"MAKE US A KING": ANARCHY, PREDATION, AND THE STATE

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ABSTRACT

In order to enforce a collective choice to allocate resources to guarding against predators, producers must subject themselves to the state's sovereign power to tax and to spend. But, with these sovereign powers in hand the state can exploit the producers by taxing and spending for its own purposes. Using a general equilibrium model in which people can choose to be either producers or predators, this paper rationalizes the biblical request, "Make us a king." The analysis shows that, if the technology of predation is sufficiently good, then having a "king" is better for everyone, including both producers and potential predators, than not having a king, even though the king maximizes the consumption of a ruling elite.

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The threat of predation confronts producers with a dilemma. In order to enforce a collective choice to allocate resources to guarding against predators, producers must subject themselves to the state's sovereign power to tax and to spend. But, with these sovereign powers in hand the state can exploit the producers by taxing and spending to benefit a ruling elite.[1]

This dilemma was recognized even in biblical times. In First Samuel 8:4-22, the people of Israel are of one mind in requesting that the prophet Samuel "make us a king...[who] may judge us, and fight our battles", but Samuel warns the people that a king will impose heavy taxes for his own purposes and cause them "to cry out in that day because of your king whom ye shall have chosen you". Despite Samuel's apt warning of the potential for abuse of sovereign power, the Israelites concluded that having a king would be on balance better than not having a king. Indeed, almost all societies that have made the transition from hunting and gathering to settled agriculture and industry seem to have reached the same conclusion.

This paper rationalizes the biblical request, "Make us a king", by addressing within a rudimentary general-equilibrium model of production and predation the question of whether or not having a state is a Pareto improvement over anarchy.[2] Analysis of this model yields

[1]The ruling elite is a generic name for whatever group appropriates the net revenues of the state. The role of the ruling elite as residual claimant is analogous to the role of the owners of a private enterprise. Actual historical examples of ruling elites include a monarch and the royal court, the members of a ruling party, the military, the professional politicians, the bureaucrats, and, in contemporary American local government, the public employees' unions. In stable democracies the ruling elite typically includes a political establishment that is an implicit coalition of ostensible political opponents. As the *Wall Street Journal* (October 24, 1990) has observed about the American federal government, "Republicans and Democrats have forged a political class to divvy up the profits, fighting only over precisely how to pick pockets".

[2]The paper takes up the challenge posed by Michael Taylor (1982) to rationalize "the *primary* or *pristine* development of a state" within an isolated economy. An alternative would be to attempt to rationalize the formation of states as an equilibrium resulting from the interaction among societies. Taylor suggests that interactions among societies are mainly relevant to rationalize "*secondary* formations of states". Historically, as Taylor points out (page 130), "The formation of states in most societies has been the direct or indirect

a simple and weak, but sufficient, condition on the technology of predation under which everyone is better off with a state than under anarchy, even though the state maximizes the consumption of a ruling elite. To derive this condition the paper extends the framework of general economic equilibrium to allow people to choose to be either predators or producers. In this context predators are people who produce nothing, but live by appropriating the product of the producers. The analysis assumes that each person chooses to be either a producer or a predator depending on whether production or predation yields more consumption for him.[3]

The possibility that some people might choose to be predators causes producers to allocate resources to guarding against predators.[4] Guarding includes all actions that are costly but have the effect of decreasing the fraction of the production of consumables that predators appropriate. Examples of ways of guarding against predators include the locating of production in inconvenient but secure places, the production of things that are harder for predators to appropriate, the installation of locks, the building of walls, the hiring of private security guards, and the organizing of a police force. For simplicity, the present analysis

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result, in least in part, of the presence nearby of already existing states...Societies without a state are subjugated, colonised or absorbed by states." In the biblical story one of the reasons that the Israelites give for wanting a king is "that we also may be like all the nations". Taylor's book contains references to earlier literature on the formation of states. The reader also should note that providing a positive rationale for the state as a Pareto improvement is neither necessary nor sufficient to answer the normative question posed by political philosophers such as Hobbes, Nozick, and Rawls of whether or not the state is justified.

[3]In Herschel Grossman and Minseong Kim (1997a), we study a model in which only some people, whom we define to be amoral, are potential predators. The other people, whom we define to be moral, always choose to be producers, no matter how lucrative predation is relative to production. The analysis in the present paper implicitly assumes that everybody is amoral. Hence, in this analysis every person is a potential predator.

[4]Dan Usher (1987; also 1992, Chapter III) developed a pioneering general-equilibrium model in which people decide whether to be producers or predators and in which producers also decide how much time and effort to put into guarding against predators.

focuses on the total amount of resources allocated to guarding, abstracting from different ways of guarding.

