sustainability

MDPI

Article

Influencing Factors of Farmers' Land Circulation in Mountainous Chongqing in China Based on A Multi-Class Logistic Model

Xusen Zhu [1,2], Chaofu Wei [1], Fengtai Zhang [3,*], Junyi Zhang [4], Yuedong Xiao [3] and Xingyu Yang [3]

[1] College of Resources and Environment, Southwest University, Chongqing 400716, China; zhuxusen@sohu.com (X.Z.); weicf@swu.edu.cn (C.W.)
[2] Chongqing Academy of Social Sciences, Chongqing 400020, China
[3] School of Management, Chongqing University of Technology, Chongqing 400054, China; xiaoxiaokey@outlook.com (Y.X.); 1835372864@2020.cqut.edu.cn (X.Y.)
[4] School of Geography and Tourism, Chongqing Normal University, Chongqing 401331, China; hellojunyi@cqnu.edu.cn
* Correspondence: zhfthero45@cqut.edu.cn

Abstract: The orderly circulation of land can affect the structure of the agricultural industry, improve the level of agricultural industrialization, and realize the sustainable development of agriculture. Located in the inland of southwest China, Chongqing is the core area of China's Three Gorges Reservoir area, with obvious mountain characteristics. The characteristics and influencing factors of land transfer here can guide the reformation of land policy in other rural areas. Therefore, based on the survey data of 1015 mountain farmers in Chongqing, this paper employs a multi-class logistic model to analyze the above issues. The results show the following: (1) The phenomena of "zero rent" and "non-agreement" are widespread, and the spontaneous internal transfer among farmers is the main influencing factor. The decline in land value, the low degree of foreign investment, and the low average level of farmers' understanding of land transfer policies are quite different from the economically developed plains in the east. (2) Different directions of land circulation have different influencing factors. (3) The main factors are the total population of rural households, the proportion of non-agricultural household income, the age of the head of the household, the education level of the head of the household, the degree of land division, and the quality of land grades that affect land transfer and development in mountainous areas. Thus, improving the education level or technological training of farmers, establishing effective market mechanisms, and increasing income from non-agricultural employment can effectively promote land transfer. Moreover, age-oriented land policy is easier to implement.

Keywords: land transfer; logistic model; farming households; southwest mountainous region; Chongqing

Citation: Zhu, X.; Wei, C.; Zhang, F.; Zhang, J.; Xiao, Y.; Yang, X. Influencing Factors of Farmers' Land Circulation in Mountainous Chongqing in China Based on A Multi-Class Logistic Model. *Sustainability* **2022**, *14*, 6987. https://doi.org/10.3390/su14126987

Academic Editors: Song Shi and Chengdong Yi

Received: 25 April 2022
Accepted: 1 June 2022
Published: 7 June 2022

1. Introduction

Managing issues concerning agriculture, the countryside, and farmers ("san nong issue" in Chinese) is a significant factor in China's development and people's livelihood. The "san nong issue" consists of three objectives. To help the rural areas flourish and develop agriculture, we must protect the interests of farmers, whose most valuable property is their land. In other words, the key to the "san nong issue" is rural land use. Since the 1978 reform and opening up, China's rural land system has implemented family contract management, which initiated the gradual separation of collective ownership of the land from family contract management rights [1]. The change in the land system has brought "institutional dividends" to China's rapid development over the past 40 years [2,3], which has dramatically promoted agricultural and rural development. Meanwhile, promoting

land transfer in rural areas and developing moderate-scale operations have been the goals of China's rural policy. Chinese laws and local practices have primarily worked in this direction [4] with the aim of promoting agricultural and industrial restructuring and enhancing agricultural industrialization through orderly land transfer [5].

After 2012, the "separation of the rural land's ownership, management rights, contracting rights" and "three rights of rural land" became the necessary direction and ideological guideline of the new round of land system reform. It aims to promote further separation of farmers' contracting and management rights and to clarify ownership rights. In this way, it identifies the keys to the "san nong issue" as promoting land transfer to accelerate agricultural modernization and stimulating the endogenous power of agricultural and rural development. From 2008 to 2017, the area of land transfer in China rapidly expanded from 109 million mu (1 hectare = 15 mu) to 512 million mu [6]. This comprised a 4.70-fold increase, with an average annual expansion of 0.45 billion mu; the rate of rural land transfer rapidly increased from 8.85 to 36.97%, with an average yearly increase of 2.81 percentage points—a million households, accounting for 31.16% of the total number of families in contracted farming households nationwide [7]. However, in recent years, land transfer has become a problematic situation. Furthermore, the "three rights of rural land" and the issuance of registration of rights certificates have not achieved the expected policy effect of promoting land transfer [4].

Some deficiencies need to be addressed effectively, such as the problem of rural land fragmentation [2], lack of land property rights [8], and small-scale land operation [4,9]. Moreover, the challenges are increasingly severe, such as land being artificially abandoned and deserted [10], agricultural resources being overexploited, ecological resources being massively damaged [11] and seriously overdrawn, and agricultural resources and environment being over "red light."

What are the influencing factors for rural land transfer in Chongqing? With a vulnerable ecological environment and the rural land area accounting for 95% of its total area [12], Chongqing is the core of the Three Gorges Reservoir area and is crucial to sustainable agricultural development and ecological and environmental protection in the mountainous regions of southwest China. To ensure sustainable agricultural development and an efficient cycle of rural land transfer in Chongqing, we must solve this issue.

This paper uses a variety of analysis tools, and different flow directions and levels of influencing factors in rural land transfer in the southwest mountainous areas of China are intensively discussed. In terms of methods and ideas, we put forward policy optimization proposals to provide a more targeted reference for further regulation and promotion of land transfer.

2. Literature Review

Land circulation is the transfer of land management rights without a change of contracting and ownership rights [13]. Scholars at home and abroad have conducted numerous in-depth studies on its macro and micro aspects, such as the economic development level, land transfer market, non-farm employment, property rights system, land resource endowment, farm household structure, and farmers' perceptions and willingness, and have achieved fruitful research results.

Most scholars believe that a proper land transfer market can promote rural land transfer among different agents [14–19] or that its inadequacy hinders the orderly and healthy development of land transfer. Some scholars even hold that transformations in the agrarian sector depend on the successful functioning of the land market [20,21].

Scholars have focused on researching the pricing of land transfers when a freer land market is contacted [22]. In contrast, they have researched the laws and policies regarding land transfer [23,24]. Apart from the land transfer market, scholars have studied the economic and social impacts of land transfer behavior [25]. For example, the impact of the land transfer policy on rural tourism has been researched [26]. Land transfer has a close positive relationship with the local per capita income level [19,27], and economically devel-

oped regions with better-developed markets also have higher land transfer rates [2,28,29]. Increasing farmers' income through non-farm employment can promote land transfer, and freer labor markets promote more land leasing [30–34].

Alchian et al. (1973) argued that land rights stability is the key to maintaining long-term investment by landowners [35]. Secure property rights effectively motivate the parties to produce, operate, and help achieve land transfer [2,36–38]. However, it has also been shown that the increased security of property rights, which reinforces the "property endowment effect" of land [9], fails to promote land transfer [4,39] effectively. Many scholars have also conducted fruitful studies on multiple influencing factors, such as farmers' livelihoods, householder characteristics, education level, household decision making, perceptions, satisfaction, famine, and land quality [4,40–44].

