

Property Rights Security in a Self-Sustaining Equilibrium of Institutions

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Abstract

This paper analyzes a dynamic equilibrium of institutions that affect property rights security, including coercion, informal means of rent-seeking, political regimes, and the legal system. The main results suggest that the evolving factor composition from land to capital, especially its decreasing vulnerability to expropriation, is the ultimately force pushing the wheel of endogenous institutional change, where the routine form of protection shifts from coercive means to politics and then to law. The internal coherence of these different formats of protection implies that general property security can't be high when key economic resources are vulnerable to expropriation, while the rule of law and a strong government coexist only when the common people are capable of defending themselves collectively against state predation. The main predictions of the model are consistent with broad historical evidence.

JEL: O10, O40, P16, N10.

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

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).

This paper provides a simple analytical framework to study such a general equilibrium of institutions, exploring the inherent links between different formats of property rights protection including coercive force, informal means of rent-seeking, and formal political and legal institutions from a historical or evolutionary perspective. The main result suggests that the wheel of endogenous institutional change is pushed by the evolving factor composition from land to capital along 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 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 endogenously invested and more dispersed among people as well as easier to move or hide than land (DeLong and Shleifer 1993, Rajan and Zingales 2003), 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 the changing characters of the dominant production factor, especially its vulnerability to expropriation and dispersion in distribution and investment, are the fundamental driving force for major institutional changes. A direct implication is that an economy based on natural resources, however rich it may be in per capita income, is not likely to be compatible with institutions providing secure property rights to common people.

The bedrock of property rights is one's overall capability to defend them, which is determined in this paper through three distinct but endogenously connected channels, namely, the coercive, political, and legal institutions. The balance of coercive force across groups shapes the political regime, which determines who belongs to the ruling group that can legitimately expropriate others using tax. The legal system enforces the political power through tax collection, while arbitrary expropriation by the state is curbed in equilibrium by informal means of protection by citizens (Tullock 1980, Olson 1993, Hirshleifer 1994).

To illustrate the dynamic process, the evolution of these three formats of property rights protection from monarchy to democracy is analyzed. 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 is thus very low so that the monarch faces little constraint in expropriating others. After physical capital investment starts, however, the dynamic economic development will change the balance of economic and coercive power under monarchy, and as a consequence, the legal quality will improve, and informal

rent-seeking intensity will be reduced. Once the wealth and coercive power of property owners become large enough, they will have the capability to challenge the 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 are consistent with relevant historical evidence (Moore 1966, North and Thomas 1973, Rosenberg and Birdzell 1986, North and Weingast 1989, Rapaczynski 1996, Polanyi 2001).

A new insight emerging from the model is the sign-switching relationship between legal quality and state advantage in expropriation over ordinary citizens: Whereas a strong government is typically associated with a weak legal system under monarchy or other exploitative political regime, 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 because they command sufficient coercive power to discipline the government in serving their joint interests.¹ This may account for the appearing contradictory evidence against better property security after democratic transitions since much higher tax rates are commonly observed in Europe (Angeles 2011).

A distinct feature of this paper is its focus on the endogenous link between the deep roots of economic and coercive forces and political and legal institutions of property rights. This sheds light on the main theme of historical movement of institutions as the process of the *de jure* property rights being forced to match the underlying *de facto* property rights, where the repercussive influence from *de jure* institutions to future *de facto* balance of power is also explicitly analyzed.² In other words, the democratization in economic power brought by widespread entrepreneurial activities would eventually lead to democratization in political and legal power, where delays caused by repressive institutions, however formidable in appearance, are temporary. The converse is also true in that, no matter how good the intentions are, idealistic institutional reforms will fail or be subverted if the underlying economic structure is not ready to support them in a self-sustaining equilibrium.

Though this paper studies the institutional changes at the national level, the evolutionary order of

¹Besley and Persson (2009), for example, proposes that investments in legal and fiscal capacities 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, where government expropriation is ruled out by assumption.

²This echoes the observation of Eggertsson (2005:184): "Only societies capable of continually renewing their property rights structures and adjusting them to new technologies, external shocks and internal dynamics are able to sustain growth indefinitely."

different formats of property rights protection suggested in the model, from using coercion to harnessing political forces, and finally to relying on the legal system, also applies to local 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.

This paper belongs to a broad literature connecting growth, development, and institutions in a long-term perspective (Bertocchi 2006). 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), Besley and Ghatak (2010), and Cervellati et al. (2012). Most of these papers, however, study property rights under a fixed government without considering factor composition of the economy, while in contrast, this paper focuses on the coevolution of political and legal institutions adapting to changing production factors; Cervellati et al. (2012) is an exception in this regard, but its main focus is on contract enforcement.

This paper also sheds new light on a common conceptual confusion observed in this literature, where the rich are often assumed to have advantage in rent-seeking (Besley and Persson 2009), but the poor in open fight (Acemoglu and Robinson 2001). These two types of ultra-legal coercive forces, namely, private protection activities in rent-seeking and violent confrontations of collective actions, both affect property rights in important ways, but are seldom analyzed simultaneously in a single framework, and as a result, their interactions and dynamic compatibility have not been studied. This paper endogenizes them together and finds that, in a *given* political regime of elite rule, the rich must possess both higher rent-seeking power and dominant coercive power in an open fight, because the latter is the very reason that gets them into political ruling privileges in the first place. Only when the poor have accumulated enough income and 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. And such a dominance of coercive power by the masses has to be continuously maintained in order to implement duly earned political and legal rights, otherwise elite capture may occur surreptitiously.

This paper proceeds as follows. The basic elements of the political economy model are introduced in Section 2, the benchmark model is analyzed in Section 3 as well as supporting historical evidence, and extensions are considered in Section 4. Concluding remarks are offered in the final section. All proofs are in the Appendix.

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 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,³ $\beta \in (0, 1)$ 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.⁴ 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. 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). Each individual is also endowed with a unit of labor.⁵

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

³This bequest motive from the "joy of giving" is commonly adopted in the recent literature on income distribution and growth (Altonji, Hayashi and Kotlikoff 1997, Galor and Moav 2006).

⁴By 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 to be shown in Section 4.

⁵The 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 in Section 4.

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.⁶ This income function can be endogenized as the optimization outcome from reasonable production functions (see Huang 2012b).

2.2 The Political Regime

The political regime is established based on *might-is-right*, where the ruler has dominant coercive power. The *coercive capability* v_{tj} of a group of N_j individuals is affected not only by its overall economic strength $\mathbf{I}_{tj} = \sum_{i=1}^{N_j} I_{ti}$, but also by the group's organizing effectiveness ψ_{tj} , which can be affected by many elements such as culture, ideology, religion, or the presence of charismatic leaders. To capture a salient feature of collective action due to free-riding and information problems, $\psi_{tj} = \psi(N_j)$ is assumed to decrease with group size N_j , where $\psi'(N_j) \leq 0$. In particular,

$$(1) \quad v_{tj} = \psi_{tj} \mathbf{I}_{tj} = \psi(N_j) \sum_{i=1}^{N_j} I_{ti}.$$

The stability of the political regime in each period t is not assumed, but has to be maintained as an endogenous result of a political transition game, where some individuals may form a group to challenge the current ruler's political dominance. The coercive capabilities of the challenging group and the ruler are denoted by $v_{tC} \equiv \psi_{tC} \mathbf{I}_{tC}$ and $v_{tR} \equiv \psi_{tR} \mathbf{I}_{tR}$, respectively. Then the relative coercive power of the challenging group in each period t is denoted by x_t where

$$x_t \equiv \frac{v_{tC}}{v_{tR}} = \frac{\psi_{tC} \mathbf{I}_{tC}}{\psi_{tR} \mathbf{I}_{tR}}.$$

Let $x^* \in (0, 1)$ denote a threshold such that 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 $x_t > x^*$). The ruler will respond to revolt by extending political power to the challenging group, 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 as long as $x_t \leq x^*$ holds, and is replaced by a more inclusive regime when $x_t > x^*$ is reached.⁷

⁶Note that the exogenous growth rate g , though positive, can be arbitrarily close to zero in the model, which is also consistent with the almost zero growth rate in the Malthusian era (Galor and Weil 2000, Hansen and Prescott 2002).

⁷This is a reduced-form version of the political equilibrium in Huang (2012b).

