When Are Autocracies Economically Efficient?

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1 Introduction

A rich tradition of research in political development suggests that democracy is a luxury good. Lipset's original (1957) essay noted the strong correlation between affluence and democratic institutions, and this pattern continues through to the present day. Although there is some debate as to whether improving economic conditions actually *cause* democratic transitions[1], recent evidence in Bates, et. al. (2003) points to the conclusion that newly democratic states with low standards of living are even more vulnerable to episodes of serious instability or collapse than are either autocracies or full democracies.

It seems, then, that the most stable path to democracy runs through a prosperous dictatorship. This leads us to our main question: Why do some countries living under dictators experience relatively high growth, while others do not? Indeed, autocracies exhibit greater variation in growth rates than do either partial or full democracies. Countries like Singapore, Portugal, Greece and Spain averaged growth rates in excess of 6% per annum under dictatorship, while many others, including Haiti, Ghana, Iran and Guyana, have negative average growth. Why such disparities?[2]

[1] Przeworski (1991) argues that nothing predicts transitions up to democracy but, once there, good economic conditions help prevent backsliding to autocracy. But see Epstein, et. al. (2003) for a counterargument, showing that higher GDP per capita does predict transitions out of autocracy to partial, or unconsolidated democracy.

[2] We can pose the theoretical question even more sharply: Why would autocracies not be run efficiently? After all, autocrats are the residual claimants for their countries' economic activity, so they should have incentives to run their countries efficiently, pay off whoever needs to be paid off, and take the rest for themselves.

Add to these observations the fact that billions of dollars in foreign aid (and sanctions) are spent yearly trying to affect the economic incentives of dictators, and the puzzle of efficient autocrats becomes even more pressing. Barro (1997, 50) puts the matter succinctly: "History suggests that dictators come in two types: one whose personal objectives often conflict with growth promotion and another whose interests dictate a preoccupation with economic development.... The theory that determines which kind of dictatorship will prevail seems missing." The present essay is an attempt to take a first step towards answering this need.

Politics-based explanations for the economic performance of autocracies center on the dual effects of insecure property rights and pressures for redistribution. Autocracies extract rents through force, meaning that property rights in such societies are not perfectly secure and, consequently, members of society spend an inefficient amount of resources trying to defend their property against state predation.[3] Both state and society might prefer firm limits on the government's power to extract resources, but autocrats cannot commit to long-term contracts, as their absolute power gives them the power to abrogate such contracts whenever they see fit. Thus autocrats' own power works against them, creating a perpetual drain on society's resources.

In addition, politicians must often trade economic rents for political support in order to maintain power. Lobbying models such as those of Bhagwati

[3]See Grossman (1991, 1995) and Grossman and Kim (1995, 1996) for formal models of these processes.

(1982), Findlay and Wellisz (1982), and Grossman and Helpman (1994, 1995) have established that competition among groups for these rents often leads to economically misguided policies and resource dissipation. Since autocrats are not bound by electoral constraints, they may be more able to resist such pressures while pursuing growth-oriented policies, and thus be relatively efficient. Again, though, violence plays an important role in the calculations: dictators do not possess an absolute monopoly on the ability to exert force, and as such they must often seek support from various segments of society.

With this background, the present paper develops a model of policy making by autocrats seeking social support, in a setting characterized by insecure property rights. To model the violent underpinnings of rent extraction, we employ techniques developed by Hirshleifer (1991; 1993), Findlay (1994), Garfinkel (1994), and Skaperdas (1995), among others, to study the allocation of resources to conflict.

Our approach synthesizes recent work on comparative political institutions being developed in both economics and political science (Shugart and Carey 1992; Huber 1996; Besley and Coate 1997; 1998; Persson, Roland and Roubini 1998; Rosendorff 2000); and Diermeier and Fedderson 1998, for example) with the more traditional literature on politics, markets, and economic growth (North and Thomas 1973; North 1981; Bates 1981; Przeworski 1991).[4] From the comparative political economy literature we take the

[4]Grossman (1999) explores the timing of successful revolutions as a game between rival "kleptocrats." Here the two kelptocrats co-exist; we call them branches of government.

assumption that institutions matter; that the particular details of political arrangements are the basis for overall economic performance. However, the mechanisms for policy formation and execution are assumed to be different in developing economies. As emphasized in the traditional literature, policies are not simply the result of a decision by a central government that is subsequently put directly into practice; rather, policy results from a negotiation process among the different groups that hold power in society.

Briefly, our model features two social sectors (capital and labor), and a government which cares both about its political support and the economic rents it can extract. The government in our model chooses the level of resources it plans to use to extract rents, aware that while increased rents are good for the government, they come at the cost of lower political support. Moreover, attempts at rent extraction are matched with wasted resource expenditure by the groups whose assets are under attack; higher extraction is thus met with larger efforts at protection. We examine both the impact of a predatory government on economic efficiency and the ability of political institutions, such as federalism, to mitigate the inefficiencies that arise in such a system.

