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Under-Investment in State Capacity: The Role of Inequality and Political Instability

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Under-Investment in State Capacity:
The Role of Inequality and Political Instability[*]

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Abstract

Existing studies have shown that the state's ability to tax, also known as fiscal capacity, is positively related to economic development. In this paper, we analyze the determinants of the government's decision to invest in state capacity, which involves a trade-off between present consumption and the ability to collect more taxes in the future. Using a model, we highlight some political and economic dimensions of this decision and conclude that political stability, democracy, income inequality, as well as the valuation of public goods relative to private goods, are important variables to consider. We then test the main predictions of the model using cross-country data and find that state capacity is higher in more stable and equal societies, both in economic and political terms, and in countries where the chances of fighting an external war are high, which is a proxy for the value of public goods.

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1 Introduction

The most commonly known and the earliest definition of state capacity is the state's power to raise tax revenues. As documented in Acemoglu (2005) and Acemoglu, Ticchi and Vindigni (2010), tax revenues constitute only a small portion of GDP in developing countries, such as those in Latin America, Asia and sub-Saharan Africa. The important consequence of the state's inability to collect taxes is the limited provision of public goods and services, which are crucial for the well-being and the living standards of its citizens, especially those of the poor. If level of economic development and welfare of a country are closely related to state capacity, it is critical to understand why certain countries have a low-state-capacity problem. What are the main determinants of the level of state capacity? When do governments under-invest in state capacity? These are the main questions we aim to answer in this paper.

We present a two-period and two-group political economy model based on the theoretical framework developed in Besley and Persson (2009). We name the two groups as elites and citizens, assuming the elites to be the minority group. In each period, the group holding the political power chooses its policy vector of taxes, spending in public goods, and the level of investment in state capacity. The maximum tax rate is determined by the level of state capacity, which can be increased with costly investments by the government. We associate political inequality to autocratic political systems. Specifically, in a fully democratic political system, the utility weights are equal to the population shares. We assume that the system is politically unequal when the utility of a particular group is weighted disproportionately. We also allow for political instability, and assume that the political system is unstable if the ruling group is likely to lose political power to the opponent group, which can occur, for example, as a result of a civil war.

We first investigate how incidence and risk of external wars, as well as political inequality and stability, shape the government's decision to invest in state capacity. Then, we include income inequality to analyze its effect on the investment decision.

Our main theoretical results indicate that the effects of external and civil wars go in opposite directions. While the future risk of fighting external wars calls for building stronger state capacity, fighting civil wars (which is a measure of political instability) causes the government to invest less in state capacity. In the case of an external war, it is the government's best interest to invest in state capacity, to be able to tax both groups at the maximum possible rate, and use these resources to increase spending in public goods (e.g., defense). However, if the country is fighting a civil war, the political system is highly unstable. In this case, the government's actions are myopic, so the future benefit of having higher state capacity stock is low. Therefore, political instability (proxied with incidence of civil wars, or with the likelihood that

the government will be destabilized or overthrown by unconstitutional or violent means) leads to lower investment in state capacity. In the case of political inequality, our model predicts that more democratic political systems (lower political inequality) invest more in state capacity. Furthermore, all these results are independent of which group holds the political power.

When we allow for income inequality, the investment decision becomes group-specific. More precisely, when the elites are in power, in the presence of political instability, both income and political inequality lead to lower investment in state capacity. Conversely, if the citizens are the rulers, our theory predicts that the combination of high political and income inequality results in higher state capacity. However, this is not always the case. Under some circumstances, inequality can result in low investment in state capacity, rationalizing the failed social revolutions.

We empirically test the model's main predictions by applying econometric methods on cross-sectional data. We use several different measures to proxy for state capacity, which cover different and complementary aspects, ranging from fiscal to bureaucratic dimensions. Our empirical results support the theoretical predictions. We find that higher incidence of external wars and political stability (lower incidence of civil wars or lower likelihood that the government will be destabilized) are associated with higher state capacity. On the contrary, inequality (political and/or income) is negatively correlated with state capacity. We also consider the interactions of income inequality with political stability and democracy. The estimation results indicate that, when there is income inequality, the magnitudes of the positive correlations of democracy and political stability with state capacity are significantly reduced.

The organization of this paper is as follows: Section 2 reviews the related literature. Section 3 introduces the model and discusses the theoretical results. In Section 4, we explain in detail the data we use, present the empirical evidence and discuss the regression results. Finally, Section 5 concludes.

2   Related Literature

Our study is related to three strands of literature. The first strand focuses on the effects of wars on formation and development of state capacity. In one of the earliest studies in this line, Tilly (1990) argues that international wars cause governments to build and invest in state capacity. In order to fight wars, governments need to raise military expenditures, for which more tax revenues have to be collected. The experiences of countries like Britain and the United States support this view, since these countries strengthened their tax systems during the first and the second World Wars.

While external wars have drawn attention for building stronger states, it is misleading to extend the argument for the case of internal wars, or civil wars.[1] Consider, for example, Latin American countries, where external wars have been rare, while civil wars have been common and long-lasting. Yet, there has been limited investment in state capacity. Among others, Centeno (2002) argues that state capacity has remained low in Latin America, because civil wars have been highly destructive. Besley and Persson (2008) find evidence that this result is not limited to Latin America, but can be extended as a general consequence of civil wars.

In line with this literature, we consider the effects of wars on shaping the government's decision to invest in state capacity. Yet, we argue that incidence of wars are not the only causes of state capacity differences across countries. There is also a strong negative relationship between state capacity and levels of political and income inequality. In order to fully grasp the low-state-capacity problem, we revisit inequality both theoretically and empirically.

Political and development economists have studied the links between income and political inequality and level of economic development and growth, extensively. Some important examples are Alesina and Rodrik (1994), Persson and Tabellini (1994) and Barro (2000) on income inequality; Acemoglu and Robinson (2000), Persson and Tabellini (2006), and Acemoglu (2005, 2006) on political inequality. Yet, the relationship between inequality and state capacity is not well documented. Our work fills this important gap in the literature by studying the effects of political and income inequality on the government's decision to invest in state capacity. Moreover, we present a unified theoretical framework, where the interactions of the two inequality measures can be analyzed.

Lastly, our work contributes to the literature on institutions. Earlier studies, such as Knack and Keefer (1995), Hall and Jones (1999) and Engerman and Sokoloff (2000), present strong empirical evidence on the positive effect of institutional quality on economic growth, development and wealth of countries. Moreover, they find that institutions persist. But, why do economic institutions differ across countries and why do they persist? One important explanation is provided by Acemoglu, Johnson and Robinson (2001), who find that colonial origins are important elements that lead to the exogenous differences between economic institutions. Our paper complements their study by treating institutions as endogenous and analyzing the conditions that lead to persistently low investment in state capacity.

Our paper is closely linked to and builds on the recent work by Besley and Persson (2009), who develop a framework where the policy choices in market regulation and taxation are constrained by state capacity, as

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[1] See Blattman and Miguel (2010) for an extensive literature survey on the causes and consequences of civil wars.

well as the economic institutions inherited from the past. They analyze the economic and political determinants of the government's choice to invest in building legal and fiscal state capacity. Their results show that fighting external wars, political stability and inclusive political institutions are central for building state capacity. Moreover, they find that legal and fiscal capacity are complements.

The important differences between this paper and Besley and Persson (2009) are as follows. First, we restrict the definition of state capacity to fiscal capacity. This enables us to analyze the interactions between political and income inequality in a simpler framework. Second, while they focus on the complementarity and the substitutability between fiscal and legal capacity of the state, our main aim is to analyze the individual and combined effects of democracy, income inequality and political stability on state capacity. Third, we present a more detailed comparison between the investment decision and the effects of the determinants of state capacity when the government is run by different income groups (elites and citizens). This is important, because low state capacity is a feature of many failed social revolutions.

3   Theoretical Model and Simulations

3.1   Model

As we mentioned previously, our model follows closely the model in Besley and Persson (2009). Time is discrete and consists of two periods, $s = 1, 2$. There are two groups of agents in the economy, $J = A, B$. In each period, one group, say group A, holds the political power (becomes the government), and makes the taxation and government spending decisions. Groups differ in their population shares β^A and β^B, and may also differ in their per capita income levels Y^A and Y^B. Total population is normalized to unity. Agents in the same group have the same preferences and income levels. All agents derive utility from consuming private goods that they purchase with their after-tax income and public goods provided by the government.

We let tax rates to be group-specific t_s^A and t_s^B, and allow them to take negative values in order to make full redistribution possible. The maximum tax rate is determined by the stock of state capacity in each period. As in Besley and Persson (2009), we assume that the capacity to tax depends on the previous investments in building institutions, such as administrations like the Internal Revenue Service in the United States, which manages and monitors taxation. The government takes the stock of the first period state capacity τ_1 as given and decides the level of investment in state capacity $\triangle\tau = \tau_2 - \tau_1$, which determines the level of state capacity in the second period. The stock of state capacity does not depreciate, but in order to have a higher level of state capacity in the second period, the government needs to make a non-negative

investment in the first period.[2] The cost of investment takes a functional form $F(\triangle\tau)$, which is increasing and strictly convex in the level of investment $\triangle\tau$, and has the properties $F(0) = F'(0) = 0$. Investment in state capacity is part of the government spending, and takes place only in the first period, since the world ends at the end of the second period.

The government also uses its resources to provide public goods G_s, from which both groups benefit. The value given to public goods in the utility function is denoted by α_s, which is a continuous random variable with c.d.f H and p.d.f h on the interval $[0, \overline{\alpha}]$, where $\overline{\alpha} \geq 1$. In order to illustrate the stochastic valuation assumption, let's consider defense as an example of a public good. If a country engages in an external war, defense becomes very valuable, and it is optimal for the government to increase military spending. In the absence of such a conflict, defense is valued less, and the government spends less or no resources for the provision of this public good.

The General Problem

Next, we set up the optimization problem of the group in power, or the government, in each period. Here is the timing of events:

1. Nature determines the value of public goods α_s and which group (A) holds the political control.
2. The government picks its policy vector of taxes t_s^J, spending in public goods G_s and the level of investment in state capacity $\triangle\tau$.
3. Agents consume.

Assuming that preferences are linear in private consumption and public goods provision, the indirect utility for each individual in group J can be written as:

$$v_s^J\left(t_s^J, G_s\right) = \alpha_s G_s + (1 - t_s^J)Y^J \tag{1}$$

The government chooses the policy vectors that maximize the sum of the weighted utilities of the two groups. In the case of a utilitarian government, or a fully democratic political system, the weights should be equal to the population shares of the two groups. Yet, many countries do not have fully democratic systems, but rather function on partial democracies, which imply some form of political inequality. In this case, the weights are not equal to the population shares, instead they are the population shares multiplied with two new parameters $\overline{\rho}$ and $\underline{\rho}$, which represent the political weights the government gives to each group. Therefore, the total weight the group in power attaches to its own group becomes $\overline{\rho}\beta^A$, while that

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[2]We assume that $\triangle\tau \geq 0$.

for the opponent group becomes $\underline{\rho}\beta^B$. We say that the system is politically unequal if the group in power favors its own group members, which corresponds to $\overline{\rho} > 1$ and $\underline{\rho} < 1$. From now on, we will assume that $\overline{\rho} \geq 1$ and $\underline{\rho} \leq 1$, and define our measure of political inequality as $\psi = \overline{\rho} - \underline{\rho}$. By assumption, the sum of the weights attached to the groups' utilities should satisfy $\overline{\rho}\beta^A + \underline{\rho}\beta^B = 1$. Under a fully democratic political system, there should be no political inequality, therefore, we should have $\psi = 0$. In this case, each group's weight in the utility is equal to its share in the population, in other words, we have $\overline{\rho} = \underline{\rho} = 1$.

Now, we can write down the first period problem of the government as:

$$max_{\{G_1,t_1^A,t_1^B,\triangle\tau\}} \quad \overline{\rho}\beta^A v_1^A\left(t_1^A,G_1\right) + \underline{\rho}\beta^B v_1^B\left(t_1^B,G_1\right) + ENP \tag{2}$$

$$= \quad max_{\{G_1,t_1^A,t_1^B,\triangle\tau\}} \quad (\overline{\rho}\beta^A + \underline{\rho}\beta^B)\alpha_1 G_1 + \overline{\rho}\beta^A(1-t_1^A)Y^A + \underline{\rho}\beta^B(1-t_1^B)Y^B + ENP \tag{3}$$

$$s.t. \quad \sum_J t_1^J \beta^J Y^J = G_1 + F(\triangle\tau) \tag{4}$$

$$G_1 \geq 0 \quad and \quad \tau_1 \geq t_1^J \tag{5}$$

where ENP stands for the second period Expected Net Payoff for the group ruling in the first period. This is an expected payoff because the outcome depends on which group holds power in the second period. In what follows, we assume that the ruling group keeps political power in the second period with an exogenous probability of γ. That is, a higher γ means greater political stability.

Similarly, the second period maximization problem of the government is:

$$max_{\{G_2,t_2^A,t_2^B\}} \quad \overline{\rho}\beta^A v_2^A\left(t_2^A,G_2\right) + \underline{\rho}\beta^B v_2^B\left(t_2^B,G_2\right) \tag{6}$$

$$= \quad max_{\{G_2,t_2^A,t_2^B\}} \quad \alpha_2 G_2 + \overline{\rho}\beta^A(1-t_2^A)Y^A + \underline{\rho}\beta^B(1-t_2^B)Y^B \tag{7}$$

$$s.t. \quad \sum_J t_2^J \beta^J Y^J = G_2 \tag{8}$$

$$G_2 \geq 0 \quad and \quad \tau_2 \geq t_2^J \tag{9}$$

As in the first period maximization problem, the ruling group takes the value of public goods α_2 and the level of state capacity τ_2 as given, and chooses the optimal level of tax rates and public goods provision.

