal{F}_{jg} & \mathcal{F}_{gg} \end{vmatrix} - \mathcal{F}_{ij} \begin{vmatrix} \mathcal{F}_{ij} & \mathcal{F}_{jg} \\ \mathcal{F}_{ig} & \mathcal{F}_{gg} \end{vmatrix} + \mathcal{F}_{ig} \begin{vmatrix} \mathcal{F}_{ij} & \mathcal{F}_{jj} \\ \mathcal{F}_{ig} & \mathcal{F}_{jg} \end{vmatrix} \\
= &\mathcal{F}_{ii} P_{jj} P_{gg} \left(R^J\right)^2 - 2P_{ii}(P_{jj} P_g R_g + P_{gg} P_j R_j) \left(R^J\right)^2 < 0,
\end{aligned}
$$

which completes the proof. □

*Proof of Proposition 3.* Solving Equation (4) simultaneously for both groups yields Equation (6). Then, multiplying the both sides of (4) by $c_i^J / w_i$ and summing over both groups yields

$$
-\frac{\sum \pi_i n_i f_i}{\sum \pi_i n_i} R^J + P^J \gamma \sum c_i n_i = 0 \leftrightarrow R^J = P^J \gamma \sum c_i n_i \frac{\sum \pi_i n_i}{\sum \pi_i n_i f_i}.
$$

By substituting $R^J$ in (5) we obtain Equation (7). By substituting Equation (7) into the budget constraint (1) we obtain Equation (8).

Multiply the first-order condition (4) by $(c_i^J \sum \pi_i n_i)/(w_i n_i)$ to get

$$
\mathcal{F}_J = -\pi_i f_i R^J + \gamma c_i^J \sum \pi_i n_i F_i(x_i^J) = 0. \tag{20}
$$

Substituting (7) into $x_i^J$, the critical value simplifies to

$$
x_i^J = 2 \ln c_i^J - 2 \ln c_i^K + b^J = x^J \tag{21}
$$

which given (6) and log-utility is the same for both groups and (20) is equivalent to (9). Using Equations (4), (8) and $P^K = 1 - P^J$, obtain

$$
c_i^K = \frac{\pi_i f_i \sum w_i n_i \, c_i^J}{\left(\sum \pi_i n_i + 4 \sum \pi_i n_i f_i\right) c_i^J - \pi_i f_i \sum w_i n_i}. \tag{22}
$$

Finally, substituting (22) in (21) yields Equation (10). □

*Proof of Theorem 1.* Differentiate Equation (9) with respect to $t_i^J$ to obtain

$$
\mathcal{F}_{JJ} = -\gamma w_i \left( 2 \sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J) + \sum \pi_i n_i f_i \frac{2Bc_i^J}{Bc_i^J - A} \right) < 0,
$$

where

$$A = \pi_i f_i \sum w_i n_i \text{ and } B = \sum \pi_i n_i + 4 \sum \pi_i n_i f_i.$$

Next, differentiate Equation (9) with respect to $b$ to obtain

$$\mathcal{F}_{Ib} = \gamma c_i^J \sum \pi_i n_i f_i > 0 \text{ and } \mathcal{F}_{Ob} = -\gamma c_i^J \sum \pi_i n_i f_i < 0.$$

By the implicit function theorem,

$$\frac{\partial t_i^I}{\partial b} = -\frac{\mathcal{F}_{Ib}}{\mathcal{F}_{II}} > 0 \text{ and } \frac{\partial t_i^O}{\partial b} = -\frac{\mathcal{F}_{Ob}}{\mathcal{F}_{OO}} < 0. \tag{23}$$

Since $b$ has no direct effect on $G^J$ or $R^J$ , (23) together with (7) and (8) imply that

$$\frac{\partial G^I}{\partial b} < 0, \frac{\partial G^O}{\partial b} > 0, \frac{\partial R^I}{\partial b} > 0 \text{ and } \frac{\partial R^O}{\partial b} < 0.$$

The effect of $b$ on $P^J$ comes through the critical value and is positive in the case of the incumbent:

$$\frac{\partial x^I}{\partial b} = \frac{2Bw_i}{Bc_i^I - A} \frac{\mathcal{F}_{Ib}}{\mathcal{F}_{II}} + 1 > 0$$

$$\leftrightarrow -\mathcal{F}_{II}(Bc_i^I - A) > \gamma w_i \sum \pi_i n_i f_i 2Bc_i^I = 2Bw_i \mathcal{F}_{Ib}.$$

