

New Progress in Rural Credit Rationing and Property Right Mortgage under the Background of "Block chain and Big data" Technology

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Abstract. Credit rationing is an important challenge to the sustainable development of rural financial credit markets. With the improvement in data availability and empirical methods, it has become a new hotspot in academic research on rural financial market to discuss the problem of rural household credit rationing from the perspective of rural property right mortgage. Through the deep integration of "block chain and big data" technology and its application in the field of rural property rights mortgage loans, it will enable the transformation and upgrading of credit allocation for rural farmers. In this paper, first of all, the genesis and classification of peasant household credit rationing in detail, based on this, the influence factors of credit rationing, and from the perspective of property right of mortgage on the influence of peasant household credit rationing system is summarized, and the one illuminating innovative insights to conduct a comprehensive review. This paper aims to provide references from the research on forest title mortgage loan and peasant household credit rationing in collective forest areas under the context of "block chain and big data" technology in china.

Keywords: Mortgage of property right; Credit rationing; Forest right mortgage loan; "Block chain and big data" technology

1. Introduction

For a long time, due to information asymmetry, lack of qualified mortgage guarantee and high transaction cost, farmers in China can not effectively obtain financial support from rural formal financial institutions, which leads to serious credit rationing problems in rural areas. The root cause of farmers' credit rationing is that rural land and housing cannot be accepted and recognized by rural formal financial institutions. Therefore, with regard to the mitigation of farmers' credit rationing, the central government, the government and the academic circles will hope to entrust the reform of rural collective property rights system and the reform of rural property rights mortgage financing in China, with a view to giving farmers in rural areas more complete and stable land rights, thus solving the problem of insufficient collateral for farmers.

The release of " Central Document No. 1" from 2004 to 2020 has attached great importance of the sustainable development of rural finance in China. On October 15, 2008, the People's Bank

of China and the former CBRC jointly issued "Opinions on Accelerating the Innovation of Rural Financial Products and Services," aims at giving full play to the capital function of rural property rights in China and realizing the mortgage ability of property rights in rural areas with rural property rights as collateral. In the specific practice process, China's rural areas have spontaneously explored and innovated according to the actual situation to form a diversified property mortgage realization path. For example, the farmland mortgage loan, forest right mortgage loan, land income guarantees loan, rural residential land use right, etc. In November 2013, the Third Plenary Session of the 18th Central Committee of the Communist Party of China adopted "Decision" to emphasize "empowering farmers to mortgage and guarantee the contracted management rights," aiming to further to clarify the mortgage ability of the contracted management right of farmers in rural areas and alleviate the long-standing mortgage difficulty in rural areas. Nonetheless, in the context of China's current legal environment and property rights control constraints, farmers' desire to obtain credit support through property rights mortgage is still difficult to achieve the desired objectives because of the fragmented land and small area. Starting from January 1, 2019, the state formally implemented the "separation of three rights" to allow the transfer of land tenure by mortgage according to law, which means that it provides a formal expression of legal effect for the mortgage of rural farmland or forest land property rights in China. The collaborative development of block chain and big data technology will open up a new path for rural financial development.

In recent years, some observer-sensitive researchers have begun to notice the important impact on rural property right mortgage on farmers' credit rationing. On the basis of absorbing and drawing on the relevant research results of information economics and institutional economics, using various rural micro surveys data, they constantly explore the influencing factors of farmers' credit rationing and the theoretical path and empirical scheme of property rights mortgage financing affecting farmers' credit rationing, forming some new insights with inspiration. This paper will first sort out the causes and classification of farmers' credit rationing and the identification and measurement of credit rationing, and then comprehensively review the influencing factors of farmers' credit rationing and the basic contents and main viewpoints of property rights mortgage on the improvement effect of farmers' credit rationing, and on this basis, prospect the future research direction in this field, so as to provide support and reference for the domestic academic circles to explore the development of forest farmers' credit rationing from the perspective of property rights mortgage reform in rural collective forest areas in China based on block chain and big data, and improve the reform of China's forestry financial system under the background of comprehensive deepening reform.

