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Research on the Impact of Land Circulation on the Income Gap of Rural Households: Evidence from CHIP

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Abstract: With the continued development of the economy, the income gap among Chinese rural households continues to widen. The land system plays a decisive role in developing “agriculture, rural areas and farmers” and land circulation is a factor in the increase in income inequality among farm households. Based on the 2013 China Household Income Project (CHIP), this article used the re-centered influence function (RIF) regression method to empirically test the impact of rural land circulation on the income gap of rural households in China in three regions: the central, eastern and western regions. The quantile regression tested the impact mechanism of income inequality of rural households from the perspective of labor mobility and land circulation. The empirical results showed that land circulation increases the income inequality of rural households. The theoretical mechanism test proved that the dynamic relationship between land circulation and labor mobility increases rural household income. However, this increase has a greater effect on rural households with a high income and a small effect on rural households with a low income, resulting in a further widening of the income gap. Therefore, while increasing the income of rural households through land circulation, the government should also consider income equity. Finally, this article puts forward the policies and opinions on land reform and provides a brief discussion on the future direction of development.

Keywords: land circulation; income gap; rural households income; re-centered influence function; quantile regression



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1. Introduction

Since the founding of New China, Chinese farmers have experienced changes in farmland, agricultural management and farmland property rights systems. With the implementation of the rural revitalization strategy, the development of urban and rural areas has been coordinated, reforms have been comprehensively deepened, and farmers' incomes have continued to increase. However, this increase in income has also been accompanied by a continuous expansion of the income gap within rural areas. The “Report on the Development of Rural Households in China (2018)” posited that rural household income inequality is rising in China. The Gini coefficient increased from 0.45 in 2011 to 0.535 in 2017, significantly higher than the internationally recognized warning line of 0.4 [1]. Figure 1 shows the Gini coefficient and Theil index estimated from quintile data of the per capita disposable income of rural households. These data came from the “China Yearbook of Household Survey” from 2005–2019.

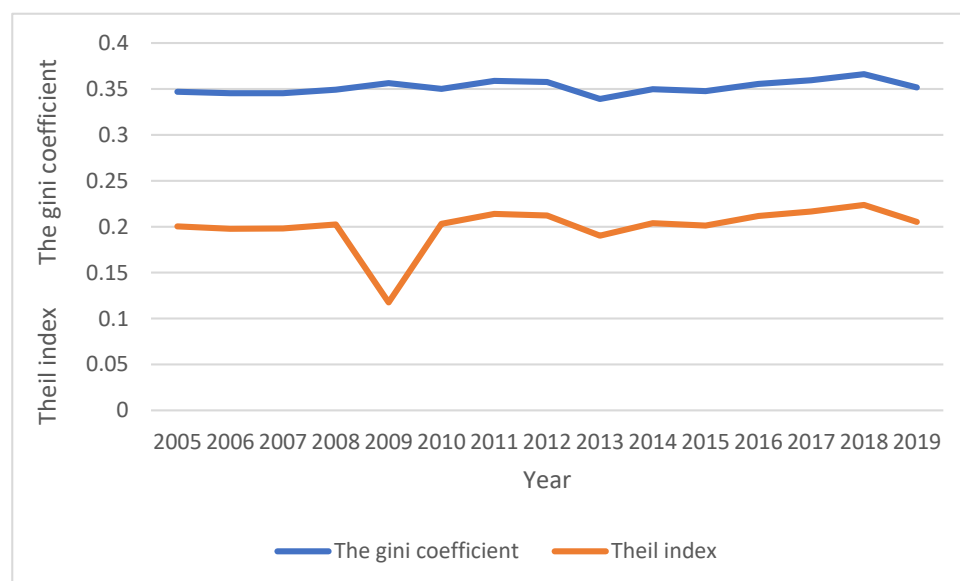


Figure 1. The Gini Coefficient and Theil Index of Per Capita Disposable Income of Rural Households in China from 2005 to 2019. Note: the data comes from the compilation and calculation of the Chinese Household Survey Yearbook.

It can be seen from Figure 1 that the Gini coefficient of rural household income has risen steadily, and the Gini coefficients calculated by quintile subgroups exceed 0.35, with a higher rise in the Theil index. In 2019, the Gini coefficient and Theil index declined slightly. China continues to explore a reform of the rural system, but the transformation of the rural economy has taken too long to exceed people's expectations. There have been twists, stagnations, and even deviations in the reform process. Although this slow economic transformation avoids the risk of economic and social disorder, it has also gained time for the formation and growth of interest groups. With a lag of political reforms, economic transformation has become the eternal theme of "always on the road". This unbalanced transformation path is fully reflected in the field of income distribution. Although the income of rural households continues to increase, the income gap within rural areas continues to widen, as does the income gap between urban and rural areas. There have been strange phenomena such as the intertwining of reasonable and unreasonable income gaps and the coexistence of open and transparent distribution models and hidden distribution mechanisms. In contrast, inequality in rural areas restricts economic development, reduces the welfare generated by increased incomes, and affects social stability.

There are many reasons for income inequality among rural households. Existing research mainly explores the physical capital, human capital and social capital owned by rural households. The land system plays a decisive role in the development of "agriculture, rural areas and farmers". The household contract responsibility system was implemented at the beginning of the founding of New China. Although it has greatly increased the enthusiasm of households' production, the government strictly prohibits the sale of land use rights. In recent years, the circulation system of land contract rights has become increasingly stable, and the government has liberalized the land circulation system. The process of urbanization and industrialization has accelerated, many rural laborers have flowed into cities and towns, and the relationship between people and land has been continuously adjusted. Figure 2 shows the change process of the land circulation scale in China from 1984 to 2014.

