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From Coercion to Politics to Law: The Evolution of Property Rights Protection (Very Preliminary)

Fali Huang*

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Abstract

This paper shows how property rights security improves over time as a result of increasing legal quality and political democratization in a political economy context, where political and legal institutions adapt to evolving factor composition of land and capital in the dynamic economic development process. There seems to exist a clear sequence of different forms of protection in that it is unlikely to have a strong rule of law with an exploitative political regime, or to have a democratic political system when the distribution of potential coercive power is too skewed. The routine form of protection thus shifts from coercion to politics and then to law. The predictions of the model are consistent with general historical patterns in England.

JEL: O10, O40, P16, N10.

Key Words: Property Rights, Coercion, Politics, Law, Democratization, Factor Composition, Monarchy, Democracy, Suffrage Extension.

1 Introduction

Across societies and over time, the security level of property rights varies a lot, which in turn affects a society's order and prosperity (North and Thomas 1973). Recent research suggests that protection against state predation, which is the focus of this paper, is more important to economic growth than protection against private predation by fellow citizens (Acemoglu et al. 2005), partially because informal contract enforcement can arise spontaneously (Greif 2006) and also because such private order is usually desirable to both state and citizens. The danger from state predation, however, is always present due to the inherent difficulty in monitoring: Who can discipline the state that by nature has to be the monopolist of coercive

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power? The only robust solution is to create a cyclical chain of institutions that form a self-sustaining equilibrium, providing check-and-balance to each other and adaptive to dynamic changes (Weingast 1997, North et al. 2009).

Though protection of property rights is presumably affected by many conditions, this paper proposes that it is essentially determined through three distinct but endogenously connected channels, namely, politics, law, and informal rent-seeking. The first channel is the political regime, which determines who belongs to the ruling group that can legitimately expropriate others using tax. The second channel is the legal system, which enforces the political power through tax collection, but due to its imperfection may not fully rule out informal expropriation; the legal quality is optimally chosen by the ruling group to maximize its overall revenue containing incomes from production, tax revenue, and informal expropriation. The third one is the informal means of protection that is invested and enforced by private individuals, which will be affected by both political and legal institutions as well as economic forces.

At the rock bottom, property rights security is determined by the balance of coercive power among citizens against an endogenously formed state; the political regime and legal quality are intermediate steps that transform the balance of coercive power between groups, which is often demonstrated and present in concrete but *temporary* formats in a short period of time, into *durable* institutions that affect property security on a routine base; to credibly discipline these formal institutions from deviating too far away from their agreed upon purposes, citizens have to invest in informal rent-seeking capacities. The optimal combination of these different formats of protection is in turn affected by factor composition and income distribution.

Though coercion may be relevant in determining both political regime and informal property protection, there is an important distinction between these two scenarios. In the potentially violent fight to gain political power between the challenging group and the current ruler, the usage of coercion is more of serving a threatening purpose or exhibiting a short-term characteristic in the sense that once the balance of power is made clear in determining the political regime, resources will be withdrawn from the coercive purpose and returned back to productive usage. In sharp contrast, resources invested into informal rent-seeking capacities are permanently transformed into coercive forces and cannot be withdrawn. For example, in some crucial periods of political transition, many people may intensively engage in demonstrations until a certain outcome is reached, but afterwards they have to go back to routine work and life. So such coercive impact is not a constantly present force that can directly and continuously shape things; its effect is through the establishment and function of fundamental political and legal institutions. The daily discipline on these

institutions is, however, made possible by the informal protection capacities of citizens. That is, if the political regime imposes too heavy a tax burden or if the law is of low quality, then citizens may have to increase their informal capacities to protect their properties, which forms a credible counteracting force against the ruler's arbitrary power. Such restraining effect, however, is again constrained or limited by the overall coercive threat of citizens that is exhibited by the political regime.

This paper endogenizes these three formats of property rights protection under monarchy and democracy. It shows that the informal rent-seeking capacities are always negatively correlated with the legal quality, while the relationship between legal quality and the government's advantage in expropriation relative to ordinary citizens changes with political regime: A stronger government is typically associated with a weaker legal system under monarchy or other exploitative political regime, but both can be strong under democracy. That is, a strong rule of law and a capable government can function together only when the political power is relatively equally distributed among citizens, who collectively can provide a stronger discipline on the government.

From the historical perspective, the monarch, once established, will remain unchallenged when land distribution is stable since the coercive power is usually proportional to land size. The optimal legal quality may be very low so that the monarch faces little constraint in expropriating others. After physical capital starts, however, the dynamic economic development will change the balance of economic and coercive power under monarchy, and as a consequence, its legal quality will improve, and informal rent-seeking intensity will be reduced. Once the wealth and coercive power of the citizens become large enough, they will have the capability to challenge the rule of monarch and force the political regime to transit to democracy, which will then in turn lead to further improvement in legal quality and reduction in informal rent-seeking. In summary, the security of property rights is essentially determined by factor composition and the distribution of incomes among citizens, where the dominance of physical capital over natural resources and a lower income inequality provide a solid foundation for better security.

The model predictions fit the historical evidence in England quite well. Feudal sovereigns might have protected individuals' property against the depredations of other individuals, but they themselves were often the greatest source of danger in that they often seize the property of their citizens without compensation and in an arbitrary manner. To establish the basic right of subjects to the enjoyment of their property without arbitrary expropriation by the Crown, the English barons confronted King John in 1215, the result of which was Magna Carta, a great charter that helped shaped the English law and political tradition such that the common law court in England was relatively independent from the Crown in its protection of private property

rights. This was important to the expansion of commerce, and thus gave the English a considerable lead on their neighbors (North and Thomas 1973, Rosenberg and Birdzell 1986). The Crown, however, invested in many other ways (which are categorized as informal rent-seeking capacities in this paper) trying to sidestep the common court and expropriate citizens' properties. Since the Crown's advantage in expropriation was still much larger than ordinary people, this resulted in severe violation of their property rights. But it had to wait until the Glorious Revolution in the 17th century that the formation of a challenging group successfully established the dominant role of parliament in important policies, which greatly reduced the Crown's advantage of expropriation (North and Weingast 1989). Such fundamental institutional changes in political and legal areas were firmly backed up by the arising importance of commercial and industrial interests in English economy, and as a result, the security of property rights was much improved, which in turn greatly facilitated investment and production that later on triggered the Industrial Revolution.

Though this paper focuses on the institutional changes at the national level, the order of different formats of property rights protection suggested in the model, from using coercion to using political forces and finally relying on the legal system, also applies to specific conflicts of property rights. For example, after studying how agents in the frontiers of Australia, Brazil and the U.S. established their property rights, Alston et. al (2012) find that the *de facto* property holders in the frontiers tend to protect their properties from competitors through violence, which however is very costly; a natural step then is to use political forces to acquire *de jure* property rights, that is, shifting the main protection method from coercion to political and legal means.