The analysis begins by considering the allocation of resources to guarding against predators, and people's resulting choices to be producers or predators, under anarchy. In this context anarchy simply means that producers or small subsets of producers individually choose the amount of resources to allocate to guarding.[5] The important property of anarchy is that an individual producer or small subset of producers in choosing the amount of guarding takes both the amount of guarding chosen by other producers and the choices of other people to be either producers or predators as given.[6]

The analysis next introduces a state that can make and enforce an irreversible collective choice of the amount of guarding against predators.[7] The critical property of this collective

[5]According to this definition anarchy precludes the enforcement of collective choices either by a state or by informal social controls. This exclusive definition of anarchy, which accords with the usage by economists such as Usher (1992) and Jack Hirshleifer (1995), contrasts with an inclusive definition of anarchy according to which anarchy precludes specialized authorities who enforce collective choices but does not preclude informal social controls. This inclusive definition of anarchy is commonly used in the literature that treats informal social controls as an alternative to the state. See, for example, Taylor (1982, page 10), who writes, "All societies, even anarchies, use social controls...and...make collective decisions." In this passage Taylor also suggests that the exclusive definition of anarchy has no historical relevance. In contrast, the present paper abstracts from informal social controls and implicitly assumes that a state is necessary, as well as sufficient, to enforce collective choices.

[6]In this analysis, as Hirshleifer (1995, page 26) puts it, "Anarchy...is not chaos, but rather a spontaneous order". Hirshleifer's paper is concerned with the problem of the existence of an anarchic equilibrium. In contrast, the present paper is concerned with explicitly modelling the possibility that a state can be Pareto superior to anarchy.

[7]As noted above, this analysis implicitly assumes that a state is both necessary and sufficient to enforce a collective choice of the amount of guarding. In particular, this assumption abstracts from the possibility of assessments by consensus that are enforced by informal social controls. According to the exclusive definition of anarchy assessments by consensus would be an alternative to both the state and to anarchy, whereas according to the inclusive definition assessments by consensus would be a variant of anarchy. See Yoram

choice is that the state can take into account the deterrent effect of guarding on the fraction of people who choose to be predators. This analysis formalizes the idea that producers individually would allocate too little resources to guarding against predators because deterrence of predation is a non-excludable public good. In order to focus on the strategic advantage of collective choice, the analysis initially abstracts from the ruling elite and assumes that the state acts solely as an agent of the producers.

The analysis then turns to the realistic case of a proprietary state that maximizes the consumption of a ruling elite.[8] The term "proprietary" emphasizes the analogy between this view of the state and the standard economic model of a profit-maximizing private enterprise. As noted above, the ruling elite as residual claimant to the net revenues of the state is analogous to the owners of a private enterprise.

The present model focuses on the constraint imposed on the proprietary state by the ability of people to avoid taxation by choosing to be predators rather than producers.[9]

Barzel (1996) for an interesting discussion of the distinction between taxes as compulsory payments enforced by the state and taxes as voluntary assessments.

[8]This analysis abstracts from the dubious possibility that producers can impose binding constitutional constraints on taxation and spending. In the biblical story, even though the state was formed at the initiative of the people, having subjected themselves to the state's sovereign power to tax and to spend, the producers cannot prevent the state from maximizing the consumption of the ruling elite.

[9]This modelling strategy attributes differences in economic policies to potentially observable differences in the constraints that proprietary states face at different places and times. More specifically, this modelling strategy presumes that economic policies accord either more or less with the interests of the citizenry not because ruling elites care either more or less about the welfare of their subjects, but because the actions or potential actions of their subjects constrain the policies of the state either more or less tightly.

In general the maximization of the consumption of the ruling elite is subject to both economic and political constraints. The economic constraints reflect the ability of producers to avoid or to evade taxation. The Laffer curve, on which there is an extensive literature, summarizes these economic constraints. See, for example, Herschel Grossman and Suk Jae Noh (1990, 1994) and Grossman (1995), which also contain references to earlier literature that develops the proprietary view of the state. The political constraint reflects the ability

The analysis reveals that, because of this critical constraint, the proprietary state allocates sufficient resources to guarding to deter predation, behaving in this respect as if it were an agent of the producers. Further, this analysis yields the main result of the paper: *Because the state is able to make and to enforce an irreversible collective choice to allocate resources to guarding against predators, if the technology of predation is sufficiently good, then a proprietary state is better than anarchy for everyone, including both producers and potential predators, even though the proprietary state maximizes the consumption of a ruling elite.*

1. Anarchy: Individual Choice of the Amount of Guarding

This section abstracts from both the state and the ruling elite. In this condition of anarchy each person potentially has to make two choices.

First, assuming, for simplicity, that each person specializes in either production or predation, each person must choose whether to be a producer or a predator. In making this choice each person takes as given his potential consumption as a producer or as a predator. Let r denote the nonnegative fraction of the people who choose to be predators and let $R \equiv \frac{r}{1-r}$ denote the ratio of predators to producers.

