

# The Application of the Binary Logistic Regression Mathematical Model in Farmers' Willingness for Land Transfer: Based on Dual Rationality Theory

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## Abstract:

In China's rural land system, land ownership is collectively held, and households obtain contracting rights through agreements, granting them operational rights over the land. The transfer of these operational rights enhances agricultural productivity and optimizes rural resource allocation, with farmers' willingness to engage in such transfers being a critical factor in determining the efficiency of land transfer. This study, based on the "dual rationality theory", constructs a theoretical model of farmers' land transfer willingness from the dual perspectives of "instrumental rationality" and "value rationality". A survey of 456 households in 17 typical indigenous villages in Guizhou Province, China, was conducted to investigate their willingness to transfer land. The data were analyzed using a binary logistic regression model and SPSS software, exploring the relationship between the variables of "instrumental rationality" and "value rationality" and the farmers' willingness to transfer land. The findings reveal that, in terms of "instrumental rationality", anticipated economic benefits and a high level of trust in rural collective organizations are significant factors influencing farmers' decisions regarding land transfers. On the other hand, elements of "value rationality", such as a deep emotional attachment to the land, strong identification with their status as farmers, and the emotional significance of the land, play a crucial role in shaping their willingness to transfer land. To facilitate an orderly and effective land transfer process, it is essential to develop and innovate land transfer models suited to local conditions, implement flexible pricing mechanisms, and establish land transfer platforms primarily managed by village committees. Additionally, reforms in the rural social security system should be prioritized, and the implementation of land transfers should consider cultural nuances.

**Keywords:** Binary logistic model, Land transfer willingness, Instrumental rationality, Value rationality, Dual rationality theory.

## INTRODUCTION

According to the sociologist Max Weber, rationality in human social action can be divided into two dimensions: "instrumental rationality" and "value rationality". Based on this distinction, Max Weber proposed the Theory of Dual Rationality. He posited that rationality dominates human cognition, thought, and practical activities. Instrumental rationality (Zweckrational) refers to actions driven solely by utilitarian motives, where individuals use rational means to achieve their desired ends, focusing purely on maximizing outcomes. This type of rationality disregards human emotions and spiritual values, with decisions being based on expectations of the object's or others' behavior in the environment. These expectations are treated as "means" or "conditions" to achieve specific goals and rational pursuits. On the other hand, value rationality (Wertrational) emphasizes the intrinsic, unconditional value of actions, prioritizing the purity of motives and the correct choice of means to achieve intended goals. This perspective suggests that decisions are influenced by a commitment to certain intrinsic values and conscious beliefs, regardless of whether these values are aesthetic, ethical, religious, or otherwise. The focus is on the action itself rather than its outcome [1].

Weber's Theory of Dual Rationality is widely applied in various fields of behavioral research due to its explanatory power and inclusiveness. Examples include studies on the efficiency of student financial aid in education [2], the value orientations in soil pollution prevention [3], and the value choices of stakeholders in marketing [4].

The Chinese government has proposed the "Rural Revitalization Strategy", under which the ownership rights, contract rights, and management rights of rural land are distinguished and assigned to different entities, known as the "separation of three rights". Since the establishment of the "three rights separation" as the fundamental direction for deepening rural land system reform, the standardization of rural land contracting and operational rights has been repeatedly included in documents related to the development of China's rural economy. On November 26, 2019, the government of China issued the Opinions on Maintaining the Stability of Land Contracting Relationships and Keeping Them Unchanged for a Long Time, which emphasized promoting the "three rights" separation framework for rural land. This framework aims to stabilize contracting rights, protect the contracting rights of the majority of farmers, and liberalize operational rights to foster the organic integration of small-scale farmers with modern agriculture. It also aims to develop various forms of appropriately scaled operations and advance the modernization of agriculture with Chinese characteristics. Land transfer is conducive to improving agricultural productivity, enhancing the level of agricultural modernization, optimizing rural resource allocation, promoting the construction of modern agriculture, improving

the quality of agricultural industries, and increasing farmers' incomes. Farmers, as the main stakeholders in land transfers, have their willingness directly impact the smoothness and effectiveness of the land transfer process.

Currently, research on land transfer is primarily conducted by Chinese scholars, focusing on rural development from various perspectives and theories, with an in-depth exploration of the factors influencing farmers' willingness to transfer land. Many scholars have chosen to conduct field surveys and use mathematical modeling for data analysis to investigate the main factors affecting farmers' willingness to transfer land. For instance: Chen et al. (2019) conducted a micro-survey of 926 rice farmers in Hubei, Anhui, Jiangxi, and Hunan provinces. Using the OLS model and advantage analysis, they examined the relative importance of factors such as comparative cost-benefit and policy environment on farmers' land transfer willingness [5]. Fu et al. (2019) selected farmers from Ning'an City, Heilongjiang Province, as the sample, designing a questionnaire survey and constructing a Logistic model to empirically analyze the factors influencing farmers' land transfer behavior [6]. Peng et al. (2020) conducted a survey of 645 households in 10 counties and districts in Hubei Province, using an unordered multinomial Logistic regression model to empirically analyze the factors affecting farmers' decisions to transfer land, acquire land, or not participate in land transfer [7]. Liu et al. (2018) surveyed the main grain-producing areas of Henan Province, employing a questionnaire survey and Logistic regression model to analyze the factors influencing land transfer willingness [8]. Lyu et al. (2017) focused on 205 households in Xinchang County, Zhejiang Province, investigating mountain farmers' willingness to transfer homestead land and using a Logistic regression model to analyze the influencing factors [9]. In summary, existing model estimates and analysis results generally indicate that the factors influencing farmers' land transfer include: (1) Individual Characteristics of Farmers: These include the age, gender, education level, health status, and occupation of the household head [10-11]. (2) Household Structure Characteristics: Factors such as the number of family members, the amount of household labor, household income levels, the proportion of non-agricultural income, and the area of contracted farmland [12-13]. (3) Social Security Characteristics: These involve the number of family members participating in rural social security, and whether farmers have medical and pension insurance [14-15]. (4) Institutional Characteristics: These include farmers' awareness of land transfer policies, whether they receive agricultural subsidies, and their understanding of land transfer intermediaries [16].