Such an evolutionary order arising from the dynamic adjustments of *de jure* property rights to *de facto* property rights at the national economy level through political and legal institutional changes is the main insight of this paper. The underlying driving force of political democratization and more secure property rights is the technical nature of physical capital, which is easier for its *de facto* owners to defend their property rights than land and other natural resources (for example, capital such as technological and business know-how has to be endogenously created, is more mobile and easier to hide). When capital replaces land to become the prominent source of wealth, if its owners' property rights cannot be protected by existing political and legal means, they will have to use coercive power to change the obsolete political and legal institutions until *de jure* property rights reflect their *de facto* counterparts.

By exploring the inherent links between different forms of property rights protection including coercive force, political power, and law from a historical or evolutionary perspective, this paper belongs to a broad

literature connecting growth, development, and institutions in a long-term perspective.¹ Its primary contribution is analyzing the relationship between three distinct but closely related formats of property rights protection in a dynamic political economy model. Due to the complex nature of property rights security, there is an enormous amount of work on this subject from several disciplines. This paper is more closely related to studies using a political economy analytical framework such as Grossman and Kim (1995), Rapaczynski (1996), Sonin (2003), Gonzalez (2007), Gradstein (2007), Besley and Persson (2009), Cervellati et al. (2012). Most of these papers, however, study property rights under a given government, while in contrast, this paper focuses on the coevolution of political and legal institutions; Cervellati et al. (2012) is an exception in this regard, but their main focus is on contract enforcement, and they do not consider factor composition of the economy, which is quite typical in the property rights literature.

A distinct feature of this paper is to explicitly model the evolving factor composition and its crucial role in pushing the wheel of institutional change during the economic development process. Specifically, the technical features of land, such as its relatively fixed supply and difficulty to hide or destroy, lead to a stable income distribution that makes it difficult for other landowners to challenge the monarch, and also makes it easy for the monarchy to expropriate them in an arbitrary manner. Only after commercial and industrial activities, which are more mobile and easier to hide than land, become more important in economy, it eventually becomes possible to establish a more democratic political regime that leads to great improvement in legal quality and property security. So it is the changing nature of the dominant production factor, not the income *per se*, that is of crucial importance in supporting the political and legal change. An implication is that an economy based on natural resources, however rich it may be, is not likely to be compatible with a democratic and fair political/legal system to support secure property rights.

This paper also reconciles the awkward conceptual confusion observed in this literature, where the rich are often assumed to have advantage in rent-seeking, but the poor in open fight. These two types of ultra-legal coercive power are explicitly modeled and endogenized in this paper. It finds that in a *given* political regime, the rich who are the ruling group, must possess both higher rent-seeking power and higher coercive power in an open fight, because the latter is the very reason that gets them into political power in the first place. Only when the poor have accumulated enough income and thus coercive power, a critical *transition* time will then arrive, where the balance of power is observed to tip over to favor the poor and lead to political regime change.

This paper proceeds as follows. The basic elements of the political economy model are introduced in

¹See Bertocchi (2006) for a survey of related literature.

Section 2, and the analysis of the model is in Section 3. Concluding remarks are offered in the final section.

2 The Political Economy Model

2.1 The Economy

There are overlapping generations in the economy with a fixed population size. Each individual lives for two periods including childhood and adulthood. All decisions are made by adults.

Preferences. Individuals are identical in preferences, which are represented by a log-linear utility function $u_{ti} = (1 - \beta) \log c_{ti} + \beta \log(z + b_{ti})$, where c_{ti} is the adulthood consumption of individual i in generation t , b_{ti} is his bequest for offspring,² $\beta \in (0, 1)$ indicates the relative weight of bequest in utility, and $z > 0$ is a constant. The budget constraint is $c_{ti} + b_{ti} \leq I_{ti}$, where I_{ti} is individual i 's income at adulthood.

As a result of utility maximization, the individual's optimal bequest is $b_{ti} = \max\{\beta(I_{ti} - Z), 0\}$ where $Z \equiv z(1 - \beta)/\beta$. That is, only when an individual's income is higher than a certain level Z , would there be any resources left as bequest; this is a reasonable result given that the model economy starts from the agricultural era where many people live at the subsistence level and may not afford any savings. The total bequest in society B_t is then $B_t = \sum_i b_{ti} = \sum_i \max\{\beta(I_{ti} - Z), 0\}$.

Endowment. The initial endowment of land L is exogenously distributed among N landowners, who may also generate physical capital $k_{ti} = b_{t-1,i}$ using bequest. By blending two distinct types of factor owners (landowners and capitalists) into one hybrid but homogenous type, this assumption is made only to simplify the exposition; the main results of the model also go through in a more realistic version. The initial state of the model economy corresponds to a time when agriculture is the dominant production method, and the physical capital stock is zero.

Final Output Production. In every period the economy produces a single homogeneous good that can be used for consumption and investment. An individual with land L_i and physical capital k_{ti} gets an income

$$I_{ti} = A_t(L_i + k_{ti})$$

from production. The knowledge stock A_t grows at an exogenous speed $g > 0$ so that $A_{t+1} = A_t(1 + g)$, which is the ultimate growth engine.³ This income function can be endogenized as the optimization outcome

²This bequest motive from the "joy of giving" is commonly adopted in the recent literature on income distribution and growth. See Altonji, Hayashi and Kotlikoff (1997) for related empirical evidence. This particular utility function is also used in Galor and Moav (2006) among others.

³The assumption of a slowly growing knowledge stock is also made by Galor and Weil (2000) and Hansen and Prescott (2002). Note that the exogenous growth rate g , though positive, can be arbitrarily close to zero in the model, which is also

from reasonable production functions (see Huang 2012b). The total quantity of land $L = \sum_i L_i$ is fixed over time, while the aggregate stock of physical capital $K_t = \sum_i k_{ti}$ depreciates fully after one period, which corresponds to one's adulthood (about 20 to 30 years). The role of human capital in production is not explicitly analyzed in this paper mainly because its effect on property rights protection is qualitatively similar to physical capital; some further discussions on this are provided at the end of the paper.

2.2 The Political and Legal Structure

The division of outputs among production factor owners is affected by the political and legal systems, where the ruler may exploit ruled agents through tax and confiscation, while the ruled agents may rob the ruler through informal rent-seeking, or challenge it in an open fight for sharing political power. The establishment and transition of political regimes are shaped by the balance of coercive powers, which may experience fundamental changes during the economic development process. Consistent with the horizon of economic decisions in the overlapping generation model, the length of an individual's adulthood, which corresponds to one period in the model, is also used as the horizon for political decisions.⁴

The timing of the model in each period is as follows. (1) **Establish the political regime.** In the beginning of every period, the ruled agents have to decide whether to obey the current ruler or to form a challenging group to initiate a fight against it, and this will depend on the balance of the two parties' coercive power. The ruler imposes tax on others. (2) **Determine the legal quality.** Once the political regime is settled, the ruler sets up the government body that will determine the quality of an independent legal system that enforces the implementation of the promised tax rate. (3) **Invest in informal rent-seeking capacities.** When the legal quality is not perfect, individuals may have to resort to informal rent-seeking activities to protect themselves and grab others' wealth. Given the political regime and legal quality, each individual decides how much resources to invest in the informal capacity of rent-seeking. (4) **Engage in production.** (5) **Collect tax, seek rent,** and then determine bequests and capital investment.

