Research on the Willingness of Farmers' Increasing Land Scale under the Financial Support

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Abstract—**The farmers' land scale has become the main factors of farmers' income. In the background of the financial support, the willingness and behavior of farmers to land transfer has a significant impact on the scale operation. Based on research data, through logistic regression models this paper explores the factors of farmers' land inflow behavior and provides policy reference for land appropriate scale of operations. The results show that 10 factors including the burden of the number of children have a positive impact on the growth of farmers' land operation scale and 8 factors including the head of household age are not conducive to the growth of farmers' land scale.**
Keywords- *financial support; farmers; land scale; moderate; factors*

I. MODEL SELECTION

Since this research focuses on the behavior of the dependent variable is whether or not the wishes of choice for analysis, namely Y = 0 or Y = 1. And the arguments of both continuous variables, also orders the number of variables. So to choose logistic regression model for analysis, specific model is as follows:

$$P(y=1|x_1,x_2,\cdots x_n) = \frac{e^{\beta_0 + \sum_{i=1}^{n}\beta_i x_i}}{1+e^{\beta_0 + \sum_{i=1}^{n}\beta_i x_i}} \quad (1)$$

$$1-P = P(y=0|x_1,x_2,\cdots x_n) = \frac{1}{1+e^{\beta_0 + \sum_{i=1}^{n}\beta_i x_i}} \quad (2)$$

$$\frac{P}{1-P} = e^{\beta_0 + \sum_{i=1}^{n}\beta_i x_i} \quad (3)$$

By the ratio of the probabilities of occurrence and not occurred of the event we get natural logarithm, that is logit transformation, and ultimately get the following formula:

$$\log it(P) = \ln(\frac{P}{1-P}) = \beta_0 + \sum_{i=1}^{n}\beta_i x_i \quad (4)$$

β_0 is a constant term, which represents the other under the premise of the argument is 0, is the natural logarithm by the ratio of the probabilities of occurrence and not occurred of the event; β_i is the natural logarithm by the ratio of the probabilities of occurrence and not occurred of the event which represents the factor i changes 1 unit and $P \in (0,1)$; $\log it(P) \in (-\infty,+\infty)$.

II. FACTORS SELECTED AND ASSUMPTIONS

By combing the literature can be found, the main factors affecting farmland transfer behavior of family are internal factors and external environmental factors. Internal environmental factors include the personal characteristics of the head of household, family characteristics, labor intensity characteristics, production and management characteristics, property characteristics, etc. External environmental characteristics include credit environment, economic environment, social environment, etc[1]. This paper is also related to the factors of farmer wishes, farmer views and market expectations. This paper eventually identifies seven factors including head of household personal characteristic, household characteristics, labor intensity characteristics, production and management features, property characteristics, external environmental characteristics, household willingness, views and market expectations characteristics. We ultimately select 36 variables with specific definitions of variables the same as technical study behavioral variables. Next, we expect the direction of the behavior of each variable on the inflow land to assume, as follows[2-7]:

TABLE Ⅰ. MODEL VARIABLES AND ASSUMPTIONS DIRECTION

Variables	Assumptions directions
Age of household head (X₁)	−
Head of household education (X₂)	−/+
Head of household spouse education (X₃)	−/+
The number of labor (X₄)	−/+
The average age of the labor force (X₅)	+
Labor average schooling (X₆)	−/+
Households in the highest degree (X₇)	−/+
The burden of the number of children (X₈)	−/+
The number of non-health (X₉)	−
Labor annual work-months (X₁₀)	−
Labor intensity per capita (X₁₁)	−
Whether a single crop (X₁₂)	−/+
The main planting paddy (X₁₃)	−/+
Sown area (X₁₄)	+
Single piece of land scale (X₁₅)	−/+
Plains accounting (X₁₆)	−/+
Low-yield farmland area accounted for (X₁₇)	−/+
Whether plowing land (X₁₈)	−/+
Agricultural product prices (X₁₉)	+
Mechanization level (X₂₀)	+
Average powered of used farm (X₂₁)	+
Subsidies for arable land scale (X₂₂)	+
Net income of households (X₂₃)	+
Food income accounted (X₂₄)	−
Wages income accounted (X₂₅)	−
Whether located village with plains (X₂₆)	−/+
Growth period of crops where the village located (X₂₇)	−/+
Whether the access to loans (X₂₈)	+
Whether the access to internet (X₂₉)	−/+
Whether the small towns built (X₃₀)	−
Whether the enterprises located in the village(X₃₁)	−
Whether the farmers are willing to work in future(X₃₂)	−
Whether the farmers should cultivate land(X₃₃)	−
Grain income-increasing possibilities (X₃₄)	+
Grain risks (X₃₅)	−
Grain income above the wage income (X₃₆)	+
Whether it will expand the land scale in future (Y)	

III. DATA ACQUISITION AND PROCESSING

The data in this section is a total of 626 households visited for the survey collated which is derived from five cities including 10 counties (districts) in Heilongjiang province.