2.3 The Legal Investment

One benefit of having political power is for the ruler to maintain order and collect legitimate tax revenues without using explicit coercive forces. The other is to shape policies and institutions in favor of one's future economic interests. These are implemented through the political ruler's decision on the quality of legal system, which affects the overall security of property rights.

The highest possible expropriation rates for land and physical capital are denoted by τ_l and τ_k , respectively. Since the size of land and its productivity are more difficult to hide, move, or misreport than business activities, $\tau_l > \tau_k$ is assumed to hold, that is, it is easier to expropriate land than capital. The long-term political ruler, unlike roaming bandits, may find it not optimal to impose such high tax rates because of negative effects on incentives in production and investment. To simplify analysis, we fix the ruler's optimal tax rate at a constant level τ_0 for all factors, where $\tau_0 < \tau_k < \tau_l$ holds, meaning that promised tax rate τ_0 is lower than the expropriation rates for all factors,

This condition, however, is dynamically inconsistent because the ruler has incentives to renege on its promise. For example, the ruler may promise to tax at τ_0 before production starts, but *ex post* it may tax at much higher rates up to τ_l and τ_k . 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 warranty for the promised tax rate to be respected.

The political ruler decides how much to invest in an independent legal system to maximize its overall expected revenue. This is indicated by the legal quality $q_t \in [0, 1]$ such that the rule of law is enforced with probability q_t , in which case an individual pays the legitimate tax $\tau_0 I_{ti}$; with probability $1 - q_t$, however, the ruler overrides the law and attempts to expropriate the citizens, who in reaction have to use informal means for self-protection. The cost of legal investment is $c(q_t)$, where $c' > 0$ and $c'' > 0$.⁸

2.4 The Rent-Seeking

Given that the legal protection of property rights is not perfect, citizens need to invest in private means to counteract the ruler's potential expropriation. For example, they may purchase weapons, hire guards, or hide revenues. This is modeled as a rent-seeking game between the ruler and citizens, which is played

⁸There are other benefits of operating a legal system such as providing social order and mitigating property transgressions among ruled agents themselves (Huang 2013), which are not explicitly modeled in this paper in order to focus on conflicts between the ruler and citizens. Possible interactions between them are briefly discussed in the last section.

with probability $1 - q_t$. The informal rent-seeking capacity is denoted by s_{tR} for the ruler, and s_{ti} for an individual i . 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 . That is, with probability μ_{tR} , the ruler expropriates the individual i 's income by the amount $\tau_{1i}I_{ti}$, while with probability $1 - \mu_{tR}$ it not only receives no tax but is also robbed with the amount $\tau_{1R}I_{tR}$, where $\tau_{1i}, \tau_{1R} \in \{\tau_l, \tau_k\}$ are the expropriation rates.

The ruler enjoys relative advantage in the rent-seeking game because its specialization in political ruling enhances its efficiency in private protection, while in contrast, normal citizens are usually engaged in economic production, which is quite different in nature from using coercive means for self-defense or expropriating others' assets. This is captured by a lower cost in rent-seeking for the ruler, whose cost of financing a private protection capacity s_{tR} is s_{tR}/ρ , where $\rho > 1$, while the cost of s_{ti} for a typical citizen is equal to s_{ti} . So the monarch's *rent-seeking advantage* is indicated by ρ .

The rent-seeking activity s_{ti} and coercive capacity v_{tj} are both ultra-legal coercive forces affecting property rights security. However, they have quite distinct features and unique roles. In the potentially violent fight to gain political power of the challenging group against the current ruler, the usage of coercion is more of serving a threatening purpose, and thus it exhibits a short-term characteristic in the sense that once the balance of power is demonstrated to all relevant sides in forging agreement upon 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.

2.5 The Timeline of Decisions

The timing of major decisions in each period is as follows. (1) **The Political Regime Stage.** The ruled agents 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 x_t . (2) **The Legal Investment Stage.** Once the political regime is settled, the ruler determines q_t , the quality of an independent legal system that enforces the implementation of the promised tax rate. (3) **The Rent-Seeking Stage.** Given the political regime and legal quality, each individual decides how much resource to invest in the informal capacity of rent-seeking s_{tR} and s_{ti} . Then tax is collected with probability q_t , otherwise the rent-seeking game is played, and finally bequests and capital investment are made for next period.

The game is solved by backward induction. 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.⁹

3 The Political and Legal Development Path

3.1 Monarchy with Land Only: Weak Law

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_R 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, incomes are assumed identical among citizens in this benchmark case, while heterogeneity is discussed in the next section.

In **the Rent-Seeking Stage**, each individual makes optimal investment in rent-seeking to maximize their expected revenue, taking as given legal quality q_t and others' expenditure. The monarch's revenue contains land income I_{tR} and legitimate tax $(N-1)\tau_0 I_{ti}$ when the legal system works properly. If not, then the monarch engages in rent-seeking with each of the $N-1$ agents at tax-collecting occasions; as a result, the monarch's revenue is either $I_{tR} + (N-1)\tau_l I_{ti}$ when he wins with probability μ_{tR} , or $(1-\tau_l)I_{tR}$ when he loses and is thus expropriated by others. So the monarch's objective function is

$$\max_{s_{tR}} q_t [I_{tR} + \tau_0 (N-1) I_{ti}] + (1-q_t) \{ \mu_{tR} [I_{tR} + (N-1)\tau_l I_{ti}] + (1-\mu_{tR})(1-\tau_l) I_{tR} \} - s_{tR}/\rho - c(q_t).$$

⁹ Allowing longer horizons may alter the timing but not the qualitative results of the transition process.

Following similar arguments, the objective function of an individual i in the rent-seeking stage is

$$\max_{s_{ti}} q_t(1 - \tau_0)I_{ti} + (1 - q_t) \left[(1 - \mu_{tR})(I_{ti} + \frac{\tau_l I_{tR}}{N - 1}) + \mu_{tR}(1 - \tau_l)I_{ti} \right] - s_{ti}.$$

Proposition 1 *The optimal expenditures on informal rent-seeking are*

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

$$(3) \quad s_{tR}^* = (N - 1)\rho s_{ti}^*.$$

The success rate of ruler's expropriation is

$$\mu_{tR}^* = \frac{s_{tR}^*}{s_{ti}^* + s_{tR}^*} = \frac{\rho(N - 1)}{1 + \rho(N - 1)},$$

which increases in both ρ and N . The percentage of rent-seeking expenditure in total income is

$$E_t^* = \frac{(N - 1)s_{ti}^* + s_{tR}^*}{Y_t} = \tau_l(1 - q_t^*)(N - 1) \frac{(1 + \rho)\rho}{(1 + \rho(N - 1))^2},$$

which decreases in q_t and increases in ρ .

These results are quite intuitive. The monarch is more likely to succeed in expropriation when the population size N is larger and when it is more efficient in expropriation (i.e., if ρ is larger). The total expenditure on rent seeking is high when the legal quality q_t is low, when the total available rent in the economy τ_l is high, and when the ruler's advantage in expropriation ρ is large.

In the **Legal Investment Stage**, the monarch, anticipating the informal rent-seeking capacity investment s_{ti}^* and s_{tR}^* in the above Proposition 1, chooses the optimal legal quality q_t^{*M} to maximize its expected overall revenue.

Proposition 2 *The optimal legal quality under monarchy is*

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

where $\omega_R A_t \equiv (\tau_0 - \mu_{tR}^* \tau_l)Y_t + (\tau_l - \tau_0)I_{tR}$ indicates the marginal benefit of legal quality, which strictly decreases in ρ . The legal quality q_t^* would stay at zero if the monarch's rent-seeking advantage ρ is sufficiently large, otherwise it will eventually become positive and then increase over time after a critical period T_q , where

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

So a higher ρ delays the beginning of legal investment and reduces legal quality.

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. Since the total private protection expenditure is high when ρ is large, the political order is maintained not by law but by the monarch's dominance in rent-seeking.

In contrast, when ρ is small, the monarch does not enjoy much advantage in expropriation compared with the risk of being robbed by others, a positive legal quality will then be optimal; in this case, the interior solution q_t^* will become higher over time because the marginal benefit 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.

In the **Political Regime Stage**, the political ruler's legitimacy is backed up by its dominant coercive power. The following proposition shows that a sufficiently large land size L_R enables the monarch to enforce a stable political order without credible challenge from other landlords; the actual size, however, is affected by cooperative effectiveness of both monarch and citizens.

