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POLITICAL ENTRY, PUBLIC POLICIES, AND THE ECONOMY

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ABSTRACT

This paper presents a theory of competition for political leadership between incumbent leaders and their challengers in which the possible equilibrium political market structures range from pure monopoly (unchallenged dictatorship) to perfectly competitive (ideal democracy). Leaders are constrained by the threat of "entry" or their ability to tax (or both), so that regimes with no challengers may nonetheless implement policies in the public interest. We offer economic interpretations of why democratic countries are associated with higher wages, why resource abundant countries tend to be nondemocratic, and how technological change affects political development. By focusing on the incentives for political entry, we show how trade sanctions and other policies designed to promote democracy may actually have the unintended consequences of discouraging political competition.

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I. Introduction

Political entry is likely affected by the economic conditions, and has an influence on public policy. Our goal is to specify some of the basic incentives for political entry that would be common across a variety of institutional and economic environments. In doing so, we derive effects of economic development, technical change, and other characteristics of the economy on political entry, as well as effects of political entry on public policy. Not surprisingly, citizens are better off when the political sector is competitive: that is, when their incumbent leaders make policy decisions with a sensitivity to the threat of political challenges. However, we show that political market structure, measured by the number of actual challengers, can be a poor indicator of political competitiveness. Rather, political competitiveness is better measured by the size of political entry barriers.

Political entry barriers are widely discussed in political science, with a large section of comparative political science concerned with measuring them. Observation suggests that there may be no ideal democracy on earth, in the sense that anyone can costlessly enter the competition for public office. At the same time, few (if any) polities are fully monopolized, because even the most oppressive regimes show some sensitivity to popular support, and some concern that a lack of popular support would hurt the regime's survival and effectiveness.[1] However, many formal models in economics and political science do not consider entry barriers, or at most treat them as a fixed parameter.[2] We help fill this gap by building a model of the causes and consequences of a variety of autocracies and democracies, identified with different degrees of entry barriers and hence competitiveness.

With a model of political entry, we are able to offer economic interpretations of how dictators extract more political rent compared with democratic leaders, why democratic countries are associated with higher wages, why resource abundant countries tend to be nondemocratic, and how technological change affects political development. Interestingly, political competitiveness may have little effect on a wide range of economic and social policies, like the mix of taxes, or spending on Social Security. Instead, competitiveness is reflected by policies like military spending, torture, and execution, which more directly serve to protect the incumbent leader's position. By focusing on the incentives for political entry, it is also easy to see how trade sanctions and other policies designed to promote democracy may actually have the unintended consequences of discouraging political competition.

Unlike a typical firm that shares a market with his competitors in an industry, government

[1] According to the POLITY IV (2000) indices of political competitiveness, at least 80% of the world, and 94% of the nonOECD countries, are imperfectly competitive in terms of the selection of political leaders, or in terms of the degree to which alternative views on policy and leadership can be expressed in the political arena. More importantly, the indices exhibit significant variations across countries and over time, suggesting that it is important to treat political competitiveness as an endogenous variable.

[2] Earlier models usually assumed either perfect competition or no competition of any kind. Perfect competition is typically assumed in models in which public policies are determined by universal voting or economic efficiency (Becker, 1958; Stigler, 1972; Wittman, 1989, 1995). The monopoly models of government include Breton (1974), Brennan and Buchanan (1980), and Olson (1993). An exception is Grossman (1991), although the paper focuses on mass insurrections instead of entry from other potential political leaders. An overview of the more recent literature will be provided in section II.

has long been understood as a natural monopoly on force. However, Schumpeter (1942), Becker (1958), and Tullock (1965) explained how government may only be a monopoly in a static sense, and an ideal democracy regularly has perfect competition for the right to run the monopoly until the next election. It is our contention that this logic can be generalized to all regimes, even when regime turnover may be driven by revolutions or insurrections. In this regard, both democratic and nondemocratic government have something in common with a regulated public utility. For example, only one firm at a time can deliver electricity, but the firm doing so may compete with others for the job, perhaps via a license auction, by pleasing a regulator who answers to the voters, etc. We interpret the degree of political (non)competitiveness as the size of entry barriers into the process allocating the rights to temporarily run the government, or the natural monopoly on force.

Such a dynamic political competition also resembles a sequential patent race (Reinganum,1985), in which firms exert R&D effort in innovation competition and a successful firm can enjoy the temporary monopoly power granted by the patent until he is "overthrown" by another more inventive challenger. After a review of previous studies from the related literature, our section III begins with a simple model of imperfect political competition, akin to a patent race.[3] Perhaps one major difference between a dictator and the manager of a public utility is that the former has no higher government to enforce agreements between he and his "customers." Hence, following the modern political economy literature, we assume that leaders lack the ability to commit to their policy platform until they are in power. More importantly, we generalize the existing patent models by endogenizing the size of entry barriers, which is arguably more important in the political sector. As a result, the political market can have various structures ranging from the most repressive leviathan to a perfect democracy. In all regimes, competition creates a fundamental conflict between incumbent leaders and challengers.

Rents are created and limited by entry barriers. Section IV demonstrates the complementarity between rent extraction and entry barrier policies, so that a more repressive regime will extract more rent. Our comparative statics predict that countries with higher wages tend to have a more competitive political sector, measured either by lower entry barriers or rent extraction. Depending on the source of income, however, economic development may or may not encourage political competition. By emphasizing the role of entry barriers, our theory also provides a novel prediction on democratization (i.e. erosion of political entry barriers) based on enforcement technological change.

Section V investigates some consequences of political competitiveness. First, we identify conditions under which all regimes choose the public policies that maximize the welfare of the society, conditional on the citizens' income. Because entry barriers are costly to maintain, leaders from regimes that are threatened by entry care about popular support. Moreover, when actual or even potential political competition is sufficiently intense so that rent extraction is limited purely by

[3] Wittman (1989, 1995) adapted private sector competitive theory to the public sector in order to formulate a theory of (ideal) democratic performance. Our paper pushes Wittman's private-public analogy beyond the purely competitive case. See also Baye and Hoppe (2003) for formal analogies between rent seeking contests and patent-race games.

threat of entry but not technology of taxation, both democracies and nondemocracies will choose the same public policy. Similarly, when leaders are constrained by competition instead of their ability to tax, we show that the actual and nominal incidence of foreign policies directed at "monopolized" political leaders are different, because of their impact on supply conditions.[4]

II. Previous Studies of Entry or Monopoly in the Political Sector and Their Effects on Public Policy

A few previous papers have modeled candidate entry.[5] Some of them (such as Besley and Coate, 1998) have no entry barriers, and find equilibrium rents to be zero. Besley and Coate (1997) predict that uncontested elections are more likely when entry barriers are high. Fedderson, Sened, and Wright (1990) formulate a model with positive entry barriers in order to show that equilibrium candidates are still likely to be centrist even when there are more than two of them. Myerson (1993) and Persson and Tabellini (1999, 2000, Ch. 9) compare two electoral systems, and find that the system with lower entry barriers has more political parties and smaller rents for office-holders. The incumbency advantage has been attributed to the existence of entry barriers, and the well-known Duverger's law, which says the plurality rule election system tends to favor a stable two-party system while a proportional representation system fosters party development, can be interpreted as plurality voting's creating a barrier to entry against new third parties (Myerson, 1999).

The aforementioned models of candidate entry feature a simultaneous game with exogenous political survival: candidates are competing against each other, and not against the incumbent. We model a sequential game in which entry barriers can favor incumbents by limiting competition. The decision to compete depends, of course, on the size of the entry barrier, but also on what the incumbent is doing. Thus, in our model an incumbent can discourage entry by behaving well.[6]

One reason that political institutions affect public policies is that they affect the identity of the pivotal voter.[7] Another reason is that policies depart from the pivotal voter's preferred policies (such as rents going to office-holders), and institutions affect the magnitude and direction of such departures. Our model abstracts from the effects of voting rules and other institutions on the identity of pivotal voters by having a representative voter/citizen.

Several studies have helped explain why politicians might receive rents at taxpayer expense. Some of these (e.g., Polo, 1998) rely on imperfect commitment by electoral candidates to the policies they will implement when elected, in which case office-holders are compensated in order

[4] Related incidence results for the private sector are familiar from the industrial organization and public finance literatures.

[5] Many papers have also looked at practical examples of political entry barriers, including Tullock (1965), Crain (1977), Lott (1986), Gelman and King (1990), Friedman and Wittman (1995), and Wohlgemuth (1999), although not necessarily connecting them to public policy outcomes.

[6] This effect of competition, including potential competition, is well-known in the (private sector) industrial organization literature (e.g. Davis, Murphy, and Topel, 2004; Goolsbee and Syverson, 2006). Grossman and Noh (1990, 1994) apply this idea to the political sector; however, they do not model entry and entry barriers explicitly.

[7] For example, majoritarian (or multiple-district) elections may induce politicians to pay more attention to voters in marginal electoral districts, whereas proportional (or single-district) elections induce parties to seek support from broader coalitions in the population. See Persson, Roland, and Tabellini (2000) and Lizzeri and Persico (2001) for studies of how specific constitutional rules can affect public policy, and Persson and Tabellini (2000, Ch. 8) for a survey of the literature.

to correctly reveal the state of nature and implement appropriate public policies.[8] Others, such as probabilistic voting models (e.g. Persson and Tabellini, 1999), assume that candidates supply something in addition to public policies (such as ideology, personal appearance, etc.). In both types of models, rents are possible because the number of candidates is fixed and finite.[9] Presumably entry barriers are required to so limit the number of candidates, although we are not aware of a formal political model of this type.

The existing literature on equilibrium rents with a fixed number of challengers sometimes finds that public policies coincide with those preferred by the pivotal voter, aside from the excessive taxation required to finance the rents for office-holders.[10] With an endogenous number of challengers, we find that some, but not all, public policies are invariant to the magnitude of political entry barriers and the number of challengers, and thus would be the same in otherwise similar democratic and nondemocratic countries.

Autocracy has been alternatively viewed as (a) the no-entry outcome in a sequential struggles among competing political leaders, as in our model, Tullock (1987), and Grossman and Noh (1990, 1994),[11] or (b) as the elite-as-victor outcome of a struggles between competing citizen groups, as in Acemoglu and Robinson (2000, 2001 and 2006), Bueno de Mesquita et al (2003), and Huang (2007).[12] In particular, the latter approach suggests that democracy indicates a sharing of political power with the poor, and thus political and economic victory for them, whereas the former approach predicts that autocrats will help the poor for the same reasons that democratic leaders do.

In our model, democracies differ from nondemocracies in a continuous fashion: in terms of the relative influence of incumbents and challengers.[13] Several studies have modeled one of the two extremes: democracies as competitive suppliers of public sector goods and services and autocracies that are monopolists of the public sector, extracting the maximum possible revenue from their "customers" (e.g. North, 1981).[14] Olson, McGuire, and Niskanen predict that dictators consume all public funds for themselves (except perhaps for expenditures to enhance the tax base) so that, among other things, dictators do nothing to help the poor.[15] In this regard, they appear to agree with Acemoglu, Robsinson, Bueno de Mesquita et al., that democracies are better for the poor.

[8] Our model does not feature this effect — it has no commitment yet zero rents would still be the outcome (with zero entry barriers) because citizens in our model are not trying to incentivize office-holders.

[9] Polo (1998, Proposition 9) shows how more candidates dissipate political rents in his imperfect commitment model. Persson and Tabellini (2000, p. 73) conjecture that more candidates would dissipate political rents in probabilistic voting models, and that equilibrium rents are implicitly the consequence of entry barriers.

[10] See Persson and Tabellini (2000, p. 72).

[11] See also Gallego and Pitchik (2004) on dictator turnover, and Wintrobe (1990) on how dictators combine loyalty and repression in order to survive.

[12] Political and economic historians have documented that revolutionary challenges to elites come most often from competing elites. In a sample of 89 heads of authoritarian government that held office for at least one year and lost power by irregular means between 1950 and 1990, Svolik (2006) finds that only 6 lost power from because of popular uprising, while the remaining were removed by other political competitors.

[13] Schumpeter (1942), Becker (1958), and Tullock (1965) also classify polities by the degree of competitiveness, albeit informally.

[14] Brennan and Buchanan (1980) have a model in which even democracies are leviathans, except as limited by their constitutions. See Wintrobe (2000, p. 131) for a list of several other studies modeling dictators as monopolists of the public sector.

[15] Olson (1993), Olson and McGuire (1996), and Niskanen (1997).

Wintrobe (2000) also considers autocracies to be monopolists, but comes to a different conclusion. In his view, an interest group or voting block that is powerful under democracy is even more powerful under dictatorship because they can repress their political opponents. If the typical democracy redistributes from rich to poor, then Wintrobe predicts that the typical nondemocracy will redistribute even more from rich to poor.[16]

III. A Model of Sequential Political Competition

We present in this section a model of political leadership as a monopolistically competitive patent race with endogenous entry barriers.

