



# The impact of rural laborer migration and household structure on household land use arrangements in mountainous areas of Sichuan Province, China



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## ARTICLE INFO

### Keywords:

Land arrangement  
Land transfer  
Land abandonment  
Labor migration  
Sichuan province  
China

## ABSTRACT

Rural household land arrangements under different household divisions of labor were investigated in Sichuan Province, a typical mountainous area of Western China. Survey data were used to construct multinomial logistic regression models of the relationships between the attributes of land plots, farmers' households, and land arrangement behaviors. In this study, (1) a total of 1839 land plots available to 240 farmers were sampled. Among these, 79.61%, 15.88% and 4.51% were cultivated, transferred or abandoned, respectively. (2) There are significant correlations between farming household structure and migration income, as well as land arrangement behaviors. Specifically, the more laborers (*Labor*) there are, the higher the ratios of farming laborers (*Agriculture*) and part-time laborers to laborers (*Pluriactivity*), greater numbers of elderly individuals aged 64 + engaged in household agricultural production (*Old*), the greater the possibility that farmers would choose family farming. The higher the ratio of migrant labor income to total household income (*Ratio*), the greater the possibility that farmers would choose land transfer or land abandonment. The higher the ratio of non-agricultural laborers to the laborers (*Non-agriculture*), the greater the possibility that farmers would choose land transfer. This study furthers our understanding of rural household land arrangement behaviors in mountainous areas in the context of China's unique land rights system and high rates of labor migration.

## 1. Introduction

The household contract responsibility system, which was implemented in the early 1980s, is a land rights system unique to China. Under this system, land belongs collectively to the village, and farmers have the right to contract and manage the land. In the implementation of this land rights policy, the government carried out random land allocations according to family size and land quality. This land allocation method greatly stimulated farmers' enthusiasm for production, resulting in great improvements in land production efficiency. However, it also led to land becoming fragmented and scattered. In order to maintain the stability of land contracts, the government and farmers signed a second round of land contracts in 1998, in which it was clearly stated that farmers had a 30-year land management right. In 2002, the government issued the Rural Land Contracting Law, which allowed farmers to transfer their land management rights in order to improve land use efficiency and ensure food security. China's No.1 Central Document for 2013 clearly pointed out that it is necessary to guide the

orderly transfer of rural land contract management rights, encourage and support the transfer of the contracted land to the leading specialized households, family farms and farmers' cooperatives and develop various forms of moderate scale management. Since then, in China's No.1 Central Document for each year and No. 1 Documents of many provinces and autonomous regions, as one of the key contents, the moderate scale management has been expounded separately, and it is considered that the moderate scale management is one of the effective ways to change the traditional land use patterns in rural areas, realize the urban-rural integration and narrow the income gap between urban and rural areas.

Concurrent with the implementation of the household contract responsibility system, China underwent many other political and economic reforms in the early 1980s, which stimulated the national economy. The first wave of a "tide of migrant workers" appeared in China between the late 1980s and early 1990s. After this period, increased numbers of laborers sought work away from home, and the composition of farmers' household incomes changed (Xu, Zhang, Rasul

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et al., 2015; Xu, Zhang, Xie et al., 2015). Nationwide, the total number of rural laborers engaged in non-farm work reached 269 million in 2013. Among these workers, 166 million (61.71%) were migrant workers (CNSB 2014a). Additionally, incomes earned by farmers in 2013 accounted for 43.17% of the net income of rural households, which represents an increase of 22.94% since 1990 (CNSB 2014b).

China's unique land system and the increasing numbers of young laborers engaged in work has resulted in changes in rural household land arrangement behaviors. Many villages have suffered, to different degrees, due to land transfers and land abandonment (Chen, Ye, Cai, Xing, & Chen, 2014; Liu & Li, 2006; Liu, Wang, Cheng, Zheng, & Lu, 2016; Long, 2014; Long, Tu, Ge, Li, & Liu, 2016; Xie & Jiang, 2016; Yan et al., 2016; Zhang, Li, & Song, 2014), and "hollow villages" and housing abandonment are springing up (Chen et al., 2014; Gao et al., 2017; Li, Wu, Huang, Sloan, & Skitmore, 2017; Liu, Liu, Chen, & Long, 2010; Long, Li, Liu, Michael, & Zou, 2012). At the end of 2014, the area of household contract farmland transferred was 403 million mu, accounting for 30.4% of the household contract management farmland area in China. During this time, 58,330,000 rural households (representing 25.3% of the total number of household contracts) transferred contracted farmland to other farmers ([http://www.gov.cn/xinwen/2015-08/27/content\\_2920879.htm](http://www.gov.cn/xinwen/2015-08/27/content_2920879.htm)). There are no official statistics to indicate how much land is currently abandoned in China, but small studies in several regions have suggested that land abandonment is widespread, especially in rural mountain areas (Yan et al., 2016; Zhang et al., 2014). Yan et al. (2016) systematically reviewed the empirical research relating to land abandonment in China from 1993 to 2015, and found that the median reported land abandonment ratios for the eastern, central, and western regions were 5.62%, 5.70%, and 4.00%, respectively. In China, conflicts between people and land use have always been prominent (Xie & Jiang, 2016; Xu, Zhang, Rasul, Liu, Xie, & Cao, 2015; Xu, Zhang, Xie, Liu, & Cao, 2015). China has only 9% of the planet's land area with which to feed 22% of its population. The mountainous areas are restricted by their location and difficult terrain, which inhibits economic development. The high numbers of migrant laborers, the increased laborer workforce, and changes in the composition of farmers' household incomes, have all contributed to different land arrangement behaviors in mountainous areas. In order to ensure food security and improve land use efficiency, it is necessary to systematically review current rural household land arrangement behaviors in mountainous areas, and identify their drivers.