Since $x^O = -x^I$, $\partial x^O/\partial b < 0$ and the opponent's probability of winning is decreasing in $b$. □

*Proof of Theorem 2.* Consider the condition (9) and its derivatives for $i = e$. Let $\pi_d = y\pi_e$, where $y \in (0, 1]$ is a measure of inclusivity. Substitute $\pi_d$ in the condition (9) and differentiate with respect to $y$ to obtain

$$\mathcal{F}_{Jy} = \gamma c_e^J \pi_e n_d \left( 2f_d + F_d(x^J) + \sum \pi_i n_i f_i \frac{2(1 + 4f_d)c_e^J}{Bc_e^J - A} \right) > 0.$$

By the implicit function theorem,

$$\frac{\partial t_e^J}{\partial y} = -\frac{\mathcal{F}_{Jy}}{\mathcal{F}_{JJ}} > 0. \tag{24}$$

Given (8), (24) and $F_i(x^J) = 1/2 + f_i x^J$,

$$\frac{\partial R^J}{\partial y} = -2\gamma \frac{\partial \left(\sum c_i n_i\right)}{\partial y} = 2w_e \frac{\partial t_e^J}{\partial y}(n_e + n_d \frac{f_d}{f_e} y) - 2c_e^J \frac{f_d}{f_e} n_d$$

$$= \frac{2\gamma^2 w_e c_e^J n_d}{-\mathcal{F}_{JJ} f_e} \Bigg[ \pi_e f_e (n_e + n_d \frac{f_d}{f_e} y) \left( 2f_d + F_d(x^J) + \sum \pi_i n_i f_i \frac{2(1+4f_d)c_e^J}{Bc_e^J - A} \right)$$

$$-f_d \left( 2\sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J) + \sum \pi_i n_i f_i \frac{2Bc_e^J}{Bc_e^J - A} \right) \Bigg]$$

$$= \frac{2\gamma^2 w_e c_e^J n_d}{-\mathcal{F}_{JJ} f_e} \Bigg[ \sum \pi_i n_i f_i F_d(x^J) - \sum \pi_i n_i F_i(x^J) f_d$$

$$+ \frac{2\sum \pi_i n_i f_i c_e^J}{Bc_e^J - A} \left( \sum \pi_i n_i f_i - \sum \pi_i n_i f_d \right) \Bigg]$$

$$= \frac{2\gamma^2 w_e c_e^J n_d}{-\mathcal{F}_{JJ} f_e} \left[ \pi_e n_e (F_d(x^J) f_e - F_e(x^J) f_d) + \frac{2\sum \pi_i n_i f_i c_e^J}{Bc_e^J - A} \pi_e n_e (f_e - f_d) \right]$$

$$= \frac{2\gamma^2 w_e c_e^J \pi_e n_e n_d}{-\mathcal{F}_{JJ} f_e (Bc_e^J - A)} (f_e - f_d) \left[ Bc_e^J - A + 4c_e^J (n_e f_e + n_d f_d y) \right], \qquad (25)$$

Which is negative if, and only if, $f_d > f_e$. Since public goods provision is increasing in private consumption (8), we have $\partial G^J/\partial y = -(\partial R^J/\partial y)/(2\alpha N) > 0$ if, and only if, $f_d > f_e$.

The derivative of the critical value with respect to $y$ is given by

$$\frac{\partial x^J}{\partial y} = \frac{2}{Bc_e^J - A} \left[ (1+4f_d)\pi_e n_d c_e^J - w_e B \frac{\partial t_e^J}{\partial y} \right]$$

$$= \frac{2\gamma w_e c_e^J \pi_e n_d}{-\mathcal{F}_{JJ}(Bc_e^J - A)} \Bigg[ (1+4f_d) \left( 2\sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J) + \sum \pi_i n_i f_i \frac{2Bc_e^J}{Bc_e^J - A} \right)$$

$$-B \left( 2f_d + F_d(x^J) + \sum \pi_i n_i f_i \frac{2(1+4f_d)c_e^J}{Bc_e^J - A} \right) \Bigg]$$

$$= \frac{2\gamma w_e c_e^J \pi_e n_d}{-\mathcal{F}_{JJ}(Bc_e^J - A)} \big[ 2\pi_e n_e (f_e - f_d) + \pi_e n_e (F_e(x^J) - F_d(x^J))$$

$$+ 4\pi_e n_e (F_e(x^J) f_d - F_d(x^J) f_e) \big]$$

$$= \frac{2\gamma w_e c_e^J \pi_e^2 n_e n_d}{-\mathcal{F}_{JJ}(Bc_e^J - A)}(f_e - f_d)x^J,$$

where we have again used $F_i(x^J) = 1/2 + f_i x^J$.