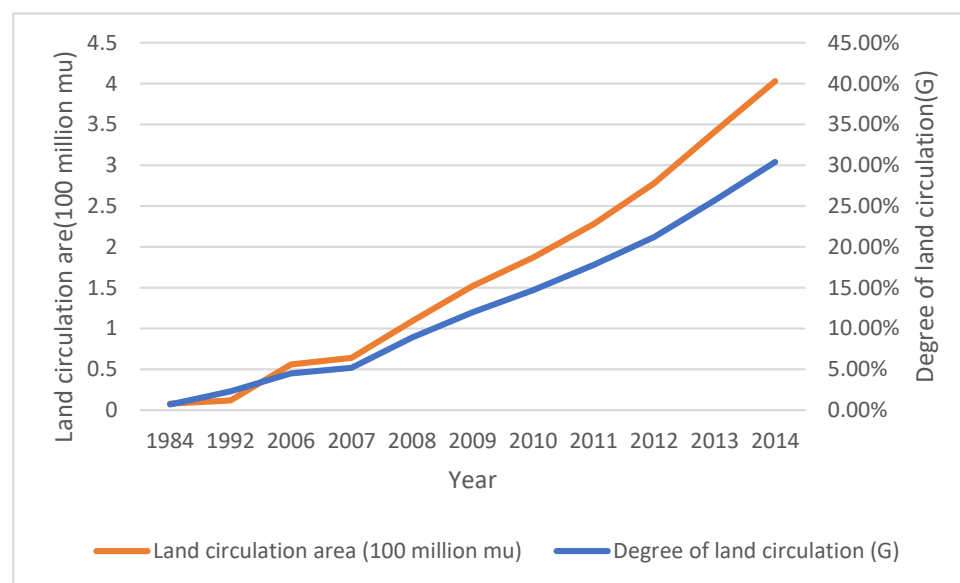


Figure 2. The scale of land circulation in China from 1984 to 2014. Note: calculated according to the annual statistical report of China’s rural policies and reforms and the statistics of the Ministry of Agriculture, where the degree of land circulation is the proportion of the circulation land area to the total cultivable land area.

As shown in Figure 2, in 1984, the degree of land circulation was less than 1% in China. In 2003, the “Contracting Law” clarified, for the first time, the specific measures for the circulation of land management rights to protect said rights. This figure has grown rapidly, and by 2012 this figure exceeded 10%. In 2014, the land circulation area was 403 million mu. According to the published data in the “Statistical Annual Report on China’s Rural Policies and Reforms (2019),” the area of rural land circulation accounted for 35.9% of the total area of contracted land in China in 2019 [2]. The substantial increase in the area of land circulation is reshaping the pattern of rural income. Households who have transferred into land carry out large-scale production and reduce land fragmentation. The young and middle-aged farmers who have transferred out their land choose non-agricultural operations and migrant workers, and their income is also increasing. The increasing scale of land circulation has reshaped the new pattern of rural man–land relationships, changed the original distribution pattern of land, reconstructed farmers’ livelihood modes, and directly affected the income distribution of rural households.

China is currently in the process of a “hidden agricultural revolution”. Population pressure has caused the per capita arable land in rural areas to steadily decline, so that it is difficult for farmers to maintain their livelihoods; as such, they must rely on auxiliary labor to meet their normal living needs. The increase in non-agricultural employment in rural areas is conducive to increasing the income of rural households. At the same time, with the advancement of new urbanization, the scale of land circulation has become larger and larger, which has promoted the large-scale development of agriculture. Therefore, discussing the effects of land circulation and labor mobility on the income inequality of rural households and comprehensively grasping the income distribution effects of land system reform can help to better promote the integration of urban and rural areas and realize the strategy of rural revitalization. This article attempts to answer two questions: first, does land circulation further widen the income inequality of rural households? Second, how does land circulation affect the income inequality of rural households?

The remainder of this paper is arranged as follows: Section 2 introduces the institutional background of land circulation and summarizes relevant literature; Section 3 discusses the impact mechanism of land circulation on the income inequality of rural households; Section 4 uses the data from the 2013 China Household Income Project (CHIP) to empirically analyze the impact of land circulation on the income gap of rural households,

and to test its theoretical mechanism; Section 5 summarizes the conclusions and provides recommendations, and looks forward to future research directions.

2. Institutional Background and Literature Review

2.1. Institutional Background

The prerequisite for land circulation is that rural households have the legal right to transfer. Before China's reform and opening up, a collectivized rural land system was implemented, but this method greatly inhibited farmers' enthusiasm for production, resulting in extremely low agricultural productivity. After the reform and opening up in 1978, China began to implement the household contract responsibility system, which greatly increased the enthusiasm of farmers [3]. The property rights system of agricultural land in China has realized the "separation of the two rights," and the full collection of land property rights has come under collective ownership. In the "Minutes of the National Rural Work Conference" in 1982, the sale and lease of land was explicitly prohibited. In 1984, the national government proposed that "the right to land contracted management remains unchanged for 15 years." With the circulation of rural labor and the increase in non-agricultural business practices, the separation of the contracting and management rights of agricultural land became more serious. In 1993, the law began to recognize the separation of land contracting and management rights, allowing the paid circulation of land use rights. In 2003, the "Contracting Law" was introduced to clarify the specific measures for the circulation of land management rights. By 2005, land circulation rights accounted for 5%–6% of the contracted arable land area, and the figure even reached 8%–10% in developed coastal areas. With the rapid development of China's economy and the acceleration of urbanization, many young and middle-aged people from rural areas flocked to cities, further stimulating land circulation. According to statistics from the Ministry of Agriculture, the total area of contracted arable land was 228 million mu in China in 2011, accounting for 17.8% of the household contracted land area.

After preliminary exploration, the Ministry of Agriculture issued "Opinions" in 2011, and gradually began a nationwide pilot project on land right confirmation and registration. In 2014, China issued the document "Several Opinions of the State Council of the Central Committee of the Communist Party of China on Comprehensively Deepening Rural Reform and Accelerating the Advancement of Agricultural Modernization." "Separating ownership rights; contract rights; and the right to use contracted rural land" is the basic direction of the reform of the agricultural land property rights system in the new era. Therefore, this document has stabilized contract rights while allowing land management rights to be mortgaged to financial institutions for financing. In 2016, the government further proposed to equally protect the land management rights acquired by business entities following the circulation contract. This has ensured stable land management activities and has initiated a comprehensive reform of the "separating ownership rights; contract rights; and the right to use contracted rural land."

Land circulation can form a large-scale land operation, reduce the fragmented use of land [4], liberate rural productivity, and support urbanization. Therefore, the main purpose of the "separating ownership rights; contract rights; and the right to use contracted rural land" reform is to promote land circulation, improve agricultural productivity and competitiveness, and at the same time, to ensure the rights of operators. However, there are still significant limitations in the circulation of rural land. First of all, the definition of land property rights is unclear. The existing laws and regulations do not regulate the relationship between land circulation and land contracts, which has led to an increasing number of disputes about land contract rights, which virtually increases the cost of land circulation. Second is the structural limitation of urban and rural areas in China. Migrant workers and peasants who transfer out their land cannot obtain urban household registration and cannot enjoy complete education and medical benefits. Therefore, they tend to keep their land contract rights and entrust their relatives and friends to cultivate them instead. In

addition, there are also other reasons, such as the reluctance of the elderly to leave their homeland and their attachment to the land, which also restricts the land circulation.