Proposition 3 *When land is the main source of wealth, monarchy continues without any revolt as long as*

$$\frac{L_R}{L} \geq \frac{1}{1 + \phi x^*},$$

where $\phi \equiv \psi(1)/\psi(N-1)$ indicates the monarch's relative coercive effectiveness.

When wealth comes only from land (or other natural resources), as long as the monarch owns enough land to support his dominant coercive power, the monarchy political order is stable. The investment in an independent legal system, in contrast, is determined by the relative benefit of committing to the promised legitimate tax rate τ_0 compared with arbitrary expropriation at a much higher rate τ_l ; even though the ruled agents have no hope to overthrow the political rule of the monarch due to their weak coercive power, they can still increase the cost of expropriation through informal rent-seeking. The ability to do so, however, is determined by the monarch's advantage in expropriation ρ , which is likely to be high. So the law is weak and frequent expropriation is the norm. Property rights security from the ruler is thus very low from both political and legal perspectives.

3.2 Monarchy with Physical Capital: Legal Quality Improved

As incomes increase over time, physical capital investment starts when the threshold income Z is reached for a typical citizen in period T_k , where T_k is determined by

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

The new income from capital $A_t k_{ti}$ grows faster than land income $A_t L_i$ because the capital stock itself is increasing while land is fixed. The monarch lacks both time and skill for physical capital investment due to its engagement in ruling,¹⁰ but it does benefit from capital accumulation through increased tax revenues.

The ever increasing stock of physical capital becomes a new engine of growth that induces the economy to grow faster than before. It also indicates an increasing economic power of physical capital owners versus landlords, which will be transmitted to other dimensions in society and eventually lead to fundamental changes in political and legal institutions. Specifically, the joint income of $N - 1$ landlords, who may form the challenging group, grows faster than that of the monarch, and so does their coercive power.

Proposition 4 *The political transition from monarchy to democracy where all property owners share political power occurs in period T_D , where T_D is determined by*

$$(4) \quad K_{T_D} = (1 + \phi x^*) L_R - L,$$

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_D , the landowners are capable of challenging the monarch to gain political rights. Condition (4) shows that when the monarch's relative coercive effectiveness ϕ is higher or when its land size L_R is larger, the political transition time T_D is reached later.

Since the expropriation rates are different for land and capital, the overall expropriation rate τ_{ti} for any citizen's income is a mixture of these two rates depending on the weights of the two incomes, where

$$\tau_{ti} I_{ti} \equiv A_t (\tau_l L_i + \tau_k k_{ti})$$

holds by definition. Since all landlords are identical, τ_{ti} is the same where $\tau_{ti} = \frac{\tau_l(L - L_R) + \tau_k K_t}{(L - L_R) + K_t}$. It is easy to see that τ_{ti} is decreasing over time because the weight on the smaller value τ_k , where $\tau_k < \tau_l$, is increasing

¹⁰ As long as the monarch is relatively less effective in accumulating physical capital than the others as a whole, the main results will go through.

given that land is fixed while the stock of physical capital continues to go up due to investment. The overall expropriation rate in economy,

$$\tau_t = \frac{\tau_l L + \tau_k K_t}{L + K_t},$$

also decreases over time. So the marginal benefit of improving legal quality increases in physical capital, and thus the optimal legal quality q_t^{**} is higher than before.

Proposition 5 *In any period $t \in [t_k, T_D]$, 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 $\omega_t A_t = \omega_R A_t + (\tau_l - \tau_t) Y_t$. So $q_t^{**} > q_t^*$ since $\omega_t > \omega_R$ holds due to $\tau_t < \tau_l$. The optimal expenditures on rent-seeking are

$$\begin{aligned} s_{ti}^{**} &= \frac{\tau_t}{\tau_l} s_{ti}^*, \\ s_{tR}^{**} &= \rho(N-1) s_{ti}^{**}, \end{aligned}$$

both of which are lower than before, though the success rate of monarch expropriation is still the same as μ_{tR}^* . The percentage of total rent-seeking expenditure is also reduced since

$$E_t^{**} = \frac{\tau_t (1 - q_t^{**})}{\tau_l (1 - q_t^*)} E_t^*.$$

After physical capital investment starts, the percentage of total exploitable income in the total income, τ_t , decreases over time. This is the underlying reason for why the endogenous legal quality q_t^{**} becomes higher, and thus the percentage of rent-seeking expenditure in the total income, E_t^{**} , decreases. The expenditure ratio of informal rent-seeking between the monarch and the ruled agents, μ_{tR}^* , however, stays constant over time because the political regime is still the same and ρ is assumed fixed. The key driving force for better property security is not physical capital *per se*, but its lower vulnerability to expropriation.

In this paper, the coming of age of physical capital is taken as an exogenous historical fact. It is not far-fetching to imagine that, counter-factually, if there is an alternative new production factor that is more effective in generating income but also more vulnerable than physical capital to expropriation, then it may not be adopted by the ruled agents in the first place. So the need for better protection may exert fundamental impact on the actual composition of production factors, where the less vulnerable varieties are more likely to be invested.

3.3 Property Rights under Democracy

After T_D , the political regime becomes democracy where all property owners share political rights. This is implemented by a random process where each citizen has an equal probability $p \in (0, 1)$ to be selected as the political ruler in each period. As a result of the democratization process, all citizens have identical land and physical capital. Heterogeneity will be analyzed in the next section.

The timing of the decision-making sequence is still the same as before, except that the legal quality q_t^{*D} has to be decided before the identity of the ruler is revealed. The cost of maintaining the legal system is shared equally among all citizens and paid at the beginning of each period. When the law functions well, which occurs with probability q_t^{*D} , each citizen pays tax $\tau_0 I_{ti}$ as before; the tax revenue is used for covering the cost of the legal system and providing a public good shared among citizens, the value of which is $\tau_0 \sum_{i=1}^N I_{ti} - c(q^*)$. With probability $1 - q_t^{*D}$, the same rent-seeking game as before is played between the ruler and citizens.

Here arises a new type of dynamic inconsistency in democracy: No matter what legal quality one desires as a typical citizen, once selected as the political ruler, she will prefer a strictly lower legal quality ex post because she now enjoys a dominant rent-seeking capacity ρ . So transparency on legal enforcement is needed to ensure that the agreed upon q_t^{*D} will not be mitigated. The importance of a written constitution and the difficulty in changing it can be justified in this context. But the ultimate force underlying the adherence to q_t^{*D} by any ruler is the political and coercive power of citizens; once the violation of q_t^{*D} is observed and verified, the ruler will be stripped off power since citizens have dominant coercive power. In the worst case where corruption is undetected, the ruler is almost surely going to be replaced by another randomly selected citizen after one period as long as p is sufficiently low. The potential danger of democracy being captured by a powerful elite group is to be discussed in the next section.

Proposition 6 *Under democracy, the optimal legal quality is determined by*

$$[(\mu_{tR}^{*2} - \frac{1}{N})(\frac{1}{N} - p)N + (1 - p)\mu_{tR}^{*2} \frac{2}{\rho(N-1)}] \frac{N}{N-1} \tau_t Y_t - c'(q_t^{*D}) = 0.$$

where $q_t^{*D} > q_t^{**}$ only when p is sufficiently small, and when $p < \frac{1}{1+\rho(N-1)^2}$ holds, q_t^{*D} increases in ρ . The elected ruler's ex post choice of legal quality is always lower than that of the citizens. The rent-seeking expenditures follow the same equations as in Proposition 5.

This proposition suggests that the relationship between legal quality and ρ is flipped under democracy to reflect the interests of citizens. Under monarchy, both q_t^* and q_t^{**} decrease in ρ because taxation and

expropriation are substitutes in generating revenues for the ruler. But now political power is shared among citizens and serves the common interests of all; when ρ is larger, q_t^{*D} needs also to be higher in order to curb the rent-seeking temptation of the ruler.¹¹ The relationship between legal quality and ρ is positive under democracy but negative under exploitative political regimes is consistent with empirical evidence, where 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 by intuition, because in democracy the legal quality is determined to maximize a typical citizen's welfare; since they are relatively disadvantaged in rent-seeking compared with the ruler, they would prefer legal protection more than the ruler. The formal analysis, however, shows that such a result is far from being fixed; actually, it is affected by how likely the decision maker of legal quality is to become the political ruler, which is captured in the model by p . The reason is that the democratic ruler, unlike the monarch, does not get tax as her own income; the only extra gain of being in the office is the expropriation opportunity provided by the strong state capacity as indicated by ρ . And indeed, under democracy, the ruler's *ex post* best choice of legal quality is always zero, which is worse than the monarch. This dynamic inconsistent problem has to be diligently mitigated by a sufficiently low p .