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of the citizenry to depose the incumbent ruling elite either by legal or extralegal means. Grossman and Noh and Usher (1992, Chapter IV) model the political constraint as an assumed effect of the incumbent ruler's policies on his survival probability. Grossman and Noh and Avner Greif et al. (1994) also allow for a binding time-consistency constraint on tax policy, another consideration from which the present paper abstracts.

In more closely related literature, Usher (1989; also 1992, Chapter IV), Kai Konrad and Stergios Skaperdas (1997), and Boaz Moselle and Ben Polak (1997) introduce a proprietary state into models in which people decide whether to be producers or predators. But, in contrast to the present paper, Usher and Konrad and Skaperdas do not derive conditions under which producers are better off with a proprietary state than under anarchy, whereas Moselle and Polak do not analyse the decision to allocate resources to guarding against predators and, hence, do not consider the state's strategic advantage in making and enforcing a collective choice of guarding. Also, some of these authors call the proprietary state "predatory", but it is not clear why the state warrants this pejorative term, which is not usually applied to profit-maximizing private enterprises.

Second, if a person chooses to be a producer, then he must allocate his resources between production of consumables and guarding against predators. Under anarchy producers, or small subsets of producers, make this choice individually, taking both the amount of guarding chosen by other producers and the choices of other people to be either predators or producers as given. Let g denote the nonnegative fraction of his resources that a producer allocates to guarding against predators, and let $G \equiv \frac{g}{1-g}$ denote the ratio of the resources that a producer allocates to guarding against predators to the resources that he allocates to the production of consumables.

Assume that each person has an identical exogenous endowment of K units of resources.[10] Further, to simplify the analysis of the choice between being a predator and a producer, assume that each unit of resources can produce one unit of consumables. The number of units of consumables that a person actually produces, equals the product of his resources and the fraction of his resources that he allocates to the production of consumables.[11]

Let Y denote production of consumables per capita. In this model, each producer makes the same choice of g and G. Consequently, we have

$$Y = (1-r)(1-g)K \equiv \frac{1}{1+R}\,\frac{1}{1+G}\,K. \tag{1}$$

A producer appropriates the nonnegative fraction p of the consumables that he produces, and predators appropriate the nonnegative fraction $1-p$. Assume that p depends negatively on the ratio of predators to producers, R, and positively on the ratio of resources allocated to guarding against predators to resources allocated to the production of consumables, G.

[10] In Grossman and Kim (1997b), we study an extended version of this model in which some people are well endowed with productive resources and other people are poorly endowed with productive resources. In this paper we analyse, among other things, how the ratio of predators to producers depends on the interpersonal distribution of productive resources.

[11] In this setup individual productive activities are independent. We also abstract from trade in either productive inputs or consumables.

Specifically,

$$p = \frac{1}{1 + \theta R/G}, \quad \theta \geq 0. \tag{2}$$

In equation (2), the nonnegative parameter θ determines the effectiveness of predators in appropriating consumables for given values of R and G. The larger is θ the better is the technology of predation.[12]

Let C denote the consumption of a producer. After allowing for the fraction of resources allocated to guarding against predators and for the fraction of consumables appropriated by predators, we have

$$C = p(1-g)K \equiv \frac{p}{1+G}\, K. \tag{3}$$

With individual choice of the amount of guarding each producer chooses G to maximize C, taking R as given. To analyse this choice problem we substitute equation (2) into equation (3) and calculate the value of G that satisfies the condition $dC/dG = 0$. This

[12]Equation (2) is a generic black box that conceals the process of predation, just as the standard generic production function conceals the process of production. For example, the relation between appropriative inputs and the appropriative outcome described by equation (2) could involve either the use of force or a peaceful settlement under the threat of force, although, strictly speaking, given complete information and the absence of stochastic factors, this model does not provide an internal explanation for costly violence. Dagobert Brito and Michael Intriligator (1985) address the question of whether appropriative conflict is resolved with or without violence and destruction, and emphasize the importance of incomplete information as a cause of violence. As Kevin Dowd (1997) points out, Hirshleifer (1995) is ambiguous about whether he wants to claim that appropriative interactions under anarchy are necessarily violent. The underlying problem, which Dowd does not identify, is that Hirshleifer's model, like the present model, cannot address the question of violence because Hirshleifer's contest success function, which is analogous to equation (2), is also a black box. Adding semantic confusion, Dowd offers the Law Merchant as an example of "peaceful anarchy". But, as described by Dowd, the Law Merchant utilized the social control of "economic ostracism", from which I infer that Dowd has in mind the inclusive definition of anarchy rather than the exclusive definition that is implicit in Hirshleifer's analysis.

condition implies that each producer chooses G such that

$$G = \sqrt{\theta R}. \tag{4}$$

In Figure 1 the concave positively-sloped locus represents equation (4).

