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**ABSTRACT**

Political competitiveness – which many interpret as the degree of democracy – can be modeled as a monopolistic competition. All regimes are constrained by the threat of "entry," and thereby seek some combination of popular support and political entry barriers. This simple model predicts that many public policies are unrelated to political competitiveness, and that even unchallenged nondemocratic regimes should tax far short of their Laffer curve maximum. Economic sanctions, odious debt repudiation, and other policies designed to punish dictators can have the unintended consequences of increasing oppression and discouraging competition. Since entry barriers are a form of increasing returns, democratic countries (defined according to low entry barriers) are more likely to subdivide and nondemocratic countries are more likely to merge. These and other predictions are consistent with previous empirical findings on comparative public finance, election contests, international conflict, the size of nations, and the Lipset hypothesis. As in the private sector, the number of competitors is not necessarily a good indicator of public sector competitiveness.

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## **I. Introduction**

What determines the organization and conduct of the public sector? To what degree can poverty, human rights violations, war, and other world problems be attributed to frictions in the political process? Why, exactly? Will China become democratic and, if so, how will that affect the welfare of the Chinese people? When it comes to designing the new constitutions in Iraq and the European Union, are political freedoms or electoral rules more important? Game theory and other economic tools have been usefully applied to some of these questions, demonstrating, for example, the potential impacts of tastes, technology, and electoral rules on public policy. Our goal is to further explore the political determinants of policy, by focusing on the *degree* of competition for political leadership, while paying little attention to the *means* of competition (e.g., electoral rules, or even whether there are regular elections). We show how the degree of competition affects public policy, and responds to economic changes. 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 competitiveness, it is easy to see how trade sanctions and other policies designed to promote democracy may actually have the unintended consequences of increasing oppression and discouraging competition. We offer economic interpretations of why democratic countries are observed to be more peaceful, and more likely to separate into smaller countries. We give economic interpretations of the variety of empirical measures of democracy published in the political science and economic literatures.

Entry barriers are widely discussed in political science, with a large section of comparative political science concerned with measuring them. For example, even though Singapore has elections, and candidates for public office can speak their minds on policy issues, the country is

usually graded as hardly competitive (a.k.a., “nondemocratic”) because, among other things, the government has the discretion to determine whether a candidate is speaking about policy rather than defaming the government leadership (the latter is illegal).<sup>1</sup> However, formal models in economics and political science usually consider only one of two extremes: perfect competition (no entry barriers) or no competition of any kind.<sup>2</sup> We help fill this gap by building a model of the causes and consequences of a variety of autocracies and democracies, with some unanticipated applications and results.<sup>3</sup>

Observation suggests that there may be no ideal democracy on earth, in the sense that anyone can costlessly enter the competition for public office. 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.<sup>4</sup> 80% is probably an underestimate of the prevalence of imperfectly competitive public sectors: Djankov et al. (2003) report that government dominates the television broadcast market (measured by viewership) in Western Europe, even though POLITY indicated no imperfection for a single one of these sixteen countries.<sup>5</sup> At the same time, few (if any) polities are fully monopolized, because even

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<sup>1</sup>See, for example, the Parliamentary Elections Act, the Films Act, and the Defamation Act at <http://statutes.agc.gov.sg/>

<sup>2</sup>Perfect competition is typically assumed in models in which public policies are determined by universal voting or economic efficiency. The monopoly models of government include Breton (1974), Brennan and Buchanan (1980), and Olson (1993).

<sup>3</sup>Crain (1977), Lott (1986), Wohlgemuth (1999), and Tsui (2002) are also studies of public sector entry barriers, although these studies put relatively more emphasis on structure than conduct and performance.

<sup>4</sup>The POLITY IV (2000) project rated 5,409 country-years, which covered practically all of the world’s population, during the period 1960-99 in terms of the competitiveness of political participation and executive recruitment. Only 1,139 of them (21%) scored perfectly in terms of competitiveness.

<sup>5</sup>See Becker (1958, p. 108), Wohlgemuth (1999, p. 183), Myerson (1999, p. 684-91), and Persson and Tabellini (2003, pp. 24, 27) for further examples of entry barriers in (so-called) “democracies,” including vote quotas and other electoral rules that make entry difficult. Electoral incumbency advantage may be the result of such entry barriers.

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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.<sup>6</sup>

Unlike a typical firm that shares a market with his competitors in an industry, government 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.<sup>7</sup> In this regard, government has 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.<sup>8</sup> 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 temporary monopoly power granted by the patent until he is “overthrown” by another more inventive challenger. Our section II therefore begins with a simple model of imperfect political competition, akin to a patent race.<sup>9</sup> Rents are created and limited by entry barriers. As a result, entry barriers create rent-seeking behavior. Rents increase less than proportionally with the size of the market, if at all. The actual and nominal incidence of foreign policies directed at “monopolized” political leaders are different, because of their impact on supply conditions. Similar results for the private sector are familiar from the industrial organization and public finance literatures, but

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<sup>6</sup>Speer (1970) notes the Hitler “regime's anxiety not to risk any shift in the popular mood,” even as compared with democratic England (p. 214). Other examples include Hitler's practices of keeping taxes invisible (pp. 87, 140), and keeping electoral rules intact (p. 152). Barzel's (2000) also has a model of the tradeoff between a dictator's personal wealth and his security.

<sup>7</sup>Wittman (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.

<sup>8</sup>See also Demsetz (1968).

<sup>9</sup>See Baye and Hoppe (2003) for formal analogies between rent seeking contests and patent-races games.

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Sections III-V show how they have been neglected in theories of politics, foreign policy, the size of nations, and international conflict.

Perhaps one 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 we suspect that imperfect competition could be more important in the public sector, despite the fact that imperfect competition models have usually been applied to private sector behaviors.<sup>10</sup> For the same reason, endogenous entry barriers may be especially important in the public sector. Our model thereby begins a theory of democratization, at least if democratization is to be interpreted as a secular increase in the number of parties seriously competing for public office, or a secular decline in entry barriers. Section IV derives the scale effect. Namely, there is a lot at stake in ruling a large public sector, so an autocrat has a tougher time blocking political entry as the public sector grows, thereby increasing the gains to entry. Section V predicts that economic development may or may not encourage democracy, depending on the nature of the income growth and whether democracy is measured according to entry barriers, the number of competitors, or the amount of rent enjoyed by the political leadership.

## **II. The “Market” for Political Leadership as a Monopolistically Competitive Patent Race with Endogenous Entry Barriers**

Our model has two basic components, which reflect the two concerns of a political leader; longevity and leadership income. Public policies are chosen by the leader, and affect both longevity and income. We partition public policies into three types: “barriers to entry” policies  $b$ , “social and economic” policies  $x$ , and a scalar markup rate  $m$ . Barriers to entry policy instruments, like execution, torture, the degree of censorship, the organization of the military, ballot fees, vote quotas, etc., have the primary effect of blocking political competition. Social and economic policies like 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 GDP and/or the government’s popular support.<sup>11</sup>

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<sup>10</sup>See also Wohlgemuth (1999, p. 179), and Myerson (1999, p. 684-91).

<sup>11</sup>Some policy instruments do not necessarily create barriers to entry, but are complementary with policies that do. A more detailed analysis would distinguish various

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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. Interestingly, Tullock's (1987) book – which is about the measures autocrats take to protect their office – is clear that some public policies are more important than others when it comes to blocking political challengers: the death penalty (pp. 6, 20, 65, 80), torture (pp. 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. 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.

For simplicity, we model the markup as if it were taken in cash.  $m$  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 right to sell monopoly licenses, or dictators who legally pay themselves large salaries or build palaces, summer homes, etc. Market power permits leaders to influence public policies for their satisfaction or personal profit, which is legal if the leader is sufficiently convincing as to the public's interest in the policy, as with esoteric appointments to the Supreme Court, presidential pardons, or Alexander Hamilton's policy of honoring Revolutionary War debt. In many cases, part of the markup is spent on entry barrier maintenance, and it may be perfectly legal to use tax revenue for these purposes, like paying the military generously or hiring civil servants to monitor and censor the press.

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elements of the  $x$  vector according to their complementarity with  $b$  policies, and vice versa, but for the moment we suppose that any policy is either in the  $x$  vector, or a contributor to  $b$ , but not both.



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### *II.A. Supply-Side Determinants of Political Rents: Structure of the Competition and the Zero Profit Condition*

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. We refer to  $b$  as the "political entry barrier";  $b$  includes the punishments (actual or potential), censorship, and inconveniences created by the incumbent in order to block challenges. The challenger proposes a policy, which both determines the profits he would earn if successful and the amount of popular support he enjoys. His popular support relative to the incumbent determines his probability of success.

