

Article

The Demsetz's Evolutionary Theory of Property Rights as Applied to Rural Land of China: A Supplement

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Abstract: The main objective of this article is to contribute to the literature on land issues, especially with regard to the evolutionary theory of China's rural land property rights. This article applies the Demsetz's evolutionary theory of property rights as a framework into an analysis of the evolutionary process of property rights in rural land of China. It is found that externality, compactness, productivity, and organizational complexity—four principles in Demsetz's framework—are at the core of understanding the evolution of property rights from collective control of land to family based control of land in China. However, the framework is incomplete due to being unlikely to notice the role of land titling so that a property rights game is developed in this article to *extend the evolutionary theory of property rights*. Importantly, it suggests the necessity of “split-rights” from family based control land to private control land in China. To sum up, this paper refreshes the dominant framework of analysis on the evolution of property rights in mainstream economics, and makes it discern when collective ownership does not evolve into pure privatization, finally, instead of into private control of land, as is currently applied to rural area in China.



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1. Introduction

In the evolutionary theory of land rights literature, the inner limitations of collective ownership are primarily recognized in the property rights school (e.g., Coase [1]) to prove an evolutionary process between communal land ownership and privatization. As Scott Gordon [2] (p. 124) said, “everybody is nobody's property”, which will result in the “tragedy of the commons” [3]. It was demonstrated that privatization largely favors potential economic growth due to its attributes of exclusivity and free transferability. This doctrine became popular in western countries [4]. However, the evolutionary explanations shed little light on the evolutionary phenomena of land rights in developing countries because it said virtually nothing about whether this principle or others would be of equal importance for evolution of land rights in developing countries.

It is apparent that the evolution of rural land rights in China is in contradiction with the prediction of the scholars [5] who regard pure privatization as a destination for the collective ownership once evolving begins. Suffice it to say, what occurred in China is about the property structure of rural land in combination with collective ownership, family based control (contract rights), and private control of rural land (management rights); perhaps this is mentioned as “socialist property rights structure” in the work of Hodgson [6]. The introduction of evolution of property rights in China looks as if it did not eliminate collective ownership but instead, collective ownership coexisted with land use rights distributed between family based and private control of land. Although it is a more sophisticated system, this case could create an opportunity for examination of the evolutionary theory of land rights and a supplement for this theory.

While analyzing the literature, publications concerning land issues in China have paid more attention to the understanding of contemporary China's rural landownership [7–9] or land titling [4,6,10,11].

This article pays special attention to the evolutionary issue related to rural land rights in China, to further provide an integrated theoretical vision of evolutionary theory of land rights in either developing or developed countries. This will be a new exploration which has not been elaborated in the current literature.

This article will apply the Demsetz's Evolutionary theory of property rights as a framework into analysis of the evolutionary process of property rights of rural land of China. Following the tradition of the school of property rights, with greater integration of Harold Demsetz's works on "Toward a Theory of Property Rights" [12] and "Toward a Theory of Property Rights II: The Competition Between Private and Collective Ownership" [13] into evolutionary theory of property rights, such theory has tended to develop two frameworks (externality and resource allocation) to analyze the evolution of property rights. It consists of four principles: externality, compactness, productivity, and organizational complexity, predicting an evolving outcome under which as long as evolution of collective rights commences, it eventually results in emergence of new property rights. The traditional viewpoint of economists regarding the evolution of property rights is represented by Coase [1], who regards the evolution of communal ownership as a progression to pure privatization. Therefore, it is expected that those scholars have difficulty understanding the evolution of property rights in rural areas in China. Instead, Demsetz's theory of property rights provides an understanding of the evolution of property rights on account of neglecting the monism of the property rights, namely, it treats communal ownership as a single property right, thus only transferred to pure privatization. Demsetz [12] defines property rights as a "mix of the components of the bundle of rights" (p. 347) attached to a physical commodity, e.g., land, which is distributed among individuals during transactions to help them develop reasonable expectations to deal with one another and to solve the so-called *externalities*. In fact, Demsetz broke through the ideological boundary between socialism and capitalism and developed a general theory of property rights.

When this theory is applied to China, evolutionary theory of property rights does not entirely give an explanation of the evolutionary issues, as it indeed was. Our observation indicates that the transition from collective ownership to family based private ownership and the emergence of land titling falls into the framework proposed by Demsetz. However, the emergence of new property rights from family based control to private control of land due to risks the land titling brought up cannot be enough to jump into current frameworks. This gap indeed was of concern by Demsetz in the past but has "*resisted this because his uncertain about the general theoretical link between risk and choice of economic system*" [13] (p. 672). In response, what this study added to this understanding was establishment of this *theoretical link* in provision of a property right game.

This article is structured as follows. The objectives of the article are: (1) to exhibit step-by-step discussion of logic for evolution of property rights in rural area in China, closer in spirit to Demsetz's evolutionary theory of property rights (Section 1); and (2) to provide a supplement for the theory in light of the positive and negative effect of land titling and of a theoretical link between the game theory and property-rights theory (Section 2). Our attempt at revelation of logic of the evolution is deemed necessarily since the academic and practical purposes are both met in the China's case. A clear academic implication of the evolutionary theory of property rights failed to explain an evolving route of property rights as collective ownership does not spontaneously evolve into privatization in land. What kind of logic for formalization of private control of land as a replacement of pure privatization; what kinds of property rights in private control of should be given; and how does this analysis can be modelled in a formal theoretical framework? These are critical issues that require thorough discussion. Meanwhile, a central tool is left for the Chinese government inasmuch as powers for those spontaneous evolution of property rights are recognized, and this tool will be taken seriously as the government plans to implement an intervention designed to create the newly emerging system of property rights. The government will *get institutions right* by recognizing the land tenure situation. In the concluding part of the article (Section 3), total summarization of the previous discussion

in two sections is given; academic developments in the future are derived; and a closer fitted adjustment of evolutionary theory of property rights, actually closer to developing countries, is conducted, which extends the reach of theory in establishment of a relationship between the game theory and evolutionary theory of property rights and is more practical than current analysis prescribed under the evolutionary theory of property rights.

