

Can Cooperation Memberships Ease Farmers' Credit Constraints? —Evidence from Sichuan Province

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ABSTRACT

In developing countries, credit constraints are often perceived as one of the most important market frictions hampering agricultural productivity growth in rural areas. In this context, it is important to study the causes of farmers' credit constraints and the corresponding solutions. This paper examines the effects of farmer cooperatives in rural areas on income and poverty by applying Probit method on survey data from 8 counties in the main grain areas in Sichuan province, it finds that farmer cooperatives can significantly ease farmers' credit constraints. It also found that the use of Internet has significantly reduced the credit constraints of farmers. Therefore it is necessary to promote the healthy development of farmers' cooperatives.

Keywords: *cooperation membership, new agricultural entities, credit constraint*

1. INTRODUCTION

Credit is increasingly being considered as the way out of poverty for poor farmers^[1], since it offers the poor a better opportunity to invest in the expansion of agricultural production and invest in productivity enhancing technology, helping them to climb out of poverty. There is a rich body of literature that has emphasized the importance of credit. For example, the access to credit helps to improve the rural households' consumption^[2], and the private lending promotes local economic development in rural China by increasing entrepreneurial possibilities for farmers and increase their non-agricultural income^[3]. Therefore, improving access to credit services has a positive impact on the development in rural areas.

However, access to credit remains a challenge in remote, poor and rural areas, about 71% of the rural households in China are rationed in the credit markets^[4]. This phenomenon is also due to the imperfection of financial market in rural areas. For example, the borrower voluntarily withdraws from taking a loan, due to the risk of losing collateral^[5]. Traditional formal insurance instruments can be used to manage risks, but such insurance services are basically non-existent in rural areas of developing countries^[6]. In this context, it is important to study the causes of farmers' credit constraints and the corresponding solutions.

There has been an explosion research on the impacts of farmer cooperatives in rural areas. The existing researches have estimated the benefits of farmer cooperatives on agricultural production, farm income, household welfare. The study by Ma and Awudu(2016) shows that cooperative memberships exert a positive and significant effect on rural household welfare^[7]. Ma et al(2018) has

also attempted to explore the impact of cooperative membership on technical efficiency, and find that farmers who are members of cooperative membership have enhanced technical efficiency^[8], and cooperative memberships have significant and positive influence on farmers' propensity to adopt safe production practices^[9]. And joining cooperatives is beneficial to improving the welfare level of farmers, specifically, joining cooperatives can promote farmers' adoption of green technologies^[10]. In addition, joining cooperatives can broaden the sales channels of agricultural products to increase farmers' income^[11]. Other studies also point out the importance of cooperative membership in enhancing farmers income and eliminate poverty^[12].

However, very little is known about the impact of farmer cooperatives on easing farmers' credit constraints. Does farmer cooperatives help ease farmers' credit constraints that hamper productivity in rural China? It has received only limited attention in empirical research to date. The aim of this paper is to examine the effect of farmer cooperative on the ease of farmers' credit constraints.

The rest of this paper is organized as follows. The second section describes the literature on the causes of credit constraints in rural China and mechanisms of cooperative membership in the ease of credit constraints; the third section presents the model on credit constraints and the data sources. Section four presents the results; and the final section, concludes the paper and presents direction for future research.

2. LITERATURE REVIEW AND THEORETICAL ANALYSIS

2.1. Literature review on causes for farmers' credit constraints

Rural households in developing countries face a number of credit constraints and market imperfections that shape investment decisions^[13]. And credit constraints are often perceived as one of the most important market frictions hampering agricultural productivity growth in rural areas. Therefore, it is important to study the causes of farmers' credit constraints and the corresponding solutions.

Farmers with better credit and lower risks are more likely to be selected as credit objectives, but the farmers in China do not have land ownership, so they cannot provide banks with guaranty, which may leads to default. And the interest rates are high in the rural area due to high default risk. In addition, the agricultural income is unstable since the price of agricultural products fluctuates greatly, which increases the possibility of farmers defaulting. Moreover, the lack of farmers' self-fulfillment due to moral hazard has also made banks reluctant to extend credit facilities to rural areas, which also increased the credit constraints of farmers to some extent. And the reasons for the constraints on farmers' credit are also related to the social environment. There is a lack of third-party supervision and reward and punishment mechanisms to reduce the default costs of farmers in practice.

However, it's important to highlight that farmers' credit constraints may not be caused by the supply side alone. In fact, rural households often faced demand-side constraints. First, as small producers, farmers have little to do against climate variability. The risk averse nature of farmers may result in farmers' credit constraints and lessen their overall welfare. Second, because searching for and processing information can be costly, and the farmers' low ability to obtain information has led to weak access to relevant information. As a consequence, household in rural areas are not able to enjoy the benefits brought about by credits.

