

“Make us a king”: anarchy, predation, and the state

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Abstract

Using a general equilibrium model in which people can choose to be either producers or predators, this paper shows that, if the technology of predation is sufficiently effective, then having a “king”, who can enforce a collective choice to allocate resources to secure producers’ claims to their product, 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. This result obtains because a more effective technology of predation both makes the social value of deterring predation larger and constrains the proprietary state more tightly. © 2002 Elsevier Science B.V. All rights reserved.

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In order for the state to enforce collective choices about resource allocation, including a collective choice to allocate resources to secure producers’ claims to their product, the state must have the power to tax and to spend. But, with these powers in hand the state can exploit its citizens 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

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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.

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 people of Israel decided that having a king would be on balance better than not having a king.

Today most people follow Thomas Hobbes in accepting that the people of Israel made the right decision. Hobbesians associate anarchy with inadequate allocation of resources to mitigating appropriative conflict. They take the request “to make us a king” to be a warranted rejection of anarchy, and they interpret the first reason that the people of Israel give for wanting a king, that he “may judge us”, to be a reasonable request for the enforcement of a collective choice to allocate more resources to guarding against predators, who otherwise would appropriate the product of producers. In contrast, an anarchist would argue that the people of Israel made a mistake in dismissing Samuel’s warning.²

This paper evaluates the Hobbesian position against an alternative, anarchist position. The paper interprets the issue to be whether or not appropriative conflict under anarchy provides a sufficient reason for the citizenry to subject itself willingly to the state’s power to tax and to spend. In other words, the paper asks whether, as Hobbesians claim, the first reason that the people of Israel give for wanting a king, that he “may judge us”, can rationalize the biblical request, “Make us a king”.

To answer this question, the paper compares the welfare of producers in a hypothetical isolated society in anarchy with the welfare of producers in a hypothetical state whose only function is to enforce a collective choice to allocate resources to guarding against internal predators. This comparison focuses on the tension between the primary biblical and Hobbesian justification for the state and the biblical warning that the state will tax and spend to benefit a ruling elite. To anticipate what we find, the analysis shows that whether the Hobbesian position or the anarchist position is correct—that is, whether producers in this experiment are better off with a state or in anarchy—depends on the effectiveness of the technology of predation.³

1. A digression on the other biblical reason for wanting a state

The people of Israel also wanted a king to “fight our battles”. It is easy to understand why. Because a state can enforce a collective choice to allocate resources to conflict with other societies, societies with states are likely to be able to subjugate societies

² A referee claims that the pre-monarchic period was not anarchic because the judges of the tribes of Israel performed the functions of a state. According to the Hobbesian definitions used in the present paper, this historical claim does not seem to be correct. As Arye Hillman has informed me, the judges did not levy taxes. Hence, the judges could not perform the essential task that the present paper associates with a state, which is enforcing a collective choice to allocate resources to secure producers’ claims to their product.

³ In contrast to the biblical story, it is possible that some states had their historical origin in a strong group taking for itself the power to tax and to spend without the consent of the citizenry. Although the biblical story highlights the dilemma created by the ability of the state to exploit its citizens, the question of whether producers are better off with a state or in anarchy is interesting and relevant regardless of the historical origin of the state.

without states. As a result, assuming that the citizenry both values subjugating other societies and dreads being subjugated by another society more than it fears being exploited by its own king, the citizenry is likely to perceive itself to be better off with a state to “fight our battles” than without a state. This conclusion provides a sufficient reason for why almost all societies that have made the transition from hunting and gathering to settled agriculture and industry seem to have reached the same conclusion as the people of Israel that having a king is on balance better than not having a king. In a world of conflict among societies, the formation of states is readily explicable as an equilibrium in which the dominant strategy of the citizenry of each society, taking as given the decisions of the citizenries of other societies to form or not to form states, is to form a state.

This conclusion, however, does not imply that the average citizen of the average state is better off in a world of states than he (or she) would be in a world without states. In a conflictual equilibrium in which all societies have formed states, states use their power to tax and to spend to increase the allocation of resources to conflict among societies. For this reason, and because conflict can be violent and destructive, if states existed only to “fight our battles”, then the average citizen of the average state surely would be worse off in a world of states than he would be in a world without states. This conclusion obtains even though forming a state is a dominant strategy for the citizenry. Furthermore, this conclusion would obtain even if states did not tax and spend to benefit ruling elites.