III.A. Three Types of Public Policies and the Tax Constraint

Public policies are of interest to the government leadership because they affect longevity and leadership income. We partition public policies into three types: (1) "social and economic" policies x, (2) "barriers to entry" policies b, and (3) rent extraction r.[17]

Social and economic policies like provision of public goods, social security, the minimum wage, various rates of taxation, etc., are functionally unrelated to the blocking of political challengers. These policies do not affect political competition, except indirectly by enhancing the government's popular support.

Barriers to entry policy instruments, like execution, torture, the degree of censorship, the organization of the military, ballot fees, vote quotas, etc., however, have the primary effect of blocking political competition. Moreover, b is not a money transfer from the challengers to the incumbent and thus is a pure deadweight loss. As with the study of complements and substitutes in consumer and producer theory, the distinction between x and b should be made on first principles, so that theoretical implications for x-b co-movements are testable rather than tautological. Some of these judgements are straightforward, as it seems that censorship and torture have a much different functional relationship with blocking political challengers than does, say the minimum wage rate. Even if these judgements turn out to be difficult, the assumption that there are a lot of important policies in the x vector is enough to generate some interesting results, namely that democracy should not affect public conduct in many dimensions.[18] Although in application it is useful to interpret x and b as vectors of policies, for simplicity we henceforth assume that x and b are each scalars.

Market power permits leaders to influence public policies for their satisfaction or personal profit,

[16] Wintrobe's approach is also unique in that it does not hinge on the assumption that redistribution is necessarily from rich to poor. Thus, Wintrobe's more general result is that dictatorships redistribute in the same direction that democracies do (e.g., from young to old, or from consumers to producers), but in greater magnitude.

[17] In the literature on constitution, policies are partitioned into those that can provide benefits to (1) many citizens, such as broad programs in the form of general public goods, (2) a narrow group of citizens, such as barrel-pork projects, or (3) virtually no citizens, but a specific group of politicians, such as salaries for public officials or various forms of corruption (Persson and Tabellini 2003, p. 14). We do not explicitly distinguish these first two types of policies and we combine them into our policies x. Instead, our model emphasizes two distinctive classes of public policies that facilitate leaders' entry prevention and rent extraction.

[18] Interestingly, Tullock's (1987) book — a book about the measures autocrats take to protect office — is clear that some public policies are more important than others when it comes to blocking political challengers: the death penalty (p. 6, 20, 65, 80), torture (p. 61, 62, 64, 65), press freedom (p. 154), regulation of religion (p. 108), and maintaining an army. A whole range of public policies, like education spending, revenue, pension spending, nonpension "social" spending, the corporate tax rate, and payroll taxation are conspicuously absent from his analysis of entry barriers.

which is legal if the leader is sufficiently convincing as to the public's interest in the policy. In many cases, part of the political rent is spent on entry barrier maintenance. In particular, the flow of the net political rent is $r - \beta b$, where βb is the cost of maintaining political entry barriers in the amount b. We assume that $\beta > 0$ and $b \geq 0$. In other words, we rule out the possibility that the incumbent can subsidize entry.

The social and economic policy x is associated with a per unit cost $p > 0$ of policy implementation, which includes any deadweight cost that reduces national income. Similarly, when x represents provision of a public good that enhances GDP, p can be interpreted as the net cost of production. For simplicity, policy x and rent extraction r are financed through a lump sum tax T.[19] The tax T itself is a policy; however, given p and the government budget equation, choosing x and r is equivalent to choosing x and T. The government budget constraint is:

$$T = r + px \leq \tau y$$

where $\tau \in (0, 1]$ is a parameter that denotes the maximum fraction of income $y > 0$ that is feasibly taxed. τy can therefore be interpreted as the maximum point of the Laffer curve faced by the government. y, τ, and p are exogenous parameters in our model.

III.B. Supply Side Determinants of Political Survival: The Entry Constraint

A large pool of identical citizens are potential challengers to the incumbent's political leadership. An actual challenger spends resources b attempting to assemble a winning coalition. From the challengers' point of view, b is a political entry barrier created by the incumbent regime to discourage their entry; b includes the punishments (actual or potential), censorship, and inconveniences created by the incumbent in order to block challengers.

Each challenger proposes a policy, which both determines the profits he would earn if successful and the amount of popular support he enjoys. We assume that challengers cannot commit to their policy before takeover actually happens:[20]

Assumption 1. (No Policy Commitment) Each challenger lacks the commitment to set policies until he is in power.

The incumbent is, of course, concerned with the number and actions of his challengers. Each challenger is concerned with the number, and actions of, other challengers. More important, each challenger is challenging because he hopes to take over, and himself someday be the incumbent. Hence, he is concerned with the next generation of challengers, whose probabilities of success will be determined by their policies relative to his. In other words, by implementing a popular policy,

[19] For simplicity, we model rent extraction as if it were taken in cash. r is more than corruption, which is sometimes interpreted as illegal cash receipts by political leaders. Some leaders receive their cash legally, as with monarchs with the legal rights to sell monopoly licenses, or dictators who legally pay themselves large salaries or build palaces, summer homes, etc.

[20] An alternative approach would have challengers commit to their policy platform upon entry into the political competition. We pursued this approach in an earlier version of this paper. Interestingly, both approaches have similar steady state qualitative comparative statics. Our no-committment approach is more tractable and perhaps more realistic.

a leader in power lengthens the expected lifetime of his regime.

Regimes are indexed $t = 0, 1, ...$ with 0 denoting the incumbent regime. When variables vary over time, we use subscripts to distinguish one regime's variables from another's. For simplicity, policies are assumed to be constant over time within a regime. For example, b_t denotes the entry barrier protecting regime t.

Let's consider the situation in which the number of parties challenging regime t is c_t. These challengers are indexed $j = 1, 2, ..., c_t$ and have success hazards $h_{1,t}, h_{2,t}, ...$ Challenger j's success hazard $h_{j,t}$ depends on his policies $\{x_{j,t+1}, b_{j,t+1}, r_{j,t+1}\}$ and the incumbent's policies $\{x_t, b_t, r_t\}$, but for the moment our notation suppresses this dependence until we consider the implications of maximizing behavior. Regime t's (flow) payoff to governing is $r_t - \beta b_t$. When the first challenger succeeds, the incumbent stops receiving this flow. If the first challenger succeeds at date R in the incumbent's regime, the incumbent's value of governing (from the perspective of the time he began) is $v_t(R)$:

$$v_t(R) = (r_t - \beta b_t) \int_0^R e^{-is} ds = (r_t - \beta b_t) \frac{1 - e^{-iR}}{i},$$

where $i > 0$ is the usual interest rate.

The probability that regime t lasts exactly R units of time is $c_t h_t e^{-c_t h_t R}$, where h_t is the average success hazard among the challengers and $c_t h_t$ is the aggregate success hazard. In order to calculate the expected value of governing as regime t, we integrate $v_t(R)$, weighting by these probabilities.

$$V_t \equiv \int_0^\infty c_t h_t e^{-c_t h_t R} v_t(R) dR = \frac{r_t - \beta b_t}{i + c_t h_t}. \tag{1}$$

In other words, the leadership has a discount rate that combines the usual interest rate with a hazard rate $c_t h_t$ for ending the regime.

Challenger j's expected profit $\pi_{j,t}$ from challenging regime t depends on four things: (a) the hazard of succeeding $h_{j,t}$, (b) hazard of the incumbent's falling $c_t h_t$ (where h_t denotes the average success hazard among the c_t challengers), (c) aggregate value V_{t+1} of beginning the next regime, and (d) the entry barrier b_t. We model b as a one-time cost for a challenger, which gives him a positive success hazard at each moment in time during which the existing incumbent is still in power.[21]

If and when challenger j overthrows regime t, the challenger obtains expected leadership value V_{t+1}. This expected prize V_{t+1} is discounted by challenger j using the factor $h_{j,t}/(i + c_t h_t)$ because $1/(c_t h_t)$ units of time are expected to elapse before regime t falls and, when regime t does fall, challenger j's probability of success (rather than one of the other challengers) is $h_{j,t}/(c_t h_t)$. At the

[21] We have considered two possible variations on this specification. One of them also has a flow cost of challenging (see Lee and Wilde, 1980) for a private sector patent race model with both stock and flow costs of challenging), which makes the numerator $(h_{j,t} V_{t+1} - b_f)$, where b_f is a flow cost of challenging.

A second variation has the stock entry cost b enabling a challenger to challenge for a finite period. This version has the same qualitative implications as our present model (it modifies only the profit function by changing the functional form by which $r + ch$ enters), so for simplicity we do not present them.

point of making his entry decision, challenger j's expected profits:

$$\pi_{j,t} = \frac{h_{j,t}V_{t+1}}{i + c_t h_t} - b_t.$$

More challengers lower the expected profit from challenging. Let w be the opportunity cost of challenging for any potential challenger. In other words, $w \geq 0$ is the reservation wage of challengers.[22] Challenger j to regime t earns zero expected profits when

$$\frac{h_{j,t}V_{t+1}}{i + c_t h_t} - b_t = w. \tag{2}$$

While b_t is an endogenous entry barrier chosen by the incumbent leader, w can be interpreted as an exogenous entry barrier determined by the condition of the economy. When citizens' productivity is high in the private sector, other things being equal, the incumbent faces a smaller threat of entry because the opportunity cost of challenging is high.

The entry constraint for the incumbent (2) is therefore also a zero profit condition for actual challengers $j = 1...c_t$. If the number of challengers is continuous and potential challengers $j = c_t...\infty$ are atomistic,[23] then equation (2) is also a zero profit condition for potential challengers. The above entry condition will hold in equality in equilibrium as long as there is entry and the number of challengers is endogenously determined. However, our model does not rule out the possibility of zero entry because the opportunity cost of entry is prohibitive. In this corner-solution of zero-challenger equilibrium, we have

$$\frac{h_{j,t}V_{t+1}}{i} - b_t \leq w.$$

III.C. Demand Side Determinants of Political Survival: Popular Support

The incentives for public policy choices are related to the form of the hazard function h. We suppose that a leader's decisions can be influenced by "popular support" even if he is a dictator. We model a leader's popular support S as a function of utility flow of a "representative" citizen:

$$S = u(z, x) \tag{3}$$

where the utility function u represents a policy preferences of the representative citizen, and z denotes his income.[24]

[22] A citizen faces a choice between being a political entrepreneur or working in the private sector. This is similar to Lucas's (1978) model of career choice between an entrepreneur or an employee in a private economy, where the market wage rate measures the opportunity cost of the entrepreneur's time. The general point that political participation has a private sector opportunity cost is also made in Mulligan and Sala-i-Martin's (1999) analysis of social security.

[23] These conditions would hold, for example, if the number of potential challengers were large and the strategy space for challengers and potential challengers were a probability of entry. In this case, c_t would be interpreted as the expected number of challengers, with the actual number to be determined by the random mechanism associated with the mixed strategy (see, e.g. Dixit and Shapiro, 1986). We follow much of the literature on private sector entry and ignore the constraint that c_t must be an integer.

[24] u can be interpreted as an indirect utility function embedding household maximization behavior subject to policy

The public sector changes income of the representative citizen. Taxation reduces, and the social and economic policy x may increase or decrease the income of the representative citizen. The representative citizen's disposable income is

$$z = y - T = y - r - px.$$

Under some conditions, social and economic policies x are efficient in the sense that the citizens' marginal rate of substitution between private spending and public policy is equal to the marginal social cost of that policy, p. Since this outcome is a possibility, it is useful to have some notation that represents efficient outcomes.

Definition 1. (Demand for Social and Economic Policies) Let $x^*(y-r,p) = argmax_x u(y-r-px,x)$ denote citizens' demand for public policies x and let $u^*(y-r,p) = u(y-r-px^*,x^*)$ denote the utility attained when public policies are provided in the amount demanded by the citizens.

To derive the comparative statics, we assume the following.

Assumption 2. (Citizens' Preferences) (a) $\frac{u^*(z,p)}{u^*_z(z,p)}$ is increasing in z, (b) $\frac{u(z,x)}{u_x(z,x)}$ is increasing in x, and (c) z and x are normal goods.

Note that assumption 2(a) is indeed weaker than concavity of the indirect utility function,[25] and assumption (b) is a regularity condition which guarantees the second-order condition is satisfied when the tax constraint is binding.[26] As we will see, assumption 2(c) is assumed so that tax revenue is increasing in rent extraction; many of the comparative statics do not require it.

The identity of the representative citizen can be interpreted in several ways. First, in a homogenous society, citizens are identical and hence any of them represents the true preferences of the society. Second, the representative citizen can be interpreted as a pivotal voter/citizen, such as the median voter, or hypothetical person whose utility function coincides with a weighted social welfare function that aggregates the preferences in a heterogenous society. Political influence in this case may well be distributed unequally across citizens. The probabilistic voting literature provides both positive and normative microfoundations of the existence of the representative citizen as the pivotal voter (Coughlin, 1992). We contend that the same logic applies to all regimes as long as the threat of entry constrains leaders' behavior and hence leaders care about support from citizens, even in the absence of meaningful elections under nondemocracies. To focus on the direct effects of barriers to entry and rent extraction policies and to contrast the existing literature that emphasizes the conflict between leaders and citizens, we abstract from any dependence of the identity of this pivotal voter on political regime, measured by b. i.e. u does not depend on b because there is a stable distribution of political power among citizens across regimes.