2. The Evolution of Property Rights in Rural Rights in Rural Area in China: An Exposition

The core of analytical process of the article is depicted in the form of a simple diagram (Figure 1). Based on this figure, it can be seen that the evolution of rural land property rights is not the straightforward replacement of the People's Commune by pure private ownership, whereas the process of “*split ownership*” occurred. Since traditional evolutionary theory supported this by endeavoring to explain evolution of land rights on the basis of the collapse of collective rights, it does not fit the analytical purpose with specific reference to China. As mentioned above, the Demsetz's theory of property rights will be applied to explain the logic of evolution of rural land rights.

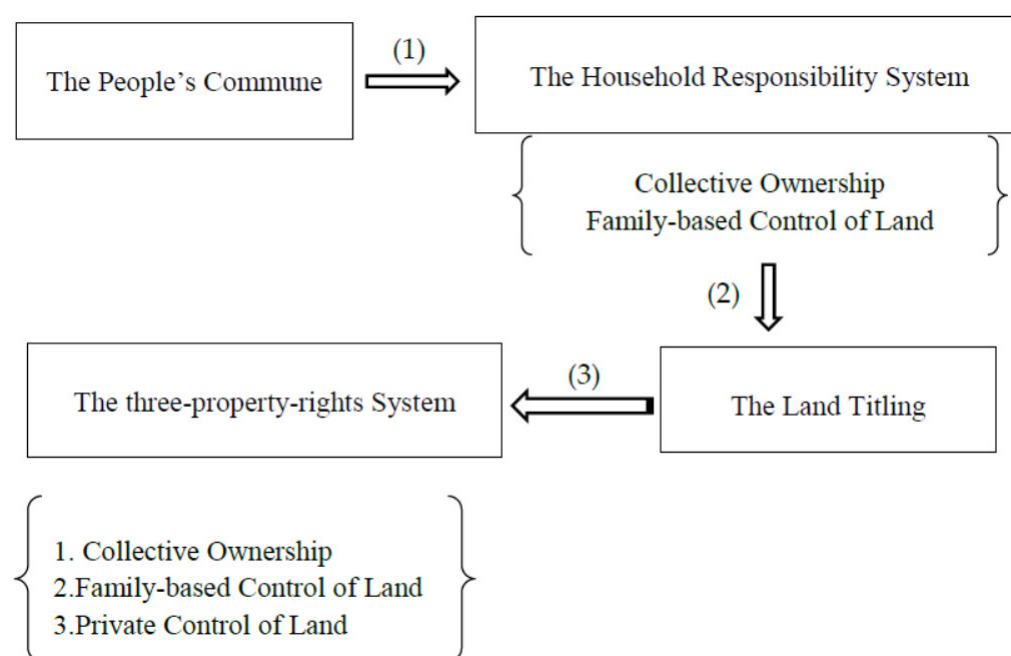


Figure 1. The Evolution of property rights in rural area in China.

The starting point of applying the Demsetz's evolutionary theory of property rights is recognition of evolutionary process of land rights as depicted in Figure 1. It was exhibited that the land tenure comprises three systems of land rights in China, that is, the People's Commune, the Household Responsibility System (henceforth labeled by HRS), and three-property-rights system. The transformation from the People's Commune to the HRS is clear. This is the first stage of the evolution of land property rights in China. The logic for this evolution is in agreement with the evolutionary theory of property rights and the function of externalities. The introduction of the HRS did not result in the complete elimination of collective ownership but instead, *collective ownership* coexisted with *family based control of land*. Based on the first stage, land rights are extended to *private control of rural land* through land titling. It gives rise to further divergence rights, in a formally official saying, a separation of *contract rights* and *management rights*. It is obvious that the land titling plays an important role in this process. However, the land titling program in China has been widely questioned by western scholars. Ho and Spoor [10] referred to the land titling program in China as an “empty institution” because if the institution issued a land title, it would have only negative effects on social behavior. Hodgson and

Huang [11] argued that due to underlying institutional constraints in China, land titles are rarely bought and sold, leaving the land inaccessible. With these skeptical things, we will apply the resource-allocation framework to give a deep analysis of why land titling proceeds in China. Of course, the positive and negative effects of land titling are both considered, of which the latter will shed light on the “general theoretical link between risk and choice of economic system” [13] (p. 672), and a property rights game will be given to explain the process of property rights split from family based control of land to private control of land. Let us explain these evolving paths in sequence.

2.1. The Transition from the People's Commune to the HRS: Externality Framework

Upholders of the “privatization” view have difficulty understanding the evolution of property rights in rural areas in China partly because these economists [1–14] have failed to notice that property rights are not a *monism* of the property rights; communal ownership being as an only progression to pure privatization. Instead, the definition of property rights on account of neglecting the monism of the property rights was given by the evolutionary theory of property rights. Demsetz [12] (p. 347) defines property rights as a “mix of the components of the bundle of rights” attached to a physical commodity, e.g., land, which is distributed among individuals during transactions to help them develop reasonable expectations to deal with one another and to solve the so-called *externalities*.