2.2.1 The Political Regime

The initial political regime is established based purely on *might-is-right*, where the dominant group in coercive power becomes the first ruler and imposes tax on others. The coercive capability of a group of N_j individuals

consistent with the almost zero growth rate in the Malthusian era.

⁴Allowing longer horizons may alter the timing but not the qualitative results of the transition process. Acemoglu and Robinson (2006b), for example, find similar results for the political transition problem in a more abstract setting with infinite horizons.

is

$$(1) \quad v_t = \psi(N_j) \sum_{i=1}^{N_j} I_{ti}.$$

The total income $\sum_{i=1}^{N_j} I_{ti}$ of the group members indicates the overall economic strength of the group, which can be transformed to coercive power through supply of weapons and soldiers, for example. $\psi(N_j)$ is the group's organizing effectiveness, which decreases with group size N_j due to free-riding and information problems. Let $v_t^C \equiv \psi_t^C I_t^C$ and $v_t^G \equiv \psi_t^G I_t^G$ denote the coercive capability of the challenging group and the ruler, respectively, where I_t^C and I_t^G are their before-tax incomes. Then the relative coercive power of the challenging group is denoted by

$$x_t \equiv \frac{v_t^C}{v_t^G} = \frac{\psi_t^C I_t^C}{\psi_t^G I_t^G}.$$

The transition of political regimes follows a reduced-form version of the political equilibrium in Huang (2012b). The challenging group will obey the current political rule when their relative coercive power x_t is weak (if $x_t \leq x^*$), and revolt otherwise (if $x_t > x^*$), where $x^* \in (0, 1)$ is an exogenously given threshold; the ruler will respond to revolt by compromise, that is, by extending political power to the challenging group so that no exploitative tax is imposed on their incomes, and this will lead to a peaceful transition to a new and more democratic political regime. In other words, the political transition is an automatic process where the current political regime continues when $x_t \leq x^*$, and it is replaced by a new regime when $x_t > x^*$.

2.2.2 The Legal Quality

One economic benefit of having political power is to get extra incomes by taxing and expropriating others. The other is to shape policies and institutions in favor of one's future economic interests, which is actually a way to exploit others in terms of future incomes.

Suppose due to exogenous reasons such as how easy it is to hide or destroy incomes and assets, the highest possible expropriation rates are different for land and physical capital, where $\tau_l > \tau_k$ holds, that is, it is easier to expropriate incomes from land than from capital. For example, the size of land and its productivity are much more difficult to hide or mis-report than business activities. The ruler, however, may find it not optimal to impose such high tax rates because of negative effects on incentives in production and investment. Though it is reasonable to assume that such disincentive effects also differ across factors, the differences, however, should be smaller than those in the expropriation rates because the efficient utilization of any factor requires endogenous effort from the factor owners. So to simplify analysis, we fix the ruler's optimal tax rate at a constant level τ_0 for all factors, where $\tau_0 < \tau_k < \tau_l$ is assumed true.

The political ruler decides whether to establish an independent legal system with legal quality q_t in order to enforce the collection of tax revenue at the promised rate τ_0 . The cost is $c(q_t)$ where $c' > 0$ and $c'' > 0$. Note that the promised rate is lower than the expropriation rates for all factors, which implies that the ruler has incentives to renege on its promise; for example, the ruler may announce the lower tax rate τ_0 before production starts, but ex post it may change the tax rate to a much higher level to expropriate the outputs of others. Repeated interactions and reputation may mitigate such dynamic inconsistency to some degree, but their effectiveness can be reduced by many elements in reality such as an impending war or other reasons that cause insecurity to the ruler (Olson 1993). An independent legal system, in comparison, provides a more reliable institutional warrant that helps guarantee the promised tax rate to be respected. There are other benefits of operating such a legal system because it also provides good social order and mitigates property transgressions among ruled agents themselves, and thus may contribute to the welfare of the ruler for example through reduced cost in maintaining order and support from society. Such benefits, however, are not explicitly modeled in this paper in order to focus on conflicts between the ruler and citizens.⁵

2.2.3 Informal Rent-Seeking Capacities

The enforcement effectiveness of property rights depends not only on the legal system's quality q_t , but also on individuals' ability to counteract the legal order. In other words, people may invest in various rent-seeking capacities to twist the legal system in their favor. For example, they may purchase guns to protect themselves, establish personal networks with judges, or give bribes. These are extra-political, extra-legal and often informal means to protect property rights. The overall investment in such informal rent-seeking capacities by an individual i is denoted by s_{ti} .

Suppose that with probability q_t an individual's property rights are secured through the rule of law so that he only needs to pay tax $\tau_0 I_{ti}$; but with probability $(1 - q_t)$ the law does not work properly so that no one's property rights are protected by law, and individuals have to use their informal means for protection. The associated cost in such protection and rent-seeking among individual agents themselves is captured by a lower income αI_{ti} to everyone, where $\alpha \in (0, 1)$; this is a channel where a well-agreed upon tax and legal system works better than informal rent-seeking where everyone is each other's potential enemy. Let $\mu_{tr} \equiv \frac{s_{tr}}{s_{tr} + s_{ti}}$ be the ruler's rate of success in the rent-seeking game with individual i , where s_{tr} is the ruler's amount of investment in informal rent-seeking. And let ρ denote the ruler's relative advantage in expropriation, where $\rho > 1$. Then with probability $(1 - q_t)\rho\mu_{tr}$, the ruler can expropriate individual i 's

⁵Possible interactions between them are briefly discussed in Concluding Remarks.

income by the amount $\tau_{1i}\alpha I_{ti}$, while with probability $(1 - q_t)(1 - \rho\mu_{tr})$ it not only receives no tax from i but is also robbed by him with the amount $\tau_{1r}\alpha I_{tr}/(N - 1)$, where $\tau_{1i}, \tau_{1r} \in \{\tau_l, \tau_k\}$.

3 The Political and Legal Development Path

3.1 Property Rights under Monarchy with Land Only

In the beginning of the model economy, agriculture is the dominant production method and there is no physical capital. The initial political regime is monarchy where a dominant landowner with land L_m is the ruler, who imposes tax τ_0 on other landowners. Since the coercive power of landowners is proportional to land size, the fixed amount of land implies that no landlords are able to challenge monarchy as long as the monarch owns large enough land. For simplicity, we focus on the case where incomes are identical among citizens.