2. Causes and Mechanism of Credit Rationing of Farmers

2.1 Analysis On the Causes of Farmers' Credit Rationing.

Academic circles have done a lot of research on credit rationing, but there is no unified definition of credit rationing. The source of credit rationing lies in the information asymmetry between credit demanders and suppliers in financial markets. Relevant scholars' research on credit rationing mainly focuses on the perspective of credit supplies. They believe that the

difficulty of farmers' loans in rural financial markets is rooted in the information asymmetry between farmers and rural financial institutions, the lack of collateral, and high transaction costs. At present, the research scope of credit rationing has gradually expanded on the perspective of credit supply of the perspective of credit demand. With the deepening of research, the mainstream view holds that the credit rationing faced by farmers with credit demands to come not only from the main behavioral decisions on formal rural financial institutions (for example, balancing the high fixed high fixed in the operation of rural financial institutions, the high credit risk faced by farmers and the high non-interest cost to be borne when lending to farmers), but also from the differences in independent behavioral decisions caused by farmers' cognitive bias and behavioral bias (such as information asymmetry and the high non-interest cost to be paid by farmers to obtain credit support)[1][2]. Based on this, there is a general consensus among scholars that credit rationing is generated under the interaction of cognitive bias, demand repression, behavioral bias of rural households and external constraints of rural formal financial institutions.

2.2 Classification and Mechanism of Credit Rationing of Farmers.

With the deepening reform of China's rural financial market, the issue of farmers' credit rationing has become a major issue of academic attention and discussion in the field of rural finance. Boucher forms credit rationing based on the fact that the credit demand side has credit demand but do not to obtain credit support due to various factors, which is mainly divided into transaction cost credit rationing, risk credit rationing and scale credit rationing [3].

At present, most scholars have reached a basic consensus on the types of credit rationing according to the mechanism of credit rationing, and believe that credit rationing mainly includes supply-based credit rationing and demand-based credit rationing. Supply-based credit rationing is based on the credit rationing behavior caused by the decision-making of formal financial institutions, that is, farmers with credit demand apply for loans from rural formal financial institutions. However, due to various factors, they have not received their credit support because they only obtain some loans or even are rejected [4].

Compared with the supply-oriented credit rationing mechanism, demand-oriented credit rationing is a kind of rationing method based on the credit demand side's own active choice behavior decision, that is, farmers with potential credit demand do not formally apply for loans to rural formal financial institutions or voluntarily give up loans after application for various reasons. Demand-oriented credit rationing is divided into three types: self-implementation credit rationing, risk credit rationing and transaction cost credit rationing. See Table 1 below.

Table 1 The Mechanism of Farmers' Credit Rationing and the Types of Credit Rationing

Type of credit rationing	The generating mechanism	Whether to apply for a loan	Whether there is loan demand and the type of loan being allocated

Demand-based credit rationing	(transaction cost credit rationing) Voluntary abandonment of loan applications due to complex loan procedures and high non-interest costs <hr/> (risky credit rationing) To abandon a loan application for fear of losing collateral <hr/> (Self-imposed rationing) People give up loans because they are afraid of being rejected due to lack of family wealth and social capital	o No	There is a demand for credit, Suffer from Demand credit rationing
Supply-based credit rationing	(Partial credit rationing) because only a portion of loan applications are received (full quantitative credit rationing) to be denied a loan application altogether	Yes	There is a demand for credit, Suffer from supply - based credit rationing

3. The Influencing Factors of Farmers' Credit Rationing

3.1 The Influencing Factors of Demand Credit Rationing.

At present, the research on farmers' demands credit rationing focuses on influencing factors. Some studies believe that face concept and risk aversion attitude is the main factors affecting household demand-based credit rationing. Wang Jining and Zhao Shunlong (2007), based on the survey data of 716 farmers' loans, show that the root cause of farmers' loans is the cognitive bias, behavioral bias and external constraints of financial institutions [5]. Even so scholars have found that the low level of farmers' participation in the formal credit market in poor areas is rooted in the shift of farmers' main economic activities from family production and operation to migrant workers [6].

However, it is also pointed out that the influencing factors of farmers' credit exclusion are summarized in the following aspects: farmers' educational level, family income, credit publicity, whether village cadres, preference for surplus treatment and the number of bank outlets per 10,000 people [2].

