

# Economic Growth under Political Accountability

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## Abstract

We examine the impact of political and criminal accountability on economic growth. Governments seek to maximize their own consumption by extracting rents that are costly to growth. When citizens are able to depose politicians through elections, governments are tightly controlled. The rents politicians are able to extract increase in the length of their term. The effect of the threshold of criminal responsibility on the ability of voters to control politicians is non-monotonic. When tenure in power does not depend on economic performance, rent extraction is limited only by the effectiveness of oversight mechanisms but does not depend on time horizons of the rulers. Accumulation constraint binds only rulers who are neither politically nor criminally accountable.

## 1 Introduction

The topic is best introduced by the conclusion. If those in power, the rulers, are concerned only about the welfare of citizens, with no private interest of their own, in an economy calibrated to resemble the United States, per capita income grows at the annual rate of 0.0303 per annum. If those in power pursue their private interests without any political or legal barriers, incomes decline at the rate of 0.0025. Yet if the incumbents maximize their private consumption but every four years face a threat of being thrown if they extract too much, while rulers extract some rents, incomes grow at almost the same rate as when rulers are benevolent. Hence, the fact that the tenure of rulers depends on their conduct, political accountability, has drastic consequences for economic growth. We do need governments, governments may have private interests and they do have instruments to extract rents, so that they can impose some costs on citizens. But well-functioning accountability mechanisms reduce these costs to relatively benign levels.

To locate our analysis in a broader context, consider the recent literature on the role of political institutions in economic development. The central claim of "new institutionalism" is that institutions are the "primary" cause of economic development, "deeper" than features of the natural environment, "geography," and deeper than the supply of

factors and the technologies for their use. The theoretical program has been laid out by North (1997: 224; italics supplied): "To make sense out of historical and contemporary evidence, we must rethink the whole process of economic growth.... The *primary source* of economic growth is the institutional/organizational structure of a political economy...."

The institutions that matter for development in the neo-institutionalist perspective are almost always those that "safeguard property rights." This idea goes back to North and Thomas (1973), indeed to Machiavelli, who observed that "everybody is eager to acquire such things and to obtain property, provided that he be convinced that he will enjoy it when it has been acquired" (*Discourses on Livy. II.2*, cited after Holmes 2003). Thus, the definition of "good" institutions offered by Acemoglu, Johnson, and Robinson (2000: 1262) goes as follows: "We take a good organization of society to correspond to a cluster of (political, economic, and social) institutions ensuring that a broad section of society has effective property rights."

The main point of Bardhan (2004) is that the new institutionalism got its institutions wrong. If "security of property rights" is the New Testament, we also have the Old Testament, drafted by Rosenstein-Rodan (1943; for a formal model see Murphy, Shleifer, and Vishny 1989) which says that institutions that matter are those that mobilize and coordinate

investment. In the literature of the 1960s, these were the institutions that force savings (Galenson 1959, DeSchweinitz 1959, Huntington 1968, Huntington and Dominguez 1975), while recent studies in this vein typically emphasize the role of financial institutions ((Beck, Levine, and Loyaza 2000; King and Levine 1993; Levine and Zervos 1998; Neusser and Kugler 1998; Rousseau and Wachtel 1998).

Yet we can also think that the institutions that matter for development are those that make rulers accountable, those that enable citizens at large or some specialized agencies to sanction bad behavior by throwing incumbents out of office (Keefer 2005) or by applying laws (for a general discussion of accountability, see the essays in Przeworski, Manin, and Stokes 1999.) Such institutions should induce governments to limit rent extraction and to promote growth. Indeed, in the light of our analysis, these institutions are fundamental for development.

The economy we consider is the simplest possible. Incomes are linearly produced by the stock of accumulable wealth. Productive assets are taxed. While in Barro's (1990) model some part of tax revenues is used by the government to finance the flow of capital services, here taxes finance only the consumption by the government.<sup>1</sup> Hence, in our

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<sup>1</sup>Barro (1990) found that when rulers maximize their own consumption they provide an optimal level of capital services and extract above this level. Grossman and Noh (1990, 1994) also concluded that self-interested politicians will provide an optimal level of public investment. These results are challenged by Acemoglu (2005),

model taxes – perhaps a better term would be ”tribute” – unambiguously reduce growth. This is a simplification, but it provides a sufficient analytical instrument for the aspect of growth we seek to analyze. Moreover, in our model taxes reduce growth only through their impact on the saving rate, without causing any other distortions. One could think that some technologies of rent extraction are more costly than others, causing a larger misallocation of resources. Because their wages, perks, and privileges depended on the size of the plants, communist managers, for example, maximized investment independently of its productivity. In our model, rent extraction constitutes pure theft, which is a minimalist view of the costs of rent extraction. Extensions are obviously possible.

Governments are accountable if their tenure in office depends on their actions.<sup>2</sup> Accountability can be enforced through two distinct mechanisms. Governments are *politically* accountable when they are subject to sanctions by citizens, that is, if voters can remove incumbents from office when they extract rents in excess of the amount voters see as justified. Since people do not observe most actions of governments directly, they make inferences about actions by observing their outcomes, which we take to be the evolution of incomes. Hence, political accountability

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according to whom when the state lacks the power to tax effectively, the rulers underinvest, which was also the point of Findlay (1990).

<sup>2</sup>A large class of models of dictatorships analyzes optimal economic strategies of rulers whose tenure in office is either fixed or stochastic but independent of performance. Since our focus is on accountability, they serve here only as a benchmark.

is a map from outcomes to tenure in power.

Specifically, we think about political accountability as follows. Elected for some fixed term, rulers decide how much they want to extract in rents, with predictable consequences for growth, anticipating that voters will decide whether to retain the incumbents on the basis of their performance. Each voter sets privately a threshold of performance below which he or she votes against the incumbent. Voters are either identical or one of them is decisive. Voters reason as follows: To be induced to perform the tasks of governing, rulers must receive a utility at least as large as the next best opportunity, which we take to be the utility of the representative citizen. Yet to make the cost of losing office costly to the rulers, they must obtain a level of compensation greater than this reservation utility. Since citizens are better off when the government limits rent extraction, voters set the compensation of rulers at the level that makes the incumbents indifferent between taking the most they can and being thrown out and taking this level of compensation and staying in office. Hence, the threshold voters use to make their decisions is an efficiency wage in the sense of Shapiro and Stiglitz (1986).