The application of logistic regression in factor analysis is well established, for example, in the field of ecological technology evaluation [45] or the analysis of rare events data, binary dependent variables with dozens to thousands of times fewer ones [46]. Multi-class logistic regression is a developmental model of logistic regression that differs from the duality of traditional logistic regression by constructing multi-category logistic variables. The multi-class logistic model has been widely used in the field of machine learning and text analysis [47–49]. The multi-class logistic model is much more relaxed and flexible in its assumptions than discriminant analysis. However, there are still relatively few studies that have used multi-class logistic regression to conduct empirical analysis. It is reasonable to adopt multi-class logistic regression when the probability distribution of samples is uncertain [50,51]. For land transfer, we cannot ensure its probability distribution.

At present, relevant studies in China have mainly focused on the plains and hills in the central–eastern part of China, where agricultural development is high. Moreover, there are fewer relevant studies on the mountainous regions of southwest China. Many factors affect rural land transfer, and the elements are intertwined with each other. Their mechanisms are complex, even with apparent spatial and temporal evolution and variation characteristics.

In the Yangtze River's upper reaches, Chongqing is an important ecological barrier area, one of the concentrated contiguous poverty and mountainous regions of China, and a key restricted development reservoir area (Three Gorges Reservoir area). What are the characteristics of rural land transfer in Chongqing? What factors influence and constrain it? An empirical study was needed to answer these questions. The relevant research results of the above studies provided an essential reference for this study.

3. Method and Data

3.1. Multi-Categorical Logistic Model Setting and Variables

Many factors, both intrinsic and extrinsic, affect rural land transfer, such as the family structure and individual characteristics of the householder and the constraints of economic, social, and natural factors outside the household. Therefore, a multi-categorical logistic regression model was used for this study. The multi-categorical logistic regression model was extended from binary logistic regression and used for multi-categorical dependent variables [52]. Its parameter estimation is better than binary logistic regression [53].

3.1.1. Variable Description and Assignment

Integrating previous related literature [37,38] and surveys, this study selected family characteristics (FCs), individual householder characteristics (ICs), land input–output level (IO), land resource endowment (LR), land transfer profile (LT), farmers' policy cognition of land transfer (PP), and six other factors (Table 1) for analysis.

(1) Household characteristics (FCs) were mainly selected from household size and income, including total household size (X_1), household labor force (X_2), total household income (X_3), and the proportion of household non-farm income (X_4). A high proportion of household non-farm income indicates that farmers' primary income comes from non-farm employment, and they are more likely to choose to transfer-out the land. Other

indicators may have different effects on land transfer in and out, and their correlations are not consistent with different types of farmers' livelihoods.

(2) Individual characteristics of householders (ICs) were mainly selected from the personal qualities of the householder, including the age (X_5), education level (X_6), and health status (X_7). The age of the householder is related to land transfer: the older the householder, the more inclined he/she will be to transfer land; the higher the education level, the greater the likelihood of land transfer; in the transfer of land, the better the health condition of the householder, the more land that will be transferred.

(3) The land input–output level (IO) factor included two indicators: the annual mechanical input value (X_8) and the agricultural commodity rate (X_9). A considerable annual mechanical input value and a high agricultural commodity rate will indicate a greater inclination to transfer-in the land. Otherwise, the land is apt to be transferred.

(4) Land resource endowment (LR) factors mainly comprised indicators of land quantity and quality. The specific indicators included the total area of household contracted land (X_{10}), the average area of cropland per laborer (X_{11}), land fineness (X_{12}), land quality grade (X_{13}), land irrigation condition (X_{14}), land micro-landform type (X_{15}), average distance of the land plot from home (X_{16}), and land abandonment area (X_{17}). Land fragmentation is calculated by applying the fragmentation index based on the plots owned by farmers; from the average distance of the plots from home, a weighted average of the plots' distance is taken. In general, those with large family contracted land area and average labor acreage are more inclined to transfer-out the land. The transferring parties are more receptive to individuals with land of a high-quality grade that is easy to cultivate and who can easily to the transfer market.

(5) The land transfer profile (LT) included two indicators: transfer rent (X_{18}) and transfer contract form (X_{19}). The "zero rent" situation for land transfer in mountainous areas is more common; therefore, the survey's actual observations were made according to the two cases of rent and no rent. The presence of a transfer contract will also encourage farmers to transfer their land.

(6) Farmers' policy perceptions of land transfer (PP) factors included indicators such as perceptions of land ownership (X_{20}), knowledge of land transfer policy (X_{21}), and the role of land in old-age security (X_{22}). Greater knowledge of land attribution and land transfer policy is more conducive to land transfer; higher perceived significance of land in old-age security may hinder land transfer to some extent.

3.1.2. Establishing A Multi-Class Logistic Model

The rationality of farmers' land transfer decision-making behavior is limited, and the criterion for decision making is to seek the right decisions. This paper referred to existing research [52,53], combined with the actual situation of rural land transfer in southwest China, and established a multi-class logistic regression model to explore the influencing factors of land transfer.

Assume that i represents the farmers concerned about the relative level of profit and loss; it determines whether to participate in land transfer by maximizing the utility function. U_i represents the indirect utility function of i, and the function equation is

$$U_i = U_i(\mathrm{W},\ \mathrm{FC_i},\ \mathrm{IC_i},\ \mathrm{IO_i},\ \mathrm{LR_i},\ \mathrm{LT_i},\ \mathrm{PP_i},\ \mathrm{u_i}) \quad (1)$$

In the formula, W represents the welfare of farmers choosing a specific land transfer method; $\mathrm{FC_i}$ represents the family characteristics of the farmer; $\mathrm{IC_i}$ represents the individual characteristics of the farmer; $\mathrm{IO_i}$ represents the input and output status of the farmer; $\mathrm{LR_i}$ represents the resource endowment of the land owned by the farmer; $\mathrm{LT_i}$ represents the land transfer status of the farmer; $\mathrm{PP_i}$ represents the cognition of the farmer regarding the land transfer policy; $\mathrm{u_i}$ is the error of the utility function equation.

Table 1. Definition of variables influencing land transfer.

Variable Type	Variable Name		Variable Code	Variable Assignment
Dependent Variable	Farmers' land transfer behavior		Y	Transfer-in = 1; Transfer-out = 2; No transfer = 3
Independent Variable	Family characteristics (FCs)	Total household size	X_1	Actual observations
		Household labor force	X_2	Actual observed value
		Total household income	X_3	Actual observations
		Household non-farm income share	X_4	Non-farm income/gross household income
	Individual characteristics (ICs)	Age of household head	X_5	Actual observed value
		Education level of the household head	X_6	Illiterate = 1; elementary school = 2; middle school = 3; high school = 4; college and above = 5
		Health status of household head	X_7	Good = 1; fair = 2; poor = 3; very poor = 4
	Input–Output (IO)	Value of annual machinery inputs	X_8	Actual observed value
		Commercialization rate of agricultural products	X_9	Calculated
	Land Resource Endowment (LR)	Total area of land contracted by the family	X_{10}	Actual observed value
		Cultivated land area per worker	X_{11}	Total area of household contracted land/number of household workers
		Land fineness	X_{12}	Calculated (fineness index)
		Land quality grade	X_{13}	First class = 1; Second class = 2; Third class = 3; Fourth class = 4; Outside class = 5
		Land irrigation conditions	X_{14}	Rain-fed = 1; irrigated = 2
		Land micro-landform type	X_{15}	Slot dam = 1; low mountain = 2; middle mountain = 3; shallow hill = 4
		Average distance of plots from home	X_{16}	Calculated (weighted average)
		Land abandoned area	X_{17}	Actual observed values
	Land transfer profile (LT)	Transfer rent	X_{18}	With rent = 1; without rent = 2
		Form of transfer contract	X_{19}	Written = 1; verbal (no formal contract) = 2
	Policy perceptions (PPs)	Awareness of land ownership	X_{20}	Belong to the state = 1; belong to the township government = 2; belong to the village (group) collective = 3; belong to oneself = 4; not sure = 5
		Knowledge of land transfer policy	X_{21}	Very well informed = 1, informed = 2, not informed = 3
		The role of land in retirement protection	X_{22}	Very important = 1, important = 2, not important = 3

The necessary condition for farmers when choosing whether to participate in the land transfer is that their welfare status is improved or remains unchanged, and risk losses are minimized as much as possible. The change in welfare status can be expressed as

$$\Delta W = W' - W^0. \quad (2)$$

In the above formula, ΔW represents the change in the welfare of the farmer's land transfer, W' represents the welfare status of the farmer after participating in the land transfer, and W^0 represents the welfare status before land transfer.

