



# Smallholder participation in the land rental market in a mountainous region of Southern China: Impact of population aging, land tenure security and ethnicity



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## ABSTRACT

Rural land rental markets in China play an increasingly important role in the transformation of the agricultural sector. This study focuses on the rural land rental market in the Xishuangbanna Dai Autonomous Prefecture in Southern China, a mountainous region, where rapid changes in land use have taken place with the transition from traditional agriculture and a tropical rainforest to rubber monoculture. Notably, we assess the impacts of population aging, land tenure security, and ethnicity on the participation of smallholders in the land rental market. The analysis suggests that a higher proportion of older people in a household increases the likelihood of renting out land and reduces the probability of renting in land, implying that population aging fosters land rental market development by transferring land from older to younger farmers. We also confirm that the availability of a land tenure certificate has a significant and positive impact on the renting out of land. Furthermore, ethnic minority groups are less likely to rent out land, indicating that land rental markets are ethnic sensitive. Additionally, specialization in rubber farming, household wealth and the altitude of household location also influence participation in the land rental market.

## 1. Introduction

Rural land rental markets in China play an increasingly important role in the transformation of the agricultural sector in the context of urbanization and societal aging. Better off-farm income possibilities in urban areas are strong incentives, especially for the rural youth to take up non-farm employment (Wang et al., 2011a), and hence the rural land rental market is gaining momentum (Huang et al., 2012). Furthermore, population aging in rural China makes it necessary to facilitate land transactions from the households lacking a labor force to those with surplus labor. To facilitate land transactions in rural China, the development of a land rental market is important. The study of Deininger and Jin (2005) conducted in China showed that the rural land rental market has a positive impact on land access by redistributing land to those with higher agricultural potential. Since the promulgation of the legislation known as the “Rural Land Contract Law” in 2002, rural land reallocation in China has become more complicated. Given this context, land rental markets in rural China are now a more important means of land redistribution compared to the administrative reallocation processes (Deininger and Jin, 2005).

Previous studies found that the development of rural land rental

markets in China could have positive growth and productivity effects without necessarily jeopardizing equity (Tan et al., 2006; Jin and Deininger, 2009; Feng et al., 2010). As demonstrated by Deininger and Jin (2005), the emergence of the land rental market can be beneficial to poor producers provided they have abundant labor endowments. It can also help to reduce land fragmentation to some extent, one of the major constraints to technological advancement in Chinese agriculture (Tan et al., 2006). By allowing a more efficient use of unused land, the participation of farmers in land rental markets can also increase agricultural output (Jin and Deininger, 2009). Empirical evidence from southeastern China suggests that land rental markets significantly contribute to higher rice production (Feng et al., 2010). Considering the growing food demand and limited land resources in China, a well-functioning rural land rental market is important for enhancing the efficiency of land allocations and thereby, contributing to the growth of agricultural output (Kimura et al., 2011).

The advantages of a well-functioning rural land rental market have also gained recognition at the policy level in China. Recently, the Chinese central government encouraged the establishment of land markets where farmers can “subcontract, lease, exchange, or swap” land-use rights (Wang et al., 2011b). Policy documents also clearly state

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that farmers should strive to rent land to increase farm size and improve efficiency and labor productivity (Huang et al., 2012).

To establish a well-functioning rural land market, an important precondition is to guarantee land tenure security (Deininger and Feder, 2001; Deininger et al., 2003; Lunduka et al., 2009; Holden et al., 2011). In many areas where individual land rights are not yet well specified, the risk of losing the rights of rented-out land can be a major constraint on land rental transactions (Otsuka and Place, 2001). In China, land tenure security improved after the government introduced a long-term certificate for land tenure under the “Rural Land Contract Law” promulgated in 2002. For instance, the Chinese central government established a fixed 30-year certificate for farmland tenure (Wang et al., 2011b). A new round of forest tenure and institutional reforms has also been undertaken in China; the duration of forestland held by individual households can last up to 70 years, and the forestland tenure certificate can be renewed upon maturity (Yin et al., 2013).

However, to date, there is still a lack of quantitative studies in China that could provide empirical evidence of the impact of land tenure security on the development of the rural land rental market, although there are numerous studies that discuss various perspectives of land tenure (Li et al., 1998; Kung, 2000; Liu, 2001; Brandt et al., 2002; Deininger and Jin, 2003; Ma et al., 2013; Qin and Xu, 2013; Robinson et al., 2014), as well as several studies on the development of rural land rental markets (Yao, 2000; Deininger and Jin, 2005; Huang et al., 2012). An exception is the study of Jin and Deininger (2009), which found that the possession of land certificates had no significant impact on participation in land rental markets. Hence, it remains unclear whether improving land tenure security can facilitate farmers’ access to the land rental market in rural China.

In this study, we focus on the rural land rental market in the Xishuangbanna Dai Autonomous Prefecture (XSBN) in Southern China. This is an interesting case in several regards. First, XSBN is a mountainous region where rapid changes in land use have taken place with the transition from traditional agriculture and a tropical rainforest to rubber monoculture (Zhang et al., 2015); thus, land tenure questions are more complex than for ordinary farm lands. Second, until recently, extreme poverty was widespread in this region, but significant improvements have been achieved among smallholder farmers following the introduction of rubber (Fu et al., 2010) and therefore, equity issues involved in land use rights have become increasingly important. Third, XSBN is a minority autonomous region with a high degree of cultural diversity including several indigenous ethnic minorities such as Dai, Hani, Bulang, and others. It will be interesting to determine whether there are differences in land rental market participation between ethnic minorities and the Han majority.