We find that autocracies are efficient when the autocrat receives his political and economic support from the same sector, and inefficient when these sources of support come from different sectors. Furthermore, if the autocrat is forced to share power (say with local leaders), then the gains or losses in

efficiency depend on the rules governing the collection and sharing of taxes. If revenues are shared according to a fixed rule, then outcomes are more efficient. But if, on the other hand, the rents extracted are shared according to the contributions to the contest, then society is worse off than before. So a federalist system is not sufficient to ensure less dissipation; the institutions that govern the bargaining between federal and state governments also matter.

The following section explains the basic workings of our model, after which we derive equilibria in systems with one autocrat, with federalism and a fixed sharing rule, and federalism with a proportional sharing rule, respectively. The final section concludes and points to directions for future research.

2 The Political Economy of Autocracy

We model a country with two (productive) groups in society, the owners of capital (K), the owners of labor (L), and a government that implements a tax at rate t and provides a set of public goods necessary for production, T. For now we consider the government to be a unitary actor, labeled A; we will later divide it into more branches.

A single consumption good can be produced using one of two technologies. The first is a market technology, with a standard constant returns to scale production function in $K$and L, $F^m(K, L^m)I\left(T_G\right)$, where L^m is the labor

time allocated to market production by workers, and $I(T)$ is an indicator function that takes on the value of 1 if $T_G \geq \overline{T}$, and 0 otherwise.

The second technology is a non-market, "subsistence" technology $F^s(L^s) = L^s$, where L^s is the labor allocation to subsistence production. Of course, $L^m + L^s = L$, and public goods are not necessary for positive output in this sector.

The units of the output are chosen such that its price is 1, and therefore the nominal wage is also 1. The capital-owners receive the residual $R(K, L^m, \{T\}) = F(K, L^m) I(T) - L^m$ once L^m and T are chosen. Since the wage rate is fixed at 1, $R(K, L^m, \{T\})$ can thus be interpreted as the earnings of capital relative to labor.[5] We will denote R (without arguments) to be the value of $R(K, L^m, \{T\})$ when all resources are optimally employed and $T \geq \overline{T}$.

2.1 Players' Utilities

Utility for capital owners is expressed as after-tax income:

$$\begin{aligned} U^K(k, R) &= (1-t)R - k \text{ when } T \geq \overline{T} \\ &= 0 \text{ otherwise,} \end{aligned} \tag{1}$$

[5] Capital is exogenously supplied and there is no alternative use to which this capital can be put that yields a positive return.

where t is the tax rate (determined endogenously), and k is a measure of the allocation of resources by the K-owners to political contest; that is, the struggle between the government and producers over the level of taxation. Labor receives income L which is not taxed; its utility is

$$U^L = L. \tag{2}$$

The autocrat is concerned with *political support*, garnered from the two productive groups, capital owners and labor owners, and the amount of *rents* extracted from the capital owners. The autocrat's utility function thus balances the desire for political support (M) against the gains from (net) rent extraction, N:

$$\begin{aligned} U^A(g, R, T) &= M + \alpha N \\ &= \beta U^K + (1-\beta) U^L + \alpha (tR - T - g), \end{aligned} \tag{3}$$

where $\beta \in (0, 1)$ is an exogenous measure of the relative weight of the interests of capital owners relative to labor in government's political support function, $\alpha > 0$ is the relative weight placed on net rents, and g is a measure of the resources that government must allocate to political contest. In various contexts, β could stand for votes derived from the two sectors; it might denote the armed strength of each sector or a more general capacity for armed disruption through riots and work stoppages; or it might denote racial or

ethnic factors leading one group to support the government at a higher rate. Finally, α denotes the value in terms of political support of a dollar of net rents.[6] Notice that rents are net of any purchase of public goods necessary to induce profitable production to take place.

The need for political support may derive from a variety of sources: it may reflect electoral support within a set of democratic institutions; it might reflect a desire to reward friends in one sector or another of the economy in return for political and financial support, a la crony capitalism; it may reflect the desire of the ruler to ward off insurrection, an event more likely as welfare falls (this is explored in relation to the transition away from apartheid in Rosendorff (1998)). Future work could explore these foundations in greater detail; here, we leave the support function as general as possible.

2.2 Taxes

The ruler is able to tax the capital owners, with the tax rate determined as the outcome of a contest: the government attacks the earnings of capital by spending g on the contest. Capital owners defend themselves against this predation by spending k. Labor is not taxed; it is assumed that the rents in this sector are marginal compared with the capital sector, so that it is not worth the government's while to establish a tax collection system here. The

[6]The objective function in equation (3) is consistent with those used in models of the political determination of policy variables. See Grossman and Helpman (1994) in the case of tariff formation, and Hillman (1989) in the case of protection for declining industries.

share of the earnings of capital that is extracted by government is given by the contest success function:

$$t(g,k) = \frac{g}{g+k}. \tag{4}$$

In its simplest form, this contest function could represent the result of actual armed conflict between the sovereign and capital owners, as might have been the case in medieval times, substituting land for capital, when kings waged wars against the barons. In a slightly more civilized vein, resource extraction might take place under cooperative Nash bargaining, with the threat point determined by the expected outcome of a war, which in turn depends on the relative armories at each side's disposal. More bloodless still, rulers might have a monopoly on the use of force, but capital owners can protect their assets, at some cost, through such devices as offshore bank accounts, large sunk-costs investments in machinery, or creative accounting. Nor are contest elements completely absent in advanced industrial democracies; governments recruit large armies of bureaucrats to regulate and tax businesses, while capital owners dissipate resources hiring accountants of their own and lobbying government actors to reduce the effective tax incidence on their firms. The common thread through all these interpretations is that each side can influence the outcome of the contest at the margin by expending more resources, and that resources thus spent are not available for directly productive activities.

