

# Impact of Rural Land Titling on Peasants' Credit and Game Analysis

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**Abstract:** China's land titling program has been basically completed; "Two Rights" mortgage loans have also been gradually promoted in different pilot areas. This paper discusses whether the value of titling farmland as a collateral can be realized. We try to construct a two-person three-stage perfect information game model of "peasants-banks" which analysis land titling how to alleviate the moral hazard and adverse selection problems in rural finance. Based on collecting relevant domestic literature, especially focusing on the field research literature with the data of some pilot areas, we can get the effect of titling land on peasant' credit obtain. At the end of this paper, we put forward three issues that should be paid attention to.

## 1. Introduction

The No. 1 Document of the Central Government in 2013 clearly stated that "the work of confirming, registering and certifying contracted management rights of rural land should be basically completed within 5 years". In 2016, the "three reforms": the reform of rural collective profit-making construction land on the market, the reform of rural homestead and the reform of land expropriation system were gradually carried out in China's pilot areas. In 2019, the Rural Land Contract Law of the People's Republic of China (2018 Amendment) was implemented, which clarified the specific contents of the separation of rural land property. The reform of China's rural land system has been promoted from the policy level to the legal level, and from pilot areas to the whole country. At the same time, in 2015 the State Council issued "the implementation of rural contracted land management rights and peasants housing property rights mortgage pilot guidance", started in the pilot areas of "three reforms" to promote "two rights" mortgage business, visible in the process of rural land system reform, the rural financial reform has been advancing. Then, if the beginning time of "two-right mortgage" is taken as the starting point, whether this round of agricultural land system reform can play a role in deepening rural finance will be discussed in the next part of the article.

## 2. International Experience in Land Titling and Credit obtain

Most international studies believe that the normalization of land property rights can help to improve the confidence and security of property rights owners, and then increase their long-term investment in land, promote their land transfer and large-scale operation, or obtain more credit support [2-4,9-10]. Due to the high cost of land right confirmation projects, many developing countries, even some developed countries, choose to accept the funding from national organizations or projects. According to available data, one of the earliest land tenure projects funded by the World Bank was a part of the Third Livestock Project and First Agricultural Credit Project in Bolivia in 1971, which ultimately resulted in 27,000 land tenure certificates and failed. However, its basic purpose is to promote the development of agricultural credit by issuing certificates to clarify property rights of agricultural land. There is a close relationship between land right confirmation and agricultural credit at the beginning. Land titling program has been completed in many developed countries and is still being promoted in some developing countries. However, there are obvious differences in the effects of land right confirmation in developing countries that have completed or are in the process of confirmation. Some

Domestic scholars also used the literature method to analyze the role of land right confirmation in the world. One domestic review collected 73 foreign literature and found that the effective quantity of land certificate in increasing land credit was slightly higher [10]. This paper also collects some literatures and finds the following findings: In-depth studies of land right confirmation on credit entry mainly focus on developing countries that have just completed or are in the process of right confirmation. Thailand and Vietnam have relatively more data among Asian countries, and land titling has a certain positive effect on credit availability of some peasants. African countries basically play a small role, and in some countries, there is no direct relationship between the two; The experience of some Latin American countries shows that empowerment helps large-scale peasants to obtain more credit, the selected countries and literatures can be referred to table 1.

Table 1. Land titling's credit effect in some Asia, Latin America, and Africa countries

State	Country	Effect of Land Titling on Credit	Author, Year
Asia	Thailand	The possibility of obtaining loans is positively correlated with the wealth of farmers, and small farmers have limited benefits; Agricultural land is difficult to dispose, farmers' loan scale is small, the service life is short, and the marginal transaction cost of agricultural land value evaluation is high, so it is difficult for agricultural land to play the role of collateral.	Feder et al. , 1988; Menkhoff&Neuberger, 2012
	Vietnam	It has little impact on the formal credit supply; It has a positive effect on collateral-based credit obtained from banks, but the effect is not applicable to other financial institutions.	Hare, 2008; Kemper et al., 2011
	India	The impact on Farmers' credit availability is very small; Have a positive effect	Pender& Kerr, 1999; Santos et al., 2014
Latin America	Nicaragua	It has a positive impact on farmers with agricultural land area > 150 hectares; The credit indicator is "whether the family believes they can get credit", not the actual loan.	Boucher et al., 2005; Macours, 2009
	Peru	The average farmland area of farmers < 3 hectares has no significant impact; The research results of National Farmers' samples showed no impact; To alleviate the credit rationing of large farmers, small farmers with an average agricultural land area of 4.5 hectares did not benefit from it	Field et al., 2006; Fort, 2008; Guiringer & Boucher, 2008
	Honduras	It has no impact on small farmers with an average agricultural land area of 4.6 hectares; It has a positive impact on farmers with a farmland area of 3-90 hectares and a negative impact on farmers with a farmland area of > 3 hectares	Jansen& Roguas, 1998; Boucher et al., 2005
	Paraguay	The availability of credit has been improved by 50% for farmers with a land area of more than 15 hectares, no impact on small-scale farmers < 3 hectares	Carter&Olinto, 2003
Africa	Uganda	No positive effect	Petracco&Pender, 2009
	Tanzania	Have a significant and positive impact	Furaha et al., 2020
	Rwanda	There is no direct connection between the two	Ali et al., 2014
	Kenya	There is no direct connection between the two	Migot-Adholla et al.,1991
	Gambia	It has no impact on farmers with an average land area of 1.5 hectares	Hayes et al., 1997
	Ghana	Basically, it has no significant impact on Farmers' credit availability	Besley,1995