Yet governments may prefer to exceed this threshold and face being thrown. If their transgression is flagrant, they may be subject to another source of sanctions, which we call *criminal* accountability. Governments

are criminally responsible if they are subject to sanctions by other public authorities when they transgress previously established rules. These authorities, to which we generically refer to as "oversight agencies," may include prosecutorial bureaucracies, courts, accounting offices, party "control commissions," and the like. Criminal accountability concerns actions and maps them on criminal sanctions. Note that voters can act arbitrarily – they are free to depose governments for any reasons they wish – while oversight authorities should act only on the basis of pre-established norms. These norms, we assume, always permit the rulers to extract at the level set as the criterion for reelection by citizens. Where oversight agencies are effective, any extraction by rulers above the legally set norm leads to criminal sanctions.<sup>3</sup> But they may be more permissive and their implementation may be lax. Yet oversight mechanisms are rarely that tight, even in democracies. Courts or other oversight agencies may be able to detect only flagrant violations or may collude with politicians. In the extreme, they may be controlled completely by the rulers. In some dictatorships, such as the Philippines under Ferdinand Marcos or the Dominican Republic under Rafael Trujillo, the dictator faced no judicial scrutiny. When in the 1930s a German court found Pastor Niemöller not

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<sup>3</sup>Congressman Dan Rostenkowski, at the time the Chair of the Ways and Means Committee in the U.S. House of Representatives, was convicted for, among other things, using an official photographer at his daughter's wedding. A Swedish Prime Minister was forced to resign because she made a minor private charge on her official credit card.

guilty, Hitler had him rearrested by the Gestapo, announcing that “this is the last time a German court is going to declare someone innocent whom I have declared guilty” (Friedrich and Brzezinski, 1961: 35). In some countries judicial institutions are simply tools of the rulers, so that they never step in while the ruler remains in power.

Whenever they are both present, the two accountability mechanisms operate in combination. First the institutional system sets the legal norms. Then voters set the efficiency rent level, which is their criterion for re-electing incumbents. Incumbents are elected for a fixed term of some years and at the end of the term they are subject to the test of election. If they extract rents below or at the efficiency level, they are reelected. If they extract above the set level, they lose office.<sup>4</sup> As long as the rents they extracted are not higher than the level operated by the criminal mechanism, dismissed politicians become ordinary citizens. If they were to extract, however, at a level subject to criminal sanctions, they would end up with a punishment that is sufficiently foreboding that they never exceed this level. In equilibrium, the level of rents at which criminal accountability kicks in determines the efficiency level of rents which voters use as the criterion for retaining the incumbent government. In turn, given that the efficiency level makes rulers indifferent

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<sup>4</sup>We investigated relaxing this rule by making the loss of office probabilistic, but this assumption complicates the algebra without altering the qualitative conclusions,

between extracting at the level at which criminal sanctions would operate and being thrown out or extracting at the level of efficiency rents, governments limit extraction to the level set by citizens and are always re-elected.

To assess the importance of accountability, we compare politically accountable systems, with different duration of terms and different legal norms, to situations in which the rulers are not politically accountable, that is, where the tenure of rulers does not depend on the performance of the economy. Rulers who are not politically accountable may still face scrutiny from their peers. In highly institutionalized dictatorships, such as the communist regimes or Mexico under PRI, where the same parties ruled for decades regardless of economic performance, private appropriation of public resources – the standard definition of corruption (Svensson 2005) – was seen as such and was sanctioned. The leadership of the Chinese Communist Party, for example, repeatedly warns local party officials that it will punish corruption. In contrast, in non-institutionalized dictatorships, true autocracies, rulers face no scrutiny from anyone. Some recent African dictatorships, in which one gang occupies the capital only to be overthrown by another, provide a good case in point. Hence, we distinguish political institutions by the possibility of incumbents being removed from office as a result of elections and by

the presence of oversight mechanisms.<sup>5</sup>

As illustrated in the first paragraph, we find that accountability mechanisms have a powerful effect on restricting rent extraction. Countries in which rulers are politically accountable should grow faster than systems where they are not. The second best, in turn, depend on the operation of the criminal accountability mechanism. If rulers who are not politically accountable are nevertheless subject to oversight by their peers, they are forced to choose tax rates that are lower than those that maximize the present value of their rents without any constraint, and thus generate better performance. If the criminal system is inoperative, they will let the economy run down.

To the extent to which our distinctions can be caught by observable features of political institutions, this finding is confirmed by the data. As Machiavelli (discussed by Bobbio 1989) observed, separation of powers requires that the rulers develop some rules about who has authority over what. The existence of a legislature indicates that a country is governed *by* laws: even if these laws are not obeyed by the powerful, there are some abstract rules and some bodies that are supposed to enforce them. Using party competition and the existence of elected legislatures as the

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<sup>5</sup>Classifications of regimes and specifically of dictatorships abound, distinguishing "kleptocracies" (Grossman and Noh 1990, Grossman 1999, Acemoglu, Robinson, and Verdier 2004), "sultanistic regimes" (Chehabi and Linz 1998), "neopatrimonial regimes" (Eisenstadt 1973, Clapham 1985, Bratton and Van de Walle 1994), "tin-pots" (Wintrobe 1998), ..., the list goes on.

institutional indicator shows that between 1950 and 2000 per capita income (as measured by Penn World Tables, Release 6.1) grew at the rate of 2.33 ( $N = 2459$ ) in democracies, at the rate of 2.00 ( $N = 1933$ ) in countries that did not allow political competition but had elected legislatures, and at the rate of 0.97 ( $N = 570$ ) in countries which had no elected legislatures. In turn, if we take as the institutional indicator the existence of political parties, we learn that the average rate of growth was 2.29 ( $N = 3376$ ) in countries that had at least two political parties, 1.87 ( $N = 1009$ ) in countries that had one party, and 0.96 ( $N = 577$ ) in countries that had no political parties. The same seems to have been true over longer period. Przeworski and Curvale (2005) distinguished between Latin American political systems that allowed some political pluralism from those that has no elected legislatures or no legal opposition and found (using economic data from Maddison 2003), that between 1870 and 2000 the pluralistic systems grew at the rate of 1.67 ( $N = 1219$ ), while systems without formal opposition grew at the rate of 0.52 percent ( $N = 267$ ).

In turn, we expect that there should be no relation between the length of tenure of individual rulers and the rate of growth during their tenure. In our model, politically accountable rulers are always reelected (it would not matter if they were occasionally thrown out by chance)

but the growth they generate declines with the length of their terms. Hence, the length of tenure and rates of growth are independent for politically accountable rulers. In turn, politically unaccountable rulers by definition lose office independently of their performance. This prediction is confirmed in statistical studies (see Thomas 2005).

Since, following Barro (1973) and the long line of accountability models that ensued (Ferejohn 1986, Austen-Smith and Banks 1989, Banks 1990, Harrington 1993), one would expect accountability to matter for government performance, the contribution of our model is only to systematically derive the consequences in a dynamic context. We are nevertheless impressed by the magnitude of its impact on growth in our stylized economies. Figure 1, calibrated loosely to the US economy (see section 5 below), shows the rates of growth when rulers are benevolent, when they are criminally accountable and politically accountable after the period of length  $T$ ,<sup>6</sup> when they are only criminally accountable and are exogenously deposed after  $T$  periods, and when they are not accountable at all.