From the existing research, it is indicated that the academic circles' research on land use patterns in the context of urbanization (namely under the background of the massive outflow of labor force driven by economic interests) is mainly concentrated in the mesoscopic and macroscopic scales (Li et al., 2017; Peng, Liu, & Sun, 2016), focusing on the dynamic changes of land use patterns of rural settlements (Cao, Bai, Sun, & Zhou, 2017; Tian, Qiao, & Gao, 2014; Zhu, Zhang, Li, & Zhu, 2014), land use conflicts between rural and urban areas (Gao & Ma, 2015; Shan, Yu, & Wu, 2017), urban land use (Shi & Yang, 2015; Yan, Bauer, & Huo, 2014; Yan, Ge, & Wu, 2014), etc., whereas the studies systematically focusing on farmers' land use patterns under the background of the massive outflow of labor force from the microscopic scale are fewer. From the micro scale of peasant households, under China's unique land system, there are three main methods of land arrangement, namely: family farming, land transfer and land abandonment. However, in existing empirical studies, scholars have focused on farmers' individual land arrangement behaviors, especially land transfers (e.g., Yan, Bauer et al., 2014; Yan, Ge et al., 2014; Zhang & Qian, 2014) and land abandonment (e.g., Yan et al., 2016; Zhang et al., 2014), and few studies have examined family farming characteristics (Xie & Jiang, 2016). In empirical studies looking at the drivers of rural household land arrangement behaviors, scholars have primarily selected indicators based on data from rural households (e.g., Li, Yan, Hua, Xin, & Li, 2014; Mullan, Grosjean, & Kontoleon, 2011; Nguyen, Nguyen, Lippe, & Grote, 2017; Tan, Heerink, & Qu, 2006; Xie & Jiang, 2016), and

few studies have focused on the impact of land plot attributes (Sikor, Müller, & Stahl, 2009; Yan et al., 2016; Zhang et al., 2014). Existing studies have focused on correlations between the labor migration of individuals aged 16–64 years (focusing on migration income and migration distance) and rural household land arrangements (such as land transfers and land abandonment), ignoring the social reality that numerous elderly individuals aged 64 years or older are still engaged in agricultural production in rural China. Few studies have theoretically and systematically reviewed rural household land arrangement behaviors under different types of farming household divisions of labor, nor explored their relationships empirically (while considering laborers and elderly individuals of 64 + years). Farmers' different land arrangement behaviors are the result of the divisions of labor that farmers conduct in order to maximize family earnings. Migrant labor income is the leading contributor to the maximization of income, whereas household costs are closely related to the attributes of the land plots.

Based on land plots and a rural household survey conducted in Sichuan Province, this study investigates farmers' household structures using indicators based on land plots and rural households. While controlling for land plot attributes and other household characteristics, this study addresses the following three questions:

- (1) What are the relationships between farmers' labor resource allocations (the ratios of agricultural, part-time and non-agricultural laborers to household laborers) and land arrangement behaviors?
- (2) What are the relationships between elderly individuals (aged 64 + years) engaged in agricultural production and rural household land arrangement behaviors?
- (3) What is the relationship between the ratio of migrant labor income to gross income and rural household land arrangement behaviors?

## 2. Theoretical analyses

China's unique land system and the young laborer workforce requires farmers to continuously adjust their household divisions of labor and land arrangement methods, in order to achieve maximum family farming income. There are three common land arrangement methods: family farming, land transfer and land abandonment. Farmers' different divisions of labor and land arrangement methods correspond to different benefits and costs. This can be represented by:

$$NP_{ij} = TR_{ij} - TC_{ij} \quad (1)$$

$$TR_{ij} = FR_{ij} + (OUTRENT_{ij} - INRENT_{ij}) \quad (2)$$

$$TC_{ij} = FC_{ij} + (OC_{ij}^1 + OC_{ij}^2) + TRC_{ij} \quad (3)$$

Where  $i$  is the number of individual migrant workers;  $j$  represents family farming, land transfer, and abandonment; and  $TR$ ,  $TC$ , and  $NP$  represent total revenues, total costs, and net profits from land arrangement decisions, respectively.  $TR$  has two components, namely  $FR$  and  $RENT$  (Formula 2):  $FR$  is the economic value of agricultural output from the land, and  $RENT$  is the rental income of farmers' land transfer. Variable  $TC$  consists of  $FC$ ,  $OC^1$ ,  $OC^2$  and  $TRC$  (Formula 3), where  $OC^1$  refers to the non-agricultural income sacrificed by families of migrant workers for land farming,  $OC^2$  refers to the sacrificial non-agricultural income of part-time laborers' choosing farming, and  $TRC$  is the transaction cost incurred in the transfer of contracted land.

This study systematically reviews the possible land arrangement methods adopted by farmers in mountain areas and the corresponding benefits and costs under different population resource allocations from the perspective of farmers' household structures. Specifically:

- (1) All rural laborers go out to work. The land arrangement methods and corresponding benefits and costs can be subdivided into the following two groups:
  - (i) In addition to laborers, there are no family members engaged in

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