In selecting research samples, Chinese scholars predominantly focus on economically developed regions with higher levels of land transfer, such as Zhejiang, Anhui, Hubei, and Jiangsu. However, there is insufficient attention given to less developed areas, particularly the rural land transfer issues in western China. The western regions face severe land fragmentation, uneven distribution of natural resources, relatively weak economic foundations, inadequate resource endowments, and distinctive local cultures. Consequently, national research conclusions are often inadequate to explain the disparities between the eastern and western regions. Currently, the proportion of the rural population remains relatively high in the western provinces. For instance, as of 2018, the rural population in Guizhou Province was 18.8928 million, accounting for 52.48% of the province's total population [17]. Implementing land transfer and promoting large-scale and modern agricultural development are crucial for consolidating poverty alleviation and achieving rural revitalization. Therefore, it is essential to focus on the land transfer issues in the western regions and investigate the factors influencing farmers' willingness to transfer land, warranting significant academic attention.

Furthermore, current research often assumes that farmers make economic decisions as "rational agents" or "economic agents", suggesting that objective realities and the pursuit of profit maximization are their primary considerations. However, the willingness to transfer land is a subjective ideology that reflects the dynamic psychological process and state of farmers. As "social beings", farmers are influenced by subjective factors such as individual endowment differences, personal goals, beliefs, perceptions, and local cultural concepts. These factors can significantly impact their choices, especially when faced with uncertainty and risk, making it challenging to make purely rational decisions [18]. In reality, farmers' decisions regarding land transfer involve a rational decision-making process, encompassing a balance of the benefits and drawbacks of land transfer, as well as considerations of land value and significance. This decision-making process aligns with Max Weber's dichotomy of value rationality and instrumental rationality. Based on this, I conducted a survey in 17 different native villages in Guizhou Province. The study utilized the dual rationality theory proposed by sociologist Max Weber, employing a Logistic model to empirically investigate the factors influencing farmers' willingness to transfer land from the perspectives of "instrumental rationality" and "value rationality". This research aims to provide theoretical support and references for further advancing land transfer efforts in western China.

## RESEARCH HYPOTHESIS AND THEORETICAL MODEL

### Research Hypotheses

The willingness to transfer land is a dynamic subjective activity that involves both the value-rational choices and instrumental-rational thinking of farmers.

#### *Value-rational choice variables and research hypotheses*

“Value rationality” emphasizes focusing rational attention on the intrinsic value represented by the behavior itself, without regard to its implications for social justice, religion, morality, or law. The actor pursues the intrinsic value of the behavior, irrespective of the consequences or means, valuing only the outcome chosen by the behavior [1]. In the land transfer process, farmers’ value-rational choices are concerned solely with the intrinsic meaning and value of the land [18]. Longstanding affection for the land is the primary reason older farmers are reluctant to transfer their land. Other emotional and cognitive factors may also influence farmers’ willingness to transfer land [19]. Most settlements are in areas with harsh natural conditions and low material living standards. Over a long period, farmers have gradually adjusted the relationship between humans and nature. On one hand, they have a natural dependence and affection for the land; on the other hand, they place a higher value on solidarity and mutual reliance [20]. Continual absorption of external cultural benefits has fostered a harmonious and symbiotic cultural character and a profound indigenous cultural endowment, with cohesiveness becoming a prominent cultural trait.

Therefore, farmers imbue land with deep sentiments and beliefs, pursuing the “inherent value” that farming brings. They link their identity to the land, feeling that detaching from it would strip them of the ancestral identity passed down through generations. This traditional perception of land is stronger among farmers. Due to the need to maintain and pass on blood or kinship ties, farmers have a natural emotional and spiritual attachment to the land, an expression of emotion unrelated to utilitarian purposes. The tranquility and comfort of rural life inspire farmers who yearn for and cherish the rural lifestyle to continue maintaining the land, seeking the “happiness” it brings. Simultaneously, the sentiment of “returning to one’s hometown” and the habit of generations of cultivation make farmers wary of land transfer, which can damage the soil and disrupt the original land layout. Keeping the land intact provides a sense of “security”. These aspects illustrate the “value rationality” characteristic of farmers in the land transfer process. Based on this, the following research hypotheses are proposed:

H1: The stronger the farmers’ deep affection for the land, the lower their willingness to transfer land;

H2: The higher the farmers’ identification with their farmer identity, the lower their willingness to transfer land;

H3: The closer the emotional attachment to the land, the lower the willingness to transfer land;

H4: The stronger the vision for rural life, the lower the willingness to transfer land;

H5: The greater the concern about land, the lower the willingness to transfer land.