The incumbent is, of course, concerned with the number and actions of his challengers. Each challenger is concerned with the number, and actions of, the 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 policy proposals relative to his. In other words, by proposing a popular policy, a challenger lengthens the expected lifetime of his regime in the event he does take over. Our political equilibrium has a lot in common with the sequential patent race equilibrium described by Reinganum (1985); a successful coup is our analogue to winning a patent race. As explained by Reinganum, analyzing such an equilibrium naturally uses dynamic programming methods.

Regimes are indexed  $t = 0, 1, \dots$ , with 0 denoting the incumbent regime. When parameters vary over time, we use subscripts to distinguish one regime's parameters from another's. 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  $i = 1, 2, \dots, c_t$ , and have success hazards  $h_{1t}, h_{2t}, \dots$ . Challenger  $i$ 's success hazard  $h_{it}$  depends on his policies  $\{m_{i,t+1}, b_{i,t+1}, x_{i,t+1}\}$  and the incumbent's policies  $\{m_t, b_t, x_t\}$ , but for the moment our notation suppresses this dependence until we consider the implications of maximizing behavior.

Let  $N$  denote population and  $y$  GDP per capita, so  $(1-m)Ny$  is the amount of GDP kept by citizens ( $(1-m)y$  per capita) and  $mNy$  the amount going to the government leadership.  $mNy$  is a "markup," and  $m$  a "markup rate."  $mNy$  does not include tax revenues approved by the citizens for the purposes of public works, public insurance, redistribution from one group of citizens to another, etc. In other words, the markup rate  $m$  is probably much less than the aggregate tax rate as usually

measured, because much of the tax revenue may be spent in the public interest, and not for the pleasure of the leadership. For the time being, we take  $N$  and  $y$  as given.

Regime  $t$ 's (flow) payoff to governing is  $m_t y - \beta(N)b_t$  per capita.  $\beta(N)b$  is the per capita cost of maintaining political entry barriers in the amount  $b$ . The per capita cost decreases or increases with population depending on whether there are economies or diseconomies of scale.<sup>12</sup> When the first challenger succeeds, the incumbent obviously stops receiving the flow  $m_t y - \beta(N)b_t$ . If the first challenger succeeds at date  $R$  in the incumbent's regime, the incumbent's per capita value of governing (from the perspective of the time he began) is  $v_t(R)$ :

$$v_t(R) = [m_t y - \beta(N)b_t] \int_0^R e^{-rt} dt = [m_t y - \beta(N)b_t] \frac{1 - e^{-rR}}{r}$$

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  $t$ ,  $V_t$ , we integrate  $v_t(R)$ , weighting by these probabilities.

$$V_t \equiv \int_0^{\infty} c_t h_t e^{-c_t h_t R} v_t(R) dR = \frac{m_t y - \beta(N)b_t}{r + c_t h_t} \quad (1)$$

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

Challenger  $i$ 's expected profit  $\pi_{it}$  from challenging regime  $t$  depends on four things: (a) the hazard of succeeding  $h_{it}$ , (b) hazard of the incumbent's falling  $c_t h_t$ , (c) the aggregate value  $NV_{t+1}$  of

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<sup>12</sup> $\beta$  may depend on other exogenous economic and demographic characteristics  $\Theta$ , although for simplicity our notation suppresses dependence on  $\Theta$ .

beginning the next regime, and (d) the entry barrier  $b_t$ . Algebraically, we have

$$\pi_{it} = \frac{h_{it} NV_{t+1}}{r + c_t h_t} - b_t$$

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.<sup>13</sup> Therefore, the first term in the expected profit function is an expected present value.

More challengers lower the expected profit from challenging. Assuming that all challengers have the same hazard rate, they all have the same zero profit condition, which can be inverted to calculate the number of challengers. The incumbent knows this,<sup>14</sup> so it is useful to substitute the zero profit condition into the incumbent's value:

$$NV_t = \frac{b_t}{V_{t+1}} \frac{m_t y - \beta(N)b_t}{h_t} \quad (2)$$

The negative effect of  $h_t$  on incumbent's value shows why popular support can be valuable to the incumbent. Holding constant the hazard per challenger and the incumbent's net income flow, incumbent value increases with entry barriers, and declines with successor value, because these

<sup>13</sup>We have considered two possible variations on this specification. One of them also has a flow cost of challenging (see Lee and Wilde for a private sector patent rate model with both stock and flow costs of challenging), which makes the numerator  $(h_{it} NV_{t+1} - b_f)$ , 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  $T$ . These 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.

<sup>14</sup>A couple of equilibrium concepts have been considered in the patent race literature. One of them is a Nash equilibrium concept in which incumbents choose their markup rate  $m$  taking the number of challengers  $c$  as given. This concept might be realistic in some private sector applications, but in public sector models it is more common to model the government as a "leader" that accounts for the effects of its policies on its citizens' behavior. Thus, we treat  $c$  an endogenous variable. In the public sector application, it may even be realistic to treat  $b$  as an endogenous variable too (we treat both cases below).

discourage and encourage challenges, respectively.

The zero profit condition also illustrates how the number of challengers can be a misleading measure of the degree of competitiveness. For example, an incumbent may face zero challengers, but may have to make sacrifices to maintain that situation. In particular, the zero profit condition  $h_{it}NV_{t+1} = rb_t$  would constrain the incumbent, who may limit markup  $m$  and choose socially optimal economic and social policies  $x$  – as if he did face challengers – in order to ensure that no potential challengers find a challenge to be profitable (i.e., to ensure that  $h_{it}$  remains low enough). This result is familiar from the private sector literature (e.g., Baumol, Panzar and Willig, 1982, and Sutton, 1991 on contestable markets), where it has been noted that tough price competition discourages entry.

### *II.B. Implications of the Zero Profit Condition: The Fundamental Conflict between Challengers and Incumbent*

Some of the patent race model's implications come from the zero profit condition, regardless of whether incumbents and challengers are choosing public policies that maximize their economic value, so it helps to further explore the condition before formally introducing an equilibrium concept. One of those are seen in formula (2) for incumbent value, which has the magnitude  $b$  of the entry barrier in the formula multiplicatively because, given the value of one leading the next regime, it increases the number of challengers and thereby a proportional effect on the actuarial value of receiving any given income flow while the incumbent regime is in place. Of course, entry barriers may enhance the incumbent's present value, but the proportionality shown in the formula (2) suggests that value would be enhanced mainly by lengthening the regime rather than increasing its net income flow.

The zero profit condition creates a fundamental conflict between the incumbent and the challengers. Equation (2) implies that  $V_t$  is inversely proportional to the continuation value  $V_{t+1}$ . Because a higher  $V_{t+1}$  encourages entry and hence reduces the expected tenure of the incumbent's leadership, the incumbent wants this continuation value to be as small as possible. Regime  $t$  and  $t+1$  therefore have exactly the opposite opinions about the choice of policies at  $t+1$ . In terms of entry barriers, regime  $t+1$  takes into account the tradeoff between the costs of maintaining the barriers  $b$  and benefit in terms of fewer challengers. Regime  $t$  would like  $b_{t+1}$  as far as possible from achieving this optimal tradeoff, so that  $V_{t+1}$  is small and nobody has an incentive to challenge it. Similarly,

regime  $t$  would like  $m_{t+1}$  to be low enough to discourage any entry. A dictator therefore does not want to see his country forever oppressed.<sup>15</sup> Without any means of commitment, the incumbent is unhappy with the future of excessive oppression because they limit his profit, but is powerless to do anything. Perhaps democratic “institutions” build some durability into the system, so that the incumbent's long term plans for freedom in his country constrain (to some degree) the oppression of his successors. Chile provided a historical example of this behavior when its General Pinochet announced in 1981 that (fair) elections would be held in 1989. Our model suggests that the short term effect of an announcement like this is to limit political competition, because someone attempting an overthrow in, say, 1985 would either have to convince the people to scrap fair election plans, or give up his monopoly after only four years.