Given $\partial x^J/\partial y$, the derivative of the probability of winning with respect to $y$ is

$$\frac{\partial P^J}{\partial y} = \frac{1}{\left(\sum \pi_i n_i\right)^2}\left(\sum \pi_i n_i f_i \sum \pi_i n_i \frac{\partial x^J}{\partial y} - \pi_e^2 n_e n_d (f_e - f_d)x^J\right)$$

$$= \frac{\pi_e^2 n_e n_d (f_e - f_d)x^J}{-\mathcal{F}_{JJ}(Bc_e^J - A)\left(\sum \pi_i n_i\right)^2}\left(2\gamma w_e c_e^J \sum \pi_i n_i f_i \sum \pi_i n_i + f_{JJ}(Bc_e^J - A)\right)$$

$$= \frac{\gamma w_e \pi_e^2 n_e n_d (f_d - f_e)x^J}{-\mathcal{F}_{JJ}(Bc_e^J - A)\left(\sum \pi_i n_i\right)^2}\Big((Bc_e^J - A)(2\sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J)) + 8\left(\sum \pi_i n_i f_i\right)^2 c_e^J\Big). \quad (26)$$

If $b = 0$, then $x^J = 0$ in the symmetric equilibrium and $\partial P^J/\partial y = 0$. If $b > 0$, then $x^I > 0$ and the incumbent's probability of winning is increasing in $y$ (and the opponent's is decreasing) if, and only if, $f_d > f_e$. □

*Proof of Lemma 1.* Note that (9) has no $\alpha$ argument and therefore $\partial \mathcal{F}_J/\partial\alpha = 0$. The derivative of (9) with respect to $\gamma$ is

$$\frac{\partial \mathcal{F}_J}{\partial \gamma} = -\pi_i f_i \left(\sum w_i n_i - 2\sum c_i n_i\right) + c_i^J \sum \pi_i n_i F_i(x^J) = \frac{\mathcal{F}_J}{\gamma} = 0,$$

since $\mathcal{F}_J = 0$. Hence, by the implicit function theorem, $\partial t_i^J/\partial\alpha = \partial t_i^J/\partial\gamma = 0$. Given (10), this further implies that $\partial x^J/\partial\alpha = \partial x^J/\partial\gamma = 0$ and $\partial P^J/\partial\alpha = \partial P^J/\partial\gamma = 0$. Finally, the constant equilibrium tax rates and (7) and (8) imply $\partial R^J/\partial\gamma > 0, \partial G^J/\partial\gamma > 0, \partial R^J/\partial\alpha = 0$, and $\partial G^J/\partial\alpha < 0$. □

*Proof of Theorem 3.* Given Lemma 1, the derivative of (14) with respect to $\alpha$ is $\partial\hat{\Pi}^I/\partial\alpha = g' > 0$. Therefore, it is optimal for the incumbent to choose $\alpha = \hat{\alpha}$. □

We make use of the following lemma in the proof of Theorem 4.

**Lemma 2.** *The incumbent's expected rent, $P^I R^I$, is increasing in $y$ if $f_e - f_d \geq \sum \pi_i n_i/(2\pi_d n_d)$ and decreasing in $y$ if $f_d - f_e \geq \sum \pi_i n_i/(2\pi_e n_e)$.*

*Proof of Lemma 2.* Consider the condition (9) and its derivatives for $i = e$. Using (25), (26) and $P^I = R^I \pi_e f_e/(\gamma c_e^I \sum \pi_i n_i)$ from (9), the derivative of the incumbent's expected rent with respect to $y$ becomes

$$\frac{\partial (P^I R^I)}{\partial y} = \frac{\partial P^I}{\partial y} R^I + P^I \frac{\partial R^I}{\partial y} = R^I \left( \frac{\partial P^I}{\partial y} + \frac{\pi_e f_e}{\gamma c_e^I \sum \pi_i n_i} \frac{\partial R^I}{\partial y} \right)$$

$$= \frac{R^I \gamma w_e \pi_e^2 n_e n_d (f_e - f_d)}{-\mathcal{F}_{JJ}(B c_e^J - A) \left(\sum \pi_i n_i\right)^2} D, \tag{27}$$

where

$$D \equiv \sum \pi_i n_i (B c_e^J - A + 4 c_e^I \sum \pi_i n_i f_i)$$
$$- x^I ((B c_e^J - A) \left(2 \sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J)\right) + 8 \left(\sum \pi_i n_i f_i\right)^2 c_e^J).$$