2.2. Analysis of the mechanism of farmers cooperatives on the ease of farmers' credit constraints

It can be hypothesized that cooperative membership would influence farmer' credit constraints through a number of channels. First, it is said that farmers can establish cooperative relationship with government agency and other economic entities through cooperative memberships. Moreover, according to the collective action theory, the uncooperative behaviour within cooperative memberships will be detected in time, after the farmer receives a loan, the potential supervision within membership can effectively monitor the use of funds. Therefore, the unique reputation within the cooperative can be approximated as a

collateral, which increases the trust between financial institutions and farmers. Therefore, compared with non-members, formal financial institutions are more willing to lend to members.

Second, farmer cooperatives can improve farmers' social capital. As a form of capital, social capital is widely thought as a substitute for collateral that can ease credit constraints. For example, Grootaer finds that social capital is positively correlated with household credit availability in rural Indonesia^[15]. In rural areas, in addition to obtaining loan funds from formal financial institutions, informal borrowing are traded among their social networks such as friends and relatives. Unlike the formal financial institution, private loans rely more on the support of social networks. Hence, farmers need to invest on social capital to increase the chances to obtain access to informal credits. Farmer cooperatives are a special organization based on social networks, Chloupkova *et al* (2003) even regarded cooperatives as agents of social networks^[14]. Farmers can improve their social capital by becoming members of farmer cooperative.

Third, as a focal point for rural information networks, farmer cooperatives can timely convey government information to farmers, and members can obtain rich external information. Smallholder farmers have less information about the credit markets and are usually in a weak position to negotiate with the financial institutions. This leads to higher transaction costs, which may negatively affect famers' participation in credit markets. Transaction costs caused by information asymmetry can be economized by farmer cooperatives^[10], because members can share their own information to each other. Therefore, the participation of farmers in cooperatives can reduce the transaction costs caused by the problem of information asymmetry.

3. DATA AND EMPIRICAL FRAMEWORK

3.1. data

The data used in our study were collected by College of Economics, Sichuan Agricultural University from July to September in 2019, and 8 counties in Sichuan Province were selected as the investigation area (Tongchuan, Dazhu, Quxian, Luoyang, Deyang, Yibin, Luzhou and Bazhong), because they are major regions in the production of grain in Sichuan province due to the fact they are endowed with relatively favourable climatic conditions. From each of our 8 sample counties, we selected 4-5 farmer cooperatives randomly. A total of 327 cooperative members were interviewed and they form the treatment group in the study sample and 296 non-members were chosed in our study.

3.2 variable selection

1. Dependent variables: The outcome variables used in the study is a dummy variable, the value of one, if the household are credit constrained, and the value zero otherwise.
2. Independent variable: The dependent variable used in the study is also a dummy variable that takes the value of one, if the household belonged to an agricultural cooperative, and the value zero, if no cooperative membership was recorded.
3. Control variables: Based on previous studies, this article selects the sex of the head of household; age; marital status; number of siblings in the family; whether party members ; education level; family size; The characteristics of farmer production and operation such as being able to access the Internet are used as control variables. Descriptive statistics of specific variables are shown in Table 1

3.3 Descriptive results

A simple cross-tabulation of the key variables allows us to compare the household characteristics between the cooperative members and non-members. A few interesting findings are worth to highlight here. First, we note that the credit constraints faced by non-members are significantly higher than non-members (0.43VS0.35).Second, the cooperative members' education is higher than non-members. Third, the cooperative members use smartphones more than non-members. These significantly different findings of household characteristics variables between cooperative members and non-members tend to support the fact that participation in farmer cooperatives is a self-selection process.

Table 1 Descriptive results

Variables	Description	All	Members	Non-members	difference	Test for diff
<i>constraint</i>	1 if the farmer is credit constrained, 0 otherwise	0.39	0.35	0.43	-0.08	***
<i>Sex</i>	1 if the head of household is male, 0 otherwise	0.91	0.88	0.93	-0.05	
<i>age</i>	Age of the farmer(years)	56.92	54.33	58.53	-4.2	
<i>married</i>	1 if the farmer is married, 0 otherwise	0.92	0.89	0.93	-0.04	
<i>siblings</i>	Farmers' siblings	3.34	3.42	3.28	0.14	
<i>political</i>	1 if the farmer is a party member, 0 otherwise	0.06	0.08	0.05	0.03	
<i>edu</i>	maximum education level of household members(years)	4.89	5.12	4.52	0.6	***
<i>hhsiz</i>	household size	4.03	4.33	3.68	0.65	
<i>internet</i>	1 if the farmer use a smartphone, 0 otherwise	0.79	0.83	0.76	0.07	***

