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Sustainable Management Behavior of Farmland Shelterbelt of Farmers in Ecologically Fragile Areas: Empirical Evidence from Xinjiang, China

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Abstract: The farmland shelterbelt is an important artificial ecological project for improving farmland microclimates, ensuring agricultural production, and promoting sustainable development in China's ecologically fragile areas. Due to the quasi-public attribute, farmland shelterbelts were mainly constructed and managed by the government in the past. In recent years, the reform of the separation of three rights in collective forestland and the mechanism of "private supply of public goods" have prompted farmers to participate in the modern forest management system. However, there is a lack of consistency between farmers' management intentions and actual contract operation and management behaviors, resulting in weakened management and protection in many places, which seriously restricts the construction efficiency of farmland shelterbelts. Therefore, based on the survey data and planning behavior theory (TPB) of 1106 farmers in 16 major agricultural production areas (counties) in Xinjiang, this study aims to explore the key factors affecting farmers 'forestry management and production decision making and to verify the transformation mechanism of farmers' behavior through path analysis. The results show that the management decisions of farmers in ecologically fragile areas follow the path form of "cognitive → intention → behavior", in which the multi-dimensional cognition of farmers has a significant impact on farmers' behavioral intention, while the effect on behavioral response is relatively small, which currently depends on the promotion of ecological compensation and government behavior. Finally, this study puts forward countermeasures and suggestions for continuously stimulating the farmers' forest operation behavior and provides policy reference for promoting the sustainable development of farmland shelterbelts in ecologically fragile areas put forward countermeasures and suggestions for continuously stimulating farmers' forestry behavior.

Keywords: farmland shelterbelt; farmer; double hurdle model; path analysis; ecologically fragile area

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1. Introduction

Farmland shelterbelt is an important ecological project [1]. It is an ecological security barrier to protect farmland and also an important part of the green ecological corridor in China [2]. Previous studies have shown that farmland shelterbelts are effective in controlling sandstorms and droughts and improving the climate and environment [3–5]. Especially in ecologically fragile areas, such as the ecological barrier of oasis farmland, shelterbelts play an important role in maintaining the balance of the agricultural ecosystem and ensuring agricultural production increase and harvest by reducing wind speed, improving farmland microclimate, and improving soil conditions [6,7]. The "No. 1 Document of the CPC Central Committee" issued in 2019, the "14th Five Year Plan for National Agricultural Green Development" issued in 2021, the "five Year Action Plan for the Improvement of Rural Human Settlements (2021–2025)" issued by the CPC Central Committee and the general office of

the State Council in 2021, and the "Notice on Strengthening the Construction and Management of Farmland Shelterbelt" issued by the State Forestry and Grassland Administration in 2022 all emphasized the importance of farmland shelterbelt construction for ecological restoration and green development of agriculture and rural areas. In the green and low-carbon circular development (The 14th Five-Year Plan for National Green Agricultural Development: http://www.gov.cn/xinwen/2021-09/09/content_5636345.htm (accessed on 3 March 2022)), farmland shelterbelt is also an important carrier for the comprehensive protection of mountains, rivers, forests, fields, lakes, grass, sand, and ice, as well as the construction of ecological civilization and rural revitalization (Sina Finance and Economics: what role does farmland shelterbelt construction play in agricultural green development? http://finance.sina.com.cn/jjxw/2022-06-06/doc-imizmscu5408302.shtml (accessed on 29 July 2022)).

With the implementation of the "private supply of public goods" and the "natural resources department's affinity with farmers" [8–10], the main body of agricultural production and management, as represented by farmers, begin to be involved in the management system of farmland shelterbelt. In this system, farmers mainly ensure their economic interests through direct ways such as an undergrowth economy and ecological compensation. At the same time, farmers can also profit from the two indirect channels of "increase of agricultural output" and "guarantee of agricultural products". This can not only broaden the channels for farmers to increase income but also help the sustainable development of the farmland ecosystem. Therefore, local governments actively guide farmers to participate in management. One of the most common forms of guidance is the publicity and training of forestry production. However, subject to the generally low educational level and the thought of "limited rationality", farmers' management intention and behavior are inconsistent, resulting in "chaos" such as weakened management and protection and lowered construction efficiency in Xinjiang. Therefore, the creative exploration of farmers' contracted management is facing obstruction.