Before we move on to the results of the maximization problem, let's have a closer look at the indirect utility that the government is maximizing in the second period. Substituting Equation (8) into Equation (7) gives:

$$\left[\overline{\rho}\beta^A Y^A + \underline{\rho}\beta^B Y^B\right] + \beta^A t_2^A Y^A(\alpha_2 - \overline{\rho}) + \beta^B t_2^B Y^B(\alpha_2 - \underline{\rho}) \tag{10}$$

Note that in order to maximize Equation (7) with the choice of any positive provision of public goods in

the first period, the condition $\alpha_2 \geq \bar{\rho}$ has to be satisfied.[3] That is, public goods are provided only when the value of public goods is greater than or equal to the value that the group in power assigns to its own private consumption. Given the cumulative distribution of the stochastic variable α_2, this event occurs with probability $[1 - H(\bar{\rho})]$. Conversely, when $\alpha_2 < \bar{\rho}$, the ruling group values public goods less than its own private consumption and, hence, finds it optimal to set $G = 0$. This occurs with probability $H(\bar{\rho})$. To summarize, the value attached to public goods determines whether the government provides public goods, or not. If public goods are provided, then we name the state of the world as 'Common Interest State'. If no public goods are provided, then the state is called 'Redistribution State', for the reasons that will become clear once we lay out the maximization results.

Optimal Taxation and Public Goods Provision

Since the maximization problem of the government is linear in the policy variables, we can analyze the optimal taxation and public goods provision decisions separately from the optimal investment in state capacity decision. We first present the optimal tax rates and public goods provision chosen by the government in each state of the world.

If $\alpha_s \geq \bar{\rho}$, then we are at the common interest state, which is observed with probability $[1 - H(\bar{\rho})]$. In this case, the optimal policy is:

$$t_1^A = \tau_1, \quad t_1^B = \tau_1 \tag{11}$$

$$t_2^A = \tau_2, \quad t_2^B = \tau_2 \tag{12}$$

$$G_1 = \sum_J t_1^J \beta^J Y^J - F(\triangle\tau) \tag{13}$$

$$G_2 = \sum_J t_2^J \beta^J Y^J \tag{14}$$

Intuitively, since public goods are valued highly, the government taxes both groups at the maximum rate and uses the collected resources for the provision of public goods in both periods and investment in state capacity in the first period.

If $\alpha_s < \bar{\rho}$, then we are at the redistribution state, which occurs with probability $H(\bar{\rho})$, and the optimal policy becomes:

$$t_1^A = \frac{F(\triangle\tau) - \tau_1 \beta^B Y^B}{\beta^A Y^A}, \quad t_1^B = \tau_1 \tag{15}$$

$$t_2^A = \frac{-\tau_2 \beta^B Y^B}{\beta^A Y^A}, \quad t_2^B = \tau_2 \tag{16}$$

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[3] Since $\bar{\rho} \geq \underline{\rho}$, this condition also guarantees that $\alpha_2 \geq \underline{\rho}$ holds.

$$G_1 = 0, \quad G_2 = 0 \tag{17}$$

In this case, the value attached to public goods is low, therefore the group in power is only interested in the redistribution of the resources. For this purpose, it taxes the opponent group at the maximum possible rate and redistributes the tax revenues amongst its own group members.

Optimal Investment in State Capacity

In order to solve for the optimal investment level, we need to write down the second period Expected Net Payoff (ENP) in detail. The ruling group of the first period is assumed to keep the political power in the second period with probability γ, and lose it to the opponent group otherwise. For each case, we use the optimal taxation and public goods provision results presented above to calculate the second period expected payoff for the first period's ruling group. When the group continues to rule in the second period, its expected payoff is:

$$
\begin{aligned}
V_2^1 &= [1 - H(\overline{\rho})] \left\{ \tau_2 \left[\beta^A Y^A + \beta^B Y^B \right] E\{\alpha_2 | \alpha_2 \geq \overline{\rho}\} + \left[\overline{\rho} \beta^A (1 - \tau_2) Y^A + \underline{\rho} \beta^B (1 - \tau_2) Y^B \right] \right\} \\
&+ H(\overline{\rho}) \left\{ \overline{\rho} \beta^A \left(1 + \frac{\tau_2 \beta^B Y^B}{\beta^A Y^A} \right) Y^A + \underline{\rho} \beta^B (1 - \tau_2) Y^B \right\}
\end{aligned}
\tag{18}
$$

The first term on the right hand side stands for the sum of the weighted utilities of the two groups in the common interest state, where both groups are taxed at the maximum amount, public goods are provided and investment in state capacity takes place. The first part presents the total utility derived by the two groups from the provision of public goods. The second part is the sum of the after-tax income of the two groups, weighted by the parameters chosen by the ruling group. The second term stands for the total utility in the redistribution state, where the group in power taxes the opponent group at the maximum rate, in order to redistribute the resources to its own members. No public goods are provided in this state. The opponent group loses a share of its income due to taxation, whereas the group in power receives the collected taxes and consumes more than its period income.

When the ruling group loses the political power to the opponent group, its expected payoff becomes:

$$
\begin{aligned}
V_2^2 &= [1 - H(\overline{\rho})] \left\{ \tau_2 \left[\beta^A Y^A + \beta^B Y^B \right] E\{\alpha_2 | \alpha_2 \geq \overline{\rho}\} + \left[\overline{\rho} \beta^A (1 - \tau_2) Y^A + \underline{\rho} \beta^B (1 - \tau_2) Y^B \right] \right\} \\
&+ H(\overline{\rho}) \left\{ \overline{\rho} \beta^A (1 - \tau_2) Y^A + \underline{\rho} \beta^B \left(1 + \frac{\tau_2 \beta^A Y^A}{\beta^B Y^B} \right) Y^B \right\}
\end{aligned}
\tag{19}
$$

The weights in this expected payoff correspond to the values set by the first period's ruling group, assuming that it no longer runs the government in the second period. Note that the only difference between Equation (18) and Equation (19) is the last term. When the ruling group loses power to the opponent group, its

members get taxed at the maximum rate and the new ruling group collects the tax revenues.

Now, we can define the Expected Net Payoff (ENP) as:

$$ENP = \gamma V_2^1 + (1 - \gamma)V_2^2 - \lambda(\alpha_1)F(\triangle\tau) \tag{20}$$

where $\lambda(\alpha_1) = max\{\alpha_1, \overline{\rho}\}$ is the Lagrange Multiplier associated with the government's budget constraint in the first period maximization problem. The sum of the first two terms in the ENP corresponds to the benefit derived from investing in state capacity, whereas the last term is the cost of investment in terms of the value of public funds. When we substitute in the payoff values, the ENP becomes:

$$
\begin{aligned}
ENP &= [1 - H(\overline{\rho})]\,\tau_2\left[\beta^A Y^A + \beta^B Y^B\right]E\left\{\alpha_2|\alpha_2 \geq \overline{\rho}\right\} + H(\overline{\rho})\left[\overline{\rho}\beta^A Y^A + \underline{\rho}\beta^B Y^B\right] \\
&\quad + [1 - H(\overline{\rho})]\,(1 - \tau_2)\left[\overline{\rho}\beta^A Y^A + \underline{\rho}\beta^B Y^B\right] + H(\overline{\rho})\tau_2(\overline{\rho} - \underline{\rho})\left[\gamma\beta^B Y^B - (1 - \gamma)\beta^A Y^A\right] \\
&\quad - \lambda(\alpha_1)F(\triangle\tau)
\end{aligned}
\tag{21}
$$

In order to determine the optimal level of investment, we go back to the first period maximization problem and write down the first order condition with respect to $\triangle\tau$, which corresponds to the derivative of the ENP with respect to $\triangle\tau$. We call the resulting optimality condition as 'OPT equality', which is satisfied at the optimal investment level.

$$
\begin{aligned}
OPT: \quad \lambda(\alpha_1)F'(\triangle\tau) &= [1 - H(\overline{\rho})]\left[\beta^A Y^A + \beta^B Y^B\right]E\left\{\alpha_2|\alpha_2 \geq \overline{\rho}\right\} \\
&\quad - [1 - H(\overline{\rho})]\left[\overline{\rho}\beta^A Y^A + \underline{\rho}\beta^B Y^B\right] \\
&\quad + H(\overline{\rho})(\overline{\rho} - \underline{\rho})\left[\gamma\beta^B Y^B - (1 - \gamma)\beta^A Y^A\right]
\end{aligned}
\tag{22}
$$

Equation (22) shows that the optimal level of investment in state capacity $\triangle\tau$ depends on the main parameters of the model, namely, α_1, α_2, and γ, as well as the level of inequality. In the next subsection, we investigate the relationship between these variables and the investment decision.

3.2 Determinants of Investment in State Capacity

Predictions of the Benchmark Model

This section presents the effects of the key variables of the model on the state capacity investment decision of the government. For this purpose, we begin with the above presented benchmark model, where we only allow for political inequality. Later on, we will also introduce income inequality.

In the benchmark model, the two groups differ only in the population shares. We denote the variables

related to the ruling group with the superscript A. We assume that the members of each group have the same income levels, that is $Y^A = Y^B = \overline{Y}$. When the elites are in power, we have $\beta^A < \beta^B$, while this assumption changes to $\beta^A > \beta^B$ when the citizens are in power. We say that there is political instability, if the ruling group's probability of keeping the political power in the second period is less than or equal to its population share $\gamma \leq \beta^A$. Lastly, we denote the level of political inequality with $\psi = \overline{\rho} - \underline{\rho}$. The results to be presented in Propositions 1-4 do not depend on which group holds the political power.

Proposition 1. *As the expected demand for public goods (or the future risk of an external conflict) increases, investment in state capacity increases as well.*

Proof. A increase in the second period demand for public goods, or a first order stochastically dominating shift in α_2, results in a higher value of $E\{\alpha_2|\alpha_2 \geq \overline{\rho}\}$. To see the effect of this change on the investment level, take the derivative of the OPT equality with respect to $E\{\alpha_2|\alpha_2 \geq \overline{\rho}\}$. This yields to $\frac{\partial(\triangle\tau)}{\partial(E\{\alpha_2|\alpha_2 \geq \overline{\rho}\})} = \frac{[1-H(\overline{\rho})]\overline{Y}}{\lambda(\alpha_1)F''(\triangle\tau)}$, which is positive. ∎

Our first result is very intuitive. When the government foresees that public goods will be more valuable in the second period, it is optimal to increase the stock of state capacity, so that higher tax revenues can be raised and more public goods can be provided. A good example of this case would be an increased expectation of an external conflict in the second period. In this case, the government would like to increase military spending, which calls for building up the tax base in the first period, in order to be able to collect more resources from all groups in the second period.

Proposition 2. *A higher current value of public goods (or a higher current threat of an external conflict) leads to lower investment in state capacity.*

Proof. Taking the derivative of the OPT equality with respect to α_1 gives $\frac{\partial(\triangle\tau)}{\partial(\alpha_1)} = -\frac{\lambda'(\alpha_1)F'(\triangle\tau)}{\lambda(\alpha_1)F''(\triangle\tau)}$, which is negative. ∎

This result is exactly the opposite of the first result, but the intuition is the same. If public goods are valued highly in the first period, then the government uses the collected resources immediately to increase the public goods provision, which results in fewer resources left for investment in state capacity. An example similar to the previous one would be the case where the country is involved in an external war in the first period. The military expenses become the government's priority, therefore, the collected resources are used for the provision of this public good immediately.

Proposition 3. *A higher level of political stability increases investment in state capacity.*

Proof. The derivative of the OPT equality with respect to γ yields to the following result: $\frac{\partial(\triangle\tau)}{\partial(\gamma)} = \frac{H(\overline{\rho})\psi\overline{Y}}{\lambda(\alpha_1)F''(\triangle\tau)}$, which is positive. ∎

If the government is likely to be in power in the second period, then the incentive to expand the tax base in the first period is high. There is no discounting, therefore, it is the government's best interest to invest in state capacity to be able to raise more tax revenues in the second period, which will lead to higher public goods provision or redistribution. Therefore, investment in state capacity is higher in a more stable political environment.

Proposition 4. *In the presence of political instability, as political inequality increases, investment in state capacity decreases.*

Proof. See Appendix A.

If the group in power is likely to lose authority to the opponent group in the second period, then its first period actions are myopic. In addition, if the group also favors its own members, it values the redistribution of the resources in the current period more than building a higher state capacity stock and raising higher tax revenues in the second period. Therefore, regardless of which group holds the power, if there is political instability, higher political inequality results in lower investment in state capacity. However, if the political system is stable, that is if $\gamma > \beta^A$, then higher political inequality may lead to higher investment in state capacity. In other words, if the ruling group is highly likely to keep the political power in the second period, it is optimal to expand the tax base in the first period, to be able to raise higher taxes in the second period. Note that, when the value of ψ increases, the probability of being in the redistribution state $H(\overline{\rho})$ also increases. A higher level of state capacity, or an expanded tax base, enables the ruling group to tax the other group at a higher tax rate in the second period and redistribute higher tax revenues amongst its own group members.