Let D denote the consumption of a predator.[13] Assuming that each predator obtains an equal share of the total amount of consumables that predators appropriate, we have

$$D = \frac{(1-p)(1-g)K}{R}. \tag{5}$$

According to equation (5) D is a decreasing function of R and is well defined for positive values of R. Further, if R equals zero, then the value of D is defined to be $\lim_{R \to 0} D$, which, using equation (2), equals $\frac{\theta}{G}(1-g)K$.

To decide whether to be a producer or a predator, each person compares the values of C and D, taking G and R as given. By substituting equation (2) into equations (3) and (5), we can calculate that C is larger than, equal to, or smaller than D as G is larger than, equal to, or smaller than θ. Thus, the choices to be a producer or a predator are such that

$$R = \begin{cases} \infty & \text{for} \quad G < \theta \\ x \in [0, \infty] & \text{for} \quad G = \theta \\ 0 & \text{for} \quad G > \theta. \end{cases} \tag{6}$$

Equation (6) says that, if G were smaller than θ, then every person would choose to be a predator, that, if G equals θ, then every person is indifferent between being a producer

[13]For simplicity, the model assumes that predators only prey on producers. Predators do not prey on other predators. The model also abstracts from possible destruction of a some consumables as the result of predation. The models in Grossman and Kim (1995, 1996) show how destruction is easily incorporated into the analysis. In addition, we could modify the model to allow the activity of guarding to include the apprehension and punishment of predators. The apprehension and punishment of predators would not directly affect p, but would reduce the expected utility of predators.

or a predator, and that, if G is larger than θ, then every person chooses to be a producer. In Figure 1 the L shaped locus represents equation (4).

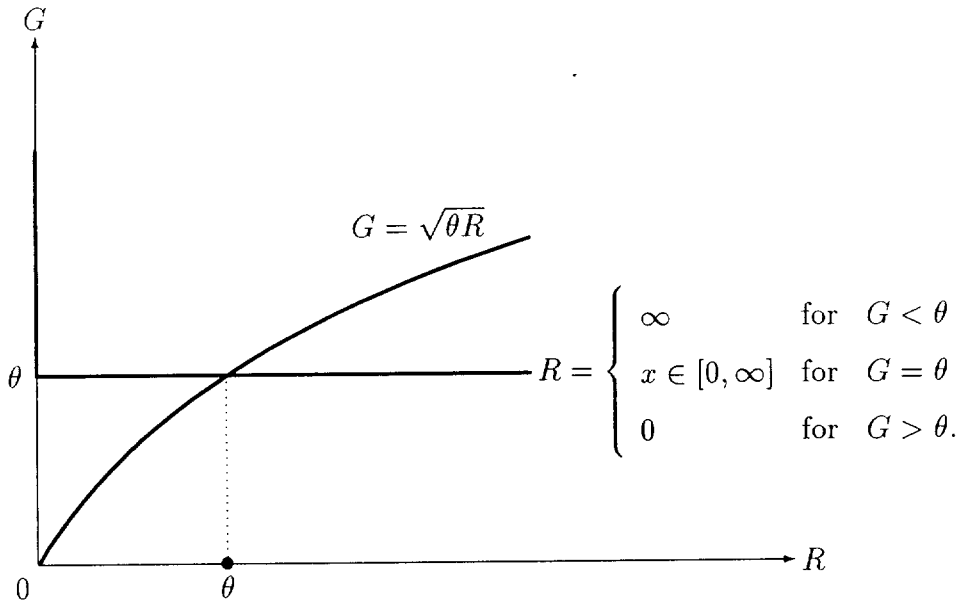

Figure 1: Anarchic Equilibrium

Solving equations (4) and (6) simultaneously, we find that, with individual choice of the amount of guarding, the equilibrium configuration of choices, as shown in Figure 1, is

$$R = G = \theta. \tag{7}$$

Equation (7) says that, with individual choice of the amount of guarding, both the ratio of resources allocated to guarding against predators to resources allocated to the production of consumables and the ratio of predators to producers are equal to θ. A ratio of predators to producers equal to θ is just sufficient to cause producers to choose G equal to θ, a choice that leaves each person indifferent between being a producer and a predator. Equation (7) also implies that $r = g = \frac{\theta}{1+\theta}$.[14] From equation (2), with $R = G = \theta$, p equals $\frac{1}{1+\theta}$.