2.2. Literature Review

The separation of the right to use and ownership of land generates land rent [5]. Moreover, with diminishing returns to land, the price of land circulation determines the amount of land rent. The circulation period is short, so the price of land circulation depends only on the average annual income of the land. At the same time, the conditions for the generation of land rent are related to the price of agricultural products, the fertility of the land, the geographical location and the relationship between supply and demand [6]. When the transaction cost is zero, market transactions can achieve an effective allocation of land resources [7], so scholars cannot think that land rent is suppressed [8]. The generation of land rent is the basis of land circulation. China has changed the land structure of contracting production to households and liberalized land circulation, and land distribution has changed from absolute equality to relative equality. The land was redistributed to the peasants with higher productivity [9]. The land system has a profound effect on the income distribution of rural households [10]. Before further reforming the land system, it is essential for the government to carefully consider the impact of the reform on the income of rural households and income inequality. Therefore, research on the impact of land circulation on the income inequality of rural households has gradually become a popular topic. The research mainly focuses on two aspects, namely the income effect of land circulation and the distribution effect of land circulation.

2.2.1. Income Effect of the Land Circulation

The existing literature on land circulation and the income of rural households analyzes the mean effect of the impact of land circulation on the income of rural households under the framework of a linear model. There are two main points of view: first, the net income of peasants before and after land circulation has not changed significantly. There is a two-way causal relationship between the level of non-agricultural income of peasants and land circulation. The impact of early land circulation on the non-agricultural income of peasants is relatively weak [11]. Second, land circulation has generally increased the income of rural households, created income for rural households, and reduced poverty. Scholars have held this view in majority [12–14]. The land rent and income from migrant work brought about by land circulation accounts for most of the income growth of rural households, which is stable and sustainable [15,16]. The study by Xiao Han and Anlu Zhang [17] from the perspective of land circulation found that land circulation has a positive effect on the income of transfer-in rural households, but has no significant effect on the income of the transfer-out rural household. Fei Chen and Weijuan Zhai [18] pointed out that renting out land is beneficial for increasing the income of rural households and reducing the incidence of poverty. However, the welfare effect is significantly different between different family groups. Xiangyong Wang et al. [19] studied the changes in farmers' income before and after land circulation and found that land circulation increased farmers' property income.

In addition, the income effect of land circulation needs to be considered from two aspects. On the one hand, because of the characteristics and factor endowments of a rural household, the benefits they receive from the land circulation market are different [20]. Land circulation generally increased the income of rural households, but this may be the result of the pull of high-growth rural households, however, it exaggerates the role of land circulation. The results of testing that land circulation does not affect the income of rural households and may also be offset by increasing income and decreasing income. On the other hand, there is the problem of the "selection bias" of the sample. Whether a rural household participates in land circulation is a non-random "self-selection" behavior. However, this self-selection bias has not been corrected when examining the income effect of land circulation on the different types of rural households, which has also brought about estimation problems.

2.2.2. Income Distribution Effect of the Land Circulation

An increase in the absolute income level does not imply that land circulation has a positive effect on income distribution. There are two main views on the income distribution effect of land circulation. First, land circulation has widened the income gap of rural households. Early research considered that land circulation was the choice and behavior of rural households with a high income [21]. In other words, only the powerful class can receive high returns on land circulation [22], while the interests of small farmers are sacrificed, leading to further widening of the income gap [23]. The constraints of credit rationing make it difficult for poor rural households to obtain benefits from the land rental market [24]. Möllers and Meyer used the PSM method to analyze the impact of labor migration on income inequality and poverty in rural Kosovo [25]. In recent years, some scholars have used quantile regression to analyze the effect of land circulation on the income gap of rural households. For example, Junping Guo [26] used a quantile regression model to investigate regional income, finding that the circulation of farmland has widened the income gap between rural households in the eastern and central regions. From the perspective of different income classes, the transfer inflow of farmland has promoted an increase in the income of poor and low-income households, resulting in some high-income households. Although land transfer inflow and outflow can increase income, land circulation exacerbates income inequality [27–29]. The research for Changliang Shi [30] found that the income-increasing effect of land circulation is heterogeneous for rural households with different income levels. Rural households with middle and high-income levels obtain greater benefits from land circulation than rural households with a low income. Second, land circulation can narrow the income gap between rural households [31]. Guanghua Wan [32] constructed a regression decomposition framework using rural household data to study rural income inequality in China, and found that the land circulation between poor rural households reduces income inequality. Land circulation increases the income level of rural households with low income and can alleviate the inequality caused by non-agricultural employment [33]. However, some scholars believe that the income distribution effect of land circulation has a selection effect among heterogeneous rural households, and the mechanism of action for a rural household in different income ranges is different [34]. The disadvantage is that most studies only compare the income effects of rural households with different income levels who participate in land circulation, and fail to answer quantitatively how land circulation widens the income inequality of rural households.

In general, the existing literature agrees that land circulation can effectively increase the income of rural households, but the perception of the income distribution effect of land circulation is still ambiguous. Previous studies have made more use of quantile regression. However, the data are too rough to infer any effect of land circulation on the income gap of rural households by relying solely on the difference in the regression coefficients in different quantiles. Moreover, this approach would ignore the internal mechanism of the income distribution effect of land circulation and the mechanism of the effect of other economic and social factors on the income distribution of rural households in the process of land circulation. There is almost no literature involved in the research on its influence mechanism and degree of influence. Shi, C.L., et al. [35] and Yang, Z et al. [36] estimate the contribution of land circulation to the income gap of rural households using a Fields decomposition. However, the decomposition method is strictly restricted by the form of the income equation and the measurement index of the income gap, and the decomposition of the constant term has not been well handled and explained. Liang Y et al. [37] discussed the effects of labor mobility and land circulation on the income of rural households, respectively. They use the propensity score matching (PSM) model to explore the effect of land circulation on the income of rural households. This can effectively alleviate the bias problem caused by the “self-selection” of the income effect, but it does not deeply explore the mechanism of the dynamic relationship between labor mobility and land circulation on the income distribution of rural households.

Compared to previous literature, there are two possible contributions of this article: first of all, it provides a new perspective to deepen the understanding of the impact of land circulation. The existing literature studies focused on the effect of land circulation on agricultural productivity and rural household income. There were not many studies on income distribution and inequality. This article has supplemented this aspect. Second, we analyze the causes of rural household income inequality from the perspective of labor mobility, and provide new connotations for income distribution theory. Existing studies rarely consider the impact of the dynamic relationship between labor mobility and land circulation on the income inequality of rural households. However, the contradiction between more people and less land has always been one of the main contradictions in China's agricultural development. The relationship between the two may have a more profound impact on income distribution than traditional economic factors such as material capital and family characteristics. Therefore, this article uses the form of interaction terms to analyze the contribution rate of labor mobility and land circulation to different income levels, to deconstruct the mechanism of land circulation on the income inequality of rural households, to provide a theoretical basis and decision-making participation for broadening farmers' income increase channels.