The conflict between incumbent and challengers also implies that the effects of permanent determinants of leadership value of leading are blunted through their impact on challengers. If, for example, something reduced the leadership's net income flow by 50%, it would reduce the incumbent's present value by less than 50% because it would discourage 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. In a stationary equilibrium (namely, an equilibrium with constant population  $N$ , entry barriers  $b$ , markup rates  $m$ , expected value  $NV$ , and expected lifetime  $1/(ch)$ ) the net result of this mutual feedback process is a square root relationship between the present value of leading and the net income flow from leading. In this case, both incumbent and successor value are the same and equation (2) becomes a formula for their squared value:

$$\begin{aligned}
 NV &= \sqrt{bN \frac{my - \beta(N)b}{h}} \\
 c &= \sqrt{N \frac{my - \beta(N)b}{bh}} - \frac{r}{h}
 \end{aligned}
 \tag{3}$$

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<sup>15</sup>In principle, either  $b_{t+1}$  very high or  $b_{t+1}$  very low could serve the purpose of minimizing  $V_{t+1}$ . However, regime  $t$  may prefer  $b_{t+1}$  very low because, due to the enforcement costs, his successor would have an easier time decreasing  $b_{t+1}$  than increasing it, and regime  $t$ 's citizens might give it credit for starting a transition to democracy.

Stationarity and the zero profit condition (equations (3)) help to illustrate our predictions about the size of nations (Section IV) and the Lipset hypothesis (Section V). We discuss these implications of our model in more detail after developing the implications of maximizing behavior.

### *II.C. Demand Side Determinants of Political Survival I: Popular Support*

In order to derive further results, we must consider the incentives for public policy choices, which are related to the form of the hazard function  $h$ . In the spirit of Machiavelli (1515, Chapter XIX), we suppose that a leader's decisions are influenced by "popular support," even if he is a dictator. We model a leader's popular support per capita  $S$  as a multiplicatively separable function of utility flow citizens enjoy under his regime:

$$S = u_y((1-m)y)u_f(f)u_x(x,\Theta) \quad (5)$$

where  $u_y$  increases in the relevant range and is concave.  $u_x$  has a unique maximum with respect to  $x$ .  $u_x$  depends on  $\Theta$ , a vector of fixed demographic and economic characteristics, including inequality, determinants of development, and tastes for redistribution.

$f$  measures freedom, which we relate below to the entry barriers  $b$ . We assume that freedom enhances support over some range. Note that support (5) is defined in absolute terms. Obviously support matters as it compares to a challenger's support, but the point of our analysis is that the identity, strategy, and public perception of the challenger are endogenous. For example,  $f$  might decrease a leader's support (votes, let's say) relative to his challenger's by strengthening the challenger, but  $u_f'$  refers to the effect of  $f$  on the leader's support holding fixed the identity, strategy, and public perception of his challenger. The shape of  $u_f(f)$  is not relevant for many of our results because they hold  $f$  fixed. Otherwise, we admit that  $f$  may decrease  $u_f$  over some range, in which case both leaders and citizens agree that more oppression is better. Perhaps this occurs when citizens desire for their own comfort to suppress certain speech, or exclude a particular minority. But the interesting case has  $u_f' > 0$ , at least when  $f$  gets small enough, because citizens dislike censorship, torture, murder, etc.

It is debated (eg., Jackman, 1986; Wittman, 1995; Mulligan, Gil, and Sala-i-Martin, 2004) whether  $u_x(\cdot)$  is simply economic efficiency, or whether  $u_x(\cdot)$  embodies some important political failures as determined by electoral rules, checks and balances, administrative procedures, etc. The

public choice and public finance fields have progressed far in terms of specifying the nature of support needed for political success and the effects of public policies  $x$  on that support: some of these results can be interpreted as specifying the persons or persons whose utility function determines political support.<sup>16</sup> Our approach complements this previous literature by taking  $u_x(\cdot)$  as given, and placing few restrictions on its shape.

Two of our results, namely that political competitiveness does not affect  $x$  and political freedom is a normal good, are affected by the multiplicative separability of the support function (5). On the second result, political freedom could be a normal good even without separability between  $f$  and  $y$ . We view the separability of  $x$  as a good approximation, for a couple of reasons. According to one interpretation analogous to private sector behavior,  $x$  is the public sector's "quality" or "product design" which is separable in citizen's indirect utility functions from the price (the  $u_y$  term), so a dictator should offer the same public sector product design even though he extracts more revenue from citizens. Furthermore,  $f$  separability might be said to rule out an effect of product quality on entry barriers. This may be a strong assumption when studying the private sector, where a producer discouraging entry is usually limited to indirect means like adjusting his quality, input mix, etc. (see Mussa and Rosen 1978 for some examples), but in the public sector challengers can be blocked by more direct and forceful means like execution, torture, and censorship. Second, we have in mind the empirical results of Mulligan, Gil and Sala-i-Martin (2004) which show that the most oppressive regimes only collect slightly more tax revenue (3% of GDP) than the most democratic regimes (controlling for development and demographics), so that the various effects on  $(1-m)y$  and the amount of inequality are of limited quantitative significance. In this case, the effects on  $x$  through  $(1-m)y$  and the amount of inequality would be small, even without separability.<sup>17</sup>

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<sup>16</sup>For example, the policy in question may be the rate of income taxation, and  $u_x(\cdot)$  could be interpreted as the median voter's indirect utility of taxation (Meltzer and Richard, 1981), an indirect social welfare function (Mirrlees, 1971), or a welfare function with weights determined by electoral rules (Persson and Tabellini, 2003).

<sup>17</sup>The deadweight costs of taxation provide one example of nonseparability. Becker and Mulligan (2003) show that deadweight costs should be expected to diminish public spending, regardless of whether spending is determined by voting, efficiency, utilitarianism, etc. Since a dictatorship would be collecting more  $m$  than a democracy, the dictatorship would have a higher deadweight cost for the first dollar of spending on programs for the public (these are elements of the  $x$  vector), and thereby spend less on them. However, given that the most oppressive regimes'

Third, to the extent that complementarity is the “realistic” nonseparability for some policy instruments, we include those instruments in the category of “entry barriers” rather than “social and economic policies.”

Challenger  $i$ 's success hazard  $h_{it}$  depends on his relative support:

$$h_{it} = S_{it+1}/S_t = su_y((1-m_{i,t+1})y)u_f(f_{i,t+1})u_x(x_{i,t+1},\Theta)/[u_y((1-m_t)y)u_f(f_t)u_x(x_t,\Theta)] \quad (6)$$

where  $s$  is the success hazard (presumably low) of a challenger who is expected to replicate the incumbent's policies. Because we assume that all challengers are identical, henceforth we suppress the  $i$  subscript.

Public policies are determined by the leadership, but when? One possible assumption is that a regime committed to public policies during the time when it was challenging the previous regime, in order to build the popular support required for a takeover. It is easier, and perhaps more realistic, to assume that regimes choose public policies only after taking power.<sup>18</sup> Citizens, the previous regime, etc., may anticipate the new regime's decisions, but those decisions treat sunk costs as sunk. Formally, this means that  $b_t$  and  $m_t$  have no effect on  $V_{t+1}$  because those variables are no longer relevant once the  $(t+1)$ st takes power. It also means that regime  $(t+1)$ 's policy does not depend on which of the challengers succeeded in overthrowing the previous regime. Formally, an equilibrium is an infinite sequence  $\{b_t, m_t, h_t, c_t, x_t, V_t\}_0^\infty$  of entry barriers, markup rates, number of challengers, success hazard per challenger, and leadership expected value per capita such that:

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$m$  exceeds the least oppressive regimes'  $m$  by 3% of GDP, our Appendix suggests that, because of deadweight costs, the former regimes would cut (relative to the latter regimes) their spending for the general public by only 1 or 2 percent of GDP (= 4 or 5 percent of public spending).

<sup>18</sup>Interestingly, most of the qualitative comparative statics are unaffected.



$$V_t = \max_{m_t, h_t, b_t, c_t, x_t} \frac{m_t y - \beta(N) b_t}{r + c_t h_t}$$

$$\text{s.t. } \frac{h_t N V_{t+1}}{r + c_t h_t} - b_t = 0 \quad (7)$$

$$h_t = s u_f(1 - b_{t+1}/y) u_y((1 - m_{t+1})y) u_x(x_{t+1}) / [u_f(1 - b_t/y) u_y((1 - m_t)y) u_x(x_t)]$$

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

#### II.D. Political Competitiveness Does not Affect Economic and Social Policies

Social and economic policies  $x$ , like social security, the minimum wage, various rates of taxation, etc., are functionally unrelated to the blocking of political challengers. These policies do affect the government's popular support and thereby its survival as modeled by equation (6). Hence all regimes will choose the same  $x$ , conditional on demographics, because each is choosing  $x$  to maximize  $u_x$ .

**Proposition 1** (Invariance) All regimes choose their economic and social policies  $x$  as the same function of economic and demographic characteristics  $\Theta$ .