Data source: according to literature review (1990-2020), some of it can be seen in the reference.

After understanding the effect of land right confirmation on the credit of property right owners in different countries through existing literature, we find some commonality : (1) the effect of land right confirmation on whether to increase credit is not direct, but is realized under certain conditions. (2) The positive effect of ownership confirmation on increasing credit is usually for peasants with large land area, while it has little or no effect on small peasants. (3) Most of the observed credit behaviors refer to the formal credit through bank loans, and the effect of informal credit is difficult to observe and study. (4) Among the literatures that land right confirmation has a significant positive impact on credit entry, there are few literatures that carry out in-depth analysis on the impact degree.

### **3. Mechanism and Game Analysis of Titling Land to Credit between Peasants and Banks**

The relationship of land titling and credit in some of the above countries have verified the “de Soto effect”, that is, by clarifying land property rights, many poor people with sleeping assets can use them as collateral to obtain credit funds, invest and turn profits into capital. In terms of the rural land system reform being deeply promoted in China, the influence mechanism and game analysis of whether land right confirmation can lead to credit relationship between peasants and financial institutions are as follows:

#### **3.1 Influence Mechanism of Rural Land Titling on Peasants' Credit**

The most direct effect of land titling on peasants' credit is to alleviate the problem of insufficient mortgage in rural financial credit in China. The mechanism of the two is based on the perspective of information asymmetry. Land titling let the land ownership is confirmed as real mortgage. At the same time, it has the signal function of transmitting information and plays a role in moral hazard and adverse selection in rural financial market. The adverse selection in the relationship is the tendency to lend to people who are at high risk of not repaying. As far as collateral is concerned, high-risk borrowers who do not repay loans are often unwilling to provide collateral and willing to accept higher interest rates, so that the defaulting borrowers in the financial market crowd out those who have mortgages and are willing to repay loans. Moral hazard refers to the post-loan default risk that the borrower may not be willing to repay the loan due to the low return on its use or the depreciation of the value of the collateral after the loan. However, the determination of farmland as legal collateral can alleviate such risk to a certain extent.

The signal transmission function of land tenure confirmation is reflected in the following aspects: the confirmation of land tenure makes peasants have a long-term expectation of the stability of land tenure, which plays a positive role in increasing long-term agricultural investment, thus increasing the demand for credit; For financial institutions, stable land rights that can be freely transferred as their property rights also send signals of increased repayment possibility, and provide better signals than those without collateral for financial institutions before, thus increasing credit supply.

#### **3.2 Analysis of Credit Game between Peasants and Banks**

Credit Game Analysis between peasant households and banks Based on the above mechanism, in order to discuss the realization of the value of farmland as collateral, a three-stage perfect information game model of "peasant households and banks" is constructed here, in which the realization of the value of collateral is shown in two aspects: The value of the mortgage before the occurrence of the credit relationship and the processing value of the default as collateral after the loan:

1. The basic assumptions of the game between the two sides are as follows:

(1) Participants: peasant (B1) and bank (B2), both of which are rational people and maximize the target income;

(2) The assumptions for participant B1 are as follows: the appraisal value of peasant's confirmed farmland mortgage is  $V$ , the loan amount is  $\vartheta$  and the general loan amount is  $\vartheta$  times the appraisal value of the collateral, which is called the mortgage rate,  $\vartheta \in [0,1]$ , the loan amount depends on the assessed value and mortgage rate. The interest rate of the loan is  $i$ , and the return rate of the loan funds used for investment is  $r$ , as long as peasants decide to go to banks for credit activities, Then the cost

of loans to be paid by peasants is  $C_1$ , It is mainly used to pay for the evaluation of agricultural land property rights expenses, transportation expenses, etc.