Xinjiang's ecological environment is extremely fragile, and the ecosystem's anti-interference ability is poor. Therefore, the construction of farmland shelterbelts in Xinjiang was initialized earlier, forming the famous "narrow shelterbelt, small grid" model. From a historical point of view, the farmland shelterbelt networking was completed in the plains of Xinjiang in the 1990s. Compared with the overall effect, the construction of farmland shelterbelts in southern Xinjiang is better than that in northern Xinjiang, while the quality is better in the Xinjiang Production and Construction Corps than in the Autonomous Region. By 2019, the area of farmland shelterbelt in Xinjiang reached 333.34 thousand hm^2, and the volume of standing trees reached 48.9302 million m^3. Theoretically, 95% of the cultivated land in the region is sheltered by the shelterbelt networks. However, the poor coordination of local departments and the sluggish running of farmers' participation mechanisms have greatly reduced the actual function of farmland shelterbelts [6,7]. In practice, how to transform the will of farmers into practical ecological management behavior and promote the sustainable development of farmland shelterbelts under the premise of ensuring the interests of farmers is a scientific problem of practical significance. To sum up, this study is based on the history of green low carbon economic transformation, with small farmers' demand and supply behavior as the breakthrough point. Depth analysis affects key elements of the current Xinjiang farmers' farmland shelter forest management decision and promotes the farmers' behavior transformation decision mechanism. According to the theoretical analysis and empirical research conclusion, this study want to explore how to improve farmers management power and induce farmers forest production enthusiasm based on the development of ecological fragile area practice, so as to continue to play the multiple benefits of farmland shelterbelt, eventually effectively boosting the sustainable development of agriculture.

2. Literature Review

Topics such as "rural public goods", "farmland shelterbelt", and "farmers' willingness and behavior deviation" have always been the focus of academic studies, and many achievements provide important references for this paper. Firstly, the effective development of the private supply mechanism of public goods in rural China is the practical background and theoretical basis of this study. According to the theories of public economics and economics of property rights, public goods should be provided by the government [11]. However, some studies have shown that when the income level increases, some public goods that can benefit exclusively could be transformed into private supplies [12,13]. Research on forestry property rights also proved that despite the externalities, privatization of forestry was possible [14]. The implementation of the household contract system in China has promoted the development of rural public goods, but there is a lack of incentives for the supply of rural public goods [15].

As a typical ecological welfare forest, the farmland shelterbelt has many attributes of rural quasi-public goods [16]. In the past years, the farmland shelterbelt is mainly invested and constructed by the government, but the management and protection of the shelterbelt in the later period has been short of a continuous and extensive mode. At present, relevant researchers at home and abroad focus more on the function and utility of farmland shelterbelts [17]. However, from the perspective of China's development practice, due to the constraints from "land threatening" and "externality" ("land threatening" mainly refers to the competition between forest roots and nearby crops for soil water and nutrients, resulting in no growth of other plants in small areas, and the "externality" mainly refers to the difficulty of regulating the ecological benefits of shelterbelt property right beneficiaries), ecological compensation and the combination of economic and ecological tree species have not significantly attracted private investment [18–20]. Since the 13th Five-Year Plan period, a new round of reform of the "separation of three rights of collective forestland" has improved farmers' awareness of property rights and enthusiasm for management [21]. However, farmers' awareness is not unified, the income of shelterbelt management comes too late, and the coordination of multiple departments is not smooth, which leads to the divergence of farmers' willingness and behavior, and the sustainable development mechanism of farmland shelterbelt is in crisis [16,21]. In addition, many Chinese scholars have also discovered the "disparity between willingness and behavior" in the research on farmers' participation in the fields of ecological production, such as "green technology adoption", "centralized waste disposal", and "rural water conservancy facilities" [22–24]. Therefore, the management dilemma of the farmland shelterbelt is by no means an isolated case. That is, the deviation between farmers' actual Behavioral Response (BR) and willingness is a common problem faced in the process of green transformation [16].

To sum up, although the "private supply of public goods" provides institutional guarantee and accessibility for farmers' forestry production, in practice, how to solve the problem of deviation of willingness and behavior and promote the sustainable development of farmland shelterbelt is of great importance. At present, there are few studies at home and abroad that consider the above three aspects comprehensively. In particular, few such studies have been conducted in ecologically fragile regions, such as Xinjiang. In addition, the empirical models currently studied in this field are mostly limited to discrete choice models such as Logit or Probit, but they are difficult to reveal the impact mechanism of various factors on farmers' willingness and behavior. Therefore, in this study, an expanded theoretical framework of the theory of planned behavior (TPB) was constructed through theoretical analysis, to analyze the mechanism of farmers' behavior in participating in the management of farmland shelterbelts in ecologically vulnerable areas from a theoretical perspective. The Double Hurdle model and path analysis were used to analyze the internal mechanism that lead to the conflict between farmers' willingness and actual behavior, and the feasible path to promote the transformation of behavior was explored. This study provides a reference for promoting the sustainable development of farmland shelterbelts.