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<sup>6</sup> $T$  is best thought of as the number of taxation decisions a ruler makes before either political accountability bites or he is deposed for exogenous reasons.

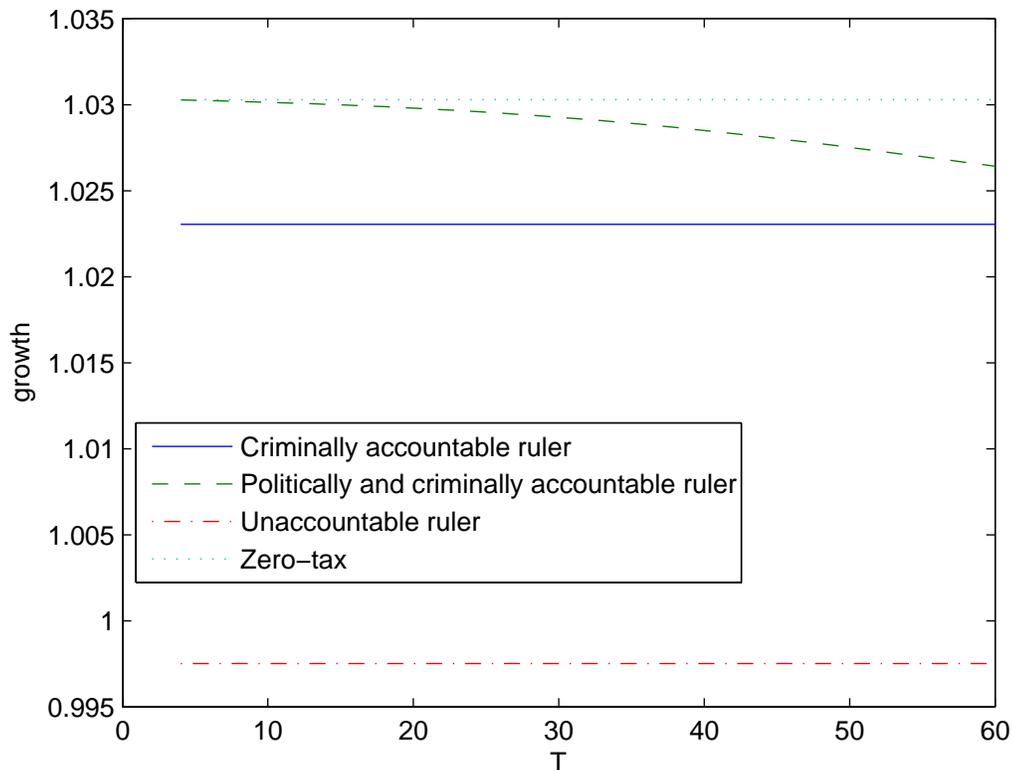


Figure 1. Rates of growth under different forms of accountability and without it.

While having a government is costly, even governments "predatory" (Levi 1988) in their intentions are controlled at a relatively low cost to the economy when political accountability operates. These costs would have been higher if actions of government were hidden and their effects uncertain, as in Ferejohn (1986), but they would be lower in a well-designed system of separation of powers, as in Persson and Tabellini (1996). Yet our highly stylized model captures the essential effect of

political accountability mechanism, namely, that governments are disciplined by the expectation that they will be subject to a popular verdict at the polls.

To isolate the effect of political accountability, we set the threshold of criminal accountability at the same level for the rulers who are doubly accountable and those who are only criminally responsible. Under the particular calibration used in Figure 1, criminal accountability goes a long way in restricting rent extraction and promoting growth. If we were to allow larger rents to escape criminal sanctions, the growth rate under criminal accountability would decline, in the extreme all the way down to the level of rulers who are not accountable in any way, while the bite of political accountability would be even tighter, meaning that rates of growth would decline less steeply in the length of terms.

Hence, the actions of non-elected officials who populate the oversight mechanisms affects the ability of citizens to control politicians through elections.<sup>7</sup> As seen in Figures 2 and 3 below, the relation between criminal and political accountability turns out to be surprisingly complex. When the criminal accountability threshold is very tight, meaning that criminal sanctions are applied when rulers extract even low rents, citi-

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<sup>7</sup>Maskin and Tirole (2004) compare constitutions in which decisions are made either by elected politicians and non-elected officials. We assume that decisions about taxation are made exclusively by elected politicians but that they may subject to varying scrutiny by "judges."

zens can rely on the courts and other oversight mechanisms to keep the elected government in rein, so they can set the efficiency rent level low. As the criminal accountability threshold becomes more lax, the burden of controlling governments shifts to voters, and since governments can extract more free of judicial scrutiny, the efficiency rent level must increase. Yet as the criminal limits to government actions become even looser, the incumbents know that if they exceed the efficiency rent level and will become ordinary citizens, they too will be taxed at high rates by all their successors. Hence, in equilibrium, incumbents will comply with a lower level of efficiency rents. In turn, this non-monotonic relation between the criminal and the efficiency thresholds, implies that growth is higher either when criminal accountability is very tight or quite loose. Oversight mechanisms that step in at intermediate levels of rents generate the lowest growth rates.

The literature on the "predatory state" is enormous but it suffers from several logical problems. McGuire and Olson (1996) take the time preference rates of rulers as exogenous and derive comparative statics with regard to utility functions. In our model, politically accountable rulers are distinguished by the length of period, the term in office, before the accountability test occurs. As seen Figure 1, contrary to McGuire and Olson, rulers who have longer terms of office should perform worse:

because they can extract more while in office, they must be allowed higher rents to prevent them from soaking voters and running away.<sup>8</sup> In turn, governments the tenure of which does not depend on economic performance differ not by their time horizon but by their vulnerability to criminal oversight. Note, still in Figure 1, that the rate of growth (and implicitly the tax rate) of the criminally accountable rulers does not depend on the length of the period after which they are thrown out. While politically unaccountable dictators would want to moderate their rent extraction if they could commit their successors to do the same (remember that dictators who lose power are subject to taxation by their successors), the best response to any future level of taxes is always to extract up to the level sanctioned by the criminal mechanism. Hence, even dictators who expect to be around for a long time, "stationary bandits" in the language of McGuire and Olson, are not bound by the accumulation constraint but only by the fear of sanctions that may be imposed by their peers. They do not perform differently than "roving bandits" facing the same criminal sanctions. In a fully dynamic framework in which dictators have finite lives, the accumulation constraint never binds.

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<sup>8</sup>Although we do not consider this aspect formally, very short terms in office would not be optimal, since rulers must have some time to learn how to govern if they are to govern effectively, a point made already by Sieyes (1980 [1789]).

To summarize, we see our contribution in (1) placing standard models of accountability in a fully dynamic framework, (2) distinguishing the role of voters from the role of criminal oversight mechanisms, (3) distinguishing the effect of criminal oversight from the effect of time horizons, and (4) illuminating the optimal system of criminal accountability.