3. Theoretical Mechanism

To analyze the theoretical mechanism of land circulation in the income gap of rural households, it is necessary first to clarify peasants' motivation to engage in land circulation. The decision of land circulation is based on the "cost-benefit" principle. When non-agricultural productivity is greater than agricultural productivity, a rural household will choose to transfer the outflow of the land. When the benefits of land operation from rural households exceeds the opportunity cost of farming the land, a rural household will choose to transfer the inflow of the land and expand the production of land on a large scale. To study the effect of land circulation on the income inequality of rural households, we can start from the income function of rural households. Assuming that the income of a rural household Y is completely determined by the scale of land circulation T , the size of the non-agricultural labor force population S , and the family characteristics Z , then the income of rural households can be expressed as:

$$Y_i = f(T, S, Z) \quad (1)$$

In order to obtain the income gap of rural households, now the variance of both sides of the equation is calculated simultaneously, and we can obtain:

$$Var(Y_i) = \delta^2 Var(T_i, S_i, Z_i) \quad (2)$$

Here, we fixed family characteristics, then δ in Equation (2) is the income effect of land circulation and the non-labor scale. In theory, land endowments in a perfectly competitive land market will not cause an income gap, and X is a constant at this time. However, in reality, the land market is incomplete. At this time, δ will vary with region, rural family, climate and time. δ_τ is the income effect variable of the interaction term of land circulation and the non-labor scale. Assuming that the income effects of land scale, land circulation, and the non-labor scale are independent of one another, then the income gap can be expressed as:

$$\mu_\delta^2 Var(T_{i\tau}, S_{i\tau}, Z_{i\tau}) + \mu_\tau^2 Var(\delta_\tau) + Var(T_{i\tau}, S_{i\tau}, Z_{i\tau}) \cdot Var(\delta_\tau) \quad (3)$$

where μ_δ is the expected value of the income effect, and μ_τ is the expected value of the interaction term between the scale of land circulation and the scale of non-agricultural labor. From Equation (3), it can be seen that the income gap of rural households is not only related to the expected values of both, but also depends on the scale of land circulation and the scale of non-agricultural labor. When the expectation of the income effect is 0, the income

gap of rural households is also 0. When the expectation and the income effect are not 0, there will be an income gap in a rural household. Land circulation is the reallocation of land resources based on market-oriented means, focusing more on efficiency rather than fairness. Therefore, a rural household with different income levels faces unequal opportunities in the land circulation market and different benefits from land circulation. Analyzing the effect of land circulation from the perspective of non-agricultural labor mobility, the flow of labor is oriented: it only flows from low-income regions to high-income regions. For rural areas, the mobility of labor optimizes the allocation of resources and adjusts the structure of the agricultural industry. However, the flow of labor from agriculture to non-agricultural employment takes away the productivity of agricultural production, and most of the labor flow out is more competitive. In particular, many of the migrant workers who leave their hometowns are young and middle-aged. The elderly and children stay in their hometowns, and the remaining family members cannot afford excessive agricultural production. Therefore, rural households choose to transfer out their excess land to achieve optimal allocation of their household resources. This shows that there is a dynamic relationship between land circulation and labor mobility. When this dynamic relationship is higher, the wider the peasants' income channels, and the greater the impact on the income of rural households. The income gap of rural households is determined by the dynamic relationship between land circulation and labor mobility. From the characteristics of rural households with different incomes, for low-income families, they can only choose to cultivate the existing land, because they cannot afford to pay enough land rent and the cost of non-agricultural operations or migrant workers. In addition, compared to high-income households, low-income households are more dependent on land and are less willing to lease out the rights of using contracted land. Therefore, low-income rural households are easily excluded from the land circulation market. High-income rural households can avoid land fragmentation through land inflow, and large-scale agricultural production can further reduce costs and increase profits. As a result, the income of high-income rural households is becoming higher and higher, while the income of low-income rural households remains the same or rises slowly alongside economic development, meaning the income gap between rural households is further widening. Analyzing this mechanism specifically in terms of agricultural and non-agricultural operation productivity, it can be divided into two parts: on the one hand, in terms of agricultural productivity, high-income farmers are better able to afford the high cost of renting land and are more likely to acquire new technologies in the process of agricultural production. Combining the potential level of human capital and the ability to obtain market information, high-income rural households have higher returns on agricultural production. On the other hand, from the perspective of non-agricultural production activities, rural households with a low income have relatively weak anti-risk capabilities and experience more restrictions on employment in the non-agricultural market. For example, the education level of family members with a low income may be lower than the average. Meanwhile, rural households with a high income can integrate family resources through the land circulation to maximize their comparative advantages in non-agricultural fields. Since the 21st century, the process of urbanization has accelerated, the price of urban labor has become much higher than the income of agricultural production, and rural households with a high income have started moving to non-agricultural operations earlier. Therefore, although land circulation has increased the income level of most rural households, it has also widened the income inequality of rural households to a certain extent.

4. Empirical Research

4.1. Model Construction

The re-centered influence function (RIF) regression method proposed by Firpo [38] is different from other regressions methods in terms of the explained variables in said RIF regression. The explained variables in RIF regression can not only be the income level of residents or other statistics, but must also be the statistics of income inequality such as the

quantile, variance and Gini coefficient obtained based on the influence function. Therefore, we can establish a direct relationship between the impact factors and the degree of income inequality. This article used RIF regression to discuss the effect of rural household land circulation on the rural household income gap. Considering that the Gini coefficient can better describe the degree of income inequality, this article used the Gini coefficient to measure the income gap in net income per capita of rural households. In the RIF regression framework, the benchmark regression model is constructed as follows:

$$Gini(inco) = \alpha_0 cland + \alpha_1 X + \varepsilon \quad (4)$$

where the explained variable *inco* is the per capita disposable income of rural households and *Gini (inco)* is the Gini coefficient of the disposable income of rural households; the explanatory variable *cland* is the land circulation area of rural households, which is the sum of the area of land transfer outflow and inflow; *X* is the control variable, which is used to mitigate the estimation error caused by the omitted variable (the selection of the control variable will be described in detail later); and ε is the random error term. The theoretical mechanism of land circulation affecting the income gap of rural households has been discussed above. Next, this article used quantile regression estimation to test this theoretical mechanism. Quantile regression was first proposed by Koenker and Bassett [39] in their systematic study, and it can accurately describe the effect of explanatory variables on the range of variation of the explained variables and the shape of the conditional distribution. Therefore, this article used quantile regression and established the following regression model:

$$Q_\tau[\ln inco|Y] = \beta_{0,\tau} + \beta_{1,\tau} bland * sland + \sum \beta_{i,\tau} CV + \omega_\tau \quad (5)$$

where the explained variable $Q_\tau[\ln inco|Y]$ is the logarithm of the per capita annual disposable income of rural households at the τ quantile. The explanatory variable is the product of the proportion of household non-agricultural labor force *bland* and the land area *sland* transfer out from rural households, which represents the dynamic relationship between labor mobility and land circulation. *CV* refers to the other control variables, which are the same as the control variables in Equation (4), and ω is a random disturbance term.