#### *Instrumental rational choice variables and research hypotheses*

“Instrumental rationality” emphasizes actions driven solely by utilitarian motives, using rational means to achieve desired objectives. Actors are motivated purely by the maximization of benefits, without regard for spiritual values or emotions [1]. This rationality focuses on the efficacy and timeliness of means in achieving specific goals and interests, reflecting a state of practical, interest-driven action. For farmers, instrumental rationality manifests in treating land as a condition or tool for realizing self-interest and maximizing benefits, imbued with a strong utilitarian flavor.

In economics, the “rational economic man” hypothesis suggests that individuals compare expected returns and costs when making economic decisions, choosing actions that maximize their interests. When deciding on land transfer, farmers weigh the expected income and benefits that land transfer may bring to their household; the higher the expected returns, the stronger the willingness to transfer land [18]. Additionally, with the urbanization trend of labor, non-agricultural income has gradually become the primary source of household income for farmers, and the lack of labor for farming has led to severe land abandonment. Therefore, the stability of non-agricultural income is correlated with land transfer. Farmers’ willingness to transfer land is also influenced by their awareness and understanding of land transfer policies; the more knowledgeable they are about these policies, the more confident they feel about transferring land. Trust in reputable individuals can influence decision-making, and the current rural land transfer platforms are mainly operated by village committees. Hence, the higher the level of trust in collective organizations, the greater the willingness to transfer land. The security of income for farmers who have already transferred land serves as a reference for others, affecting their willingness to transfer. The better the income security observed, the higher the willingness to transfer land. Based on this, the following hypotheses are proposed:

- H6: There is a positive correlation between expected income from land transfer and farmers' willingness to transfer land;  
H7: The stability of non-agricultural income significantly affects farmers' willingness to transfer land;  
H8: The level of familiarity with land transfer policies is positively correlated with farmers' willingness to transfer land;  
H9: The higher the trust in collective organizations, the stronger the willingness to transfer land;  
H10: The security of income for farmers who have already transferred land is significantly related to farmers' willingness to transfer land.

### Theoretical Model

Based on Max Weber's dimensions of "instrumental rationality" and "value rationality", a model of factors influencing farmers' willingness to transfer land is constructed, as shown in Fig. 1:

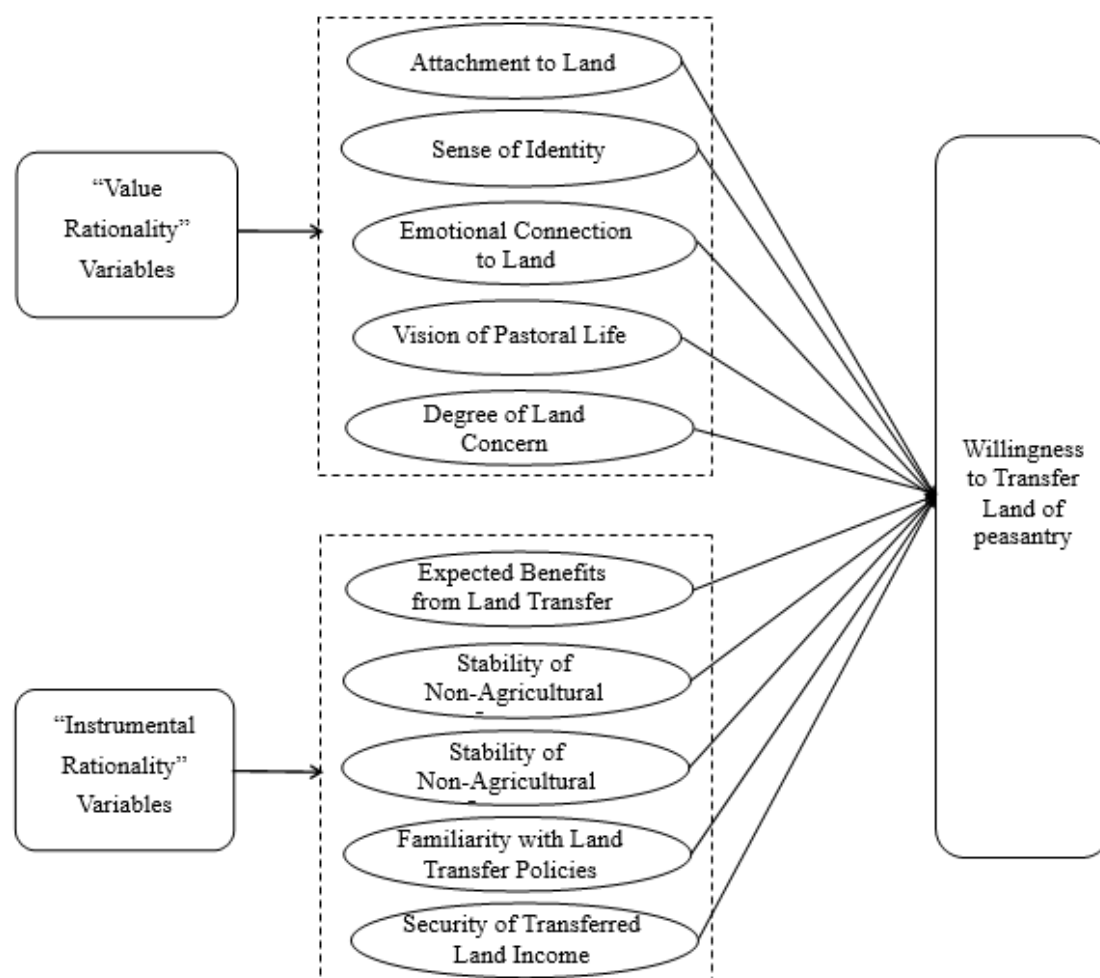


Figure 1. Farmers' willingness to transfer land model based on dual rationality theory