(3) The assumptions for participant B2 are as follows: banks have two options: lending and refusing to lend: before deciding whether to lend to peasants, financial institutions need to conduct credit investigation and credit investigation on peasants, and the cost is  $C_2$ . If they refuse to lend, the benefit is  $-C_2$ ; If the loan is granted normally, after banks issues the loan, it will face two situations: the borrower's performance and default: When peasants repay normally, the game ends; When the peasants default, the bank needs to deal with his collateral. The probability of successful disposal is  $p$ ,  $P \in [0,1]$ , in which the bank's disposal cost is  $C_{21}$ , including lawyer's legal fees, management time cost, etc. if the treatment is successful, the evaluation fee, auction fee, execution fee, etc. will be deducted from the value of the peasant's collateral, which can be regarded as the peasant's disposal cost is  $C_{11}$ .

(4) The process of the game is a perfect information game. Both sides of the game understand each other's utility function and each game, The first actor can predict the reaction behavior of the second actor to his own action, and the second actor can also observe the behavior of the former.

2. The process and benefits of the game are:

After peasants have a credit demand, banks decide whether to lend. The dynamic process of the game between the two sides includes three stages:

(1) In the first stage, banks decide whether to lend according to peasants' conditions and due diligence. If they refuse to lend, the game ends. The benefit of peasants and banks is  $A_1 = (-C_1, -C_2)$ ; If banks lend, they will enter the next stage of the game.

(2) In the second stage, after obtaining the loan, peasants face two options: performance and default. If peasants perform, the game ends and the benefits of peasants and banks are  $A_2 = (\vartheta V(r - i) - C_1, \vartheta Vi - C_2)$ . If peasant defaults, they enter the next stage of the game.

(3) In the third stage, after the peasant defaults, the bank chooses whether to dispose of the peasant's collateral. If it is successfully handled, the benefits of both parties are  $A_3 = \{P[\vartheta V(r - i) - C_1 - C_{12} - V] + (1 - P)[\vartheta V(1 + i) - C_1 - C_{12}], P(\vartheta Vr - C_2 - C_{22}) + (1 - P)[- \vartheta V - C_2 - C_{22}]\}$  ; The benefits of unsuccessful disposal are  $A_4 = (\vartheta V(1 + i) - C_1, -\vartheta V - C_2)$ , and the game ends, as shown in Figure 1.

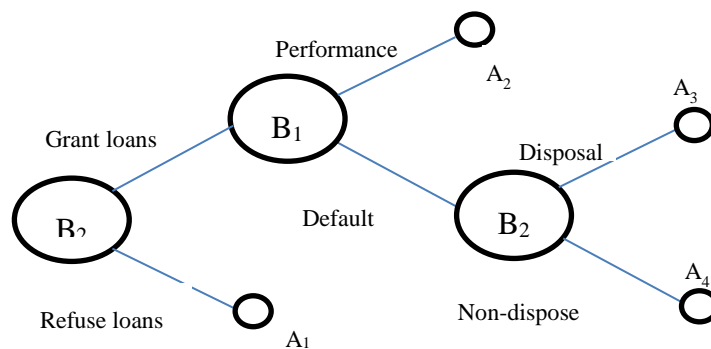


Figure 1. Three stage dynamic game of credit between banks and peasants

Through the inverse method, the mortgage rate is  $\vartheta$  and the successful disposal rate  $P$ , the following conclusions are drawn:

When  $\vartheta = 0$ ,  $P \in [0,1]$ , that is, when the mortgage rate is 0, the bank certainly refuse to lend, and the peasant do not realize the loan demand. In real life, this condition is mainly reflected in the fact that peasant have loan needs, but it is difficult to find a suitable evaluation institution and evaluate the property rights of agricultural land, and banks have failed to find an approved evaluation unit in time, which cannot make the credit relationship happen.