Suppose that $f_e - f_d \geq \sum \pi_i n_i/(2\pi_d n_d) > 0$. Then $F_e(x^I) < 1$ implies that $x^I < 1/(2f_e)$,

$$D > \sum \pi_i n_i (B c_e^J - A + 4 c_e^I \sum \pi_i n_i f_i)$$
$$- \frac{1}{2f_e} ((B c_e^J - A) \left(2 \sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J)\right) + 8 \left(\sum \pi_i n_i f_i\right)^2 c_e^J)$$
$$> \frac{B c_e^J - A}{2 f_e} \left(2\pi_d n_d (f_e - f_d) - \sum \pi_i n_i\right) \geq 0$$

and that (27) is positive.

Suppose next that $f_d - f_e \geq \sum \pi_i n_i/(2\pi_e n_e) > 0$. Then $F_d(x^I) < 1$ implies that $x^I < 1/(2f_d)$,

$$D > \sum \pi_i n_i (B c_e^J - A + 4 c_e^I \sum \pi_i n_i f_i)$$
$$- \frac{1}{2f_d} ((B c_e^J - A) \left(2 \sum \pi_i n_i f_i + \sum \pi_i n_i F_i(x^J)\right) + 8 \left(\sum \pi_i n_i f_i\right)^2 c_e^J)$$
$$> \frac{B c_e^J - A}{2 f_d} \left(2\pi_e n_e (f_d - f_e) - \sum \pi_i n_i\right) \geq 0$$

and that (27) is negative. □

*Proof of Theorem 4.* Given Lemma 1, the first-order condition of (14) with respect to $\gamma$ is

$$\mathcal{G}_I \equiv \frac{\partial \hat{\Pi}^I}{\partial \gamma} = -f' + \delta P^I \frac{R^I}{\gamma} = 0. \tag{28}$$

Since

$$\mathcal{G}_{II} \equiv \frac{\partial^2 \hat{\Pi}^I}{\partial \gamma^2} = -f'' < 0, \left.\frac{\partial \hat{\Pi}^I}{\partial \gamma}\right|_{\gamma=\hat{\gamma}} = \delta P^I \frac{R^I}{\hat{\gamma}} > 0 \text{ and } \left.\frac{\partial \hat{\Pi}^I}{\partial \gamma}\right|_{\gamma=1} = -\infty,$$

there exists a unique maximum given by $\hat{f}_I$.

We know from Theorem 1 that both $P^I$ and $R^I$ are increasing in $b$, and hence

$$\mathcal{G}_{Ib} \equiv \frac{\partial^2 \hat{\Pi}^I}{\partial \gamma \partial b} = \frac{\delta}{\gamma} \frac{\partial \left(P^I R^I\right)}{\partial b} > 0.$$

By the implicit function theorem,

$$\frac{\partial \gamma}{\partial b} = -\frac{\mathcal{G}_{Ib}}{\mathcal{G}_{II}} > 0.$$

Theorem 2 and Lemma 2 imply that

$$\mathcal{G}_{Iy} \equiv \frac{\partial^2 \hat{\Pi}^I}{\partial \gamma \partial y} = \frac{\delta}{\gamma} \frac{\partial \left(P^I R^I\right)}{\partial y}$$

is positive if $b = 0$ and $f_e > f_d$ or $f_e - f_d \geq \sum \pi_i n_i / (2\pi_d n_d)$ and negative if $b = 0$ and $f_d > f_e$ or $f_d - f_e \geq \sum \pi_i n_i / (2\pi_e n_e)$. By the implicit function theorem,

$$\frac{\partial \gamma}{\partial y} = -\frac{\mathcal{G}_{Iy}}{\mathcal{G}_{II}},$$

which has the same sign as $\mathcal{G}_{Iy}$. □

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