### VARIABLE DEFINITION AND RELIABILITY AND VALIDITY ANALYSIS

#### Variable Definition

Based on the research hypotheses, this study uses the "willingness of farmers to transfer land" as the dependent variable. The independent variables include five indicators under farmers' "value rationality" choices: attachment to land, sense of identity, emotional connection to land, vision of pastoral life, and degree of land concern. Under the "instrumental rationality" considerations, the indicators are expected benefits from land transfer, stability of non-agricultural income, familiarity with land transfer policies, farmers' trust in collective organizations, and the security of transferred land income. The measurement method employs a five-point Likert scale, assigning values according to direction-intensity descriptive statements, with favorable items scoring 5, 4, 3, 2, and 1 respectively. The relevant definitions and variable descriptions are detailed in Table 1:

Table 1. Definitions and descriptions of key variables

| Items                                | Variables                               | Symbols  | Definitions                                                       | Descriptions                                                                                    |
|--------------------------------------|-----------------------------------------|----------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Dependent Variable                   | Willingness to Transfer Land            | $L$      | Farmers' willingness to transfer land                             | 1 = Willing to transfer; 0 = Not willing to transfer                                            |
| "Value Rationality" Variables        | Attachment to Land                      | $X_1$    | Degree of farmers' deep attachment to land                        | 1 = Very deep; 2 = Deep; 3 = Uncertain; 4 = Not deep; 5 = Not deep at all                       |
|                                      | Sense of Identity                       | $X_2$    | Degree of farmers' identification with the farmer identity        | 1 = Strongly identify; 2 = Identify; 3 = Uncertain; 4 = Not identify; 5 = Strongly not identify |
|                                      | Emotional Connection to Land            | $X_3$    | Natural emotional connection of farmers to land                   | 1 = Very emotional; 2 = Emotional; 3 = Uncertain; 4 = Not emotional; 5 = Not emotional at all   |
|                                      | Vision of Pastoral Life                 | $X_4$    | Aspiration of farmers for pastoral life                           | 1 = Strongly aspired; 2 = Aspired; 3 = Uncertain; 4 = Not aspired; 5 = Strongly not aspired     |
|                                      | Degree of Land Concern                  | $X_5$    | Concern about the destruction of land transfer                    | 1 = Very concerned; 2 = Concerned; 3 = Uncertain; 4 = Not concerned; 5 = Not concerned at all   |
| "Instrumental Rationality" Variables | Expected Benefits from Land Transfer    | $X_6$    | Expected benefits of farmers from land transfer                   | 1 = Very high; 2 = Moderate; 3 = Uncertain; 4 = No expectation; 5 = Very low                    |
|                                      | Stability of Non-Agricultural Income    | $X_7$    | Stability of non-agricultural income in farmers' household income | 1 = Very stable; 2 = Quite stable; 3 = Stable; 4 = Not very stable; 5 = Very unstable           |
|                                      | Familiarity with Land Transfer Policies | $X_8$    | Farmers' familiarity with land transfer policies                  | 1 = Very familiar; 2 = Familiar; 3 = Uncertain; 4 = Not familiar; 5 = Not familiar at all       |
|                                      | Trust in Collective Organizations       | $X_9$    | Trust of farmers in village collective organizations              | 1 = Strongly trust; 2 = Trust; 3 = Uncertain; 4 = Not trust; 5 = Strongly not trust             |
|                                      | Security of Transferred Land Income     | $X_{10}$ | Security of income from transferred land                          | 1 = Very secure; 2 = Secure; 3 = Uncertain; 4 = Not secure; 5 = Not secure at all               |

## Data Analysis Methods

Based on the variable definitions, the factors influencing farmers' willingness to transfer land are divided into two categories: "value rationality" and "instrumental rationality", with a total of 10 independent variables. The dependent variable, farmers' willingness to transfer land, can be categorized into two responses: "willing" and "unwilling", with values of 0 or 1. Since the dependent variable is dichotomous, it is appropriate to use a binary logistic regression model to explain the issue. The model is as follows:

$$P_i = F(Z_i) = F(X_i\beta) = \frac{1}{1 + e^{-Z}} \quad (1)$$

Where,  $e$  is the natural logarithm, and after performing a linear transformation on the Logistic model, it becomes

$$\ln\left(\frac{P_i}{1 - P_i}\right) = Z_i = X_i\beta \quad (2)$$

Where,  $\frac{P_i}{1 - P_i}$  represent the odds ratio of the two choices. Let  $P_i$  be the probability of  $Y=1$ . Taking the logarithm of  $\frac{P_i}{1 - P_i}$ , we performed a logistic transformation and use the logistic  $P$  as the dependent variable. The  $i$  independent variables are  $X_1, X_2, \dots, X_i$ , corresponding to the regression model:

$$\text{Logistic}P = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i = \beta_0 + \sum_{j=1}^i \beta_j X_j \quad (3)$$

Where,  $\beta_0$  is the constant to be estimated, and  $X_j$  ( $j = 1, 2, \dots, i$ ) represent the “value rationality” and “instrumental rationality” factors affecting farmers’ willingness to transfer land,  $\beta_j$  is the partial regression coefficients of  $X_j$  ( $j = 1, 2, \dots, i$ ) .