Proposition 1 derives from the assumptions that regimes maximize their value and that  $x$  affects that value only through a separable popular support function, although the separability does not have to be multiplicative as we have shown here. Obviously, without separability the effect of  $b$  on an element of  $x$  could be either positive or negative or zero depending on the sign of the various second derivatives of  $S$ .

Olson, McGuire, and Niskanen pioneered formal analysis of the degree of competition for public office.<sup>19</sup> Their models predict that dictators are leviathans, extracting the maximum possible

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<sup>19</sup>Olson (1993), Olson and McGuire (1996), and Niskanen (1997). Based on an absence of competition, Wittman (p. 2) conjectures that nondemocratic regimes would be less efficient.

tax revenue from their countries, and consuming the proceeds themselves (except perhaps for expenditures to enhance the tax base).<sup>20</sup> In other words, in their view  $my$  is quite large, and  $x$  quite different, under dictatorship because the dictators uses all policy instruments to maximize  $my$  subject to the Laffer curve. Obviously they disagree with our Proposition 1, and the reason is already familiar to students of industrial organization. Olson et al. model dictators as monopolists limited only by the Laffer curve, whereas we assume that a dictator (or any other government leader) is mainly limited by the threat of entry.<sup>21</sup> They implicitly reject (or assume that dictators reject) Machiavelli, because their dictators have no concern for popular support. For Olson et al., profits per capita are  $my/r$  in present value for dictators ( $r$  is the interest rate) and zero for democratic leaders. In contrast, our model features “monopolistic competition,” with all leaders expecting profits less than the Olson et al dictators, both because they receive a smaller profit flow and discount it for fewer years. We postulate a reduced profit flow because we anticipate that leaders will limit their income in order to maintain some popularity and thereby lengthen their regimes expected lifetime. They also dissipate some of their income by erecting and maintaining entry barriers. Leaders in our model discount cash flows at more than  $r$ , because there is always the chance that the regime is ended.<sup>22</sup>

Later we show that the entry barrier  $b$  might be high enough that there are no challengers and the incumbent’s regime lasts forever. Nonetheless, Proposition 1 obtains because, by choosing the best public policy vector  $x$ , a leader lowers the value of challenging and thereby lowers the entry barrier required to make challenging unprofitable (remember that entry barriers are costly to maintain). Thus we have a public sector analogue to the contestable market hypothesis: a market may have only one producer but nonetheless perform much like a competitive market. A dictator can have public policies much like a democracy’s, even though he has no visible challengers.

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<sup>20</sup>Brennan and Buchanan (1980) have a model in which even democracies are leviathans, except as limited by their constitutions.

<sup>21</sup>See also Grossman (1991).

<sup>22</sup>Our model has apparent similarities with Olson’s (1991) “roving bandit” model, except that we treat the degree of roving as endogenous. Namely, leaders in our model use popular support as one means to remain longer in office. Olson (1991) also emphasizes policy horizons; our Appendix II derives some results for policy horizons in our model, and compares them with Olson’s.

If Proposition 1 were right, there should be no partial correlation over time or across countries between democracy (measured in terms of political competitiveness) and various measures of economic and social policies. Olson, McGuire, Niskanen, Acemoglu, Robinson, Boix (2003), and several others disagree, arguing that democracy should affect the mapping  $u_x(\cdot)$  from public policy into popular support, and, for example, deriving that “democratic regimes generally choose policies that are more favorable to the poor than nondemocratic regimes” (Acemoglu and Robinson, 2003, p. 3).<sup>23</sup> On the other hand, 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.<sup>24</sup> They admit that democracies are different in terms of torture, execution, military policies, etc., but our Proposition 1 does not apply because these policies are closely linked with barriers to political entry.

### *II.E. The Distribution of Income*

Studies of the supply side of private sector industries usually distinguish between a “short run” when prices equilibrate the market and entry and/or capital are held constant, and a “long run”

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<sup>23</sup>Acemoglu and Robinson (2006) predicts that changes in political institutions will have no effect on economic institutions, because leaders can invest more in their de facto power in democracy than in nondemocracy. Acemoglu and Robinson obtain this result by modeling the conflict between leaders and citizens, whereas we model the competition between incumbent leader and other potential leaders. Interestingly, 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, Svobik (2006) finds that only 6 lost power from because of popular uprising, while the remaining were removed by other political competitors.

<sup>24</sup>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.

when all variables are endogenous. Sometimes the distinction is quite literal in that entry and capital accumulation are spread over time due to explicit costs of adjustment, and other times the distinction is more intellectual than literal. We maintain the same tradition in our analysis, by first considering the case in which political entry barriers  $b$  are a given fraction of per capita income  $y$ , and later taking  $b$  as endogenous.<sup>25</sup>

With  $b$  given, the incumbent's optimal markup rate solves:

$$NV_t = \frac{b_t}{V_{t+1}} \max_{m_t, h_t} \frac{m_t y - \beta(N)b_t}{h_t} \quad \text{s.t.} \quad h_t = s u_y((1 - m_{t+1})y) / u_y((1 - m_t)y)$$

A high markup brings the incumbent a larger revenue flow, but makes him unpopular thereby shortening his regime's lifetime. A low markup is popular and would enhance survival, but the revenue flow while in office would be small.

The product  $(m_t y - \beta(N)b_t)u_y((1 - m_t)y)$ , which we obtain by substituting the endogenous determinants of  $h$  into the endogenous component of formula above for the value of governing, might be interpreted as a social welfare function of the per capita flows of net income to leadership and citizens. Of course, the citizens' weight in this function is not determined by ethical considerations, but rather by the effect of their welfare on the regimes survival via support.<sup>26</sup> The optimal markup rate is described by the first order condition<sup>27</sup>

$$m_t y - \beta(N)b_t = \frac{u_y((1 - m_t)y)}{u_y'((1 - m_t)y)} \quad (8)$$

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<sup>25</sup>Perhaps political institutions do have costs of adjustment, although see Acemoglu and Robinson (2006) for historical examples of rapidly adjusting political institutions.

<sup>26</sup>Analytically similar results can be found in the probabilistic voting literature (e.g., Coughlin et al., 1990).

<sup>27</sup>For simplicity, this condition is based on the assumption that per capita income is independent of the markup rate. Even if per capita income were a function  $y(m)$  of the markup rate, the leadership would still maximize the product  $(m_t y(m) - \beta(N)b_t)u_y((1 - m_t)y(m))$  of the flows to leadership and citizens. Thus, our qualitative conclusions would be unchanged.

On the left hand side is the per capita flow of net income to the leadership. On the right is a function of the citizens' per capita income. Thus, the formula (8) describes the distribution of net income between citizens and leadership.

Notice that  $b$  appears in the income distribution condition only through the per capita cost  $\beta b$  of maintaining entry barriers because the costs and benefits of  $m$  are both flows. Thus, holding  $\beta b$  constant, larger entry barriers serve entirely to prolong the regime (see also our discussion in Section II.B of the implications of the zero profit condition), and not to increase its flow of income.  $b$  does increase  $\beta b$ , which means that  $b$  increases the leadership gross income flow but the added gross flow is dissipated through greater costs of maintaining the barriers. Thus, while dictatorships may collect more revenue than democracies, the excess may be small and associated with spending on the military and other expenditures for blocking competition and increasing survival.<sup>28</sup>

#### *II.F. Demand Side Determinants of Political Survival II: The Demand For Freedom*

So far, we have treated the entry barrier  $b$  as a fixed parameter. The next step is analogous to the work of Beard (1913), Niskanen (1990), and Aghion et al. (2004), who use the political effects of constitutional rules to form a positive theory of constitutions, except that our attention is limited to political entry barriers as measured by a scalar  $b$ .

Although political entry barriers are an important source of political rents, the leadership may rationally limit entry barriers in order to gain popular support and to economize on the costs of oppression. Entry barriers can hurt support in two ways. First, and least significant, is the fact that the entry barriers are a resource cost for the challengers, some of whom may be among the citizens. However, we neglect this effect because there are only  $c/N$  challengers per capita, and  $c/N$  is likely small (and can even be zero in equilibrium). Second, political entry barriers may limit the enjoyment of freedom by the citizens. We account for this effect with a production function for freedom:

$$f = 1 - b/y \tag{9}$$

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<sup>28</sup>See Mulligan, Gil, and Sala-i-Martin (2004) for some empirical findings along these lines.