Predictions of the Benchmark Model with Income Inequality

Now, we introduce income inequality to our benchmark model. We continue to assume that all agents in the same group have the same income levels, but per capita income levels of the two groups are no longer equal to each other. More specifically, we let the elites have a per capita income level of $\overline{Y} + \epsilon$, and the citizens have a per capita income level of $\overline{Y} - \epsilon$, where $\overline{Y} > \epsilon > 0$. We name ϵ as our measure of income inequality.

a. Elites in Power

First, consider the case where the elites are in power. The main assumptions are:

$$Y^A = \overline{Y} + \epsilon, \quad Y^B = \overline{Y} - \epsilon \quad and \quad \beta^A < \beta^B$$

In this setting, Propositions 1-3 continue to hold, and additionally we get Propositions 5-7 on the effects of the inequality measures on the investment decision:

Proposition 5. *When the elites are in power and there is political instability, a higher level of political inequality leads to lower investment in state capacity.*

Proof. See Appendix A.

As in Proposition 4, if there is political instability, then the elites choose to redistribute the resources in the current period rather than using the resources to invest in state capacity. First, since the elites hold the greater share of the total income, the expected benefit of raising higher tax revenues in the second period is low, which lowers the group's incentive to expand the tax base. Second, when the elites value the benefits of their group more and they are likely to lose the political power in the second period, it is optimal to take advantage of the collected resources in the first period and redistribute immediately.

Proposition 6. *When the elites are in power, as income inequality increases investment in state capacity decreases.*

Proof. See Appendix A.

When income inequality is high, the elites hold a greater part of the total income. They choose to invest less in expanding the tax base for two reasons. First, the amount of resources that they can collect from the citizens is limited. Therefore, they find it more profitable to redistribute the resources immediately, rather than building on state capacity in the first period. Second, an increased tax base translates into a higher loss of income by the elites, if they lose power to the citizens in the second period. Mainly due to the fear of being taxed at a higher rate in the second period, the elites use the collected resources for immediate redistribution and invest less in state capacity.

Proposition 7. *When the elites are in power, higher income inequality reduces the positive effect of political stability on investment in state capacity.*

Proof. See Appendix A.

In Proposition 3, we stated that greater political stability increases the government's incentive to invest in state capacity. However, since income inequality has an adverse effect on the investment decision, it decreases the positive impact of political stability. As income inequality increases, the tax revenues that the elites can collect from the citizens become more limited. Therefore, the expected benefit from investing in state capacity decreases, which reduces the elites' incentive to expand the tax base.

b. Citizens in Power

Now, consider the case where the citizens are the ruling group. The above assumptions change as:

$$Y^A = \overline{Y} - \epsilon, \;\; Y^B = \overline{Y} + \epsilon \;\; and \;\; \beta^A > \beta^B$$

Propositions 1-4 and 7 continue to hold, but we see some changes in Propositions 5 and 6.

Proposition 8. *When the citizens are in power, there is political instability and income inequality is low, higher political inequality leads to lower investment in state capacity. However, if income inequality is high, then higher political inequality leads to higher investment in state capacity.*

Proof. See Appendix A.

Proposition 9. *When the citizens are in power and political inequality is low, higher income inequality decreases investment in state capacity. However, if political inequality is high, then higher income inequality increases investment in state capacity.*

Proof. See Appendix A.

Propositions 8 and 9 state that the effects of the inequality measures on the investment decision depend mainly on the interactions between them. We will elaborate more on these propositions in the next subsection.

3.3   Numerical Comparative Statics

To illustrate the propositions of the previous subsection, and more specifically, to shed light on the conditional results presented in Propositions 8 and 9, we simulate the optimality condition, or the OPT equality. Our aim is to see how the level of investment in state capacity changes as ψ, ϵ and γ vary. First,

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we generate two initial benchmarks (one for each group running the government), where there is positive investment in state capacity. The calibration for the benchmarks is explained in detail below. Then, we let the political stability and the inequality measures vary, in order to illustrate the results presented in the propositions.

We set the population share of the elites to 20 percent. The average per capita income level is normalized to unity. We let α to be a stochastic variable with truncated normal distribution on the interval $[0, 5]$, with mean 0 and standard deviation 1.2. The value of public goods in the first period α_1 is 1.

We assume that, when the elites are in power, the total weights of the groups in the utility function are chosen to be close to the income shares, $\overline{\rho}\beta^A \sim \frac{\beta^A Y^A}{\beta^A Y^A + \beta^B Y^B}$ and $\underline{\rho}\beta^B \sim \frac{\beta^B Y^B}{\beta^A Y^A + \beta^B Y^B}$. That is, there is some political inequality. We further assume that the top quantile in the population, the elites, get 40 percent of the total income. Therefore, when the elites rule, $\overline{\rho}\beta^A$ is assigned a value close to this level (the exact value that we set is 0.34, which makes $\underline{\rho}\beta^B$ equal to 0.66). Then, $\overline{\rho}$ becomes 1.72 and $\underline{\rho}$ becomes 0.82, which gives a political inequality measure ψ of 0.9. Using the assumed population and income shares of the two groups, we calculate the consistent income inequality measure ϵ, which is 0.45. With these parameter values, the probability of being in the common interest state in the second period $[1 - H(\overline{\rho})]$ becomes 0.15.

When the citizens are in power, we arbitrarily set the total utility weight for citizens $\overline{\rho}\beta^A$ to be 0.94, which is greater than the group's population share of 0.8. Holding ψ equal to 0.9, $\overline{\rho}$ and $\underline{\rho}$ become 1.18 and 0.28, respectively. The inequality measure ϵ stays as 0.45, since we continue to assume that the top quantile in the population, the elites, get 40 percent of the total income. With these parameter values, the probability of being in the common interest state in the second period $[1 - H(\overline{\rho})]$ turns out to be 0.33. See Table 1 for the summary of all parameter values used in the benchmarks.

Next, we let the political stability and the inequality measures vary. First, consider the effect of political inequality on state capacity investment. In Proposition 5, we stated that, when the elites are in power, in the presence of political instability and income inequality, higher political inequality leads to lower investment in state capacity. This result is illustrated in Figure 1-a. As the political system becomes less democratic, that is, as the value of ψ increases, the probability of being in the redistribution state $H(\overline{\rho})$ increases. In turn, the elites can definitely benefit from collecting higher tax revenues in the second period by increasing the tax base. But, given the presence of political instability, the citizens may take advantage of the increased stock of state capacity and tax the elites at higher rates, if they gain power in the second period. The elites become more concerned about the the second period outcome, due to the fear of being

Table 1: Parameter Values and Results

Parameter Name	Description	Value - Elites (Citizens)
β^A	Population share of group A	0.20 (0.80)
β^B	Population share of group B	0.80 (0.20)
$\overline{Y} = \frac{Y^A + Y^B}{2}$	Mean income	1.00
α_1	Value of public goods in period 1	1.00
$\overline{\alpha}$	Upper bound of α_2	5.00
ψ	Level of political inequality	0.90
ϵ	Level of income inequality	0.45
γ	Political stability constant for group A	0.19 (0.79)
ω^A	GDP Share for group A	0.40 (0.60)
ω^B	GDP Share for group B	0.60 (0.40)
$\overline{\rho}$	Political weight for group A	1.72 (1.18)
$\underline{\rho}$	Political weight for group B	0.82 (0.28)
$\overline{\rho}\beta^A$	Total weight for group A	0.34 (0.94)
$\underline{\rho}\beta^B$	Total weight for group B	0.66 (0.06)
$[1 - H(\overline{\rho})]$	Probability of the common interest state	0.15 (0.33)
μ^α	Mean of alpha	0.00
σ^α	Std. of alpha	1.20

taxed at higher rates later as the income gap between the two groups increases. Overall, from the elites' point of view, with higher income inequality and political instability, the current cost of investing in state capacity is higher than the expected benefit from higher tax rates in the second period. As a result, the level of state capacity stays low, even under a more democratic system as reflected by the downward shift in the investment curve with higher income inequality. Also, as income inequality increases the slope of the investment curve becomes steeper. Therefore, when the elites are in power, income inequality seems to amplify the negative effect of political inequality on the investment decision.

As a second exercise, we drop the political instability assumption, and consider the extreme case of full political stability, corresponding to $\gamma = 1$. As shown in Figure 1-b, for lower levels of income inequality, the effect of political inequality on the investment decision is positive. Given political stability, the elites choose to invest in expanding the tax base, in order to be able to tax the citizens at higher rates in the second period. However, as income inequality increases, the elites' incentive to invest in state capacity is reduced, since the citizens hold only a very small portion of the total income. Then, at very high levels of income inequality, it is optimal for the elites to redistribute the collected tax revenues immediately.

Third, we hold the level of income inequality constant at $\epsilon = 0.45$, and vary the value of the political stability variable. As shown in Figure 1-c, as long as there is political instability, higher political inequality leads to lower investment in state capacity. This is mainly due to the elites' fear of being taxed at higher

Figure 1: Elites - Political Inequality
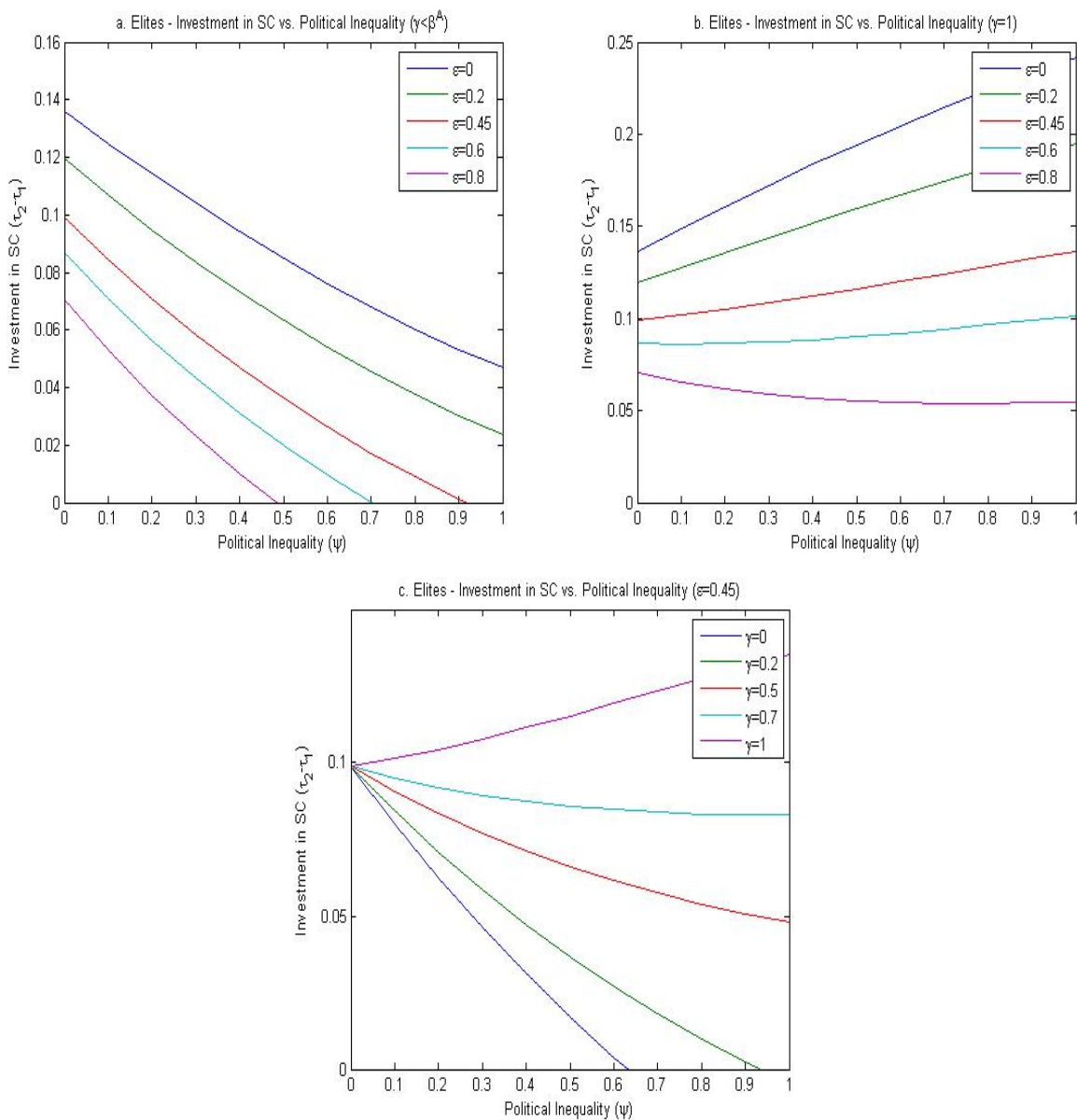
rates in the second period, if the citizens become the ruler. As the level of political stability increases, the investment curve becomes less steep, showing that the positive effect of political stability reduces the negative effect of political inequality on the investment decision. Therefore, even when the elites are in power, a more democratic political system, which is also stable, can lead to higher investment in state capacity.