Therefore, the probability Pr that a farmer decides whether to participate in land transfer can be expressed as

$$\begin{aligned}\mathrm{Pr} = \mathrm{Pr}(U_i(\ \mathrm{W}', \mathrm{FC_i}, \mathrm{IC_i}, \mathrm{IO_i}, \mathrm{LR_i}, \mathrm{LT_i}, \mathrm{PP_i}, \mathrm{u_i}) \\ > U_i(\mathrm{W}^0, \mathrm{FC_i}, \mathrm{IC_i}, \mathrm{IO_i}, \mathrm{LR_i}, \mathrm{LT_i}, \mathrm{PP_i}, \mathrm{u_i})).\end{aligned} \tag{3}$$

Facing land transfer, farmer i has n choices: transfer-in land, transfer-out land, or not transfer. The probabilities are p, q, and r, and they satisfy $r = 1 - p - q$. Therefore, the model that farmer i chooses to participate in land transfer is

$$U_i(x : p, y : q) = \Pi(p)U(x) + \Pi(q)U(y) \tag{4}$$

The general form of the binary discrete choice model of the probability that the independent variable x affects the Y distribution is

$$Pr(Y = n|x_i) = \frac{exp(x_i C_n)}{\sum_{n=1}^{n} exp(x_i C_n)}. \tag{5}$$

In the formula, Y is the dependent variable, which represents the land transfer behavior and is assigned values according to the transfer behavior: $Y = 1$ means transfer-in land; $Y = 2$ means transfer-out land; $Y = 3$ means no transfer; thus we assume that $C_3 = 3$. x is an independent variable representing the factors that affect farmer households' land transfer behavior, including family characteristics, individual characteristics, input and output conditions, land resource endowments, and policy perceptions. The dependent variable's division meets the requirements of the multi-class logistic regression model for the dependent variable. Thus, this study utilizes the multi-class logistic regression model to analyze the influencing factors of land transfer. The general form of the multi-class logistic regression model is

$$\begin{cases} logPr_{1/3} = ln\left[Pr\left(Y = 1\middle|X_j\right)/Pr\left(Y = 3\middle|X_j\right)\right] \\ = \beta_1 + \beta_{11}x_1 + \beta_{12}x_2 + \cdots \beta_{1i}x_i + u = g_1\left(X_j\right) \\ logPr_{2/3} = ln\left[Pr\left(Y = 2\middle|X_j\right)/Pr\left(Y = 3\middle|X_j\right)\right] \\ = \beta_2 + \beta_{21}x_1 + \beta_{22}x_2 + \cdots \beta_{2i}x_i + u = g_2\left(X_j\right) \end{cases}. \tag{6}$$

In the formula, X_j represents the various factors that affect land transfer. β_{1i}, β_{2i} are the partial regression coefficients of X_j that represent the ratio of the probability of two choices caused by the value of X_j increasing by one unit when other factors remain unchanged. β_1 and β_2 are constant terms, and u is a random error term.

Therefore, we constructed a multi-class logistic regression model:

$$\begin{cases} g_1\left(X_j\right) = log\frac{Pr(Y=1)}{Pr(Y=3)} \\ = \varphi_1 + \varphi_{11}W^a + \varphi_{12}FC^a + \varphi_{13}IC^a + \varphi_{14}IO^a + \varphi_{15}LR^a + \varphi_{16}LT^a + \varphi_{17}PP^a + \varepsilon \\ g_2\left(X_j\right) = log\frac{Pr(Y=2)}{Pr(Y=3)} \\ = \varphi_2 + \varphi_{21}W^a + \varphi_{22}FC^a + \varphi_{23}IC^a + \varphi_{24}IO^a + \varphi_{25}LR^a + \varphi_{26}LT^a + \varphi_{27}PP^a + \varepsilon \end{cases} \tag{7}$$

In the above formula, $g_1\left(X_j\right)$ and $g_2\left(X_j\right)$ represent the probability of transfer-in land and transfer-out land, respectively, and W^a represents the current welfare state. $\varphi_1\varphi_{11} \ldots \varphi_{17}$ and $\varphi_2\varphi_{21} \ldots \varphi_{27}$ are the coefficients to be estimated, and ε is the random error term. If choosing not to participate in land transfer as the control group, all the coefficients are 0 $g_3\left(X_j\right) = 0$. According to the above formula,

$$\begin{cases} Pr(Y = 1) = \frac{e^{g_1(X_j)}}{e^{g_1(X_j)} + e^{g_2(X_j)} + e^{g_3(X_j)}} \\ \quad = \frac{e^{g_1(X_j)}}{e^{g_1(X_j)} + e^{g_2(X_j)} + e^{0}} \\ Pr(Y = 2) = \frac{e^{g_2(X_j)}}{e^{g_1(X_j)} + e^{g_2(X_j)} + e^{g_3(X_j)}} \\ \quad = \frac{e^{g_2(X_j)}}{e^{g_1(X_j)} + e^{g_2(X_j)} + e^{0}} \end{cases}. \tag{8}$$

Through parameter estimation and logistic regression results, it is possible to analyze the impact of family, economic, social, and natural factors on land transfer in southwest China.

3.2. Study Area and Data

3.2.1. Study Area and Sample Plot Selection

Chongqing is located in southwest China and the upper reaches of the Yangtze River. It is an urban–rural comprehensive reform experimental area integrating large cities, rural areas, mountainous areas, and reservoir areas, and includes modern industry and traditional agriculture. The city covers an area of 82,400 km^2, of which rural areas account for 95%. The types of landforms in Chongqing are complex and diverse, dominated by hills and mountains. Approximately 76% are mountains, which are ecologically fragile areas superimposed by mountain and karst systems. In 2019, Chongqing's permanent population was 3.12 million, of which the permanent urban and rural population was 2.07 million (accounting for 66.8%) and 1.04 million (accounting for 33.2%), respectively.

This paper adopted a systematic selection method to determine the sample area. First, the southeast and northeast parts of Chongqing are typical mountainous terrains. The region has large undulations, a fragile ecological environment, poor soil, fragmented arable land, and low drought resistance. Moreover, its economic and social development are relatively backward, and there are many migrant workers. It is a fragile twofold area of ecology and livelihood. Therefore, we selected Wushan, Wulong, and Youyang as the study areas (Figure 1) typical and representative of the region. Second, we selected two towns based on the townships' economic development and agricultural production status in the above three counties. Finally, we selected 12 sample villages in those towns.