3.4 The Evolution Path and Historical Evidence

The increase of legal quality over time, as illustrated in Figure 1, is driven by three interconnected sources in the above benchmark model. (1) The benefit of legal system as represented by the tax revenue gradually increases due to productivity growth of A_t . It may not lead to any visible change of legal quality for a long time, however, until period T_q , in which the legal quality becomes positive and keeps increasing over time since then. (2) The physical capital K_t , a new format of property that differs from land and other natural resources in its better protection against expropriation, tilts the trade-off between legal tax and expropriation in favor of the former, and thus induces the ruler to increase legal investment. So the trajectory of legal quality follows a higher sloped curve once capital investment starts in period T_k , and property is more secure than before. (3) A discrete jump of legal quality, however, has to wait until the transition of political regime at period T_D , when all property owners share political power to collectively determine the optimal legal protection of properties. So the political regime change is a necessary condition for a dramatic improvement of legal quality, which is possible only when the joint coercive power of the citizens is strong enough to gain

¹¹One can also imagine that the opposite direction is also true: when the legal quality is high, then the government can be trusted to have high state capacity as indicated by ρ . That is, a strong rule of law allows the state to play a bigger role in society (Lizzeri and Persico 2004).

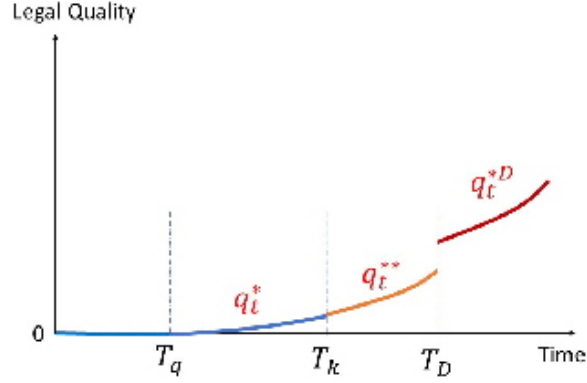


Figure 1: The Evolution Path of Legal Quality

political dominance.

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 (this corresponds to low legal quality in periods before T_q). 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 became relatively independent from the Crown in its protection of private property rights (this corresponds to higher legal quality after T_k). 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, severe violation of property rights was not uncommon. 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 (this corresponds to T_D), which greatly reduced the Crown's expropriating capacity (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 and later

on triggered the Industrial Revolution.

An often cited evidence against property rights improvement after the Glorious Revolution is that the tax rate was higher than before. From the thirteen century until the Glorious Revolution, the tax rate is around 2% to 6% of national income (Clark 2007, p. 148–154), while in contrast, the government’s share in aggregate output increased since 1688 to levels around 20% of national income by the end of the 18th century (Angeles 2011). This pattern of having higher taxes in societies with a more constrained executive branch is actually quite common in Europe at least since the mid-17th century (Dincecco 2009). Such a confusion is difficult to understand in a static environment, but could be easily explained in a dynamic environment where the change of political regime affects property rights fundamentally. Specifically, the property owners, now with political power in the format of being represented in the parliament that determines the tax rate and legal quality, have more secure property rights and thus are willing to pay higher tax than before, where the tax now is not exploitative but for their collective interests such as improving the infrastructure. This is captured by the above result of changing relationship between state capacity and legal quality after democracy, that is, the possession of political power by common property owners enables the government to acquire more legitimacy and capacity to raise more tax for collective purposes.

4 Extensions and Discussions

In the benchmark model discussed above, citizens are assumed to be homogenous, the legal quality is the same for all property types and can be observed by all. These assumptions, adopted to simplify the analysis of the evolution path of legal development, can be relaxed to derive interesting insights and provide explanation for often confusing historical evidence on property rights. It turns out that heterogeneity in property holding leads to lower expenditure in rent-seeking and higher legal quality than the benchmark case.

4.1 Monarchy with Unequal Land Distribution

Suppose there are N_1 big landlords each owning a sizable land L_1 , while the rest are the majority in population owning very little land. This gives rise to three potential challenging groups in the political game: the big-landlords group (i.e., the barons), small-landlords group, and all $N - 1$ landlords together. An often observed scenario in history is that the barons have the highest coercive power due to their small number and large average land size. In contrast, the group of small landlords, though with the greatest numbers of individuals, has the lowest coercive power due to small land size and difficulty in collective actions. The joint group of

all landlords is in the middle. This is captured by condition

$$(5) \quad \psi(N_1)N_1L_1 > \psi(N-1)(L-L_R) > \psi(N-N_1-1)(L-L_R-N_1L_1),$$

which is assumed true.

Proposition 7 *The optimal expenditures on informal rent-seeking with unequal land distribution are*

$$(6) \quad s_{tR}^{*H} = \rho \sum_{i=1}^{N-1} s_{ti}^{*H} = s_{tR}^* \frac{\hat{Y}_t}{Y_t},$$

where $\hat{Y}_t = \frac{1}{N-1} \left(\sum_{i=1}^{N-1} \sqrt{I_{ti} + \frac{I_{tR}}{N-1}} \right)^2$, and $\hat{Y}_t < Y_t$ holds by Jensen's Inequality. So s_{tR}^{*H} is smaller than s_{tR}^* in the benchmark case. The percentage of rent-seeking expenditure in total income

$$E_t^{*H} = \frac{\sum_{i=1}^{N-1} s_{ti}^{*H} + s_{tR}^{*H}}{Y_t} = E_t^* \frac{\hat{Y}_t}{Y_t}$$

is also lower than the benchmark case E_t^* . The optimal legal quality is determined by

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

where $\omega_{Ht} = (\tau_0 - \tau_l \mu_{tm}^* \frac{2\hat{Y}_t}{Y_t})Y_t + (\tau_l - \tau_0)I_{tR}$, and $\omega_{Ht} > \omega_R A_t$ holds. The start of legal development is thus earlier and the optimal quality higher than the benchmark case, while the minimum land size of the monarch to maintain a stable political order is larger.

When the land size L_1 is large enough and N_1 sufficiently small, the barons is likely to be the strongest group to challenge the monarch and may cause political instability occasionally, but as long as the monarch owns the dominant size of land, the political order of monarchy will remain stable. This power structure, however, will permanently change once physical capital starts to accumulate.

In the benchmark case, the joint group of all landlords and capital owners will sum up enough coercive power to overthrow the monarchy and establish democracy in period T_D . When property owners are not homogeneous, however, the political transition process can be more complicated.

4.2 Monarchy with Heterogeneity in Land and Capital

Physical capital investment starts later than the benchmark case due to lower savings caused by a larger land size of monarch, higher rent-seeking expenditure, and lower legal quality. The presence of physical capital adds a new dimension to heterogeneity in property holding under monarchy, where the following two types

are relevant historically. One is composed of big landlords, who do not invest in physical capital, and small business owners who have little land. The other type of heterogeneity is on size only, where individuals own both land and capital, and thus do not have conflicts across sectors. The outcomes of these two types would be quite different.¹²

Type 1 (Co-optation of Landlords versus Capital Owners). Suppose the N_1 big landlords, labelled as barons, spend their savings in conspicuous consumption and do not invest in physical capital, while the others start to engage in business enterprises such as trading and craftsmanship. As the stock of physical capital increases over time, the coercive power of the capital owners goes up, which would eventually change the balance of power.

The baron group, which poses no credible threat before, now can collaborate with capital owners to challenge the monarch; realizing this potential danger, however, the monarch may choose to co-opt the barons group (Bertocchi and Spagat 2001) by offering them a better legal protection that they can't refuse. This can be implemented as high quality law enforcement over land, while adopting an inferior legal protection for other business owners.¹³

In this co-optation case, the conflict of interests is represented by land versus capital owners, rather than monarch versus other property owners. The alliance between the monarch and barons boosts up the monarch's coercive power and weakens that of capital owners, which, together with worse legal protection of capital, will greatly delay the political transition timing.