Next, consider the effect of political inequality on the investment decision when the citizens are in power. Figure 2-a shows that, when there is political instability, at low levels of income inequality, political inequality has a negative effect on investment in state capacity (Proposition 8). Note that, when there is no income inequality, that is, when $\epsilon = 0$, the two groups become identical, and the citizens behave just like the elites do. However, when income inequality is high, the citizens choose to invest more in state capacity as the political system becomes less democratic. As political inequality ψ increases, it is more likely that the world will be in the redistribution state in the second period, since $H(\bar{\rho})$ also increases. Then, the citizens would like to tax the elites at a higher rate to redistribute the resources amongst themselves. As income inequality increases, the slope of the investment curve becomes steeper, due to the increasing rate at which they benefit from redistribution.

When there is full political stability, for all levels of income inequality, investment in state capacity increases as the citizens favor their group more, or as political inequality increases. Figure 2-b displays that the investment curve becomes steeper as income inequality increases. Since the citizens hold only a small portion of the total income at a high level of income inequality, they have a higher incentive to tax the elites at higher rates in the second period. Hence, given that there is full political stability, they invest more in expanding the tax base.

While this result is very intuitive, it does not reflect reality. In the case of many countries, even when the government is run by the political groups favoring the citizens, we do not observe high levels of investment in state capacity. Figure 2-c suggests an explanation for this observation. If we assume a reasonable level of income inequality, say $\epsilon = 0.45$, the citizens choose to make investment in state capacity only when the political system is stable. At low levels of political stability, investment in state capacity decreases with higher political inequality. That is, when the citizens are less likely to be in power in the second period, they choose to redistribute the tax revenues immediately, as many failed social revolutions have done in the past.

Lastly, consider the effect of income inequality on state capacity investment. Proposition 6 states that when the elites are in power, investment in state capacity decreases as income inequality increases. This

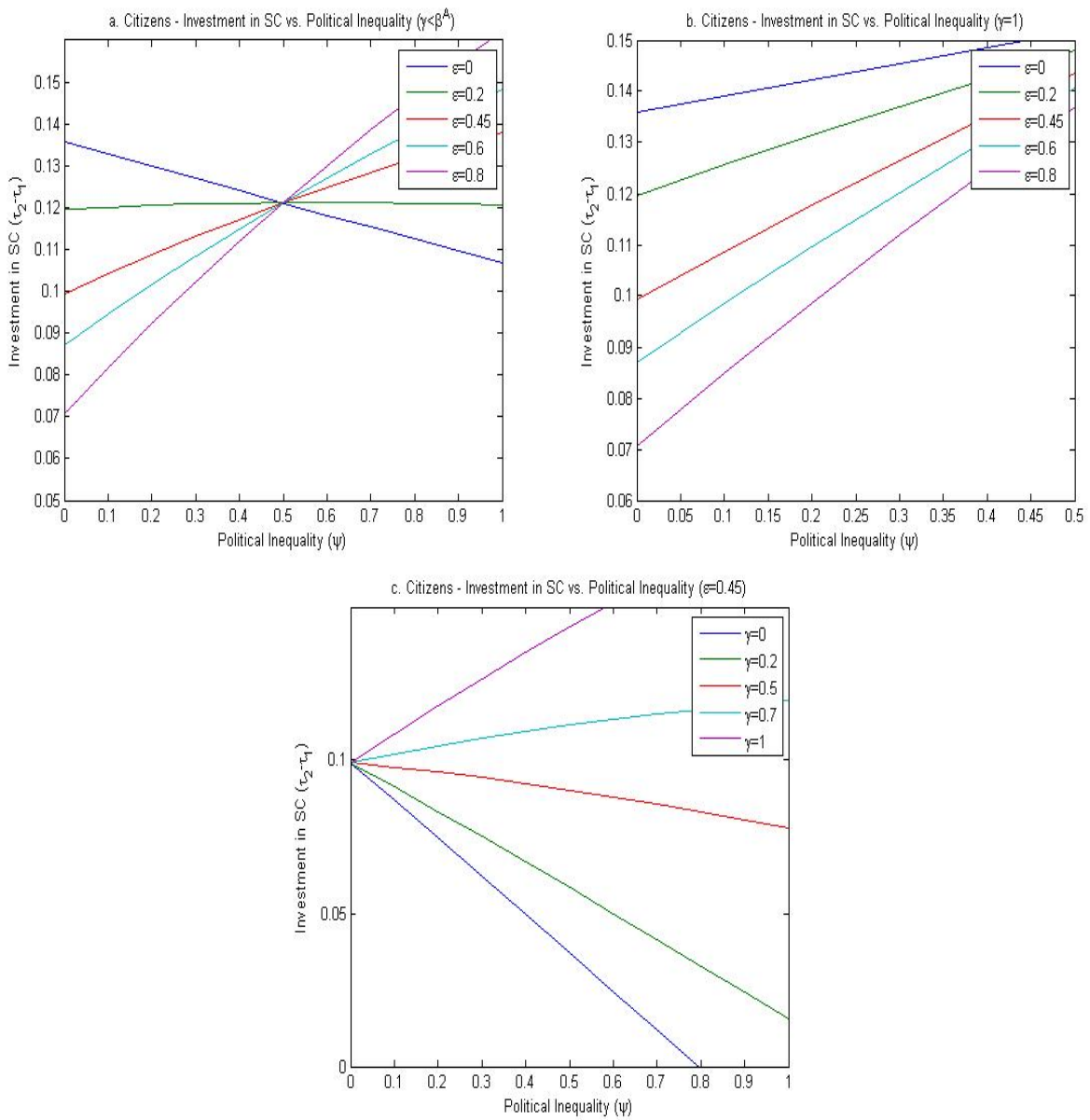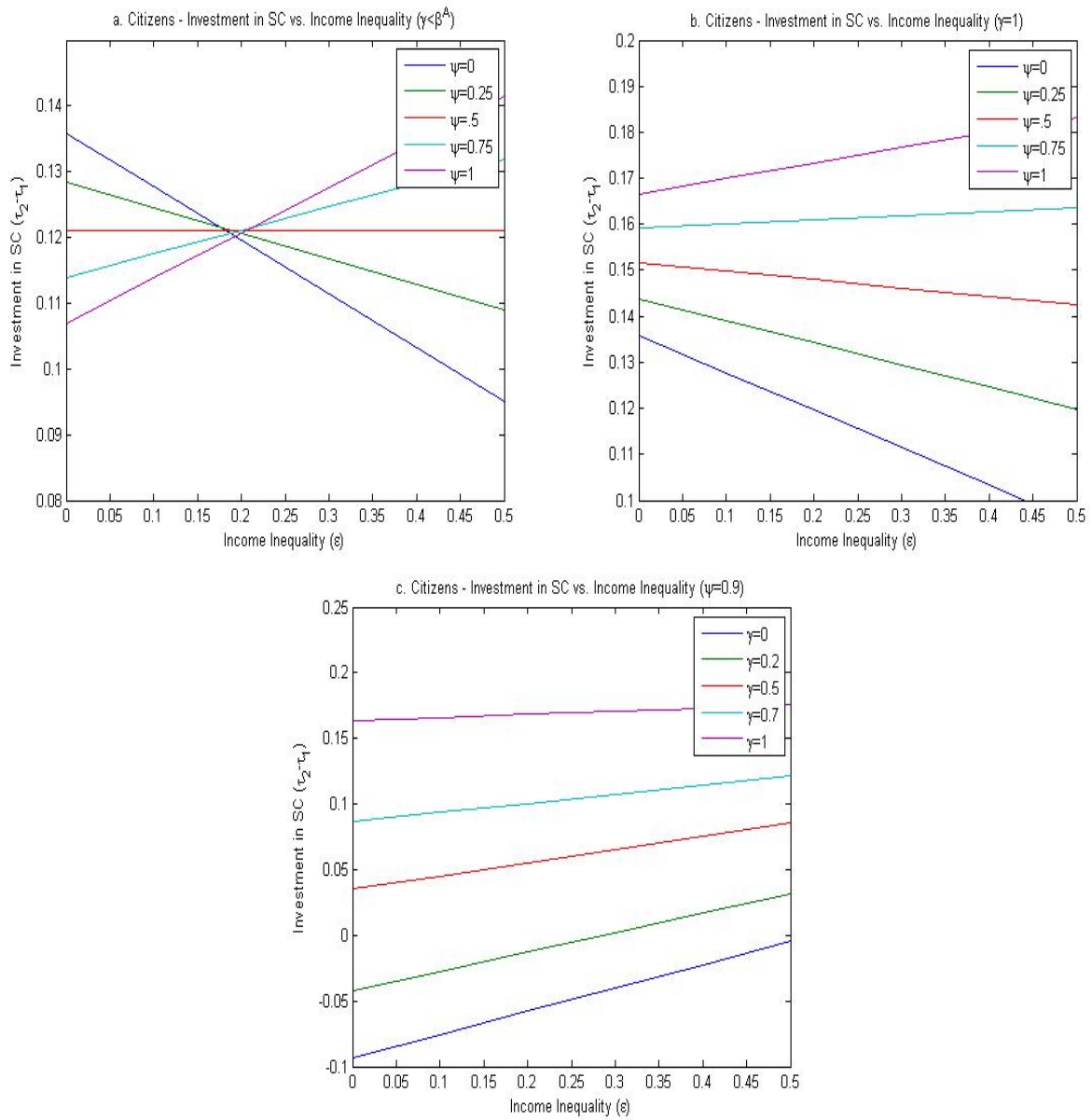# Figure 2: Citizens - Political Inequality

Figure 3: Citizens - Income Inequality

result is robust to the changes in the levels of political inequality and stability. However, Figures 3-a and 3-b display that, when the citizens are the ruling group the effect of income inequality on the investment decision depends on the level of political inequality (Proposition 9). When the political system is more democratic, the government becomes more utilitarian, and thus, it keeps the tax rates lower by not increasing the stock of state capacity. But, as the citizens favor their own group, higher income inequality calls for more redistribution. The cost of investment does not change, but a higher income gap between the groups makes investment more profitable from the citizens' point of view, since the amount to be redistributed increases. Therefore, the citizens increase the stock of state capacity in the first period, in order to be able tax the elites at higher rates and transfer more resources to their own group members in the second period. Note that, as the political system becomes less democratic, first the slope of the investment curve becomes less steep, then its sign changes. Under a highly undemocratic political system, the value of ψ is high, which corresponds to a higher probability of being in the redistribution state $H(\bar{\rho})$. Since the redistribution motive is high, investment in state capacity increases. Even when there is no political instability, the same result follows, as seen in Figure 3-b.

In order to understand the effect of political stability on the relationship between income inequality and the investment decision, we fix the level of political inequality ψ to 0.9. As shown in Figure 3-c, when the citizens favor their group, higher income inequality leads to higher investment in state capacity. However, political stability plays an important role as well. The stock of state capacity is higher when the political system is more stable.

4   Empirical Analysis

So far, we have qualitatively determined the effects of fighting external wars and political stability, as well as political and income inequality, on the decision of the government to invest in state capacity. We summarize our theoretical results in Table 2.

Table 2: Summary of Theoretical Results

The Qualitative Effect of Each Determinant on Investment in State Capacity

	α_2 ($\uparrow$)	α_1 ($\uparrow$)	γ ($\uparrow$)	ψ ($\uparrow$)	ϵ ($\uparrow$)
Benchmark - Elites Rule	($\uparrow$)	($\downarrow$)	($\uparrow$)	($\downarrow$)	NA
Benchmark - Citizens Rule	($\uparrow$)	($\downarrow$)	($\uparrow$)	($\uparrow$)	NA
With Income Inequality - Elites Rule	($\uparrow$)	($\downarrow$)	($\uparrow$)	($\downarrow$)	($\downarrow$)
With Income Inequality - Citizens Rule	($\uparrow$)	($\downarrow$)	($\uparrow$)	($\downarrow\uparrow$)*	($\downarrow\uparrow$)*

Note:

* indicates that the sign depends on the interactions of the inequality measures.

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We stated that, if the country is more likely be involved in an external war, the government chooses to invest more in state capacity.[4] Intuitively, the government would like to raise funds to be able to pay for military costs, and therefore increases the tax base by investing in state capacity. As for the inequality measures and political instability, we showed that political instability and higher levels of political and/or income inequality lead to lower investment in state capacity.[5] If the political system is less democratic and/or the distribution of income is unequal, the government's priorities are shifted towards redistributing the tax revenues immediately, since the benefit from redistribution in the first period outweighs the expected benefit of collecting higher tax revenues in the second period.

In this section, we test the predictions of our model by applying econometric methods on cross-sectional data.

4.1 Data

In our theoretical framework, we defined state capacity as the government's ability to raise tax revenues, following the earliest definition of state capacity as in Tilly (1990). Accordingly, we use three different tax measures to proxy for state capacity in the empirical analysis. Additionally, we relate state capacity to state's bureaucratic quality in line with Hendrix (2009), and use two more proxies.[6] Here is a brief description of the five measures of state capacity that we consider:

1. Total tax revenues: Annual average of total tax revenues, reported as percentage share in GDP, for the periods 1980-2006 and 2000-2006. We use the data from Baunsgaard and Keen (2009), which is constructed by using Government Finance Statistics (GFS) and IMF country documents.[7] The initial sample contains 125 countries. We also include Mexico and Brazil in our sample and take the tax data for these countries from the dataset used in Lora (2007).

2. Income tax revenues: Annual average of income tax revenues, reported as percentage share in GDP, for the period 1980-2000. We use the dataset from Baunsgaard and Keen (2005), which is a previous version of the one used in Baunsgaard and Keen (2009). We also add the data for Mexico and Brazil from Lora (2007).