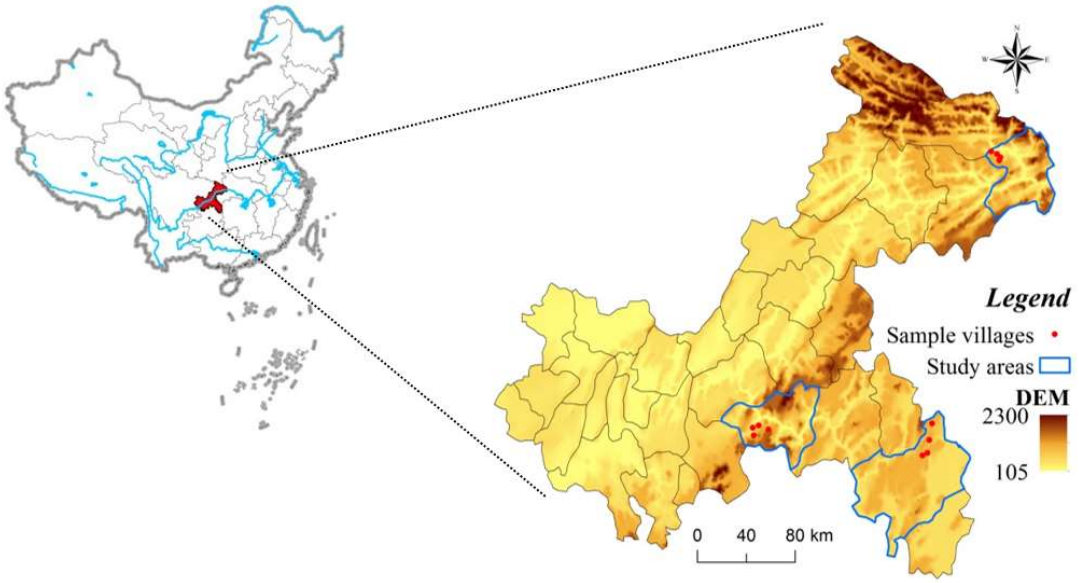

Figure 1. Locations of sample areas.

3.2.2. Data Collection

The design of the questionnaire comprised the following steps: (1) Determine the sample points and the scope of the study area and select the sample villages. (2) Obtain basic information. Conduct the necessary preliminary communication with relevant agricultural departments and governments. In addition, collect essential information about the sample villages and determine their natural environments, population resources, crucial agricultural production conditions, and other related information to lay the questionnaire design foundation. (3) Design the questionnaire. Based on the sample villages' actual situation, and under the guidance of instructors and relevant experts, a useful question-

naire is designed according to the research purpose. (4) Pre-investigation: a preliminary questionnaire is used to conduct a preliminary survey to test the questionnaire's rationality. (5) Improve the questionnaire based on the pre-investigation problems. The preliminary questionnaire is revised and perfected to determine the final questionnaire. The content of the questionnaire mainly revolves around the basic situation of farmers, their livelihood, land resource status, specific plot information, agricultural farming status, and land transfer awareness.

The data used in this article came from field surveys and government departments. From May to October 2018, we surveyed 12 sample villages over about 60 days. In the actual study, we conducted interviews with 1100 farmers. After sorting, we obtained 1015 valid questionnaires, including 373 in Wushan, 318 in Wulong, and 324 in Youyang, with an efficiency of 92.4%. Among the useful questionnaires, 577 samples participated in land transfers, of which 318 were transfer-in land, accounting for 55.11%, 259 were transfer-out lands, accounting for 44.89%, and 111 were both transfer-in land and transfer-out land (double transfers), accounting for 19.24%. Furthermore, there were 439 samples without land transfer.

4. Results and Discussion

4.1. Descriptive Statistical Results of the Sample

Among the 577 samples of farmer households participating in land transfer (Table 2), 522 households were headed by men, which accounted for 90.47%, and 55 households were female, accounting for 9.53%. There were only 78 household heads under 40 years old, accounting for 13.52% of the total sample. Most house -heads were over 50 years old, accounting for 53.73%, among which 32.41% were over 60 years old. The overall educational level of the head of the household was low. As many as 75.91% were illiterate and of primary school level. A total of 34.09% completed junior high school or above, and only 2.95% completed senior high school or above. A total of 52.17% of the heads of households were in "good" health, and 47.83% were in "average," "poor," or "very poor" health. Among the marital status of householders, 21.32% were "unmarried", "divorced", or "widowed", and 78.68% were "married".

Table 2. Descriptive statistics of influencing factors in land transfer.

Variable Types	Variable Name		Variable Code	Mean Value	Standard Deviation
Dependent Variable	Farmers' land transfer behavior		Y	2.051	1.266
Independent Variable	Family Characteristics (FCs)	Total household population	X_1	4.183	1.685
		Family labor force	X_2	2.821	1.178
		Total household income	X_3	34379	35682
		Proportion of household non-farm income	X_4	0.812	0.724
	Individual Characteristics (ICs)	Age of head of household	X_5	55	12
		Educational level of householder	X_6	2.124	0.694
		Health status of head of household	X_7	1.707	0.812
	Input–Output (IO)	Annual value of mechanical inputs	X_8	151	517
		Commercialization rate of agricultural products	X_9	0.106	0.234
		Total land area contracted by households	X_{10}	10.354	5.899
	Land Resource Endowment (LR)	Cultivated land area per worker	X_{11}	4.258	2.655
		Land fineness	X_{12}	0.681	0.168
		Land quality grade	X_{13}	2.117	0.681
		Land irrigation conditions	X_{14}	1.142	0.351
		Types of land micro geomorphology	X_{15}	1.712	0.802
		Average distance from home	X_{16}	408	283
	Land Transfer Overview (LT)	Abandoned land area	X_{17}	2.475	1.563
		Transfer rent	X_{18}	1.931	0.321
		Form of transfer contract	X_{19}	1.923	0.267
	Policy Perceptions (PPs)	Cognition of land ownership	X_{20}	2.879	1.420
		Understanding of land circulation policy	X_{21}	2.250	0.654
		The role of land in old-age security	X_{22}	1.623	0.692

The sample data indicated that the average total family size was 4.183 people, and the average family labor force was 2.821 people, indicating that the family size and the pressure to support them were moderate.

The average proportion of household non-farm income was 0.812, indicating that non-farm income had become the primary income source. The average age of the household head was 55 years old. The intermediate educational level was 2.124, indicating that most households had a low academic level comprising only primary school education, and good health. The low input value of land machinery and the low commodity rate of agricultural products indicated that traditional agricultural management was the primary mode. Otherwise, the results indicated that the degree of land fragmentation was high (0.681), the land quality grade was general (2.117), the irrigation condition was low (1.142), and the micro-landform type was mainly low and medium mountains (1.712).

Furthermore, land abandonment was common (2.475). The "zero rent" and non-agreement situations were common (1.923), indicating a spontaneous internal circulation among farmers as the main factor. The land value was reduced, and the participation of foreign capital was less. The average cognition level of farmers regarding land transfer policies was 2.250.

4.2. Empirical Analysis Results and Discussion of Multi-Classification Logistic Model

Based on the micro-survey data of rural households, a multi-classification logistic regression model was constructed to analyze the overall influencing factors in rural land transfer in the mountainous areas of southwest China.

Since the premise of using the multi-classification logistic regression model for analysis is to pass the likelihood ratio test, Table 3 shows the likelihood ratio test results of the model to analyze its overall effectiveness.

Table 3. Likelihood ratio test results of the multi-classification logistic regression model.