Equation (3) is defined in absolute terms. Obviously, support matters as it compares to a challenger's support. We suppose, in particular, that challenger j's hazard $h_{j,t}$ depends on his

parameters as in Persson and Tabellini 2000, p. 20.

[25] Therefore, in terms of u, a sufficient condition is $u_{zz}u_{xx} > u^2_{zx}$.

[26] A sufficient condition is $u_{xx} < 0$.

relative support:

$$h_{j,t} = \frac{sS_{j,t}}{S_t} = \frac{su(z_{j,t+1}, x_{j,t+1})}{u(z_t, x_t)} \tag{4}$$

where s is the baseline success hazard (presumably low) of a challenger who is expected to replicate the incumbent's policies.[27] In other words, s can be interpreted as a measure of incumbency (dis)advantage. Note that in this "Poisson" political contest, the probability for a challenger to overthrow the incumbent regime in any interval $(t, t+\triangle t)$ is therefore $\frac{su(z_{j,t+1},x_{j,t+1})}{u(z_t,x_t)}\triangle t$. Hence, our dynamic model of leadership can be thought of as a continuous sequence of static probabilistic voting games (Hinich, 1977), which can also be represented by a conditional logit model or qualitative response model in general.

III.D. Political Equilibrium and the Fundamental Conflict between Challengers and Incumbent

According to assumption 1, regimes choose public policies only after taking power. Because of this assumption, when an incumbent chooses his policies, he anticipates what his challengers will choose once they takeover. Similarly, citizens may also anticipate the new regime's decisions, but those decision from regime t will be treated as sunk. This means that r_t and x_t have no effect on V_{t+1} because those variables are no longer relevant once the $t+1$ regime takes power. Formally,

Definition 2 (Equilibrium) In any regime $\{y, w, p, \tau, \beta, i, s\}$, an equilibrium is an infinite sequence $\{x_t,\ r_t,\ b_t,\ T_t,\ c_t,\ h_t,\ V_t\}_{t=0}^{\infty}$ of policies, number of challengers, success hazard per challenger, and leadership expected value such that:

$$V_t = \max_{x_t, r_t, b_t, T_t, c_t, h_t} \frac{r_t - \beta b_t}{i + c_t h_t}$$

such that

$$\frac{h_t V_{t+1}}{i + c_t h_t} - b_t - w \leq 0$$

$$h_t = s\frac{u(y - T_{t+1}, x_{t+1})}{u(y - T_t, x_t)}$$

$$T_t = r_t + px_t \leq \tau y,\ c_t \geq 0,\ x_t \geq 0,\ b_t \geq 0,\ r_t \geq 0$$

for all $t \geq 0$, with regime t taking as given the sequence $\{x_s, r_s, b_s, T_s, c_s, h_s, V_s\}$ from regimes $s \geq t+1$.

Note that our definition restricts attention to equilibria that are symmetric in the sense that all challengers to a given regime are identical. Thus, we suppress the j subscript from the per challenger hazard rate h. Equilibrium public policies are value maximizing for the incumbent, who anticipates the effect of his policy choices on the number of challengers through the political entry constraint.[28]

[27] The assumption of relative support simplifies our equilibrium analysis. It is related to binary Luce model (Coughlim 1992, p. 88-92). Moreover, our specification corresponds to the proportional hazards assumption in the duration analysis literature. In the stationary state equilibrium, our main results are robust to this specification.

[28] A couple of equilibrium concepts have been considered in the patent race literature. One of them is a Nash

One important implication of the sequential patent race model comes from the zero profit condition, regardless of whether incumbent and challengers are choosing public policies that maximize their economic value, so it helps to further explore the condition before characterizing the equilibrium. The zero profit condition creates a fundamental conflict between the incumbent and the challengers. In particular, using the envelope theorem,

$$\frac{dV_t}{dV_{t+1}} = -\lambda_\pi \frac{h_t}{i + c_t h_t} < 0$$

because the Lagrange multiplier for the entry constraint λ_π is positive as long as there is a threat of entry. It is interesting to note that the conflict exists even when there is no actual challenger in equilibrium. Because a higher V_{t+1} encourages entry, the incumbent has to either increase the size of entry barriers or reduce rent extraction to keep the number of challengers unchanged — otherwise the his expected tenure would decline with V_{t+1}. The incumbent, therefore, wants this continuation value to be as small as possible.[29] It also implies that the effects of permanent determinants of leadership value of leading are blunted through their impact on challengers. The more challengers are discouraged, the less the present value of leading is harmed; but the less value is harmed, the less challengers are discouraged. The easiest way to see this is perhaps in a stationary equilibrium (i.e. $V_t = V_{t+1} = V$) with a positive number of challengers, we can substitute the zero profit condition into the incumbent's value by eliminating c_t and obtain a square root relationship between the present value of leading and the net income flow from leading:

$$V = \sqrt{\frac{(b+w)(r-\beta b)}{h}}. \tag{5}$$

III.E. The Structure of the Political Market: Leviathan, Contestable Political Market, and Entry Equilibria

We define s_b, s_c, s_x, s_π, and s_τ be the critical values of the parameter s that partition the parameter space according to whether the constraints $b \geq 0$, $c \geq 0$, $x \geq 0$, the entry and the tax constraints bind, respectively. Three or four market structures are possible in our model, with the actual outcome depending on the value of the parameter vector $\{\beta, s, i, w, \tau, p, y\}$. To eliminate some trivial cases, we restrict attention to the subset of the parameter space according to the following assumption.

Assumption 3. (Parameter Restrictions) (a) $u_z^*((1-\tau)y, p) < \infty$, (b) $\beta w < \frac{pu((1-\tau)y,0)}{u_x((1-\tau)y,0)} < \tau y$, (c) $px^*(y,p) < \tau y$.

equilibrium concept in which incumbents choose their policies taking the number of challengers c as given. This might be realistic in some private sector applications, but the government is more commonly modeled as a "leader" that accounts for the effects of its policies on its citizens' behavior. Thus, we treat c as an endogenous variable.

[29] The appendix shows that this fundamental conflict can create a cycle in the number of challengers because, say, even-numbered regimes face little entry threat because their few challengers (aspiring to become an odd-numbered regime) expect to face a large entry threat, in turn because their many challengers (aspiring to become an even-numbered regime) expect to face little entry threat.

Assumption 3(a) says that the marginal indirect utility is bounded when $r = \tau y$ so that it allows for a "leviathan" outcome in which the leadership acts as if it were a pure monopoly: spending nothing in the public interest. Assumption 3(b) bounds leaders' net cost pu/u_x of supplying at least some strictly positive public spending x.[30] Finally, assumption 3(c) simply allows for regimes that are not constrained by the technology of tax collection, so that not all polities are at the top of the Laffer curve. We will provide a more detailed discussion of this constraint in section V.C. In addition to the above parameter restrictions, to simplify our exposition, in what follows, we also focus our attention on the stationary equilibrium.[31]

Figure 1 partitions the parameter space according to the market structures that can result under assumption 3. The number of challengers c is strictly positive above the s_c schedule, which is calculated by inverting the zero profit condition facing regime t's challengers evaluated at $c_t = 0$ and the steady state values $u_{t+1} = u^*(y - r_t, p)$ and $V_{t+1} = \frac{r_t + \beta w}{2\sqrt{s_c \beta}}$, implying $s_c = i^2/\beta$.

The s_c schedule is only a rough indicator of political market performance. First of all, public policies can be quite efficient with $c = 0$ and quite inefficient with $c > 0$. Second, a number of model parameters have a larger effect on b than on c and would therefore would be more readily detected from data on b than from data on c. For example, when $b > 0$, the formula for the equilibrium number of challengers c is:

$$c = \max\left\{0, \sqrt{\frac{\beta}{s}} - \frac{i}{s}\right\}. \tag{6}$$

Only three of the seven parameters can affect the number of challengers (and only then when the number of challengers is positive) because the leadership adjusts to parameter changes by changing entry barriers. For example, the leadership responds to an increase in the opportunity cost of challenging by reducing the entry barrier b so that there is no net reduction in the number of challengers. Similarly, an increase in the amount of GDP y that can be taxed has no net effect on the number of challengers and instead increases the size of political entry barriers. Thus, the facts that entry barriers are endogenous and practically always positive further enhance the case for using b rather than c as and indicator of political competitiveness.

Figure 1's s_x schedule provides an economically more interesting indicator of political market performance. Below this schedule are a variety of "leviathan" outcomes in the sense that the leadership taxes the maximum and spends none of it in the public interest: the constraint $x \geq 0$ binds.[32] The political market results in leviathans when entry barriers are cheap to maintain (β small) or when the incumbency advantage is sufficiently large even when the leadership is not blocking entry (i.e., s small or w large). Note that a reduction in the incumbency advantage

[30] Assuming that it is large relative to the cost of entry barriers β allows for the possibility (but does not require) that entry barriers are sometimes preferable to public spending as a way to enhance political survival. Assuming that it is small relative to maximum possible rents τy allows for the possibility of a "contestable political market" outcome — in which leaders pay attention to public support even they are facing no actual challengers.

[31] The appendix shows quite similar results for non-stationary equilibria.

[32] Even with an Inada condition (with respect to x), an "unthreatened leviathan" region is possible because the leadership may be oblivious to popular support. This is the case considered by the monopoly models of dictatorship by Olson, Wintrobe, and others

can create leadership turnover ($c > 0$) but does not necessarily motivate spending in the public interest. In other words, part of the parameter space has a "sequential leviathan" outcome: all leaders tax the maximum and spend part of their rents erecting entry barriers that extend their political survival, although not indefinitely.

Although leadership turnover is not sufficient to motivate spending in the public interest, for some parameter values it does as shown in Figure 1 as the two regions labeled "competitors supplying public spending." These are the outcomes that would usually be judged to reflect healthy competition for public office, especially those in which endogenous entry barriers b are small and an efficient amount is spent in the public interest. Our model also has a public sector analogue to the "contestable market" hypothesis of Baumol, Panzar, and Willig (1982) and Sutton (1991): a market may have only one producer but nonetheless perform much like a competitive market. As we show below, the most efficient outcomes occur in this part of the parameter space.

IV. Economic Causes of Political Competitiveness

Economic outcomes represented by various parameters in our model — such as military and communication technologies, standards of living, productivity in the private sector, etc. — have changed significantly over time, and thereby provide the basis for a theory of democratization. In this section we give attention to the effects of the parameter w (labor productivity in the private sector), the parameter y (national income), and the parameter β (the marginal cost of maintaining and enforcing entry barriers).

IV.A. Complementarity between Rent Extraction and Entry Barriers

We have seen from the previous section that the political market structure (measured by the number of challengers, and hence regime turnover) in general is a poor indicator of the conduct and efficiency of the public sector. Moreover, under certain parameter restrictions and hence certain political market structures (e.g., unthreatened leviathan), political competition is trivial in the sense that either rent extraction is limited solely by the ability to tax (i.e. $r = \tau y$) or entry barriers are useless (i.e. $b = 0$). For the remaining but still rich set of political market structures, however, the degree of political competitiveness (measured by rent extraction or entry barriers) responds systematically to economic and technological changes. One of the oldest economic doctrines in the industrial organization literature is that entry barriers give rise to market power, and hence higher entry barriers should be associated with higher monopoly rent. The following comparative statics formalize this in our political market setting.

Proposition 1. (Rent Extraction-Entry Barriers Complementarity) Consider any non-leviathan leader who spends a positive amount to deter entry (i.e., $r_t < \tau y$ and $b_t > 0$). Rent extraction and entry barriers are always complements. Moreover, (a) when the tax constraint is non-binding,

$$\frac{dr_t}{dw}, \frac{db_t}{dw}, \frac{dr_t}{d\beta}, \frac{db_t}{d\beta} < 0, \tag{7}$$

and

$$\frac{dr_t}{dy}, \frac{db_t}{dy} > 0; \tag{8}$$

and (b) when the tax constraint is binding, (7) is also true, and (8) is true when $u_z u_x \geq u u_{zx}$.

The above proposition says that when a leader's conduct is constrained by political competition, there is a robust complementary relationship between political rent extraction and entry barriers. Moreover, this result is independent of political market structure and leaders' ability to tax. Therefore, even in a contestable political market in which the incumbent leader faces no actual challengers or in an economy where taxation reaches the top of the Laffer curve, political competitiveness (measured by the size of entry barriers and rent extraction) will still respond in a similar way with respect to economic as well as technological changes.

