

An empirical study on the impact of non-grain planting on land transfer decisions based on binary Logit model

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Abstract: *The trend of land transfer in China is parallel to the risk of food security. The "factors-countermeasures" method used in the general research is not effective for the symbionism within land transfer. Based on the Logit model, this paper empirically analyzes the impact of non-grain planting on land transfer. Research shows that: (1) In the regression analysis, the inflows and outflows, non-staple planting will be negative effects of land circulation (2) Plants grown planting intensive features suppresses the will of the individual farmers out of land, and grain planting scale features will enhance farmers into the land (3) Age, quality of labor force and total income of family also have significant influence on land transfer*

Keywords: *Land Transfer, Non-grain planting, Logit*

1. Introduction

Moderate agricultural land scale management is beneficial to improve the level of mechanized production and promote the development of modern agriculture. However, with the progress of agricultural land transfer, the problem of excessive non-grain conversion has aroused the academic circles' concern about China's food security. There are relatively few researches on whether the degree of non-grain conversion will affect the willingness of farmers to further participate in land transfer. Therefore, by analyzing the relationship between the degree of non-grain planting and the decision-making of land transfer, we can understand the willingness of farmers with different operation modes and operation scales to participate in land transfer, which has important guiding significance for the formulation of deeper land transfer policies.

Land has both resource function and asset function, and agricultural land has dual attributes of survival guarantee and economic income for farmers. Farmers with different characteristics will prefer the survival or economic attributes of land according to different planting characteristics, which leads to different circulation intentions. The empirical analysis shows that the proportion of land transfer in communities implementing old-age security policies and measures such as new rural insurance or old-age peasant insurance and granting subsidies to the elderly over 65 years old is relatively high (Zhao Guang and Li Fang, 2014) [1]; The increase of other non-agricultural incomes can also promote male farmers to participate in land transfer (Applied Economics, 2020) [2], especially in the case of clear expected returns and locked risks (Li Jinggang et al., 2014) [3]. All these studies show that small-scale farmers pay more attention to whether their lives can be guaranteed stably during the process of land transfer. Farmers with larger scale of farmland management tend to pay more attention to the economic income attribute of land. Compared with food crops that can be mechanized, labor-intensive non-food crop cultivation is difficult to break through labor constraints and there is a ceiling of optimal planting scale. Therefore, large-scale land operators tend to plant food crops more often (Zhang Zongyi and Du Zhixiong, 2015) [4]. However, the change in the proportion of land transfer rent in the production cost may affect the choice of crops by large-scale land operators. In Jiangsu, Henan and other provinces, land rent becomes the largest part of the production cost, and even leads to a loss for continuing to grow food (Cai Ruilin et al., 2015) [5].

Therefore, this paper sets three binary variables of land rented, land rent out and land transfer to empirically analyze the impact of non-grain planting on land transfer behavior, in order to provide data and research ideas for the reform of land transfer system in GuanZhong Plain and even the whole country.

2. Methods

2.1 Experimental setting

Firstly, this study uses the database to separate the influence of relevant variables on farmers' willingness to transfer farmland through regression Logit model, so as to find out the potential rural land leasing households and rural land leasing households. The function expression is shown in Equation (1) below:

$$Y = \ln[p/(1 - p)] = \beta_0 + \text{non_grain}_i + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + \varepsilon \quad (1)$$

In the formula, P and 1-P are respectively "Yes" and "No" probability of farmers transferring land after planting in this quarter. β_0 is the constant term; Non_grain_i is the proportion of mu planted by domestic cash crops to the total mu of land. X_1, X_2, \dots, X_k is the independent variable, including the quality of labor force, characteristics of household head, family characteristics, etc. β_i is the regression coefficient of the corresponding independent variable; ε is the random error term. The core variable was non-grain planting.

2.2 Notations

The key mathematical notations used in this paper are listed in Table 1.

Table 1: Notations used in this paper

Variable	Description	Average	Std. Err
Land transfer	Land transfer = 1 not transfer = 0	.252	.434
Land rented	Land rented = 1 other = 0	.056	.230
Land rent out	Land rent out = 1 other = 0	.200	.400
Non-grain planting	Planting Non-grain crops = 1, planting food crops = 0	.311	.396
The age of the head of a household	The age of the head of a household	63.216	10.096
Quality of labor force	primary school =1, junior high school =2, high school and technical secondary school =3, college or university =4, graduate or above =5	1.609	.903
Labor transfe	The proportion of the number of transferred non-farm labor in the total household labor force	.411	.456
Total household income (10 thousand Yuan)	Annual household income = (Non-agricultural income + Agricultural production income) /10000	4.999	28.566
Household agricultural labor force	The number of workers in a household engaged in agricultural production	1.850	0.830
Per capita household income (10 thousand yuan)	per capita household income = total household income/family population	1.706	9.560
Non-farm income	Share Non-farm income as a percentage of total household income	.510	.498

2.3 The Data

During December 2020 to January 2021, members of the research group conducted a random household survey in GuanZhong Plain of Shaanxi Province, and a total sample size of 1079 was obtained. A total of 180 administrative villages in Guanzhong were involved, including 181 from Baoji City, 141 from Xi'an City, 706 from Xianyang City and 51 from Xingping City.