Proposition 1 *When land is the main source of wealth, monarchy continues without any revolt as long as*

$$L_m \geq \frac{\phi}{\phi + x^*} L.$$

Proof. The $N - 1$ landlords constitute the challenging group. Their coercive power is $v_t^C = \psi(N - 1)A_t(L - L_M) = \phi A_t(L - L_M)$, where $\phi \equiv \psi(N - 1)$. The monarch's coercive power is $v_t^G = \psi(1)A_t L_M = A_t L_M$ given that $\psi(1) = 1$ by normalization. Landlords will not challenge the monarch if $x_t \leq x^*$ holds, where $x_t = v_t^C/v_t^G = \phi(L - L_M)/L_M$. So $x_t \leq x^*$ is equivalent to $\frac{\phi(L - L_M)}{L_M} \leq x^*$, which is simplified to $L_M \geq \frac{\phi}{\phi + x^*} L$. ■

This proposition suggests that the overwhelming power of the monarch, which is derived from his dominant land size L_m , enables him to enforce a stable political order without challenge from other landlords when land is the main source of wealth.

Proposition 2 *The optimal legal quality is*

$$q_t^* = \begin{cases} 0 & \text{if } \omega_m A_t \leq c'(0) \\ c'^{(-1)}(\omega_m A_t) & \text{if } \omega_m A_t > c'(0) \end{cases},$$

where $\omega_m \equiv [\tau_0 - \tau_l \rho \alpha (1 - \frac{1}{N})^2] L + (\tau_l - \tau_0) L_m$ is a constant number that strictly decreases in ρ . So the legal quality q_t^* would stay at zero when the monarch's advantage in expropriation, ρ , is sufficiently large, otherwise the legal quality will eventually become positive and then increase over time.

The optimal expenditures on informal rent-seeking are

$$\begin{aligned} s_{ti}^* &= \rho(1 - q_t^*)\tau_l\alpha \frac{Y_t}{N^2} = \rho(1 - q_t^*)\tau_l\alpha \frac{A_t L}{N^2}, \\ s_{tm}^* &= (N - 1)s_{ti}^*, \end{aligned}$$

which together imply that the probability of monarch's expropriation is constant:

$$\mu_{tm}^* = \frac{s_{tm}^*}{s_{ti}^* + s_{tm}^*} = 1 - \frac{1}{N}.$$

The percentage of rent-seeking expenditure in total income, $\frac{2(N-1)}{N^2}\rho\alpha(1-q_t^*)\tau_l$, is lower when the legal quality q_t^* is higher.

Proof. The equilibrium is solved backwards. Taking as given the legal quality q_t and the expenditure of others on informal rent-seeking s_{ti} , the monarch's total revenue is

$$\max_{s_{tm}} q_t [I_{tm} + \tau_0(N-1)I_{ti}] + (1-q_t)\alpha \left[\rho \frac{s_{tm}}{s_{tm} + s_{ti}} [(N-1)\tau_l I_{ti} + I_{tm}] + (1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}})(1 - \tau_l)I_{tm} \right] - s_{tm} - c(q_t).$$

With probability q_t , the legal system works properly, the monarch's revenue contains his income I_{tm} from land and legitimate tax revenue $\tau_0(N-1)I_{ti}$, which is the benefit of his dominant political power. With probability $1 - q_t$, the legal system is dysfunctional and the rent-seeking game is played. One can think of $N - 1$ delegates of the monarch playing the rent-seeking game simultaneously with each of these $N - 1$ agents in tax-collecting occasions. Then in each game, the monarch's revenue is either $\alpha[\tau_l I_{ti} + \frac{I_{tm}}{N-1}]$ with probability $\rho \frac{s_{tm}}{s_{tm} + s_{ti}}$, which occurs when he wins in the rent-seeking game and thus is able to expropriate the other landlords income at the highest possible rate τ_l and to defend his own production income, or his revenue is $(1 - \tau_l)\alpha \frac{I_{tm}}{N-1}$ with probability $(1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}})$, which occurs when he loses in the rent-seeking game and thus is expropriated by the other landlords at the highest possible rate τ_l .

The monarch's FOC w.r.t s_{tm} is

$$(1 - q_t)\rho\tau_l\alpha Y_t \frac{s_{ti}}{(s_{tm} + s_{ti})^2} - 1 = 0,$$

where $Y_t = [(N - 1)I_{ti} + I_{tm}]$ is the total income of the economy, and $\tau_l\alpha Y_t$ is the total amount of rent available in the rent-seeking game. This condition uniquely determines the optimal investment in rent-seeking capacity s_{tm}^* :

$$(2) \quad s_{tm}^* = \sqrt{\rho(1 - q_t)\tau_l\alpha Y_t s_{ti}} - s_{ti}.$$

The net income of an individual i is

$$I_{ti}^q \equiv \max_{s_{ti}} q_t(1 - \tau_0)I_{ti} + (1 - q_t)\alpha \left[(1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}})(I_{ti} + \frac{\tau_l I_{tm}}{N-1}) + \rho \frac{s_{tm}}{s_{tm} + s_{ti}}(1 - \tau_l)I_{ti} \right] - s_{ti},$$

taking as given the expenditure of others. The FOC for interior solution is

$$(1 - q_t)\rho\tau_l\alpha Y_t \frac{1}{N-1} \frac{s_{tm}}{(s_{tm} + s_{ti})^2} - 1 = 0,$$

which uniquely determines the optimal investment in rent-seeking capacity s_{ti}^* :

$$(3) \quad s_{ti}^* = \sqrt{(1 - q_t)\rho\tau_l\alpha Y_t \frac{1}{N-1} s_{tm}} - s_{tm}.$$

Combining the two FOCs (2) and (3), after some algebra we get the optimal results s_{ti}^* and s_{tm}^* stated in the proposition. So we have

$$\mu_{tm}^* = \frac{s_{tm}^*}{s_{ti}^* + s_{tm}^*} = \frac{N-1}{N} = 1 - \frac{1}{N},$$

which is constant over time, and goes to 1 when N goes to infinity. This is quite intuitive because when the size of each landlord is very small, then it is almost surely that they will be expropriated by the monarch when the legal system does not work.