Suppose the number of challengers is positive. When the tax constraint is non-binding, the incumber's problem becomes

$$V_t = \frac{1}{su(z_{t+1}, x_{t+1})V_{t+1}} \max_{x_t, b_t, r_t} (b_t + w)(r_t - \beta b_t)u(y - r_t - px_t, x_t). \tag{9}$$

Holding b_t and x_t fixed, the optimal rent extraction maximizes the product $(r_t - \beta b_t)u(y - r_t - px_t, x_t)$,which might be interpreted as a social welfare function of net income to leadership and citizen.[33] Less rent extraction is popular and would enhance survival, but the revenue flow while in office would be smaller. The optimal rent extraction is described by the first order condition:

$$r_t - \beta b_t = \frac{u(y - r_t - px_t, x_t)}{u_z(y - r_t - px_t, x_t)} \equiv \frac{u^*(y - r_t, p)}{u_z^*(y - r_t, p)}, \tag{10}$$

because the optimal x_t will be chosen to maximize the welfare of the citizen in this case (see section IV for the details). On the left hand side is the flow of net income to leadership. On the right is a function of the citizens' income $y - r_t$. Thus, formula (10) describes the distribution of net income between citizen and leadership. Note that since u^*/u_z^* is increasing in z by assumption 2(a), the right-hand side of (10) is decreasing in r_t, and hence βb_t and r_t have to move in the same direction with respect to w and β. In other words, citizens share part of the cost of maintaining entry barriers.

Although political entry barriers are an important source of political rents, it is constrained by the cost of maintaining them. The optimal entry barriers satisfies

$$b_t = \frac{r_t}{2\beta} - \frac{w}{2}. \tag{11}$$

Note that since y does not appear in the above equation, b_t and r_t move in the same direction when y changes. The optimal conditions (10) and (11) imply

$$-\beta w = r_t - 2\frac{u^*(y - r_t, p)}{u_z^*(y - r_t, p)}.$$

To show dr_t/dy and db_t/dy are positive, assume on the contrary that they are not. If $dr_t/dy \leq 0$,

[33] Of course, the citizens' weight in this function is not determined by ethical considerations, but rather by the effect of their welfare on the regime's survival via support.

$r_t - 2\frac{u^*(y-r_t,p)}{u_z^*(y-r_t,p)}$ will be decreasing in y, which contradicts the left-hand side that is constant in y. Therefore, we must have dr_t/dy and hence db_t/dy positive. A similar argument shows that $\frac{dr_t}{dw}$, $\frac{db_t}{dw}$, $\frac{dr_t}{d\beta}$ and $\frac{db_t}{d\beta}$ are negative.

IV.B. Democracies Pay Higher Wages, Political Resource Curse, and The Lipset Hypothesis

y is the amount of income available to society (i.e., leaders and citizens combined) and w is private sector productivity. Holding national income y constant, our model implies that b and w are negatively correlated.[34] Holding w and other parameters constant, an increase in y is associated with a higher level of b as long as the initial level of b is positive. Because b refers to policies such as punishments, censorship, and inconveniences created by the incumbent in order to block political competition, it is a natural indicator of the degree of (non)democracy,[35] and our model thereby offers predictions about correlations between democracy and economic outcomes y and w.

Since w is interpreted as the wage in the private sector, the model predicts that, other things being equal, more democratic regimes are associated with higher wages. Rodrik (1999) shows that controlling for income levels and other factors, democracies tend to have higher wages and a higher labor share. This interesting finding has been interpreted as evidence that democratic institutions tend to be more labor-friendly.[36] Our theory offers an alternate interpretation: higher wages in the private sector are a substitute for entry barriers because both discourage challengers, and the entry barriers are costly for the incumbent to maintain.[37]

A recession (economic boom) are related cases, in that private sector productivity w is temporarily low (high) without much change in "permanent income." Thus, our model predicts that political challengers are less likely during temporary economic booms.[38]

An interesting and important case in which y increases but w remains constant is a discovery of natural resource. When the opportunity cost of challenging is held constant, an increase in national

[34] This is indeed true even when $r = \tau y$ in equilibrium.

[35] This notion of political competitiveness is consistent with Schumpeter's (1942) definition of democratic method, which he defines as an "institutional arrangement for arriving at political decisions in which individuals acquire the power to decide by means of a competitive struggle for the people's vote." It is also consistent with the way in which political scientists empirically measure democracy. For instance, the widely used POLITY IV dataset measures democracy in terms of the competitiveness of political participation and executive recruitment.

[36] In particular, Rodrik (1999) conjectures that democracies might be more friendly to labor because (1) democratic regimes are more likely to follow the rule of law, which enhances the bargaining power of labor, (2) democracies are less prone to political instability and discontinuity, which enhances the outside options of employees, (3) democracies may directly enhance the bargaining power of labor by allowing freedom of association and of collective bargaining, and (4) the process of political participation and competition may increase the bargaining power and reservation wage of workers by producing legislation and instutitions that are more partial to workers' interests.

[37] Although an economy with higher wages is more democratic in the sense of lower political entry barriers, as we have seen above, expected regime tenure (or regime turnover) is uncorrelated with wages when b is endogenous. $b_t + w$ increasing in w. To see this, assume on the contrary that it is not. The optimal condition for b then implies $dr_t/dw < -\beta$, which contradicts the optimal condition for r.

[38] For a temporary reduction in w, holding V_{t+1} fixed,

$$c_t = \frac{V_{t+1}}{b_t + w} - \frac{i}{h_t}$$

increases because $b_t + w$ decreases as w decreases, and also h_t increases with a reduction in w since r_t increases and x_t decreases. Acemoglu and Robinson's (2001) model has a similar effect.

income increases the potential benefit of leadership and hence the gain from challenging as well. To deter entry, the incumbent will run a more oppressive regime and increase his rent extraction, to the point that the number of challengers remains unchanged in the stationary equilibrium, according to equation (6).[39] This phenomenon is known as the natural resource curse. Tsui (2007) provides evidence that wealth generated from oil discovery significantly slows down democratic transition.

Economic development is expected to increase both y and w, although whether one increases proportionally more than another is an empirical question. Our prediction that y and w have offsetting effects on b can be compared with the positive cross-country correlation between income and democracy found empirically. This correlation, known as the Lipset hypothesis (Lipset, 1959), is one of the central empirical findings of comparative political science, and has led some political scientists as well as economists to interpret democracy as a normal good. However, this view has been recently challenged by Przeworski and Limongi (1997) and Acemoglu et al. (2006). Moreover, Haggard and Kaufman (1995) and Acemoglu et al. (2006) show that economic crisis makes democracy more likely. These empirical challenges contradict the modernization theory, which asserts a causal link between economic development and democracy. They are, nonetheless, consistent with our theory, which emphasizes the supply side of democracy. We predict that the effect of economic development on democracy depends on the source of the development. We have seen that when income gains are derived from natural resource, the degree of democracy tends to be weakened. In contrast, when economic development is driven by higher productivity in the private sector, economic growth may foster democracy because the negative effect of the increase in the opportunity cost of challenging dominates the positive effect of the increase in national income on entry barriers.[40] Our model says that changes in income and labor productivity alone (represented by proportional permanent increases in y and w), cannot explain the secular trend of democratization (represented as an erosion of political entry barriers along with a less concentrated political market) that occurred in the past two centuries.

IV.C. Enforcement Technological Change

Unlike income and labor productivity, technological changes affecting the military and other political entry barriers have not received much attention among economists as determinants of political transition.[41] The parameter β is the marginal enforcement cost of deterring entry, which may depend on military technology and other technologies available for communication, monitoring and pursuing criminals, etc. Our theory of political entry barriers predicts that entry barriers b and rent extraction r fall with β. In other words, technological progress that reduces β would increase repression and hinder democracy.[42] Since entry barriers and rent extraction are complements, citizens will also suffer more from more rent extraction. Indeed, when β decreases, not only will b

[39] For countries with initial $b = 0$, an increase in y will instead affect the entry margin so that $dc/dy > 0$.

[40] In Mulligan and Tsui (2006), we also explore how citizens' freedom demand affects public policy, where freedom is inversely related to entry barriers. In particular, we show that economic development will foster democracy when the income elasticity of freedom demand exceeds its price elasticity in magnitude.

[41] See, however, Huang (2007) for a recent exception.

[42] George Orwell's famous 1984 raised the possibility that technological progress would favor leadership.

increases, enforcement expenditure βb will also rise, because from the optimal condition of b,

$$\frac{d\beta b_t}{d\beta} = \frac{1}{2}\frac{dr_t}{d\beta} - \frac{w}{2},$$

which is negative. Moreover, according to equation (6), a reduction in β will have a real negative impact on the number of challengers. This result is in contrast to changes in w or y, which affect the size of entry barriers but not the number of challengers.

Emphasizing the incentives of political entry and the cost of entry deterrence, our theory highlights a fundamental difference between democratization due to economic factors versus technological progress, in which only the latter can simultaneously lead to a decline in entry barriers and an increase in regime turnover. While being ignored by economists, the role of military technology in political change has been discussed by political scientists and historians. Finer (1997) argues that the nature of military technology affects the distribution of military power within a society and hence the form of government. For example, historically, a disarmed population and a permanent professionalized force opened a way for an absolutist regime in the Roman, the Byzantine, and the Chinese empires. Our rent extraction-entry barriers complementarity is also consistent with his notion of extraction-coercion cycle, which says a dictator can use a military force to extract taxes, builds up that force, and with it extracts more taxes. Downing (1992) also argues that the shift from small, decentralized knight service to large standing armies since the late medieval period in Europe explains the destruction of constitutional government and the rise of military-centered autocracies.

Communication technologies are often thought to favor challengers to the government.[43] The proliferation of the internet may help challengers to the government to coordinate with each other, because they no longer have to rely on physical meetings or distribution of hard-copies of their communications. By raising β, the internet should foster democracy, but not as much as it would if government policy were held constant, because government increases their enforcement expenditures in response to the technological change. Examples include attempts by government to censor the internet or limit its distribution within their borders. Therefore, prior to the 20th century, β may have increased as military technologies improved. Probably more important in modern times is the advancement of communications technologies that have the effect of increasing β. Our theory, which predicts that democracy should decline over time as military technologies developed, and increase over time as communication technologies improved, is consistent with the secular trends of political entry barriers and expected regime length. Moreover, it explains why the cross-section and time series relationships between democracy and development can be different: oil countries are more repressive because of pure economic reasons, whereas less developed countries reach democracy at lower living standards than the developed countries did by importing modern communication technologies from developed countries.

V. Policy Consequences of Political Competitiveness

[43] In the famous moon cakes in China, rebels coordinated efforts by baking messages inside cakes.

When the size of entry barriers is interpreted as the degree of political (non)competitiveness, the previous section suggests that political regime matters, and in particular political competitiveness is negatively associated with the extent of rent extraction, although they are indeed jointly determined in equilibrium. Moreover, we have seen that this relationship does not depend on the tax constraint. Empirically, we therefore expect correlations between the degree of democracy and public policies that block political competition or extract rent. In this section, we consider some other consequences of political competitiveness.

V.A. Does Political Competitiveness Affect Social and Economic Policies?

Social and economic policies x, like social security, the minimum wage, labor regulation, etc., are functionally unrelated to the blocking of political challengers or rent extraction. These policies affect government's popular support and thereby its survival as modeled by equation (4). Hence all regimes will choose the same x, conditional on the income $y-r$ that remains for citizens' public and private purposes unless spending on x restricts political rents via the tax constraint:

Proposition 2. (Conditional Invariance) Consider any political market structure. (a) When the tax constraint is non-binding (i.e. $r_t + px_t < \tau y$), the equilibrium social and economic policies coincide with the citizens' demand (i.e. $x_t = x^*$). In particular, conditioning on $y - r_t$ and p,

$$\frac{\partial x_t}{\partial w} = \frac{\partial x_t}{\partial \beta} = \frac{\partial x_t}{\partial s} = \frac{\partial x_t}{\partial i} = \frac{\partial x_t}{\partial \tau} = 0.$$

(b) When the tax constraint is binding (i.e. $r_t + px_t = \tau y$), $x_t \neq x^*$, and x_t becomes a non-trivial function of the regime characteristics. In particular, x will be underprovided.

Regime characteristics affect policies related to the blocking of political challengers and the amount of political rent, but they do not affect the choice of social and economic policies unless the tax constraint is binding. The taughtness of the tax constraint provides a necessary and sufficient condition for the invariance result. In particular, among regimes for which the taxation constraint is non-binding, the equilibrium social and economic policies lie on citizens' desired demand function, and they will all choose the same policies as a function of citizens' income and "prices" of the policies. In other words, it is the tax constraint, rather than the lack of political competitiveness per se, which gives rise to government failure.