The mechanics of our model are displayed in schematic form in Figure 1. If the public good is provided, the economic sector produces output of size $F(K, L)$, which is divided between owners of capital and labor. A slice t of capital's share of this pie goes to taxes, where t is endogenously determined by the amounts g and k that the government and capital, respectively, contribute to the contest. Labor's utility is factored into the government's utility with a factor of $(1 - \beta)$, while capital's utility receives a factor of β. The amounts g and k represent utility losses to government and capital and, finally, tax revenue factors into the government's utility with a weight of α. If the public good is not provided, then the size of the economic pie shrinks to the slice marked with an "L", and the government receives utility only from Labor; it does not allocate resources to contest, and capital receives no returns at all.

2.3 Efficient Benchmarks

Note that it is efficient to provide the public good whenever the extra rents created by the market economy exceed the costs; that is, when $R \geq T$. Figuratively speaking, this outcome could be implemented by capital's simply "handing over" sufficient funds to the government to supply the good. Within the scope of our model, capital and government could allocate arbitrarily small amounts $\hat{k}$ and $\hat{g}$ to the contest such that

$$\frac{\hat{g}}{\hat{g} + \hat{k}} R \geq T.$$

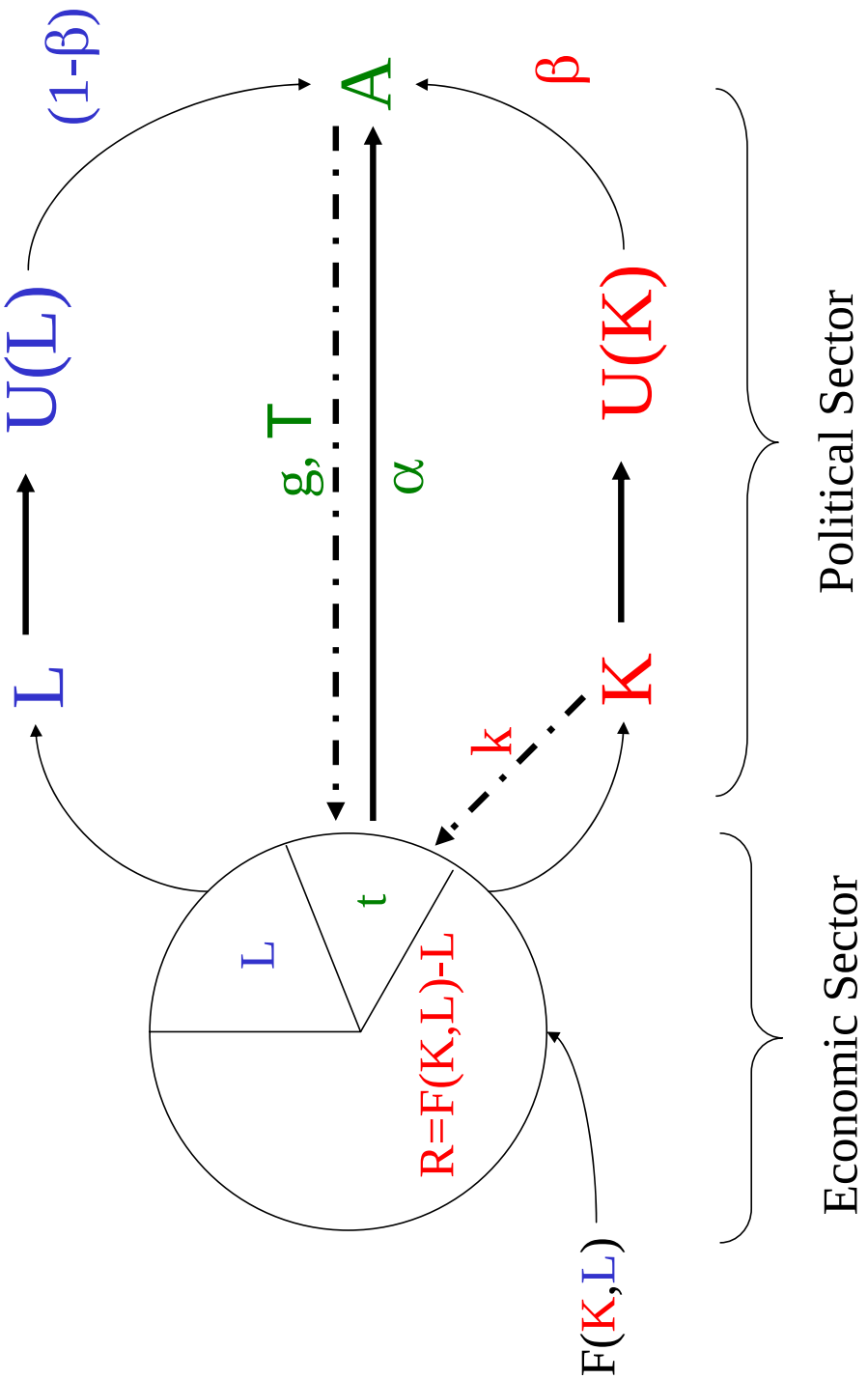

Figure 1: Production and Utilities

In our model, though, such behavior would not be in equilibrium; capital owners or government or both would have the incentives to allocate more resources to the contest; they have no way to commit to not doing so. The clash of resources devoted to the contest will instead produce (as we shall see below) an equilibrium tax rate $t^* < 1$, and the government cannot supply the public good without sufficient tax returns. So we can define the second-best efficient outcome, saying that the public good will be provided whenever $R \geq t^*T$. Hence we would expect that the public good will in some cases be underprovided. We will examine below under what circumstances even this weaker standard of efficiency can be met.

3 Autocracy

We first examine the behavior of this model under the basic institutional setting in which the government is represented by a single extractor, called an autocrat A who spends resources a on the contest. Then $U^A(a) = \beta U^K + (1-\beta)U^L + \alpha(tR - T_A - a)$ when $T_A \geq \overline{T}$, and $(1-\beta)U_L$ otherwise. Substituting equations 1, 2, and 4 into this expression, we have

$$\begin{aligned} U^A(a, R, T_A) &= \beta\left(\left(1 - \frac{a}{a+k}\right)R - k\right) + (1-\beta)L \\ &+ \alpha\left(\frac{a}{a+k}R - T_A - a\right) \\ \text{subject to } \overline{T} &\leq T_A \leq \frac{a}{a+k}R, \end{aligned}$$

and from equation 1 we have

$$U^K(k,R) = \left(1 - \frac{a}{a+k}\right) R - k \text{ when } T_A \geq \overline{T}; \text{ zero otherwise.} \quad (5)$$

In equilibrium, if the public goods provision is below the threshold $\overline{T}$, the capital owners do not bother to invest, or produce, and hence pay no tax. On the other hand if the public goods provision meets the threshold in any equilibrium, both players will choose their contest levels (k and a) taking the behavior of the other as given, bearing in mind the effect of the outcome of the contest on the tax rate and hence on each of the players' earnings. The equilibrium is calculated by deriving the reaction functions of each player A and K to contest expenditures by the other.