IV. MODEL ANALYSIS AND DISCUSSION

This section is also selected multivariate logistic model to analyze the relevant data, taking regression analysis to analyze the willingness of farmers on land inflows. We finally obtain the following results:

The factors of land inflow willingness are drawn from the analysis: -2 Log likelihood is 557.586, the accuracy rate of model prediction reaches 80.8%, Cox & Snell R^2 is 0.370, Nagelkerke R^2 is 0.499. The fitting result is acceptable, basically meets the needs of analysis. The need to fit with the expected results remains the same. The value of Chi-square model is 289.358 and sig. = 0.000. This explains it has been mixed through the test of model coefficients. We select 36 relevant variables on the stage of assumption, after model screening 18 variables have been retained. Variable Specifically: age of household head (X_1), the number of labor (X_4), the burden of the number of children (X_8), labor intensity per capita (X_{11}), whether a single crop (X_{12}), sown area (X_{14}), plains accounting (X_{16}), whether plowing land (X_{18}), average powered of used farm (X_{21}), subsidies for arable land scale (X_{22}), food income accounted (X_{24}), whether located village with plains (X_{26}), growth period of crops where the village located (X_{27}), whether the access to internet (X_{29}), whether the enterprises located in the village (X_{31}), whether the farmers should cultivate land (X_{33}), grain income-increasing possibilities (X_{34}) and grain income above the wage income (X_{36}).

The first is the personal characteristics of the head of household. Age of household head (X_1) has been into the final model. Head of household education (X_2) and head of household spouse education (X_3) are excluded from the model. Age of household head (X_1) coefficient is -0.434, and it is significance at the level of 5%. This indicates that it has a negative effect on the willingness to land inflow, which is expected to be reversed. Plausible explanation is that the older the head of household, household labor capacity decreased. Thereby they are not willing to expand the operation scale, and even reduce the size of the field.

The second is family characteristics. The number of labor ((X_4) and the burden of the number of children (X_8) have been into the final model. The average age of the labor force (X_5), labor average schooling (X_6), households in the highest degree (X_7) and the number of non-health (X_9) are excluded from the model. The number of labor (X_4) coefficient is -0.422, and it is significant at the level of 5%. The burden of the number of children (X_8) coefficient is 0.321 and it is significant at the level of 5%.

The third is the labor intensity characteristics. Labor intensity per capita (X_{11}) has entered the final model and labor annual work-months (X_{10}) is excluded from the model. Labor intensity per capita (X_{11}) coefficient is 0.634, and it is significant at the level of 1%, this indicates it has a positive impact on the willingness to land inflow. The higher labor intensity per capita, the farmers are more willing to increase land inflows, which is expected to assume the opposite. Possible explanation is that the higher labor intensity

per capita, farmers will be more and more hard-working, and farmers' planting experience on agriculture is more relatively abundant, so they are more willing to expand the scale of planting.

The fourth is the household production and management characteristics. Whether a single crop (X_{12}), sown area (X_{14}), plains accounting (X_{16}) and whether plowing land (X_{18}) have been into the final model, The main planting paddy (X_{13}), single piece of land scale (X_{15}), low-yield farmland area accounted for (X_{17}), agricultural product prices (X_{19})and mechanization level (X_{20})are excluded from the model. Whether a single crop (X_{12}) coefficient is 1.354 and it is significant at the level of 1%. This indicates it has a positive impact on the willingness to land inflows. The farmers who plant a single crop are more willing to increase land inflows than farmers who own non single crop, which is expected to assume the same. Sown area (X_{14}) coefficient is 0.253, and it is significant at the level of 1%. Plains accounting (X_{16}) coefficient is 0.353, and it is significant at the level of 1%. Whether plowing land (X_{18}) coefficient is 0.638, and it is significant at the level of 1%[8].