The paper is organized as follows. The economy is introduced in the next section and it is followed by a formal discussion of the accountability mechanisms. After a brief summary of results, we calibrate the model and illustrate the results in the form of graphs.

## 2 The Economy

The output  $y_t$  at time  $t$  is produced with capital  $k_t$  according to the linear production function

$$y_t = rk_t$$

with  $r > 1$ . There are  $n$  agents, indexed by  $i$ . In the initial period  $t_0$ , they each own a share of the capital stock,  $v_{t_0}^i$ , with  $\sum_{i=1}^n v_{t_0}^i = 1$ . The shares of capital owned by agent  $i$  at time  $s$  are denoted by  $v_s^i$ , and the capital stock of this agent is  $k_s^i = v_s^i k_s$ . Assets are taxed at the rate  $\tau_s$ , and in each period tax collections are distributed to the agents in proportion  $\alpha_t^i$  of the total, where  $\sum_i \alpha_t^i = 1$ . Note that we are allowing for  $\alpha_t^i$  to depend on time. The post-redistribution income is

$$y_t^i = (1 - \tau_t) r v_t^i k_t + \alpha_t^i \tau_t r k_t = (1 - \tau_t) r k_t^i + \alpha_t^i \tau_t r k_t,$$

where we assume that  $\tau_s \in [0, \tilde{\tau}]$ , where  $\tilde{\tau} \leq 1$  for all  $s$ .

Redistribution has incentive effects on accumulation. Agents use their capital to produce income, pay proportional taxes on assets, and to consume. They have CRRA preferences so that the value function for agent  $i$  is:

$$V_i(k_t^i) = \max_{c_t^i} \frac{(c_t^i)^{1-\sigma} - 1}{(1-\sigma)} + \beta V_i(r(1-\tau_t)k_t^i + q_t^i - c_t^i),$$

where  $q_s^i$  is the transfer that agent  $i$  receives at time  $s$ .

The first-order condition of the agent for an interior solution is:

$$c_{t+1}^i = c_t^i (\beta r (1 - \tau_t))^{\frac{1}{\sigma}} \quad (1)$$

Note that consumption will grow if  $(\beta r (1 - \tau_t))^{\frac{1}{\sigma}} > 1$ . Forward iteration of the budget constraint  $k_{t+1}^i = r(1 - \tau_t)k_t^i - (c_t^i - q_t^i)$  implies, provided  $\tau < 1$ :

$$c_0^i - q_0^i + \sum_{j=1}^t (c_j^i - q_j^i) [(r(1 - \tau_j))^{-j}] + (r(1 - \tau_{t+1}))^{-s} k_{t+1}^i = (r(1 - \tau_0)) k_0^i \quad (2)$$

From the no Ponzi and transversality conditions,

$$\lim_{t \rightarrow \infty} ((r(1 - \tau_{t+1}))^{-t}) k_{t+1}^i = 0. \quad (3)$$

Iterating 1 forward, substituting into 2, using 3 and solving for  $c_0^i$ , we obtain:

$$c_t^i = \lambda_t^i \left( (r(1 - \tau_t)) k_t^i + \left( q_t^i + \sum_{j=t+1}^{\infty} q_j^i ((r(1 - \tau_j))^{-(j-t)}) \right) \right) \quad (4)$$

where

$$\lambda_t^i = \left( 1 + \sum_{j=t+1}^{\infty} \prod_{s=t+1}^j \beta^{\frac{1}{\sigma}} (r(1 - \tau_s))^{\frac{1-\sigma}{\sigma}} \right) \equiv \lambda_t$$

If  $\tau_s$  is assumed constant at  $\tau$ , then

$$\lambda = 1 - \beta^{\frac{1}{\sigma}} (r(1 - \tau))^{\frac{1-\sigma}{\sigma}}$$

Thus agent  $i$  consumes a fraction  $\lambda$  of his net capital income  $(r(1 - \tau))k_t^i$  plus the value of transfers that he receives, discounted at  $r(1 - \tau)$ . Note that  $\lambda$  is the propensity to consume out of wealth because  $r$  is one plus the rate of return, net of depreciation.

The following assumptions assure that  $\lambda$  stays bounded away from zero and one.

**Assumption 1**  $0 \leq \tau \leq \tilde{\tau} \leq 1 - r\beta^{\frac{1}{\sigma-1}}$

**Assumption 2**  $0 < \beta^{\frac{1}{\sigma}} r^{\frac{1-\sigma}{\sigma}} < 1$ .

## 2.1 Endogenizing transfers

Without loss of generality we define growth rates as  $g_s = \frac{k_s}{k_{s-1}}$  so that

$$k_t = \left( \prod_{s=t_0+1}^t g_s \right) k_{t_0}$$

Let the transfers be defined as:

$$q_t^i = \alpha_t^i \tau_t r k_t = \alpha_t^i \tau_t r \left( \prod_{s=t_0+1}^t g_s \right) k_{t_0}$$

Using the definition of the growth rates and transfers,

$$c_t^i = \lambda_t \left( (1 - \tau_t) r k_t^i + \alpha_t^i \tau \left( 1 + \sum_{j=t+1}^{\infty} (g_s r (1 - \tau_j))^{-(j-t)} \right) r k_t \right) \quad (5)$$

Each agent's budget constraint implies

$$\begin{aligned} k_{t+1}^i &= (1 - \tau_t) r k_t^i + \alpha_t^i \tau_t r k_t - c_t^i \\ &= (1 - \tau_t) (1 - \lambda_t) r k_t^i \\ &\quad + \left( \tau_t (1 - \lambda_t) - \lambda_t \tau_t \left( \sum_{j=t+1}^{\infty} (g_s r (1 - \tau_j))^{-(j-t)} \right) \right) \alpha_t^i r k_t \end{aligned} \quad (6)$$

Summing over agents,

$$k_{t+1} = \sum_{i=1}^n k_{t+1}^i = \left( 1 - \lambda_t - \lambda_t \tau_t \left( \sum_{j=t+1}^{\infty} (g_s r (1 - \tau_j))^{-(j-t)} \right) \right) r k_t$$

Therefore, the equilibrium relation describing growth rates for our redistributive economy is:

$$g_{t+1} = r \left( 1 - \lambda_t - \lambda_t \tau_t \left( \sum_{j=t+1}^{\infty} (g_s r (1 - \tau_j))^{-(j-t)} \right) \right) \quad (7)$$

If taxes are constant at  $\tau$ , then

$$g = r (1 - \lambda) (1 - \tau)$$

The growth rate  $g$  then will be constant as well.