“Externalities”

With regard to *externality*, Demsetz [12] (p. 348) states that “what converts a harmful or beneficial effect into an externality is that the cost of bringing the effect to bear on the decisions of one or more of the interacting persons is too high to make it worthwhile”. A primary allocative function of property rights is a process of “internalizing” in which the arrangement of property rights enables “these effects to bear (in a greater degree) on all interacting persons”. Thus, a greater *internalization of the externalities* is of importance to prompt the evolution of the current property rights.

Under a communal property system, externalities are widely recognized in social science. The first is that a *coordination dilemma* emerges given the large size of the collective because the negotiating costs and cost of policing the agreement are large so that a mutually satisfactory agreement cannot be achieved. The second feature is the “free ride” due to being incapable of recognizing contributions of others; the members of the collective want to maximize their profits by shirking so that the cost of the “free ride” is “to bear on decisions of one or more of the interacting persons” [12] (p. 348); this is the definition of *externality*. Therefore, preservation of the communal property system is rarely rational especially when the externalities have damaging consequences.

The communal property system is an example of externalities in *the people's commune* in China. The *movement of the people's commune* lasted from 1958 to 1978 under Mao's regime. The emergence of communal ownership to land, such as the one described by Demsetz [12] (p. 354), is a right that “can be exercised by all members of the community”. This runs counter to the previous perception by scholars, e.g., Scott Gordon [2] (p. 124), who said that “everybody is nobody's property” and who believed that Chinese peasants in a *people's commune* have hardly any property rights to land; instead in fact, “every person has the right to hunt, till, or mine the land” [2] (p. 354). As a well-ascertained meaning of externalities in the words of Demsetz arise from “the difficulties that have arisen in an attempt to partition the team output in accordance with marginal products of cooperating team members” [13] (p. 657). This is the same kind of a grueling dilemma that we have seen in Hume's [15] (p. 538) example of draining a meadow by two neighbors. When team members do not obtain enough incentive to contribute to team output, it will result in the tragedy; this result can be a burden on agricultural productivity [7]. It thus suggests communes collapsed. By the end of 1983 communes almost disappeared in China [11].

The *internalization of externality* is a power for the evolution of communal property rights, and as a result of it, in an event in December 1979 eighteen farmers in the Xiaogang

village in Anhui Province of China signed a production share contract with each household by dividing the communal land into randomly sized plots; this was the start of the HRS. The HRS is flexible enough to allow for “internalizing the external costs resulting from communal property by allowing private parcels owned by small groups of persons with similar interests” [12] (p. 355). The small groups with similar interests are the household (family) in this case. The effect of establishing boundaries to family based control of land reduced the costs of prohibiting others from harvesting the “fruits of their effect” under the communal rights system, including the negotiating and policing costs because the crop output is confined to the boundaries of the land parcels so as to create an attribute of exclusiveness.

In effect, family based rights were endowed by few property rights under the HRS, e.g., “the right to manage and to receive income”, when the land parcel was assigned. However, these rights resulted in the economic use of the land and the expectation to increase the investment. The former meant that the family acted as a broker, compared to communal property rights, as Demsetz [12] mentioned; subsequent generations will benefit from appropriate use of the land (due to effort at husbanding), and the soil health will be maintained. The latter occurs because, under assured tenancy, peasants are more likely to adopt new technology and increase the labor force, eventually leading to increase of the output.

However, when the rural land in China was broken up into smaller land parcels, it resulted in resource allocation problems in the economic system because the land parcels were sanctioned only among common descent, leading to a significant autonomous exchange in an inefficiency-enhancing direction. Therefore, this problem reduces the role of the government to more efficiency function to intervene this change in a beneficial direction by the support of exchange of land in a larger domain ascribed to the well-defined property rights.

2.2. Why Land Titling Is Proceeded in China? Resource-Allocation Framework

The kind of land titling which Demsetz [13] deemed necessary in his theory of property rights II involves re-consideration of two types of economic systems, as a number of economists have stressed in their studies, i.e., a kinship-based economic system and modern system. He argued that the preservation of kinship-based economic systems can be regarded as an alternative to the modern system insofar as the rural economy remains closed. In this case, land titling is an *anachronism*. However, as the modern system develops rapidly, there is positive value to rural society of creating well-defined land rights on account of growing heterogeneous interactions and value of the land as a result of drastic change of compactness, productivity, and organizational complexity. Eventually, the combined effect of these factors works out a land titling’s solution.

2.2.1. “Compactness”

Demsetz defined “compactness” as follows: the “compactness of the economizing problem is the degree to which the problem is largely confined to a group whose members, per force of circumstances, are ‘close’” [13] (p. 61). He was well aware of the two meanings of “close”, i.e., to a greater degree, being knowledgeable about each other and having strong kinship ties (or geographic connectivity). In a compact setting, interactions among individuals do not occur once but rather repeatedly. This suggests that social dilemmas of cooperation can be solved thanks to complete information on the past histories of each other in interactions; therefore, the individual rationality is compatible with the collective rationality. In this case, the collective control of land is practical.

The rural society of China is widely recognized as an acquaintance society. There are many small isolated villages in China’s rural areas, similar to stars in the sky. These villages are characterized not only by closeness but they also have the same cultural identity. Chinese peasants in these compact villages are knowledgeable about each other’s

preferences and land and there is extensive information flow, which implies that the collective control of land guides the positive incentives to achieve the exchange of land.