In view of the possible false value and input error in the sample, we eliminated the extreme value samples according to certain standards, such as: (1) the sample with zero family land quantity; (2) the sample of household head age in single digits; (3) Samples with annual household income less than 200 yuan. In the end, 1052 valid questionnaires were obtained, with a valid questionnaire rate of 97.4%

3. Results

3.1 Regression result analysis

From the variables of householder characteristics, age, labor quality and whether farmers carry out land transfer have a significant impact, which passed the significance test of 1% and 5% respectively.

For transfer, the coefficient of age variable is negative, indicating that when other variables remain unchanged, the older farmers are, the less willing they are to transfer. This is mainly because older farmers have stronger emotional dependence on land, have long-term agricultural planting traditions in their family background. The coefficients of labor quality are all positive, which indicates that the improvement of education level significantly promotes land transfer, and also reflects that the transfer policy is easy to be accepted by middle and high quality farmers.

Table 2: Regression result

Variable	Land rented	Land rent out	Land transfer
The age of the head of a household	-.003(.001)***	.001(.001)	-.003(.002)**
Quality of labor force	.0282(.010)***	.029(.013)**	.0525(.015)***
Labor transfe	-.012(.022)	.061(.034)	.056(.036)
Total household income	.005(.001)***	-.008(.003)**	.004(.002)*
Non-grain planting	-.038(.020)*	-.098(.034)***	-.111(.036)***
Non-farm income	-.147(.030)***	.072(.027)***	.023(.024)

Note: ***, ** and * indicate significant at the level of 1%, 5% and 10% respectively; All reported coefficients are marginal coefficients and robust standard errors are indicated in parentheses.

From the perspective of family characteristics, total household income passed the significance test of 1%, 5% and 10%. For transfer and transfer, the coefficient of total family income is positive, indicating that the higher the total family income, the higher the probability of transfer behavior. From the perspective of income gap within rural areas, land transfer is the choice and behavior of "rich peasants". When low-income families do not have the ability to effectively transfer to the secondary and tertiary industries, land is the basic means of production to guarantee their lives [6]. For farmland outflow, the influence of total household income variable coefficient by the statistical difference of 5% significance test, and the estimated coefficient is negative, low-income families more likely to rent out land, possible reason is that the family contracting the fragmentation of small-scale farmland is difficult to get a higher income, to provide for his family.

Non-staple planting variable flow on the land, and have a significant impact on flow, circulation, respectively by 1%, 10%, the level of significance test, non-staple planting variable coefficient of the three models are negative, which means that the planting of economic crops while driving up agricultural income in the proportion of household income structure, but little impact on household income growth, However, the more conservative decision-making preference of farmers will restrain the willingness of farmers to transfer, making them more hope to obtain long-term profits by managing land within the family. Therefore, the higher the proportion of non-grain planting in the household planting structure, the more active farmers are not to carry out circulation activities, but more willing to retain land.

4. Conclusion

4.1 The basic conclusion

Non-staple planting, although to a certain extent, improve the income of farm household, also in the market and have more advantages than grain planting status, but the general farmers usually do not expand the planting scale.

First of all, even assuming that farmers for the rationality in the economic activity, as a family unit, individual production data ownership on the basis of small peasant economy also determines its production activities tend to be more conservative and family as the main body of the business model, will not easily make the choice of transfer of land rights completely, so that it can't be choose out of the land. Secondly, under the trend of gradually aging rural labor force, the characteristics of intensive planting of cash crops require individual farmers to integrate management elements and concentrate on human capital investment, which makes it difficult for older left-behind farmers to continue to expand the scale under the existing technical conditions, and can only maintain the current planting structure, so they do not choose to enter the land. In conclusion, non-grain planting that can bring a small increase in income does not increase farmers' willingness to transfer land

4.2 Specific suggestions

- (1) Strengthen the quality training of professional farmers and ensure the stable income increase of

individual farmers

- (2) Give policy support to large circulation households to promote large-scale grain cultivation
- (3) Improve the supervision of land transfer mode and realize the transparency of transfer transactions

Acknowledgements

Provincial innovation training program for college students

Diagnosis and optimization of the matching between rural land transfer and concentration (mode) and labor force structure (upgrading path) in Yangling

S202010712615

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