Based on the background of rural property right mortgage loan, some scholars analyze the influence of farmers' cognition of property right mortgage financing policy and lending institutions on farmers' willingness to participate in property right mortgage financing[7]. The study of Lianghu and Luojuan (2019) found that farmers' demand credit rationing was mainly affected by the number of financial institutions and arable land[8]. In addition, scholars further examine the reasons why farmers face demand-based credit rationing in the farmland management right mortgage market from the perspective of heterogeneity. Specifically, the main impact of demand-based credit rationing on small farmers can be summarized as the following aspects : whether agriculture is the main source of income, the average annual income of agricultural land, the distance from home to the agricultural exchange, and whether (ever) family members serve as village cadres. The main influencing factors of demand-based credit rationing for large-scale farmers are summarized as the following aspects: the difficulty of obtaining authentication certificates, the absence of registration of farmland property rights exchanges in the rural comprehensive property rights exchange, the absence of farmland transfer contracts in the registration, the fact that agriculture is the main source of household income, and the average income in recent years, the distance from home to the rural exchange and bank outlets[9].

3.2 Analysis of Different Types of Demand-based Credit Rationing Mechanism.

Demand-based credit rationing includes self-implementation credit rationing, risk credit rationing and transaction cost credit rationing. Relevant scholars believe that different types of demand-based credit rationing have different mechanisms. Therefore, it is necessary to study different types of influencing factors of demand-based credit rationing. For example, based on the influencing factors of self-enforcing credit rationing, farmers' self-enforcing credit rationing is affected by loan demand, the number of insurance purchases and participation in farmer cooperative organizations[10].

In terms of the influencing factors of risk credit rationing, farmers' risk attitude has a significant positive impact on credit rationing. Specifically, farmers' risk attitude determines the risk cost and risk premium, resulting in demand-based credit constraints[11]. That is, the stronger farmers' awareness of risk aversion makes farmers' risk aversion behavior improve farmers' perceived credit costs, resulting in a decline in their expected credit acquisition, resulting in greater demand credit rationing. The study further believes that farmers with risk allocation are in conflict with the mortgage of land use right[12]. In addition, Meng Ying (2017) believes that age, education and credit demand have a significant impact on risk rationing [10]. It should be noted that Ma Wenjie (2018) found that demand credit rationing caused by risk is the main source of restraining the sustainable development of China's rural credit market based on the readily available bank network data and the heterogeneous stochastic bilateral frontier model[13].

In addition, some relevant scholars studied the influencing factors of transaction cost rationing of farmers. For example, Zhang Longyao et al. (2011) found that the high degree of inhibition of farmers' credit demands is due to non-interest credit transaction costs and non-price contract conditions[14]. Due to the information asymmetry between the two sides of the credit, the lack of effective contract implementation mechanism will improve the possibility of farmers' transaction cost credit rationing. Farmers give up loans or refuse loans because of the cumbersome loan procedures or require them to provide collateral and long-term credit history,

and then form transaction cost credit rationing [15-18]. Some scholars have further studied that farmers who are only engaged in agriculture or migrant workers are more likely to face transaction-cost credit rationing[16].

3.3 The influencing factors of supply credit rationing.

The literature on the influencing factors of supply credit rationing is very rich. Some existing scholars have studied the supply-based credit rationing of rural households based on individual characteristics and family economic characteristics. For example, relevant scholars put forward that farmers' age, education level, family land area, lending channels and total household income have a significant impact on supply-oriented rationing, especially the education level of household head and family land area have a significant negative impact, resulting in a lower probability of supply-oriented rationing [19][20]. In terms of the characteristics of the financial environment, the distance between bank outlets has a positive impact on farmers' supply-oriented rationing, which means that the probability of supply-oriented rations increases[19].

In addition, some scholars study the influencing factors of supply credit rationing based on rural farmland management right mortgage loan. For example, based on the reform of farmland property rights system to elaborate its credit supply effect[21]. Scholars at home and abroad believe that the positive effect of farmland property right mortgages system reforms on credit supply are not universal. On the one hand, it is affected by the credit record of farmers, the stability of farmland property right, the scale of farmers' land, the mortgage value of land contractual management right and the perfection degree of farmland transfer market. On the other hand, it is also restricted by many aspects such as the cancellation of redemption right, the transaction cost of disposing mortgaged land and the perfection degree of rural external financial market [22-25]. It should be pointed out that the research on the impact on supply credit rationing based on the reform of rural land property rights system should fully consider the different characteristics of different property rights and mortgage systems in different rural areas in China.