Likelihood Ratio Chi-Square Value	df	*p*	AIC Value	BIC Value
62.543	44	0.000	2862.524	2702.354

Table 3 shows the likelihood ratio test results of the model, which were used to analyze the model's overall effectiveness. The model test's original hypothesis was whether the model quality was the same when the independent variables were included in the two cases. Here, the *p* value was less than 0.05, indicating that the original hypothesis was rejected. The independent variables in the model construction were valid, and the model construction was meaningful. AIC and BIC values were used for comparison in multiple analyses. The lower the two values, the better. If the analysis is carried out several times, the changes in these two values can be compared to illustrate the model construction's optimization process.

As seen in the above table, the model test's original hypothesis was that the quality of the model would be the same whether the independent variables were input or not. Here, the *p*-value was less than 0.05 (chi-square = 62.543, P = 0.00), indicating that the original hypothesis was rejected. Thus, the model constructed in this study was meaningful, and the multi-classification logistic regression model can be used to analyze the influencing factors of rural land transfer. Therefore, we used SPSS 24.0 software to carry out logistic regression on 1015 samples of farmers, using those who had not transferred as the reference group, and analyzed them according to the situations of transferred-in land and transferred-out land, respectively. The regression results are shown in Table 4.

Table 4. Logistic regression results.

Influencing Factors	Variables	Variable Code	Transfer-in Land		Transfer-out Land	
			Coefficient B	Standard Error S.E.	Coefficient B	Standard Error S.E.
Family Characteristics (FCs)	Total household population	X_1	0.1704 *	0.0730	−0.3349 **	0.1049
	Family labor force	X_2	0.2826	0.1871	0.2709	0.2288
	Total household income	X_3	0.1809	0.1244	0.1909	0.1408
	Proportion of household non-farm income	X_4	−1.7069 ***	0.4476	1.6698 ***	0.6894
Individual Characteristics (ICs)	Age of head of household	X_5	−0.0113 *	0.0092	0.0208 **	0.0113
	Educational level of householder	X_6	−0.2325 **	0.1491	0.5290 ***	0.1877
	Health status of head of household	X_7	0.1305	0.1247	0.0348	0.1516
Input and OutPut(IO)	Annual value of mechanical inputs	X_8	0.3780 *	0.2347	−0.1642 **	0.1596
	Commercialization rate of agricultural products	X_9	0.2610 ***	0.4700	−0.0215	0.6369
Land Resource Endowment (LR)	Total land area contracted by households	X_{10}	0.0426	0.0493	−0.0582	0.064
	Cultivated land area per worker	X_{11}	−0.2673 **	0.1023	−0.0354	0.1084
	Land fineness	X_{12}	2.0584 ***	0.6934	1.8891 *	0.7791
	Land quality grade	X_{13}	−0.3276 **	0.1498	−0.2393 **	0.1842
	Land irrigation conditions	X_{14}	0.0608	0.3067	0.2685	0.4253
	Types of land micro geomorphology	X_{15}	−0.1349	0.1350	0.2632	0.1629
	Average distance from home	X_{16}	0.5406 ***	0.1488	0.0101	0.1235
	Abandoned land area	X_{17}	0.2416	0.1453	0.4310 ***	0.2175
Land Transfer Overview (LT)	Transfer rent	X_{18}	−1.2971 ***	0.4261	1.5123 ***	0. 5364
	Form of transfer contract	X_{19}	0. 2013	0.4439	0.1267	0.4121
PolicyPerceptions (PPs)	Cognition of land ownership	X_{20}	0.0723	0.1445	0.1578	0.1752
	Understanding of land circulation policy	X_{21}	0.1287 ***	0.0666	0.2957 ***	0.0867
	The role of land in old-age security	X_{22}	0.1237	0.1392	−0.1052	0.1808

Note: *, **, and *** indicate statistical significance at the 10, 5, and 1% levels, respectively.

As can be seen from the above regression results, the relationship between the relevant influencing factors and land transfer was as follows:

(1) In terms of family characteristics, the total proportion of non-agricultural household income was significantly correlated with the transferred land at the levels of 10 and 1%, respectively. The same two factors were significantly associated with the transferred land at the levels of 5 and 1%, respectively, while the other factors were not strongly correlated. Specifically, the number of family members was significantly positively correlated with the transferred land and negatively correlated with the transferred land. This may occur because, to obtain more benefits from a larger land area and cope with the pressure to support a larger family population, farmers turned to land transfer to expand their production and operation scale. The proportion of non-agricultural household income was negatively correlated with land transfer-in and positively associated with a land transfer-out, both of which were significant at the 1% level. If the proportion of non-agricultural household income was high, farmers were unwilling to transfer-in land but were willing to transfer-out land. This indicated that when non-agricultural income becomes the primary source of family income, farmers often want to pull out of the original land production and management and invest more time and energy into non-agricultural production in towns or big cities. This also reflected that traditional agricultural production and management modes offered poor economic benefits and were not too attractive. Therefore, it was necessary to transform and upgrade conventional agriculture to improve its benefits.

(2) From the perspective of householders' individual characteristics, the age and educational level of householders were significantly correlated with land transfer. Conversely, the health status of householders was not strongly correlated with land transfer. Specifically, the householder age was negatively related to land transfer at the 10% significance

level. Land transfer was significantly associated at the 5% level with an increase in the age of the head of the household. Furthermore, the gradual loss of labor capacity was not conducive to heavy agricultural production activities, and farmers were unwilling to transfer-in more land but were rather willing to transfer the land out, hoping to maximize the value of the land as much as possible, from which to achieve a corresponding return. The influence of the householder's educational level on land transfer was similar to that of the householder's age. This significantly negatively correlated with the transferred land at the level of 5% and significantly positively correlated with the transferred land at the 1% level. This indicated that a high level of education often meant a strong ability to make a living. Most were engaged in non-agricultural production with better economic benefits. Agriculture was no longer the focus of their production and lives, and they were not willing to transfer too much land to agricultural production. At the same time, well-educated, relatively liberated farmers were more inclined to transfer land out.

(3) The input–output regression results demonstrated that the annual mechanical input value was significantly positively correlated with the transfer-in land at the level of 10%. It was significantly negatively correlated with the transfer-out land at the level of 5%. This indicated that the farmers with high annual mechanical input values usually reached an absolute scale of land operation, obtained good income from the land operation, and were willing to continue to transfer more land to expand the scale of operation. Farmers with high annual mechanical input values were reluctant to transfer-out the land and did not want to lose the land's value. The commercialization rate of agricultural products was significantly positively correlated with the transfer-in land at the 1% level but not strongly correlated with the transfer-out land. This showed that a higher rate of commercialization of farmers' agricultural products was more likely to turn into land, especially at a larger scale, and obtain more profits. Moreover, it may enable farmers to move from traditional agriculture to the higher economic benefits of Chinese herbal medicine planting and other modern agriculture. It also indicated that modern agriculture can offer extensive benefits to farmers. Thus, support for it should increase to encourage more farmers.