As Demsetz [13] noticed, compactness creates *Moral Sentiments* [16] and general trust ascribed to the closeness and clear boundary of the village [17–20]. Chinese peasants in these villages enjoy a high level of trust, in which potential social costs are lost, e.g., the costs of negotiating and policing, because only promises are involved.

Therefore, land titling in these compact villages is not required. Either the collective control of land or private transactions functions well for the redistribution of land. Even when the demarcation of land parcels is not clear, due to the peasants' knowledge of the boundaries, there is little conflict. When land titling occurs in this case, it would be, as Ho and Spoor [10] argued, an “empty institution”.

However, as the modern economy is developing rapidly in China, most villages have become heterogeneous and unstable due to off-farm employment. As different types of peasants have migrated into villages, which were characterized by a high degree of closeness due to kinship in the past, the rural society has changed into a *semi-acquaintance* society [10,21,22]. The influx of different people led to conflicts of interest in land transactions because these people do not share the knowledge of the demarcation of land parcels, suggesting the increase in land surveys or contract costs. Some peasant workers have moved to the cities and left the land behind, resulting in a barrier for land transactions in the villages. These people are not in the minority: “an estimated 230 million Chinese—about seven percent of the entire population—have migrated to the cities in recent years” [11] (p. 612). Therefore, the reduction of the degree for compactness has resulted in gradual but meaningful alterations in collective control of land practices in the demand for the well-defined property rights of enhanced individualization.

2.2.2. “Productivity”

Evolution, argued by Demsetz [13], rests upon the premise that potential productivity discrepancy between modern economies and kinship-based economic system generates instability for communal ownership on account of an increase value of rural land by increasing commercialization of agriculture in modern economies. The productivity justifies the replacement of collective control of land by private control of land. Therefore, land titling becomes a requisite for clearly defined property rights to private control.

Demsetz [13] assumed that the higher productivity of the modern economy is attributed to *technical change* and *specialization*. Specifically, specialization has a large impact on compactness “because specialization of economic activities is productive and the control of resource to produce goods cannot be so easily centralized” [13] (p. 664). This means that resources have to be decentralized and private negotiation emerges in which individuals who have property rights decide how to coordinate their resources with the demand of others.

In Chinese rural areas, the collective control of land under the HRS is also faced with the impact of specialization. Under the HRS, rural land becomes a production factor that is a part of the immensely complicated specialization. Chinese peasants not only enter into the market by deciding which crops to grow on their lands and the prices but also become associated with modern companies. For example, according to statistical data from the Ministry of Agriculture and Rural Affairs in China, the “peasants associated with companies” organization model comprised one-third of the agricultural product market in 2018 because it provided higher profits for Chinese peasants.

To achieve an efficient allocation of resources and higher output for specialization, a series of regularization for encouraging peasants to transfer their lands is sanctioned by the Chinese government. In 2008, the Chinese government issued the “Decision of Importance Issues of the CPC Central Committee on the Implementation of the Rural Reform and Development”; it stipulates: “allowing the peasants to subcontract, sublet, perform mutual exchange, transfer, and joint-stock partnership to use their rights”. In 2013, the No. 1 central document once mentioned that “the land-use rights must be transferred

based on personal voluntary participation, compensation, and obeying the rule of law and transfer to professional farmers, the family farm, and the cooperative is encouraged in different manners for the purpose of scale development". These laws and regulations, in fact, increased the calling for property rights to be more *well-defined* and more *secure* by having land certificates, which provides an incentive for the government to implement land titling.

Another reason for implementing land titling is under the impulse of economic productivity of an organization. Demsetz [13] believed that organizational reform will result in the butterfly effect, in which the reform would first give rise to "excess" amounts of output and wealth if the organizational reform was successful. Second, high per-capita wealth would trigger a greater demand for goods and services, which would emphasize the inability of collective control to handle this complexity. In rural areas of China, different organizations with different economic and social purposes exist, e.g., professional family farms, cooperatives, and modern companies. These organizations focus on technology and the outputs exceed the requirements of the peasants. In addition, the output is commercialized in modern farming to provide higher returns for the peasants, which triggers a greater demand by the peasants for goods and services. Therefore, Chinese peasants are placing greater value on having property rights, which has increased the demand for secure and specific ones by land titling. This implies that land under traditional collective control has lower productivity than land managed by modern agricultural organizations.

2.2.3. "Organizational Complexity"

Demsetz [13] defined complexity as organizational complexity created by specialization. Organizational complexity incurs a so-called *coordination problem* in game theory expression because the specialization is controlled by many heterogeneous individuals. In this case, a new coordination mechanism emerges to facilitate the coordination of an *arena* consisting of a large number of specialties. It is a price system, as Demsetz [13] (p. 664) alleges and it is "prodigious in its ability to do this".

The price system achieves this purpose on the condition that it is supported by a social-legal system to ensure the execution of agreements [13] because the organizational complexity triggers the social dilemma of cooperation in a 'one-shot' situation in which self-interested individuals are strangers to each other in terms of specialization. It is common sense that if the agreement can be executed, property rights to physical commodity should be clear and secure, otherwise conflicts in the frequent and complex exchange will become hardly operative under legal institutions. Social institutions can overcome social dilemma but this is not always possible [23] but may be more likely in a compact setting. Thus, organizational complexity results in coordination problems and social dilemma, which require an accurate definition of property rights as a precondition to prevent opportunistic behavior in a legal system. The effect favors the implementation of land titling.