## 2.2 Dynamics of Shares $\frac{k_t^i}{k_t}$

To characterize the equilibrium dynamics of the economy, we first describe the evolution of asset shares from an initial distribution, given the redistribution scheme. If we express asset shares as  $v_t^i = \frac{k_t^i}{k_t}$ , then

equation 6 yields:

$$v_{t+1}^i = ((g_{t+1})^{-1} r (1 - \lambda_t) (1 - \tau_t)) v_t^i + (g_{t+1})^{-1} r \alpha_{i,t} \left( \tau_t (1 - \lambda_t) - \lambda_t \tau_t \sum_{j=t+1}^{\infty} (g_j r (1 - \tau_j))^{-(j-t)} \right) \quad (8)$$

where the law of motion for  $g_{t+1}$  is given by (7).

If  $\tau_j$  is constant however the above becomes

$$v_{t+1}^i = g^{-1} r (1 - \tau) (1 - \lambda) v_t^i = v_t^i \quad (9)$$

The shares  $v_{t+1}^i$  remain constant if taxes are constant . This is because, even though agents consume a fraction  $\lambda_t$  of their wealth that includes the discounted value of all future transfer payments, in equilibrium they end up consuming all income other than capital income, as shown by Bertola(1993) in a slightly different context.

### 3 Accountability Mechanisms

While more general setups are possible, assume that there is a ruling elite  $E$  of size  $m < n$ , where the members of the elite are  $E = \{i \in M\}$  and  $\sum_{i \in M} \alpha_t^i = 1$ . Agents outside the elite do not receive transfers. Thus later on, in considering the accumulation decisions of agents, we will have  $\alpha_t^i = \alpha^i > 0$  while an agent remains part of the elite, but  $\alpha_t^i = 0$

otherwise. There is a particular member of the elite, with index  $r \in E$ , who is decisive in the sense that he or she chooses the tax rate. We call this member "the ruler" and identify his share of tax collection as  $\alpha^r$ .

The political accountability mechanism, if there is one, operates as follows. The elite is elected for a period of  $T$  years, after which a new election takes place and the elite is either retained or removed from office. The ruler implements a tax rate  $\tau$ , taking into account that the tax rate affects the savings behavior of all agents. There is a threshold tax  $\bar{\tau}$ , such that if  $\tau \leq \bar{\tau}$  then the elite is retained; otherwise it is thrown out and no longer receives tax receipts. We assume that voters will not re-elect a ruler that sets  $\tau$  above  $\bar{\tau}$  in any period while in office.<sup>9</sup> For the moment, we treat  $\bar{\tau}$  as a parameter. In turn, elites that are not subject to the political accountability mechanism are thrown out of office after some period regardless of the tax rates they chose.

The discounted utility of the ruler if he chooses a constant tax rate

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<sup>9</sup>We will show that in equilibrium, given the behavior of voters, the politically accountable ruler sets  $\bar{\tau}$  for all  $t$ . In principle if the ruler could credibly commit to future taxes, an optimal tax schedule that declines to zero could dominate a constant tax schedule, but to simplify the analysis we want to avoid the complications associated with optimal tax schedules under commitment.

$\tau$  and remains in power forever would be:

$$\begin{aligned}
V_r(\tau) &= \sum_{t=0}^{\infty} \beta^t \frac{(c_t^r)^{1-\sigma} - 1}{(1-\sigma)} & (10) \\
&= \sum_{t=0}^{\infty} \beta^t \frac{(\lambda((1-\tau)v_t^r + \alpha^r \tau) r (r(1-\tau)(1-\lambda))^t k_0)^{1-\sigma} - 1}{(1-\sigma)} \\
&= \left( \begin{array}{c} (1-\sigma)^{-1} (\lambda r k_0 ((1-\tau)v_t^r + \alpha^r \tau))^{1-\sigma} \\ \cdot (1 - \beta r^{1-\sigma} (1-\tau)^{1-\sigma} (1-\lambda)^{1-\sigma})^{-1} - (1-\beta)^{-1} \end{array} \right)
\end{aligned}$$

where we suppressed the time subscript from  $\alpha_t^r$ <sup>10</sup>. The ruler would choose the tax rate  $\tau$  and  $c_s^r \in [0, (1-\tau)rk_s^r + \alpha_t^r \tau rk_s]$ ,  $s \geq t$ , to maximize 10. Once the tax rate is set, the saving behavior of agents, including that of the members of the elite, is determined. The agents take the growth of aggregate wealth  $k_t$  as given.

If  $V_r(\tau)$  is increasing over  $[0, \bar{\tau}]$ , and the ruler who is politically accountable chooses to remain in office, he will set  $\tau = \bar{\tau}$  to maximize his utility. In this case the wealth of any  $i$ 'th member of the elite evolves

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<sup>10</sup>It will be apparent that in choosing to set a tax rate to remain in power the ruler will compare the discounted utility of setting a tax that keeps him in power versus a tax that assures only a limited tenure. Since the both utilities will be proportional to the capital stock, if at any point in time setting a tax rate to remain in power is preferable to optimally setting a high tax and losing power at the end of the term, then it will be preferable to do so at all times.

according to:

$$\begin{aligned}
k_{t+1}^i &= (1 - \bar{\tau}) r k_t^i + \alpha^i \bar{\tau} r k_t - c_t^i \\
&= \left( (1 - \bar{\tau}) (1 - \lambda) v_t^i + \alpha^i \bar{\tau} (1 - \lambda) - \alpha_t^i \lambda \bar{\tau} \left( \sum_{j=t+1}^{\infty} (gr (1 - \bar{\tau}))^{-(j-t)} \right) \right) r k_t
\end{aligned} \tag{11}$$

$$= ((1 - \lambda) (1 - \bar{\tau}) r) k_t^i \tag{12}$$

His consumption is given by

$$c_t^i = \lambda \left( (1 - \bar{\tau}) v_t^i + \alpha^i \bar{\tau} \left( 1 + \sum_{j=t+1}^{\infty} (gr (1 - \bar{\tau}))^{-(j-t)} \right) \right) r k_t \tag{13}$$

$$= (\lambda (1 - \bar{\tau}) v_t^i + \alpha^i \tau) r k_t \tag{14}$$

where the propensity to consume is  $\lambda = 1 - \beta^{\frac{1}{\sigma}} (r (1 - \bar{\tau}))^{\frac{1-\sigma}{\sigma}}$ , and his discounted utility is:

$$V_i(\tau) = (1 - \sigma)^{-1} \left( \begin{array}{c} (\lambda r k_0 ((1 - \bar{\tau}) v_t^i + \alpha_t^i \bar{\tau}))^{1-\sigma} \\ \cdot (1 - \beta r^{1-\sigma} (1 - \bar{\tau})^{1-\sigma} (1 - \lambda)^{1-\sigma})^{-1} - (1 - \beta)^{-1} \end{array} \right)$$

Note that private wealth grows at the same rate across agents, elite or not.