3. Domestic tax revenues: Annual average of GDP share of total tax revenues net of trade tax revenues,

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[4]We actually state a more general result: a higher expected demand for public goods leads to higher investment in state capacity. Fighting an external war is an example of a situation where the demand for public goods, such as defense, increases.

[5]Except for the case where the citizens are in power, as we discussed in detail previously.

[6]See Appendix B for the details of Hendrix (2009).

[7]The dataset was generously provided by Thomas Baunsgaard and Michael Keen.

for the period 1980-2006. The resources for the dataset are the same as the ones used to construct the dataset for total tax revenues.

4. Government effectiveness index: An index which represents one of the six dimensions of governance, computed for the Worldwide Governance Indicators (WGI) research project and reported in Kaufmann et al. (2009).[8] This particular index measures quality of public services, capacity of the civil service and its independence from political pressures, as well as quality of policy formulation. The index values are computed for every year since 1996, and range between -2.5 and 2.5, where a higher value indicates a more effective government. We use the averages of all the values available for each country, for the periods 1996-2008 and 2002-2008.[9]

5. Ease of doing business ranking: A ranking of the countries according to the Ease of Doing Business category of the Doing Business Project of the World Bank.[10] We use the 2009 version of the dataset, which covers rankings for 181 countries. We modify the rankings, so that each country takes a value between 0 and 1, where the country that is ranked as the best in terms of ease of doing business has a value of 1.

As for the possible determinants of state capacity, we use the following data:

1. Incidence of external wars: We construct a dummy variable that takes a value of 1 if the country has been involved in an external war in a given year, and 0 otherwise. We use the definitions and the data from the Correlates of War database.[11] We define incidence as the fraction of the years that the country has been involved in an external war for two time periods: 1900-1975 (or since independence if this occurred after 1900) and 1960-1997. Thus, our variable goes from 0 to 1, where a country that has been engaged in an external war in all years in the sample has a value of 1. This measure proxies for α used in the theoretical model.

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[8] See Appendix B for further details.

[9] The definitions and the data are available online at http://info.worldbank.org/governance/wgi/.

[10] The data can be found at http://www.doingbusiness.org/. For each economy, the index is calculated as the ranking on the simple average of its percentile rankings on each of the following 10 topics: Starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business.

[11] The original data can be reached online at http://correlatesofwar.org/. In the data, there are two variables that refer to external conflict: interstatewar and extrastatewar. To be classified as an interstate war, at least two participants in sustained combat should qualify as members of the interstate system and there should be at least 1,000 battle related fatalities among all of the system members involved. A state involved is regarded as a participant if it incurs a minimum of 100 fatalities or has 1,000 armed personnel engaged in fighting. Extrastate wars are wars between a state and a non-state entity. To be classified as an extrastate war, at least one major participant in the conflict (however irregular and disorganized) should not be a member of the state system and there should be at least 1,000 battle related fatalities in every year for each of the state participants. The year for which either of the two or both are equal to unity is counted as a year that the country has been involved in an external war. Also, see the discussion of democracy variables for the matching procedure with modern countries. The Correlates of War data report countries that have involved in civil wars or internal disputes in other polities (e.g., European powers that were involved during the Russian civil war after the end of World War I). The data reported here exclude foreign countries from the definition of civil wars.

2. Political Instability/Stability: We use two different measures. The first one is incidence of civil wars, which proxies for political instability (corresponding to $(1 - \gamma)$), since the risk of civil war increases with political instability (Hegre et al. (2001), Fearon and Laitin (2003), and Blattman and Miguel (2010)) and the government is likely to be overthrown as a result of a civil war. We construct a dummy variable that takes a value of 1 if the country has been involved in an internal war that took place in its own territory in a given year, and 0 otherwise.[12] Again, our dataset comes from the Correlates of War. Incidence is then defined as the fraction of the years from 1900 to 1975, and from 1960 to 1997, that the country has been engaged in an internal war, reported only for the time period that the country has been independent since 1900. The result is a variable that goes from 0 to 1, where 1 represents that the country has been in an internal war in all years in the sample. Our second proxy is the Political Stability and Absence of Violance/Terrorism index computed for the Worldwide Governance Indicators (WGI) research project and reported in Kaufmann et al. (2009).[13] It is constructed to 'capture perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.' Higher index values indicate more stable political environments (higher γ). We use the data for 1998.[14]

3. Incidence of Democracy (Political equality): We assume that the political system is more equal if it is more democratic (lower ψ). We proxy for political equality with each country's Polity2 score in the Polity IV database.[15] The Polity2 score captures the regime authority on a spectrum of a 21-point scale ranging from -10 (hereditary monarchy) to 10 (consolidated democracy). The score is constructed by calculating the difference between the regime's democracy and autocracy scores for a given year. Since we are interested in capturing the regimes that are likely to represent low levels of political inequality, we define a country to be democratic in a certain year, if the Polity2 score is greater than 3.[16] As in the case of the conflict variables, we compute the fraction of the years that a country has a Polity2 score greater than 3 for the period between 1900 and 1975 (or since independence if this occurred after 1900) and the period between 1960 and 1999.[17]

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[12]In order to be classified as a civil war, the central government should be actively involved in military action with effective resistance for both sides and there should be at least 1,000 battle related deaths. In order to constitute as effective resistance, both sides must have been initially organized for violent conflict, or the weaker side must be able to inflict upon the stronger opponents at least five percent of the number of fatalities it sustains. We add the additional territory restriction, because in many cases some countries got involved in civil wars or internal disputes that took place in other polities (e.g., some European powers were involved during the Russian civil war after the end of World War I).

[13]See Appendix B for the details on the construction of this variable.

[14]The averages for 1996 and 1998 are also used for the robustness check.

[15]The data can be accessed online at http://www.systemicpeace.org/polity/polity4.htm.

[16]We also use a second definition that considers a country to be democratic in a certain year if the Polity2 score is greater than 0.

[17]Here we would like to add a note on how we match the country classifications used in the Polity IV and Correlates of War databases to that of the current countries. We first take all the countries that currently exist and match them to their equivalent country in the above mentioned datasets. We then match some of the current countries to their previous political

4. Gini coefficient (Income inequality): Gini coefficient for the total population of the country, which proxies for ϵ in our theory. We use the data from the 2008 World Income Inequality Database of the United Nations University - World Institute for Development Economics Research (UNU-WIDER). The data cover the time period 1867-2006, and include, in the more recent years, 186 countries. Reported gini coefficients come from surveys which can differ greatly, in ten dimensions, such as area (e.g., national, rural, urban, metropolitan areas, cities, etc.), population group (e.g., all, workers, taxpayers, certain age groups, etc.), unit of analysis (e.g., individual, household, etc.) and measure of economic conditions (e.g., income or expenditures). Given the heterogeneity in the original data, we use the gini measures derived from national surveys covering all the population. If more than one observation per country/year meets these criteria, then we choose the higher quality observation (based on a quality index included in the database). Finally, if there are still several reported gini coefficients for the same country and year, we choose those with a common characteristic (among the remaining 7 dimensions) with more observations in the original database. Our resulting data have information for 88 countries for the period 1890-1975, and consist of 338 observations in total. From this dataset, we construct and use average gini coefficients for the periods 1900-1975 and 1960-1999.[18]

The descriptive statistics for the measures and the determinants of state capacity are presented in Table C1 in Appendix C.

4.2 Empirical Results

We first graphically present the cross-correlations between the measures and the determinants of state capacity. The following three measures are used as proxies for state capacity in this exercise: GDP share of total tax revenues (2000-2006), the government effectiveness index (2002-2008) and the ease of doing business ranking (2009). The cross-correlations are plotted in Figures 4 and 5.

Democracy scores and incidence of external wars are positively correlated with each measure of state capacity we consider. On the contrary, incidence of internal wars and gini coefficients are negatively correlated with the measures of state capacity. The data show that, countries with more democratic

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entities, if the current country is clearly a continuation of the previous one. For example, Germany is matched to West Germany and to the original German state classified in Polity IV and Correlates of War (the same is done with Ethiopia and Vietnam-North Vietnam). Finally, if the current countries were part of a larger independent political entity before 1975, we assign the polity2 and war indicators of the older country to the new ones. For example Czech and Slovak Republic are both assigned the value of Czechoslovakia. The same procedure is applied to Bangladesh and Pakistan, and the countries that originated from the USSR and Yugoslavia. Baltic countries and Serbia, that did exist before they were absorbed by the USSR and Yugoslavia, are not matched to their historical equivalents.

[18] For 31 countries there is only one data point. The country with the maximum number of observations between 1900 and 1975 is the United States. The median country has 2 observations in that period.

Figure 4: Cross Correlations - Measures of State Capacity vs. Determinants of State Capacity
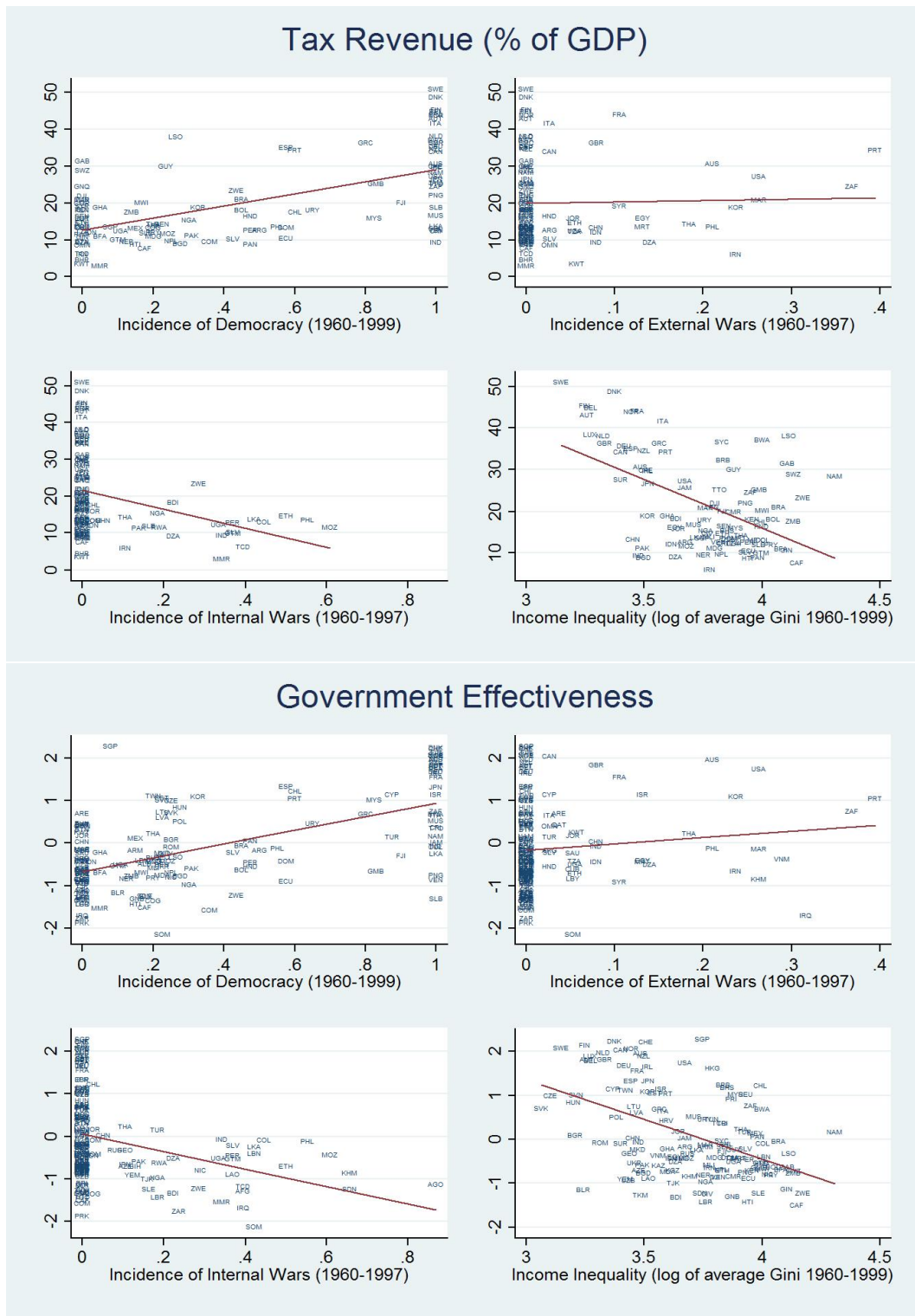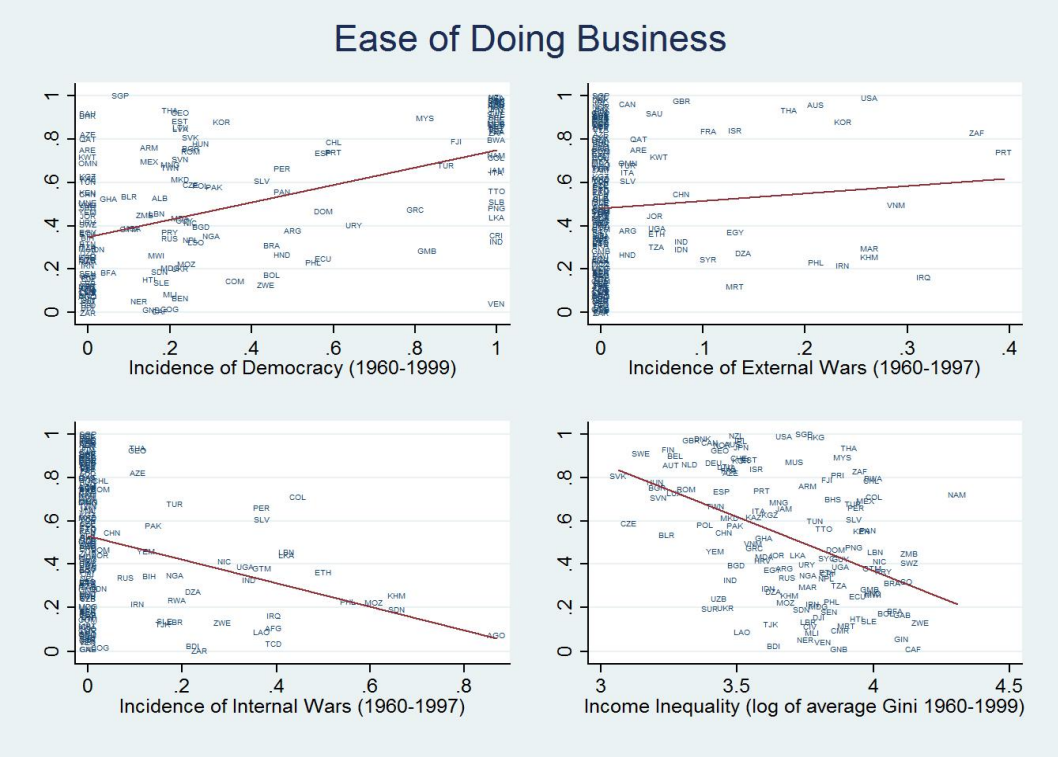
Figure 5: Cross Correlations (Cont.) - Measures of State Capacity vs. Determinants of State Capacity

political systems (less political inequality) and higher valuation of public goods (higher incidence of external wars) have higher levels of state capacity. However, higher incidence of internal wars (higher political instability) and higher levels of income inequality are related to lower levels of state capacity. This empirical evidence is line with our earlier theoretical predictions.