The phenomenon of organizational complexity has been perceived by the Chinese government and the risk of Chinese peasants to lose their land due to defection in cooperation of specialization should not be ignored. Given the very high risk of Chinese peasants, the government gave up its previous stance of liberalization in rural land transactions, imposed strict restrictions on rural land transactions, and issued in 2002 article 37 of the Law on Contracting Rural Land, which stipulates: "If the land-use rights are subcontracted, sublet, mutually exchanged, transferred, etc., formal written contract should be signed and the formal written contracts should be recorded for the collective". This indicates that contract enforceability is considered in the law and it can be expected that an increase in the number of formal contracts in rural communities would finally make land transactions lawful. To ensure efficient execution of the law, land property rights have to be unambiguously defined to make the transactions legal and protect people instead so as to increase the intense need on the land titling.

As mentioned before, rural land transactions in China are not based on formal contracts but rather on promises or agreements because the "compactness" is a factor in these

interactions; the resulting “social fruit” overcomes any opportunistic behavior that may occur in a collective [24]. These interactions are characterized by homogeneity in which the exchange of land is limited to the members of the collective. This suggests that in an isolated, small village in China, dealing with opportunistic actions at a lower degree of specialization works. However, when the exchange area increases due to specialization and there are more heterogeneous interactions, the problems will increase due to the “one-shot” situation. Strangers will pursue self-interest by exhibiting negative feelings toward others and the collective may not be able to deal with this. The clear assignment of property rights by the collective to private entities (here: family based) is necessary because heterogeneous interactions are protected under law.

The core of Demsetz’s theory of property rights II explained the emergence of land titling as an *induced institutional innovation*, which was the results of compactness lost, productivity and organizational complexity. These factor means increasing of the number of heterogeneous interactions in land allocation. This was bound to result in conflicts which could not be solved in a compact setting in isolated, small villages and entailed contract enforceability under the legal system in ‘sparse’ production specialization. This is particularly apparent for incentives for land titling when litigation resulted due to conflicts because this will give rise to social tensions and affects social and political stability. Thus, the public demands a full cadastral survey or formal titling of family based property rights under the aegis of the central government. In 2013, Document No. 1 announced: “within five years, to finish the registration of contracted management rights in rural areas”. In 2016, Document No.1 announced that “the plot of the provinces should be further extended”. At the end of 2017, it was reported by the Ministry of Agricultural that the proportion of land-use certificates had increased to about 90% and at the end of 2018, all provinces had completed the registration of contracted management rights.

3. The Emergence of Property Rights in Private Control of Rural Land in China: A Supplement

A positive effect of land titling is that private control of land increases and property rights are gradually granted to people. This suggests that in the implementation of land titling, a new system of property rights has developed in rural areas of China, namely, the co-existence of collective ownership, family based control, and private control of land; this system largely differs from land privatization by land titling in western countries [13,25]. Thus, our analysis of the evolution of rural land property rights in China, which includes land titling, is regarded as a supplement to Demsetz’s general property rights. In this manner, the Demsetz externality and resource allocation framework fits tightly with our case.

The implementation of legally protected land registration based on a full cadastral survey that facilitates market transactions on a voluntary basis results in two socially positive effects, i.e., a static effect and a dynamic effect. The static effect is the greater incentive for original landholders to transfer their lands to more dynamic farmers due to land security by land titling [10,26,27]; this results in greater crop yield due to the aggregations of land parcels. The dynamic effect is a more stable income, which increases the willingness to invest in the land or treat the land as a liquid asset for rent; this is an indirect result of the emergence of a rural credit market [28–30].

Of course, land titling leads to negative effects, which might result in the emergence of new property rights. In fact, there have been cases in transitional economies that were faced with coordination problems resulting from the introduction of land titling programs because the institutional arrangement is much less developed than in western countries. Honduras is still under critique due to a lack of formal institutions, e.g., market and institutions to provide “secure” land titles in return for “mere modernized insecurity” [10]. This raises basic questions mainly concerned with the integration of traditional and modern institutions.

In fact, these coordination problems reveal the role of risk in the evolution of property rights, as Demsetz [13] (p. 672) has emphasized. He states that the “theory of property rights could be made more complete by adding a degree of risk to compactness, productivity, and complexity as a relevant dimension of the resource allocation setting”. However,

he also “resisted this because he is uncertain about the general theoretical link between risk and choice of economic system” [13] (p. 672). This regret gives us an opportunity to consider the case of land titling in China.

In our opinion, there are at least two kinds of risks for contracted peasants in China to make them hesitate to allocate their lands to create the problem of land allocation.

One risk is the lack of formal institutions (e.g., market) after the completion of land titling; these institutions are developed in due course, which will prevent the transfer of the lands to third parties (managers) who are unfamiliar with it. That is to say, this negative effect is to prevent the evolution of property rights and weaken the value of property rights of third parties by *segregation*. Instead, the exchange of land will also be more routinely performed among the members of the collective. It is noteworthy that the formal market for transferring rural land in China has not been established to date and the informal market is also segregated from the urban market for the exchange of land. This means that most land transactions are conducted in private. Another practical concern is whether the contracts between the peasants and third parties can be enforced by formal institutions, which exemplifies the risk for the contracted peasants.

Another risk is the inertia of customary behavior in the compact villages of China, especially trust behavior. Trust behavior is a routine action resulting from recurring beneficial relationships, social embeddedness, and reputation [31]. By routinely placing trust in others, the exchange of land is more dependent on the promises or agreement. However, if the compact setting is changed and specialization continues, mistrust may occur, especially after the implementation of land titling, which provides an incentive for land exchange. Especially in heterogeneous interactions, this risk increases because the customary behavior may change and become opportunistic, which cannot be solved using traditional ways in a compact setting; this makes the land transaction system more rigid and difficult.