[14] Although this model can determine the fractions of the people who choose to be producers and predators,

Substituting $R = G = \theta$ and $p = \frac{1}{1+\theta}$ into equations (1), (3), and (5), we obtain

$$Y = C = D = \frac{K}{(1+\theta)^2}. \tag{8}$$

Equation (8) says that every person, whether he chooses to be a producer or a predator, has the same consumption. More importantly, if θ is positive, then production of consumables is less than the potential production of consumables, which is K. This shortfall results because the fraction $\frac{\theta}{1+\theta}$ of the people choose to be predators, who produce nothing, and because producers allocate the fraction $\frac{\theta}{1+\theta}$ of their resources to guarding against predators.

Equation (8) also implies that, as shown in Figures 2 and 3 below, production of consumables under anarchy is a decreasing convex function of θ. This result obtains because the more effective are predators in appropriating consumables the more people choose to be predators and the more resources producers allocate to guarding against predators. The social cost of predation includes the wasted resources of predators plus the resources allocated to guarding against predators, what Usher (1992, page 48) in his discussion of the work of John Stuart Mill refers to as "the waste of labour when one man attempts to take property from another and the other is compelled to divert effort from production to defense."

2. Collective Choice of the Amount of Guarding with the State as an Agent of Producers

This section introduces a state that has the ability both to tax producers and to make an irreversible collective choice to allocate resources to guarding against predators. To bring out the importance of an irreversible collective choice of guarding, this section continues to abstract from the ruling elite and assumes that the state acts as the agent of producers by maximizing C, the consumption of each producer. An irreversible collective choice to allocate resources to guarding differs from an individual choice of G in that an irreversible collective choice can take into account both the effect of G on p for a given ratio of

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because each person have the same resource endowment, this model cannot determine which of the people choose to be producers or predators.

predators to producers and the effect of G on the choices of the people to be producers or predators.[15]

To enforce the allocation of resources to guarding, the state taxes the endowments of producers at rate t. Thus, with the state choosing the amount of guarding, the consumption of a producer, C, is

$$C = p(1 - t)K. \tag{9}$$

The model assumes, apparently realistically, that the state is not able to tax predators.

For tax revenue to be sufficient to pay for the amount of guarding that the state chooses, t must satisfy the fiscal budget constraint $t \geq g$. To maximize C the state would choose the lowest tax rate consistent with its choice of g. Hence, in this section the state chooses t to satisfy the fiscal budget constraint as an equality.[16]

Substituting $t = g$ into equation (9), we see that equation (9) becomes identical to equation (3). Thus, with the fiscal budget constraint satisfied as an equality, a comparison of the values of C and D still leads to choices to be a producer or a predator such that R satisfies equation (6).

Substituting equation (2), which determines the effect of G on p for a given R, and equation (6), which determines the effect of G on R, into equation (3), we find that the state maximizes C by setting

$$G = (1 + \epsilon)\theta, \tag{10}$$

[15]Because the model assumes that for each producer p depends only on R and on his own amount of guarding, the potential gain from collective choice of guarding involves only the strategic advantage from taking into account the effect of G on R. If p also depended either positively or negatively on the amount of resources that other producers allocate to guarding, then with collective choice of guarding the state also would take these technological externalities into account. Another possible complication from which we abstract is that some ways of guarding that can only be chosen collectively could be more efficient than other ways of guarding.

[16]This analysis abstracts from any resource costs associated with administering the collection of taxes.

where ϵ, a small positive number, is the smallest fraction by which the state can increase G. From equation (6), $(1+\epsilon)\theta$ is the minimum value of G that would result in an equilibrium in which R uniquely equals zero.[17] Equation (10) says that, in this model, to maximize C the state would make and enforce an irreversible collective choice that each producer should allocate a fraction of his resources to guarding against predators that is larger by a small amount than he would choose individually, just enough larger to deter all people from being predators.[18] From equation (2), with R equal to zero p equals one.

Substituting $R = 0$, $p = 1$, and $G = (1+\epsilon)\theta$ into equations (1) and (3), we obtain

$$Y = C = \frac{K}{1+(1+\epsilon)\theta}. \tag{11}$$

Comparing equations (8) and (11), we see that, with the state as the agent of producers making and enforcing an irreversible collective choice of the amount of guarding, although production of consumables is still less than potential production of consumables, production of consumables is larger than with individual choice of the amount of guarding. This improvement occurs because, by increasing G from θ to $(1+\epsilon)\theta$, the state is able to prevent the fraction $\frac{\theta}{1+\theta}$ of the people from choosing to be predators, whose resources would be wasted.

Equation (11) also implies that with the state acting as the agent of producers production of consumables is still a decreasing function of θ. This result obtains because the more

[17] If the state could assign people to be producers, subject to people being able to reject an assignment if it violates equation (6), then the state could set $G = \theta$ and also select $R = 0$. Given that ϵ is small, this possibility would not change the conclusions of the analysis.