To prove part (a) of the proposition, we rewrite the incumbent's optimization as a Lagrangian:

$$V_t = \max_{x_t, b_t, r_t} \frac{r_t - \beta b_t}{i + c_t h_t} + \lambda_\pi (b_t + w - \frac{h_t V_{t+1}}{i + c_t h_t}) + \lambda_\tau (\tau y - r_t - p x_t)$$

where $h_t = \frac{su(y - r_{t+1} - px_{t+1}, x_{t+1})}{u(y - r_t - px_t, x_t)}$, $c_t \geq 0$, $b_t \geq 0$, and $\lambda_\pi \geq 0$ and $\lambda_\tau \geq 0$ are the Lagrangian multipliers for the entry and tax constraints respectively. The policy instrument x_t enters in two ways: as part of the tax constraint and through the challenger hazard h_t. If the tax constraint were not binding, it is simply a question of minimizing the challenger hazard, which is equivalent to maximizing popular support $u(y - r_t - x_t, x_t)$.[44] When the tax constraint is binding, $\lambda_\tau > 0$,

[44] A similar argument appears in Persson and Tabellini's (2000, p. 72) model of politicians' rents under democracy.

so that the optimal x_t trades off popular support with relaxation of the tax constraint. In other words, conditional on the same distribution of income, x_t will be more expensive to a leader facing a binding tax constraint, who therefore under-provides x_t.

V.B. Does Punishing Dictators Benefit Citizens?

We have built an economic model of regime turnover. One use of such a model is to help predict the effects of foreign policies intended to encourage "regime change" on the countries targeted. Here we consider two such foreign policies: reductions in net income of the leadership of the (targeted) country and the repudiation of odious debts. The effects of these policies are very different if leaders maximize tax revenue rather than, as in our model, trade off revenue and survival. Punishing dictatorial regimes can indeed discourage regime change and have adverse consequences for welfare of citizens, if the punishment is not designed with attention to political competitiveness and entry into the market for political leadership.

Suppose a country were to suffer a perpetual loss L from its net government revenue $r - \beta b$, perhaps because it is subject to economic sanctions, has to spend on the military in order to deter invasion (as the USSR did), etc. If the government had already been extracting the maximum possible revenue from its citizens, then there is nothing it could do to shift the burden of L to its citizens. However, only leviathans behave this way. Other leaders in our model — even those facing no challengers — do not extract the maximum possible revenue from their citizens in order to enhance regime survival. Consider the case when the number of challengers is positive.[45] Leaders and citizens share the economy's resources with the citizens according to the income distribution condition. When the tax constraint is non-binding, the equilibrium conditions become

$$r_t - \beta b_t - L = \frac{u^*(y - r_t, p)}{u_z^*(y - r_t, p)} \text{ and } \beta b_t = \frac{r_t}{2} - \frac{\beta w}{2} - \frac{L}{2}.$$

As described above, this conditions shows how the equilibrium reflects a tradeoff between leadership and citizen cash flows. Hence, both citizens and leadership suffer lost income flows as a consequence of the punishment L.

Due to the reduction in leadership income, the marginal benefit of entry barriers will also be lower. In equilibrium, $r_t - L$ decreasing in L implies $db_t/dL < 0$ from the optimal condition of b_t. However, it does not follow that punishing dictators helps regime change. To the extent that challengers expect to suffer the same loss L if they were to lead the government, the cost of L to the incumbent is further mitigated. The steady state formulae for V and c imply that the number of challengers is independent of L, because the leadership value is decreasing in L.

Punishing dictators also reduces x_t (i.e. $dx_t/dL < 0$) when x_t is a normal good. However, the tax revenue $r_t + px_t$ is increasing in L, since r_t increases at a faster rate. If τ is not high enough, the punishment L can induce the government to raise the tax rate to the maximum possible so that the tax constraint binds and the provision of x becomes inefficient, according to Proposition 2. Thus, if L were intended to help citizens by hastening the demise of the regime, it serves neither

[45] For other political market structures, see the appendix.

purpose: citizens' net incomes are lower, the expected regime tenure remains unchanged, and the provision of social and economic policy may become inefficient.[46]

Punishments are more effective, in terms of enhancing freedom and raising citizen utility, when conditioned on entry barriers.[47] For example, if L were known by the leadership to be proportional to b, the effects of the punishment are isomorphic to the effects of increasing the parameter β. According to Proposition 1, a higher β is associated with a lower rent extraction and a lower level of entry barriers. Citizens therefore enjoy higher income than they would under an unconditional punishment. Moreover, in the steady state equilibrium, such a policy can also encourage regime change because the number of challengers will also increase with β.

Some of these unintended consequences occur because challengers anticipate a lesser value from leading. It follows that punishing a dictator hastens his demise if it is known that his successor will not be punished, regardless of his policies. Perhaps this helps explain why Germany's unpopular Weimar republic (unpopular for reasons including the Versailles Treaty and the Great Depression) made fertile political ground for Hitler's regime. However, this approach still reduces citizens' income and, as the German example shows, gives no incentive for the successor regime to be less oppressive. Lessons like these are familiar in industrial organization, where supply conditions are given a lot of attention and it is widely recognized that, say, a tax on producers may hurt competitiveness and consumers more than it hurts producers.

Odious debt — sovereign borrowing for the benefit of the dictator and not the people — may offer another example. It has been proposed (mostly recently by Jayachandran and Kremer, 2006) that odious debts be repudiated as a way of hurting dictators and helping their citizens. Studying all aspects of odious debt repudiation — for example, how to detect odious debt, and to ensure that all countries can obtain legitimate economic development loans, etc. — is beyond the scope of this paper, but an economic analysis of odious debt might benefit from attention to the incentives for political entry. Suppose, for the sake of argument, that odious debt were known to be accurately identified and repudiated, so that a market for it would not exist and it would never be issued. In the context of our model, this means that the dictator cannot borrow to smooth his cash flows.[48] Hence i becomes the dictator's intertemporal marginal rate of substitution, rather than the world interest rate, and we presume the former is larger (otherwise he would have no desire to borrow). In short, the odious debt market collapse can be modeled as an increase in i.

Higher i has no impact on r, b, and x. A regime's expected tenure increases with i because

[46] Similarly, when the tax constraint is binding, the optimal conditions imply

$$-\beta w + L = \tau y - x_t - 2\frac{pu((1-\tau)y, x_t)}{u_x((1-\tau)y, x_t)},$$

and hence x_t is always decreasing in L. The government budget constraint and the optimal condition of b_t then imply that r_t is increasing in L and b_t is decreasing in L. Therefore, even in this case when the citizen's after-tax income remains unchanged, facing a fixed tax budget, the incumbent leader will reduce the provision of x_t to increase r_t.

[47] Wintrobe (2006, p. 70-1) recommends that foreign policy be conditioned on "repression" or "human rights."

[48] Legitimate economic development loans are part of the x vector. One Ricardian possibility (see Barro, 1974) is that the dictator can borrow from his citizens by tilting the time profile for r, and then his citizens could borrow from abroad. In this case, which we rule out for the sake of argument, odious debt repudiation has no effect on the welfare of dictator or citizen.

the number of challengers decreases.[49] Thus, if odious debt repudiation affects incumbent and challengers equally, it has the unintended effect of lengthening the incumbent's tenure, while having no impact on entry barriers or citizen's income. Intuitively, the incumbent's benefits from b are in the more distant future than are the benefits from r because b serves to lengthen the regime. If odious debt repudiation affected only the incumbent's discount rate, then the incumbent would extract more rent because the higher discount rate makes him less future-oriented.

Proposition 3. (Unintended Consequences of Punishing Dictators) When any non-leviathan leaders are punished by (a) reducing their political rent by L,

$$\frac{dr_t}{dL} \in (0,1] \text{ and } \frac{dx_t}{dL} < 0.$$

Although, $db_t/dL < 0$, $dc_t/dL = 0$, as long as the same punishment is anticipated by future leaders, or (b) increasing their interest rate i,

$$\frac{dr_t}{di} = \frac{db_t}{di} = \frac{dx_t}{di} = 0, \text{ but } \frac{dc_t}{di} < 0;$$

or,

$$\frac{dr_t}{di} > 0, \ \frac{db_t}{di}, \frac{dx_t}{di} < 0, \text{ and } \frac{dc_t}{di} = 0,$$

depending on whether challengers are positive, or the political market is contestable, respectively.

V.C. Are Leaders' Conduct Constrained by Political Competition or their Ability to Tax?

A fundamental question is whether rents obtained by such regimes are limited by the threat of challengers or whether they are limited by the taxation constraint ($T \leq \tau y$), because the answer determines how the regimes' policies will react to economic development, foreign policies that punish dictators, and other changes in their environment. Figure 2 shows how the answer is related to market structure. The s_τ schedule partitions the parameter space according to whether the tax constraint binds: it binds below and does not bind above.

The distinction between the taxation constraint and the zero profit condition can be further analyzed using the comparative statics for the incumbency advantage parameter s, because it enters the model only through the zero profit condition. This parameter tightens the entry constraint facing the challenger — because challengers are willing to hurdle higher entry barriers when their success hazard is higher — with no direct effect on the polity's tax base. The conceivable range for s is $(0, \infty)$, and can be partitioned at four critical s values s_π, s_τ, s_c, and either s_x or s_b depend on the magnitude of β. For $s < s_\pi$, the tax constraint binds so tightly that $x = 0$ and $r = \tau y$. The other critical values indicate the largest value of s for which the various non-negativity constraints bind.[50]

[49] Even though the value of leadership involves future cash flows, incumbent present value (conditional on the value expected by successors) does not depend on the discount rate i because i has an exactly offsetting effect on the forward-looking challengers.

[50] s_π is the largest value of s that is consistent with a slack entry constraint. When s the entry constraint is slack,

In the leviathan regions, only the technology of tax collection constrains leadership rents, which is why the leadership spends none of its revenue in the public interest. In the parts of the contestable market and competitor regions nearest the leviathan regions (below the s_τ schedule), both entry and the tax technology constrain leadership rents. Spending in the public interest comes at the expense of leadership rents, so leaders spend something in the public interest in order to limit entry, but less than the efficient amount.

In parts of the contestable market and competitor regions above the s_τ schedule, only entry constrains leadership rents. The leaders perceive no tradeoff between rents and public spending, so public spending occurs in the efficient amount. In fact, the contestable market region above the s_b and s_τ schedules has maximum efficiency because: (i) public spending occurs in the efficient amount ($x = x^*$), (ii) no rents are dissipated by entry barrier maintenance ($b = 0$), and (iii) no resources are spent challenging the incumbent ($(b + w)c = 0$).

As shown in Figure 2, s_π is the smallest of the four critical s values. For the purpose of illustration, Figure 3 shows the s comparative static for a value of β that is large enough to encourage public spending for some s, but not so large that entry barriers b are always zero. In the region of Figure 3 with $s \in (s_\pi, s_\tau)$, spending in the public interest px is positive and $r < \tau y$. In this region, rent extraction is limited both by competition (or potential of competition) and the tax constraint. Competition is relevant because it motivates spending in the public interest px, which, due to the binding tax constraint, reduces the revenue available for rent extraction.

The tax constraint does not bind for $s > s_\tau$; rent extraction is limited only by competition, or the potential for it. In this region, public spending is efficient. Maximum efficiency is achieved for the smallest s in this region because, in addition to public spending in the efficient amount, no resources are spent challenging or blocking challengers. For $s > s_b$, leaders dissipate some of their rents by blocking, or attempting to block, challengers.

Figure 3 is a horizontal slice of Figure 2 at a relatively large value of β. A number of the comparative statics are similar along horizontal slices at for smaller values of β: more s causes a monotone reduction in r, monotone increases in x and b, and a hill-shaped response of the number of challengers c. However, as suggested by Figures 1 and 2, there are also leviathan regions in which b and/or c are positive while $x = 0$ and $c > 0$ regions with a binding tax constraint.[51]

V.D. The Democracy Effect is at Most Small

Suppose for the moment that a "democracy" is a polity with small values of r. Under this interpretation, part (a) of Proposition 2 allows for an effect of democracy on public policies x

regimes have no reason to spend on x or b because the only purpose of such spending is to discourage entry. In this case $V = \tau y/i$ and the expected profit of a challenger is

$$s\frac{\tau y}{i^2} - w$$

which would not negative as long as $s < s_\pi = \frac{wi^2}{\tau y}$.

[51] Another way is to look at the comparative statics of the tax revenue T when the tax constraint is non-binding. Since z is a normal good, one can show that T is decreasing in β, and hence the tax constraint tends to be non-binding when β is large. Similarly, one can show that T is also decreasing in w, and hence the tax constraint is also less likely to be binding when w is high.

only through an income effect. This income effect is likely small compared to the effects of other economic and demographic variables determining public policies. First of all, some public policies may not depend on income per se because they do not reduce citizens' disposable income $y-r-px$ (i.e., $p=0$ for some public policies).[52] Even for public policies that must be funded by reductions in citizens' disposable incomes, the income elasticity of citizens' demand for them may be small.[53] Finally, even if demand for a public policy were income elastic, the effect of democracy on r may not be large enough to have a significant proportional effect on $y-r$.[54] Table 1 further illustrates this point. Each column corresponds to a different income elasticity of the demand for public spending. Each row corresponds to a different assumed impact of democracy of the rent extraction r, measured as a share of GDP y. The entries in the top panel display the percentage point impact of democracy, through the income effect, on public spending. The entries in the bottom panel display the percentage point impact of democracy on the tax rate T/y, assuming that democratic governments spend 25 percent of GDP.