Notice that freedom declines with  $b/y$  or, equivalently, that the entry costs faced by challengers as a consequence of limited freedom increase with per capita income. Examples of this type include the death penalty or political incarceration, because victim's economic costs of his death or each day in prison are proportional to his opportunity costs, such as his value of time.<sup>29</sup>

In order to calculate regime  $t$ 's preferred entry barrier  $b_t$ , we begin with the definition of equilibrium (7), substitute the zero profit condition into the incumbent's value formula, and factor out some of the variables exogenous to the incumbent:

$$NV_t = \frac{1}{V_{t+1}} \max_{m_t, h_t, b_t} b_t \frac{m_t y - \beta(N)b_t}{h_t} \quad (10)$$

s.t.  $h_t = s u_f(1 - b/y) u_y((1 - m_{t+1})y) / [u_f(1 - b_t/y) u_y((1 - m_t)y)]$

Raising  $b_t$  has one marginal benefit and two marginal costs. The marginal benefit is reducing the number of challengers, which by itself has a proportional effect on incumbent value because incumbent and challengers discount certain cash flows at the same rate  $r$  and are concerned with the same stochastic event: the end of the incumbent's regime. One marginal cost is a loss of popular support, which makes each challenger more successful. The other marginal cost is that entry barriers are costly to maintain.

In order to characterize the regime's preferred policy in terms of the preferences of the citizens, we (without loss of generality) restate the problem in terms of the goods in the citizens' utility function, namely net income  $z = (1 - m)y$  and freedom  $f = 1 - b/y$ . We also factor out variables determined by the next regime, which the current regime takes as given:

$$\max_{z_t, f_t} [y(1 - f_t)(y - z_t - \beta(N)y(1 - f_t))] [u_f(f_t) u_y(z_t)]$$

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<sup>29</sup>Section V discusses in more detail the relation between freedom and per capita income, including the possibility that per capita income may be a poor proxy for citizens' opportunity costs.

A necessary condition for an interior optimum is that the marginal rate of substitution in the first square bracket term equals the marginal rate of substitution in the citizen's utility function (the second square bracket term). Thus the amount of freedom chosen by the regime is the same that citizens would choose for themselves if they faced first square bracket term as the constraint dictating their tradeoff between freedom and net income. This duality is no surprise, since, taking as given the number of challengers and its flow of net income, the incumbent regime would like to make the public as happy as possible because public happiness with the incumbent regime makes each challenger unlikely to succeed.

The “price” of freedom is the slope of term in square brackets, namely:

$$\left( \frac{m_t}{1-f_t} - 2\beta(N) \right) y$$

Notice that the price of freedom is proportional to GDP per capita. If we had focused on the demand side only, we might predict that the demand for freedom increases with GDP per capita as long as freedom is a normal good. But this prediction ignores the supply of freedom: GDP per capita raises the cost to the leadership of supplying freedom. Freedom as a normal good is necessary, but not sufficient, for GDP per capita to increase freedom.

The price of freedom falls with the marginal cost  $\beta$  of maintaining and enforcing entry barriers. Because the demand side is neutral with respect to  $\beta$ , the supply side predicts that freedom rises (and  $b$  falls) with  $\beta$ . With fairly weak conditions on the utility function (see Section V for details),  $\beta$  increases the markup rate  $m$ . As explained below, this comparative static gives us predictions regarding the effects of population (Section IV), various methods of punishing dictators (Section III), and enforcement technical change (Section V).

Because leaders strive for popular support, citizen preferences for freedom are one determinant of the equilibrium amount of freedom, and whether or not they will dominate supply side determinants. Hypotheses about the shape of citizen's preferences for freedom can, in principle, be empirically estimated by studies of behaviors related to imprisonment (e.g., Abrams and Rohlfs, 2006), uncensored reading materials, draft dodging, etc. Conducting such studies is beyond the scope of this paper, so we state results for our model conditional on various hypotheses about

preferences, and give somewhat more weight to those hypotheses we suspect more likely.

### **III. Unintended Consequences of Punishing Dictators**

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.” Here we consider two such foreign policies: reductions in leadership net income and the repudiation of odious debts. The effects of these policies are very different if dictators maximize tax revenue rather than, as in our model, trade off revenue flows and survival. Our model does not defend dictatorship because, to the extent that regime matters, dictatorships are predicted to be somewhat worse in terms of incomes for citizens and a lot worse in terms of political and personal freedoms. However, punishing dictatorial regimes can have adverse consequences for efficiency and freedom if the punishment is not designed with attention to political competitiveness and entry into the market for political leadership.

#### *III.A. Citizens Suffer, and Regimes Likely Prolonged, When The Leadership is Punished*

Suppose a country were to suffer a perpetual loss  $L$  from its net government revenue, perhaps because it is subject to economic sanctions, spends on the military 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. 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. They share the economy’s resources with the citizens according to the income distribution condition (8). In other words,  $dm/dL > 0$ ; both citizens and leadership suffer lost income flows as a consequence of the punishment  $L$ .

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. For example, the equations (3) show how there is a square root (i.e., less than proportional) relationship between the regime’s net income flow and its value because the number of challengers depends on the net income flow expected by



successors.<sup>30</sup> Thus, if  $L$  were intended to help citizens by hastening the demise of the regime, it serves neither purpose: the regime lasts longer and reduces citizens' net incomes.

Punishments are more effective, in terms of enhancing freedom and raising citizen utility, when conditioned on entry barriers.<sup>31</sup> 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  $\beta$ . As explained in Section II,  $\beta$  increases the markup rate  $m$  and decreases entry barriers  $b$  because  $\beta$  makes it cheaper for the leadership to supply freedom. By itself, less  $b$  increases the number of challengers. On the other hand, challengers are discouraged by the lower net income they anticipate. Citizens also enjoy more consumption  $(1-m)y$  than they would under an unconditional punishment of the same magnitude because the markup rate  $m$  depends on the sum  $L + \beta b$  (see the income distribution condition (8), modified to include  $L$ ), and not its composition.

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' incomes 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.

### *III.B. Repudiating Odious Debt Makes Regimes More Oppressive*

Odious debt – sovereign borrowing for the benefit of the dictator and not the people – may

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<sup>30</sup>A similar result is familiar from the private sector literature (e.g., Sutton, 1991, and predecessors), where it has been noted that tough price competition discourages entry.

An alternate way of punishing dictators is to have a country suffer a perpetual loss  $L$  directly from per capita income  $y$ . This may be the case if in practice it is difficult to target punishment on government revenue. Citizens lose income, a loss that is further exacerbated by the responses of dictators in the form of raising  $m$ . Moreover, as we show in Section V, freedom  $1-b/y$  is likely to decrease when income decreases.

<sup>31</sup>Wintrobe (2006, pp. 70-1) recommends that foreign policy be conditioned on “repression” or “human rights.”

offer another example. It has been proposed (most recently by Kremer and Jayachandran, 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 would benefit from attention to political competitiveness. 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.<sup>32</sup> Hence  $r$  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  $r$ .<sup>33</sup>

Even though the value of leadership involves future cash flows, the formula (2) for incumbent present value does not depend on the discount rate  $r$  because  $r$  has an exactly offsetting effect on the forward-looking challengers. Thus, higher  $r$  has no impact on  $m$  and  $b$ . A regime's expected tenure increases with  $r$  because the number of challengers decreases. Thus, if odious debt repudiation affects incumbent and successor equally, it has the unintended effect of lengthening the incumbent's tenure, while having no impact on entry barriers or citizens' incomes.

Intuitively, the incumbent's benefits from  $b$  are in the more distant future than are the benefits from  $m$  because  $b$  serves to lengthen the regime.<sup>34</sup> If odious debt repudiation affected only the incumbent's discount rate, then the incumbent would raise his markup rate because the higher

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<sup>32</sup>Legitimate economic development loans are part of the  $x$  vector, which we hold fixed. One Ricardian possibility (see Barro, 1974) is that the dictator can borrow from his citizens by tilting the time profile for  $m$ , 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 citizens.

<sup>33</sup>Odious debt can also be modeled as an increase in the incumbent's tax base at the expense of his successor's tax base. However, the effect of tax base on leadership income is ambiguous (see Proposition 3) because, in our model, the entry barrier rather than the tax base is the primary determinant of leadership income.

<sup>34</sup>More precisely, incumbent value is proportional to  $(r+ch)^{-1}$ , which declines with  $ch$  but declines less when  $r$  is large. In other words, the benefit to reducing the success of challengers declines with  $r$ .

discount rate makes him less future-oriented. To the extent that entry barriers can adjust, the same reasoning implies that odious debt repudiation can decrease the entry barriers  $b_t$  protecting the incumbent regime. However, this version of odious debt repudiation still gives no incentive to the successor regime to limit its entry barriers  $b_{t+1}$ , and leaves citizens with less net income. The fact that the value of governing is limited by competition, and not good will, means that dictators can pass on their punishments, at least in part, to citizens and competitors. In summary, we have the

Proposition 2. (Economic Incidence of Punishing Dictators) (a) The burden of punishing dictators is shared among dictators and citizens, even if the punishment is targeting the former, although to a lesser degree when the punishment is conditional on entry barriers. (b) Repudiating odious debt increases the expected tenure of incumbent dictators if odious debt repudiation affects both incumbent and successors equally. If it only affects incumbent, it tends to increase the markup rate and lower entry barriers.