Therefore, it is expected that in order to reduce risk, at least one property right needs to be granted to managers in the future, i.e., the “prohibition of harmful use”, as identified by Honoré [9] (p. 681); this refers to the “owner’s liberty to use and manage the thing owned as he chooses . . . subject to the condition that uses harmful to other members of society are forbidden”. In spite of the incompleteness of the contract and the inertia of customary behavior, the contracted peasants have the right to obtain land from the managers when the land transaction does not result in harmful use. This suggests once again that “the theory of property rights could be made more complete by considering the role of risk” [13] (p. 672).

3.1. The Concept of Trust

What is trust? In the words of Hardin [31], trust can be seen as a reasoning process in environments featured by risking. To say “*A* trusts *B*” means “I trust someone if I have reason to believe it will be in that person’s interest to be trustworthy in the relevant way at the relevant time” (p. 19). Hardin’s work model concept of trust as an operational concept: *A* trusts *B* because *A* reason logically with respect to *X*. For instance, suppose *A*, in an exchange with Amazon, buys a watch. If the seller *B* had a good reputational score (*X*), *A* will reason the seller will not behave opportunistically by selling a “lemon”, and *A* will trust “you have an interest in fulfilling my trust” (p. 3).

The concept that trust was placed in a risk environment is not new one to academic world. Many studies describe the same meaning. Gambetta [32] stated that trust is considered to exist when “the probability that the trustee will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him” (p. 217). Moellering [33] defined trust as “a state of favorable expectation regarding other individual actions and intentions” (p. 404). Coleman’s [34] definition of trust in “situations in which the risk one takes depends on the performance of another actor” (p. 91). It is possible to say “there is an element of trust in very transaction” [35] (p.24) because risks always exist.

In economics, more studies modelled trust in various forms of exchange on a similar logic. Examples include: the principal's problem [36,37]; the market for lemon [38]; and free-riding in team production exchange [39]. These studies examined trust in various risking environments, which are mainly produced by informational incompleteness. Based on this assumption, the economic approach for *A* trusting *B* in risking environments was modelled as *A* taking a trusting action by assessing the incentive *B* not to behave opportunistically. In fact, this approach is similar to the modelling of trust in Hardin [31] because *B* has the incentive not to act opportunistically with respect to *X*. This reflects the economic logic. It implies that if without *X*, a mechanism or institutional constraint, every transaction is fully filled with trust dilemma.

3.2. Trust Dilemma

As we have mentioned, Demsetz [13] stated that the development of a “general theoretical link between risk and choice of economic system” should be a focus because risk that “makes persons less willing to depend on others [is plausible], that is the theoretical linkage used in this essay” (p. 672). It is apparent that Demsetz [13] believes that in order to solve the problem of resource allocation, the trust problem in exchanges has to be addressed. The reason is that trust problems arise because “situations in which the risk on takes depends on the performance of another actor” [34] (p. 91). The trust problem is thus crucial for assessing the importance of risk during an exchange [36]. Based on this logic, when Chinese peasants face a higher level of risk in heterogeneous interactions, the resulting “trust dilemma” will prevent them from renting land to strangers; this leads to inefficiency of land allocation and resource allocation problems. Consequently, the “trust dilemma” is a core problem that “make persons more hesitant to accept the dependency that comes with specialization (or organizational complexity)” [13] (p. 672).

By adding the trust dilemma to the existing factors of compactness, productivity and complexity, the Demsetz theory of property rights has gained a new analytical perspective. We use the transformation from collective ownership to private ownership as an example. In a collective, where people are integrated into a small group of related individuals who have common ownership of the resources, it is assumed that in this group, individuals enjoy generally higher trust because of the compact setting. The existence of trust creates two effects that facilitate resource allocation. The first effect is a reduction in the transaction costs among individuals, which serves as “an important lubricant of a social system” [40]. The second effect is the development of stable exchange relationships [41–43]. Therefore, it can be concluded that collective ownership facilitates resource allocation in this case. However, when individuals have to travel further to conduct trade (or specialize), the “trust dilemma” occurs and fosters institutional change, i.e., privatization. The reason is that the property rights granted to individuals will prevent opportunistic behavior due to the protection by the legal system, e.g., the court. This case, in conjunction with the existence of compactness and specialization, highlights the development in the theory of property rights using this new perspective, especially to explain the evolution from collective ownership to private ownership. In addition, it explains how land titling developed in China.

We believe that the advantage of this approach is that it represents an important tool to analyze the evolution of property rights at the microscale. More importantly, the approach provides an integration of Demsetz's theory of property rights and game theory.