### Reliability and Validity Tests

To ensure the effectiveness and reliability of the information collected by the questionnaire, further reliability and validity tests were conducted. The commonly used Cronbach’s alpha coefficient was employed to measure the internal consistency reliability of the questionnaire items, while exploratory factor analysis was used to examine the dimensional structure within the questionnaire. The test results are shown in Table 2. As indicated in Table 2, the sample’s Cronbach’s alpha coefficient is 0.723, which is greater than 0.7, demonstrating that the questionnaire is reliable. The KMO value is 0.654, which is greater than 0.6, indicating good sample validity.

Table 2. Reliability and validity test of the questionnaire

| Indicators                    |                        | Determination Coefficient |
|-------------------------------|------------------------|---------------------------|
| Cronbach’s $\alpha$           |                        | 0.723                     |
| KMO                           |                        | 0.654                     |
| Bartlett’s Test of Sphericity | Approximate Chi-Square | 625.146                   |
|                               | df                     | 55                        |
|                               | sig.                   | 0.000                     |

## RESULTS ANALYSIS

### Sample Selection and Data Sources

It is well known that the rural population and rural land are abundant in Guizhou, with a high degree of population aggregation. According to the 2010 “Sixth National Census” data, Guizhou Province has a total population of 34.7465 million. 17 rural villages with long-established resident populations were selected in this study as the research objects. In each village, a typical settlement was chosen, and 30 households were randomly selected as the sample for the survey.

Researchers, who were all students from Liupanshui Normal University and whose families were residents of the local villages in Guizhou Province, were recruited for the survey. These researchers received professional training, and a survey questionnaire was designed. From July to October 2022, the researchers conducted on-site surveys in 17 long-established villages in Guizhou Province, including Dazhai Village in Liping County, Yao’ ai Village in Libo County, Yunshe Village in Jiangkou County, Kala Village in Danzhai County, Bide Village in Shuicheng County, and Hejiazhuang Village in Panzhou City. A total of 510 questionnaires were distributed, and all were effectively retrieved, yielding a recovery rate of 100%. After screening and removing 54 invalid samples, 456 valid questionnaires were retained, resulting in an effective response rate of 89.4%. Through this survey, basic data for the research sample was obtained.

### Descriptive Statistics of the Sample

The interviewees in this study were primarily heads of ordinary farming households involved in land transfer. The term “land transfer” refers to the transfer of land contract management rights by ordinary farming households, specifically the first transfer, excluding secondary transfers through land transfer platforms. Land transfer generally involves the operational rights (excluding ownership and contracting rights) of farmland, grassland, and aquaculture waters contracted by families or still managed collectively by the village, and does not include homestead land.

The purpose of this study is to analyze the influencing factors and significance of farmers’ willingness to transfer land based on Weber’s dual rationality theory. The frequency of willingness within the sample is shown in Table 3. The descriptive statistics of the 456 surveyed households are detailed in Table 4.

Table 3. Frequency statistics of the dependent variable

|       |           | Frequency | Percentage | Valid Percentage | Cumulative Percentage |
|-------|-----------|-----------|------------|------------------|-----------------------|
| Valid | Unwilling | 242       | 53.1       | 53.1             | 53.1                  |
|       | Willing   | 214       | 46.9       | 46.9             | 100.0                 |
|       | Total     | 456       | 100.0      | 100.0            |                       |



The dependent variable is the farmers' willingness to transfer land, categorized into two answers: "willing" and "unwilling". A value of 1 indicates "willing", while a value of 0 indicates "unwilling". Among the 456 valid samples, 242 farmers were unwilling to transfer their land, accounting for 53.1% of the total sample; 214 farmers were willing to transfer their land, representing 46.9% of the valid questionnaires. The data suggests that the willingness of farmers in Guizhou Province to transfer land is not particularly strong.

Table 4. Results of descriptive statistics

| Symbols  | $N$ | Min. | Max. | Mean | SD   | Variance |
|----------|-----|------|------|------|------|----------|
| $L$      | 456 | 0    | 1    | .48  | .48  | .500     |
| $X_1$    | 456 | 1    | 5    | 1.90 | 1.90 | .804     |
| $X_2$    | 456 | 1    | 5    | 2.66 | 2.66 | 1.167    |
| $X_3$    | 456 | 1    | 4    | 1.78 | 1.78 | .596     |
| $X_4$    | 456 | 1    | 5    | 1.95 | 1.95 | .957     |
| $X_5$    | 456 | 1    | 5    | 2.24 | 2.24 | 1.104    |
| $X_6$    | 456 | 1    | 5    | 2.34 | 2.34 | .969     |
| $X_7$    | 456 | 2    | 5    | 3.52 | 3.52 | .942     |
| $X_8$    | 456 | 1    | 5    | 3.65 | 3.65 | .921     |
| $X_9$    | 456 | 1    | 5    | 2.96 | 2.96 | 1.033    |
| $X_{10}$ | 456 | 1    | 5    | 3.07 | 3.07 | .802     |