The fifth is the family property characteristics. Average powered of used farm (X_{21}) and subsidies for arable land scale (X_{22}) have been into the final model. Average powered of used farm (X_{21}) coefficient is 0.545, and it is significant at the level of 1%. Subsidies for arable land scale (X_{22}) coefficient is -0.143, and it is significant at the level of 1%, which is expected to assume the opposite. Possible explanation is that the larger subsidies of arable land scale for farmers, even if the farmers do not grow food, subsidies they received are more relatively substantial[9]. Under the premise of stable income subsidies, farmers are more willing to transfer employment to seek more interests, so they are reluctant to increase land inflows.

The sixth is the family income characteristics. Food income accounted (X_{24}) has been into the final model. Net income of households (X_{23}) and wages income accounted (X_{25}) are excluded from the model. Food income accounted (X_{24}) coefficient is -0.212, and it is significant at the level of 1%. This explains it has a negative impact on the willingness to land inflows. And the larger food income accounted for farmers, they are more reluctant to increase land inflows, which is expected to assume the same.

The seventh is the external environmental characteristics. Whether located village with plains (X_{26}), growth period of crops where the village located (X_{27}), whether the access to internet (X_{29}) and whether the enterprises located in the village(X_{31}) have been into the final model. Whether the access to loans (X_{28}) and whether the small towns built (X_{30}) are excluded from the model.

TABLE II. MODEL ESTIMATION RESULTS

Variables	B	Wald	df	Sig.
Age of household head	-0.434	4.965	1	0.026
The number of labor	-0.422	4.967	1	0.026
The burden of the number of children	0.321	3.859	1	0.049
Labor intensity per capita	0.634	40.447	1	0.000
Whether a single crop	1.354	14.459	1	0.000
Sown area	0.253	18.237	1	0.000
Plains accounting	0.353	32.495	1	0.000
Whether plowing land	0.638	5.768	1	0.016
Subsidies for arable land scale	-0.143	14.885	1	0.000
Average powered of used farm	0.545	23.345	1	0.000
Food income accounted	-0.212	9.702	1	0.002
Whether located village with plains	-1.574	16.882	1	0.000
Growth period of crops where the village located	-0.394	5.208	1	0.022
Whether the access to internet	1.553	27.832	1	0.000
Whether the enterprises located in the village	-1.565	27.565	1	0.000
Whether the farmers should cultivate land	-0.765	6.402	1	0.011
Grain income-increasing possibilities	0.696	24.123	1	0.000
Grain income above the wage income	0.237	3.308	1	0.069
Constant	-7.007	23.712	1	0.000
Forecast accuracy	80.8%			
-2 Log likelihood	557.58			
Cox & Snell R Square	0.370			
Nagelkerke R Square	0.499			
Chi-square	289.35			
	0.000			

The eighth is household willingness, views and market expectations characteristics[10]. Whether the farmers should cultivate land(X_{33}), grain income-increasing possibilities (X_{34}) and grain income above the wage income (X_{36}) have been into the final model. Whether the farmers are willing to work in future(X_{32}) and grain risks (X_{35}) are excluded from the model away. The coefficient of whether the farmers should cultivate land(X_{33}) is -0.765, and it is significant at the level of 1%. This indicates it has a negative impact on the willingness to land inflows. Namely, farmers who believe the farmers should cultivate land than farmers who do not agree with this point of view are more reluctant to increase land inflows, which is consistent with expectations hypothesis. The coefficients of grain income-increasing possibilities (X_{34}) and grain income above the wage income (X_{36}) are 0.696 and 0.237, respectively; and they are significant at the level of 5% and 10%, respectively, which indicate that the two variables have a positive effect on the willingness to land inflows.

V. CONCLUSIONS

(1) The variables which have a positive impact on willingness to land inflows as follows: the burden of the number of children (X_8), labor intensity per capita (X_{11}), whether a single crop (X_{12}), sown area (X_{14}), plains accounting (X_{16}), whether plowing land (X_{18}), average powered of used farm (X_{21}), whether the access to internet (X_{29}), grain income-increasing possibilities (X_{34}) and grain income above the wage income (X_{36}).

(2) The variables which have a negative impact on willingness to land inflows as follows: age of household head (X_1), the number of labor (X_4), subsidies for arable land scale (X_{22}), food income accounted (X_{24}), whether located village with plains (X_{26}), growth period of crops where the village located (X_{27}), whether the enterprises located in the village(X_{31}) and whether the farmers should cultivate land(X_{33}).

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