4.2. Data Source

The Chinese Household Income Project (CHIP) conducted five household surveys in 1989, 1996, 2003, 2008 and 2014, and collected data of the income and expenditure of urban and rural households from 1988, 1995, 2002, 2007 and 2013, respectively. This article selected the data from the 2013 CHIP, which covers 18,948 household samples and 64,777 individual samples, selected from 234 counties and districts of 126 cities in 14 provinces, including 7175 urban household samples, 11,013 rural household samples, and 760 outdoor migrant workers samples. According to the research content of this article, only the data of the rural households in the questionnaire were retained, and missing values and unreasonable data were excluded, thus, a total of 10,262 valid data were obtained. These valid data were distributed across 14 provinces, namely, Shanxi, Henan, Anhui, Hubei, Hunan, Gansu, Yunnan, Sichuan, Chongqing, Beijing, Liaoning, Jiangsu, Shandong and Guangzhou. After sorting, we divided the data into the central, western, and eastern regions, with 3963, 2705, and 3594 data, respectively.

4.3. Variables

Explained variable: per-capita annual disposable income of rural households (*inco*); the unit is yuan/person. The CHIP data selected “2013 household disposable income” divided by “total household population”. Disposable income mainly included wage income, net operating income, property income and transfer income.

Explanatory variable: land circulation area (*cland*); the 1st unit is hm^2 . We used the sum of the area of land transfer out (*sland*) and the area of land transfer in (*tland*) of rural

households. From the CHIP data, we deleted the data of rural households who transferred the outflow and inflow of land at the same time. In addition, rural households were the only inflow and outflow of land.

The control variables mainly included two aspects, namely the characteristics of the head of the rural household and the characteristics of the family. The characteristics of the head of the household included:

- ① Gender (*gen*): with gender as a dummy variable, a value of 1 was assigned to males and 0 to females. Generally speaking, the income of male-headed rural households is greater than that of female-headed households, especially for low- and middle-income households.
- ② Age (*age*): age inevitably affects the income gap of rural households, which shows multiple effects.
- ③ Education level (*edu*): the highest educational level experienced by the head of the household was used to measure education level. As dummy variables, no elementary school was assigned a value of 1, elementary school a value of 2, junior high school a value of 3, senior high school a value of 4, vocational/technical school a value of 5, technical secondary school a value of 6, junior college a value of 7, undergraduate university a value of 8, and postgraduate university and above a value of 9.
- ④ Being a member of the Communist Party of China (*pol*): a value of 1 was assigned to being a member of the Communist Party of China (CPC), while a value of 0 was assigned to not being a member of the Communist Party of China (CPC).
- ⑤ Being a village cadre (*cad*): being a village cadre was assigned a value of 1, while not being a village cadre was assigned a value of 0.
- ⑥ Participation in a professional cooperative economic organization (*org*): participation was assigned a value of 1, while no participation was assigned a value of 0.
- ⑦ Health status (*hea*): this indicator was self-evaluated by the respondent, and was also used as a dummy variable and assigned the following values: 1 = very good; 2 = good; 3 = fair; 4 = bad; 5 = very bad.

Meanwhile, family characteristics included:

- ① Family size (*pop*): the total family population represents the family size.
- ② Non-agricultural labor force population (*lab*): the sum of non-agricultural business population and migrant workers was regarded as the family non-agricultural labor force population, and the proportion of the non-agricultural labor force (*blab*) was used as the non-agricultural labor force population over the total family population.
- ③ The net value of agricultural operating fixed assets (*agr*): this is an operating asset, presented in the CHIP data as the “estimated net value of agricultural operating fixed assets at current prices at the end of 2013”.
- ④ Operating land area (*land*): refers to the area of land operated by a family. In addition, this article divided the provinces into three regions based on their location. The central region included the five provinces of Shanxi, Henan, Anhui, Hubei and Hunan; the western region included the four provinces of Gansu, Yunnan, Sichuan and Chongqing; the eastern region included the five provinces of Beijing, Liaoning, Jiangsu, Shandong and Guangdong. The descriptive statistics of the variables are shown in Table 1.

Table 1. Definitions of variables and descriptive statistics.

Variable	Variable Name	Variable Definition and Assignment	Mean	Standard Deviation
Explained variable	Household income per capita (<i>inco</i>)	Family annual total income/total population, in yuan/person	13,259.9	14,039.9
Explanatory variables	Land circulation area (<i>cland</i>)	Area of land transfer inflow plus the area of land transfer outflow (<i>hm²</i>)	1.3814	6.8296
Characteristics of the household head	Gender (<i>gen</i>)	1 means male; 0 means female	0.9172	0.2756
	Age (<i>age</i>)	Age of the household head	51.83	11.50
	Education level (<i>edu</i>)	no elementary school as 1, elementary school as 2, junior high school as 3, senior high school as 4, vocational/technical school as 5, technical secondary school as 6, junior college as 7, university undergraduate as 8, and postgraduate and above as 9.	2.736	0.9729
	State of health (<i>hea</i>)	1 = very good, 2 = good, 3 = fair, 4 = bad, 5 = very bad	2.20	0.9482
	Being a member of the CPC (<i>pol</i>)	1 means a member of CPC 0 means not a member of CPC	0.110	0.3129
	Being a village cadre (<i>cad</i>)	1 means yes; 0 means no	0.0492	0.2163
	Participation in a professional cooperative economic organization (<i>org</i>)	1 representative to participation 0 representative not to participation	0.0341	0.1815
	Family size (<i>pop</i>)	Total family population	3.80	1.489
Family characteristics	Number of families non-agricultural labor (<i>lab</i>)	The total number of households migrant workers and non-agricultural production and operation population (person)	0.9818	2.44
	The net value of fixed assets of agricultural operations (<i>agr</i>)	The estimated net value of agricultural operating fixed assets at the end of the year	6189.0	84,159.6
	Family-owned land area (<i>land</i>)	The total land area operated at the beginning of 2013	5.574	8.868
Region	Central Region	Central region = 1, non-Central region = 0	0.3859	0.4868
	Western Region	Western region = 1, non-Western region = 0	0.2638	0.4407
	East Region	Eastern region = 1, non-Eastern region = 0	0.3503	0.4771

4.4. Benchmark Regression Results

Table 2 shows the estimated results of the RIF regression benchmark for the impact of land circulation on the income gap of rural households. The per capita annual disposable income of rural households was used as the explained variable, and land circulation was used as the explanatory variable. Columns (1)–(3) report the empirical results of the central, western, and eastern regions, respectively. Column (4) shows the empirical results of the national data without a fixed province effect, while Column (5) shows the empirical results of the national data after fixing the province effect. Comparing the results from Columns (1)–(6), it can be seen that the area of land circulation further widens the income gap of rural households.