Note: *, **, and *** indicate that they are significant at the significance level of 10%, 5%, and 1%

3.4 the model setting

In order to confirm the hypothesis of this article, the Probit model is used to investigate the impact of farmer cooperative on farmers' credit constraints. Model (1) is set as follows:

$$P_i(Y_i = 1|X_i) = \Phi(\alpha + \beta X_i + \gamma Z_i) \quad (1)$$

In the formula (1), $Y_i = 1$ indicates that the farmer i is subject to credit constraints; $Y_i = 0$ means that the farmer i is not subject to credit constraints. X_i is the core explanatory variable of the model; Z_i is the control variable of the model.

4. EMPIRICAL RESULTS

Using Stata 15.0, the Probit model was used to empirically test the research hypothesis in this paper. The likelihood ratio is 128.35, and it passed the significance test at the

level of 1%. In order to test the robustness of the estimated results, the ols model and the marginal effect model were used for regression. The significant variables in the effect model are basically consistent with model (1), so the results of model (1) are robust.

The regression results in Table 2.shows that farmer cooperatives has a significant negative impact on members credit constraints, that is, joining the cooperatives can significantly ease the farmers' credit constraints. At the same time, it can be seen that the higher the level of farmers' education, the lower the probability of being subjected to credit constraints. In other words, the more educated farmers are, the more willing they are to learn about credit information and increase their expectations of credit demand. Therefore, education can significantly ease the credit constraints faced by farmers. In addition, the use of the Internet has greatly eased the credit constraints of farmers. This is because if farmers have more access to the Internet, they can know more information about finance and credit.

Table 2 Regression results of the impact of farmer cooperatives on farmers' credit constraint

<i>variables</i>	<i>Probit(1)</i>	<i>Margins(2)</i>	<i>Ols(3)</i>
<i>membership</i>	-0.9592*** (0.1276)	-0.2846*** (0.0335)	-0.3178*** (0.0398)
<i>sex</i>	-0.1139 (0.2193)	-0.0338 (0.0651)	-0.0202 (0.0652)
<i>age</i>	0.0519 (0.0405)	0.0154 (0.0120)	0.0154 (0.0136)
<i>married</i>	0.0656 (0.2497)	0.0195 (0.0741)	0.0046 (0.0715)
<i>siblings</i>	-0.0219 (0.0391)	-0.0065 (0.0116)	-0.0072 (0.0113)
<i>political</i>	0.2983 (0.2587)	0.0885 (0.0763)	0.1108 (0.0725)
<i>edu</i>	0.1462*** (0.0270)	0.0434*** (0.0075)	0.0452*** (0.0075)
<i>hhsiz</i>	-0.0288 (0.0524)	-0.0086 (0.0155)	-0.0106 (0.0154)
<i>internet</i>	-0.3996*** (0.1461)	-0.1186*** (0.0426)	-0.1233*** (0.0452)
<i>constant</i>	-2.4984**	-0.5672	-0.2196
<i>Pseudo r2</i>	0.216	0.2077	0.2600
<i>observations</i>	623	623	623

Note: *, **, and *** indicate that they are significant at the significance level of 10%, 5%, and 1%, respectively, and the standard errors in brackets () are robust standard errors

5. CONCLUSION

This paper focuses on the role of farmer cooperatives on farmers' credit constraints. Our study contributes to the large literature on farmers' cooperatives in rural China by focusing on the effects of farmer cooperative on farmers' credit behaviour. Taking the collected data from both members and non-members from main paddy production province in China, we rigorously evaluate the impact of cooperative membership on farmers' credit constraints. The findings from this study show that farmers cooperatives play a positive and significant roles in easing farmers' credit constraints and farmers' access to internet tend to relax their credit constraints. Therefore it is necessary to promote the healthy development of farmers' cooperatives and the government should guide farmers' cooperatives to provide members with more practical services. In addition, it's important for members to strengthen cooperation and enhance trust and cohesion with other members to increase their social capital. More importantly, farmer cooperatives should strengthen the communication and cooperation with financial institutions to help members relax the credit constraints. Moreover, government should improve rural internet routing infrastructure to improve the access to internet, which could provide farmers with more information.

ACKNOWLEDGMENT

This work was supported by National Students' innovation and entrepreneurship training program (20190626038)

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