The monarch chooses the legal quality q_t , anticipating the reaction of individuals in informal rent-seeking capacity investment. The objective function for the ruler becomes

$$\begin{aligned} \max_{q_t} & q_t [I_{tm} + \tau_0(N-1)I_{ti}] + (1 - q_t)\alpha \left[\rho \frac{N-1}{N} [(N-1)\tau_l I_{ti} + I_{tm}] + (1 - \rho \frac{N-1}{N})(1 - \tau_l)I_{tm} \right] \\ & - (1 - q_t)\rho\tau_l\alpha A_t L \frac{N-1}{N^2} - c(q_t) \end{aligned}$$

after plugging in s_{ti}^* and s_{tm}^* . The FOC w.r.t to legal quality q_t is

$$\begin{aligned} A_t\omega_m - c'(q_t^*) &= 0 \text{ if } q_t^* > 0, \\ &< 0 \text{ if } q_t^* = 0, \end{aligned}$$

where $\omega_m \equiv [\tau_0 - \rho\alpha\tau_l(1 - \frac{1}{N})^2]L + (\tau_l - \tau_0)L_m$ is a constant number that strictly decreases in ρ . To have a positive solution, ρ cannot be too large. Let

$$[\frac{\tau_0}{\tau_l} + (1 - \frac{\tau_0}{\tau_l})\frac{L_m}{L}](1 - \frac{1}{N})^{-2}\alpha^{-1} \equiv \hat{\rho},$$

that is, $\omega_m(\hat{\rho}) = 0$. This means if $\rho \geq \hat{\rho}$, then it is not possible to have a positive legal quality in any period under monarchy when there is only land. The reason is the potential benefits of expropriation are too large to resist for the monarch. This condition is more easily satisfied when $\hat{\rho}$ is smaller, which occurs when L_m/L and τ_0/τ_l are smaller or when N is bigger. So in a large country with higher L and N , legal quality tends to be lower.

When $\rho < \hat{\rho}$, the benefit of legal quality is strictly increasing over time due to the ever increasing knowledge stock A_t . This means that even if $q_t^* = 0$ holds in the initial periods when A_t is small, eventually the legal quality will be positive after a threshold is reached when the marginal benefit exceeds the marginal cost. The critical period T_q is determined by

$$T_q = \ln \frac{c'(0)}{\omega_m} / \ln(1 + g).$$

Again a higher ρ will delay the timing of legal investment. The interior solution q_t^* is higher over time because A_t is increasing.

$$\frac{\partial q_t^*}{\partial A_t} = \frac{\omega_m}{c''(q_t^*)} = \frac{c'(q_t^*)}{c''(q_t^*)A_t} > 0.$$

The percentage of rent-seeking expenditure in total exploitable income is

$$\frac{s_{tm}^* + (N-1)s_{ti}^*}{\tau_l A_t L} = \frac{2(N-1)}{N^2} \rho \alpha (1 - q_t^*),$$

which is strictly lower when the legal quality q_t^* is higher. The percentage of rent-seeking expenditure in total income, $\frac{2(N-1)}{N^2} \rho \alpha (1 - q_t^*) \tau_l$, is thus decreasing over time when q_t^* increases. ■

These results suggest that the monarch's optimal legal quality would be zero when his advantage in expropriation ρ is large enough relative to others, and if this is the case, it will remain zero until physical capital investment starts. In other words, when ρ is too large, the monarch faces very small risks of being robbed by others so that he will find it optimal to have no rule of law, under which he faces no constraint in confiscating any ruled agents.

In contrast, when ρ is small, the monarch does not enjoy too much advantage in expropriation compared with the risk of being robbed by others, and so a positive legal quality will then be optimal; in this case, the interior solution q_t^* will become higher over time because the value of rule of law is increasing steadily due to the increasing aggregate income. The informal rent-seeking capacities of both the monarch and the ruled agents are always negatively related to the legal quality, which is not surprising. Given that the income ratio of these two sides is constant over time due to fixed land size and distribution, the ratio of their rent-seeking investment is also constant over time. The rent-seeking expenditure relative to total income, which can be a good indicator of waste in economy, is always lower when q_t^* is higher.

3.2 Property Rights under Monarchy with Land and Physical Capital

We assume that, except for the monarch who has to engage in ruling, all landlords acquire the skills to invest their bequests in physical capital investment and hence $k_{ti} = b_{t-1,i}$. To simplify analysis, we assume that

the bequest of monarch is consumed by his offspring, for example, in the form of luxury goods, instead of being invested in capital.⁶ Since the incomes increase over time, investment in physical capital starts when the threshold income Z is reached for a typical citizen in a certain period t_k , where t_k is determined by

$$A_0(1+g)^{t_k} \frac{L - L_m}{N - 1} = Z.$$

The income of a typical citizen is thus from two sources, one is the land income $A_t L_i$ and the other is from capital $A_t k_{ti}$. Since the expropriation rates are different for land and capital, the overall expropriation rate τ_{1t} for any individual's income is a mixture of these two rates depending on the weights of the two incomes, where

$$\tau_{1t} I_{ti} \equiv \tau_l A_t L_i + \tau_k A_t K_t$$

holds by definition. It is easy to see that τ_{1t} is decreasing over time because the weight on the smaller value τ_k is increasing given that land is fixed while the stock of physical capital continues to go up due to investment. The increasing physical capital accumulation indicates an increasing economic power of physical capital owners versus landlords in production, and this changing power balance in economy will be transmitted to other dimensions in society and eventually may lead to fundamental changes in political and legal institutions. Though not studied in this paper, the rising importance of human capital would have similar effects (see Huang 2012a).

Lemma 1 *The percentage of exploitable income, τ_{1t} , is decreasing over time due to $\tau_k < \tau_l$ and K_t increasing.*

The ever increasing stock of physical capital becomes a new engine of growth that induces the economy to grow faster than before. The monarch benefits from capital accumulation through increased tax revenues. Economic development, however, would gradually build up pressure to challenge the monarch's absolute power because the joint income of landowners grows faster than that of the monarch and so does their coercive power.

Proposition 3 *After t_k , the challenging group's relative coercive power $x_t = \phi(\frac{L+K_t}{L_m} - 1)$ goes up over time because K_t keeps increasing. As a result, monarchy continues with no revolt before T_k , where T_k is determined by*

$$(4) \quad K_{T_k} = \frac{\phi + x^*}{\phi} L_m - L,$$

⁶As long as the monarch is relatively less effective in accumulating physical capital than the others as a whole, the main results will go through.

while revolt occurs at the first period after T_k , which leads to democracy where all landowners share political power.

This proposition makes it clear that the driving force of the increasing coercive power of the challenging group is the ever increasing physical capital K_t , and when it becomes large enough at T_k , the landowners are capable of challenging the monarch. Condition (4) shows that when the coordination effectiveness ϕ is smaller or when L_m is bigger, the political transition time T_k is reached later. The proof of this proposition is straightforward and hence omitted.

The optimal legal quality and expenditure on rent-seeking can also be solved similarly as before.