(4) According to the regression results of the farmers' land resource endowment, cultivated land area per worker, land fragmentation, land quality grade, and the average distance of the land from home were significantly correlated with the transferred land. Factors such as land fragmentation, land quality grade, and abandoned area were significantly associated with the transferred land. Specifically, the cultivated land area per laborer had a significant negative correlation with the transfer-in land at the level of 5%. However, it was not strongly correlated with the transfer-out land, indicating that farmers with a small area of cultivated land per laborer were more willing to transfer land to increase income. The degree of land fragmentation was significantly positively correlated with the transfer-in land and the transfer-out land. The higher the degree of land fragmentation, the more the willingness to transfer land. Therefore, both transfer-in households and transfer-out households hoped that the optimal allocation of land resources space would make the farming conditions more convenient through land circulation. This also indicated the necessity of implementing land consolidation. The land quality grade had a significant negative correlation with the transfer-in land and the transfer-out land at the level of 5%, indicating that the lower the land quality grade was, the more willing farmers were to transfer the land. Conversely, the farmers with a higher land grade were unwilling to transfer the land. Both attached importance to the land grade correlation. However, there was no significant correlation between land transfer and irrigation conditions and micro-geomorphic types. This indicated that farmers paid little attention to irrigation conditions and micro-geomorphic types in the land transfer process when the surrounding conditions were generally similar. The average distance from the plot's home was significantly positively correlated with transfer-in land at the 1% level. However, it was not strongly correlated with transfer-out land, indicating that the transferring households in the mountainous environment were more sensitive to the distance and preferred to improve the convenience of farming through land transfer. The abandoned land area factor was

not strongly correlated with the transfer-in land. However, it was significantly positively correlated with the transfer-out land at the 1% level, which indicated that farmers generally attached importance to land value, were unwilling to abandon the land and preferred to realize land value through transfer.

(5) In terms of the general situation of land transfer, the rent was significantly correlated with both the transfer-in land and the transfer-out land at the 1% level. The contract form of land transfer was not strongly correlated with the land transfer. It indicated that rent was an important influencing factor for both transfer-in land and transfer-out land. Increasing rent would significantly inhibit farmers from transferring land, but increasing rent would also stimulate farmers to transfer more land. The economic aspect was always an important concern for farmers.

(6) According to the regression results of policy perception, the degree of understanding of land-related policies was significantly positively correlated with the transfer-in land and the transfer-out land at 1%. Furthermore, cognition of land ownership and the role of old-age land security were not strongly correlated with land transfer. This indicated that the more farmers knew about the policies, the more conducive they were to the development of land transfer. We should continue to strongly publicize relevant policies and improve farmers' understanding of land transfer to activate the land transfer market.

5. Discussion

(1) In the eastern plains of China (such as Henan Province), the degree of satisfaction with agricultural technology training and the proportion of non-agricultural income had a strong ability to explain the choice of farmland transfer behavior, and the factors that strongly impacted farmland transfer-out behavior were physical condition and farmland quality [7,44]. However, in the southwest mountainous region, family structure characteristics had the greatest impact on land transfer, followed by household head characteristics, and land use characteristics. In addition, "zero rent" and no agreement were common. Spontaneous internal transfers between farmers were the main factors.

(2) The multi-categorical logistic regression model was used for farmers' land circulation in the mountainous area. The multi-categorical logistic regression model was extended from binary logistic regression and used for multi-categorical dependent variables. We provided a method selection reference for land transfer-related research.

(3) Many factors affected land transfer, all of which influenced each other and had complex mechanisms and dynamic changes. For many reasons, other land transfer possibilities influenced the property rights system, intermediary organizations, etc., and factor analysis was not comprehensive enough. It also failed to provide a dynamic analysis of the factors affecting land transfer evolution law. How rural capital will affect land transfer, etc., will be important directions for future research.

(4) There are limitations to our study. First, more village data should be acquired to provide robust results. Second, the land market is not totally open in China, and similar research in foreign countries where the land market is free would be more accurate.

6. Conclusions and Policy Implications

6.1. Conclusions

(1) From the perspective of different land transfer directions, the relevant factors affecting the transfer-in land and transfer-out land are different. Transfer-in land is significantly affected by factors such as the total household population, proportion of non-agricultural family income, age of the head of the household, education level of the head of the household, value of machinery input, commercialization rate of agricultural products, area of arable land per laborer, degree of land fragmentation, quality of the plot, the average distance from home, transfer rent, degree of understanding of the transfer policy, and so on. Transfer-out land is significantly affected by the total population of the household, proportion of the non-agricultural income of the household, age of the household head, educational level of the household head, annual mechanical input value, degree of land

fragmentation, quality grade of the land, abandoned area of the land, transfer rent, degree of understanding of the transfer policy, and other factors. Therefore, improving the farmer's degree of education and income from other industries would decrease land transfer.

(2) From the perspective of the influence of peasant household structure on land transfer, feature-headed family structure, household characteristics, land use characteristics, decision making, and other latent variable characteristics of land transfer have a better explanatory power flow. These latent variables all have a significant positive impact on land transfer, among which family structure characteristics have the greatest impact on land transfer, followed by household head characteristics and land use characteristics, and decision-making features have the least impact on land transfer. Thus, it is advisable to facilitate land transfer by improving the farmer's technology training, especially for the head of a rural household with a low degree of education. Improving income is the impetus for farmers' land transfers since they desire to improve production and life quality by rationally arranging resources such as labor and land and making more favorable decisions.

(3) From the perspective of the characteristics of householders, with advancing age, the ability and willingness of householders to engage in agricultural production decreases, but they have a strong willingness to transfer land out and realize land income from the transfer, even if it favors rent in the form of zero rent. If the head of the household has a high degree of education and has received skill training, this indicates that they have a strong ability to work off-farm. They are also more emancipated and more inclined to participate in land transfer. Thus, a novel land policy is accepted by older people if they can profit. A suitable land policy must protect the rights and interests of older people in rural areas. Age-oriented land policy is more easily implemented.

(4) From the perspective of family characteristics, a large family population means more significant pressure to support them. To relieve the living pressure, farmers are more willing to transfer-out the land if more people engage in non-agricultural production. If more people work in agriculture at home, farmers will transfer-in the land, aiming to increase the family's overall income. Farmers whose family members have been away from home for a long time on average and whose non-agricultural income ratio is high no longer focus on agricultural production at home. Non-agricultural income is the main income source for their families, and they are more willing to transfer the contracted land out. Therefore, we should study land annexation. Urbanization has led to an outflow of the rural population, and their land has been returned to the collective village (the basic administrative unit in China), which may lead to land annexation. Although the land is owned by the collective village, the leaders have control over the use of the collective land. After continuous land transfer, land annexation can still occur.

(5) From the perspective of land resource endowment and use characteristics, the factors of land quality and farming convenience have a significant impact on land transfer. Improving land quality, increasing output benefits and farming convenience, and realizing the optimal allocation of land resources are the important factors that farmers consider in land transfer. Farmers who have already participated in land transfer tend to expand land transfer, whether they transfer-in land to expand their operation scale or transfer-out land to achieve transfer income. Farmers prefer to transfer their land rather than abandon it.

(6) From the perspective of decision-making characteristics and policy cognition, extensive transfer information and convenient access to it are conducive to promoting land transfer. Increasing policy publicity and improving farmers' understanding of land transfer and other related policies are also conducive to promoting land transfer. Additionally, the transfer rent is an essential factor that affects the transfer. A reasonable price can attract more farmers to transfer-out the land, but it is an inhibiting factor for farmers who transfer-in the land.

6.2. Policy Implications

Promoting land transfer, developing appropriate scale management, and improving agricultural production efficiency are important directions for central and local policy guidance and practice. Analysis of the factors influencing land transfer is an important aspect of theoretical research. Based on an empirical analysis of the factors influencing rural land transfer in southwest China's mountainous areas, the following suggestions are put forward to further optimize and perfect the land transfer policies and measures.