Capital owners maximize (5) subject to a non-negativity constraint ($k \geq 0$) and a "budget" constraint (they can't spend resources on conflict that they don't expect to own in equilibrium), i.e. $k \leq tR$.

For the capital owners, the first order condition (when a and k are non-zero) is

$$\frac{d}{dk} U^K(k,R) = -\frac{-aR + a^2 + 2ak + k^2}{(a+k)^2} = 0.$$

Solving for k, and checking the second order condition, we get the capital-owners' reaction function

$$k(a,R) = -a + \sqrt{aR}. \quad (6)$$

For the autocrat, solving for a (and checking the second order condition) we get the reaction function:

$$a\left(k,R\right)=-k+\sqrt{Rk\left(1-\frac{\beta}{\alpha}\right)}. \tag{7}$$

Clearly, α must be greater than β for $\left(1-\frac{\beta}{\alpha}\right)$ to be positive, and it approaches 1 as α becomes large. Solving equations (6) and (7) simultaneously and simplifying, we find the Nash equilibrium pair of actions:

$$\begin{aligned}\left(a^{A},k^{A}\right) &= \left(R\frac{\left(\alpha-\beta\right)^{2}}{\left(2\alpha-\beta\right)^{2}},\alpha R\frac{\alpha-\beta}{\left(2\alpha-\beta\right)^{2}}\right) \text{ whenever } T\geq\overline{T},\\ &= \left(0,0\right) \text{ otherwise.}\end{aligned}$$

Note first that resources are expended in contest only when α is sufficiently larger than β, or when the elasticity of substitution between political support and net rent is sufficiently larger than the relative influence of capita owners on political support. Otherwise neither side spends resources on contest, the public good is provided, and the equilibrium tax rate is 0. So autocrats sensitive to their political constraints will enact efficient policies; it is the politically secure autocrats who care more about extraction that produce the greatest welfare loss.

Also, the expenditures by both the autocrat and the capital owners rise with R, the capital-labor earnings ratio. Note too that R rises with K; therefore expenditures by both groups rise as there are more earnings to be

taxed—as the pie gets bigger.

The equilibrium tax rate is $t^A = \frac{a^A}{a^A+k^A} = \frac{\alpha-\beta}{2\alpha-\beta}$, which depends only on the relative political support that the autocrat receives from capital and labor, and tradeoff between net rents and political support, and not on R (or K). When $\beta = 0$, so that the autocrat places all his utility weight on labor, both the autocrat and capital owners devote resources $\frac{R}{4}$ to the contest in equilibrium and the tax rate is $\frac{1}{2}$. When $\beta = 1$, so that the autocrat cares only about capital, then, as would be expected, neither devotes any resources and the tax rate is 0. Importantly, then, the autocrat in this model is never maximally extractive; even when he derives all his political support from labor, the equilibrium tax rate is bounded above by $\frac{1}{2}$. This derives from the fact that each marginal unit of taxation brings the autocrat extra income of $(\alpha - \beta) R$, which is constant in a, and costs him $\frac{(a+k)^2}{k}$ in utility to extract, which is rising in a. Even when the ruler does not care politically about the capital sector's lost utility, then, past a certain point the extra income gained through higher taxation is dissipated in collection costs.