Of course, actual states do not exist only to “fight our battles”. On the contrary, the state’s ability to enforce collective choices about resource allocation and income distribution offers many potential benefits for its citizens, including the benefit on which this paper focuses, which is securing producers’ claims to their product. This observation suggests that, despite the fact that states increase the allocation of resources to conflict among societies, the citizenry can be better off with a state than in anarchy. This paper begins to explore this possibility by focusing on one primary function of the state, the enforcing of a collective choice to allocate resources to guarding against internal predators.

2. Overview of the analysis

Consider a simple general-equilibrium model of a closed society with a large number of identical people. These people choose to be either producers or predators according to which activity is more lucrative. Predators are people who produce nothing, but live by appropriating the product of the producers.

The possibility that some people 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 production that predators appropriate. Examples of ways of guarding against predators include the locating of production in

⁴ Usher (1987, 1992, Chapter III) developed a pioneering general-equilibrium model of anarchy 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. Usher (1989, 1992, Chapter IV) introduced a proprietary state into this model. Usher did not ask whether producers are better off with a proprietary state than under anarchy.

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 model focuses on the total amount of resources allocated to guarding, abstracting from different ways of guarding.⁵

The analysis begins by considering the allocation of resources to guarding against predators, and people's resulting choices to be producers or predators, in anarchy. In this context, anarchy simply means that producers or small subsets of producers individually choose the amount of resources to allocate to guarding. According to this definition, anarchy precludes the enforcement of collective choices either by a state or by informal social controls. In other words, the present paper follows Hobbes in implicitly assuming that a state is necessary, as well as sufficient, to enforce collective choices.⁶ In the present context, the important property of anarchy is that an individual producer or small subset of producers in choosing the amount of guarding takes the choices of other people to be either producers or predators as given.

The analysis next introduces a state that can enforce a collective choice of the amount of guarding against predators. This ability gives the state a strategic advantage because a collective choice 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 shows how a more effective technology of predation increases the social value of the state's ability to deter people from choosing to be predators.

The analysis then turns to the realistic case of a proprietary state that maximizes the consumption of a ruling elite.⁷ The term "proprietary" emphasizes the analogy between

⁵ Although the analysis does not explicitly consider the apprehension and punishment of predators, it could be extended to allow for apprehension and punishment. The apprehension and punishment of predators would not directly decrease the ability of predators to appropriate the product of producers, but apprehension and punishment by decreasing the expected utility of predators would make the choice to be a predator less attractive. Skogh and Stuart (1982) rationalize the formation of the state by assuming that only the state can punish predatory activities. But, Skogh and Stuart consider only a benevolent state that acts as an agent of producers.

⁶ This exclusive definition of anarchy, which accords with the usage by economists such as Usher (1992) and 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. For example, Taylor (1982, page 10) writes, "All societies, even anarchies, use social controls...and...make collective decisions". Barzel (2000) discusses the distinction between taxes as compulsory payments enforced by the state and taxes as voluntary assessments. Rutten (1999) provides a convincing critique of the anarcho-liberal position that informal social controls can enable a society to enforce collective choices while avoiding the abuse of sovereign power.

⁷ 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 power to tax and to spend, the producers cannot prevent the state from taxing and spending to benefit a ruling elite. Some 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.

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.

Importantly, the ability of people to avoid taxation by choosing to be predators rather than producers constrains the proprietary state. This constraint embodies what is popularly called a Laffer curve.⁸ The analysis shows that this constraint is tighter the more effective is the technology of predation. By taking account of the effects of a more effective technology of predation both in increasing the social value of deterring predation and in constraining the proprietary state more tightly, the analysis derives a sufficient condition for having a “king” who enforces a collective choice to allocate resources to guarding against internal predators to be a Pareto improvement over anarchy.

3. 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, each person must choose whether to be a producer or a predator. In making this choice, each person takes as given his (or her) potential consumption as a producer or as a predator. Let R denote the ratio of predators to producers. The fraction of people who choose to be predators is $R/(1+R)$, and the fraction of people who choose to be producers is $1/(1+R)$.

Second, if a person chooses to be a producer, then he must allocate his resources between production of consumables and guarding against predators. In anarchy producers, or small subsets of producers, make this choice individually, taking the choices of other people to be either predators or producers as given. Let 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. Each identical producer makes the same choice of G . The fraction of his endowment that a producer allocates to production is $1/(1+G)$.