As shown in the Table's first column (top panel), democracy would have no impact on public spending if that spending were income inelastic. The impact on the tax rate (bottom panel) is therefore equal to the impact on the political rent share of GDP. The middle column of the table shows the unit elastic case, which implies that, holding the price p of $x$constant, public expenditure's share of GDP is invariant to GDP. In this case, the impact of democracy on public spending ranges from 1% to 10% for the range of markup impacts shown (more on this range below). The impact on the tax rate (bottom panel) is smaller in magnitude than the impact on the political rent share by a factor equal to one minus the fraction of GDP spent by democratic governments. Certainly there are some categories of public activity that are luxury goods, but it has even been suggested that the average public activity is a luxury good because total public spending increases more than GDP over time and across countries.[55] When the income elasticity is 1.2 rather than 1.0, the impact on public spending is slightly larger and the impact on the tax rate somewhat smaller in magnitude.[56]

[52] More precisely, when $p=0$ and $u(z,x)=f(z)g(x)$, $x=\arg\max g(x)$. Alternatively, when x is pure economic policy that enhances GDP and citizens have no preferences for it directly (i.e. $u_x \equiv 0$), there again will be no income effect and x will be chosen simply to maximize GDP, regardless of the degree of democracy.

[53] When citizens have quasilinear preferences, the most widely-used utility specification in the political economy literature (see for example, Persson and Tabillini 2000), the income effect is zero and hence all regimes will choose the same policy.

[54] Dougan and Snyder (1993), however, argue that tariff politics may be an exception, because for some nondemocratic developing countries tariff revenue constitutes a significant fraction of government income and hence leadership rent.

[55] Although Baumol (1967) explains this empirical finding without a large income elasticity.

[56] An income elasticity of 1.2 fits the cross-country data pretty well and, because the impact formula is proportional to the income elasticity, implies proportionally larger percentage impacts on public spending. Mulligan, Gil and Sala-i-Martin (2004) regress total government revenue as a percentage of GDP 1973-90 on log real 1960-89 average GDP per capita and find a positive coefficient of 5.2 (see their Table 2), holding some other country charactersitics. At the sample mean taxation percentage of 25.8, the 5.2 coefficient implies an elasticity of 1.2. Persson, Roland, and Tabellini (2000, Table 1) report a coefficient closer to zero (and therefore an income elasticity closer to 1.0), based on a sample of democracies for the years circa 1990. Note that an income elasticity of 1.2 implies that a program that was 0.5% of GDP in a poor country would be 10% of GDP in a rich country, assuming that the rich and poor country had per capita GDP that differed by a factor of 20 and that the other determinants of x demand were held constant.

The magnitude of the impact of democracy on the rent extraction is also important, although less studied. Mulligan, Gil and Sala-i-Martin (2004) find that the most oppressive regimes only collect slightly more tax revenue (3% of GDP) than the most democratic regimes (controlling for development and demographics), which suggests that the middle rows of the table's to and bottom panels may be the more relevant ones. (note that the tax rate entries in middle rows of the bottom range from -5.0 to -2.1). Even if the impact of democracy on the political rent were much larger — as large as 10% of GDP — the bottom row of the Table's top panel shows that democracy's impact on spending in the public interest is still small compared to some of the impacts that have been suggested by previous studies.

A number of empirical studies in sociology, economics, and political science have found little impact of democracy on public policies that probably do not serve as political entry barriers. For example, Cutright (1965), Jackman (1975), and Pampel and Williamson (1989) observed an obvious raw correlation between democracy and the introduction of pension and welfare programs, but pointed out that economic development likely drives social programs, and is correlated with democracy. Mulligan, Gil, and Sala-i-Martin's (2004) cross-country study for the years 1960-90 finds no significant partial correlation between democracy and the amount of welfare spending, education spending, the corporate income tax rate, and whether the payroll tax is capped.[57] Empirical work in this area is ongoing; our purpose is to point out how empirical estimates of the democracy's policy impacts help gauge the relative importance of entry barriers versus shifts in political influence as defining characteristics of democracies

VI. Conclusions

Our paper adapts and extends models of private sector patent races to analyze the economic causes and policy consequences of political entry. An incumbent leader faces a tradeoff between the magnitude of its flow of rents and his regime's survival prospects. Regime survival depends on the number of challengers and on the policies to be implemented if and when a challenger is ultimately successful. The number of challengers depends on the probability of a successful challenge, the present value of rents to be obtained by a successful challenger, the amount of political entry barriers, and the private sector opportunity costs of political activity. As noted by Sutton (1991) in the context of private sector entry, these basic incentives are expected to be present under a variety of institutional arrangements, so that the resulting qualitative comparative statics likely transcend institutional detail.

One of our results is that competitiveness can be measured in several ways. In our model, the size b/w of the entry barrier relative to challenger opportunity cost is one measure. Alternatively, the hazard ch of the incumbent's losing his job to a challenger is sometimes taken as an indicator of political competitiveness, for example, when a country is considered "undemocratic" because the

[57] See also Easterly and Rebelo (1993, p. 436), Lindert (1994), and Mulligan, Gil, and Sala-i-Martin (2002), who found no cross-country relationship between democracy and a number of government tax and expenditure items. Mulligan, Gil, and Sala-i-Martin (2004) do find that democracies are different in terms of torture, execution, and military policies, but our Proposition 2 does not apply because these policies are closely linked with barriers to political entry. For an opposite view, however, see Besley, Persson, and Sturm (2007) and Deacon (2005).

incumbent executive seems to have too much electoral success relative to challengers. However, as with the private sector, measuring competitiveness by ch can be misleading because even an incumbent without challengers may limit his behavior in order to remain that way. Commentators in the industrial organization literature questioned the Justice Department's pursuit of private sector anti-trust cases based on industry concentration.[58] Perhaps the same logic applies to the public sector: our model suggests that regimes with few challengers may nonetheless be quite democratic in the sense that entry barriers and markup rates are low. Furthermore, the possibility of endogenous political entry barriers blunts the effects of competitiveness on the number of challengers. Perhaps constitutions or other political institutions designed to "police" the amount of political competitiveness better serve the public by monitoring entry barriers and markups than monitoring the number of competitors. In this view, it is appropriate that some of the measures of democracy developed by political scientists are based on entry barriers rather than the number of competitors.

The "markup" or rent r is commonly used to measure noncompetitiveness in private sector studies, and it would be interesting to examine such measures for the public sector. However, in the public sector application, r itself needs not create efficiency costs, whereas public sector entry barriers have the dual marginal costs of maintenance βb and challenger expenditure cb. In contrast, potential private sector entry barriers such as advertising, research and development, and vertical restrictions (e.g., exclusive dealing) are often said to help enhance efficiency. Thus, the main social costs of noncompetitiveness are fundamentally different in the private and public sectors.

Measuring competitiveness in one or more of these ways is important because democracies and nondemocracies have some obvious policy differences including torture, execution, and censorship. Furthermore, history has plenty of examples of nondemocracies' pursuing reprehensible policies, but this does not mean that democracies and nondemocracies always, or even usually, have many different public policies. The monopolistic competition model suggests that the "product mix and design" — such as the composition of taxes, spending, and economic regulations — are functions of economics and demographics, but not regime.[59] Although we do not deny that a dictator prefers more money to less, the fact that his taking is limited by the threat of entry means that he has an important reason to spend much of the tax revenue in the public interest: it buys him popular support and thereby regime longevity. Nondemocracies may collect more revenue, but they are not leviathans.

If we are right that dictators are not leviathans, foreign policies designed to punish them may have the unintended consequences of postponing regime change and lowering citizens' incomes. The fact that the value of governing is limited by competition, and not the technology of tax collection, means that dictators are not 100% marginal claimants on government revenues and pass on their punishments, at least in part, to citizens and competitors. Punishing dictators conditional on competitiveness can be more effective in terms of enhancing freedom, and to focus more of the ultimate incidence of the punishment on the leadership rather than the citizens. Future research

[58] See Demsetz (1973), Baumol, Panzar, and Willig (1982), Sutton (1991), and Baldwin and Gorecki (1994).

[59] This result therefore also sheds light on the debate on the political origin of Industrial Revolution (North and Weingast, 1989; Clark 1996, 2007).

can use a model like ours to compare and evaluate dictator punishments that are conditioned on b or c or r or some other measure of political competitiveness.

Our model of dynamic political competition also has implications for recent political events in oil countries in the wake of the large (and, potentially, largely permanent) oil price increases of 2004-2006. These oil price increases should increase the net incomes of both citizens and leaders in oil countries which, by itself, encourages challengers. However, many oil countries had already been among the less democratic countries in the world, and our model predicts further increases in political entry barriers (and further losses of freedom) as a consequence of the increase in the value of leading relative to the opportunity cost of challenging. For example, the government of Iran has been increasingly restricting its citizens' internet access,[60] and Venezuela's government's censorship has increased its international visibility. One exception may be Iraq where the value of leading may someday be quite high due to the country's oil assets, but the United States and its allies are attempting to limit – with elections, press freedoms, etc. — political entry barriers. Thus, regime challengers are twice encouraged in Iraq — once by the expected future value of leadership and a second time by current-day political freedoms. Perhaps attempts to grab power in Iraq would have been less intense if the country's oil assets had not gained so much value since 2003, or entry into the Iraqi political process were as difficult as in neighboring nondemocratic countries.

[60] http://www.opennetinitiative.net/studies/iran/

VII. Appendix

Proof of equilibrium and comparative statics

We derive equilibrium comparative statics under various political market structures.

(a) *Unthreatened Leviathan*: The optimization problem in this case is:

$$\max_{x,t r_t, b_t} \frac{r_t - \beta b_t - L}{i}$$

subject to the non-negativity constraints and

$$r_t + p x_t \leq \tau y.$$

In this case, $r_t = \tau y$, $b_t = x_t = c_t = 0$, and hence $V = (\tau y - L)/i$. Therefore, the tax constraint is binding, and small changes in w or β will have no effect on any policy. The only effect of an increase in y is to increase r. Because the entry constraint is non-binding (i.e. $\frac{h_t V_{t+1}}{i} - b_t - w < 0$), in a stationary equilibrium, this requires $s < i^2 w/(\tau y - L) \equiv s_\pi$.

(b) *Threatened Leviathan*: This is the same as the unthreatened leviathan except that the entry constraint is binding and $b > 0$. In a stationary equilibrium, the size of entry barriers is determined by

$$V = \frac{\tau y - \beta b - L}{i} \text{ and } \frac{sV}{i} - b - w = 0,$$

which implies

$$b = \frac{s\tau y - w i^2 - sL}{i^2 + \beta s} \text{ and } V = \frac{i(\tau y + w\beta - L)}{i^2 + \beta s}.$$

While $r = \tau y$, which is increasing in y, b is increasing in y and s, but decreasing in w, β, i and L.

Note that to guarantee $x = 0$, we require that the net marginal benefit to the incumbent of x be non-positive, which means that

$$p \geq \frac{s\beta V}{i} \frac{u_x((1-\tau)y, 0)}{u((1-\tau)y, 0)} = \frac{\beta s(\tau y + \beta w - L)}{i^2 + \beta s} \frac{u_x((1-\tau)y, 0)}{u((1-\tau)y, 0)},$$

where the equality is satisfied when $s = s_x$.

(c) *Actual Challengers with Non-Binding Tax Constraint*: Since $c > 0$, we can substitute the entry constraint into the objective function:

$$V_t = \max_{x_t, b_t, r_t} \frac{(b_t + w)(r_t - \beta b_t - L)u(y - r_t - p x_t, x_t)}{s u(y - r_{t+1} - p x_{t+1}, x_{t+1}) V_{t+1}}$$

When $b = 0$, the first-order conditions are:

$$r_t - \beta w - L < 0 \text{ and } r_t - L = \frac{u(y - r_t - p x_t, x_t)}{u_z(y - r_t - p x_t, x_t)}$$

where $x_t = \arg\max u(y - r_r - p x_t, x_t)$. First, notice that since the equillibrium policies do not depend on s, the condition for $b = 0$ can be written as $\beta > \frac{r - L}{w}$, where r is is the solution to the

second equilibrium condition, which is free of s. Because $b > 0$ was considered in the text, here we assume that this condition holds.

Assumption 2(a) also implies that $dr_t/dy > 0$ and $dr_t/dL > 0$. Moreover, since r_t is increasing in L, we must also have $dr_t/dL < 1$. Note also since w and β only appear in the inequality constraint, small changes in w or β will not affect the equilibrium. Moreover, in a stationary equilibrium, the number of challengers is

$$c = \frac{V}{w} - \frac{i}{s} = \sqrt{\frac{(r-L)}{sw}} - \frac{i}{s}$$

where

$$V = \sqrt{\frac{w(r-L)}{s}}$$

Since, r is increasing in y, c is also increasing in y. Moreover, c is decreasing in w, i and L, but independent of β. Punishing leaders in this case will reduce regime turnover, because b is fixed. Finally, since $c > 0$ in this case, we need to have $s > \frac{i^2 w}{r-L} \equiv s_c$, where r is derived from the above equilibrium conditions. Note that s_c is independent of β when $b = 0$.