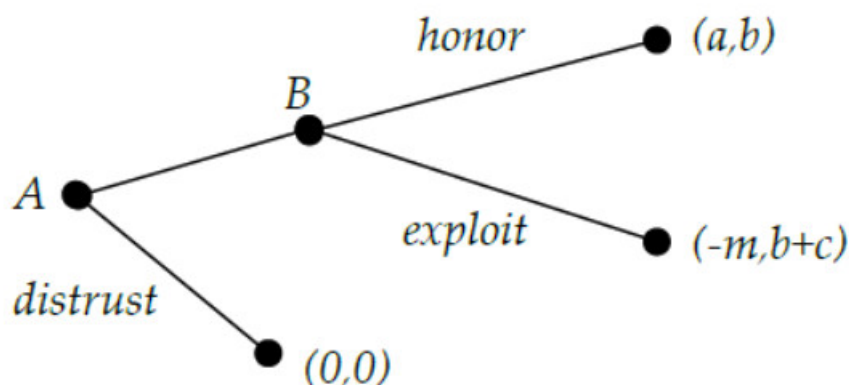
3.3. A Property-Right Game

Game theory has been widely applied in recent years. In this study, we integrate game theory and Demsetz's theory of property rights to achieve a “general theoretical link between risk and choice of economic system”. This allows for conducting a game-theoretical analysis of property rights, the *value base*, and behavioral choices and for creating a bridge between the theory of property rights and game theory, thereby *extending the reach of the evolutionary theory of property rights*.

The integration of the two theories represents a complementarity with the possibility of further extension in the future. The combination of the game theory and theory of property rights (1) represents a theoretical analysis of the emergence of property rights, (2) demonstrates the important role of the *value base*, (3) creates a theoretical link between risk and the choice of economic system and (4) provides a more general understanding of the property rights as institutions. If such an equivalence to look at one another, the theory of property rights would be more likely to walk across its boundaries with an extension of analytical domain. Let us be further in line with success of these purposes.

Based on the integration, we will explore the concept of trust and its model in game theory to illustrate the insight game theory offers to emergence of property rights. That is A trusting to transfer his land to B with respect to emergence of property rights. In this conception, in fact, emergence of a property rights as a solution to trust dilemma. Of course, this is a regular solution for economists to provide. For example, in the trust dilemma occurred in transaction costs economics, A 's asset specificity is faced with B 's ex post opportunism, and it can be solved through emergence of property rights (for example, right to obtain a certain amount of compensation) in the contract to protect A from B acting opportunistically. Similarly, in the trust dilemma occurred in principal-agents' relationships, a principal A is met with an agent B 's opportunistic behavior, called a "moral hazard", and this dilemma can be solved through emergence of a property right, such as residual claim, which makes B to follow the purpose of the principle A . So, in this paper we call the property-right game because A who transfers his land is met with B behaving opportunistically, and emergence of property rights can be as solution to the trust dilemma.

The trust dilemma in game theory can be represented by a simple trust game (Figure 2). In this game, peasant A makes a decision on whether to trust peasant B to perform an action with no harm in order to determine how to allocate his land. If peasant A distrusts B , the exchange does not take place, thus, the values are 0 for both peasants. When A trusts B and B honors the trust, A will obtain a benefit a (e.g., rental) and B obtains a benefit b from the land. When A trusts B and B exploits this trust (e.g., overuse of soil), A will obtain the benefit $-m$ and B obtains the benefit $b + c$.



Where $a, b, c, m > 0$

Figure 2. The Property-right Game.

Based on this structure of payoffs, it is evident that in a "one-shot" interaction, A would not trust B to rent his land because this creates "a situation in which the risk one takes depends on the performance of another actor" [34] (p. 91); B is willing to exploit his trust because he compared the payoffs resulting from choosing "honor" or "exploit". In other words, by choosing "trust" and since $b + c > b$, the payoffs received by A are less than

the payoffs when choosing “distrust”, namely, $-m < 0$. To solve this dilemma, we focus on the emergence of property rights in the case of China.

3.3.1. Emergence of “Duration of the Right to Use the Land” as a Solution

We consider the “duration of the right to use the land”, which refers to property rights that allow for private control, as a solution to the property right game. This property right ensures that tenants can safely obtain yields without the intervention of the lessor. Thus, the flow of money is considered by the tenant, that is, the tenant’s payoffs is a present value because the future value is discounted if the tenant chooses the “honor” in the property right game (Figure 2 (e.g., sustainable use of the land)), namely:

$$\pi_{discounting/honor} = b + \delta y + \delta^2 y + \delta^3 y + \dots = b + \frac{\delta y}{1-\delta}$$

If the tenant chooses exploitation (e.g., overuse of soil) during the contract period, he also receives a present value by discounting the future, namely:

$$\pi_{discounting/exploit} = b + c + \delta c_1 + \delta^2 c_2 + \delta^3 c_3 + \dots$$

where $c > c_1 > c_2 > c_3 > \dots$, indicating that the payoffs due to exploitation decrease over time.

If we use c to replace c_1, c_2, c_3, \dots , as the maximum payoff that the tenant can receive, then:

$$\pi_{discounting/exploit} = b + c + \delta c + \delta^2 c + \delta^3 c + \dots = b + \frac{\delta c}{1-\delta}$$

If $\pi_{discounting/honor} > \pi_{discounting/exploit}$, namely,

$$\begin{aligned} b + \frac{\delta y}{1-\delta} &> b + \frac{c}{1-\delta} \\ \rightarrow \delta y &> c, \end{aligned}$$

the tenant will not exploit rationally. In this situation, the *duration* of the contract δ is sufficiently long and the equation is satisfied. The tenant will choose ‘honor’ and the lessor will exhibit trust, thereby solving the problem of land allocation.

3.3.2. Emergence of “Prohibition of Harmful Use” as a Solution

The “prohibition of harmful use” would be a requirement to prevent opportunistic behavior during the land exchange. This emergence of property rights means that people have the right to withdraw the land when the partner in the exchange behaves opportunistically. However, this is contingent on information. If the information is *complete*, then the owner of the land can monitor the actions of the partner. In this case, we consider the information to be complete and determine how the emergence of the “prohibition of harmful use” minimizes risk in this dilemma.