[18] The implication that with $G = (1+\epsilon)\theta$ every potential producer chooses to be a producer requires the assumption that all people have the same endowment K. In reality some people have smaller endowments and, hence, less lucrative production opportunities than others. In a more general analysis, although the state typically would allocate a larger fraction of each producer's resources to guarding against predators than each producer would allocate individually, the state might not choose enough guarding to deter all of the relatively poorly endowed people from choosing to be predators.

effective are predators in appropriating consumables the more resources must be allocated to guarding against predators in order to deter people from choosing to be predators.

3. Collective Choice of the Amount of Guarding with a Proprietary State

This section introduces a ruling elite and assumes that, in taxing producers and in choosing the amount of guarding against predators, the state maximizes the consumption of the ruling elite rather than the consumption of each producer. Let E denote the consumption of the ruling elite, where[19]

$$E = Y - (1 - r)C - rD. \tag{12}$$

Equation (12) says that the consumption of the ruling elite equals production of consumables less the consumption of producers and predators. Substituting for Y from equation (1), for C from equation (9), and for D from equation (5) into equation (12), we obtain

$$E = (t - g)p(1 - r)K. \tag{13}$$

Equation (13) shows that for E to be positive the tax rate t must be larger than g, the fraction of resources allocated to guarding against predators, and that, for given values of p and r, the consumption of the ruling elite is increasing in the difference between t and g.

With t not necessarily equal to g, to decide whether to be a producer or a predator, each person, taking G and R as given, compares the value of C, as given by equation (9) rather than equation (3), with the value of D, as given by equation (5). By substituting equation (2) into equations (9) and (5), we can calculate that C is larger than, equal to, or smaller than D as $G(1 + G)(1 - t)$ is larger than, equal to, or smaller than θ. Thus,

[19]This analysis takes the existence and composition of the ruling elite as given. The existence of a viable state implies that the ruling elite is small enough that in equilibrium E multiplied by the number of producers and predators and divided by the size of the ruling elite is at least as large as C. Given this condition being a member of the ruling elite is at least as lucrative as being a producer.

the choices to be a producer or a predator are such that

$$R = \begin{cases} \infty & \text{for } G(1+G)(1-t) < \theta \\ x \in [0,\infty] & \text{for } G(1+G)(1-t) = \theta \\ 0 & \text{for } G(1+G)(1-t) > \theta. \end{cases} \tag{14}$$

Equation (14) says that, if $G(1+G)(1-t)$ were smaller than θ, then every person would choose to be a predator, that, if $G(1+G)(1-t)$ were equal to θ, then every person would be indifferent between being a producer or a predator, and that, if $G(1+G)(1-t)$ is larger than θ, then every person chooses to be a producer.

Substituting equation (2), which determines the effect of G on p for a given R, and equation (14), which determines the effect of G on R, into equation (13), we find that the state maximizes E by choosing G large enough and t small enough such that

$$G(1+G)(1-t) = (1+\epsilon)\theta. \tag{15}$$

From equations (2) and (14), we see that, with $G(1+G)(1-t) = (1+\epsilon)\theta$, R equals zero and p equals one. Thus, equation (15) implies that to maximize E, just as to maximize C, the state chooses to deter all of the people from choosing to be predators. Maximizing E implies deterrence because by deterring all of the people from choosing to be predators the state maximizes the tax base.

Next, we substitute $p = 1$ and $r = 0$ into equation (13), and we calculate the value of G that satisfies the condition $dE/dg = 0$, given that t and G satisfy equation (15). This condition implies that the state chooses G such that

$$G = (1+\epsilon)\theta + \sqrt{(1+\epsilon)\theta}\,\sqrt{1+(1+\epsilon)\theta}. \tag{16}$$

Comparing equation (16) with equation (10) we see that, with the state maximizing E, to deter all of the people from choosing to be predators the state must allocate more resources to guarding against predators than if it were maximizing C. This result obtains because

with t larger than g production is less lucrative relative to predation than with t equal to g. Equation (16) implies that G is again an increasing function of θ.

Combining equations (15) and (16) we see that the state chooses t such that

$$t = \frac{1}{1 + \frac{\sqrt{(1+\epsilon)\theta}}{[1+2(1+\epsilon)\theta][\sqrt{(1+\epsilon)\theta}+\sqrt{1+(1+\epsilon)\theta}]}}. \tag{17}$$

Interestingly, equation (17) implies that t is a U-shaped function of θ such that t equals almost one at θ equal to zero, t reaches a minimum that is much less than one at a positive value of θ, and t asymptotically approaches one from below as θ goes to infinity.[20] This property that either a very large value of θ or a very small value of θ results in a high tax rate obtains for two reasons. First, as we have seen, maximizing the consumption of the ruling elite implies maximizing the difference between t and g, given that the combination of t and g is such as to deter all of the people from choosing to be predators. Second, according to whether θ is large or small, the possibility of choosing to be a predator is a more or less attractive option for the people. Thus, if θ is small, then a high tax rate, and a small amount of guarding against predators, is consistent with deterring all of the people from choosing to be predators. At the other extreme, if θ is large, then a large value of G is necessary to deter all of the people from choosing to be predators, and a high tax rate is necessary to satisfy the fiscal budget constraint.