Table 4 reveals that the mean value for farmers' attachment to their land ( $X_1$ ) is 1.9, falling between the choices of "very deep" and "deep", indicating that many farmers have a profound attachment to their land. The mean value for the degree of identity recognition ( $X_2$ ) is 2.66, tending towards "uncertain". The mean values for emotional connection to land ( $X_3$ ) and aspiration for pastoral life ( $X_4$ ) are 1.78 and 1.95, respectively, reflecting a strong emotional bond with the land and a significant longing for rural life among the farmers. The concern about land being damaged after transfer ( $X_5$ ) has a mean value of 2.24, which lies between "uncertain" and "concerned". The expected benefit from land transfer ( $X_6$ ) has a mean value of 2.34, indicating that farmers anticipate some level of profit from land transfer. The stability of non-agricultural income ( $X_7$ ) has a mean value of 3.52, between "not very stable" and "stable", suggesting that farmers have relatively poor stability in their non-agricultural income. Additionally, farmers generally have moderate knowledge of land transfer policies and trust in the collective. The recognition of the income security for farmers who have already transferred land has a mean value of 3.07, indicating a relatively low level of recognition for income security.

## Empirical Results

This study empirically examines the factors influencing farmers' willingness to transfer land. The collected data were tested and analyzed using SPSS 22.0, and the regression results were obtained using multiple linear methods, as shown in Table 5.

### Significance analysis of the "Value Rationality" variables

In the process of land transfer, farmers' focus on "value rationality" does not lie in the market value of the land itself, but rather in the conscious or unconscious attribution of "absolute value" to the act of farming. This endows the land with certain beliefs, culture, or sentiments, seeking the "intrinsic value" derived from farming activities [18]. Thus, it is hypothesized that farmers value the act of cultivation for maintaining their attachment to the land, the honor of identity recognition, personal emotional investment, the idyllic longing for pastoral life, and the natural care for the land. These aspects reflect the characteristics of value rationality in the land transfer process. Using the five elements of "value rationality" as independent variables, SPSS software was employed for logistic regression analysis on valid data. The results show that  $X_1$  (attachment to the land),  $X_2$  (identity recognition), and  $X_3$  (emotional connection) passed the 5% significance level test.

The partial regression coefficient result for the  $X_1$  (attachment to the land) variable is negative and significant at the 5% level. This indicates that attachment to the land has a significant negative impact on farmers' willingness to transfer land. Mendras, in his in-depth study of traditional farmers, discovered that for farmers, land represents the fields they cultivate, the crops that have sustained their families for generations, and their occupation. Traditional farmers believe that they are the ones who understand, love, and own the land. The emotions of "understanding", "loving", and "owning" express traditional farmers' deep sentiments towards the land [21]. Chinese scholar Chen Shengxiang's research on land attachment points out that "land attachment" refers to a profound and mysterious emotion deeply rooted in farmers' hearts, encompassing love, possession, and attachment to the land [22]. Therefore, it is evident that farmers endow the land with natural and sincere emotions, making it an entity that holds their feelings and sentiments, especially for those who have been engaged in farming for generations. Consequently, farmers with a higher attachment to the land are less willing to transfer it, which is consistent with the empirical analysis results of this study.

Table 5 Empirical results of the model on factors influencing farmers' willingness for land transfer

| Symbols  | B     | S.E. | Wals   | df | Sig.  | Exp (B) |
|----------|-------|------|--------|----|-------|---------|
| $X_1$    | -.533 | .190 | 7.882  | 1  | .005* | .587    |
| $X_2$    | -.358 | .128 | 7.788  | 1  | .005* | .699    |
| $X_3$    | -.772 | .284 | 7.415  | 1  | .004* | 2.165   |
| $X_4$    | -.213 | .155 | 1.875  | 1  | .171  | 1.237   |
| $X_5$    | -.048 | .121 | .157   | 1  | .692  | 1.049   |
| $X_6$    | 1.320 | .178 | 55.041 | 1  | .000* | .267    |
| $X_7$    | -.124 | .146 | .717   | 1  | .397  | .883    |
| $X_8$    | .187  | .162 | 1.329  | 1  | .249  | 1.206   |
| $X_9$    | .407  | .132 | 9.467  | 1  | .002* | .665    |
| $X_{10}$ | .144  | .203 | .503   | 1  | .478  | .866    |
| Constant | 4.149 | .857 | 23.440 | 1  | .000* | 63.344  |

Note: a. Variables entered in Step 1: [ $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ ,  $X_5$ ,  $X_6$ ,  $X_7$ ,  $X_8$ ,  $X_9$ ,  $X_{10}$ ], b. \* indicates statistical significance at the 5% level.

The partial regression coefficient result for the  $X_2$  (identity recognition) variable is -0.358, with a  $P$  value of 0.005 at the 5% significance level, indicating a significant negative correlation between identity recognition and farmers' willingness to transfer land. Identity recognition refers to farmers viewing the land as a hallmark and symbol of their agricultural identity [18]. The land is a crucial source of wealth, a vital means of survival, and a symbol of the farmer's identity. For farmers, the land carries the weight of identity inherited from years of farming traditions. If they leave the land and cease farming, they lose their sense of identity and recognition. This traditional understanding and cognition lead farmers to be reluctant to transfer the land that has been passed down through generations.