It may be possible that the tax rate that maximizes 10 exceeds  $\bar{\tau}$ . Elections, however, are not the only mechanism of accountability. The

rate at which rulers can extract rents may be subject to judicial scrutiny and criminal sanctions. We assume that these sanctions are sufficiently foreboding that no ruler would want to suffer them. Hence, there is an upper bound to the tax rate that can be set,  $\tau'$ , which represents a criminally enforced limit to how much can be extracted in one period.

If  $V_r(\tau)$  is increasing over  $[0, \tau']$  the politically accountable ruler has to compare the discounted utility of setting  $\bar{\tau}$  and staying in power forever with the discounted utility of choosing  $\tau'$  and being thrown out of office at the end of one electoral period. We turn, therefore, to the computation of the utility of the elite when the ruler chooses to set a tax  $\tau' \geq \tau > \bar{\tau}$  and to lose power when the term of  $T$  years runs out.

If the ruler sets a tax rate above  $\bar{\tau}$  he will do so optimally, taking into account that the elite will be thrown out of office at the end of its tenure and will no longer receive a share  $\alpha^i$  of tax receipts. The utility of the ruler will be:

$$\begin{aligned}
Z(\tau, \{\tau_j\}_{T+1}^\infty) &= \text{Max}_{\tau, \{k_j^r\}_1^T} \sum_{t=0}^{\infty} \beta^t \frac{(c_t^r)^{1-\sigma} - 1}{(1-\sigma)} & (15) \\
&= (1-\sigma)^{-1} \left( (\lambda_0 ((1-\tau_0)rk_0^r + \alpha^r \tau_0 rk_0))^{1-\sigma} - 1 \right) \\
&+ \beta (1-\sigma)^{-1} \left( (\lambda_1 ((1-\tau_1)rk_1^r + \alpha^r \tau_1 rk_1))^{1-\sigma} - 1 \right) \\
&+ \beta^2 (1-\sigma)^{-1} \left( (\lambda_2 ((1-\tau_2)rk_2^r + \alpha^r \tau_2 rk_2))^{1-\sigma} - 1 \right) \\
&\dots \\
&+ \beta^T (1-\sigma)^{-1} \left( (\lambda_T ((1-\tau_T)rk_T^r + \alpha^r \tau_T rk_T))^{1-\sigma} - 1 \right) \\
&+ (1-\sigma)^{-1} \left( \sum_{t=T+1}^{\infty} \beta^t \left( (\lambda_t r (1-\tau_t) k_t^r)^{1-\sigma} - 1 \right) \right)
\end{aligned}$$

Note that once he is out of office, the ruler is taxed without receiving any rents.

We assume that the ruler, in setting a tax  $\tau_t > \bar{\tau}$  cannot commit to setting future taxes during the remaining periods of his tenure, and therefore we can use backward induction to determine tax rates. We therefore focus on the optimal choice of  $\tau_T$  in period  $T$ . It is clear from the first order condition with respect to  $\tau$  at  $T$  that irrespective of the choices of previous  $\tau'$ s, future expected  $\tau'$ s, as well as the optimal choices for  $k_s^r$ ,  $s = T+1, \dots$  and therefore of future shares, it is a dominant strategy to choose  $\tau = \tau'$  if  $\alpha^r k_T^r > k_T^r$ , or equivalently if  $\alpha^r > v_T^r$ .

Note also that the choice of  $\tau$  at  $T$  does not affect future  $\lambda_t$ . The same argument holds at  $T - 1$  if  $\alpha^r > v_{T-1}^r$ . It follows by backward induction that it is a dominant strategy to set  $\tau_j = \tau'$  if  $\alpha^r > v_j^r$  for  $j = 1, \dots, T$ . In particular  $\tau = \tau'$  will be an optimal choice if  $\alpha^s > v_0^s$  for all future rulers  $s$  because future shares will remain constant at  $v_t^s = v_0^s$  for  $t = 1, 2, \dots$  (See 9). Note also  $\lambda_t = 1 - \beta^{\frac{1}{\sigma}} \left( r (1 - \tau')^{\frac{1-\sigma}{\sigma}} \right)$  will also remain constant. It is natural to assume that the rulers are net beneficiaries of the tax-transfer scheme, so that

**Assumption 3**  $\alpha_s > v_0^s$ , for all  $s$ .

Therefore, if the ruler sets  $\tau > \bar{\tau}$  in any period it will be a dominant strategy to set  $\tau = \tau'$  for all periods during its tenure. Under assumption 3 all elites will make the same choice. This considerably simplifies the accumulation decision of the elites, since under constant taxes savings will be a fraction  $\lambda$  of capital income and the remainder, including shares of tax receipts accruing to members of the elite, will be consumed. The utility  $Z_r(\tau, \{\tau_j\}_{T+1}^\infty)$  now becomes, since  $c_t = (\lambda(1 - \tau')v_0^r + \alpha^r \tau')rk_t$

and  $k_{t+1}^r = ((1 - \lambda)(1 - \tau')r)k_t^r$ ,

$$\begin{aligned}
Z(\tau, \{\tau_j\}_{T+1}^\infty) &= (1 - \sigma)^{-1} \left( ((\lambda(1 - \tau')v_0^r + \alpha^r \tau')rk_0)^{1-\sigma} - 1 \right) \\
&\quad + \beta(1 - \sigma)^{-1} \left( ((\lambda(1 - \tau')v_0^r + \alpha^r \tau')r[(1 - \lambda)(1 - \tau')r]k_0)^{1-\sigma} - 1 \right) \\
&\quad + \beta^2(1 - \sigma)^{-1} \left( ((\lambda(1 - \tau')v_0^r + \alpha^r \tau')r[(1 - \lambda)(1 - \tau')r]^2 k_0)^{1-\sigma} - 1 \right) \\
&\quad \dots \\
&\quad + \beta^T(1 - \sigma)^{-1} \left( ((\lambda(1 - \tau')v_0^r + \alpha^r \tau')r[(1 - \lambda)(1 - \tau')r]^T k_0)^{1-\sigma} - 1 \right) \\
&\quad + (1 - \sigma)^{-1} \left[ \beta((1 - \lambda)(1 - \tau')r)^{1-\sigma} \right]^{T+1} \\
&\quad \cdot \left( \sum_{t=T+1}^\infty \left( (\lambda r(1 - \tau')v_0^r)^{1-\sigma} \left[ \beta((1 - \lambda)(1 - \tau')r)^{1-\sigma} \right]^{t-T-1} (k_0)^{1-\sigma} \right) - (1 - \beta)^{-1} \right)
\end{aligned}$$

where  $\lambda = 1 - \beta^{\frac{1}{\sigma}} \left( r(1 - \tau')^{\frac{1-\sigma}{\sigma}} \right)$

or

$$Z(\tau'; v_0^r, \alpha^r, k_0, T) = (1 - \sigma)^{-1} \left[ \begin{aligned} &\frac{((\lambda(1 - \tau')v_0^r + \alpha^r \tau')rk_0)^{1-\sigma}}{1 - \beta((1 - \lambda)(1 - \tau')r)^{1-\sigma}} \left[ 1 - [\beta((1 - \lambda)(1 - \tau')r)^{1-\sigma}]^{T+1} \right] \\ &+ [\beta((1 - \lambda)(1 - \tau')r)^{1-\sigma}]^{T+1} \frac{((\lambda(1 - \tau')v_0^r)rk_0)^{1-\sigma}}{1 - \beta((1 - \lambda)(1 - \tau')r)^{1-\sigma}} \\ &\quad - (1 - \beta)^{-1} \end{aligned} \right] \quad (16)$$