In our analysis, we aim to investigate the behavior of smallholder rubber farmers with respect to participation in the local land rental market. In particular, we focus on two factors: (1) the effect of land tenure security on farmers’ participation in the local land rental market and (2) the role of population aging, i.e., to what extent a farm household’s age structure influences its decision to engage in land rental markets. The data used in this study were obtained from a cross-sectional survey of 612 smallholder rubber farmers in XSBN carried out in 2013. In this comprehensive survey, we collected detailed information, including land use history, natural land conditions, current land tenure status, land productivity, farm and off-farm activities as well as demographic characteristics of the individual member of the households.

To achieve our objectives, we developed two types of econometric models. First, a bivariate probit regression was developed to test the possible correlation between equations pertaining to the renting out and the renting in of the land. Second, an endogenous switching probit (ESP) model was employed to control for the possible endogeneity of the land tenure certificate to explain farmers’ participation in the land rental market due to the consideration that land rental behavior without clear land tenure in previous years may cause conflicts and

thereby affect the current issuance of land tenure certificates. The ESP model also can test and control for the potential selection bias of land tenure certificates caused by certain unobserved factors during the cross-sectional survey. Based on the estimation results of the ESP model, a counterfactual analysis was further conducted.

The results of our econometric models showed that households with a higher share of older people were more likely to participate in the land rental market, while the availability of a land certificate was a significant factor in facilitating participation in the land market. Hence, population aging and issuing of land tenure certificates can foster a rural land rental market in general. However, this is difficult to establish in an ethnic minority region because minorities tend to rent out less land. Although this study is limited to XSBN, the findings can contribute to a better understanding of land rental market development in rural China.

The rest of this paper is organized as follows. In Section 2, a conceptual framework related to farmers’ participation in the land rental market is developed. Section 3 briefly introduces the study area and the data collection procedure. Descriptive statistics are presented in Section 4. Section 5 describes the empirical models developed to assess the likelihood that smallholders will rent out or rent in land. In Section 6, we report and discuss the results of our models. The last section consists of a summary and conclusions.

## 2. Conceptual framework

Following a household model of agricultural production and land rental market participation (Deininger and Jin, 2005; Jin and Deininger, 2009), we develop a conceptual model here to capture the determinants of a farmer’s participation in the land rental market.

Suppose the  $i^{\text{th}}$  household’s decision problem is to choose the land to be farmed ( $A_i$ ), the amount of labor allocated to farming ( $l_{ia}$ ) and the allocation of household labor for wage employment ( $l_{io}$ ). This can be written in the following equation:

$$\text{Max}\{pf(a_i, l_{ia}, A_i) + wl_{io} - I^{in}_i[(A_i - \bar{A}_i)(r + TC^{in}_i)] + I^{out}_i[(\bar{A}_i - A_i)(r - TC^{out}_i)]\} \tag{2.1}$$

$$\text{s.t. } l_{ia} + l_{io} \leq \bar{L}_i \tag{2.2}$$

where  $\bar{A}_i$  and  $\bar{L}_i$  are the fixed amounts of land and labor endowments, respectively, of the  $i^{\text{th}}$  household, while  $a_i$  is a given agricultural ability assumed to be affected by the endowment of household characteristics;  $f(a_i, l_{ia}, A_i)$  is an agricultural production function;  $p$  denotes the price of agricultural goods;  $w$  is an exogenous wage rate for  $l_{io}$ ; and  $r$  is a competitive rental rate for land.  $I^{in}_i$  and  $I^{out}_i$  are indicators for the renting in ( $I^{in}_i = 1$  for rent in or 0 otherwise) and the renting out ( $I^{out}_i = 1$  for rent out or 0 otherwise), respectively, of land.  $TC^{in}_i$  and  $TC^{out}_i$  are the respective transaction costs for the renting in and the renting out of land and can be assumed to be proportional to the amount of land transacted.

Through solving the above maximization problem, we can derive the two equations for the renting in and the renting out of land as follows:

$$I^{in}_i = f(\bar{L}_i, l_{ia}, l_{io}, \bar{A}_i, a_i, TC^{in}_i, TC^{out}_i, w, r) \tag{2.3}$$

$$I^{out}_i = f(\bar{L}_i, l_{ia}, l_{io}, \bar{A}_i, a_i, TC^{in}_i, TC^{out}_i, w, r) \tag{2.4}$$

Assume  $w$  and  $r$  are consistent for all local farmers.  $TC^{in}_i$  and  $TC^{out}_i$  are different because only landlords have to face the risk of land loss; hence  $TC^{in}_i$  could be assumed to be consistent for all local farmers, while  $TC^{out}_i$  is also associated with land tenure security, which could be represented by the status of the land tenure certificate ( $C_i$ ). The labor variables ( $\bar{L}_i, l_{ia}, l_{io}$ ) could be represented by the household size ( $H_i$ ), demographic structure ( $D_i$ ) and wage employment ( $W_i$ ).  $a_i$  is assumed to be determined by a vector of household characteristics ( $Z_i$ ). Thus, by incorporating  $H_i, W_i$  and  $\bar{A}_i$  into the vector of  $Z_i$  and separating ethnicity

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