3. Data Sources and Research Design

3.1. Data Sources

The survey data of farmers in the main agricultural production areas in Xinjiang from 2018 to 2020 were used in this study. The survey sites covered the key areas of the farmland shelterbelt network in northern, southern, and eastern Xinjiang, as well as some pilot areas of collective forest reform. Three to five villages in 16 counties, such as Manas County (Changji), Shawan County (Tacheng), Huocheng County (Ili), Wensu County (Aksu), Yanqi County (Bazhou), Shule County (Kashi), and Balikun (Hami) were randomly selected, and 20–30 farmers in each village were selected to participate in a questionnaire survey. In addition, the survey adopted the suggestions on the scale design. While conducting an open survey, the staff of the forest management stations were also interviewed to verify the reliability of the questionnaire. A total of 1200 questionnaires were distributed. After eliminating the questionnaires with logical contradictions and missing data, 1106 valid questionnaires were actually obtained, accounting for 92.1% (Table 1).

Table 1. Characteristics of samples.

Variable	Classification Criteria	Frequency	Proportion/%	Variable	Classification Criteria	Frequency	Proportion/%
Gender	Male	538	48.64	Survey area	Eastern Xinjiang	297	26.85
	Female	568	51.35		Northern Xinjiang	457	41.32
Age of head of household	Below 30 years old	172	15.55		Southern Xinjiang	352	31.83
	31–50 years old	594	53.71	Number of family members	1	24	2.17
	51–60 years old	246	22.24		2	75	6.78
	Over 60 years old	94	8.50		3–5	569	51.45
Education level	Primary school and below	259	23.42		6 or more	438	39.60
	Junior high school	526	47.56	Average annual household income	Less than 10,000 yuan	34	3.07
	High school/ Technical School	188	16.99		10,000–30,000 yuan	286	25.86
	College degree or above	133	12.03		30,000–70,000 yuan	747	67.54
Total	Total samples	1106	100.00		More than 70,000 yuan	39	3.53

3.2. Research Method

3.2.1. Theoretical Framework

The analytical framework of this study is mainly based on the theory of planned behavior (TPB) [25], which is deemed to be the best for revealing the influencing factors of behavior and decision making and is widely used in the studies of social disciplines such as management and psychology to explain and predict the behavior of different individuals [26]. Behavior intention (BI), refers to the subjective probability that an individual intends to take a certain behavior, which is usually expressed as the degree of willingness to participate. Ajzen and Fishbein pointed out that any behavioral intention was the result of the comprehensive action of three elements [27]: attitude toward behavior (AB), subjective norms (SN), and perceived behavioral control (PBC) [26–30]. In addition, the survey found that the behavior of farmers to manage farmland shelterbelts in Xinjiang was not only the embodiment of the maximization of interests, but its behavioral connotation was also far more complex than the "rational maximization" of personal utility in the paradigm of neoclassical economics. For example, phenomena such as self-discipline and altruism were widespread. This indicates that the institutional environment has a particularly prominent impact on farmers' behavior. Therefore, based on the survey, this study introduced the latent variable "policy and institutional environment" (PIE) to construct an expanded TPB framework [31,32]. Compared with the traditional theory of planned behavior, the basic composition of the theory mainly focuses on the attitude generated by an individual's cognition of a specific behavior, the social pressure felt by individuals to behave in a specific way, their past experience, and their obstacles to expectations. According to the field

investigation, the influence of "ecological compensation", "cutting quota system" and "collective forest right reform" must be considered in the production decision of farmers in ecologically fragile areas. Therefore, it is necessary to expand the theoretical analysis framework of planning behavior according to the particularity of the research. This is also an important breakthrough and progress made in this study compared with the traditional peasant household decision-making research institute.

In addition, when selecting variables according to the TPB framework, potential variables such as AB and PIE involved economic factors such as "rational maximization" and "expected benefits". At present, there are two views of "rational farmers" represented by Theodore W. Schultz and S. Popkin and the "moral economy" represented by Chayanov and James C. Scott on the "rational farmer hypothesis". The former explains the view of "economic rationality", while the latter focuses on "survival rationality". For this study, farmers' choice of management of farmland shelterbelt shows a crisscross of substantialism and formalism. First of all, farmers, as the main body of production and management, belong to "economic man", and usually decide whether to participate according to the expected benefits, that is, "economic rationality". However, the actual decisions are not limited to economic considerations. James C. Scott put forward the concept of subsistence ethic in his book "Farmers' Moral Economy: Rebellion and Survival in Southeast Asia", believing that what farmers pursue under the survival ethics of safety first is not the maximization of economic income, but the balance between lower distribution risk and higher survival security [33]. Farmers will use reciprocity and asylum relations to provide informal social security and achieve the purpose of group survival through redistribution. Especially in the context of green agricultural development, farmland shelterbelt management has gone beyond the rational decision-making of family income, and the decisions will inevitably be affected by the production environment and the survival of groups. Maslow's hierarchy of needs theory can also provide evidence for incentives [34]: if the livelihood needs of farmers are met, their BR will show the value orientation of safe survival. Therefore, farmers' decisions may be based on the need for ecological security, not just on the cost-benefit estimates.