### 3.1 Efficiency rents

If the ruler chooses to set the threshold tax and retains power, his utility will be  $V_r(\bar{\tau})$ . If he sets  $\tau > \bar{\tau}$ , he obtains discounted utility

$Z(\tau'; v_0^r, \alpha^r, k_0, T)$  given by 16. The reelection threshold,  $\bar{\tau}$ , is set by identical voters or, if voters are heterogeneous, by the decisive voter. As in all accountability models (Barro 1973, Ferejohn 1986) the optimal strategy of voters is to set  $\bar{\tau}$  at the level which makes the incumbent indifferent between extracting at the rate  $\bar{\tau}$  and remaining in office, and extracting at the rate  $\tau'$  and leaving office after one period of  $T$  years. Our framework is now akin to the Shapiro-Stiglitz efficiency-wage model: unless the threshold tax  $\bar{\tau}$  is high enough, the ruler will find it optimal to set the high tax  $\tau'$  and loose power in the subsequent period.

Note that because of disincentive effects on accumulation, and thus on the tax base,  $V_i(\tau)$  may be decreasing over some range of  $\tau$ . Furthermore, for any  $\tau'$ ,  $V_r(\tau') \geq Z(\tau', T)$  because  $\tau'$  has the same disincentive effects on accumulation both for  $V_r(\tau')$  and  $Z(\tau', T)$ , but under  $V_r(\tau')$  the ruler collects rents forever whereas under  $Z(\tau', T)$  he collects rents only during the first  $T$  years. Since voters prefer lower taxes, they will then set  $\bar{\tau} = \text{Min}\{\tau \geq 0 | V_r(\tau) \geq Z(\tau', T)\}$ . This implies that  $\bar{\tau}$  will either be at the lowest intersection of  $V_r(\tau)$  and  $Z(\tau', T)$  with  $\frac{V_r(\tau)}{d\tau}|_{\tau=\bar{\tau}} > 0$  and  $\bar{\tau} > 0$ , or at  $\bar{\tau} = 0$  if  $V_r(0) \geq Z(\tau', T)$ . In the former case the ruler will be indifferent between setting the constant tax rate of  $\bar{\tau}$  and staying in power, and setting  $\tau'$  and being thrown out of office at the end of the term. In the latter case the ruler will strictly

prefer setting  $\bar{\tau} = 0$  if  $V_r(0) > Z(\tau', T)$ .

## 4 Summary

The results established above can be summarized by the following propositions:

**Proposition 1** *If a ruler is politically accountable, that is, if he is thrown out whenever he exceeds  $\bar{\tau}$ , then he will always choose  $\bar{\tau}$  and be re-elected.*

**Corollary 1** *When the ruler is politically accountable,  $\bar{\tau}$  is weakly increasing (non-decreasing) in  $T$ .*

This corollary follows directly from the fact that the utility of the single term ruler  $Z(\tau', T)$  is increasing in  $T$ , and that  $\bar{\tau}$  has to be set either to equate  $Z(\tau', T)$  to the utility of the politically accountable ruler that sets  $\bar{\tau}$  forever, or to  $\bar{\tau} = 0$  if  $V_r(0) > Z(\tau', T)$ .

**Corollary 2** *If the ruler is politically accountable,  $\left(\frac{\partial Z}{\partial \tau'}\right) \left(\frac{\partial \bar{\tau}}{\partial \tau'}\right) \geq 0$ , so that  $\bar{\tau}$  weakly increases with  $\tau'$  over the range of  $\tau'$  where  $Z$ , the discounted lifetime utility of a single term ruler, increases with  $\tau'$ , and  $\bar{\tau}$  weakly decreases with  $\tau'$  over the range of  $\tau'$  where  $Z$  decreases with  $\tau'$ .*

**Proposition 2** *If the ruler is criminally (but not politically) accountable, and cannot commit to tax future tax rates while in office, the equilibrium tax sequence is  $\{\tau'\}_0^\infty$ , regardless of  $T$ .*

## 5 Calibration to US

To compute the effects of the accountability mechanisms we calibrate our model roughly to the US economy at an annual frequency. We set the pre-tax rate of return to  $r = 1.1$ , the discount factor to  $\beta = 0.965$ , and the inverse elasticity of intertemporal substitution to  $\sigma = 2$ . Without loss of generality we normalize  $k_0^i = 1$ . Furthermore we set the wealth share of the pivotal elite member to  $v_0^i = 0.00005$ , his share of tax collections to  $\alpha^i = 0.005$  and the upper bound for redistributive capital to  $\tau' = 0.014$ , implying an income tax of 15.4%.

So far our calibration reflects an annual frequency. However a typical electoral cycle is four years, and we are also interested in exploring the effect of longer cycles on growth and taxes. The number of years that a ruling elite can remain in power before it can be removed, through elections is  $T$ . The utility  $Z(\tau'; v_0^i, \alpha^i, k_0)$  of a ruling elite setting the maximal tax  $\tau'$  depends on  $T$ . Therefore  $\bar{\tau}$ , computed from  $V_r(\bar{\tau}) = Z(\tau'; v_0^i, \alpha^i, k_0)$ , as

$$\bar{\tau} = V_r^{-1}(Z(\tau'; v_0^i, \alpha^i, k_0, T)) = g(\tau') \quad (17)$$

and will also depend on  $T$ . Elites that tax at the rate  $\bar{\tau}$  are re-elected.

If we set  $T = 4$ , we compute  $\bar{\tau} = 0.0000165$ . If we assume that US

wealth producing taxable income is 100 trillion dollars, tax collections then yield \$1,650,000,000, and the ruler receives a share  $\alpha^i = 0.01$  of it, or \$16,500,000. Elites that set  $\tau = \tau' > \bar{\tau}$  only rule for  $T = 4$  years and are then thrown out of office. While in office they collect 1.4 trillion, or 14% of GDP in taxes each year, and the ruler receives 14 billion dollars per year before losing power and reverting to a representative agent.