(1) Realizing more benefits has always been an important impetus for farmers to participate in land transfer. With the aims of increasing the overall family income and improving the quality of production and life, farmers make reasonable arrangements for labor, land, and other resources, and make land transfer decisions that are more beneficial. Farmers have gradually shifted from homogenization to differentiation, and land use strategies have also undergone significant changes [54]. When optimizing and perfecting land transfer policies, we should fully consider the different types of farmers' livelihoods and transfer directions to make the policies more detailed, precise, and effective.

(2) Through the establishment and improvement of the land transfer system, on the one hand, we can broaden the policy publicity and improve farmers' knowledge and understanding of land transfer policy. On the other hand, we can expand the channels of land transfer information, thus improving the convenience of information access. This will help dispel farmers' concerns, reduce the transaction cost of land transfer, and continuously improve activity in the land transfer market to promote orderly land transfer.

(3) Strengthening skills training has positive significance for both transfer-out farmers and transfer-in farmers, but the focus should be on the training content for farmers willing to transfer-out the land. On the other hand, recruiting workers in towns or cities, supporting rural secondary and tertiary industries and new types of agriculture, and creating more non-agricultural employment opportunities will allow rural laborers who are willing to transfer land to transfer out, so their contracted land enters the transfer market. For farmers willing to transfer in land, we should strengthen agricultural production skills training and expand agricultural product sales channels by increasing agricultural machinery subsidies, optimizing resource allocation, and e-commerce to help farmers increase the commercialization rate of agricultural products. Furthermore, we should continuously improve the efficiency of agricultural production and operation. This will help farmers transfer-in the land to expand the scale of operation, and it will also help traditional agriculture gradually transform into modern agriculture.

Author Contributions: The study was designed and written by: X.Z.; supervision: F.Z.; ideas and suggestions contributed by: C.W. and J.Z.; investigation and data processing: Y.X. and X.Y. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by National Natural Science Foundation of China (Grant No.41901214); Scientific and Technological Research Program of Chongqing Municipal Education Commission (No:KJQN201800511); The Humanities and Social Sciences Research Program of the Chongqing Municipal Education Commission (No:19SKGH132); The Chongqing Social Science Planning Project (2019YBGL075); The Scientific Research Foundation of the Chongqing University of Technology.

Institutional Review Board Statement: The study was conducted according to the research guidelines approved by the Research Committees of Authors Institutions.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data used to support the findings of this study are available from the first author upon request (e-mail: zhuxusen@sohu.com).

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Liu, S.; Xiong, X.; Long, T. Separation and Evolution of Farmland Rights under Collective Ownership System. *J. Renmin Univ. China* **2019**, *33*, 2–12. Available online: https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2019&filename=ZRDX201901001&v=MDAwMTBqTXJvOUZaWVI4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckNVUjdpZlllWnBGeS9sVWJyTVB6L1Bkckc0SDk= (accessed on 1 January 2021).
2. Ye, Q.; An, F.; Zhang, Z. Present Situation, Problems and Countermeasures of Land Transfer in the Process of Agricultural Industrialization in the Qinling-Daba Mountains (Shiyan). *Asian Agric. Res.* **2018**, *10*, 39–42.
3. Wu, C.; Chen, M.; Zhou, L.; Liang, X.; Wang, W. Identifying the Spatiotemporal Patterns of Traditional Villages in China: A Multiscale Perspective. *Land* **2020**, *9*, 449. [CrossRef]
4. Chen, R.; Ye, C.; Cai, Y.; Zheng, B.; Lu, Z. The impact of rural out-migration on landuse transition in China: Past, present and trend. *Land Use Policy* **2014**, *40*, 101–110. [CrossRef]
5. Huang, X. Returning Power and Ability to the Market: On the Design of Land System Reform at the Third Plenary Session of the 18th CPC Central Committee. *Res. Land Econ.* **2014**, *1*, 1–9. (In Chinese)
6. Zhou, Y.; Li, X.; Liu, Y. Rural land system reforms in China: History, issues, measures and prospects. *Land Use Policy* **2020**, *2*, 104330. [CrossRef]
7. Li, Y.; Du, R.; Li, L.; Jiang, G.; Fan, Z. Influences of the Transaction Intention of Farmland Transfer under Information Asymmetry: An Empirical Study of 1100 Questionnaires from China. *Sustainability* **2020**, *12*, 3739. [CrossRef]
8. Zhou, C.; Liang, Y.; Fuller, A. Tracing Agricultural Land Transfer in China: Some Legal and Policy Issues. *Land* **2021**, *10*, 58. [CrossRef]
9. Ma, X.; Qiu, T.; Qian, Z. The security of farmland property rights and farmers' participation in farmland transfer market: An empirical analysis based on the survey data of Jiangsu, Hubei, Guangxi and Heilongjiang. *Chin. Rural. Econ.* **2015**, *2*, 22–37. (In Chinese)
10. Wang, Y.; Yang, Q.; Xin, L.; Zhang, J. Does the New Rural Pension System Promote Farmland Transfer in the Context of Aging in Rural China: Evidence from the CHARLS. *Int. J. Environ. Res. Public Health* **2019**, *16*, 3592. [CrossRef]
11. Zhong, L.; Zhao, W.; Zhang, Z.; Fang, X. Analysis of Multi-Scale Changes in Arable Land and Scale Effects of the Driving Factors in the Loess Areas in Northern Shaanxi, China. *Sustainability* **2014**, *6*, 1747–1760. [CrossRef]
12. Hou, Y.; Chen, P. Research on the Relationship between Price Mechanism and Short-Term Behavior in Chinese Farmland Trusteeships. *Sustainability* **2019**, *11*, 5708. [CrossRef]
13. Tian, G.; Duan, J.; Yang, L. Spatio-temporal pattern and driving mechanisms of cropland circulation in China. *Land Use Policy* **2021**, *100*, 105118. [CrossRef]
14. Deininger, K.; Jin, S. The potential of land markets in the process of economic development: Evidence from China. *J. Dev. Econ.* **2005**, *78*, 241–270. [CrossRef]
15. Vranken, L.; Swinnen, J. Land rental markets in transition: Theory and evidence from Hungary. *World Dev.* **2006**, *34*, 481–500. [CrossRef]
16. Kimura, S.; Otsuka, K.; Sonobe, T.; Rozelle, S. Efficiency of Land Allocation through Tenancy Markets: Evidence from China. *Econ. Dev. Cult. Change* **2011**, *59*, 485–510. [CrossRef]
17. Latruffe, L.; Piet, L.; Dupraz, P.; Le Mouel, C. The influence of various agricultural subsidies on sale prices of French farmland. In Proceedings of the EAAE 2014 Congress 'Agri-Food and Rural Innovations for Healthier Societies', Ljubljana, Slovenia, 26–29 August 2014.
18. Wu, J. Return land management rights to farmers as soon as possible. *China Rural. Discov.* **2015**, *3*, 15–19. (In Chinese)
19. Wang, Y.; Li, X.; Xin, L.; Tan, M.; Jiang, M. Regional differences of land circulation in China and its drivers: Based on 2003–2013 rural fixed observation points data. *Acta Geogr. Sin.* **2018**, *73*, 487–502. (In Chinese)
20. Kaletnik, G.; Honcharuk, I.; Yemchyk, T.; Okhota, Y. The World Experience in the Regulation of the Land Circulation. *Eur. J. Sustain. Dev.* **2020**, *9*, 557. [CrossRef]
21. Lupenko, Y.; Khodakivska, O. Scientific principles of introduction of market circulation of agricultural lands. *Economy APK* **2016**, *12*, 5–15. Available online: http://nbuv.gov.ua/UJRN/E_apk_2016_12_3 (accessed on 1 January 2021).
22. Kyrylenko, I. Capitalization of land resources in the conditions of development and transformation of land relations in Ukraine. *Economy. Finances. Manag. Top. Issues Sci. Pract.* **2017**, *12*, 7–20.
23. Draft Law on Amendments to Certain Legislative Acts of Ukraine on the Circulation of Agricultural Lands. Available online: http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=66948 (accessed on 1 January 2021).
24. Hong, Z.; Sun, Y. Power, capital, and the poverty of farmers' land rights in China. *Land Use Policy* **2020**, *92*, 104471. [CrossRef]
25. Li, H.; Zhang, X.; Li, H. Has farmer welfare improved after rural residential land circulation? *J. Rural. Stud.* **2019**, *10*, 1–8. [CrossRef]
26. Mei, Y.; Xiao, X. Research on Rural Tourism Development Based on the New Policy of Land Circulation. *Res. Agric. Appl. Econ.* **2009**, *1*, 19–22. Available online: https://ageconsearch.umn.edu/record/53603/. (accessed on 1 January 2021).
27. Li, Q.; Zhang, W. Analysis of farmers' willingness to transfer farmland management rights and its influencing factors under the background of urban-rural coordination: Based on the survey data of 428 households in Cheng-Chongqing. *Agrotech. Econ.* **2010**, *5*, 47–54. (In Chinese)