When  $\vartheta \in (0,1)$ , loans may occur. Then consider the situation of  $P$ : ①when  $p = 0$ , that is, the peasant defaults, and the possibility of successful disposal of the collateral is 0, then  $A_3 = [\vartheta V(1 + i) - C_1 - C_{12}, -\vartheta V - C_2 - C_{22}]$ , in which the income of the bank is less than that in  $A_4$ , so the financial institution will choose not to dispose; In the second stage, peasants know that banks do

not dispose of collateral. From the perspective of income, if the income of peasants A2 is less than A3, peasants will choose to default; In the first stage, if the bank knows that the peasants will default, the bank will choose to refuse the loan, that is, the sub-game perfect Nash equilibrium is {peasants choose to loan, banks refuse the loan}. ② When  $p = 1$ , the peasant defaults and the collateral is disposed successfully.  $A_3 = [\vartheta V(r - i) - C_1 - C_{12} - V, \vartheta Vr - C_2 - C_{22}]$ , as mentioned above, the sub-game perfect Nash equilibrium is {peasants choose to loan, banks grant loans}. ③ When  $p \in (0, 1)$ , in the third stage, the gains when the bank disposes of the collateral is greater than that when it does not dispose, then  $p$  is solved by  $P(\vartheta Vr - C_2 - C_{22}) + (1 - P)[- \vartheta V - C_2 - C_{22}] > - \vartheta V - C_2$ , After calculation, the solution is  $P > C_{22} / \vartheta V(1 + r)$ , in the second stage, when the peasant know that the bank will successfully dispose of the loan, they choose to repay the loan, which means the gains in the second stage is greater than that in the third stage, that is  $\vartheta V(r - i) - C_1 > P[\vartheta V(r - i) - C_1 - C_{12} - \vartheta V] + (1 - P)[\vartheta V(1 + i) - C_1 - C_{12}]$ , through calculation, the solution is:  $P > 1 + \frac{(C_{12} + 1)}{r - 2i - 2}$ ,  $P \in (0, 1)$ , we can see  $P^* \in \text{Max}(P_1, P_2)$ , At this time, the sub-game perfect Nash equilibrium is also the peasant choose to loan and the bank grants loans.

When  $\vartheta = 1$ , which means that the mortgage rate is 100%, and the result of lending by the bank is shown in case (2) above. The solution is still the peasant choose to loan and the bank grants loans.

In summary, the greater the value of  $\vartheta$  and  $P$ , the greater the possibility that banks choose to lend. The higher the value of the two means that the value of agricultural land ownership is more recognized by the market. Whether in the evaluation stage before the loan, or in the stage of peasants' default after the loan and the disposal of collateral by banks, the mortgage value of agricultural land property rights can be fully recognized, and the resulting moral hazard will be reduced.

#### 4. Analysis on the Effect of Rural land Titling on Peasants' Credit

##### 4.1 The Affection of "Two Right" Mortgage Loan in Pilot Area

In 2015, the State Council put forward the pilot scheme of mortgage loan for the management right of rural contracted land and peasants' housing property right (hereinafter referred to as "two rights" mortgage loan), which was implemented in 232 pilot counties (cities and districts) such as Daxing District of Beijing and 59 pilot counties (cities and districts) such as Jixian County of Tianjin, It is allowed to use the contracted management right of agricultural land and peasants' housing property rights for mortgage loans. By the end of 2019, with the approval of the Standing Committee of the National People's Congress, according to the mortgage loans in relevant pilot areas, it has been extended step by step for two years since the end of 2017.

Results achieved in the pilot areas of "two rights" mortgage loans: statistically, by the end of the third quarter of 2008, the loan balance, the number of financial institutions handling loan business and the number of government guarantee companies in the pilot areas had increased significantly; At the same time, the risk control is also relatively perfect. Risk compensation funds have been established in more than 80% of the pilot areas and government guarantee companies have been established in more than 60% of the pilot areas, creating good conditions for the development of "two rights" mortgage loans, as shown in Table 2 below.

Table 2. The basic results in pilot areas by the end of September 2018

Pilot area	Loan Balance	Financial Institutions Number	Risk Compensation Fund	Government guarantee company
Agricultural land mortgage area	The total amount was 52 billion, with an increase rate of 76.35	1193 financial institutions handle the business	There are 190 pilot areas establishment of such funds	There are establishment in 140 pilot areas
Rural housing mortgage area	The balance was 29.2 billion, a year-on-year increase of 48.9% and the total amount is 51.6 billion	330 financial institutions handle the business	There are 48 pilot areas establishment of such funds	There are establishment in 29 pilot areas

Data source: Summary Report of The State Council on the Pilot Mortgage Loans of Rural Contracted Land Management Rights and Peasants' Housing Property Rights in 2018

#### 4.2 The policy effect of affirming the right of agricultural land right on household credit

In this paper, the main reference for nearly five years of domestic related research literature, research provinces involved in Jiangsu, Shanxi, Ningxia, Shandong, Liaoning, Anhui, Guangdong, Jiangxi, Guizhou, Henan and other dozen provinces, have Chinese family financial investigation data and at the same time of rural credit cooperatives and bank data (in view of the space, the following lists only 10 articles) for nearly three years of discovery: on the whole, the policy of mortgage of farmland property rights has achieved initial results without deviating from policy expectations, but there are still some problems.