(d) *Actual Challengers with Binding Tax Constraint*: When the tax constraint is binding (i.e. $r_t + px_t = \tau y$) with positive equilibrium x, citizens are consuming a fixed after-taxed income $(1-\tau)y$ and leaders are facing a fixed government budget constraint τy. Therefore, from the leaders' perspective, there is a direct tradeoff between rent extraction and public spending, and hence assumption 2(a) is neither necessary or sufficient for our comparative statics. The optimal conditions imply

$$-\beta w = \tau y - x_t - 2\frac{pu((1-\tau)y, x_t)}{u_x((1-\tau)y, x_t)}.$$

Since the right-hand side is decreasing in x_t according to assumption 2(b), x_t is increasing in β and w, and hence r_t is decreasing in β and w. From the optimal condition of r_t, it follows that b_t is also decreasing in β and w.

Finally, differentiating the equilibrium conditions with respect to y, we can show

$$\frac{dr_t}{dy} = 2\frac{pu_x\tau + (1-\tau)\,p^2u_z - (r_t - \beta b_t)\,[(1-\tau)pu_{zx} + \tau u_{xx}]}{3u_x p - 2u_{xx}\,(r_t - \beta b_t)}.$$

However, $pu_x\tau + (1-\tau)\,p^2u_z - (r_t - \beta b_t)\,[(1-\tau)pu_{zx} + \tau u_{xx}] > (1-\tau)\,p^2u_z - (r_t - \beta b_t)\,(1-\tau)pu_{zx} = (1-\tau)\,p^2u_z - (1-\tau)\frac{pu}{u_x}pu_{zx} \geq 0$ when $u_z u_x \geq u u_{zx}$. We therefore show that dr_t/dy is positive.

Even when $b > 0$, it is still possible to have $x = 0$. In this case of sequential leviathans,

$$-pu((1-\tau)y, 0) + (\tau y - \beta b - L)u_x((1-\tau)y, 0) < 0$$

where

$$b = \frac{\tau y}{2\beta} - \frac{w}{2} - \frac{L}{2\beta} \text{ and } r = \tau y.$$

Hence, b is increase in y, decreasing in w, β, L, and r is increasing in y. The condition for $x = 0$

becomes

$$\beta < \frac{2pu((1-\tau)y,0)}{wu_x((1-\tau)y,0)} - \frac{\tau y - L}{w},$$

or equivalently, $p > \frac{\tau y+\beta w-L}{2}\frac{u_x((1-\tau)y,0)}{u((1-\tau)y,0)}$.

(e) *Contestable market with* $b > 0$: First, when the tax constraint is not binding, the problem can be written as

$$V_t = \max_{x_t,b_t,r_t} \frac{r_t - \beta b_t - L}{i}$$

such that

$$\frac{su(y - r_{t+1} - px_{t+1}, x_{t+1})V_{t+1}}{i}\frac{1}{u(y - r_t - px_t, x_t)} - b_t - w = 0$$

Substituting $b_t = \frac{sV_{t+1}u(y-r_{t+1}-px_{t+1},x_{t+1})}{i}\frac{1}{u(y-r_t-px_t,x_t)} - w$ and $x_t = x^*$ into the objective function and maximizing with respect to r, the first-order condition is:

$$\frac{1}{i} - \frac{\beta}{i}\frac{sV_{t+1}u(y - r_{t+1} - px_{t+1}, x_{t+1})}{i}\frac{u_z}{u^2} = 0.$$

In a stationary equilibrium, $V_{t+1} = V_t$ and $h_t = s$, and hence

$$V = \frac{i\,(r + \beta w - L)}{i^2 + \beta s}.$$

Substituting back to the first-order conditions and rearranging, in stationary equilibrium we have

$$\frac{u^*}{u_z^*} - \frac{\beta s(r + \beta w - L)}{i^2 + \beta s} = 0.$$

Assume that r is decreasing in y. Assumption 2(a) imples that u^*/u_z^* increases as y increases, but $\frac{\beta s(r+\beta w-L)}{i^2+\beta s}$ will become smaller when y increases, which contradicts the equilibrium condition. Therefore, we must have $dr/dy > 0$. This also implies $dV/dy > 0$. Indeed, similar arguments show $dr/dy \in (0,1)$, $dr/dw < 0$, $dr/d\beta < 0$, $dr/di > 0$, and $dr/ds < 0$.

Assume that r is decreasing in L. From the above equation, u^*/u_z^* increases as L increases, but $\frac{\beta s(r+\beta w-L)}{i^2+\beta s}$ will become smaller when L increases, which contradicts the equilibrium condition. Therefore, we must have $dr/dL > 0$. Since r is increasing in L, u^*/u_z^* decreases as L increases, we must have $r - L$ decreases in L from the above equation.

Substituting V into the zero profit condition, in a stationary equilibrium, we obtain:

$$b = \frac{s(r - L) - wi^2}{i^2 + \beta s}.$$

It follows that b and r are complements in w, β,and y. Moreover, b is decreasing in i and L.

Unlike the case when $c > 0$, tax revenue $r + px$ is decreasing in s in a contestable market.

Next, consider the case when the tax constraint is binding and $x > 0$. The problem becomes

$$\max_{x_t, r_t} \frac{\tau y - p x_t - L}{i} - \frac{\beta}{i}\left(\frac{s V_{t+1} u(y - r_{t+1} - p x_{t+1}, x_{t+1})}{i} \frac{1}{u((1-\tau)y, x_t)} - w\right).$$

The equilibrium formula $V = \frac{i(r+\beta w - L)}{i^2 + \beta s}$ together with the first order condition with respect to x implies

$$\frac{\beta s \left(\tau y + \beta w - L\right)}{i^2 + \beta s} = \frac{p u((1-\tau)y, x)}{u_x (1-\tau)y, x)}.$$

Since the left-hand side is increasing in w and the right-hand side in increasing in x, $dx/dw > 0$,and hence $dr/dw < 0$ from the tax constraint. Similar arguments imply $dx/d\beta > 0$, $dx/dL < 0$, $dx/di < 0$, and hence $dr/d\beta < 0$, $dr/dL > 0$ and $dr/di > 0$.

Finally, differentiating with respect to y,we obtain

$$\frac{dx}{dy} = \frac{u_x \beta s \tau - p u_z \left(1-\tau\right)\left(i^2 + \beta s\right) + \left(1-\tau\right)\beta s u_{zx}\left(r + w\beta - L\right)}{p u_x \left(i^2 + 2\beta s\right) - \beta s u_{xx}\left(r + w\beta - L\right)}$$

and hence

$$\frac{dr}{dy} = \frac{\left(p\tau u_x + p^2\left(1-\tau\right)u_z\right)\left(i^2 + \beta s\right) - \left(\beta s \tau u_{xx} + p s \beta u_{zx}\left(1-\tau\right)\right)\left(r + w\beta - L\right)}{p u_x \left(i^2 + 2\beta s\right) - \beta s u_{xx}\left(r + w\beta - L\right)}.$$

Note that $(r + w\beta - L) = \frac{p(i^2+\beta s)u}{\beta s u_x}$,and hence $dr/dy > 0$ when $u_z u_x \geq u u_{zx}$.

The effect on b is similar to the case when the tax constraint is non-binding.

(f) *Contestable market with $b = 0$.* First, when the tax constraint is non-binding, the problem can be written as

$$V_t = \max_{x_t, r_t} \frac{r_t - L}{i} + \lambda\left(w - \frac{s u(y - r_{t+1} - p x_{t+1}, x_{t+1}) V_{t+1}}{i} \frac{1}{u(y - r_t - p x_t, x_t)}\right)$$

The first-order conditions are:

$$\frac{1}{i} - \lambda \frac{s u(y - r_{t+1} - p x_{t+1}, x_{t+1}) V_{t+1}}{i} \frac{u_z}{u^2} = 0$$

and

$$\frac{s u(y - r_{t+1} - p x_{t+1}, x_{t+1}) V_{t+1}}{i} \frac{1}{u(y - r_t - p x_t, x_t)} = w$$

with $x_t = \arg\max u(y - r_t - p x_t, x_t)$.

In a stationary equilibrium,

$$V = \frac{iw}{s} \text{ and } r = \frac{i^2 w}{s} + L$$

and hence r is increasing in w, i and L, decreasing in s, but independent of y and β.

Note that to make sure $b = 0$ is optimal, we need $\beta > i\lambda$, and hence

$$\beta \geq \frac{u(y - \frac{i^2 w}{s} - L - px, x)}{w u_z(y - \frac{i^2 w}{s} - L - px, x)}$$

with equality when $s = s_b$.

Finally, since the tax constraint is non-binding, we must have $px + r = px + \frac{i^2 w}{s} + L < \tau y$, where $x = \arg\max u(y - \frac{i^2 w}{s} - L - px, x)$, which is increasing in s and decreasing in w, i, and L. Since r is decreasing in s and x is increasing in s, tax revenue is decreasing in s when z is a normal good. As s decreases, T increases and the tax constraint becomes binding at $s_\tau = \frac{i^2 w}{\tau y - px - L}$, which does not depend on β.

Next, suppose the tax constraint is binding. The problem becomes

$$V_t = \max_{x_t} \frac{\tau y - px - L}{i} + \lambda(w - \frac{su(y - r_{t+1} - px_{t+1}, x_{t+1})V_{t+1}}{i} \frac{1}{u((1-\tau)y, x_t)}).$$

In a stationary equilibrium, $V = \frac{iw}{s}$ and $r = \frac{i^2 w}{s} + L$, and hence from the tax constraint and the first order condition,

$$x = \frac{\tau y - L}{p} - \frac{i^2 w}{sp},$$

which is increasing in s, τ, y and decreasing in i, w,and L. Therefore, in a contestable political market with $b = 0$, the taughtness of the tax constraint will affect the economic and social policy only but will have no effect on rent extraction.

Finally, note that to ensure $b = 0$, we need $\beta > i\lambda$ and hence

$$\beta \geq \frac{pu((1-\tau)y, \frac{\tau y - L}{p} - \frac{i^2 w}{sp})}{w u_x((1-\tau)y, \frac{\tau y - L}{p} - \frac{i^2 w}{sp})},$$

with equality when $s = s_b$.■

Almost Stationary Equilibria and Political Cycles

Our model has a unique stationary equilibrium. For $s > i^2/\beta$, the stationary equilibrium number of challengers $c$and regime values V have square root closed form solutions:

$$V = \sqrt{\frac{\beta}{s}}(b + w) \text{ and } c = \sqrt{\frac{\beta}{s}} - \frac{i}{s}.$$

Non-stationary equilibria also exist. Interestingly, if $s > i^2/\beta$, these equilibria are almost stationary in the sense that most of the variables are constant over time and have the same values as in the stationary equilibrium. Only regime values and the number of challengers are vary over time, and these follow a every-other-regime cycle. Regime net income flows are the same as in the stationary equilibrium, but regime values cycle every other regime because of the cycle in the number of challengers.

To see this, notice that the zero profit condition holds with equality for an equilibrium sufficiently near the stationary equilibrium (because $s > i^2/\beta$). As shown for the proof of Proposition 1, this implies:

$$V_t = \frac{1}{su(z_{t+1}, x_{t+1})V_{t+1}} \max_{x_t, b_t, r_t} \{(b_t + w)(r_t - \beta b_t)u(y - r_t - (p - q)x_t, x_t)\}$$

The parameters of the maximization problem in square brackets are the same for every regime, which means that all regimes choose the same policies as in the stationary equilibrium. Citizens therefore enjoy the same constant utility flow, and leaders the same net income flow, as in the stationary equilibrium. However, this does not imply that $V_t$necessarily equals V_{t+1}. Rather, we have

$$V_0V_1 = V_1V_2 = V_2V_3 = V_3V_4...$$

In other words, V can alternate between two values — one value V_{even} for even numbered regimes and another value V_{odd} for odd number regimes. Because b and h are constant over time, the zero profit condition implies that the number of challengers alternates from one regime to the next, with more challengers occurring prior to the high value regimes.

There are a continuum of these non-stationary equilibria, half with few challengers for the initial regime and many challengers for his successor. For these equilibria, the initial regime has a longer expected lifetime and therefore a higher expected value than his successor. One of the non-stationary equilibria has no challengers for the initial regime, which means that the initial regime lasts forever. This is a more dramatic example of the political contestable market hypothesis because this unchallenged regime has public policies and income flows just like those for an otherwise identical polity that does have challengers and turnover.■

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Figure 1. Market Structures Consistent with Stationary Equilibria

The Figure illustrates comparative statics with respect to *s* and β, the challenger hazard and price of entry barriers, respectively. Three steady state outcomes are examined: entry barriers *b*, public policy *x*, and the number of challengers *c*. The parameter space is divided into seven regions according to which (if any) of the non-negative constraints bind: 3 leviathan regions (no spending in the public interest), 2 contestable market regions (no challengers, but spending in the public interest), and 2 regions with competitors supplying public spending.