Next, we move on to the results for the econometric analysis. Our primary empirical tests are based on the ordinary least squares (OLS) regressions of the following form:

$$SC_i = \beta_0 + \beta_{ew}ExtWar_i + \beta_{iw}IntWar_i + \beta_{pol}Polity_i + \beta_{gini}Gini_i + \varepsilon_i \qquad (23)$$

where SC_i is a measure of state capacity for country i. $ExtWar_i$ and $IntWar_i$ stand for incidence of external and internal wars, respectively. As discussed earlier, we use incidence of internal wars as a proxy for political instability. To check for the robustness of our results, in a second set of regressions, we replace $IntWar_i$ with $PolStab_i$, which stands for the political stability and absence of violance/terrorism index. $Polity_i$ measures incidence of democracy, which proxies for the level of political equality. $Gini_i$ is the gini coefficient, which measures the level of income inequality. Finally, ε is an error term capturing all other omitted factors, with $E(\varepsilon) = 0$ for all i.

We are aware that there may be potential endogeneity and simultaneity problems. Our explanatory variables may have been jointly determined with the different measures of state capacity, through channels that our model fails to capture. We deal with these potential problems by measuring all explanatory variables before the years when the proxies for state capacity are observed and measured.

We use the data from two different sample periods in the estimations. The first sample considers a long-run perspective, and the average values of the explanatory variables correspond to the period 1900-1975. The purpose of the regressions using the long term sample is to see to what extent the historical levels of democracy, inequality and wars have had an impact on the average values of state capacity, which are measured after 1980. The second sample is constructed with more recent measures: average values of the explanatory variables are calculated for the periods 1960-1997 and 1960-1999, while state capacity is measured after 2000.

Table 3 reports the results for the first set of regressions, where the long term data are used. The estimates in Panel a indicate that countries with more democratic political systems have, on average, higher levels of state capacity, compared to the countries with less democratic political systems. Quantitatively, a one standard deviation increase in our measure of democracy is associated with a 4.1 percentage point increase in GDP share of total taxes, and a 3.5 percentage point increase in GDP share of income taxes. A country with a one standard deviation decrease in the level of political inequality has a 0.4 increase (in a scale that ranges between -2.5 and +2.5) in the government effectiveness index, while the ease of doing business ranking increases by 0.1 (in a scale ranging from 0 to 1).

As for incidence of external wars, we find that countries that have spent more years fighting external wars have higher state capacity. More precisely, a country with one standard deviation higher incidence of external wars has 2.6 percentage points higher GDP share of total taxes, 2 percentage points higher GDP share of income taxes, and 5.2 percentage points higher share of domestic taxes in total taxes. When we use the non-fiscal proxies of state capacity, a one standard deviation increase in incidence of external wars turns out to be associated with a 0.2 increase in the government effectiveness index, and a 0.1 increase in the ease of doing business ranking.

The estimates in Table 3-a further indicate that countries engaged in internal wars have, on average, lower state capacity. Since incidence of internal wars is used as the proxy for political instability, we conclude that higher political instability is related to lower state capacity. Quantitatively, a one standard deviation increase in incidence of internal wars corresponds to a 1.7 percentage point decrease in GDP share of

Table 3: Determinants of State Capacity: Long-Run Perspective

a. Without Income Inequality

	Tot. Taxes (% of GDP) 1980-2006	Inc. Taxes (% of GDP) 1980-2000	Dom. Taxes (% of Tot.Taxes) 1980-2006	Government Effectiveness 1996-2008	Ease of Doing Business 2009
Democracy 1900-1975	10.670*** (2.888)	9.160*** (2.561)	5.817 (4.939)	1.045*** (0.228)	0.233*** (0.068)
External Wars 1900-1975	23.480*** (8.638)	18.410** (7.593)	46.870*** (11.470)	1.914*** (0.520)	0.580*** (0.150)
Internal Wars 1900-1975	-13.020* (7.498)	-3.735 (4.357)	12.130 (11.390)	-1.516*** (0.440)	-0.501*** (0.144)
Constant	14.030*** (0.932)	3.829*** (0.606)	73.370*** (1.936)	-0.538*** (0.086)	0.306*** (0.032)
Number of obs.	104	104	104	154	147
Adjusted R-sq.	0.520	0.562	0.234	0.473	0.427

b. With Income Inequality

	Tot. Taxes (% of GDP) 1980-2006	Inc. Taxes (% of GDP) 1980-2000	Dom. Taxes (% of Tot.Taxes) 1980-2006	Government Effectiveness 1996-2008	Ease of Doing Business 2009
Democracy 1900-1975	7.864** (2.985)	6.879** (2.631)	7.327 (5.910)	1.145*** (0.233)	0.288*** (0.088)
External Wars 1900-1975	28.970*** (9.038)	22.320*** (7.626)	40.380*** (14.080)	1.866*** (0.551)	0.542*** (0.182)
Internal Wars 1900-1975	-14.270 (9.712)	-4.171 (5.160)	0.017 (11.020)	-2.244*** (0.413)	-0.583*** (0.192)
Ln of Gini 1900-1975	2.345 (5.675)	-0.876 (4.059)	3.408 (10.480)	-0.833** (0.381)	-0.054 (0.115)
Constant	6.585 (21.830)	7.668 (15.540)	63.280 (40.140)	2.771* (1.518)	0.532 (0.450)
Number of obs.	67	67	67	80	78
Adjusted R-sq.	0.549	0.561	0.210	0.595	0.485

Note: Standard errors are reported in parentheses: * $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

total taxes.[19] A country with one standard deviation higher incidence of internal wars has its government effectiveness index and ease of doing business ranking lower by 0.2 and 0.1, respectively.

These results generally hold when we also control for income inequality. However, as reported in Table 3-b, when state capacity is proxied with GDP share of total taxes, the statistically significant relationship between incidence of internal wars and state capacity is no longer observed.[20] Nevertheless, we find that countries with more equal distribution of income are associated with higher levels of state capacity when we use the government effectiveness index as the measure of state capacity.

Table 4 reports the regression results for the more recent measures. While the data for the measures of state capacity are for the 2000s, the data for democracy and inequality are for the period 1960-1999, and the data for external wars are for the period 1960-1997. GDP share of total taxes, the government effectiveness index and the ease of doing business ranking are used as the proxies for state capacity. We replace incidence of internal wars with the political stability and absence of violance/terrorism index (1998). So, our focus changes from the effect of political instability to the effect of political stability on state capacity. The basic results, presented in columns 1, 5 and 9 of Table 4, show that democracy is positively correlated with the recent measures of state capacity. Similarly, the coefficient estimate of the political stability index is highly significant and positive, reassuring that political stability is an important element of stronger states.[21]

While these results support the conclusions drawn from the previous regressions, there are some differences as well. First, the positive correlation between incidence of external wars and state capacity vanishes in the case of GDP share of total taxes (shown in column 1), suggesting that external conflict no longer plays the role (on taxation) it had played in the earlier part of the 20th century. Second, the results in columns 2, 6 and 10 of Table 4 show that income inequality is highly negatively correlated with state capacity in the recent time period (except for case of GDP share of total taxes).

We also introduce two new terms corresponding to the interaction of income inequality with political equality (ln of the gini coefficient and incidence of democracy), and the interaction of income inequality with political stability (ln of the gini coefficient and the political stability index). The coefficient estimates of the two interacted terms are both negative and significant, when GDP share of total taxes and the

---

[19]The statistically significant relationship between incidence of internal wars and state capacity is no longer observed when we use the other two fiscal proxies.

[20]The problem that we face when we include the gini coefficient as an additional regressor is the loss of some of our observations. We use between 104 and 154 observations for the set of regressions for the benchmark model. The number of observations we can use decreases to a number between 67 and 80, when we add the gini as an additional explanatory variable. This reduction in the sample size may be responsible for the insignificance of some of our results.

[21]We repeat the analysis by using the averages for the political stability variable for 1996 and 1998. Our results are robust to this change. The corresponding estimation results are available upon request.

government effectiveness index are used to proxy for state capacity (shown in columns 3, 4, 7 and 8 of Table 4). In the case of the first interacted term, the estimation results indicate that income inequality reduces the magnitude of the positive correlation between democracy and state capacity, which is line with the prediction of our theory (Proposition 7). Similarly, the negative significance of the second interacted term shows that, in the presence of income inequality, the positive correlation between political stability and state capacity is dampened.

In the last set of regressions, we use the recent measures, but proxy political instability with incidence of internal wars as in the long term regressions. The results are reported in Table 5. In line with our previous results, we find that countries with higher democracy scores and higher incidence of external wars (except for the case of GDP share of total taxes) have higher state capacity.

Moreover, income inequality has a significant negative correlation with all of the measures of state capacity as shown in columns 2, 6 and 10 of Table 5. In the case of wars, our results indicate that internal wars have a significant and negative correlation with all of the measures of state capacity in the recent time period. Therefore, internal wars, rather than external, are more important in explaining the differences in state capacity across countries when state capacity is proxied with GDP share of total taxes.[22]

We continue to include the interacted terms, which capture the interaction of income inequality with democracy and incidence of internal wars (used as a proxy for political instability, rather than political stability). As in the previous regressions, the results in columns 3, 7 and 11 of Table 5 show that income inequality leads to a reduction in the positive correlation between democracy and state capacity (except for the case of ease of doing business ranking). On the contrary, the coefficient estimate of second interacted term is significant and positive in all regressions (in columns 4, 8 and 12 of Table 5), since both income inequality and political instability are negatively correlated with state capacity. In other words, in the presence of income inequality, the negative correlation of internal wars with state capacity, or the positive correlation of political stability with state capacity is reduced.[23]

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[22]These results support the panel estimations results in Cárdenas and Eslava (2010). They find that incidence of internal wars, rather than incidence of external wars, is the key driver for the changes in state capacity.

[23]The results reported in Tables 3-5 are robust to using the alternative definition of democracy, which considers a country to be democratic in a certain year, if the Polity2 score is greater than 0. The corresponding estimation results are available upon request.