Proposition 8 *The best time for the monarch to co-opt the big landlords is period T_D as in condition (4), and then the legal quality for land property rights would be higher than that for capital. Revolt by capital owners against the landlords occurs after T_{DC} , where*

$$(7) \quad K_{T_{DC}} = \left(\frac{\psi(N_1 + 1)}{\psi(N - 1 - N_1)} x^* + 1 \right) (L_R + N_1 L_1) - L,$$

which leads to democracy. Since $T_{DC} > T_D$ holds when L_1 is large enough, the political transition from monarchy to democracy is delayed by cooptation.

This proposition states that land inequality is likely to give rise to co-optation, which would delay the political transition considerably. It is quite ironic to see that, a better legal protection of land for barons

¹²In a given country, the first type is typically more prevalent earlier in history than the latter. Across countries, for example, during the early industrialization eras, continental European countries fits the first type, while England the latter. In current times, oil rich countries can be categorized as the first type, while some developing countries with authoritarian political regimes and dominant business tycoons the latter.

¹³There is indeed historical evidence that land security was already high before democratic transition and didn't experience dramatic increase afterwards.

comes not from their own merit *per se*, but from the increasing power of capital owners. Note that the relative coercive power of barons as a single group against the monarch stays constant over time since land stock remains constant; the strategic value of barons as a potential force joining together with capital owners to challenge the monarchy, however, goes up with capital stock. The smaller number of barons and commonality of land ownership makes them a better target for cooptation by the monarch than the group of many smaller business owners.

Type 2 (Rich versus Poor). In this case, the N_1 big landlords also invest in physical capital, which means their income and coercive power will grow faster than the monarch. Since physical capital investment is from savings, its stock is positively related to earlier income and thus land ownership; so the group of big landlords may still possess the strongest coercive power among all potential challenging groups.

Different from Type 1 where the group of big landlords by itself is not capable of overthrowing the monarch and thus would accept the co-optation arrangement, physical capital investment enables this group to act alone politically to push for transition from monarchy to oligarchy, where political power is shared among all big landlords. Co-optation is less attractive to this group since they can gain political power themselves, and also not feasible for the monarch due to its shrinking relative coercive power to maintain control.

As a result, the legal quality would be higher for both land and capital of big property owners, leaving the majority of population, the $N - 1 - N_1$ small landlords and business owners with inferior legal protection. For example, the cost of using court service can be too high for the poor to afford, or the legal enforcement favors rich elites. Full democracy has to wait until the latter's coercive power becomes high enough to challenge the ruling group. The timing of the two political transitions is specified in the following proposition.

Proposition 9 *The transition from monarchy to the oligarchy of big property owners occurs in period T_O where*

$$K_{T_O,1} = \frac{\psi(1)x^*}{\psi(N_1)}L_R - N_1L_1.$$

This can be earlier than T_D in the benchmark case, that is, $T_O < T_D$ holds if L_1 is large enough. The final transition to full democracy for all property owners, if any, occurs at period T_{DO} where

$$K_{T_{DO}} = [\phi_c x^* + 1](L_R + N_1L_1 + K_{T_{DO},1}) - L,$$

which is later than T_D and T_{DC} .

Type 1 scenario is more likely to occur when the wealth inequality is higher, which is consistent with

historical experiences of East European and continental European countries as well as contemporary authoritarian societies, while Type 2 seems to fit the history in England. Even though eventually the legal quality will become higher as the capital stock increases over time, the exact timing will be delayed when wealth inequality is high. And it is also likely that land is better protected than other types of properties, and rich elites enjoy more secure property rights than others.

4.3 Democracy with Heterogeneity

In the benchmark model, the key condition to discipline the elected ruler from abusing power is the implicit political game played in each period, where the coercive power of the masses remains dominant to replace any misbehaving ruler. This is implemented partly by the routine election cycle in democratic societies. This condition can be violated, however, either by elite capture, or by the lack of transparency in legal quality.

Wealth heterogeneity also increases legal quality under democracy, since the rent-seeking expenditure is lower according to Proposition 7. It can, however, cause more severe consequences such as elite capture that may lead to degeneration of democracy and worse legal quality than monarchy or oligarchy.

Suppose there exists an elite group of individuals who are more likely to be selected as the political ruler. For example, the elite school (such as the Ivy Leagues) graduates, top law professionals, and rich businessmen have much higher chances in holding key political and legal leadership positions than ordinary people. Specifically, N_1 elite individuals of the population have a higher probability p_1 to be selected as the political ruler, while the rest majority, $N - N_1$, have slim chances as indicated by a very low probability p_2 , where $p_1 > p_2$. Then based on results of Proposition 6, the optimal choice of legal quality by the elites, q_{t1}^* , would be lower than that of the masses, q_{t2}^* , and can be even lower than that under monarchy. That is, $q_{t1}^* < q_{t2}^*$ holds due to $p_1 > p_2$.

The ultimate legal quality q_t^* will be affected by the political power balance of these two groups, where three outcomes are possible: **Case 1 (Mass Dominance):** When a democracy serves the interests of the masses, $q_t^* = q_{t2}^*$ is likely to occur. This outcome occurs in a stable equilibrium when the masses possess dominant coercive power, that is, when $\psi(N - N_1) \sum_{i=1}^{N-N_1} I_{ti}^P > \psi(N_1) \sum_{i=1}^{N_1} I_{ti}^E$ holds, which is likely when income inequality between the elite and the masses is quite low. **Case 2 (Elite Capture):** When a democracy is captured by the elite group, $q_t^* = q_{t1}^*$. The sustainability of such elite dominance is feasible when the income inequality is sufficiently high so that $\psi(N_1) \sum_{i=1}^{N_1} I_{ti}^E > \psi(N - N_1) \sum_{i=1}^{N-N_1} I_{ti}^P$ holds. **Case 3 (Fragile Inbetween):** When no group has clear dominance in coercive power, either a compromise is maintained, where $q_t^* \in (q_{t1}^*, q_{t2}^*)$, or a swing between the former two extreme outcomes occurs subject to

some random shocks.

When legal quality can vary across of different types of properties, then a similar political economy analysis would suggest that the legal protection of the politically dominant group's property would be higher. For example, under elite capture, big banks and companies may get much better legal treatment than others, such as small business owners and employees. A formal analysis of these issues, however, needs to specify the detailed process of political and legal conflict resolution, which is best left for future research.¹⁴

Endogenous Heterogeneity. Even when individuals are equal initially, the access to top political and legal positions will always be unequal *ex post*, since the lucky ones who were selected into top offices are more likely to accumulate more wealth than others, which may give their offsprings extra advantages in maintaining the privileges.¹⁵ This may gradually give rise to a ruling group, whose probability of getting top jobs in the state is so high that they behave like inherited aristocracies. So new elites are likely to be created under democracy even with initial equality across people (Andrias 2015).

Degeneration of Democracy. When the initial income inequality is not too high, it is difficult for any narrow group of citizens to capture democracy as long as transparency is meticulously maintained. However, when the information of real situation is manipulatable so that legal quality is blindly believed to be high and the election process just, then elite capture is likely to creep in. Legal protection may deteriorate if some groups have much higher chances to take top positions in the state and monopolize key information.¹⁶ So the dynamic degeneration sequence of democracy may run from Case (1) to (3) and finally to (2).

When situations become glaringly inconsistent with the expectation, the masses might eventually grasp the truth that they are already in Case (2), and try to restore their rights through political process or social upheavals.¹⁷ Whether the degeneration of democracy can be reversed, however, depends again upon the balance of coercive force between the elites and masses. It is not impossible for democracy to degenerate back into oligarchy of elites if technological innovations render the masses more exploitable than before.

The main message of the analysis, both in the benchmark model and with heterogeneity, is that the bedrock of property rights is essentially one's overall ability to defend them, the ultimate source of which is

¹⁴As an example, see Huang (2013) for a detailed analysis of legal quality in contract enforcement.

¹⁵Piketty (2014) observes that "a market economy based on private property, if left to itself...contains powerful forces of divergence" (p. 571). Similar divergence occurs in communist countries too.

¹⁶Gilens (2012) provides evidence that U.S. policy is "strongly tilted toward the most affluent citizens" such that, "under most circumstances, the preferences of the vast majority of Americans appear to have essentially no impact on which policies the government does or doesn't adopt."