Figure 2 displays the equilibrium graphically. Typical reaction curves of capital owners and the government are indicated, as well as the resulting contest equilibrium. Note that K's reaction function crosses the y-axis at R, while G's reaction function crosses at $\left(1 - \frac{\beta}{\alpha}\right) R$. As the value of $\left(1 - \frac{\beta}{\alpha}\right)$ declines, so that tax revenues are less important to the autocrat relative to political support, the curve moves down, indicating that the autocrat ex-

pends fewer resources on the contest for any given level of k. The figure also makes it clear that as R grows, each of the reaction curves moves outwards proportionally, so that the level of contest spending rises, but not the equilibrium tax rate, which is determined by the curves' intersection relative to the origin.

The total resources dissipated on contest activities (labeled D^A) will be the sum of attack and defense expenditures:

$$D^A = a^A + k^A = R\frac{\alpha - \beta}{2\alpha - \beta}.$$

Notice that $D^A = Rt^A$, so that the economic inefficiency generated within the system is equal to the total taxes collected. After $\overline{T}$ is allocated to the public goods provision, the surplus, the "pure dissipation" accrues to the executive.[7]

We can use these results to specify the conditions under which an autocrat is extractive, and alternatively the conditions under which the autocracy is benevolent, or non-extractive.

Lemma 1 *An autocracy is extractive whenever* $\frac{\alpha}{\beta} > \pi^A$. *Otherwise it is non-extractive.*

Proof. $D^A > 0$ whenever $\alpha > \beta\pi^A$; $D^A = 0$ otherwise. ■

[7]In the present model, this dissipation comes directly from after-production capital income; but the same qualitative conclusions would hold in a model where resources spent on contest were diverted from other productive employment.