From Column (5), after controlling for the provincial factors that do not affect the income gap of rural households over time, the larger the land circulation area in the country as a whole, the bigger the income gap of rural households. Moreover, comparing Columns (4) and (5), the coefficient increased from 0.0014 to 0.016 after controlling for the province. The specific impact mechanism will be discussed in detail in the next section. Among the control variables, the variables of whether to participate in a professional cooperative economic organization, family size, the size of the non-agricultural labor force, and the area of land operated by the family have a significant effect on the income gap of rural households. Among them, the variable of participation in a professional cooperative economic organization can widen the income gap of rural households. Meanwhile, the other variables can narrow the income gap of rural households. Families participating in professional cooperative economic organizations can obtain certain advantages in agricultural production, so this factor can widen the income gap of rural households. In the context of the one-child policy, the family population is limited; a large family size and a large non-agricultural labor force can narrow the income gap among rural households. The contracted land area can also reduce the income gap between rural households; this is because large-scale agricultural production reduces production costs. However, a rural household with less land typically chooses non-agricultural management to realize the optimal allocation of limited land resources, which increases the overall income level while also reducing the income inequality of rural households.

The national data on rural households were divided into three regions. Comparing Columns (1)–(3), it can be seen that the most significant effect of land circulation on the income gap of rural households was in the central region. This is because Henan and Hunan, the major grain-growing provinces, are in the central region. Before the emergence of large-scale migrant workers, the main economic source of income for a rural household was agricultural production. Cities in the eastern region are relatively more developed, relying mainly on a non-agricultural economy to drive employment. In particular, the eastern coastal cities have benefited from the reform and opening-up policy and no longer rely on agricultural production. Meanwhile, the population in the western region is relatively small, and the level of land rent is generally low; therefore, the ratio of land rent to the total income of rural households is relatively low. Most rural households are unable to achieve an increase in income in this way, so the effect of land circulation on income inequality among rural households was shown to be non-significant.

Table 2. Baseline estimation results of the impact of land circulation on the income gap of rural households.

	Central Region (1)	Western Region (2)	East Region (3)	Nationwide (4)	Nationwide (5)
Land circulation area <i>cland</i>	0.0032 * (1.65)	−0.00002 (−0.01)	0.0011 (1.38)	0.0014 * (1.70)	0.0160 ** (1.89)
Gender <i>gen</i>	−0.032 (−1.25)	−0.0113 (−0.39)	−0.018 (−0.71)	−0.0091 (−0.58)	−0.0145 (−0.91)
Age (Logarithm) <i>age</i>	0.0491 ** (1.85)	0.0038 (0.11)	0.03224 (0.69)	0.0243 (1.08)	0.0279 (1.18)
Education level <i>edu</i>	−0.008 (−1.44)	0.0041 (0.39)	0.0103 (1.16)	0.0053 (1.00)	0.0084 (1.57)
State of health <i>hea</i>	0.0089 (1.45)	−0.0045 (−0.54)	0.0017 (0.22)	0.0038 (0.92)	0.0035 (0.80)
Being a member of the CPC <i>pol</i>	0.0246 (1.18)	0.006 (0.25)	−0.0228 (−1.13)	0.003 (0.24)	0.0053 (0.42)
Being a village cadre <i>cad</i>	−0.0112 (−0.47)	0.059 (1.21)	0.0439 (1.16)	0.025 (1.16)	0.023 (1.07)
Participation in a professional cooperative economic organization <i>org</i>	−0.0446 * (−1.88)	−0.0754 *** (−2.88)	0.1428 ** (2.02)	0.0958 ** (2.04)	0.1037 ** (2.36)
Family size <i>pop</i>	−0.012 *** (−2.63)	−0.0139 ** (−2.23)	−0.0132 ** (−2.41)	−0.0084 ** (−2.53)	−0.009 ** (−2.35)
Number of family non-agricultural labor <i>lab</i>	−0.0037 * (−1.89)	−0.0036 ** (−2.52)	−0.0003 (−0.16)	−0.0028 *** (−3.10)	−0.0023 *** (−2.58)
Net value of fixed assets of agricultural operations <i>agr</i> (Logarithm)	0.0028 * (1.73)	−0.002 (−1.08)	0.0016 (0.58)	0.0012 (0.93)	0.0004 (0.27)
Family-owned land area land (Logarithm)	−0.008 (−0.89)	−0.0165 ** (−1.77)	−0.0042 (−0.43)	−0.014 *** (−2.57)	−0.0196 *** (−3.23)
Intercept term	0.2783 *** (2.56)	0.5084 *** (3.17)	0.3049 (1.52)	0.3527 *** (3.62)	0.3485 *** (3.45)
Province dummy variable	No	No	No	No	Yes
F test	Pass	Pass	Pass	Pass	Pass
Observations	3963	2705	3594	10262	10262

Note: *t*-values in parentheses, ***, **, and * represent 1%, 5%, and 10% significance levels, respectively.

4.5. Robustness Test

The RIF regression program operates with robust standard errors by default; this can effectively weaken the endogenous problems caused by the omission of variables, etc., and avoid heteroscedasticity from interfering with the estimation results. In addition, the per capita net income of rural households and the behavior of land outflow and land inflow do not exist exactly in the same year. Therefore, the possibility of endogenous factors between land circulation and the net income of rural households was relatively slight. This paper uses a series of tests to confirm the robustness of the conclusions, such as changing the income gap measurement indicators, replacing explanatory variables and explained variables. The results are shown in Table 3.

Table 3. Robustness test results.

Explanatory Variables	Measuring Inequality with Variance	Inequality Measured by 80–20 Quantile Distance Values	Replacement of Explanatory Variables	Replacement of Explanatory Variables
	(1)	(2)	(3)	(4)
Land circulation area (<i>cland</i>)	0.0035 *** (2.04)	0.0223 *** (3.2)	—	0.007 * (1.71)
Area of land transferred to (<i>tland</i>)	—	—	0.0014 * (1.66)	—
Control variable	Yes	Yes	Yes	Yes
Intercept term	0.3102 (1.38)	0.2408 (0.23)	0.3483 *** (3.44)	0.3814 *** (3.3)
Province dummy variables	Yes	Yes	Yes	Yes
R ²	0.0176	0.0191	0.0131	0.0124
Observations	10,262	10,262	10,262	10,262

Note: *t*-values are in parentheses, and *** and * represent 1% and 10% significance levels, respectively.