Assume that each person has an endowment of Ω units of resources. Further, to simplify the analysis of the choice between being a predator and a producer, assume that with each unit of resources a producer can produce one unit of consumables. Each producer actually produces $\Omega/(1+G)$ units of consumables, equal to the product of his endowment and the fraction of his endowment that he allocates to the production of consumables.

Let Y denote per capita production of consumables, which equals the product of the fraction of people who choose to be producers and the production of each producer. Thus, we have

$$Y = \frac{1}{1+R} \frac{\Omega}{1+G}. \quad (1)$$

⁸ A proprietary state can face a credibility constraint and/or a political constraint as well as a Laffer curve. For relevant analysis see, for example, Grossman and Noh (1990, 1994), Usher (1992, Chapter IV), and Greif et al. (1994). The credibility constraint reflects the need for the state's policies to be intertemporally consistent. The political constraint reflects the ability of a maltreated citizenry to depose an incumbent ruling elite. The present paper abstracts from both the credibility constraint and the political constraint.

Let p denote the fraction of his own production that a producer appropriates. Predators appropriate the fraction $1 - p$.⁹ To determine p , assume that the larger is the ratio of predators to producers the more predators each producer encounters. In addition, assume that the larger is the ratio of resources that a producer allocates to guarding against predators to the production that he has to guard the less success a predator has in each encounter. These assumptions imply that p depends negatively on R and positively on G .

To incorporate this story into the analysis in a simple and tractable way, assume that

$$p = \frac{1}{1 + \theta R/G}, \text{ where } \theta > 0. \quad (2)$$

The parameter θ , which embodies the technology of predation, determines the effectiveness of predators in appropriating consumables for given values of R and G .¹⁰

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

$$C = \frac{p \Omega}{1 + G}. \quad (3)$$

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

$$G = \sqrt{\theta R}. \quad (4)$$

In Fig. 1, the concave positively sloped locus represents Eq. (4).

Let D denote the consumption of a predator. To calculate D , observe that predators appropriate $(1 - p)\Omega/(1 + G)$ units of consumables from each producer. Thus, assuming that each predator obtains an equal share of what predators appropriate, D equals the product of $(1 - p)\Omega/(1 + G)$ and the ratio of producers to predators. Accordingly, we have

$$D = \frac{1 - p}{R} \frac{\Omega}{1 + G}. \quad (5)$$

To decide whether to be a producer or a predator, each person compares the values of C and D . In taking G as given his potential consumption as a producer or as a predator, each

⁹ For simplicity, the model abstracts from possible destruction of consumables as the result of predation. Grossman and Kim (1995) show how destruction is easily incorporated into an analysis of appropriative conflict.

¹⁰ Although Eq. (2) is easy to rationalize, it is a generic black box that conceals the process of predation, just as the standard generic production function conceals the process of production. In addition, Eq. (2) assumes, for simplicity, that for each producer p depends only on R and on his own guarding ratio. We could extend the model to allow for a negative externality in guarding. For example, it is possible that, if your neighbors build high walls around their properties but you do not build a high wall around your property, then your property becomes a relatively easier target for burglars. In this case, for given values of R and a producer's own guarding ratio, for each producer p would be negatively related to the guarding ratio of other producers. It is easy to show that this effect would cause each producer in anarchy to choose a larger guarding ratio for any given value of R .

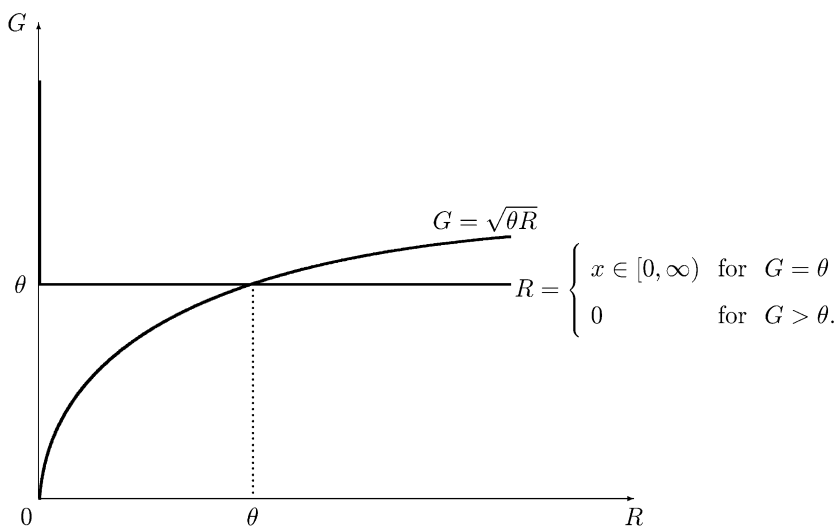


Fig. 1. Anarchic equilibrium.