Proposition 4 *The marginal benefit of improving legal quality is higher when the physical capital stock is larger, and thus the legal quality is higher than before and keeps improving over time. In any period $t \in [t_k, T_k]$, the optimal legal quality under monarchy with $K_t > 0$ is*

$$q_t^* = \begin{cases} 0 & \text{if } \omega_t A_t \leq c'(0) \\ c'^{-1}(\omega_t A_t) & \text{if } \omega_t A_t > c'(0) \end{cases},$$

where $\omega_t \equiv \omega_m + [\tau_0 - \rho\alpha\tau_k(1 - \frac{1}{N})^2]K_t$. The optimal expenditures on rent-seeking are

$$\begin{aligned} s_{tm}^* &= \rho(1 - q_t^*)\alpha A_t(\tau_l L + \tau_k K_t)/N^2, \\ s_{ti}^* &= (N - 1)s_{tm}^*. \end{aligned}$$

The probability of monarch's expropriation $\mu_{tm}^* = 1 - \frac{1}{N}$ is the same as before.

The percentage of rent-seeking expenditure in total income,

$$\frac{s_{tm}^* + (N - 1)s_{ti}^*}{A_t(L + K_t)} = \rho(1 - q_t^*)\alpha[\tau_l - (\tau_l - \tau_k)\frac{K_t}{L + K_t}]\frac{2(N - 1)}{N^2},$$

is strictly lower than before, and it decreases in both legal quality q_t and physical capital stock K_t .

Proof. In the Appendix. ■

After physical capital investment starts, the percentage of total exploitable income in the total income, $\frac{\tau_l L + \tau_k K_t}{L + K_t}$, is lower than before. This is the underlying reason for why the legal quality is higher than before, and thus the percentage of rent-seeking expenditure in the total income is lower than before. The expenditure ratio of informal rent-seeking between the monarch and the ruled agents, however, stays constant over time, which is because the amounts of their investment are proportional to the total exploitable income, and also because the political regime is still the same.

3.3 Property Rights under Democracy

After T_k , the political regime becomes democracy where all individuals share political rights. To simplify the algebra, we assume that once under democracy the original monarch becomes indistinguishable from any typical citizens, all having identical land and physical capital. This means that all need to pay the same tax rate τ_0 , but they also share the tax revenue. There is no exploitable tax anymore, so that $\tau_0 = 0$ is used; there may be taxes for public goods purpose, but this is not considered here. Each citizen has a probability $p \in (0, 1)$ to be selected as the ruler, whose role is then similar to the median voter in the majority voting model. This is meant to keep consistency with the earlier analysis of a one-man government model where details of government operation are not explicitly considered.

Once a ruler is selected through a random and exogenous process, the timing of the decision-making sequence is still the same as before. The only change is that the legal quality q_t^* has to be decided ex ante, before the identity of the ruler is revealed in the voting process. This implies that there is dynamic inconsistency in democracy. Ex ante, everyone desires a higher legal quality, but ex post, once selected, the ruler wants a lower legal quality. So transparency on legal enforcement is needed to ensure that the agreed upon q_t^* will not be changed. The importance of a written constitution and the difficulty in changing it can be justified in this context. But of course, the ultimate force underlying the adherence to q_t^* by any ruler is the equal political and coercive power among all citizens; once q_t^* is violated, the ruler will be stripped off power by others in the political game.

Proposition 5 *Under democracy, the optimal legal quality is determined by*

$$\left[(1 - pN) \left[\rho\alpha \left(1 - \frac{1}{N^2} \right) - \frac{1}{(N-1)} \right] + \frac{2\rho\alpha(1-p)}{N^2} \right] \tau_{1t} I_{ti} - c'(q_t^*) = 0.$$

The relationship between q_t^ and ρ is the opposite compared with monarchy; now when ρ is larger, q_t^* is also higher. The legal quality is also higher when the probability of a typical citizen to become the ruler, p , is smaller. The informal rent-seeking expenditures follow the same equations as before. The optimal legal quality is higher than that under monarchy.*

Proof. In the Appendix. ■

This proposition suggests that the relationship between q_t^* and ρ is flipped. Before, under monarchy, when ρ is larger, q_t^* is lower because they are substitutes in generating revenues for the ruler. But now they become complementary: when ρ is larger, q_t^* needs also to be higher in order to curb the political power of the ruler. One can also imagine that the opposite direction is also true: when the legal quality is higher, then

the government's power or capacity ρ can also be higher because the government now can be trusted more. That is, a strong rule of law allows the government to play a bigger role in the economy. There is a positive relationship between q_t^* and ρ under democracy, but a negative relationship under a non-democratic or an exploitable political regime. This seems to be a new result in the literature.⁷ In other words, a strong rule of law and a capable government can function together only when the political power is relatively equally distributed among citizens.

Is legal quality higher in democracy? It should be because in democracy the legal quality is determined by taking into consideration of the ruled citizens' welfare. Since they are relatively disadvantaged in rent-seeking compared with the ruler, they would prefer legal protection more than the ruler. Is informal rent-seeking less intensive under democracy than monarchy? The answer is yes given that the legal quality is much higher under democracy. All these elements considered altogether, the security of property rights is much higher under democracy.

4 Concluding Remarks

Secure property rights are widely recognized as a crucial condition for economic growth. But how the overall security level is determined in a society is such a complex matter that there is still no clear understanding. This paper shows how property rights security improves over time as a result of increasing legal quality and political democratization in a political economy context, where political and legal institutions adapt to evolving factor composition in the dynamic economic development process. When land is the prominent production factor, property security against state predation is low because land is easy to be expropriated without reducing productivity and also because a small group can accumulate and manage a big land size. Only when physical capital, as represented by technical know-how and business networks, becomes such a dominant source of wealth that enables its diverse owners to defend themselves in collective actions, would the formal institutions supporting secure property rights become established and sustainable. This transition, however, is far from automatic, and often associated with open political fights, regular checking on the quality of enforcement, and credible threats whenever security falls below the expected level. The capability to transform economic and other resources into coercive power when necessary is also important.

Another insight emerging from the analysis is a natural order of institutions: The state's power as

⁷Besley and Persson (2009), for example, proposes that investments in legal and seal capacity are often complements. In their model, however, property rights refer to protection against risk of expropriation by other private agents and not by the government. Government expropriation is ruled out by assumption.

embodied by formal political and legal institutions is earned initially and has to be re-confirmed in each period by the balance of raw coercive power, which usually takes a dormant format that can be, if necessary, transformed from economic and other resources. So it is very unlikely that a high quality of legal system can function well when the political system is not fundamentally (rather than nominally) democratic in the sense that majority of citizens' interests are properly represented; and furthermore, it is also very unlikely that a democratic political system can function well when most citizens are not important factor owners that can defend themselves against state predation either individually or collectively.

Due to the extremely complex nature of property rights security issues, many important dimensions are not explicitly modeled in this paper. For instance, the interaction between state predation and contract enforcement, though not studied in this paper, seems to be an important topic that deserves further research (Greif 2005). A potentially fruitful idea is that an exogenous increase of commercial activities may, through economy of scale, enable the provision of better legal contract enforcement, and then help facilitate the rule of law to spread to other areas of property rights protection. That is, better institutions in curbing private predation may prove to be a convenient and less painful way than political confrontation to gradually impose effective constraints on state predation. Another example is about the role of the state's fiscal need and capacity (Tilly 1990), which may vary a lot due to geopolitical conditions, could also be crucial in determining the potential combination of political and legal institutions of property rights security.