28. Zhao, Y.; Wang, B.; Wang, M. A survey report on farmers' views and willingness to land contract and transfer. *Res. World* **2006**, *12*, 32–33. (In Chinese)
29. Bao, Z.; Xu, Z.; Gao, S.; Zhou, C. Regional differences and influencing factors of rural land transfer: A case study of Jiangsu Province. *Chin. Rural. Econ.* **2009**, *4*, 23–30. (In Chinese)
30. Liu, Y.; Wang, C.; Tang, Z.; Nan, Z. Farmland Rental and Productivity of Wheat and Maize: An Empirical Study in Gansu, China. *Sustainability* **2017**, *9*, 1678. [CrossRef]
31. Kung, J.K.S. Off-Farm labor markets and the emergence of land rental market in rural China. *J. Comp. Econ.* **2002**, *30*, 395–414. [CrossRef]
32. Yang, R.; Yang, Q. Restructuring the State: Policy Transition of Construction Land Supply in Urban and Rural China. *Land* **2021**, *10*, 15. [CrossRef]
33. He, Z. Labor Migration, Land Transfer and Farmer's Long-term Investment. *Econ. Sci.* **2006**, *3*, 10–18. (In Chinese)
34. Deininger, K.; Jin, S. Land rental markets in the process of rural structural transformation: Productivity and equity impacts in China. *Res. Work. Pap.* **2007**, *1*, 1–13.
35. Alchian, A.A.; Demsetz, H. The property rights paradigm. *J. Econ. Hist.* **1973**, *33*, 16–27. [CrossRef]
36. Arnot, C.D.; Luckert, M.K.; Boxall, P.C. What is tenure security? Conceptual implications for empirical analysis. *Land Econ.* **2011**, *87*, 297–311. [CrossRef]
37. Deininger, K.; Ali, D.A.; Alemu, T. Impacts of land certification on tenure security, investment, and land market participation: Evidence from Ethiopia. *Land Econ.* **2011**, *87*, 312–334. [CrossRef]
38. Luo, Y. The Experience and Future Thinking of China's Rural Land System Reform in the 70th Anniversary of New China. *Economist* **2020**, *2*, 109–116. (In Chinese)
39. Mullan, K.; Grosjean, P.; Kontoleon, A. Land tenure arrangements and rural-urban migration in China. *World Dev.* **2011**, *39*, 123–133. [CrossRef]
40. Knight, J.; Song, L. The rural-urban divide: Economic disparities and interactions in China. *OUP Cat.* **1999**. Available online: https://ideas.repec.org/b/oxp/obooks/9780198293309.html (accessed on 1 January 2021).
41. Carter, M.R.; Zimmerman, F. The dynamic costs and persistence of asset inequality in an agrarian economy. *J. Dev. Econ.* **2000**, *63*, 265–302. [CrossRef]
42. Luo, B.; Wang, S.; Li, S. Transaction Costs, Farmers' Cognition and Farmland Circulation: A Questionnaire Survey from Farmers in Guangdong Province. *Agrotech. Econ.* **2012**, *1*, 11–21. (In Chinese)
43. Deng, X.; Xu, D.; Zeng, M.; Qi, Y. Does early-life famine experience impact rural land transfer? Evidence from China. *Land Use Policy* **2019**, *81*, 58–67. [CrossRef]
44. Wang, Y.; Li, X.; Xin, L.; Tan, M.; Jiang, M. Spatiotemporal changes in Chinese land circulation between 2003 and 2013. *J. Geogr. Sci.* **2018**, *28*, 707–724. [CrossRef]
45. Hu, X.; Luo, H.; Guo, M.; Wang, J. Ecological technology evaluation model and its application based on Logistic Regression. *Ecol. Indic.* **2022**, *136*, 108641. [CrossRef]
46. King, G.; Zeng, L. Logistic Regression in Rare Events Data. *Political Anal.* **2001**, *9*, 137–163. [CrossRef]
47. Pranckevičius, T.; Marcinkevičius, V. Application of logistic regression with part-of-the-speech tagging for multi-class text classification. In Proceedings of the 2016 IEEE 4th Workshop on Advances in Information, Electronic and Electrical Engineering (AIEEE), Vilnius, Lithuania, 10–12 November 2016; pp. 1–5. [CrossRef]
48. Marek, R. A Proof of Convergence of Multi-Class Logistic Regression Network. *arXiv* **2021**, arXiv:1903.12600. [CrossRef]
49. Christodoulou, E.; Ma, J.; Collins, G.S.; Steyerberg, E.W.; Verbakel, J.Y.; van Calster, B. A systematic review shows no performance benefit of machine learning over logistic regression for clinical prediction models. *J. Clin. Epidemiol.* **2018**, *110*, 12–22. [CrossRef]
50. de Souza, R.M.C.R.; Cysneiros, F.J.A.; Queiroz, D.C.F.; Fagundes, R.A.d.A. A multi-class logistic regression model for interval data. In Proceedings of the 2008 IEEE International Conference on Systems, Man and Cybernetics, Singapore, 12–15 October 2008; pp. 1253–1258. [CrossRef]
51. Hosmer, D.W., Jr.; Stanley, L. *Applied Logistic Regression*, 2nd ed.; John Wiley and Sons: Hoboken, NJ, USA, 2000.
52. Fang, B.; Lan, Z. *Public Management Research and Quantitative Analysis Method*; Science Press: Beijing, China, 2013; pp. 254–258.
53. Norris, C.M.; Ghali, W.A.; Saunders, L.D.; Brant, R.; Galbraith, D.; Faris, P.; Knudtson, M.L.; Approach Investigators. Ordinal regression model and the linear regression model were superiorto the logistic regression models. *J. Clin. Epidemiol.* **2006**, *59*, 448–456. [CrossRef]
54. Liu, L.; Wang, T.; Xie, L.; Zhan, X. Influencing Factors Analysis on Land-Lost Farmers' Happiness Based on the Rough DEMATEL Method. *Discret. Dyn. Nat. Soc.* **2020**, 6439476. [CrossRef]