#### **IV. The Extent of the Political Market: Three Margins of Adjustment**

The effect of population  $N$  on markup rates and competition has implications for international conflict and the size of nations. All else the same, it is better to rule a large jurisdiction than a small one. It follows from the zero profit condition that all else cannot be the same: population either reduces the per capita *flow* of net income to the leadership, reduces the regime's expected duration by increasing the number of challengers, or increases entry barriers, or some combination of all three. If population either reduces the net income flow per capita or increases the number of challengers, then the value of leadership per capita falls with population even though the aggregate value of leadership rises.

##### *IV.A. The Size of Nations and the Democratic Peace*

Because the value of leadership increases with population, leaders have an incentive to acquire territory and encourage population growth, especially when they are nondemocratic. Perhaps this is why Alesina and Spolare observe a positive effect of democracy on nation splitting: a democratic leader (who, by definition, earns little rent) has less to lose from reductions in the population he leads.

Przeworski et al. (2000) find that regime type affects the rate of population growth. In particular, they provide evidence that population grows faster under dictatorships than under democracies because birth rates are higher under the former. They attribute the higher fertility under nondemocracies to more policy uncertainty which leads parents to hoard children as a form of less risky asset. We, however, argue that the phenomenon may be explained by the interaction between barriers to entry and population; namely, the marginal benefit of  $N$  increases with  $b$ . Interestingly, Mirilovic (2006) argues that there is more immigration into rich dictatorships than into rich democracies, because dictatorships adopt more permissive immigration policies.

The same logic implies in reverse, namely that democratic countries are more likely to subdivide than are nondemocratic ones. Hence we predict that country unions are more likely to spread nondemocracy to larger groups of people, as under Hitler and the USSR, whereas country divisions are important for the creation of democratic governments.

If population reduces the markup rate (this occurs under conditions specified below), then there are further implications for the size of nations because the citizens themselves would prefer to live in a large nondemocracy than a small one. Although nothing may be “good” about oppression, in this case the markups paid to nondemocratic leaders are analytically similar to the “public goods” featured in the economics of country size (e.g., Alesina and Spolare 2003) because the per capita cost of both public goods and paying a dictator falls with population. Perhaps this is why Alesina and Spolare find an effect of democracy on nation splitting, and why they confirm a number of implications of the public good model without having many literal examples of public goods.

The interaction between democracy and the effects of population also have implications for the incidence of country mergers, and thereby the types of countries that might fight with each other over people and territory. First of all, the incidence of merging two countries depends on whether the two countries are both democratic, both nondemocratic, or one of each. Second, it matters whether the newly merged country would be ruled as democratic or not. For example, two democracies have little to gain by merging, because their markup rates are already low (by definition). Citizens of democracies stand to lose if they merge with a nondemocratic country. The citizens of a nondemocracy have more to gain by merging with another country, especially if the new country were to be ruled democratically. The proposition that nondemocratic citizens have something to gain from their country’s losing a war helps explain why citizens of democracies are

observed to fight more effectively (Reiter and Stam, 1998). Perhaps the German experience at the end of WWII shows that citizens do seriously consider the degree of political competitiveness that will prevail after a war, and that they are better off losing to the democracy. For example, German refugees almost always chose to migrate westward toward the advancing U.S. and British armies than migrating eastward toward Soviet armies. The Germans also put up more resistance on their eastern front.

Because citizens of democracies have less to gain when their country acquires persons and territory, democratic countries might be more peaceful, and less likely to merge. This does not by itself imply that democracies would fight fewer wars, because democracies may be targets of nondemocracies, or because the citizens of democracies are economically or altruistically linked to the citizens of nondemocracies, but it does imply that democracies would fight less with other democracies. Interestingly, the international conflict literature<sup>35</sup> finds that democracies fight less with democracies, an empirical finding which is known as the (dyadic version of) “democratic peace.” The democratic peace literature interprets this behavior in terms of democratic morals, or the incapacity of democratic leaders to make important decisions, but our model suggests that a democratic peace might be observed even in the absence of these factors, merely because of the economics of competitiveness.

#### *IV.B. Constant versus Increasing Returns to Scale in Oppression*

Whether, and how much, population affects each of the three margins – the per capita flow of net income to the leadership, the number of challengers, and the magnitude of entry barriers – depends in part on the nature of the enforcement technology  $\beta(N)$  and whether the number of challengers is strictly positive. If the enforcement of entry barriers has constant returns to scale (i.e.,  $\beta$  is independent of  $N$ ), then population effects only the number of challengers and not the markup rate  $m$  or per-challenger entry barrier  $b$ .<sup>36</sup> With the *flow* of income to the leadership and the per-challenger entry barrier independent of population, the zero profit condition is maintained by a combination of more challengers and shorter durations for the leadership. The square root formula

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<sup>35</sup>See Elman (1997) for a survey.

<sup>36</sup>For a proof of this proposition, notice that  $N$  has no effect on the marginal rates of substitution in the leadership’s value function (10).

(3) shows how the stationary equilibrium number of challengers and aggregate value of leadership increase with the square root of population, at least over the range of parameters for which the number of challengers is strictly positive.

If the number of challengers were zero, the regime's (infinite) horizon would not be affected by small changes in population. Instead, population would decrease the net flow of leadership income per capita via some combination of the added cost of the entry barriers required to deter challengers and a reduced markup rate. Enforcement scale economies (i.e.,  $\beta'(N) < 0$ ) may be another reason why population reduces the markup rate.<sup>37</sup> In summary, we have

Proposition 3. (The Extent of the Political Market) The value of leadership and number of challengers increase with the extent of the political market. Moreover, dictators have greater incentives to acquire territory and encourage population growth than do democratic leaders. When enforcement of entry barriers has increasing returns, entry barriers increase, and markup rates decrease, with population.

#### *IV.C. Application: Contested Elections Across U.S. Offices*

As explained above, our model predicts that population increases the number of challengers and the rate of turnover. This comparative static is analytically familiar from the private sector patent race literature, in which a larger prize for an invention encourages people to attempt to search for that invention.<sup>38</sup> In the political sector, it means that more candidates challenge the incumbent when the aggregate markup is large. When the competition occurs via elections, it follows that the number of challengers and the probability of a challenger's victory in the election increases with the jurisdiction size  $N$  and other proxies for the extent of the political market.

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<sup>37</sup>If we consider the “barriers to exit” interpretation of  $b$ , one example of scale economies comes from Friedman (1977), namely that large countries have fewer miles of boarder to patrol per capita. With scale economies, a sufficient (but not necessary) condition for  $dm/dN < 0$  is that income elasticity of citizens' freedom demand exceeds the price elasticity in magnitude (the elasticities are defined precisely below).

<sup>38</sup>Acemoglu and Linn (2004) and Cerda (2003) study this phenomenon in the pharmaceutical industry. See also Breshnahan and Reiss (1991) for an empirical study of the relation between entry, pricing, and market size for selected private industries.

Coats & Dalton (1992) study of British parliamentary general elections 1852-80 finds the size of jurisdiction is the best predictor of whether an election would be contested. This pattern is conspicuous in U.S. elections too. Table 1 combines our calculations from ICPSR study #0002 with those of Mulligan and Hunter (2003). The rows of the Table are ordered by our judgement of the extent of the political market. Since essentially all of the United States had elections of the five types listed in the table, the number of elections measured (reported in the left half of the Table) helps inform this judgement because we presume that the extent of the political market is larger when the U.S. is divided into fewer jurisdictions or the elections occur less frequently. For example, although the jurisdictions covered by each of the first three rows are the entire state, we presume that the extent of the market is smallest for U.S. Senate elections because they occur every three years (on average) whereas Presidential and Gubernatorial elections typically occur on a four year cycle.<sup>39</sup> U.S. House districts are smaller, and the elections more frequent, than U.S. Senate elections so we presume that the latter have a larger political market. Jurisdictions are smaller still for state House and state Senate elections.

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<sup>39</sup>In the earlier period, 2-year gubernatorial terms were more common (in which case the extent of the Senate market might be considered greater). The number of elections used to compile Table 1 is less than the number actually held due to observations missing from the computer file.