person in effect takes as given the choices by other people to be producers or predators, as reflected in R , and the choice by producers to allocate productive resources between production and guarding against predators, as reflected in G . He knows that, if he chooses to be a producer, then, like other producers, he will choose G according to Eq. (4).

Substituting Eq. (2) into Eqs. (3) and (5), and assuming that R is finite, we calculate that D/C equals θ/G . Accordingly, if G equals θ , then every person is indifferent between being a producer or a predator, and, if G were larger than θ , then every person would prefer to be a producer. (The ratio D/C is undefined for G smaller than θ .) Thus, in anarchy the choices to be a producer or a predator are such that

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

In Fig. 1, the L-shaped locus represents Eq. (6).¹¹

Solving Eqs. (4) and (6) simultaneously, we find that the equilibrium configuration of choices in anarchy, as shown in Fig. 1, is

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

Eq. (7) says that, with individual choice of the amount of guarding, both the guarding ratio and the ratio of predators to producers are equal to θ . A ratio of predators to producers

¹¹ The form of Eq. (6) results from the simplifying assumption that people are identical. Alternatively, if, as in Grossman (1998) and Grossman and Kim (2000), some people have smaller endowments and, hence, less lucrative production opportunities than other people, then the relation between R and G would be more complex.

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. With R and G equal to θ , the fraction $\theta/(1+\theta)$ of the people choose to be predators, and producers allocate the fraction $\theta/(1+\theta)$ of their resources to guarding against predators.¹² In addition, from Eq. (2), p equals $1/(1+\theta)$.

Substituting $R=G=\theta$ and $p=1/(1+\theta)$ into Eqs. (1), (3) and (5), we obtain

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

Eq. (8) implies that per capita production of consumables is less than the potential per capita production of consumables, which is Ω . Eq. (8) also implies that, as shown in Figs. 3 and 4 below, production of consumables in 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, who produce nothing, 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, p. 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.”

4. Collective choice of the amount of guarding

This section introduces a state that has the ability to tax producers. The ability to tax allows the state to enforce a collective choice of how much resources each producer should allocate to guarding against predators. This collective choice of G affords a strategic advantage because it can take into account both how each producer’s allocation of resources to guarding affects his value of p for a given ratio of predators to producers as well as how the amount of resources that all of the producers allocate to guarding affects the choices of people to be producers or predators.¹³

¹² Although this model can determine the fractions of the people who choose to be producers and predators, because each person has the same resource endowment, this model cannot determine which of the people choose to be producers or predators. In Grossman and Kim (2000), a version of this model of anarchy in which some people are well endowed with productive resources and other people are poorly endowed with productive resources allows an equilibrium in which well endowed choose to be producers and poorly endowed people choose to be predators.

¹³ In order to focus on the strategic advantage of collective choice, the analysis abstracts from the possibility that some effective ways of guarding can only be chosen collectively as well as from the possibility of increasing returns to scale in guarding. In a related paper, Moselle and Polak (2001) do not consider the strategic advantage of a collective choice of guarding. Instead, they assume that the state has a unique “power...to inflict harm” on predators and that this power is measured by an exogenously given parameter. In their analysis, producers are better off with a proprietary state than in anarchy only if this parameter is neither too small nor too large. Otherwise, the state would be either too ineffectual or too powerful.

To enforce its collective choice of G , the state taxes the endowments of producers at rate t . In this context, taxation means that the state compels each producer to allocate the fraction t of his endowment to something other than the production of consumables for his own consumption. Thus, with the state choosing the amount of guarding, the consumption of each producer, C , is

$$C = p(1 - t)\Omega. \quad (9)$$

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

To bring out the importance of a collective choice of guarding, this section abstracts from the ruling elite and assumes that the state acts as the agent of producers by maximizing C , the consumption of each producer. To maximize C , the state would choose the lowest tax rate consistent with its choice of G . Hence, in this section the state sets the fraction t equal to the fraction $G/(1 + G)$.¹⁴

Substituting $t = G/(1 + G)$ into Eq. (9), we see that Eq. (9) becomes identical to Eq. (3). Thus, with the state choosing the lowest tax rate consistent with its choice of G , a comparison of the values of C , as given by Eq. (9), and D , as given by Eq. (5), implies that R still satisfies Eq. (6).