¹⁷For example, the recent wave of populism across many countries may reflect the masses' realization that globalization benefits the elites disproportionately to the point that the masses' property rights are seriously weakened in terms of deteriorating public facilities, stagnant wages and high unemployment (Purdy et al 2020).

one’s coercive force. This is true for democratic societies too. That is, even widely accepted constitutional rights have to be carefully examined, and if necessary, reinforced or adjusted by every generation, because constitutions were shaped by the power balance at the initial democratic transition period, while as long as such balance will change dynamically over time, so will do the corresponding rights. Even when the political regime remains the same in the nominal sense, the legal protection of property rights could have gone through dramatic changes (Pistor 2019), which, if unchecked in time, may need costly turmoils of social upheavals to restore the equilibrium.

5 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 a clear understanding is still elusive. 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 political and legal 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 embodied by formal political and legal institutions is earned initially and has to be re-confirmed in each period by the balance of 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 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, Galor and Moav 2006) 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 (Barzel 1989). 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, she is not able to become intensively involved in rent-seeking activities either in terms of time, effort, or skill constraints (Huang 2012a). A business owner, in contrast, can 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 1.

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

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

where $Y_t = [(N-1)I_{ti} + I_{tR}]$ is the total income of the economy, and $\tau_l Y_t$ is the total amount of rent available in the rent-seeking game.

The FOC for individual i is

$$(1 - q_t)\tau_l Y_t \frac{1}{N-1} \frac{s_{tR}}{(s_{tR} + s_{ti})^2} - 1 = 0.$$

Combining the two FOCs, we get

$$s_{tR}^* = \rho(N-1)s_{ti}^*,$$

which can be plugged in the above condition to get

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

Then the optimal result

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

is obtained. So we have

$$\mu_{tR}^* = \frac{s_{tR}^*}{s_{ti}^* + s_{tR}^*} = \frac{\rho(N-1)}{1 + \rho(N-1)},$$

which is constant over time, and increases in both ρ and N :

$$(8) \quad \frac{d\mu_{tR}^*}{d\rho} = \frac{N-1}{[1 + \rho(N-1)]^2} > 0.$$

The percentage of rent-seeking expenditure in total Y_t is

$$E_t^* = \frac{(N-1)s_{ti}^* + s_{tR}^*}{Y_t} = \tau_l(1-q_t^*)(N-1) \frac{(1+\rho)\rho}{(1+\rho(N-1))^2},$$

which increases in ρ since

$$d \frac{(1+\rho)\rho}{(1+\rho(N-1))^2} / d\rho = \frac{1 + \rho(N-1) + 2\rho^2(N-2)}{(1+\rho(N-1))^3} > 0.$$

■

Proposition 2.

Proof. 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

$$\begin{aligned} & \max_{q_t} q_t [I_{tR} + \tau_0(N-1)I_{ti}] + (1-q_t)\{\mu_{tR}^*[I_{tR} + (N-1)\tau_l I_{ti}] + (1-\mu_{tR}^*)(1-\tau_l)I_{tR}\} \\ & - (1-q_t^*)\mu_{tR}^*\tau_l Y_t \frac{1}{\rho(N-1)+1} - c(q_t) \end{aligned}$$

after plugging in s_{ti}^* and s_{tR}^* in equations (2) and (3). The FOC w.r.t to legal quality q_t is

$$(9) \quad \begin{aligned} (\tau_0 - \mu_{tR}^{*2}\tau_l)Y_t + (\tau_l - \tau_0)I_{tR} - c'(q_t^*) &= 0 \text{ if } q_t^* > 0, \\ &< 0 \text{ if } q_t^* = 0, \end{aligned}$$

where $A_t\omega_R \equiv (\tau_0 - \mu_{tR}^{*2}\tau_l)Y_t + (\tau_l - \tau_0)I_{tR}$ strictly decreases in μ_{tR}^* . To have a positive solution, μ_{tR}^* cannot be too large. Let

$$[\frac{\tau_0}{\tau_l} + (1 - \frac{\tau_0}{\tau_l})\frac{L_R}{L}] \equiv \widehat{\mu_{tR}^*}^2,$$

then $\omega_R(\widehat{\mu_{tR}^*}) = 0$. Since μ_{tR}^* strictly increases in ρ , it means that there exists a threshold $\widehat{\rho}$ such that if $\rho \geq \widehat{\rho}$, then it is not possible to have a positive legal quality in any period under monarchy when there is

only land. The reason is that 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_R/L and τ_0/τ_l are smaller.

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 $A_{T_q}\omega_R = c'(0)$, where $A_{T_q} = (1+g)^{T_q}$. So

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

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.

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

The percentage of rent-seeking expenditure in total exploitable income will thus decrease over time when q_t^* increases. ■

Proposition 3.

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

Proposition 4

Proof. The challenging group's coercive power is $v_t^C = \psi(N - 1)A_t(L - L_R + K_t)$, where $K_t = (N - 1)[I_{t-1,i}^* - Z]$ and $I_{t-1,i}^*$ is the disposable income of a typical landowner. The monarch's coercive power is $v_t^G = \psi(1)A_tL_R$. They will challenge the monarch once $x_t = x^*$ is reached in period T_D , where $x_t = v_t^C/v_t^G = (L - L_R + K_t)/\phi L_R$. So $x_t = x^*$ is equivalent to $\frac{L-L_R+K_{T_D}}{\phi L_R} = x^*$, which is simplified to $K_{T_D} = (1 + \phi x^*)L_R - L$ that determines T_D . ■

Proposition 5.

Proof. The equilibrium is solved backwards.

(1) **The Rent-Seeking Stage.** Taking as given the legal quality q_t and the expenditure of others s_{ti} , the monarch's total revenue is

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

The FOC wrt s_{tR} is

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

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

$$(10) \quad s_{tR}^{**} = \sqrt{(1 - q_t)[(N-1)\tau_{ti}I_{ti} + \tau_l I_{tR}]\rho s_{ti} - s_{ti}}.$$

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

The net income of an individual i is

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

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

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

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

$$(11) \quad s_{ti}^{**} = \sqrt{(1 - q_t)[(N - 1)\tau_{ti} I_{ti} + \tau_l I_{tR}] \frac{s_{tR}}{N - 1}} - s_{tR}.$$

Combining the two FOCs (10) and (11), we get two values of s_{ti}^{**} and s_{tR}^{**} that must be equal to each other, and this leads to

$$s_{tR}^{**} = (N - 1)\rho s_{ti}^{**},$$

Then we get from (10) that

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

which after some algebra leads to

$$(12) \quad s_{ti}^{**} = (1 - q_t)\tau_t Y_t \frac{\rho}{(\rho(N - 1) + 1)^2},$$

$$(13) \quad s_{tR}^{**} = (1 - q_t)\tau_t Y_t \frac{\rho^2(N - 1)}{(\rho(N - 1) + 1)^2}.$$

So we have

$$\mu_{tR}^{**} = \frac{s_{tR}^{**}}{s_{ti}^{**} + s_{tR}^{**}} = \frac{\rho(N - 1)}{1 + \rho(N - 1)} = \mu_{tR}^*,$$

which is the same as before. The percentage of rent-seeking expenditure in total income is

$$\frac{(N - 1)s_{ti}^{**} + s_{tR}^{**}}{Y_t} = (1 - q_t)\tau_t Y_t \frac{(1 + \rho)(N - 1)}{(\rho(N - 1) + 1)^2}.$$

(2) **The Legal Investment Stage.** Anticipating the reaction of individuals in rent-seeking capacity investment, the monarch chooses the optimal legal quality q_t^{**} . The objective function for the ruler becomes

$$\begin{aligned} & \max_{q_t} q_t[\tau_0(N - 1)I_{ti} + I_{tR}] + (1 - q_t)[\mu_{tR}^*[(N - 1)\tau_{ti}I_{ti} + I_{tR}] + (1 - \mu_{tR}^*)(1 - \tau_l)I_{tR}] \\ & - (1 - q_t^*)\mu_{tR}^*\tau_t Y_t \frac{1}{\rho(N - 1) + 1} - c(q_t), \end{aligned}$$

after plugging in s_{ti}^* and s_{tR}^* in equations (12) and (13). The FOC w.r.t to legal quality q_t is

$$\begin{aligned} (\tau_0 - \mu_{tR}^{*2}\tau_t)Y_t + (\tau_l - \tau_0)I_{tR} - c'(q_t^{**}) &= 0 \text{ if } q_t^{**} > 0, \\ &< 0 \text{ if } q_t^{**} = 0, \end{aligned}$$

where $A_t\omega_t \equiv (\tau_0 - \mu_{tR}^{*2}\tau_t)Y_t + (\tau_l - \tau_0)I_{tR}$. This condition is similar to (9) except that $\omega_t > \omega_R$ holds due to $\tau_t < \tau_l$; it implies that the marginal benefit of improving legal quality is higher when physical capital stock is larger, and thus $q_t^{**} > q_t^*$.