Table 1: Frequency of Uncontested Elections by Year and Office

office	number of elections		percentage uncontested	
	1911-67	1968-89	1911-67	1968-89
President (state level ballot)	661	294	0	0
Governor	621	288	2.4	0
U.S. Senator	581	359	4.0	0.6
U.S. Representative	11,668	4591	9.2	4.1
State Senator or Representative	NA	51,262	NA	21.9

Sources: (1) State Senator and Representative from Mulligan and Hunter (2003)

(2) Other offices calculated from ICPSR study #0002, for general elections in the 50 states minus Louisiana (in which some general elections are automatically uncontested because a candidate obtains a majority in an open primary)

Table 1's first row shows that at least two presidential candidates were on the ballot in every state – i.e., none of them were uncontested. The second and third rows show that a few gubernatorial and U.S. Senate elections were uncontested. The fourth row shows that elections to the U.S. House of Representatives were unopposed 9.2% of the time during the earlier period, and 4.1% of the time during the later period. The last row on the right half shows that almost 22% of elections to state Senates and state Houses of Representatives are uncontested during the later period.<sup>40</sup> In summary, during both time periods, offices with larger political markets are more likely to be contested.<sup>41</sup> Comparing the earlier and later periods shows that uncontested elections are less likely in recent years (perhaps because populations and incomes have grown).

<sup>40</sup>We do not have data for the earlier period.

<sup>41</sup>All challengers are the same in our model, but in reality some challengers are more serious threats to the incumbent than others. We have examined the same elections (except Presidential) shown in Table 1, and find that, during both time periods, victory margins are smaller for offices with a greater political market.

The same data suggest offices associated with larger political markets turn over more often. During both time periods, party turnover from one election to the next was much higher for Governors and U.S. Senators than for U.S. Representatives and for State Senators and State Representatives.



## V. Democratization

Economic outcomes represented by various parameters in our model – such as military technologies, communication technologies, standards of living, 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  $\beta$  (the marginal cost of maintaining and enforcing entry barriers) and the parameter  $y$  (per capita income).

### *V.A. Enforcement Technical Change*

The parameter  $\beta$  is the marginal enforcement cost of deterring entry. As discussed above, this may be related to the size of the jurisdiction. But it may also depend on the technologies available for communication, monitoring and pursuing criminals, etc. The entry process is a conflict between challengers and incumbent, so in principle technological advancement can either raise or lower  $\beta$ . George Orwell's famous *1984* raised the possibility that technological progress would favor the government leadership. Our model predicts that entry barriers  $b$  fall, enforcement expenditures  $\beta b$  rise, and markup rates  $m$  rise, with  $\beta$ . If George Orwell were right, then (by reducing  $\beta$ ) technical progress would reduce freedom and reduce enforcement expenditures, but increase citizens' net incomes.

Communication technologies are often thought to favor challengers to the government, as with the famous moon cakes in China with which rebels coordinated efforts by baking messages inside cakes. More recently, the proliferation of the internet has helped 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  $\beta$ , the internet should increase freedom, but not as much as it would have if government policy were held constant, because government increases their enforcement expenditures in response to the technical change. Examples include attempts by governments to censor the internet or limit its distribution within their borders.

### *V.B. The Lipset Hypothesis, Natural Resource Curse, and other Effects of Economic Development*

Our model has predictions related to the well-known "Lipset (1959) hypothesis," namely that economic development increases the likelihood that a polity is democratic. GDP per capita  $y$

appears in four places in our model.<sup>42</sup> First, on the supply side, it increases the benefit of challenging holding the markup rate  $m$  constant. Second, also on the supply side, it increases the flow of net income to the incumbent. Third, on the demand side, it increases the flow of net income to citizens. Fourth, gdp per capita appears in the freedom production function. Freedom declines with  $b/y$  or, equivalently, that the entry costs faced by challengers as a consequence of limited freedom increase with per capita income. In this fourth instance, and only in this instance, GDP per capita appears in the model as a proxy for citizens' opportunity costs of challenging. Thus, if economic development means proportional increases in both opportunity costs (especially the value of time) and GDP per capita, then the applicable comparative static in our model varies  $y$  in all four places. If the opportunity cost of challenging is held constant (as it might be if economic development derived from increases in nonhuman wealth, such as an oil discovery), then the applicable comparative static in our model varies  $y$  only on the first three places.

Comparative statics that hold freedom  $f$  fixed can be examined from the income distribution condition (8), modified as (8)' only to reflect the freedom production function (whose inverse is  $b = (1-f)y$ ).

$$m_y y - \beta(N)(1-f)_y y = \frac{u_y((1-m)_y y)}{u'_y((1-m)_y y)} \quad (8)'$$

Only the  $y$  multiplying  $1-f$  appears in the income distribution condition because it proxies for the opportunity cost of challenging. If this were held constant, then  $y$  unambiguously increases both  $my$  and  $(1-m)y$ . Intuitively, extra GDP per capita is shared between the leadership and the citizens.  $y$  is likely to decrease the markup rate  $m$ .<sup>43</sup> If the opportunity cost of challenging also increased with  $y$ , then  $m$  either increases or decreases (or stays constant) depending on the shape of the utility function.

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<sup>42</sup>It may also enter the  $\Theta$  vector appearing the  $x$  portion of the utility function; this possibility has no effect on our results.

<sup>43</sup>A price elasticity of freedom demand that is smaller than the income elasticity (these terms are precisely defined below), is a sufficient, but not necessary, condition for  $dm/dy < 0$ .

In order to further explore how citizens' freedom demand affects public policy, we parameterize the utility function as follows:

$$\begin{aligned}
 u_y(z) &\equiv e^{\frac{\sigma}{\sigma-\eta}[z^{(\sigma-\eta)/\sigma} - 1]} \\
 u_f(f) &\equiv e^{\frac{\sigma}{\sigma-1}[f^{(\sigma-1)/\sigma} - 1]}
 \end{aligned}
 \tag{12}$$

where  $\eta$ ,  $\sigma$ , and  $\phi$  are positive constants. With these functions, the utility function  $u_y(z)u_f(f)$  is a nonhomothetic version of the CES utility function. The parameter  $\phi$  dictates the relative preference of freedom versus consumption.  $\sigma$  is the constant elasticity of substitution between  $z^\eta$  and  $f$ , and is therefore price elasticity of freedom demand when  $z$  is held constant. The magnitude of  $\eta$  dictates how nonhomothetic is the utility function;  $\eta$  is greater (less) than one as the income elasticity of freedom demand is greater (less) than one.<sup>44</sup> We therefore refer to  $\eta$  and  $\sigma$  as the “income elasticity” and the “price elasticity” of freedom demand, respectively. One important property of the utility function is whether the ratio of income to price elasticity  $\eta/\sigma$  (sometimes known as the “coefficient of income variation, e.g., Hicks and Allen, 1934) is greater than, less than, or equal to one. In the latter case, a proportional increase in GDP per capita and the opportunity cost of challenging has no effect on  $m$  with  $b$  held fixed.

$y$  affects the supply of freedom. The leadership's marginal rate of transformation between freedom and citizen net income is  $[m/(1-f)-2\beta]y$ , of which the  $m$  term reflects the effect of GDP on the leadership's potential tax base and the  $\beta$  term reflects the effect of the opportunity costs of challenging on entry costs for given amount of freedom. If the opportunity costs of challenging were proportional to GDP per capita, then both terms are proportional to  $y$ . If the opportunity costs were held constant, then  $y$  increases the marginal rate of transformation more than proportionally, because  $y$  increases gross leadership revenue  $my$  but does not increase its costs. Thus, we conclude that more GDP per capita does less to increase (or more to decrease) freedom when the additional GDP comes from natural resources rather than from human capital. For example, for the benchmark

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<sup>44</sup>In the special case  $\eta = 1$ , citizens' utility is homothetic with a constant elasticity of substitution. In the special case  $\eta = \sigma = 1$ , citizens' utility is Cobb-Douglas.

utility functions (12) with price and income elasticities that are equal in magnitude, citizens' marginal rate of substitution is itself proportional to  $y$  which implies that freedom is independent of  $y$  when the opportunity costs of challenging are proportional to GDP per capita, and declines with  $y$  when the opportunity costs of challenging are held constant.

We believe that the income elasticity of citizens' freedom demand likely exceeds the price elasticity in magnitude, in which case  $y$  increases freedom  $f$ , entry barriers  $b$ , the markup rate  $m$ , and the number of challengers  $c$  when the opportunity costs of challenging are proportional to GDP per capita.<sup>45</sup> With the opportunity costs of challenging held constant,  $y$  increases freedom less, and may decrease it. In summary, our approach says that predicting the effect of development on democracy requires more than an analysis of the demand side. The supply of freedom is also affected by development, and as a result freedom need not increase with development (especially when income gains derive from natural resources) even if freedom, civic norms, and the like, were normal goods (see Huber, Rueschemeyer, and Stephens, 1993).