Inequality is measured by variance. Variance is a widely used indicator in the issue of inequality, as well as the Gini coefficient. To verify the robustness of the empirical results, this article uses the variance of the logarithm of household disposable income per capita to replace the Gini coefficient. The regression results are shown in column (1) of Table 3. The core explanatory variable land circulation is positive at the 1% significance level, which is consistent with the result of the benchmark regression.

The income gap is measured using 80–20th quantile values. Quantile distance can better test the income gap between the highest and the lowest income group. This article uses the 80–20 quartiles to replace the Gini coefficient to test the robustness of the empirical results. The regression results are shown in column (2) of Table 3. *cland* is significantly positive at the 1% level, the coefficient of *cland* in the corresponding regression is 0.0223. This shows that when the area of land transfer to all rural households in the sample increases by 1 unit, the difference between the 80th quantile and the 10th quantile of the per capita disposable income of rural households will increase by 0.0223, an increase of 2.2%. After the replacement of the inequality measurement indicators, they are consistent with the benchmark results, indicating that the empirical conclusions of this article have not changed due to different income gap indicators.

Replacement of explanatory variables. The area of land circulation is composed of the area of land transfer outflow and inflow. After rural households have transferred inflow land, they can expand the scale of agricultural production and increase their income, which in theory can better reflect the further widening of the income gap. Therefore, this article replaces the explanatory variable with the area of land transferred inflow by rural households. The regression results are shown in Column (3) in Table 3. The estimated results are positive at the 10% significance level, which is consistent with the benchmark regression results.

Replacement of the explained variable. Compared with income, consumption is more stable and more reliable. It can better reflect the living conditions of rural households and is a more accurate indicator of inequality. Therefore, this article replaces the explained variable with the Gini coefficient of per capita consumption of rural households. The regression results are shown in Column (4) in Table 3. The core explanatory variables are significantly positive at the 10% level, which is consistent with the benchmark regression results, indicating that the conclusions of this article are not affected by the metrics of the explained variables.

4.6. Analysis of the Influence Mechanisms

The previous section mainly confirmed that land circulation increases the income gap among rural households. This part mainly focuses on analyzing the mechanism of the effect of land circulation. The government is continuing to further lift the restrictions on non-agricultural employment, is continuously improving the non-agricultural employment market, and is reducing the gap of registered residence between urban and rural areas, thereby providing more employment opportunities for young migrants workers. With the rapid economic development in developed cities, there is a greater labor shortage. The income from migrant workers and non-agricultural business income is significantly higher than that from agricultural production. More young and middle-aged laborers from families with a low income choose to give up their farmland and switch to non-agricultural operations or go out to work, which increases family income. Table 4 shows the regression results of the dynamic relationship between labor mobility and land transfer out on the per capita disposable income of rural households by region. The labor mobility indicator here was the ratio of non-agricultural labor over the total household population, and the per capita disposable income of rural households was processed in logarithm.

Column (1) in Table 4 shows the OLS estimation. Based on the results of this OLS estimation, it can be seen that the coefficients of the interaction terms between labor mobility and land outflow are significantly positive, and passed the 1% significance level test for both the national region and the central, western, and eastern regions. This shows that the interaction term of labor mobility and land outflow increases the income of rural households. Moreover, the dynamic relationship in the eastern region is significantly higher than that of the other two regions. This is because there are more developed cities and more non-agricultural employment opportunities in the eastern region. The estimation result of OLS was used to compare the result of the quantile regression. The quantile regression results of the different quantile points are given in Columns (2)–(6), respectively, which are the 10th, 30th, 50th, 70th, and 90th points. From the results of the quantile regression, as the degree of dynamic relationship increased, the per capita disposable income of rural households also increased. From the national data, it can be seen that the interaction term has the greatest promotion effect on middle-income families. However, the promotion effect of high-income households is significantly higher than that of low-income households, which means that the benefits of “rich people” from land circulation are significantly greater than those of “poor people”, which naturally further increases the income gap. In addition, these estimated coefficients are significant in the different quantiles, however the coefficients are not identical, indicating that rural households with different income levels do not benefit equally from land circulation. Combining the results of quantile regressions by regions, especially the western and eastern regions, the dynamic relationship between high-income households with labor mobility and land outflow has increased. The promotion effect on the per capita income of rural households is much higher than that of low-income households, with the coefficient even exceeding 0.1 in the highest quintile. Therefore, land circulation not only causes inequality in the allocation of agricultural land resources in villages, but also further aggravates this inequality through labor mobility, forming the “Matthew effect” where the rich get richer, leading to further widening of the income gap among rural households.

Table 4. Regression results of the dynamic relationship between labor mobility and land transfer outflow on the per capita disposable income of rural households by region.

Region	Variable	Ols (1)	Q10 (2)	Q30 (3)	Q50 (4)	Q70 (5)	Q90 (6)
Nationwide	Proportion of non-agricultural labor force *	0.0686 *** (5.69)	0.0486 ** (2.12)	0.0779 *** (5.11)	0.0758 *** (5.21)	0.0588 *** (3.82)	0.065 *** (2.95)
	land outflow						
	Other variables			Already controlled			
	Constant term	9.541 *** (61.66)	9.147 *** (31.1)	10.031 *** (48.33)	10.288 *** (56.13)	10.459 *** (55.09)	10.506 *** (44.99)
Central Region	Proportion of non-agricultural labor force *	0.0593 *** (3.72)	0.0642 *** (3.08)	0.0914 *** (4.63)	0.0538 *** (3.27)	0.0515 *** (2.89)	−0.0004 (−0.02)
	land outflow						
	Other variables			Already controlled			
	Constant term	9.97 *** (40.32)	8.843 *** (19.09)	10.31 *** (30.3)	10.382 *** (36.29)	10.543 *** (37.29)	10.491 *** (30.81)
Western Region	Proportion of non-agricultural labor force *	0.060 ** (2.23)	0.0402 (1.10)	0.03182 (0.68)	0.0896 * (1.76)	0.1003 ** (1.98)	0.0582 (1.2)
	land outflow						
	Other variables			Already controlled			
	Constant term	9.497 *** (34.12)	7.973 *** (15.78)	9.071 *** (25.3)	9.749 *** (27.74)	10.367 *** (28.61)	10.323 *** (19.99)
Eastern Region	Proportion of non-agricultural labor force *	0.107 *** (4.52)	0.0818 ** (2.37)	0.0665 ** (2.15)	0.1037 *** (3.60)	0.1127 *** (3.63)	0.1288 *** (2.79)
	land outflow						
	Other variables			Already controlled			
	Constant term	10.157 *** (38.24)	10.739 *** (19.72)	10.156 *** (27.36)	10.445 *** (34.72)	10.354 *** (35.35)	10.42 *** (27.78)

Note: *t*-values in parentheses, ***, **, and * represent 1%, 5%, and 10% significance levels, respectively. The control variables are not listed due to space limitations.