Eq. (6) implies that, in this model, by enforcing the allocation of a slightly larger fraction of resources to guarding against predators than producers would choose in anarchy—specifically, an allocation such that G is equal to or larger than θ^* , where $\theta^* \equiv (1 + \epsilon)\theta$, and where ϵ is an arbitrarily small positive number—the state can deter every person from choosing to be a predator.¹⁵ Given that the ratio θ/θ^* is close to one, and that, with G equal to θ^* , p equals one, Eq. (3) implies that the state maximizes C by setting

$$G = \theta^*. \quad (10)$$

Substituting $R = 0$, $p = 1$, and $G = \theta^*$ into Eqs. (1) and (3), we obtain

$$Y = C = \frac{\Omega}{1 + \theta^*}. \quad (11)$$

Comparing Eqs. (8) and (11), we see that, with the state as the agent of producers making and enforcing a collective choice of the amount of guarding, per capita production of consumables is still less than potential per capita production of consumables. But, per capita

¹⁴ This analysis abstracts from any resource costs associated with administering the collection of taxes. In a related model, Mendoza (1999) analyzes the implications of collection costs as well as other important complications.

¹⁵ As we have noted, the implication that with G equal to θ^* every person would choose to be a producer results from the assumption that all people have the same endowment. In a more general model in which some people have smaller endowments and, hence, less lucrative production opportunities than others, although the state would choose a larger guarding ratio than producers would choose in anarchy, the state might not choose a large enough guarding ratio to deter all of the relatively poorly endowed people from choosing to be predators. Grossman (1998) analyzes collective choice of the guarding ratio in a version of this model in which some people are well endowed with productive resources and other people are poorly endowed with productive resources.

production of consumables is larger than in anarchy. This improvement occurs because, by increasing G from θ to θ^* , the state deters the fraction $\theta/(1 + \theta)$ of the people from choosing to be predators, whose resources would be wasted. In addition, the ratio of Y and C as given by Eq. (11) to Y and C as given by Eq. (8), which quantifies the advantage of collective choice of the amount of guarding, is increasing in θ . This result implies that the more effective are predators in appropriating consumables the more valuable is the state's ability to deter people from choosing to be predators in mitigating the social cost of predation.

5. A proprietary state

This section makes the analysis of the state more realistic by introducing a ruling elite and by assuming 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, normalizing the population of producers and predators to one, we have

$$E = Y - \frac{1}{1 + R}C - \frac{R}{1 + R}D. \quad (12)$$

Eq. (12) says that the consumption of the ruling elite equals the production of consumables less the consumption of producers and predators.¹⁶

Substituting for Y from Eq. (1), for C from Eq. (9), and for D from Eq. (5) into Eq. (12), we obtain

$$E = p \left(t - \frac{G}{1 + G} \right) \frac{\Omega}{1 + R}. \quad (13)$$

Eq. (13) shows that for E to be positive t , the rate at which the state taxes the endowments of producers, must be larger than $G/(1 + G)$, the fraction of resources that the state compels each producer to allocate to guarding against predators. The difference between t and $G/(1 + G)$ is the fraction of the resources of producers that the state compels each producer to allocate to the production of consumables for the ruling elite.

With t not necessarily equal to $G/(1 + G)$, 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 Eq. (9) rather than Eq. (3), with the value of D , as given by Eq. (5). Eq. (5) assumes that predators appropriate the fraction $1 - p$ of the consumables produced either for the consumption of producers or for the consumption of the ruling elite. Substituting Eq. (2) into Eqs. (5) and (9), we calculate that D/C equals $\theta/G(1 + G)(1 - t)$. Accordingly, if $G(1 + G)(1 - t)$ were equal to θ , then every person would be indifferent between being a

¹⁶ This analysis takes the existence and composition of the ruling elite as given. The existence of a viable proprietary state implies that the ruling elite is small enough that in equilibrium E 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.

producer or a predator, and, if $G(1+G)(1-t)$ is larger than θ , then every person chooses to be a producer. Thus, with a proprietary state the choices to be a producer or a predator are such that

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

Eq. (14) implies that the higher is t the larger must be G for predation to be deterred. This result obtains because, as the state taxes producers but cannot tax predators, the higher is t the less lucrative is production relative to predation. If the state were to set t equal to $G/(1+G)$, then Eq. (14) would be identical to Eq. (6).