According to the existing statistical data, survey data and literature, the reform of agricultural land system in China has achieved certain results: land right confirmation has been basically completed, peasants have obtained the land title certificate, which plays a positive role in the credit access of large-scale peasants, promotes the large-scale operation of land, and revitalizes the "sleeping capital" in rural areas. The implementation of the "two rights" mortgage loan policy, has given rise to many new rural financial credit model, financial products, such as mechanism, such as Ningxia "concentric model", "Ping Luo model", "peasants + local governments (land association, the professional cooperatives, the village committee, etc.) + financial institutions' credit mode, Shandong Texas land mortgage" pool "project to undertake mechanism, Henan Tai Qian County rural commercial bank of rural family loans "family good" products. It not only meets the financial needs of peasants, but also develops the business of financial institutions and alleviates the financial repression in rural areas.

### 5. Conclusions and Further Thinking

In the process of the rural land reform, there are three problems worth paying attention to: first, it will take a long time to realize the value of farmland property rights. Whether the credit relationship's assessment of the value before or after the loan default effective disposal of the mortgaged property, farmland property value is the key, both peasants and financial institutions, valuable farmland property right can play a role of the capital's largest, and behind it are concerned with the value of land as a factor of production, the unity of the urban and rural factor market, and the ascension of the market value of agricultural products, etc.<sup>2</sup> it is made by agricultural credit relief significantly higher than that of small peasants, the function of large scale and small peasants is the main organization form of agricultural production and operation in China and will be long-term and modern agriculture, international experience and research of our country farmland counterpoising truly did raise the empirical analysis also found that rich peasants and large land owners credit availability, Even the number of loans to some small peasants is not increasing but decreasing. How to make small peasants

get reform dividends in the current round of agricultural land reform is the problem we should pay more attention to. Third, in the pilot of "two rights" mortgage, the credit of contracted management rights of rural land has formed a complete closed loop, which has been promoted and implemented nationwide. However, there are still many problems in the mortgage of rural houses, and more supporting policies and measures need to be introduced.

## References

- [1] Boucher S R, Barham B L, Carter M R. The Impact of "Market-Friendly" Reforms on Credit and Land Markets in Honduras and Nicaragua [J]. *World Development*, 2005, 33(1):107-128.
- [2] Carter, M R. and Olinto P., 2003, "Getting Institutions "Right" for Whom Credit Constraints and the Impact of Property Rights on the Quantity and Composition of Investment"[J]. *American Agricultural Economics Association*, 85(1): 173-186.
- [3] FEDER G, NISHIO A. The benefits of land registration and titling: economic and social perspectives [J]. *Land Use Policy*, 1998, 15(1): 25 - 43.
- [4] Hare D. The Origins and Influence of Land Property Rights in Vietnam [J] *Development Policy Review*. 2008, 26 (3): 339-363.
- [5] KASSA W. Land titling and investment in Tanzania: an empirical investigation [J]. *Mpra Paper*, 2014 (57987): 19.
- [6] Macours K, Carpio X D. Leveling the Intra-household Playing Field: Compensation and Specialization in Child Labor Allocation [J]. *Policy Research Working Paper Series*, 2009, 784 (4822):135-144.
- [7] Santos F, Fletschner D, Savath V, et al. Can government-allocated land contribute to food security? Intrahousehold analysis of West Bengal's Microplot allocation program [J]. *World Development*, 2014, 64:860-872.
- [8] Pender and Kerr, The effects of land sales restrictions:evidence from south India[J]*Agricultural Economics*,1999,21(3):279-294
- [9] Jiang Li, Zheng WenBo. An evolutionary game analysis of "government-peasant household" behavior in the change of land titling in China [J]. *Modern Economic Research*, 2017(08):126-132.
- [10] Feng Lei, Zhang Minghui, Li Yixin. The Effect of Land Certificate in Rural Land Title Registration: Mechanism, Conditions and Empirical Tests [J]. *China Land Science*, 2019, 033(005):39-49.