Substituting $R = 0$ into equation (1) we obtain

$$Y = \frac{K}{1+G}, \tag{18}$$

[20]The property of this model that the tax rate that maximizes the consumption of the ruling elite approaches one as θ becomes either very small or very large reflects the implicit simplifying assumption that the people can avoid taxation only be choosing to be predators. In more general models in which people also can engage in other nontaxable activities, like leisure or home production, or in which the survival probability of the incumbent ruling elite is a decreasing function of the tax rate, the tax rate still would be a U-shaped function of θ, but the tax rates associated with either very small or very large values of θ would be smaller than one.

where G is given by equation (16). Equation (18) implies that, as shown in Figure 2, production of consumables under a proprietary state is also a decreasing convex function of θ. Comparing equation (18) with equation (11), we see that, with the state maximizing the consumption of the ruling elite, because the amount of resources that the state allocates to guarding is larger than if the state were maximizing the consumption of each producer, production of consumables is smaller than if the state were maximizing the consumption of each producer. But, comparing equation (18) with equation (8), we find that, as shown in Figure 2, there exists a positive value of θ, denoted θ_1, such that, with the state maximizing the consumption of the ruling elite, production of consumables is larger or smaller than under anarchy as θ is larger or smaller than θ_1. This result obtains because for larger values of θ the ability of the state to enforce the choice of enough guarding to deter all of the people from choosing to be predators becomes increasingly important in mitigating the social cost of predation, even though deterrence is costly.

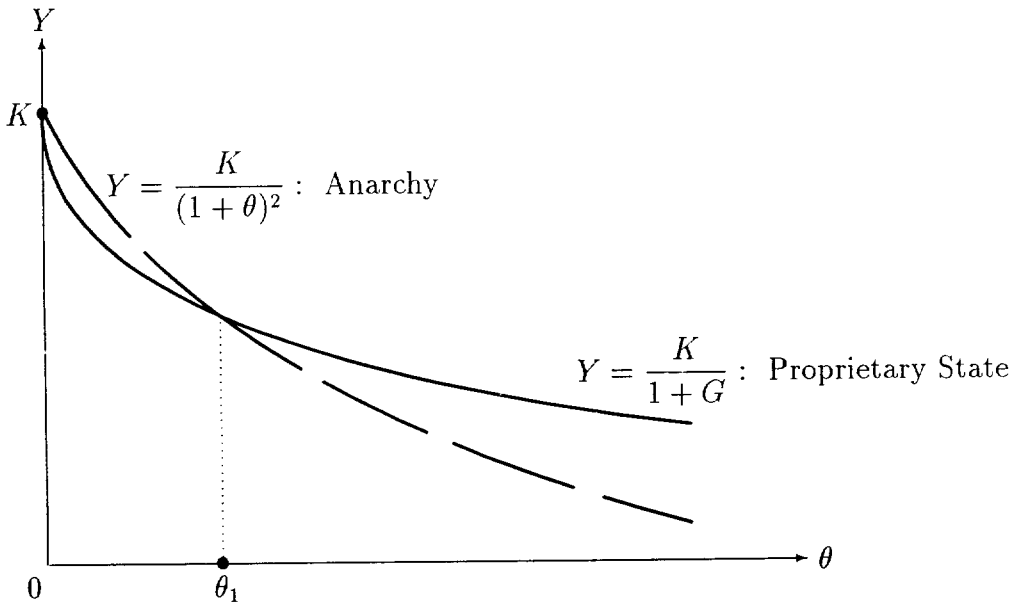

Figure 2: Production of Consumables

With $p = 1$ and $R = 0$, substituting equation (15) into equation (13), we obtain

$$E = \frac{(1+\epsilon)\theta}{G^2}K, \tag{19}$$

where G is given by equation (16). Equation (19) implies that the consumption of the ruling elite is a monotonically decreasing function of θ such that E is close to K at θ equal to zero, but E asymptotically approaches zero from above as θ goes to infinity.

Turning to the consumption of producers, given $p = 1$, equation (9) implies that

$$C = (1-t)K, \tag{20}$$

where t satisfies equation (17). Given the U-shaped functional relation between t and θ, equation (20) implies that, as shown in Figure 3, C is a hump-shaped function of θ such that C equals barely more than zero at θ equal to zero, C reaches a positive maximum at a positive value of θ, and C asymptotically approaches zero from above as θ goes to infinity. Interestingly, with the state maximizing the consumption of the ruling elite the consumption of producers is an increasing function of θ for small values of θ and becomes a decreasing function of θ only for large values of θ.