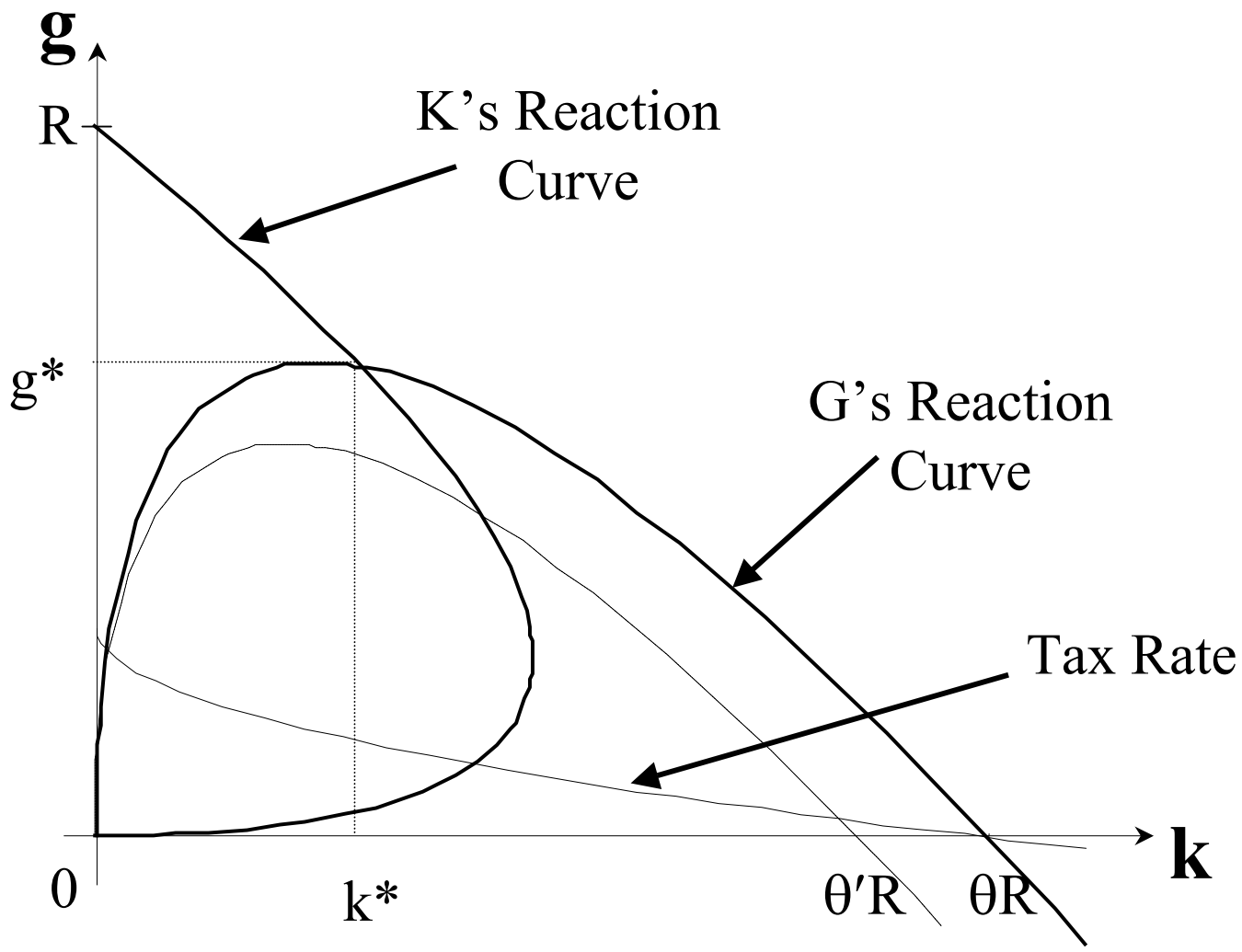

Figure 2: Production and Utilities

Summarizing the results of this section, we predict that autocrats will extract rents through contest activities, but their proclivity to do so will be restrained by three factors: their desire for political support from certain segments of the population; the loss in economic efficiency resulting from the extraction of resources; and capital owners' defense of their earnings through counteractive contest spending. Our model can thus provide a rationale for the phenomenon noted, for instance, by Bates (1981), in which governments engage in economically unsound policies in order to shore up their political support among certain key groups; here, a government which draws backing from labor groups will tax capital at a higher rate. To put it another way, economic inefficiency arises here from a mismatch of economically productive resources and political alliances. Were the government aligned with capital owners instead–the taxable sector–then no waste on contest would result. But to the degree that governments derive tax revenues and political power from different sources, they will engage in directly unproductive extraction contests, to the greater social detriment.

4 Federalism

Now consider the possibility that the government is itself divided into a federal and state level, each of which can engage in contest activities. The question is the degree to which political institutions can alleviate the inefficiencies derived in the previous section. There are two identical players in

government, labeled C and S for central and state governments. We assume that

$$F^m(K, L^m)\Pi_{G\in\{C,S\}} I\left(T_G\right),$$

where L^m is the labor time allocated to market production by workers, and $I\left(T_G\right)$ is an indicator function that takes on the value of 1 if $T_G \geq \overline{T}$, and 0 otherwise. So unless a critical threshold level of public expenditures takes place *by each branch of government*, output in the market sector falls to zero.[8]

4.1 Fixed Revenue Sharing

First, we assume that the division of revenues between the branches goes by a fixed formula; for simplicity, we assume that revenues are equally shared. This approach would apply to situations in which the allocation of tax revenues is known in advance, say through a budget or a fixed tax-sharing formula between the central government and states.[9]

Assume that the central and state governments contribute resources c

[8]The thresholds are assumed to be the same for each branch of government. Different thresholds add little to the analysis.

[9]Alternatively, we could adjust the production function to be non-convex is public goods from both branches: $F\left(K, L^M\right) I\left(T_S\right) I\left(T_C\right)$ where $I\left(T_i\right) = 1$ if $T_i > \overline{T_i}$ and 0 otherwise for $i = C, S$. The results are identical. We will adopt this specification in the next section.

and s to the contest, respectively. Then the equilibrium tax rate is now

$$t\left(s,c,k\right)=\frac{s+c}{s+c+k} \tag{8}$$

Each government player receives $\frac{s+c}{s+c+k}R$ and provides T for the public goods. Substituting equation (8) into (3)

$$\begin{aligned}
U^{S}\left(s,c;\beta,R\right) &= \beta\left(\left(1-\frac{s+c}{s+c+k}\right)R-k\right)+\left(1-\beta\right)L \\
&\quad +\alpha\left(\frac{1}{2}\frac{s+c}{s+c+k}R-T_{S}-s\right) \text{ and} \\
U^{C}\left(c,s;\beta,R\right) &= \beta\left(\left(1-\frac{s+c}{s+c+k}\right)R-k\right)+\left(1-\beta\right)L \\
&\quad +\alpha\left(\frac{1}{2}\frac{s+c}{s+c+k}R-T_{C}-c\right) \\
\text{subject to } \overline{T} &\leq T_{G}\leq\frac{s+c}{s+c+k}R, \text{for } G=S,C.
\end{aligned}$$

And, as before,

$$U^{K}\left(k;R\right)=\left(1-\frac{s+c}{s+c+k}\right)R-k$$

whenever $T_{G}\geq\overline{T},G=S,C$ and zero otherwise.

Solving for the Nash equilibrium in contest allocations[10]

$$\begin{aligned}\left(s^F, c^F, k^F\right) &= \left(\frac{1}{2}R\frac{(2\beta-\alpha)^2}{(2\beta-3\alpha)^2}, \frac{1}{2}R\frac{(2\beta-\alpha)^2}{(2\beta-3\alpha)^2}, 2R\alpha\frac{\alpha-2\beta}{(3\alpha-2\beta)^2}\right) \\ &\quad \text{whenever } \frac{\alpha}{\beta} > \pi^F; \\ &= (0,0,0) \text{ otherwise,}\end{aligned}$$

where $\pi^F = 2\frac{1-\frac{\overline{T}}{R}}{1-3\frac{\overline{T}}{R}}$. Again, we require $t^F R > \overline{T}$, i.e. $\frac{\alpha}{\beta} > \pi^F$. Total resource dissipation is $R^F = s^F + c^F + k^F = R\frac{\alpha-2\beta}{3\alpha-2\beta}$ and the equilibrium tax rate is $t^F = \frac{s^F+c^F}{s^F+c^F+k^F} = \frac{\alpha-2\beta}{3\alpha-2\beta}$. As before, the amount spent on the contest by each player rises with the amount of resources R that are being fought over, but the equilibrium tax rate depends only on the politicians' relative preferences for political support and personal economic gain. Notice that total resource dissipation under federalism is