The  $P$  value for  $X_3$  (emotional connection) is 0.004, with a regression coefficient of -0.772, indicating that farmers' emotional connection to the land has a significant negative impact on their willingness to transfer it. Emotional connection to the land primarily refers to the subjective feelings and experiences farmers have towards the land. The variable of emotional connection specifically refers to the value and significance that farmers attribute to the land in maintaining personal emotions. It is an expression and reliance on personal feelings, unrelated to profit, driven by emotion rather than utility [18]. American anthropologist Redfield (1956) suggested that "attributing a mystical value and emotion to the land is a unique attitude of farmers worldwide". Affection for, respect for, and love for the land are the natural logic of farmers' existence and life. Based on the demands of emotional connection, farmers prefer to transfer land to relatives and friends to maintain a sense of "ownership" and preserve their emotional bond with the land, rather than transferring the land's operational rights to outsiders.



The  $P$  value for the  $X_4$  (aspiration for pastoral life) variable is 0.171, failing to pass the statistical test at the 5% significance level. For long-term residents, pastoral life is already a part of their existing lifestyle, so they lack the desire and longing for it. Their perception of pastoral life is relatively low, and it does not become a factor in their decision-making regarding land transfer.

The  $P$  value for the  $X_5$  (concern about land destruction) variable is 0.692, failing to pass the statistical test at the 5% significance level. The terms of land transfer agreements often specify the intended use of the land after transfer, typically maintaining its agricultural use. Therefore, according to field surveys, farmers are less concerned about the potential destruction of the land when considering land transfer.

#### ***Significance analysis results of the “Instrumental Rationality” variables***

Among the five independent variables in the “instrumental rationality” dimension,  $X_6$  (expected returns) and  $X_9$  (trust in collective organizations) passed the 5% significance test, while  $X_7$  (stability of non-agricultural income),  $X_8$  (familiarity with land policies), and  $X_{10}$  (security of households with transferred land) did not pass the test.

The partial regression coefficient for the  $X_6$  (expected returns) variable is 1.320, with a  $P$  value of 0.000 at the 5% significance level, indicating that farmers’ expectations of income from land transfer significantly influence their willingness to transfer land. The higher the expected rent and anticipated returns from land transfer, the more willing farmers are to transfer their land [23]. The economic function is the primary function of land [24]. He et al. (2016) found that one of the key reasons farmers transfer land is to obtain rental income [25]. From a cost-benefit perspective, achieving maximum economic returns through land is the desired outcome for all farmers, aligning with the conclusions of most current researchers.

The variable  $X_7$  (stability of non-agricultural income) has a  $P$  value of 0.397 and failed to pass the 5% significance level statistical test. The mainstream perspective posits that, due to the lower efficiency of agricultural industries compared to non-agricultural industries, rational farmers will gradually shift to non-agricultural production and transfer their land when non-agricultural income surpasses agricultural income. However, this assumption presumes that farmers are “rational” and “economic” agents. When farmers imbue land with emotional value or view it as the minimum safeguard for their livelihood, their willingness to transfer land does not increase even if non-agricultural income gradually rises and becomes stable. This has been empirically verified in surveys of farmers in Guizhou Province.

The variable  $X_8$  (familiarity with land policy) has a  $P$  value of 0.249, indicating that farmers’ familiarity with land policies is not directly related to their willingness to transfer land. In recent years, various levels of government have introduced a series of policies to expedite the separation of land’s “three rights” and promote land transfer. The traditional view holds that, based on risk aversion considerations, farmers’ familiarity with land policies can enhance their willingness to transfer land [18]. Risk aversion refers to the strategy of proactively abandoning or altering an activity to avoid risks associated with it, particularly when there is a significant possibility of loss. Eliminating risk factors before they materialize is the most thorough risk control technique. However, the prerequisite for fully considering risk aversion is also based on the assumption of rationality. Concerns about losing land, which is the primary risk control factor, outweigh the concerns of risk aversion associated with land transfer. Consequently, farmers choose to retain land to secure their basic livelihood.

The partial regression coefficient for the variable  $X_9$  (trust in collective organizations) is 0.407, with a  $P$ -value of 0.002, passing the significance test. Farmers’ trust in collective organizations is significantly and positively correlated with their willingness to transfer land. This indicates that the higher the farmers’ trust in collective organizations, the more likely they are to transfer land. The collective organizations mentioned here include village committees, village cooperatives, and kinship families. Members’ trust in these organizations can effectively enhance their willingness to cooperate. The nature of farmers’ trust is characterized by differential trust and concrete trust, meaning their participation in cooperation stems not from a cooperative ideology but from their recognition of the leaders. In rural areas, traditional authority-based trust is widespread, and farmers inherently trust the authorities within their families or immediate surroundings. In rural communities, authoritative and capable individuals often serve as village committee or cooperative leaders. Thus, the smoothness of land transfers organized by village committees largely depends on the village leader’s prestige and credibility among the villagers, as well as the farmers’ trust in the village leader.