One of the central empirical findings of the political economy literature is the positive cross-country correlation between income and democracy. This correlation has led some economists as well as political scientists to interpret democracy as a normal good. However, this view has been recently challenged by Przeworski and Limongi (1997) and Acemoglu et al. (2005). Moreover, Haggard and Kaufman (1995) and Acemoglu et al. (2005) show that economic crisis makes democracy more likely. On the other hand, Tsui (2006) provides evidence that wealth generated from oil discovery slows down democratic transition. These findings 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. Economic growth (especially that resulting from natural resources) does not necessarily foster democracy – even if freedom is a normal good. In summary, we have

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<sup>45</sup>The private sector literature on the “countercyclical markup” (e.g., Rotemberg and Woodford, 1999) emphasizes the opposite result ( $dm/dy < 0$ ) derived because entry barriers are held fixed, which means that an expansion of the market induces monopolistically competitive producers to price closer to marginal cost (see also Sutton, 1991). Our model also has  $dm/dy < 0$  with entry barriers held fixed if either  $\beta'(N) < 0$  or  $c = 0$ . Wintrobe (1990) also derives  $dm/dy < 0$  for the public sector, but for a different reason: in his model  $y$  increases support for the incumbent relative to support for his challengers.

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Proposition 4. (Lipset Hypothesis) Economic development decreases the supply of freedom. Therefore, economic development is more likely to foster democracy to the degree that the income elasticity of freedom demand exceeds its price elasticity in magnitude and human capital (rather than natural resources) is the source of development.

## VI. Conclusions

Our paper adapts and extends models of private sector patent races to analyze the causes and consequences of competitiveness in the public sector. Some of our results are familiar from the private sector literatures, although sometimes unappreciated in discussions of the public sector. If we are right that the economic theory of competitiveness applies to both the private and public sectors, our approach greatly widens the range of empirical observations than can be used to make predictions about political behaviors, and widens the ranges of empirical observations that can be used to make predictions about private industrial behaviors.

One of the familiar private sector results – arguably applicable to political behaviors – is that competitiveness can be measured in several ways. In our model, the size  $b/y$  of the entry barrier relative to challenger opportunity cost is one measure, and is conceptually closest to POLITY IV and other empirical indices constructed by political scientists.  $ch$ , the hazard of the incumbent 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 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. Just as commentators in the I-O literature questioned the Justice Department’s pursuit of anti-trust cases based on industry concentration,<sup>46</sup> our model suggests that regimes with few challengers may nonetheless be quite democratic in the sense that entry barriers and markup rates are low. 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

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<sup>46</sup>See Demsetz (1973), Baumol, Panzar, and Willig (1982), Sutton (1991), and Baldwin and Gorecki (1994).

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 profit rate  $m$  is commonly used to measure noncompetitiveness in private sector studies, and it would be interesting to examine such measures for the public sector. However, recall our finding that comparative statics for the markup rate are smaller when entry barriers are endogenous than exogenous (as in many private sector models). Furthermore, in the public sector application,  $m$  itself need not create efficiency costs, whereas public sector entry barriers have the dual marginal costs of maintenance  $\beta b$  and citizen loss of utility of freedom  $u_f(1-b/y)$ . 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. 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 citizen’s 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. We suspect that, as with anti-trust policy applied to the private sector, it matters exactly how “competitiveness” is measured for the purpose designing foreign policies that promote democracy. Future research can

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

Market power is more profitable in a large market than in a small one, and this insight applies to the public sector as well. Both efficiency and leadership incentives imply that nondemocracies should take more steps to acquire people and territory, and that democracies should not fight with each other. The democratic peace literature interprets this behavior in terms of democratic morals, or the incapacity of democratic leaders to make important decisions, but our model suggests that a democratic peace might be observed even in the absence of these factors, merely because of the economics of 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 and 2005. 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 (see our Section V). Higher entry barriers tend to discourage challengers. 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 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.

## **VII. Appendix I: Deadweight Costs and the Effect of Regime on General Public Spending**

As shown by Hamilton (1986) and Becker and Mulligan (2003), one type of public spending can crowd out another due to the deadweight costs of taxes, even when the spending is on transfers and there would otherwise be no income effect. For our purposes, this means that support is nonseparable between  $x$  and  $my$ , because tax revenue for the leadership raises the marginal cost of obtaining public revenue for other purposes. The quantitative significance of this effect can be

calculated directly from a flypaper parameter  $\theta \in [0,1]$ , namely the amount by which extra government revenue is used to raise spending rather than cut taxes.<sup>47</sup> If the effect of autocracy on  $m$  is  $\Delta$ , then the effect on other public spending (as a fraction of  $y$ ) is  $-\theta\Delta$ , and the effect on total taxes (including  $mNy$ ) is  $(1-\theta)\Delta$ . Mulligan, Gil, and Sala-i-Martin (2004) estimate  $(1-\theta)\Delta = 0.03$ , since they find taxes in the most oppressive regimes' to exceed taxes in the least oppressive regimes by 3% of GDP. If the typical flypaper effect estimate (see Hines and Thaler, 1995, for a survey) of 0.6 applies here, then  $(1-.6)\Delta = 0.03$ ,  $\Delta = 0.075$ , and  $\theta\Delta = 0.045$ . On the other hand, Mulligan, Gil, and Sala-i-Martin estimate various categories of nonmilitary public spending (like health, education, pensions, and welfare) to be uncorrelated with democracy – the 0.03 tax difference can be attributed almost entirely to military spending – which (given  $(1-\theta)\Delta = 0.03$ ) may suggest that  $\theta = 0$ ,  $\Delta = 0.03$ , and  $\theta\Delta = 0$ . These estimates from the tax and spending sides of the budget give us a range for  $\theta\Delta \in [0,0.045]$ . Given that average spending in democracies is about 25% of GDP for the period 1960-90, complete autocracy depresses government spending for the general public by 0 to 18%, which might be neglected to a first approximation.

### VIII. Appendix II: Regime and Policy Horizons

According to a literal interpretation of our model, a leader's expected remaining lifetime is  $1/(ch)$ , so that democratic leaders have short tenures by definition. Turnover is indeed one (of many) indicators of healthy competition. Bueno de Mesquita et al. (2003) has found that nondemocratic regimes last longer than democratic regimes. Useful extensions of our model might recognize that leaders face multiple threats to their tenure, some of which cannot be alleviated with popular support. For example, a leader may be threatened by foreign armies or other parties.

Another question is whether a leader's policy horizon coincides with his expected tenure. If so, and democracies have greater turnover, are democracies expected to be relatively short-sighted in their policy choices? In our model, even if a leader has a short expected lifetime, it does not mean that he prefers public policies with short term benefits. Our Proposition 1 says that he implements policies that give him support; to a first approximation it is the horizon of the supporters that matters

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<sup>47</sup>The flypaper parameter can be derived from a model of public spending and deadweight costs (as shown by Hamilton, Becker, and Mulligan), and its magnitude depends on the first and second derivatives of deadweight costs, expressed as a function of tax collections.



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for the public policy horizon. Thus, the joint interests of citizens and incumbent leadership are relevant. Consider, for example, policies affecting the tax base  $y$ . A dictator expecting to survive  $1/(ch)$  periods obtains (per capita) revenue equal to  $my/(r+ch)$  in present value terms, while the citizens retain  $(1-m)y/r$ .<sup>48</sup> That leaves  $[my/(r+ch)](ch)/r = my/[r(1+r/ch)]$  for all future leaders. If the future leaders have less influence on current policy than do citizens and incumbent leaders, and  $m > 0$ , then current policy will excessively discount the future tax base. However, the future leader term  $my/[r(1+r/ch)]$  may or may not increase with democracy because democracies have less  $m$  but shorter expected tenure for a given  $m$ . Thus, while Hoppe (2001) and Olson (1991) conclude that the public sector could be more efficient when ruled by dictatorship – because dictators are supposed to have long horizons and  $c = 0$  – our model with  $c > 0$  suggests that more work is needed to fully work out the relationship between competitiveness and policy horizons.

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<sup>48</sup>Recall that  $y$  is income per capita,  $m$  is the leadership's "markup rate,"  $c$  is the number of challengers,  $h$  is the success hazard of each challenger, and  $r$  is the interest rate.

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