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

$$G(1+G)(1-t) = \theta^*. \quad (15)$$

According to Eqs. (14) and (15), the state chooses a combination of a value of G that is just large enough and a value of t that is just small enough to make R uniquely equal to zero. Thus, to maximize E , just as to maximize C , the state chooses to deter all predation.¹⁷ Maximizing E implies deterrence because deterrence maximizes the tax base.

Next, we substitute $p=1$ and $R=0$ into Eq. (13), and we calculate the value of G that satisfies the condition $dE/dG=0$, given that t and G satisfy Eq. (15). This condition implies that the state chooses G such that $dt/dG=1/(1+G)^2$, where, from Eq. (15), we have $dt/dG=\theta^*(1+2G)/G^2(1+G)^2$. Solving for G , we obtain

$$G = \theta^* + \sqrt{\theta^*(1+\theta^*)}. \quad (16)$$

Comparing Eq. (16) with Eq. (10), we see that with the state maximizing E the state compels producers to allocate more resources to guarding against predators than if it were maximizing C . This result obtains because maximizing E implies that t is larger than $G/(1+G)$, and because with t larger than $G/(1+G)$ deterrence requires a larger value of G than with t equal to $G/(1+G)$.

Eqs. (15) and (16) together imply that to maximize E the state chooses t such that

$$t = \frac{1+2\theta^*}{1+\theta^* + \sqrt{\theta^*(1+\theta^*)}}. \quad (17)$$

Interestingly, as shown in Fig. 2, Eq. (17) implies that t is a quasi-convex function of θ , that t equals one at θ equal to zero, and that t asymptotically approaches one from below as

¹⁷ This analysis abstracts from the possibility that the proprietary state would allocate none of its tax revenue to guarding, simply free riding on the allocation of resources to guarding by individual producers. Mendoza (1999) derives conditions under which the state would choose to be a free rider. Mendoza also argues that these conditions are relevant in some countries.

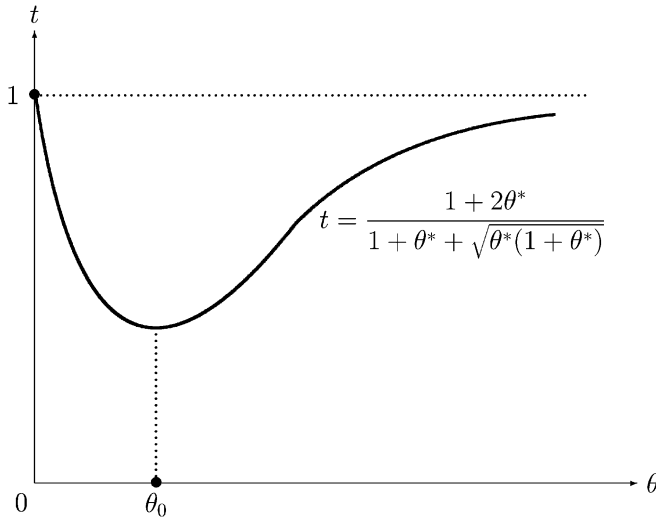


Fig. 2. Tax rate with a proprietary state.

θ goes to infinity. The minimum value of t , which is less than one, obtains at a positive value of θ , denoted θ_0 , where $\theta_0 = (\sqrt{2} - 1)/2$.¹⁸

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 $G/(1 + G)$, given that the combination of t and G is such as to deter all predation. Second, according to whether θ is large or small, the possibility of choosing to be a predator is a more or less attractive option. Thus, if θ is small, then a high tax rate, and a small amount of guarding against predators, is consistent with deterring all predation. At the other extreme, if θ is large, then a large value of G is necessary to deter all predation, and a high tax rate is necessary to enforce this choice of G .