Another possible extension of the paper is to study the unique effects of the increasing importance of human capital (Goldin 2001) on the protection formats of property rights. Though human capital is similar to physical capital in that both have to be invested endogenously and are more mobile, their differences are also quite substantial. For example, the possessors of human capital face more constraints in defending their property rights than physical capital owners simply because of the non-separability of human capital with its owner. Individuals also face the problem of diversification due to specialization of labor: If one is engaged in full time production, he is not able to become intensively involved in rent-seeking activities either in terms of time, effort, or skill constraints. A business owner, in contrast, can typically delegate some functions to others and actively participate in political activities. These differences and the sheer number of human capital owners would imply different forms of political and legal institutions when human capital becomes the dominant source of wealth in economy.

APPENDIX: Proofs

Proposition 4.

Proof. The equilibrium is solved backwards. Taking as given the legal quality q_t and the expenditure of others s_{ti} , the monarch's total revenue is

$$\max_{s_{tm}} q_t [\tau_0(N-1)I_{ti} + I_{tm}] + (1-q_t)\alpha \left[\rho \frac{s_{tm}}{s_{tm} + s_{ti}} [(N-1)\tau_{1t}I_{ti} + I_{tm}] + (1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}})(1 - \tau_l)I_{tm} \right] - s_{tm} - c(q_t).$$

The FOC wrt s_{tm} is

$$(1 - q_t) \frac{\rho s_{ti}}{(s_{tm} + s_{ti})^2} \alpha [(N-1)\tau_{1t}I_{ti} + \tau_l I_{tm}] - 1 = 0,$$

which uniquely determines the optimal investment in rent-seeking capacity s_{tm}^* :

$$(5) \quad s_{tm}^* = \sqrt{\rho(1 - q_t)\alpha[(N-1)\tau_{1t}I_{ti} + \tau_l I_{tm}]s_{ti}} - s_{ti}.$$

Note that $(N-1)\tau_{1t}I_{ti} + \tau_l I_{tm} = A_t[\tau_l L + \tau_k K_t]$ is the total exploitable income.

The net income of an individual i is

$$I_{ti}^q \equiv \max_{s_{ti}} q_t(1 - \tau_0)I_{ti} + (1 - q_t)\alpha \left[(1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}})(I_{ti} + \frac{\tau_l I_{tm}}{N-1}) + \rho \frac{s_{tm}}{s_{tm} + s_{ti}}(1 - \tau_{1t})I_{ti} \right] - s_{ti},$$

taking as given the expenditure of others. The FOC for interior solution is

$$(1 - q_t) \frac{\rho s_{tm}}{(s_{tm} + s_{ti})^2} \alpha (\tau_{1t}I_{ti} + \frac{\tau_l I_{tm}}{N-1}) - 1 = 0,$$

which uniquely determines the optimal investment in rent-seeking capacity s_{ti}^* :

$$(6) \quad s_{ti}^* = \sqrt{\rho(1 - q_t)\alpha(\tau_{1t}I_{ti} + \frac{\tau_l I_{tm}}{N-1})s_{tm}} - s_{tm}.$$

It is easy to see that s_{ti}^* strictly increases in the potential gain in expropriation, $(1 - q_t)\alpha[(N-1)\tau_{1t}I_{ti} + \tau_l I_{tm}] = (1 - q_t)\alpha A_t[\tau_l L + \tau_k K_t]$, and thus is higher when the legal quality q_t is lower.

Combining the two FOCs (5) and (6), we get two values of $s_{ti}^* + s_{tm}^*$ that must be equal to each other, and this leads to

$$s_{tm}^* = (N-1)s_{ti}^*.$$

Then we get from (5) that

$$s_{ti}^* + s_{tm}^* = \sqrt{\rho(1 - q_t)\alpha[\tau_l L + \tau_k K_t]s_{ti}^*} = N s_{ti}^*$$

which after some algebra leads to

$$\begin{aligned} s_{ti}^* &= \rho(1 - q_t)\alpha A_t(\tau_l L + \tau_k K_t)/N^2, \\ s_{tm}^* &= \rho(1 - q_t)\alpha A_t(\tau_l L + \tau_k K_t)\frac{N-1}{N^2}. \end{aligned}$$

So we have

$$\mu_{tm}^* = \frac{s_{tm}^*}{s_{ti}^* + s_{tm}^*} = 1 - \frac{1}{N}.$$

The total expenditure is

$$(N-1)s_{ti}^* + s_{tm}^* = \rho(1 - q_t)\alpha A_t(\tau_l L + \tau_k K_t)/N.$$

Anticipating the reaction of individuals in informal rent-seeking capacity investment, the monarch has to choose the legal quality q_t . The objective function for the ruler becomes

$$\begin{aligned} \max_{q_t} q_t [\tau_0(N-1)I_{ti} + I_{tm}] + (1-q_t)\alpha \left[\rho \frac{N-1}{N} [(N-1)\tau_{1t}I_{ti} + I_{tm}] + (1-\rho \frac{N-1}{N})(1-\tau_l)I_{tm} \right] \\ - \rho(1-q_t)\alpha A_t(\tau_l L + \tau_k K_t) \frac{(N-1)}{N^2} - c(q_t), \end{aligned}$$

which is simplified to

$$\max_{q_t} q_t A_t [\tau_0 L + (1-\tau_0)L_m + \tau_0 K_t] + (1-q_t)\alpha A_t \left[\rho [\tau_l L + \tau_k K_t] (1 - \frac{1}{N})^2 + (1-\tau_l)L_m \right] - c(q_t).$$

The FOC w.r.t to legal quality q_t is

$$\begin{aligned} A_t \left[[\tau_0 - \rho\alpha\tau_l(1 - \frac{1}{N})^2]L + (\tau_l - \tau_0)L_m + [\tau_0 - \rho\alpha\tau_k(1 - \frac{1}{N})^2]K_t \right] - c'(q_t) &= 0 \text{ if } q_t^* > 0, \\ &< 0 \text{ if } q_t^* = 0. \end{aligned}$$

This condition has an additional term $[\tau_0 - \rho\alpha\tau_k(1 - \frac{1}{N})^2]K_t > 0$ compared with before, which implies that the marginal benefit of improving legal quality is higher when physical capital stock is larger.