The variable  $X_{10}$  (security of transferred land for farmers) has a  $P$  value of 0.478, not passing the 5% significance test. The security of income from transferred land for farmers who have already transferred their land serves as a reference for other farmers' decisions regarding land transfer but does not become a primary consideration. The survey found that farmers are not very concerned about whether those who have transferred their land can receive rent on time or whether disputes related to land transfer are effectively resolved.

## CONCLUSIONS AND IMPLICATIONS

Accelerating the orderly, reasonable, and efficient transfer of land contract and operational rights is an inevitable direction for the development of China's rural society, particularly in its modernization efforts. The key lies in considering the perspective of the farmers, ensuring their rights, and addressing their concerns to increase their willingness to transfer land rights. This study, using a sample of 456 households from 17 indigenous villages in Guizhou Province and based on Max Weber's dual rationality theory, provides an empirical analysis of the significant factors influencing the willingness of western farmers to transfer land from both "value rationality" and "instrumental rationality" perspectives. The specific conclusions and implications are as follows:

### **"Instrumental Rationality" as Farmers' Rational Choice to Maximize Land Transfer Benefits**

The existence of instrumental rationality, through calculating specific practices and environments, enables individuals to achieve their desire to conquer and transform nature based on their own intelligence and physical abilities, thereby materializing their essential powers. Typically, driven by instrumental rationality, farmers consciously calculate the costs and benefits of land transfer to find the optimal means for this definite goal. The study shows that the expected benefits of land transfer ( ) and a high level of trust in collective organizations ( ) have passed the significance test. (1) Regarding the consideration of land transfer benefits, once farmers believe that land transfer can increase their income, they become willing to transfer their land. The higher the expected income, the stronger the willingness to transfer land. This reflects a rational thought process aimed at maximizing benefits. Hence, regional department at various levels should experiment with new land transfer models within the existing frameworks and implement corresponding benefit-linking mechanisms to stimulate farmers' enthusiasm and initiative in participating in land transfers. It is essential to explore various land transfer methods such as subleasing, leasing, exchanging, transferring, mortgaging, and equity participation, evaluating the optimal model that fits farmers' land transfer preferences. Enhancing farmers' psychological expectations of land transfer can strengthen their willingness to transfer land. For land pricing, a flexible pricing mechanism should be adopted. For instance, the land transfer pricing model of "fixed dividends + profit-sharing" explored in E'ga Village, Shuicheng County, Guizhou Province, significantly boosts the willingness for land transfer. The fixed dividends increase progressively with the length of the land transfer period, and profit-sharing is determined based on the operating entity's annual revenue. This greatly increased the enthusiasm of land transfer. (2) Trust in collective organizations is about risk avoidance and cost consideration. Collective organizations provide a highly trustworthy environment for farmers, reducing their concerns about bearing the risks associated with land transfer, which can greatly enhance their willingness to transfer land. This reflects farmers' rational calculation of risks and costs. Therefore, in building land transfer platforms, the land network transfer platforms established by provinces, cities, and towns may not be suitable. Instead, it is more necessary for village committees to serve as the main entities for constructing land transfer platforms, with village committee leaders or village cooperative leaders as the main advocates for land transfer promotion. Establishing village-level land transfer service centers through farmers' trust in collective organizations can organize and implement orderly land transfers.

### **Reflecting Farmers' Rational Consideration and Value Orientation Towards Land Transfer**

The prerequisite for instrumental rational thinking is the existence of value rationality. As long as farmers believe that land transfer itself holds certain value and significance, they will decide to implement it, leading to subsequent instrumental rational thinking. The study shows that attachment to the land ( ), identity recognition ( ), and emotional connection ( ) have passed the significance test, becoming important factors influencing farmers' value rationality in land transfer. Remote geographical locations, underdeveloped economic and cultural levels, coupled with certain unique family and ethnic concepts and distinctive cultures, make farmers view land as the most basic means of production and the most important means of livelihood, with strong dependence and emotional attachment to it. Unlike farmers in general regions, these farmers place greater emotional value on the land. This conclusion is drawn from a comparison with other scholars' studies, such as the research by Wang et al. (2019) [18]. Therefore, it is necessary to support and protect farmers' value rational choices while reducing their dependence on value rationality through instrumental rationality. This includes reforming the rural social security system, innovating rural pension models to alleviate farmers' concerns about life security, exploring pilot projects for advanced land transfer models, and

organizing farmers to visit, learn, and understand these models. Respecting customs and traditions, formulating appropriate and moderate land transfer policies, and recognizing that most of the attachment to land comes from middle-aged and elderly people can also help. When implementing land transfer, garnering the support of younger family members first and then communicating within the family can increase farmers' willingness to transfer land. Additionally, recognizing the importance of kinship, leveraging the authority of land transfer leaders can ensure the success of land transfers.

Max Scheler posits, "Every rational cognition activity is preceded by an evaluative emotional activity. Only by noticing the value of an object does it become worthy of study and meaningful." Farmers' willingness to transfer or not transfer land is a complex and comprehensive process, involving not only their cautious instrumental rational considerations but also self-reflection based on value rationality. Therefore, the effective implementation of land transfer cannot be assessed by general standards alone; it requires a tailored approach, respecting the personalized characteristics of farmers and considering both "instrumental rationality" and "value rationality" to enhance farmers' willingness to transfer land.

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