6. Production and consumption with a proprietary state

We can now compare production and consumption in anarchy and with a proprietary state that enforces a collective choice to allocate resources to secure producers' claims to

¹⁸ In this model, the tax rate that maximizes the consumption of the ruling elite approaches one as θ becomes either very small or very large because of the simplifying assumption that the people can avoid taxation only by 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 quasi-convex function of θ with a minimum at a positive value of θ , but the tax rates associated with either very small or very large values of θ would be smaller than one.

their product. With $p=1$ and $R=0$, substituting Eqs. (16) and (17) into Eq. (13), we obtain

$$E = \left(t - \frac{G}{1+G} \right) \Omega = \frac{1 + \theta^* - \sqrt{\theta^*(1 + \theta^*)}}{1 + \theta^* + \sqrt{\theta^*(1 + \theta^*)}} \Omega. \tag{18}$$

Eq. (18) implies that the consumption of the ruling elite is a monotonically decreasing function of θ such that E equals Ω at θ equal to zero, and E asymptotically approaches zero from above as θ goes to infinity.

Substituting $R=0$ and $G = \theta^* + \sqrt{\theta^*(1 + \theta^*)}$ from Eq. (16) into Eq. (1), we obtain

$$Y = \frac{\Omega}{1 + \theta^* + \sqrt{\theta^*(1 + \theta^*)}}. \tag{19}$$

As shown in Fig. 3, Eq. (19) implies that per capita production of consumables under a proprietary state is also a decreasing convex function of θ . Comparing Eq. (19) with Eq. (11), we see that, with the state maximizing the consumption of the ruling elite, because the amount of resources that the state compels producers to allocate to guarding is larger, per capita production of consumables is smaller than if the state were maximizing the consumption of each producer.

More interestingly, comparing Eq. (19) with Eq. (8), which gives per capita production of consumables in anarchy, we find that, as shown in Fig. 3, if θ is larger than θ_1 , where $\theta_1 = (\sqrt{5} - 1)/2$, then per capita production of consumables is larger with the state maximizing the consumption of the ruling elite than in anarchy. This result obtains

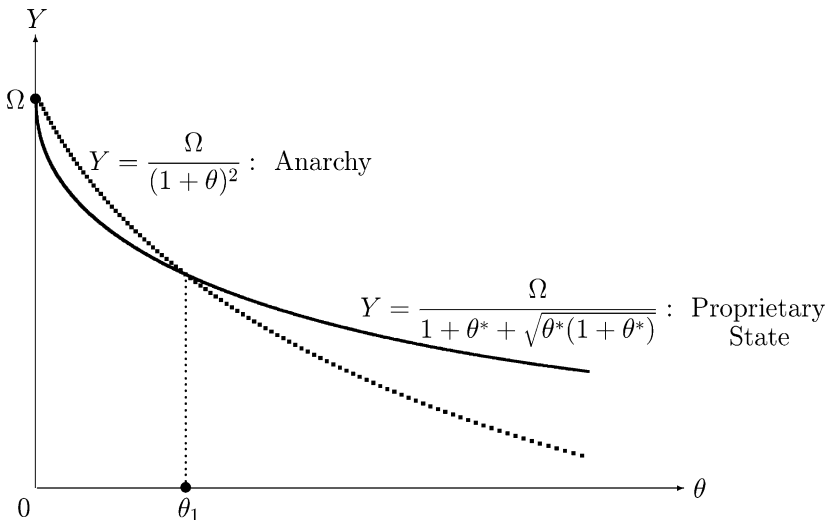


Fig. 3. Production of consumables.

because for larger values of θ the ability of the state to enforce the choice of enough guarding to deter all predation becomes increasingly important in mitigating the social cost of predation, even though by setting t higher than $G/(1 + G)$ the proprietary state increases the cost of deterrence.

We turn now to our main concern, the consumption of producers with a proprietary state. Given $p = 1$, substituting Eq. (17) into Eq. (9), we obtain

$$C = (1 - t)\Omega = \frac{\sqrt{\theta^*(1 + \theta^*)} - \theta^*}{1 + \theta^* + \sqrt{\theta^*(1 + \theta^*)}} \Omega. \tag{20}$$

As shown in Fig. 4, Eq. (20) implies that with a proprietary state, C is a hump shaped function of θ such that C equals zero at θ equal to zero, C reaches a positive maximum at $\theta = \theta_0$, 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 a producer is an increasing function of θ for small values of θ and becomes a decreasing function of θ only for large values of θ .