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

$$E_t^{**} = (1 - q_t^{**})\tau_t Y_t \frac{(1 + \rho)(N - 1)}{(\rho(N - 1) + 1)^2} = \frac{\tau_t}{\tau_l} \frac{(1 - q_t^{**})}{(1 - q_t^*)} E_t^*.$$

It is easy to see $E_t^{**} < E_t^*$ holds due to $\tau_t < \tau_l$ and $q_t^{**} > q_t^*$. ■

Proposition 6.

Proof. The equilibrium is solved backwards.

(1) **The Rent-Seeking Stage.** Taking as given the legal quality q_t and the expenditure of others s_{ti} , the elected ruler's total revenue is

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

Now the benefit of legal system does not include exploitative tax revenue, only protection of one's own income. The FOC w.r.t s_{tR} is

$$(1 - q_t) \frac{s_{ti}}{(s_{tR} + s_{ti})^2} \tau_{ti} Y_t - 1/\rho = 0,$$

The net income of an individual i is

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

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

$$(1 - q_t) \frac{s_{tR}}{(s_{tR} + s_{ti})^2} \tau_{1t} Y_t \frac{1}{N - 1} - 1 = 0.$$

Combining the two FOCs, we get the same optimal solutions as in Proposition 5.

(2) **The Legal Investment Stage.** The legal quality is chosen in the voting process before the ruler's identity is revealed. Anticipating the reaction of individuals in rent-seeking capacity investment, the objective function of a typical voter is

$$I_{tD}^q = \max_{q_t} p I_{tr}^q + (1 - p) I_{ti}^q,$$

where, after plugging in the rent-seeking expenditures,

$$I_{tr}^q = q_t I_{ti} + (1 - q_t) [\mu_{tR}^* \tau_t Y_t + (1 - \tau_l) I_{ti}] - (1 - q_t^*) \mu_{tR}^* \tau_t Y_t \frac{1}{\rho(N - 1) + 1} - c(q_t)/N,$$

$$I_{ti}^q = q_t I_{ti} + (1 - q_t) [(1 + \frac{\tau_t}{N - 1}) I_{ti} - \frac{1}{N - 1} \mu_{tR}^* \tau_t Y_t] - (1 - q_t^*) \mu_{tR}^* \tau_t Y_t \frac{1}{\rho(N - 1) + 1} \frac{1}{N - 1} - c(q_t)/N.$$

So we get the net marginal benefits of legal quality for the ruler and citizens:

$$\begin{aligned} \frac{dI_{tr}^q}{dq_t} &= (\frac{1}{N} - \mu_{tR}^{*2}) \tau_t Y_t - c'(q_t^*)/N < 0, \\ \frac{dI_{ti}^q}{dq_t} &= \frac{1}{N - 1} [(\frac{2}{\rho(N - 1)} + 1) \mu_{tR}^{*2} - \frac{1}{N}] \tau_t Y_t - c'(q_t^*)/N, \end{aligned}$$

The FOC

$$\frac{dI_{tD}^q}{dq_t} = p \frac{dI_{tr}^q}{dq_t} + (1 - p) \frac{dI_{ti}^q}{dq_t} = 0$$

is thus the weighted sum of them, and after some algebra becomes

$$\frac{dI_{tD}^q}{dq_t} = \frac{N}{(N-1)} \left\{ (\mu_{tR}^*)^2 - \frac{1}{N} \right\} (1 - Np) + \mu_{tR}^* \frac{2}{\rho(N-1)} (1-p) \tau_t Y_t - c'(q_t^*) = 0.$$

So q_t^* is higher when p is lower.

Three extreme cases of p are worth considering. (i) When $p = \frac{1}{N}$, the above FOC becomes

$$\mu_{tR}^* \frac{2}{\rho(N-1)} \tau_t Y_t - c'(q_t^*) = 0.$$

This is the social welfare maximizing solution.

(ii) When $p = 0$, the above FOC coincides with the ordinary citizen's best choice, which is

$$\frac{dI_{ti}^q}{dq_t} = \frac{N}{(N-1)} \left[\mu_{tR}^* \left(1 + \frac{2}{\rho(N-1)} \right) - \frac{1}{N} \right] \tau_t Y_t - c'(q_t^*) = 0.$$

This suggests that q_t^* is higher when ρ is higher since

$$(14) \quad \frac{d\mu_{tR}^* \left(1 + \frac{2}{\rho(N-1)} \right)}{d\rho} = \frac{N-1}{[1 + \rho(N-1)]^3} > 0.$$

(iii) When $p = 1$, the above FOC coincides with the ruler's best choice, which is

$$\frac{dI_{tr}^q}{dq_t} = -N \left[\mu_{tR}^* \left(1 + \frac{2}{\rho(N-1)} \right) - \frac{1}{N} \right] \tau_t Y_t - c'(q_t^*) < 0.$$

This suggests that under democracy, the ruler's ex post best choice of legal quality is always zero, which is worse than the monarch. Recall that the marginal benefits of improving legal quality under monarchy is

$$A_t \omega_t \equiv \left(\frac{\tau_0}{\tau_t} - \mu_{tR}^* \right) \tau_t Y_t + (\tau_l - \tau_0) I_R.$$

The reason is that the democratic ruler, unlike the monarch, does not get the legal tax as its own income. The only extra gain of being ruler is the expropriation opportunity represented by ρ as provided by a strong state machinery under its control.

So the dynamic inconsistency of legal quality under democracy can only be mitigated when p is sufficient low. A sufficient condition for the marginal benefit under democracy with $p = \frac{1}{N}$ to be higher than that under monarchy is

$$\mu_{tR}^* \left(1 + \frac{2}{\rho(N-1)} \right) > \frac{\tau_0}{\tau_k} + \left(\frac{\tau_l}{\tau_0} - 1 \right) \frac{L_R}{L}$$

which is true when ρ is large enough, since the left-hand-side strictly increases in ρ by equation (14).

And q_t^* strictly increases in ρ holds when p is sufficient low; specifically,

$$\frac{d\left(\frac{dI_{tD}^q}{dq_t}\right)}{d\rho} = p \frac{d\left(\frac{dI_{tr}^q}{dq_t}\right)}{d\rho} + (1-p) \frac{d\left(\frac{dI_{ti}^q}{dq_t}\right)}{d\rho} = \left\{ \frac{1-p[1+\rho(N-1)^2]}{[1+\rho(N-1)]^3} \right\} 2N\tau_t Y_t > 0$$

holds when $p < \frac{1}{1+\rho(N-1)^2}$, where $\frac{1}{1+\rho(N-1)^2} < \frac{1}{N}$. ■

Proposition 7.

Proof. (1) **The Rent-Seeking Stage.** With heterogenous land holding, the monarch's objective function is

$$\max_{s_{tR}} q_t [I_{tR} + \tau_0(Y_{ti} - I_{tR})] + (1 - q_t) \left\{ \sum_{i=1}^{N-1} \mu_{tRi} [\tau_l I_{ti} + \frac{I_{tR}}{N-1}] + \sum_{i=1}^{N-1} (1 - \mu_{tRi})(1 - \tau_l) \frac{I_{tR}}{N-1} \right\} - s_{tR}/\rho - c(q_t),$$

which can be simplified as

$$\max_{s_{tR}} q_t [I_{tR} + \tau_0(Y_{ti} - I_{tR})] + (1 - q_t) \left\{ \sum_{i=1}^{N-1} \frac{s_{tR}}{s_{tR} + s_{ti}} [\tau_l I_{ti} + \frac{\tau_l I_{tR}}{N-1}] + (1 - \tau_l) I_{tR} \right\} - s_{tR}/\rho - c(q_t).$$

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

$$(15) \quad (1 - q_t) \tau_l \sum_{i=1}^{N-1} \frac{s_{ti}}{(s_{tR} + s_{ti})^2} [I_{ti} + \frac{I_{tR}}{N-1}] - 1/\rho = 0,$$