$$D^F = \sqrt{2Rc^F}. \tag{9}$$

Proposition 2 *$D^F \leq D^A$ for all $\alpha, \beta \in (0,1]$*

Proof. First note that $\pi^F > 2 > \pi^A > 1$ for $\frac{\overline{T}}{R} < \frac{1}{3}$. Then for $\frac{\alpha}{\beta} \leq \pi^A, D^F = D^A = 0$. If $\frac{\alpha}{\beta} \in \left(\pi^A, \pi^F\right)$, $D^F = 0 < R\frac{\alpha-\beta}{2\alpha-\beta} = D^A$. If $\frac{\alpha}{\beta} \geq \pi^F$ then $D^F = R\frac{\alpha-2\beta}{3\alpha-2\beta} < R\frac{\alpha-\beta}{2\alpha-\beta} = D^A$ iff $\frac{\alpha-2\beta}{3\alpha-2\beta} < \frac{\alpha-\beta}{2\alpha-\beta}$ iff $\frac{\alpha^2}{(2\alpha-\beta)(3\alpha-2\beta)} > 0$. Now $\frac{\alpha}{\beta} > \pi^S > 2 \Rightarrow \frac{\alpha^2}{(2\alpha-\beta)(3\alpha-2\beta)} > 0$. ■

[10] Notice that in any equilibrium with positive contest allocations implies that both P and C will also contribute to the provision of the public good.

This is a key result; federalism can decrease total resource dissipation. Interestingly, the tax rate under federalism is lower as well, as shown in the following proposition.

Proposition 3 *$t^F \leq t^A$ for all $\alpha, \beta \in [0,1]$*

Proof. For $\frac{\alpha}{\beta} \leq \pi^A, t^F = t^A = 0$. If $\frac{\alpha}{\beta} \in \left(\pi^A, \pi^F\right)$, $t^F = 0 < \frac{\alpha-\beta}{2\alpha-\beta} = t^A$. If $\frac{\alpha}{\beta} \geq \pi^F$ then $t^F = \frac{\alpha-2\beta}{3\alpha-2\beta} < \frac{\alpha-\beta}{2\alpha-\beta} = t^A$ iff $\frac{\alpha-2\beta}{3\alpha-2\beta} < \frac{\alpha-\beta}{2\alpha-\beta}$ iff $\frac{\alpha^2}{(2\alpha-\beta)(3\alpha-2\beta)} > 0$ which is true whenever $\frac{\alpha}{\beta} > \pi^F$ since $\pi^F > 2$. ■

Thus federalism with fixed revenue sharing offers the possibility of saving on resources dedicated to contest activities. Before exploring this result in more detail, we first analyze another flavor of federalism; one in which the various branches of government themselves fight over the spoils extracted from economic actors.

4.2 Conflict over Distribution

Assume now that the two players S and C divide the gains from extraction according to their relative shares in the contest. That is if $t(s,c,k) = \frac{s+c}{s+c+k}$ then the total rents available for distribution are $\frac{s+c}{s+c+k}R$. For each dollar of this surplus rent accumulated, S earns $\frac{s}{s+c}$, and C earns $1 - \frac{s}{s+c}$. The

objective functions for the two branches now take the form

$$\begin{aligned} U^C(s,c,R) &= \beta\left(\left(1-\frac{s+c}{s+c+k}\right)R-k\right)+(1-\beta)L \\ &\quad +\alpha\left(\frac{s}{s+c}\frac{s+c}{s+c+k}R-T_C-p\right) \text{ and} \\ U^S(c,s,R) &= \beta\left(\left(1-\frac{s+c}{s+c+k}\right)R-k\right)+(1-\beta)L \\ &\quad +\alpha\left(\left(1-\frac{s}{s+c}\right)\frac{s+c}{s+c+k}R-T_S-c\right) \\ \text{subject to } \overline{T} \leq T_G &\leq \frac{s+c}{s+c+k}R \text{ for } G=S,C. \end{aligned} \tag{10}$$

This would be the case if two independent entities were taxing capital, with the relative allocation of the revenues themselves divided according to the collection effort that each branch had exerted. Then the central government maximizes 10; differentiating with respect to c, taking s and k as given yields the reaction function $c=-(k+s)+\sqrt{\frac{R}{\alpha}(k(\alpha-\beta)+\alpha s)}$. Similarly for the state, yielding $s=-(k+c)+\sqrt{\frac{R}{\alpha}(k(\alpha-\beta)+\alpha s)}$. As before, the reaction function for capital is $k=-(s+c)+\sqrt{R(s+c)}$. Solving the three equations in the three unknowns and applying the symmetry condition (since C and S are identical), we have the Nash equilibrium in contest allocations