Figure 2 below shows the relation between the criminal threshold tax  $\tau'$  and the utility of the single-term ruler  $Z(\tau'; v_0^i, \alpha^i, k_0, T)$ . Note that  $\tau' = 0.014$  used in our calibration is in the declining region for  $Z$ . This helps the growth rate for accountable regimes. If  $\tau'$  were lower,  $Z$  would be higher and  $\bar{\tau}$  would have to increase, reducing growth under accountability. This result may seem counter-intuitive, but it is the consequence of the inability of the ruler to commit to tax rates over his tenure. If he chooses to exceed  $\bar{\tau}$  in the last period of his tenure, he will set the maximal tax rate  $\tau'$ , which the agents will expect, and therefore the ruler will set  $\tau'$  in each of the previous periods without being able to take into account the incentive effects on accumulation. A high  $\tau'$  reduces the utility that the ruler can obtain by setting a tax rate that exceeds  $\bar{\tau}$ , since subsequent rulers will also set  $\tau'$ . Therefore we observe a non-monotonic relation between the criminal threshold tax rate  $\tau'$  and the utility of the single term ruler.

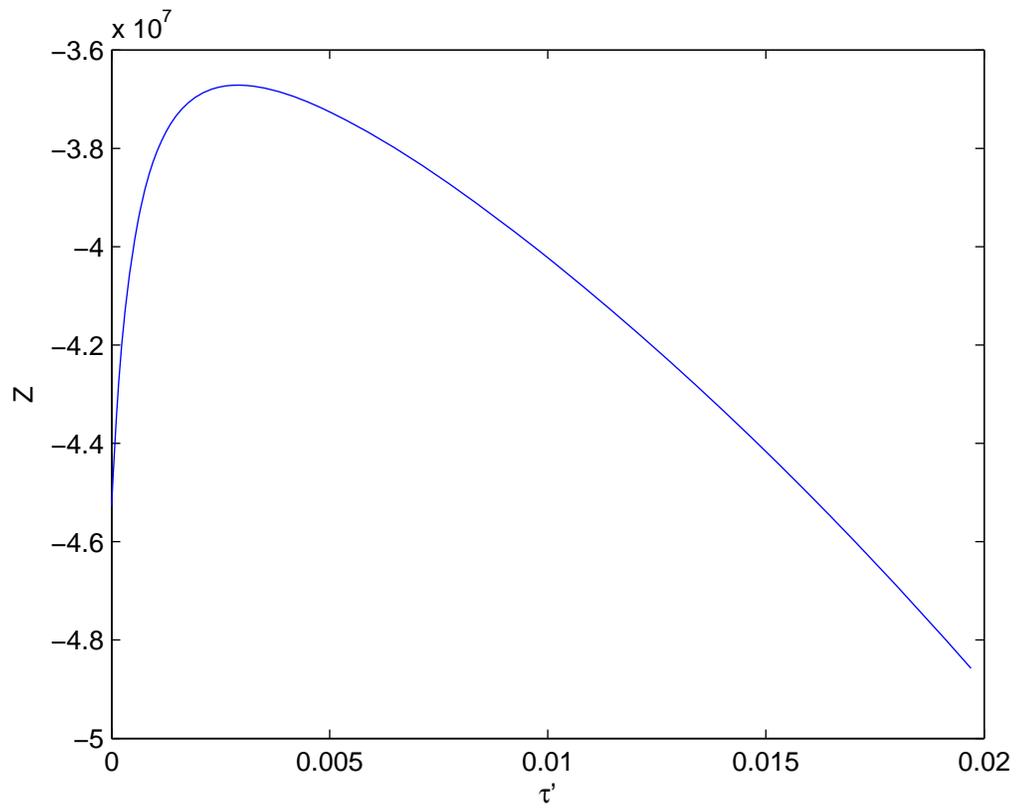


Figure 2: The utility of one-term ruler as a function of the criminal threshold.

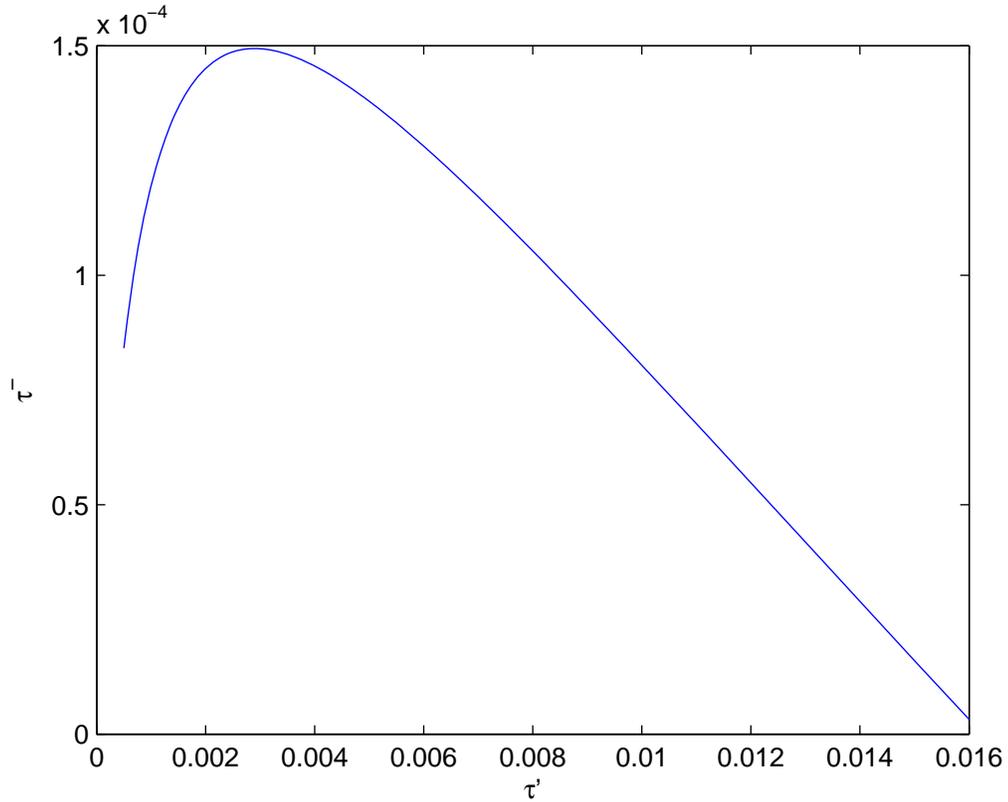


Figure 3: Efficiency rent as a function of criminal threshold.

In Figure 3 we show the relation between  $\tau'$  and  $\bar{\tau}$ , which reflects the non-monotonicity displayed in Figure 2. As  $\tau'$  increases, at first  $Z$  increases, causing  $\bar{\tau}$  to rise as well because the tax rate  $\bar{\tau}$  is set to yield a utility  $V_i(\bar{\tau})$  equal to  $Z(\tau'; v_0^i, \alpha^i, k_0, T)$ . Then, at higher values of  $\tau'$  for which  $Z$  declines with  $\tau'$ ,  $\bar{\tau}$  also decreases with  $\tau'$ , and this increases the equilibrium growth rate. The graph of the rate growth for the accountable regime against  $\tau'$ , would just invert this curve.

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