5. Conclusions and Recommendations

The main purpose of China's current rural revitalization strategy is to promote rural development, increase farmers' income, and narrow the income gap of rural households. Under the background of "separating ownership rights; contract rights; and the right to use contracted rural land," the scale of land circulation is getting larger and larger, and stable land property rights are the foundation of rural development. Based on the 2013 China Household Income Project (CHIP), this article used the re-centered influence function (RIF) regression method to empirically test the impact of rural land circulation on the income gap of rural households in China in three regions: the central, eastern, and western regions. The final result were as follows.

First, as a result of the implementation of the "separating ownership rights; contract rights; and the right to use contracted rural land" by the government, the legitimate rights and interests of land operators are now protected. Land circulation has improved agricultural production efficiency and has liberated labor productivity. Surplus peasants are moving to cities to work and earn an income. Coupled with the acceleration of urbanization, the overall income of rural households has improved. For example, rural households with a low-income lack funds for agricultural production and have limited access to land, but have a surplus of labor. Thus, young and middle-aged people of low-income rural households choose to transfer out their land, and then go out for work or go into non-agricultural employment, thereby greatly increasing the total family income. Rural households with a high-income can increase their income by transferring in their land, expanding the scale of agricultural production and reducing the marginal costs. Therefore, the continuous increase in the scale of land circulation has greatly increased the income of rural households as a whole.

Second, land circulation widens the income inequality of rural households. The inequality of market opportunities leads to different amounts of land circulation by different income groups, resulting in income inequality within groups. In addition, the differences in the abilities and factor endowments between groups also leads to different income returns in land circulation among different income groups. From the central, western, and eastern regions, the region where land circulation has the most significant impact on the income gap of rural households is in the central region. There are several large agricultural provinces in the central region, where farmers are more dependent on land. The adjustment of income distribution is also more sensitive to changes in the land system.

Third, from the perspective of labor mobility, the impact mechanism shows that the interaction term of land outflow and the proportion of non-agricultural labor have a more significant effect on the income growth effect of high-income rural households. The "rich" gain from land circulation to a significantly greater extent than the "poor". On the one hand, the total value of agricultural output is limited, and the average income of each farmer is very small. The surplus of rural laborers can only choose to work in cities. However, farmers who originally owned land resources have expanded their production scale through land circulation. The increase in income of rural household migrant workers is smaller than that of rural households with large-scale production, which has led to a gradual widening in the income gap between rural households. On the other hand, land circulation not only causes inequality in the allocation of arable land resources, but also further contributes to the widening of the income gap among rural households through the "Matthew Effect" of the rich getting richer.

Land circulation has liberated rural surplus productivity, increased the scale of land production, and enabled many young adults to engage in non-agricultural operations, allowing effective allocation of land and human resources. Although land circulation has led to the widening of income inequality for rural households, it is unnecessary to give up land circulation. Instead, we should continue to promote land circulation and improve the land system. Based on the previous analysis and the above conclusions, this article proposes the following policy recommendations.

First, the government should further improve the land circulation market and the efficiency of land circulation, reduce the transaction cost of land circulation, and clarify land use rights. This requires establishing an information platform for the transfer market with transparent and open information to solve the problem of information asymmetry. At the same time, they should reduce the restrictions of non-market factors in land circulation so that farmers can become the real beneficiaries of land circulation.

Second, we should provide certain policy preferences to low-income farmers who do not have comparative advantages in land circulation, and we should strengthen the investment and technical training of farmers so that they can improve their competitiveness in non-agricultural employment. The overall education level of the labor force flowing into the cities and towns from rural areas is relatively low, and most of them can only perform simple labor with low wages. Therefore, the government needs to increase the technical training and improve the cultural quality of farmers. In this way, although rural households with a low-income lack the means of production, they can increase their income and stability by relying on their technology and cultural literacy to work outside the home, thereby increasing the income of the family. At the same time, the government should also improve the welfare protection measures for rural non-agricultural operations, so that low-income farmers can engage in non-agricultural operations without worries and can further liberate productivity. For example, the government grants a quota of low-interest loans to farmers who switch from agricultural production to self-employment, and provides a series of policy supports such as tax cuts.

Third, the government should reform the household registration system and open up the social security system. A certain percentage of migrant workers cannot enjoy complete social security due to the restrictions of the household registration system. Thus, they do not dare to transfer out all of their contracted lands, instead only letting their relatives and friends cultivate or even abandon them. At the same time, household registration restrictions have resulted in farmers lacking a sense of belonging to a city, so land reform must also be coordinated with urban sector reforms. Cities and towns have further improved their medical and educational systems, allowing residents who work in said places to enjoy the same welfare protection as urban residents. In particular, the schooling problem of enrolling the children of migrant workers needs to be solved urgently, and the five social insurances and one housing fund should be fully implemented as soon as possible for migrant workers. The government should eliminate the worries that migrant workers have regarding having nowhere to stay in the city and should increase their sense of belonging to said city, so that land resources can be better allocated.

Finally, the value of total agricultural output on the technical level should be increased. Due to the scissors gap between the prices of industrial and agricultural products, the increase in grain prices lags behind the increase in the prices of agricultural materials and other industrial products, further shrinking the value of agricultural output. Therefore, the government needs to increase its support for rural production technology, the value of total agricultural output, and the capacity of the land for the strong rural labor force.

China is a largely agricultural country, and land policy involves all aspects. With the progress of urbanization and industrialization, the proportion of non-agricultural employment among farmers has gradually increased, as has the scale of land circulation. The study of rural household income inequality from the perspective of land circulation is only one aspect. After a significant increase in higher education, a new generation of farmers began to experiment with more income options. Next, we should study whether the combination of land circulation and education system affects agricultural productivity and the income gap of rural households. In addition, we can also explore the improvement of the land circulation market from the perspective of land circulation prices. Uncertainty in the boundaries of land property rights affects farmers' expectations of land use and also restricts potential land transferees; land right confirmation can eliminate this type of institutional risk. Limited by the availability and applicability of the data, this article only used the 2013 CHIP data. These data only span some provinces, so the research in

this article has certain limitations regarding depth and breadth. In future research, we will continue to focus on the inequality of rural household income, and strive to find more suitable data and methods to further improve this research.

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