$$\begin{aligned} \left(s^D,c^D,k^D\right) &= \left(2R\frac{(\alpha-\beta)^2}{(3\alpha-2\beta)^2},2R\frac{(\alpha-\beta)^2}{(3\alpha-2\beta)^2},2\alpha R\frac{\alpha-\beta}{(3\alpha-2\beta)^2}\right) \\ &\quad \text{whenever } \frac{\alpha}{\beta}>\pi^D \\ &= (0,0,0) \text{ otherwise,} \end{aligned}$$

where $\pi^D = 2\frac{1-\frac{\overline{T}}{R}}{2-3\frac{\overline{T}}{R}}$. That is the equilibrium tax rate $t^D = \frac{s+c}{s+c+k} = 2\frac{\alpha-\beta}{3\alpha-2\beta}$, and therefore the equilibrium tax revenue is $2\frac{\alpha-\beta}{3\alpha-2\beta}R$. Revenue earnings must exceed the cost of public goods provision for each player to be willing to allocate to the contest initially. That is $2\frac{\alpha-\beta}{3\alpha-2\beta}R > \overline{T} \Leftrightarrow \frac{\alpha}{\beta} > \pi^D$. Notice too that $D^D = s + c + k = 2R\frac{\alpha-\beta}{3\alpha-2\beta}$.

Proposition 4 *$D^D \geq D^A \geq D^S$ for all $\alpha, \beta \in (0, 1]$*

Proof. First note that $1 < \pi^D < \pi^A$ for $\frac{\overline{T}}{R} < \frac{1}{3}$. If $\frac{\alpha}{\beta} \geq \pi^A$, then $D^D = 2R\frac{\alpha-\beta}{3\alpha-2\beta} > R\frac{\alpha-\beta}{2\alpha-\beta} = D^A$ iff $\frac{\alpha(\alpha-\beta)}{(3\alpha-2\beta)(2\alpha-\beta)} > 0$ which is true for all $\frac{\alpha}{\beta} \geq \pi^A > 1$. If $\alpha \in \left(\pi^D, \pi^A\right)$, $D^D = 2R\frac{\alpha-\beta}{3\alpha-2\beta} > 0 = D^A$; if $\frac{\alpha}{\beta} \leq \pi^D, D^D = D^A = 0$. An earlier proposition (Proposition 2) established $D^S \leq D^A$ over the same intervals. ■

What we have found is that when the contest allocations determine the share of the tax revenue, each player over-invests in contest. If on the other hand the shares are divided according to a rule that is independent of the contest allocation, free-riding dominates, and each player under-invests in contest.

5 Discussion

This paper examined the impact of politics on economic efficiency, employing a theoretical model in which tax rates are endogenously determined via a

contest between government actors and their constituents. The taxed sector, capital in our model, must divert otherwise productive resources towards fending off the government's "grabbing hand", in the terminology of Shleifer and Vishny (1998). We investigated three variations on the basic model: one in which the government is represented by a single individual, or autocrat, another in which the government is characterized by federalism and all tax revenue is shared between the branches in a fixed proportion, and a third in which interbranch revenue sharing was proportional to the amount of resources expended by each branch extracting revenue.

Our results indicate, somewhat surprisingly, that the introduction of federalism does not always guarantee more efficient outcomes; in particular, federalism with fixed sharing is more efficient than autocracy, but under proportional sharing it is less efficient. From an economic perspective, this is a statement about the fundamental game being played between the branches: with fixed sharing, resource extraction is a prisoners' dilemma, leading to free riding and relatively less effort devoted to resource extraction. With proportional sharing, the game becomes a common pool problem, leading the branches to devote "too many" resources to the contest.

From a political perspective, our findings lend a new perspective to the problem of transitions from autocracy. Our results imply that political institutions can help restrain government and hence improve economic efficiency, but only if they are well-regulated in the sense of having an enforceable,

predetermined allocation of tax revenues. Absent these types of background institutions, autocracy may well be economically more efficient than a more democratic federalist arrangement. If governments are just mafias, that is, extracting whatever they can from the productive sectors of society, and the choice is between a single extractor or multiple extractors, then a single autocratic extractor is more efficient.

Just as interesting as our findings on inefficiency are the conditions under which politicians extract nothing from the economy. This could result, in the first case, if politicians' taste for personal gain is low relative to their preferences for political support (α is small compared with β). Hence even dictators will leave the market sector alone if their economic returns at the margin mean less to them than the loss of political support from their favored group(s). Conversely, the worst situation economically occurs with a politically secure autocrat who can turn all his energies towards extracting resources for personal benefit.

The economy also becomes efficient if the government receives its support from the taxable sector, capital in our example. Resource dissipation is therefore a symptom of a mismatch between the economically productive segments of society and the politically influential sectors. This tension, when it arises, encourages politicians to interfere in markets, taxing those who matter less in their political calculus.

A number of extensions to our basic model come readily to mind. One

could allow the president and Congress to receive different levels of support from different sectors of society, leading to interbranch conflict not only over spending on contest activities but also on which sector should be taxed in the first place. One could ask under what circumstances the autocrat derives higher utility from a separate powers regime than from autocracy; this could lead to a theory of endogenous transitions away from dictatorships. Or one could have the government play a direct role in the market in one stage, and then tax it in the next, so as to be able to address questions about the circumstances under which privatization is efficient. As usual, we leave these possibilities to future work.