The objective function of an individual i in the rent-seeking stage is

$$\max_{s_{ti}} q_t (1 - \tau_0) I_{ti} + (1 - q_t) \left[(1 - \mu_{tRi}) (I_{ti} + \frac{\tau_l I_{tR}}{N-1}) + \mu_{tRi} (1 - \tau_l) I_{ti} \right] - s_{ti},$$

which is simplified to

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

The FOC for individual i is

$$(1 - q_t) \tau_l [I_{ti} + \frac{I_{tR}}{N-1}] \frac{s_{tR}}{(s_{tR} + s_{ti})^2} - 1 = 0,$$

which implies that

$$(16) \quad (s_{tR} + s_{ti})^2 = (1 - q_t) \tau_l [I_{ti} + \frac{I_{tR}}{N-1}] s_{tR}.$$

Plug this condition into the monarch's FOC (15), we get

$$s_{tR}^{*H} = \sum_{i=1}^{N-1} \rho s_{ti}^{*H}.$$

Putting this in condition (16), after some algebra we get

$$s_{tR}^{*H} = (1 - q_t) \tau_l \frac{\rho^2 (N-1)}{(\rho(N-1) + 1)^2} \hat{Y}_t,$$

where

$$\hat{Y}_t = \frac{1}{N-1} \left(\sum_{i=1}^{N-1} \sqrt{I_{ti} + \frac{I_{tR}}{N-1}} \right)^2,$$

and $\hat{Y}_t > Y_t$ holds, since by Jensen's inequality

$$\left(\frac{1}{N-1} \sum_{i=1}^{N-1} \sqrt{I_{ti} + \frac{I_{tm}}{N-1}} \right)^2 < \frac{1}{N-1} \sum_{i=1}^{N-1} \left(\sqrt{I_{ti} + \frac{I_{tm}}{N-1}} \right)^2$$

holds, while the left-hand-side of the above inequality is equal to $\frac{\hat{Y}_t}{N-1}$, and the right-hand-side $\frac{Y_t}{N-1}$. So the monarch's rent-seeking expenditure is smaller when individual incomes are more heterogenous since

$$s_{tR}^{*H} = s_{tR}^* \frac{\hat{Y}_t}{Y_t} < s_{tR}^*.$$

The percentage of rent-seeking expenditure in total income $\tau_l Y_t$ is

$$E_{ti}^{*H} = \frac{\sum_{i=1}^{N-1} s_{ti}^{*H} + s_{tR}^{*H}}{Y_t} = \frac{s_{tR}^*(1 + 1/\rho)}{Y_t} = E_{ti}^* \frac{\hat{Y}_t}{Y_t}.$$

again smaller than the benchmark case due to $\hat{Y}_t < Y_t$.

$$s_{ti}^{*H} = \sqrt{(1 - q_t)\tau_l[I_{ti} + \frac{I_{tR}}{N-1}]} s_{tR}^{*H} - s_{tR}^{*H}$$

So we have

$$\mu_{tRi}^{*H} = \frac{s_{tR}^{*H}}{s_{ti}^{*H} + s_{tR}^{*H}} = \frac{\sqrt{s_{tR}^{*H}}}{\sqrt{(1 - q_t)\tau_l(I_{ti} + \frac{I_{tR}}{N-1})}} = \frac{\sum_{i=1}^{N-1} \sqrt{I_{ti} + \frac{I_{tR}}{N-1}}}{(N - 1 + \frac{1}{\rho})\sqrt{I_{ti} + \frac{I_{tR}}{N-1}}},$$

which again increases in ρ as before, but varies across individuals. This expression boils down the benchmark condition when incomes are homogenous.

(2) **The Legal Investment Stage.** 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

$$\max_{s_{tR}} q_t [I_{tR} + \tau_0(Y_{ti} - I_{tR})] + (1 - q_t) \left\{ \sum_{i=1}^{N-1} \frac{s_{tR}}{s_{tR} + s_{ti}} [\tau_l I_{ti} + \frac{\tau_l I_{tR}}{N-1}] + (1 - \tau_l) I_{tR} \right\} - s_{tR}/\rho - c(q_t),$$

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

$$(17) \quad \begin{aligned} (\tau_0 - \tau_l \mu_{tR}^* \frac{2\hat{Y}_t}{Y_t}) Y_t + (\tau_l - \tau_0) I_{tR} - c'(q_t^*) &= 0 \text{ if } q_t^* > 0, \\ &< 0 \text{ if } q_t^* = 0, \end{aligned}$$

where the marginal benefit strictly decreases in ρ . Since $\hat{Y}_t < Y_t$, the optimal legal quality with heterogenous incomes is higher than the benchmark if I_{tR} is the same.

(3) **The Political Regime Stage.** As long as the barons do not have enough coercive power to challenge the monarch, the political order is stable. The monarch's coercive power is $v_t^G = \psi(1)A_t L_R$. Landlords will not challenge the monarch if $x_t \leq x^*$ holds, where $x_t = v_t^C/v_t^G = \psi(N_1)N_1 L_1/\psi(1)L_R$. So $x_t \leq x^*$ is equivalent to $\frac{\psi(N_1)N_1 L_1}{\psi(1)L_R} \leq x^*$, which is simplified to $L_R \geq \frac{\psi(N_1)}{\psi(1)x^*} N_1 L_1$. This is more stringent than the homogenous benchmark case since $\psi(N_1)N_1 L_1 > \psi(N-1)(L - L_R)$ holds by condition (5). ■

Proposition 8.

Proof. Since cooptation is costly for the monarch, it is best to delay it until the period when the joint coercive power of $N - 1$ property owners is almost high enough to challenge the monarch, which is period T_D as defined by condition (4).

Then the only challenging group in the political game is the $N - 1 - N_1$ small landlords and business owners, whose coercive power is $\psi(N - 1 - N_1)(L - L_R - N_1 L_1 + K_t)$. The ruling group's coercive power is $\psi(1 + N_1)(L_R + N_1 L_1)$. The challenging group's relative coercive power

$$x_t = \frac{\psi(N - 1 - N_1)(L - L_R - N_1 L_1 + K_t)}{\psi(1 + N_1)(L_R + N_1 L_1)}$$

has to be larger than the threshold x^* for political transition to occur. $x_t \geq x^*$ implies (7). $K_{T_{DC}} > K_{T_D}$ holds if

$$\frac{N_1 L_1}{L_R} \geq \frac{\phi - \phi_c}{\phi_c + (x^*)^{-1}},$$

where $\phi_c = \frac{\psi(N_1 + 1)}{\psi(N - 1 - N_1)}$. This condition is satisfied when L_1 is large enough. ■

Proposition 9.

Proof. The group of large property owners' coercive power, $\psi(N_1)(N_1 L_1 + K_{t1})$, is the highest among all potential challenging groups, since an individual's capital stock is positively linked with his land size. Then it may act alone as the challenging group in the political game to push for a transition to the oligarchy of large property owners in period T_O when

$$x_t = \frac{\psi(N_1)(N_1 L_1 + K_{t1})}{\psi(1) L_R} \geq x^*$$

holds in the first time. This leads to

$$K_{T_{O,1}} = \frac{\psi(1)}{\psi(N_1)} x^* L_R - N_1 L_1.$$

It is easy to see that $K_{T_{O,1}} < K_{T_D}$ holds as long as $N_1 L_1 > L - L_R[1 + (\phi - \frac{\psi(1)}{\psi(N_1)})x^*]$, since $K_{T_D} = (1 + \phi x^*)L_R - L$.

Full democracy has to wait until the coercive power of small property owners, $\psi(N - 1 - N_1)(L - L_R - N_1 L_1 + K_t - K_{t1})$, becomes high enough to challenge the ruling group, whose coercive power is $\psi(1 + N_1)(L_R + N_1 L_1 + K_{t1})$. The challenging group's relative coercive power is

$$x_t = \frac{\psi(N - 1 - N_1)(L - L_R - N_1 L_1 + K_t - K_{t1})}{\psi(1 + N_1)(L_R + N_1 L_1 + K_{t1})}$$

in this case, which has to be larger than the threshold x^* for political transition to occur. $x_t \geq x^*$ implies

$$K_t \geq [\phi_c x^* + 1](L_R + N_1 L_1 + K_{t1}) - L.$$

This gives rise to the specification of transition period T_{DO}

$$K_{T_{DO}} = [\phi_c x^* + 1](L_R + N_1 L_1 + K_{T_{DO,1}}) - L.$$

It is easy to see that $K_{T_{DO}} > K_{T_{DC}}$ holds due to $K_{t1} > 0$. ■

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