Table 4: Determinants of State Capacity: Recent Measures, Interactions of Inequalities and an Alternative Measure of Political Instability

	Total Taxes (% of GDP) 2000-2006				Government Eff. Index 2002-2008				Ease of Doing Buss. Rank 2009			
Democracy	8.453***	5.072*	104.100**	4.144	0.755***	0.711***	4.455**	0.700***	0.219***	0.259***	0.072	0.260***
1960-1999	(2.609)	(2.603)	(43.120)	(2.552)	(0.171)	(0.194)	(1.898)	(0.192)	(0.066)	(0.074)	(0.695)	(0.074)
External Wars	4.083	-2.192	2.627	-0.358	1.430***	1.259**	1.324**	1.331***	0.377**	0.282	0.278	0.278
1960-1997	(7.649)	(8.429)	(8.849)	(7.464)	(0.485)	(0.482)	(0.509)	(0.485)	(0.171)	(0.184)	(0.186)	(0.188)
Political Stability	3.863***	5.096***	4.246***	48.230***	0.545***	0.509***	0.490***	1.718**	0.124***	0.104***	0.105***	0.047
1998	(0.977)	(1.215)	(1.365)	(15.250)	(0.063)	(0.077)	(0.082)	(0.713)	(0.022)	(0.029)	(0.029)	(0.361)
Ln. of Gini	-	-6.725	8.881	-6.021	-	-1.095***	-0.585*	-1.071***	-	-0.201**	-0.226*	-0.202**
1960-1999		(4.535)	(7.502)	(4.541)		(0.202)	(0.302)	(0.200)		(0.079)	(0.116)	(0.081)
Dem.*Ln.Gini	-	-	-26.000**	-	-	-	-0.995**	-	-	-	0.050	-
1960-1999			(11.340)				(0.497)				(0.186)	
Pol.St.*Ln.Gini	-	-	-	-11.580***	-	-	-	-0.330*	-	-	-	0.015
1998				(4.016)				(0.198)				(0.098)
Constant	15.240***	42.990**	-17.470	39.580**	-0.388***	3.824***	1.871	3.699***	0.324***	1.076***	1.172***	1.082***
	(1.408)	(17.320)	(28.880)	(17.370)	(0.097)	(0.787)	(1.194)	(0.784)	(0.038)	(0.299)	(0.447)	(0.312)
Number of obs.	107	93	93	93	159	131	131	131	152	129	129	129
Adjusted R-sq.	0.536	0.573	0.604	0.604	0.671	0.757	0.762	0.759	0.543	0.564	0.561	0.561

Note: Standard errors are reported in parentheses: * $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 5: Determinants of State Capacity: Recent Measures and Interactions of Inequalities - Political Instability Proxied with Internal Wars

	Total Taxes (% of GDP) 2000-2006				Government Eff. Index 2002-2008				Ease of Doing Buss. Rank 2009			
Democracy 1960-1999	12.240*** (2.552)	9.833*** (2.394)	131.600*** (43.620)	9.232*** (2.449)	1.305*** (0.194)	1.184*** (0.188)	7.111*** (2.262)	1.131*** (0.189)	0.341*** (0.060)	0.355*** (0.061)	0.658 (0.694)	0.329*** (0.059)
External Wars 1960-1997	8.650 (8.651)	2.203 (8.495)	7.443 (8.174)	1.942 (8.299)	1.925*** (0.601)	1.722*** (0.428)	1.802*** (0.399)	1.812*** (0.436)	0.494*** (0.165)	0.378** (0.165)	0.382** (0.168)	0.422*** (0.157)
Internal Wars 1960-1997	-18.270*** (4.455)	-18.840*** (4.900)	-16.840*** (5.262)	-280.000** (128.700)	-1.406*** (0.301)	-1.116*** (0.263)	-1.068*** (0.273)	-19.510*** (6.880)	-0.325*** (0.103)	-0.243* (0.128)	-0.240* (0.131)	-9.563*** (3.090)
Ln. of Gini 1960-1999	-	-9.854** (4.709)	10.190 (7.883)	-13.060** (5.124)	-	-1.433*** (0.260)	-0.601 (0.381)	-1.633*** (0.272)	-	-0.271*** (0.079)	-0.229** (0.116)	-0.376*** (0.079)
Dem.*Ln.Gini 1960-1999	-	-	-32.240*** (11.700)	-	-	-	-1.583*** (0.601)	-	-	-	-0.081 (0.188)	-
Int.W.*Ln.Gini 1960-1997	-	-	-	68.360** (33.300)	-	-	-	4.855*** (1.804)	-	-	-	2.460*** (0.821)
Constant	14.150*** (1.218)	53.180*** (18.130)	-23.920 (30.100)	65.500*** (19.770)	-0.680*** (0.100)	4.853*** (1.027)	1.685 (1.489)	5.604*** (1.071)	0.260*** (0.036)	1.292*** (0.304)	1.133** (0.446)	1.683*** (0.307)
Number of obs.	107	93	93	93	159	131	131	131	152	129	129	129
Adjusted R-sq.	0.523	0.532	0.587	0.548	0.521	0.650	0.664	0.662	0.456	0.513	0.510	0.556

Note: Standard errors are reported in parentheses: * $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

5   Conclusion

In this paper, we studied the economic and political factors that shape the government's decision to invest in state capacity. We showed that political stability and equality are the building blocks of stronger states. While political stability calls for higher investment in state capacity, political and income inequality lead to lower investment. In line with existing literature, we presented that wars, whether external or internal, are important determinants as well. While external wars result in higher state capacity, civil wars lead to weaker states.

Our empirical analysis confirmed that countries with more democratic political systems and lower income inequality are associated with higher state capacity. We found that more stable governments (whether measured with the lower incidence of internal wars or higher political stability index) have higher state capacity. Our results further indicate that the magnitudes of the positive correlations of democracy and political stability with state capacity are significantly reduced with higher income inequality. To conclude, high political and/or income inequality, absence of external wars and high political instability (or the presence of common and long-lasting civil wars) stand out as the main reasons why some governments under-invest in state capacity.

While we have taken important steps to contribute to the recently growing literature on various dimensions of state capacity, we believe that there are many theoretical and empirical issues, which deserve further attention. For example, by using a two-period model, we abstracted from the possible differences in the short-run and the long-run investment decisions of the government. We assumed that the level of political inequality is exogenously determined. This assumption can be relaxed and the model can be improved by considering a dynamic multi-period version, where investment in state capacity, provision of public goods and the representativeness of the political system are simultaneously determined by the government. While we assumed the investment and public goods provision decisions to be dependent on political stability, the causality can go in the opposite direction as well. Finally, civil wars can be re-defined as the rebellious movements by the citizens, which occur when they find the government policies to be unsatisfactory, in terms of redistribution, the level of the provision of public goods and political representation. Such an approach may bring more insight to the trade-offs faced by the government, as well as the consequences of different political and fiscal policies.

Empirically, it would be worthwhile to re-investigate the effects of the interactions between political and income inequality on state capacity, when different income/political groups run the government. On this issue, our theory predicts different results depending on the group in power (elites and citizens). In the

data, grouping governments according to their political stance, such as the right wing and the left wing, may be one way to represent such a distinction. It then becomes an empirical challenge to analyze the effects of the interactions of the inequality measures on the government's decision to invest in state capacity.

References

[1] Acemoglu, Daron (2005), 'Politics and Economics in Weak and Strong States,' *Journal of Monetary Economics*, 52, 1199-226.

[2] Acemoglu, Daron, Davide Ticchi and Andrea Vindigni (2010), 'Emergence and Persistence of Inefficient States,' *Journal of the European Economic Association*, forthcoming.

[3] Acemoglu, Daron and James A. Robinson (2000), 'Why Did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective,' *Quarterly Journal of Economics*, 115, 1167-99.

[4] Acemoglu, Daron and James A. Robinson (2006), 'Economic Origins of Dictatorship and Democracy,' Cambridge University Press.

[5] Acemoglu, Daron, Simon Johnson and James A. Robinson (2001), 'The Colonial Origins of Comparative Development: An Empirical Investigation,' *American Economic Review*, 91, 1369-401.

[6] Alesina, Alberto and Dani Rodrik (1994), 'Distributive Politics and Economic Growth', *Quarterly Journal of Economics*, 109, 465-90.

[7] Barro, Robert J. (2000), 'Inequality and Growth in a Panel of Countries', *Journal of Economic Growth*, 5, 5-32.

[8] Baunsgaard, Thomas, and Michael Keen (2009), 'Tax Revenue and (or?) Trade Liberalization,' *Journal of Public Economics*, forthcoming.

[9] Baunsgaard, Thomas, and Michael Keen (2005), 'Tax Revenue and (or?) Trade Liberalization,' Working Paper 05/112: International Monetary Fund, Washington, DC.

[10] Besley, Timothy, and Torsten Persson (2008), 'Wars and State Capacity,' *Journal of European Economic Association*, 6(2-3), 522-30.

[11] Besley, Timothy, and Torsten Persson (2009), 'The Origins of State Capacity:Property Rights, Taxation, and Politics,' *American Economic Review*, 99(4), 1218-44.

[12] Blattman, Christopher and Edward Miguel (2010), 'Civil War', *Journal of Economic Literature*, 48(1), 357.

[13] Cárdenas, Mauricio and Marcela Eslava (2010), 'Determinants of State Capacity in a Panel of Countries,' mimeo.

[14] Centeno, Miguel Angel (2002), 'Blood and Debt: War and the Nation-State in Latin America', University Park, Pa., Pennsylvania State University Press.

[15] DeRouen, Karl R. and David Sobek (2004), 'The Dynamics of Civil War Duration and Outcome,' *Journal of Peace Research*, 41(3): 303-20.

[16] Engerman, Stanley L. and Kenneth L. Sokoloff (2000), 'Institutions, Factor Endowments, and Paths of Development in the New World,' *Journal of Economic Perspectives*, 3, 217-32.

[17] Fearon, James D. and David D. Laitin (2003), 'Ethnicity, Insurgency and Civil War,' *American Political Science Review*, 97(1): 75-90.

[18] Hall, Robert E. and Charles I. Jones (1999), 'Why Do Some Countries Produce so much more Output per Worker than Others?,' *Quarterly Journal of Economics*, 114, 83-116.

[19] Hegre, Havard, Tanja Ellingsen, Scott Gates and Nils Petter Gleditsch (2001), 'Toward a Democratic Civil Peace? Democracy, Political Change and Civil War, 1816-992,' *American Political Science Review*, 95(1), 33-48.

[20] Hendrix, Cullen S. (2009), 'Measuring State Capacity: Theoretical and Empirical Implications for the Study of Civil Conflict, APSA 2009 Toronto Meeting Paper.

[21] Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2009), 'Governance Matters VIII, Aggregate and Individual Governance Indicators 1996-2008,' World Bank Policy Research Working Paper, no: 4978.

[22] Knack, Steven and Philip Keefer (1995), 'Institutions and Economic Performance: Cross-Country Tests using Alternative Measures,' *Economics and Politics*, 7, 207-27.

[23] Lora Eduardo (2007), 'Trends and Outcomes in Tax Reform,' in Eduardo Lora (editor) The State of State Reform in Latin America, Inter-American Development Bank and Stanford University Press.

[24] Persson, Torsten and Guido Tabellini (1994), 'Is Inequality Harmful for Growth?,' *American Economic Review*, 84, 600-21.

[25] Persson, Torsten and Guido Tabellini (2006), 'Democratic capital: The nexus of political and economic change,' NBER Working Paper, no: 12175.

[26] Tilly, Charles (1990), 'Coercion Capital and European States, AD 990-1990,' Cambridge MA; Blackwell.

Appendix A - Proofs of Propositions 4-9

Proof of Proposition 4. Using the definition of political inequality, $\psi = \overline{\rho} - \underline{\rho}$ and the constraint, $\overline{\rho}\beta^A + \underline{\rho}\beta^B = 1$, we can re-write the weighting parameters as $\overline{\rho} = 1 + \psi\beta^B$, and $\underline{\rho} = 1 - \psi\beta^A$. Then we can express the OPT equality in Equation (22) as:

$$OPT: \ \lambda(\alpha_1)F'(\triangle\tau) \ = \ \left\{ \begin{array}{l} \left[1 - H(1 + \psi\beta^B)\right] E\left\{\alpha_2 | \alpha_2 \geq (1 + \psi\beta^B)\right\} \\ - \left[1 - H(1 + \psi\beta^B)\right] \left[(1 + \psi\beta^B)\beta^A + (1 - \psi\beta^A)\beta^B\right] \\ + \left[H(1 + \psi\beta^B)\right] \psi(\gamma - \beta^A) \end{array} \right\}\overline{Y} \quad (24)$$

The derivative of this equality with respect to ψ gives:

$$\frac{\partial(\triangle\tau)}{\partial(\psi)} \ = \ -\frac{\left[\beta^B h(\overline{\rho})\psi(1 - \gamma) + H(\overline{\rho})(\beta^A - \gamma)\right]\overline{Y}}{\lambda(\alpha_1)F''(\triangle\tau)} \quad (25)$$

which is negative when we also assume $\gamma \leq \beta^A$. ∎

Proof of Proposition 5. Having defined the the per capita income levels with the measure of income inequality, we can re-write the OPT equality in Equation (24) as:

$$OPT: \ \lambda(\alpha_1)F'(\triangle\tau) \ = \ \left[1 - H(1 + \psi\beta^B)\right]\left[\beta^A(\overline{Y} + \epsilon) + \beta^B(\overline{Y} - \epsilon)\right] E\left\{\alpha_2 | \alpha_2 \geq (1 + \psi\beta^B)\right\}$$
$$- \left[1 - H(1 + \psi\beta^B)\right]\left[(1 + \psi\beta^B)\beta^A(\overline{Y} + \epsilon) + (1 - \psi\beta^A)\beta^B(\overline{Y} - \epsilon)\right]$$
$$+ \left[H(1 + \psi\beta^B)\right] \psi\left[\gamma\beta^B(\overline{Y} - \epsilon) - (1 - \gamma)\beta^A(\overline{Y} + \epsilon)\right] \quad (26)$$