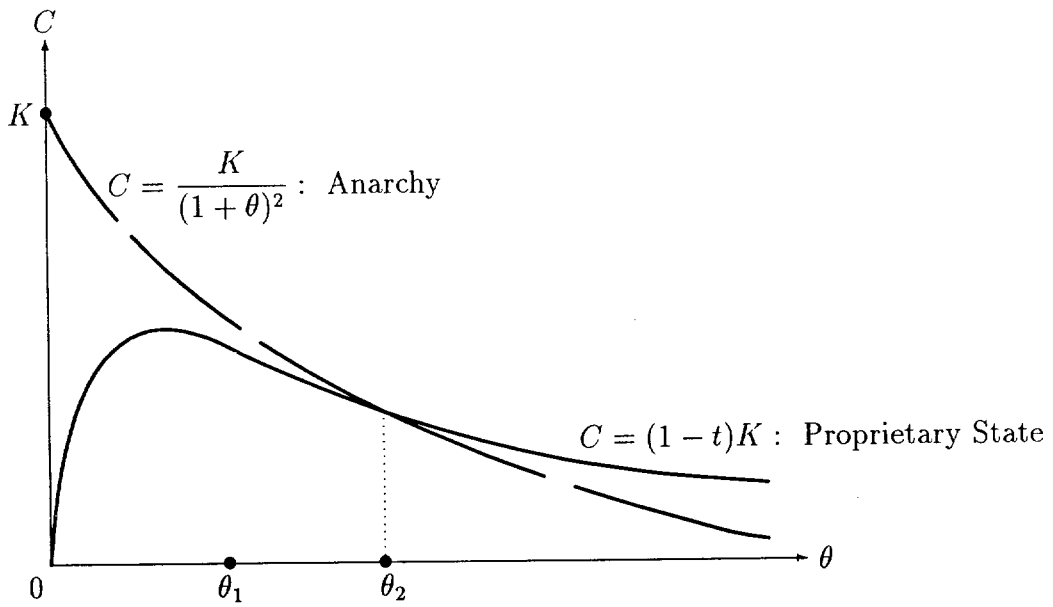

Figure 3: Consumption of Producers

Comparing equation (20) with equation (11) we confirm, not surprisingly, that, with the state maximizing E, C is smaller than if the state were to maximize C. More importantly, comparing equation (20) with equation (8) we find that, as shown in Figure 3, there exists a positive value of θ, denoted θ_2, where $\theta_2 > \theta_1 > 0$, such that, with the state maximizing E, C is larger or smaller than both C and D would be under anarchy as θ is larger or smaller than θ_2. In other words, if θ is sufficiently large, then having a "king" who can make and enforce a collective choice of the amount of guarding is on balance better for everyone than not having a king, even though the king maximizes the consumption of a ruling elite. This result obtains both because for larger values of θ the ability of the state to enforce the choice of enough guarding to deter all of the people from choosing to be predators becomes increasingly important and because for larger values of θ the ability of people to avoid taxation by choosing to be predators implies a tighter constraint on the proprietary state.

4. Summary

This paper has analysed the allocation of resources to guarding against predators, the resulting choices of people to be producers or predators, and the resulting consumption of producers and a ruling elite, in a general equilibrium model in which a proprietary state maximizes the consumption of the ruling elite. The analysis revealed that, because this maximization is constrained by the ability of people to avoid taxation by choosing to be predators, the proprietary state behaves in one respect as if it were an agent of citizen-producers, allocating sufficient resources to guarding against predators to deter predation. Most importantly, the analysis showed that, because the state is able to make and to enforce an irreversible collective choice to allocate resources to guarding, if the technology of predation is sufficiently good, then a proprietary state is better than anarchy for everyone, including both producers and potential predators.

How good does the technology of predation actually have to be in order for a proprietary

state to be Pareto superior to anarchy? The model analysed in this paper has provided a simple and weak, but sufficient, rationale for the state. In the model producers benefit only from the state's ability to facilitate a collective choice of the amount of guarding against predators. Realistically, producers also might benefit from the state's ability to take into account technological externalities in guarding against predators and from the state's ability to effect more efficient ways of guarding, as well as from the state's ability to provide public goods that are unrelated to predation. In addition, in the model the only constraint on the proprietary state's exploitation of producers is the ability of people to avoid taxation by choosing to be predators. Realistically, producers also might be able to evade taxation or to avoid taxation by allocating resources either to leisure or to nontaxable production, and producers might be able to depose an exploitive ruling elite. Clearly, the more ways in which the state benefits producers and the tighter that the actions or potential actions of producers constrain the policies of the proprietary state the less good does the technology of predation have to be in order to rationalize the biblical request, "Make us a king".

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