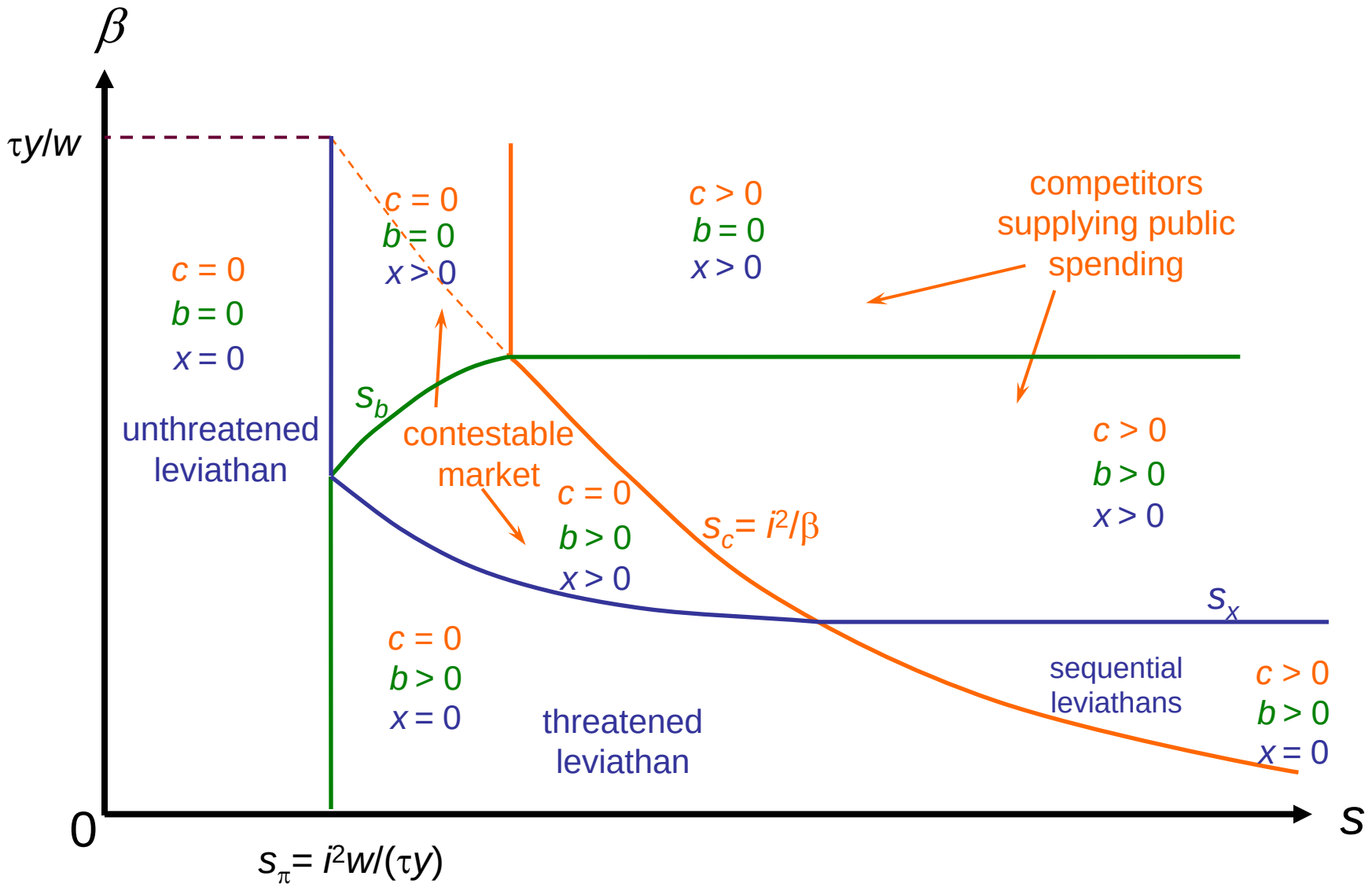

Figure 2. Entry vs. the Laffer Curve as Constraints on Leadership Rents

The Figure illustrates comparative statics with respect to *s* and β, the challenger hazard and price of entry barriers, respectively. The parameter space is divided into regions according to whether the entry constraint binds, the tax constraint binds, or both.

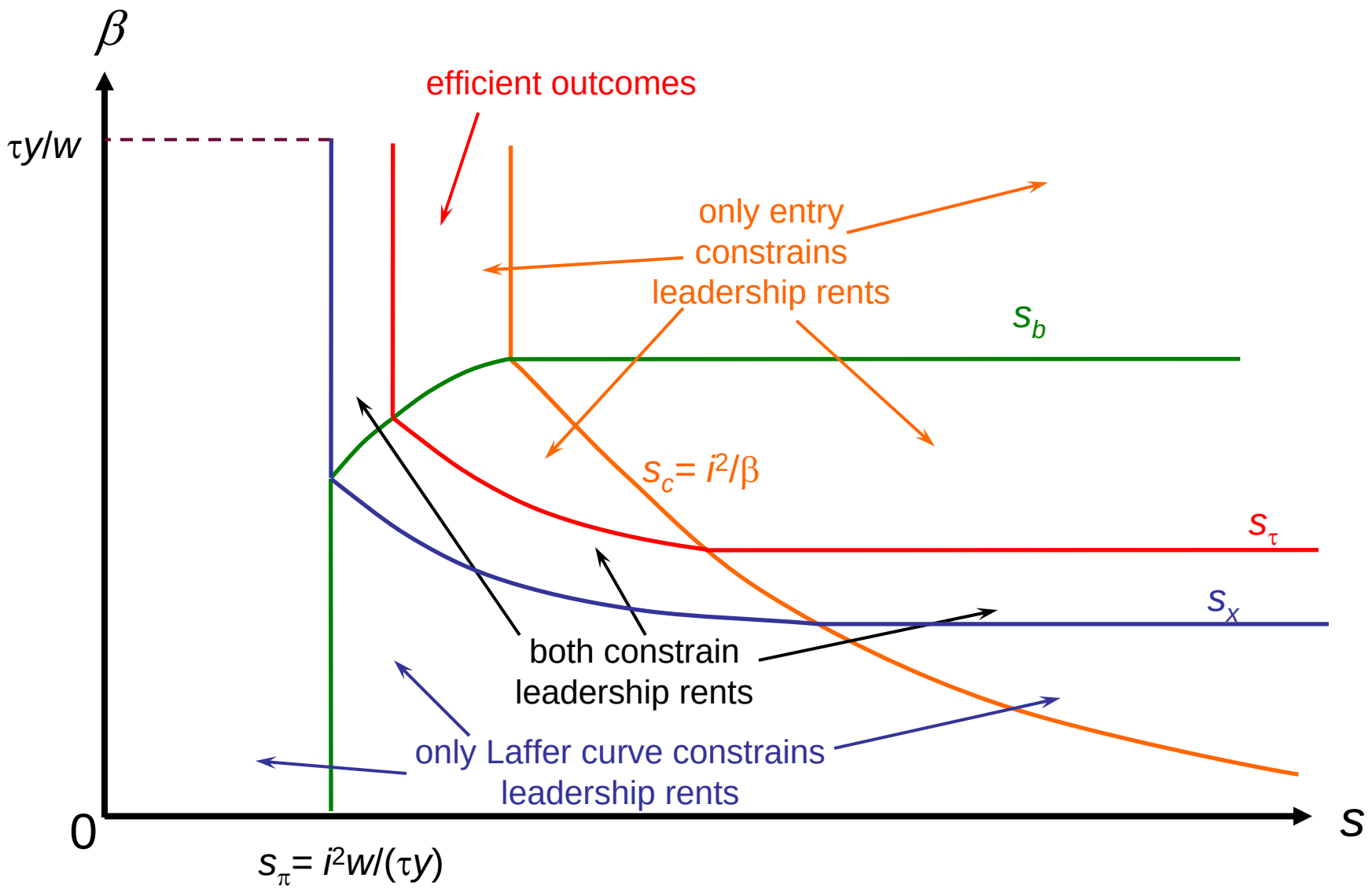

Figure 3. Taughtness of the Entry Constraint (steady state)

The Figure illustrates comparative statics with respect to *s*, the challenger hazard facing current and all future regimes. Three steady state outcomes are examined: rent extraction *r*, public policy *x*, and the number of challengers *c*. "Efficient" public policy x^* is shown for reference.

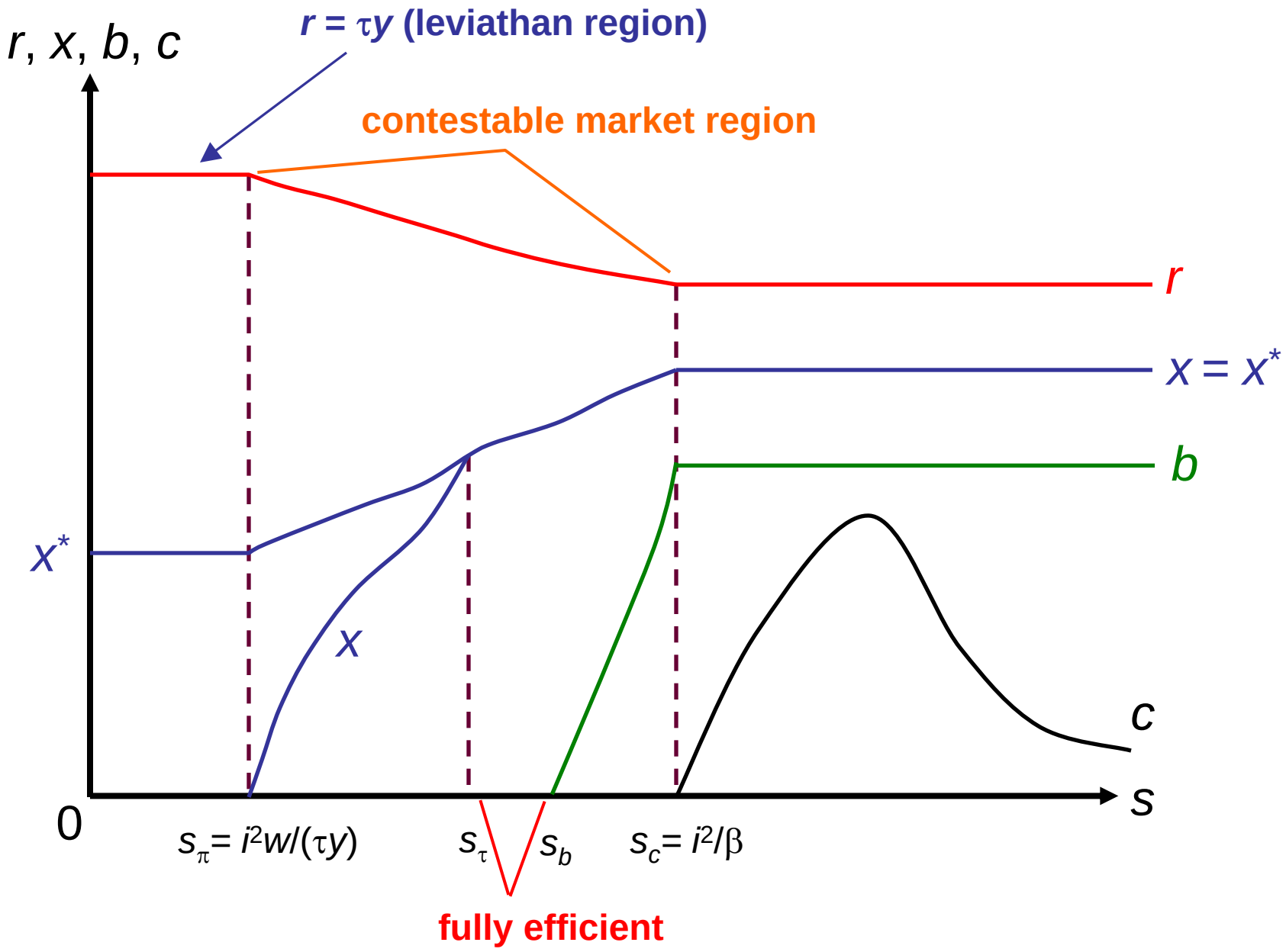

Table 1: Effect of democracy on public spending and taxation via the income effect

	Income elasticity of demand for public spending		
dr/y	0	1	1.2
	Panel A: Percentage effect on public spending *amount*		
-0.01	0	1.0	1.2
-0.03	0	**3.0**	**3.7**
-0.05	0	**5.1**	**6.2**
-0.10	0	10.5	12.6
	Panel B: Percentage point effect on the tax *rate* , assuming democratic T/y = 0.25		
-0.01	-1.0	-0.8	-0.7
-0.03	-3.0	**-2.3**	**-2.1**
-0.05	-5.0	**-3.8**	**-3.5**
-0.10	-10.0	-7.5	-7.0

Panel A entries display 100*(ln x for democracy - ln x for nondemocracy)
Panel B entries display 100*(T/y for democracy - T/y for nondemocracy)
Democracy is assumed to have r = 0. Nondemocratic r exceeds democratic r by dr