Then, the derivative of the equality with respect to ψ becomes:

$$\frac{\partial(\triangle\tau)}{\partial(\psi)} \ = \ -\frac{\left\{ \left[\beta^B h(\overline{\rho})\psi(1 - \gamma) + H(\overline{\rho})(\beta^A - \gamma)\right]\left[\overline{Y} + (\beta^A - \beta^B)\epsilon\right] + 2\beta^A\beta^B\epsilon \right\}}{\lambda(\alpha_1)F''(\triangle\tau)} \quad (27)$$

which is negative when $\gamma \leq \beta^A$ is assumed. ∎

Proof of Proposition 6. Taking the derivative of the OPT equality in Equation (26) with respect to ϵ

and re-arranging the terms gives:

$$
\begin{aligned}
\frac{\partial(\triangle\tau)}{\partial(\epsilon)} &= -\frac{1}{\lambda(\alpha_1)F''(\triangle\tau)} \\
&\times \left\{ [1 - H(\overline{\rho})](\beta^B - \beta^A)\left[E\left\{\alpha_2|\alpha_2 \geq (1 + \psi\beta^B)\right\} - 1\right] \right. \\
&\left. + 2[1 - H(\overline{\rho})]\psi\beta^A\beta^B + H(\overline{\rho})\psi\left[\gamma\beta^B + (1 - \gamma)\beta^A\right] \right\}
\end{aligned}
\tag{28}
$$

which is negative. ∎

Proof of Proposition 7. Taking the derivative of the OPT equality in Equation (26) with respect to ϵ and γ yields to the following second derivative:

$$
\frac{\partial(\triangle\tau)}{\partial(\gamma)\partial(\epsilon)} = -\frac{H(\overline{\rho})\psi(\beta^B - \beta^A)}{\lambda(\alpha_1)F''(\triangle\tau)}
\tag{29}
$$

which is negative, assuming $F'''(\triangle\tau) = 0$. Previously, we derived $\frac{\partial(\triangle\tau)}{\partial(\gamma)} > 0$ and concluded that the effect of political stability on state capacity investment decision is positive. The negative sign associated with the above second derivative shows that, as income inequality increases, the positive impact of political stability on the investment decision decreases. ∎

Proof of Proposition 8. Using the new assumptions (for the case of the citizens), we re-write the OPT equality in Equation (22) and take its derivative with respect to ψ:

$$
\begin{aligned}
OPT: \ \lambda(\alpha_1)F'(\triangle\tau) &= \left[1 - H(1 + \psi\beta^B)\right]\left[\beta^A(\overline{Y} - \epsilon) + \beta^B(\overline{Y} + \epsilon)\right]E\left\{\alpha_2|\alpha_2 \geq (1 + \psi\beta^B)\right\} \\
&- \left[1 - H(1 + \psi\beta^B)\right]\left[(1 + \psi\beta^B)\beta^A(\overline{Y} - \epsilon) + (1 - \psi\beta^A)\beta^B(\overline{Y} + \epsilon)\right] \\
&+ \left[H(1 + \psi\beta^B)\right]\psi\left[\gamma\beta^B(\overline{Y} + \epsilon) - (1 - \gamma)\beta^A(\overline{Y} - \epsilon)\right]
\end{aligned}
\tag{30}
$$

$$
\frac{\partial(\triangle\tau)}{\partial(\psi)} = \frac{-\left[\beta^B h(\overline{\rho})\psi(1 - \gamma) + H(\overline{\rho})(\beta^A - \gamma)\right]\left[\overline{Y} - (\beta^A - \beta^B)\epsilon\right] + 2\beta^A\beta^B\epsilon}{\lambda(\alpha_1)F''(\triangle\tau)}
\tag{31}
$$

Note that it is not possible to tell the sign of the derivative analytically. When we assume $\gamma \leq \beta^A$, for low levels of income inequality, higher political inequality leads to lower investment in state capacity. However, when the level of income inequality is high, the sign of the derivative is likely to become positive. We can determine the effect of income inequality on the impact of political inequality on the investment decision with:

$$
\frac{\partial^2(\triangle\tau)}{\partial(\psi)\partial(\epsilon)} = \frac{\left[\beta^B h(\overline{\rho})\psi(1 - \gamma) + H(\overline{\rho})(\beta^A - \gamma)\right](\beta^A - \beta^B) + 2\beta^A\beta^B\epsilon}{\lambda(\alpha_1)F''(\triangle\tau)}
\tag{32}
$$

which is positive, assuming $F'''(\triangle\tau) = 0$. Therefore, when the effect of political inequality is to lower the

level of investment in state capacity, then higher income inequality reduces this effect. On the contrary, if the impact of political inequality is positive on the investment decision, then higher income inequality amplifies this effect. ∎

Proof of Proposition 9. Taking the derivative of the OPT equality in Equation (30) with respect to ϵ yields:

$$
\begin{aligned}
\frac{\partial(\triangle\tau)}{\partial(\epsilon)} &= \frac{1}{\lambda(\alpha_1)F''(\triangle\tau)} \\
&\times \left\{ -\left[1 - H(\bar{\rho})\right](\beta^A - \beta^B)\left[E\left\{\alpha_2|\alpha_2 \geq (1 + \psi\beta^B)\right\} - 1\right] \right. \\
&\left. +2\left[1 - H(\bar{\rho})\right]\psi\beta^A\beta^B + H(\bar{\rho})\psi\left[\gamma\beta^B + (1 - \gamma)\beta^A\right] \right\}
\end{aligned}
\tag{33}
$$

Again, it is not possible to determine the sign of the derivative analytically. However, for low levels of political inequality, the first term is likely to cancel off the positive effect of the last terms. Therefore, we conclude that for low levels of political inequality, higher income inequality leads to lower investment in state capacity. However, when the level of political inequality is high, the effect of income inequality on the investment decision is likely to have the opposite sign. The effect of political inequality on the impact of income inequality on the investment decision is:

$$
\frac{\partial^2(\triangle\tau)}{\partial(\epsilon)\partial(\psi)} = \frac{\left[\beta^B h(\bar{\rho})\psi(1 - \gamma) + H(\bar{\rho})(\beta^A - \gamma)\right](\beta^A - \beta^B) + 2\beta^A\beta^B\epsilon}{\lambda(\alpha_1)F''(\triangle\tau)}
\tag{34}
$$

which is positive, assuming $F'''(\triangle\tau) = 0$. Therefore, when the effect of income inequality on the level of investment in state capacity is in the negative direction, higher political inequality reduces this effect. On the contrary, if the impact of income inequality is positive on the investment decision, then higher political inequality amplifies this effect. ∎

Appendix B - Additional Details on the Data

1. Measures of State Capacity:

The term 'state capacity' has been widely used in the political science, sociology, and more recently in the economics literature. The interpretation varies. According to Hendrix (2009), the use of the term can be grouped into three categories. The first one is military capacity, which represents the states ability to overcome the rebellious actions against its authority with force. The proxies commonly used in this category are military personnel per capita and military spending per capita. The second one is bureaucratic and administrative capacity, which focuses on the professionalization of the state bureaucracy, its ability

to protect property rights, and make credible commitments to private investors, as well as its ability to raise revenue from the society. The popular measures used in this category consist of Political Risk Services Groups International Country Risk Guide (ICRG), specifically the measure that assesses the risk of expropriation and repudiation of government contracts. This category also includes measures of fiscal state capacity, such as GDP share of total taxes, share of income taxes in total taxes and share of domestic (non-trade) taxes in total taxes. The third category is the quality and coherence of political institutions, which considers the degree of interference between the democratic and nondemocratic features in the political system. Studies in the civil war literature, such as Hegre et al. (2001), Fearon and Laitin (2003) and DeRouen and Sobek (2004) use the Polity index to represent this concept of state capacity.

All the above mentioned measures of state capacity are highly collinear and endogenous, so it is appropriate to select a few that are highly correlated with the others. Using factor analysis, Hendrix (2009) shows that bureaucratic quality and GDP share of total taxes stand out as the most representative definitions and measures of state capacity. In total, Hendrix uses 15 different and highly correlated measures of state capacity including military personnel and expenditures (per capita), ICRGs measures of bureaucratic quality and investment profile, GDP share of total taxes, GDP share of total revenue and the Polity2 index, among others. Using principal factor analysis to create a smaller set of measures that can account for most of the variance in the 15 measures, he finds that, bureaucratic quality and GDP share of total tax revenues can explain cumulatively 90.6 percent of the variance in all the measures considered, with the first factor alone capturing 53.2 percent. In what follows, we focus on the bureaucratic and administrative definitions of state capacity in our empirical analysis. We use five different measures to proxy for state capacity. The first three measures (GDP share of total taxes, GDP share of income taxes, total tax share of domestic taxes) are related to the state's ability to raise revenue from the public, while the remaining two measures (government effectiveness index and ease of doing business ranking) represent the state's bureaucratic quality.

2. Construction of the Political Stability and Absence of Violence Index:

Kaufmann et al. (2009) organize many individual sources of the data on governance perceptions and assign them to these six broad categories: 1. Voice and Accountability, 2. Political Stability and Absence of Violence, 3. Government Effectiveness, 4. Regulatory Quality, 5. Rule of Law, 6. Control of Corruption. Then, they use an unobserved components model to construct aggregate indicators from these individual measures.

The following data sources are used in the construction of the political stability and absence of violence

index:

'A. Representative Sources: 1. BRI (Business Environment Risk Intelligence Business Risk Service / Financial Ethics Index): a. Fractionalization of political spectrum and the power of these factions, b. Fractionalization by language, ethnic and/or religious groups and the power of these factions, c. Restrictive (coercive) measures required to retain power, d. Organization and strength of forces for a radical government, e. Societal conflict involving demonstrations, strikes and street violence, f. Instability as perceived by non-constitutional changes, assassinations and guerrilla wars; 2. DRI (Global Insight Global Risk Service): a. Military coup risk, b. Major insurgency/rebellion, c. Political terrorism, d. Political assassination, e. Civil war, f. Major urban riot; 3. EIU (Economist Intelligence Unit Riskwire and Democracy Index): a. Armed conflict, b. Violent demonstrations, c. Social unrest, d. International tensions; 4. GAD (Cerberus Intelligence Gray Area Dynamics): a. Autonomy and separatism, b. Civil unrest, c. State of emergency/martial law, d. Active terrorist groups in the last two years; 5. GCS (World Economic Forum Global Competitiveness Report): Country terrorist threat : Does the threat of terrorism in the country impose significant costs on firms? 6. HUM (Cingranelli Richards Human Rights Database and Political Terror Scale): a. Frequency of political killings, b. Frequency of disappearances, c. Frequency of torture; 7. IJT (iJET Country Security Risk Ratings): Security risk rating; 8. IPD (Institutional Profiles Database): a. Conflicts of ethnic, religious, regional nature, b. Violent actions by underground political organizations, c. Violent social conflicts, d. External public security; 9. PRS (Political Risk Services International Country Risk Guide): a. Internal Conflict: Assesses political violence and its influence on governance, b. External conflict: The external conflict measure is an assessment both of the risk to the incumbent government and to inward investment, c. Government stability: Measures the governments ability to carry out its declared programs and its ability to stay in office, d. Ethnic tensions: This component measures the degree of tension within a country attributable to racial, nationality or language divisions; 10. PTS (Political terror scale); 11. WMO (Global Insight Business Conditions and Risk Indicators): a. Civil unrest: How widespread political unrest is and how great a threat it poses to investors, b. Terrorism: Whether the country suffers from a sustained terrorist threat and from how many sources.'

'B. Non-representative Sources: 1. AEO (OECD Development Center African Economic Outlook): Civil tensions, b. WCY (Institute for Management and Development World Competitiveness Yearbook): Risk of political instability.'

Appendix C - Additional Tables

Table C1: Descriptive Statistics

Measures of State Capacity								
	Obs.	Mean	Std.	Min.	Max.	25th Percentile	75th Percentile	Period Covered
Total Taxes (% of GDP)	127	20.63	10.52	1.86	51.43	13.12	27.02	1980-2006
Total Taxes (% of GDP)	127	20.83	10.84	2.97	51.00	12.67	27.65	2000-2006
Income Taxes (% of GDP)	127	8.64	8.53	0.00	37.30	2.61	11.44	1980-2000
Dom. Taxes (% of Tot. Taxes)	127	77.04	17.56	32.16	99.71	65.19	93.57	1980-2006
Government Eff. Index	210	0.01	0.98	-2.10	2.29	-0.70	0.71	1996-2008
Government Eff. Index	210	0.01	0.99	-2.12	2.27	-0.70	0.70	2002-2008
Ease of Doing Bus. Ranking	181	0.50	0.29	0.00	1.00	0.25	0.75	2009
Determinants of State Capacity								
	Obs.	Mean	Std.	Min.	Max.	25th Percentile	75th Percentile	Period Covered
Democracy ($Polity2 > 3$)(% of Years)	156	0.27	0.38	0.00	1.00	0.00	0.41	1900-1975
Democracy ($Polity2 > 3$)(% of Years)	161	0.35	0.38	0.00	1.00	0.00	0.60	1960-1999
Democracy ($Polity2 > 0$)(% of Years)	156	0.33	0.39	0.00	1.00	0.00	0.68	1900-1975
Democracy ($Polity2 > 0$))(% of Years)	161	0.38	0.38	0	1.00	0.00	0.66	1960-1999
External Wars (% of Years)	156	0.07	0.11	0.00	0.57	0.00	0.12	1900-1975
External Wars (% of Years)	161	0.03	0.08	0.00	0.39	0.00	0.03	1960-1997
Internal Wars (% of Years)	156	0.05	0.13	0.00	1.00	0.00	0.06	1900-1975
Internal Wars (% of Years)	161	0.08	0.16	0.00	0.87	0.00	0.04	1960-1997
Gini (Averages)	88	42.12	9.91	18.42	63.70	33.78	49.50	1900-1975
Gini (Averages)	142	41.34	10.82	21.42	74.33	32.34	49.07	1960-1999
Political Stab. & Absence of Violence/Terrorism	190	-0.09	0.98	-2.60	1.48	-0.69	0.66	1996 & 1998
Political Stab. & Absence of Violence/Terrorism	180	-0.11	1.01	-2.80	1.46	-0.72	.75	1996