When full monitoring is achieved, the opportunistic agent obtains a “one-shot” payoff if he chooses to “exploit” in the exchange; the land will be taken back by the owner because the rule of “prohibition of harmful use” was violated. Instead, he would receive a series of payoff in the future if he acts honorable. This is defined as: $\pi_{discounting/honor} = b + \delta y + \delta^2 y + \delta^3 y + \dots = b + \frac{\delta y}{1-\delta}$, and $\pi_{one-shot/exploit} = b + c$.

Namely, $\pi_{discounting/honor}$ is greater than $\pi_{one-shot/exploit}$; in this case, the partners in the exchange do not exploit and the land is successfully allocated. Incomplete information is not considered here but this example demonstrates how the emergence of property rights minimizes risk and results in a suitable economic system.

4. Discussion and Conclusions

The evolution of China's rural land property rights has been described in this paper with reference to Harold Demsetz's theory of property rights I and II to provide a better understanding of the process. Some studies have concentrated on this topic, e.g., Meng [9] but these studies lacked a formal theoretical framework to explain the reason for the evolution of property rights in rural areas in China. The great strength of Demsetz's theory is that he provides a classical framework in "Toward a Theory of Property Rights" [12] and "Toward a Theory of Property Rights II: The Competition Between Private and Collective Ownership" [13] that is well suited to explain the evolution of property rights in either socialism or capitalism. His framework of externalities provides a good explanation for the emergence of family based property rights in rural areas in China and the resource allocation also provides an understanding of how land titling has evolved. However, but frameworks do not consider the function of land titling.

The positive effects of land titling are the emergence of private control of rural land. The negative effects of land titling helped Demsetz to develop a broader theory of property rights by creating risk. As Demsetz mentioned, the "theory of property rights could be made more complete by adding degree of risk to compactness, productivity, and complexity as a relevant dimension of the resource allocation setting" [13] (p. 672). Of course, he also "resisted this because he is uncertain about the general theoretical link between risk and choice of economic system" [13] (p. 672). This provided an opportunity for us to extend the theory of property rights.

By providing insight into land titling, we have concentrated more on the positive effects. Of course, land titling leads to negative effects, which might result in the emergence of new property rights. In fact, the land titling program in China has been widely questioned by western scholars. Ho and Spoor [10] referred to the land titling program in China as an "empty institution" because if the institution issued a land title, it would have only negative effects on social behavior. In the case of Belarus, for example, in first 9 years of the land registration program, the agricultural output of Belarus decreased by 50% and agricultural labor productivity decreased by 30% [44]. Due to underlying institutional constraints in China, land titles are rarely bought and sold, leaving the land inaccessible [11]. There are different viewpoints on this. Some researchers argue that land titling is rarely necessary because the customary property rights in rural areas of China still function for redistributing land and ownership of the land is not transferred to third parties, e.g., Ho and Spoor [10]. Other researchers state that land privatization is a straightforward corollary of land titling because it replaces collective ownership; this viewpoint is supported by the property rights school and scholars such as Nolan [45].

Based our findings, Chinese governments should consider more rights entailed to private control of rural land as land-titling practices. For example, the "right to mortgage" should be further given to the managers. To be practical, the "right to mortgage" has been evaluated in experimental trials. The Interim Measures for Pilot Mortgage Loan of Contracted Land in Rural Areas was issued in 2016 and stipulates that "the managers (private control) who obtain the land via allocation have the "right to mortgage" and "financial institution should support it". This feature is based on the improvement by the originally contracted peasants if the manager wants to mortgage the land. In fact, this innovation is in contrast to the dynamic effect of land titling in other countries. For example, in Vietnam, "the right to mortgage" is not granted to the managers but instead to the contracted peasants. This unbalanced right of the contracted peasants and managers in China indicates a land reform strategy, whose goal is to pave the road for big farms because they need to mortgage the land to obtain more capital to achieve large-scale investments. Based on Demsetz's framework the innovation in China's rural land property rights also fits with the analysis of Demsetz's resource allocation framework because the manner in which the managers obtain the "right to mortgage" might be considered releasing of efficiency and scale in land allocation (as a solution to the problem of resource allocation). Meanwhile, in this innovation, "duration of the right to use the land" as an implication of

the property-right game in the article should be considered simultaneously to provide a stable expectation to manages and obtain income so that they are willing to invest in the land and to ensure that the “right to mortgage” granted by the government can be achieved.

Of course, the “right to manage and to obtain income” is necessary to be given to the private control insomuch as the problem of externality exists. When a landholder signs a formal contract with a farmer or organization (internal or external), it means that the “rights to manage and to obtain income” has been transferred to the landholder; otherwise, the two types of externalities will occur. One externality is the exploitation of the land/soil for maximizing the output because tenure insecurity (including instability in management, income, and duration of the contract by the interference of landholders) will result in unsustainable land management. The other externality is the unwillingness to consolidate the land for the same reason, which leads to loss of efficiency resulted from excessive land fragmentation. Therefore, the *internalization of externalities* occurs, and the “rights to manage and to obtain income” is given by government.

To sum up, this paper refreshes the dominant framework of analysis on evolution of property rights in mainstream economics, and makes it sense when collective ownership does not evolve into pure privatization finally, instead into private control of land, as currently applied to rural area in China. The discrepancy eventually leads this paper to press for the creation of the theoretical link between theory of property rights and game theory—a demand to which Demsetz wanted to respond in consideration of the role of risk. In particular, the question of whether this adjusted framework is also suitable for other developing countries is left for the future studies.

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