In addition, based on the heterogeneity of farmers, some scholars believe that the influencing factors of supply credit rationing faced by farmers in the mortgage market of farmland management right are different. Specifically, the fundamental factors that small farmers face complete quantitative credit rationing are that their families have not ever served as village cadres, have not joined the government credit information system and have high fixed assets. The main factors that large-scale farmers face quantitative credit rationing are that their families do not have served as village cadres, do not sign farmland transfer contracts, do not go to the rural comprehensive property rights exchange registration, do not join the government credit information system, the level of credit demand is too high, the area of farmland management is small and the period of farmland management is short[9].

4. Rural Property Right Mortgage and *Farmers'* Credit Rationing

For a long time, China's rural financial credit markets due to the lack of effective collateral make farmers face more serious credit rationing. However, as innovation and attempt to

China's rural land system reform, the property right system reform and guarantee system reform, mortgage financing of rural land property rights can, to some extent, break through the practical problems faced by farmers in rural areas of China, such as difficulty in loan, mortgage and guarantee, and thus alleviate the credit rationing problem of farmers.

Based on the perspective of property rights mortgage, different scholars hold different views on the mitigation effect of farmers' credit rationing. Scholars have studied the impact on farmland rights confirmation and farmland mortgage on credit rationing, and believe that the impact on farmland rights confirmation on farmers' credit rationing and different types of credit rationing is different. In theory, mortgage guarantees can weaken the credit rationing problem caused by information asymmetry between the two sides of credit to some extent. That is, collateral plays an incentive role in pre-loan information screening, borrowers' financial situation and borrowers' risk types, and post-loan performance, which can alleviate adverse selection and moral hazard caused by information asymmetry in rural financial institutions. Therefore, granting farmland property rights certificates can significantly increase the credit supply of financial institutions to farmers[26][27], and alleviate the supply-based credit rationing. However, the mortgage of rural land property rights shows a tendency to scale preference[28], that is, farmers with strong profitability of business projects and sufficient non-agricultural income can obtain the improvement of credit contracts of formal financial institutions. As far as the impact on different types of credit rationing is concerned, farmland confirmation alleviates risk-based credit rationing by weakening farmers' psychological characteristics of loss aversion, and reduces price-based credit rationing by reducing the information cost of formal financial institutions[29]. Based on the land management right loan model, Cao Li, Luo Jianchao (2020) think that the land management right transfer to cooperatives of multi-person joint guarantee loan model to achieve the effective docking of farmers and rural formal financial institutions[30]. This means that it not only enhances farmers' demands for loans in rural areas, but also promotes the timeliness of lending by formal financial institutions and promotes the sustainable development of rural financial credit.

In addition, many literatures doubt whether property right mortgage can improve credit rationing, and believe that property right confirmation or property right mortgage is not necessarily able to alleviate farmers' credit rationing and improve farmers' credit availability. For example, Guirkinger and Boucher (2008) pointed out that in the case of asymmetric information in the financial credit market, mortgage conditions required by formal financial institutions not only led to quantitative credit rationing, but also to risky credit rationing[3]. Although farmland rights confirmation and farmland transfer have increased farmers' nominal credit needs, to some extent, farmers with nominal credit needs are still unable to effectively express their credit needs, only converting nominal credit needs into potential credit needs[21]. Due to the long-term household contract responsibility system, the land is fragmented and decentralized, which makes the value of agricultural land low. Therefore, the existing rural assets such as rural land are not the collateral that formal financial institutions can recognize and accept, which leads to the unsatisfactory effect of rural formal financial institutions launching mortgage loans based on rural property rights. Therefore, relevant scholars further believe that the impact of the reform of rural land property rights system on the mortgage effect of farmers' income has not been highlighted[31], that is, the reform of agricultural land

property rights and mortgage system may not be able to promote the availability of farmers' credit by alleviating the practical problems of farmers' credit rationing [32][33].