Comparing Eq. (20) with Eq. (11) we confirm, not surprisingly, that, with the state maximizing E , C is smaller than if the state were to maximize C . More importantly, to compare Eq. (20) with Eq. (8), which gives per capital consumption of both producers and predators in anarchy, define a positive value of θ , denoted θ_2 , where $\theta = \theta_2$ implies

$$\sqrt{\theta(1 + \theta)} = \left[1 + \sqrt{\theta/(1 + \theta)}\right]^2.$$

We find that, as shown in Fig. 4, if θ is larger than θ_2 , then C is larger with the state maximizing the consumption of the ruling elite than both C and D would be in anarchy. In

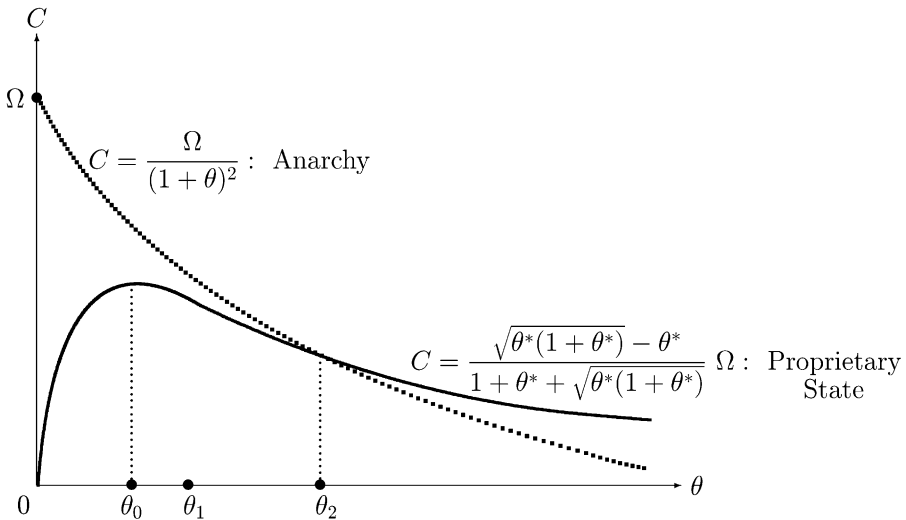


Fig. 4. Consumption of a producer.

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 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 predation 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.

7. Summary

Having a state is advantageous because a state can enforce collective choices about resource allocation and income distribution. But, the state also can exploit its subjects by taxing and spending to benefit a ruling elite. Motivated by this observation this paper asked whether, as Hobbesians claim, appropriative conflict under anarchy provides a sufficient reason for the citizenry to subject itself willingly to the state’s power to tax and to spend.

To answer this question, the paper developed a comparative analysis of the welfare of producers in a hypothetical isolated society in anarchy and in a hypothetical proprietary state whose only function is to enforce a collective choice to allocate resources to secure producers’ claims to their product. The analytical framework was a simple general-equilibrium model in which people can choose to be either producers or predators. The assumed objective of the proprietary state is to maximize the consumption of the ruling elite.

The analysis revealed two critical ways in which the differences between the implications of anarchy and the implications of a proprietary state depend on the technology of predation. First, because the state is able to enforce a collective choice to allocate resources to guarding against predators, the state can take into account the deterrent effect of guarding on the fraction of people who choose to be predators. The more effective is the technology of predation the more valuable is the state’s ability to deter predation in mitigating the social cost of predation.

Second, the ability of people to avoid taxation by choosing to be predators rather than producers constrains the proprietary state. This constraint is tighter the more effective is the technology of predation. Furthermore, to mitigate this constraint the proprietary state allocates sufficient resources to guarding against predators to deter predation.

Taken together the effects of a more effective technology of predation both in increasing the social value of deterring predation and in constraining the proprietary state more tightly lead to the following result:

If the technology of predation is sufficiently effective, then a proprietary state that can enforce a collective choice to allocate resources to secure producers’ claims to their product is better than anarchy for everyone, including both producers and potential predators, even though the proprietary state maximizes the consumption of a ruling elite.

How effective does the technology of predation actually have to be in order for a proprietary state to be Pareto superior to anarchy? The model analyzed in this paper has

provided a sufficient condition for Pareto superiority in an isolated society. Importantly, the model abstracted from the role of the state in increasing the costly allocation of resources to conflict among societies. But, on the other side of the ledger the model also abstracted 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. Presumably, notwithstanding the effect of the state in increasing the cost of conflict among societies, 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 easier it is for a proprietary state to be better than anarchy.

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