The percentage of rent-seeking expenditure in total exploitable income is

$$\frac{s_{tm}^* + (N-1)s_{ti}^*}{A_t(\tau_l L + \tau_k K_t)} = \rho\alpha(1-q_t^*) \frac{2(N-1)}{N^2},$$

which is strictly lower when the legal quality q_t is higher. The percentage of rent-seeking expenditure in total income is

$$\begin{aligned} \frac{s_{tm}^* + (N-1)s_{ti}^*}{A_t(L + K_t)} &= 2\rho\alpha(1-q_t^*) \frac{\tau_l L + \tau_k K_t}{L + K_t} \frac{2(N-1)}{N^2} \\ &= 2\rho\alpha(1-q_t^*) \frac{\tau_l L + \tau_l K_t - (\tau_l - \tau_k)K_t}{L + K_t} \frac{2(N-1)}{N^2} \\ &= 2\rho\alpha(1-q_t^*) [\tau_l - (\tau_l - \tau_k) \frac{K_t}{L + K_t}] \frac{2(N-1)}{N^2}. \end{aligned}$$

So it is lower when K_t is higher. It is lower than before because the percentage of total exploitable income in the total income, $\tau_{1t} = \frac{\tau_l L + \tau_k K_t}{L + K_t}$, is lower than before. ■

Proposition 5.

Proof. The equilibrium is solved backwards. Taking as given the legal quality q_t and the expenditure of others s_{ti} , the elected ruler's total revenue is

$$I_{tm}^q \equiv \max_{s_{tm}} q_t I_{tm} + (1-q_t)\alpha \left[\rho \frac{s_{tm}}{s_{tm} + s_{ti}} [(N-1)\tau_{1t}I_{ti} + I_{tm}] + (1-\rho \frac{s_{tm}}{s_{tm} + s_{ti}})(1-\tau_{1t})I_{tm} \right] - s_{tm} - c(q_t).$$

Now the benefit of legal system does not include tax revenue, only protection of one's own income. The FOC wrt s_{tm} is

$$(1-q_t) \frac{\rho s_{ti}}{(s_{tm} + s_{ti})^2} \alpha \tau_{1t} [(N-1)I_{ti} + I_{tm}] - 1 = 0,$$

which uniquely determines the optimal investment in rent-seeking capacity s_{tm}^* :

$$s_{tm}^* = \sqrt{\rho(1-q_t)\alpha\tau_{1t}[(N-1)I_{ti} + I_{tm}]s_{ti}} - s_{ti}.$$

Note that $\tau_{1t}[(N-1)I_{ti} + I_{tm}] = A_t[\tau_l L + \tau_k K_t]$ is the total exploitable income as before.

The net income of an individual i is

$$I_{ti}^q \equiv \max_{s_{ti}} q_t I_{ti} + (1 - q_t) \alpha \left[\left(1 - \rho \frac{s_{tm}}{s_{tm} + s_{ti}}\right) \left(I_{ti} + \frac{\tau_{1t} I_{tm}}{(N-1)}\right) + \rho \frac{s_{tm}}{s_{tm} + s_{ti}} (1 - \tau_{1t}) I_{ti} \right] - s_{ti},$$

taking as given the expenditure of others. The FOC for interior solution is

$$(1 - q_t) \frac{\rho s_{tm}}{(s_{tm} + s_{ti})^2} \alpha \tau_{1t} \left(I_{ti} + \frac{I_{tm}}{(N-1)}\right) - 1 = 0,$$

which uniquely determines the optimal investment in rent-seeking capacity s_{ti}^* :

$$s_{ti}^* = \sqrt{\rho(1 - q_t) \alpha \tau_{1t} \left(I_{ti} + \frac{I_{tm}}{(N-1)}\right) s_{tm}} - s_{tm}.$$

It is easy to see that s_{ti}^* strictly increases in the potential gain in expropriation, and thus is higher when the legal quality q_t is lower.

Combining the two FOCs, we get

$$\begin{aligned} s_{ti}^* &= \rho(1 - q_t) \alpha A_t (\tau_l L + \tau_k K_t) / N^2, \\ s_{tm}^* &= \rho(1 - q_t) \alpha A_t (\tau_l L + \tau_k K_t) \frac{N-1}{N^2}. \end{aligned}$$

So we have

$$\mu_{tm}^* = \frac{s_{tm}^*}{s_{ti}^* + s_{tm}^*} = 1 - \frac{1}{N}.$$

The total expenditure is

$$(N-1)s_{ti}^* + s_{tm}^* = 2\rho(1 - q_t) \alpha A_t (\tau_l L + \tau_k K_t) \frac{N-1}{N^2}.$$

The legal quality is chosen in the voting process before the ruler's identity is revealed. Anticipating the reaction of individuals in informal rent-seeking capacity investment, the objective function of a typical voter is

$$\max_{q_t} p I_{tm}^q + (1 - p) I_{ti}^q = I_{ti} - (1 - q_t) \left[(1 - pN) \left[\rho \left(1 - \frac{1}{N^2}\right) - \frac{1}{(N-1)} \right] + \frac{2\rho(1-p)}{N^2} \right] \alpha \tau_{1t} I_{ti} - c(q_t).$$

The FOC is

$$\left[(1 - pN) \left[\rho \left(1 - \frac{1}{N^2}\right) - \frac{1}{(N-1)} \right] + \frac{2\rho(1-p)}{N^2} \right] \alpha \tau_{1t} I_{ti} - c'(q_t^*) = 0.$$

So q_t^* is higher when p is lower and when ρ is higher, because both imply that the ruler's power of expropriation is higher so that a better legal quality is needed to discipline him.

We can compare the marginal benefits of improving legal quality between monarchy and democracy. Let

$$V_{mt} = A_t \left[\left[\tau_0 - \rho \alpha \tau_l \left(1 - \frac{1}{N}\right)^2 \right] L + (\tau_l - \tau_0) L_m + \left[\tau_0 - \rho \alpha \tau_k \left(1 - \frac{1}{N}\right)^2 \right] K_t \right]$$

denote the marginal benefit under monarchy, and

$$V_{dt} = A_t \left[(1 - pN) \left[\rho \alpha \left(1 - \frac{1}{N^2}\right) - \frac{1}{(N-1)} \right] + 2\rho \alpha (1 - p) \frac{1}{N^2} \right] \frac{[\tau_l L + \tau_k K_t]}{N}$$

denote the marginal benefit under democracy. Then we need to show $V_{mt} < V_{dt}$. As long as

$$(1 - pN)[\rho\alpha(1 - \frac{1}{N^2}) - \frac{1}{(N - 1)}] + 2\rho\alpha(1 - p)\frac{1}{N^2} > \frac{\tau_0}{\tau_k} - \rho\alpha(1 - \frac{1}{N})^2,$$

the ever growing physical stock will guarantee that $V_{mt} < V_{dt}$ holds sooner or later. A sufficient condition is

$$\rho\alpha\tau_k[2(1 - p)\frac{1}{N^2} + (1 - \frac{1}{N})^2] > \tau_0,$$

which is true when ρ and N are large enough. ■

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