In addition, the effect of farmland property rights on transaction cost credit rationing was studied. For example, Mi Yunsheng (2018) found that the mitigation effect of farmland confirmation on transaction cost credit rationing is still not fully demonstrated[30]. Specifically, on the one hand, based on China's current legal system on rural land property rights and the reality that the rural land market is relatively weak, the mortgage of land management right has not been fully recognized by the current law, and the cost of financial institutions to cancel the foreclosure right of loan collateral and dispose of mortgaged land is high. On the other hand, because the transaction cost of mortgage financing undertaken by farmers is still high, and the land evaluation value is low, the credit amount obtained by farmers from financial institutions is extremely limited, resulting in the low willingness of farmers to participate in the mortgage of land management rights[34]. Therefore, the central and local governments place high hopes on mortgage reform of rural land management rights in order to alleviate the shortage of collateral, but there are still a large part of farmers' credit rationing problem is difficult to effectively alleviate. However, the reason that credit rationing has not been slowed down is that in the process of farmland mortgage loan, farmers may face new demand-based credit rationing due to the particularity of rural land[9], such as new transaction cost-based credit rationing and risk-based credit rationing.

5. Conclusion

The existing research explains the credit rationing problem with rural financial market from different aspects, and has accumulated rich research results. It mainly focuses on the causes and classification of farmers' credit rationing, the influencing factors of farmers' property mortgage credit rationing, and the effect of property mortgage on alleviating farmers' credit rationing. Especially from the perspective of rural property rights mortgage to explore the related research of farmers' credit rationing, which greatly expands the research connotation of rural financial analysis, but most studies focus on the impact on rural land mortgage and farmers' credit rationing. With the deepening of the reform of collective forest tenure system, a new round of collective forest tenure reform with the core of restitution and empowerment has been comprehensively promoted throughout the country, and a new climax of forest tenure mortgage has emerged from China's collective forest areas. This provides rich research materials and new perspectives for academic research. Therefore, domestic scholars in the future can be based on existing literature from the following aspects of China's collective forest mortgage loans and farmers' credit rationing related issues to expand.

Firstly, the theoretical research on the formation and mitigation mechanism of farmers' credit rationing needs to be further studied. Most of the existing research is based on the analysis framework of information asymmetry theory to explain the credit rationing problem of farmers in China, which is not well combined with the particularity of China's existing rural financial market, resulting in the lack of depth and strong explanation of the credit rationing problem of farmers in China. Therefore, it is necessary to strengthen the theoretical research on the credit rationing of farmers' forest rights mortgage loan. While borrowing the latest achievements of economics such as information asymmetry theory, contract theory,

transaction cost theory and social capital theory. It is particularly necessary to fully consider the particularity of China's collective forest region forestry financial market and the actual situation of forest farmers, and on this basis to build a more realistic theoretical analysis framework.

Secondly, expand the rural property rights mortgage-related research data, rich credit rationing research variables. As an alternative mechanism of property right mortgage, forest right mortgage expands the research scope of rural property rights mortgage. Through field research, valuable research data can be obtained, which provides data support for the development of research and enriches the research connotation of forest rights mortgage and farmers' credit rationing. The influencing factors of farmers' credit rationing are mostly studied from the demand side or the supply side, and the influencing factors of different types of credit rationing are common but also have certain differences, especially in the forest rights mortgage loans. However, the credit rationing of forest right mortgage loan is more caused by the interaction between demand and supply, and what is the reality of credit rationing. Therefore, it is necessary to introduce more influencing factors based on the particularity of forest land resources in collective forest areas in China to analyze the deep-seated reasons for the suppression of farmers' forest rights mortgage loans from the interaction of demanders and suppliers, so as to construct a more explanatory analysis.

Finally, the substitution mechanism of property right mortgage needs to be expanded to alleviate the credit rationing of farmers. There are many studies on the mitigation of land mortgage loan to farmers' credit rationing, and the mitigation of different types of farmers' credit rationing under the background of land mortgage is empirically investigated. However, in the field of domestic rural property rights financing, there are few empirical studies on the mitigation of farmers' credit rationing from the perspective of forest right mortgage loan, especially block chain and big data technology have gradually penetrated into China's rural financial field and become an important means to help China's collective forest region develop digital finance, which undoubtedly leaves a large space for domestic scholars to carry out relevant research. Compared with farmland mortgage loans, forest rights mortgage loans are more complex because of their particularity of resources. The forest rights mortgage credit market is not a factor market in the general sense, but a special credit market including kinship, geography, industry and human relations, which has its own special market logic. Therefore, based on the special transaction nature and high transaction cost of personalized property of forest right mortgage loan, it is necessary to match the optimal property right transaction path of personalized property and its governance to alleviate the credit rationing of farmers, which will be worthy of attention and interesting research topics.

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