3.2.2. The Proposed Hypotheses

To sum up, based on TPB and the theory of rational "economic man" ("Homo economicus"), this study constructed a research framework to explore the impact mechanism of farmers to manage farmland shelterbelt in arid areas with AB, SN, PBC, and PIE as the primary potential variables (Figure 1), and put forward the following research hypotheses, aiming to lay a theoretical foundation for the establishment of subsequent index systems and the verification of models.

H1. *The AB of farmers to manage farmland shelterbelt has a significant impact on BI.*

H2. *The SN of farmers to manage farmland shelterbelt has a significant impact on BI.*

H3. *The PBC of farmers to manage farmland shelterbelt has a significant impact on BI.*

H4. *The PIE of farmers to manage farmland shelterbelt has a significant impact on BI.*

H5. *The PBC of farmers to manage farmland shelterbelt is positively correlated with BR.*

H6. *The PIE of farmers to manage farmland shelterbelt is positively correlated with BR.*

H7. *The BI of farmers to manage farmland shelterbelt has a significant impact on BR.*

H8. *The "ecological rationality" of farmers to manage farmland shelterbelt takes precedence over "economic rationality".*

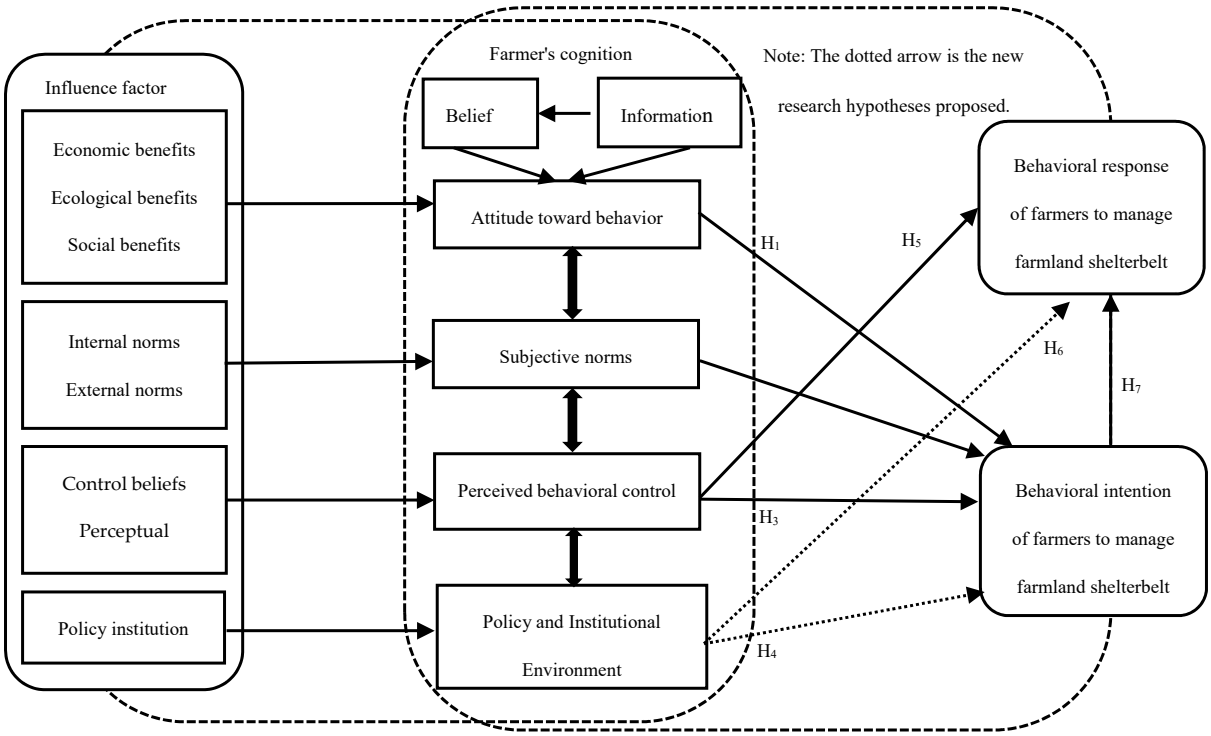

Figure 1. The research framework of farmers' management of farmland shelterbelt in arid area.

3.2.3. Variable Selection

There are two dependent variables in this study. One is the BI of farmers to manage farmland shelterbelt, and 0 and 1 represent the willingness to manage and the willingness to not manage, respectively. The second is the BR of farmers to manage farmland shelterbelt, and 1 to 5 indicates the increasing degree of response. Based on the theoretical framework and previous research results, the important indicators observed in the survey were selected as the core independent variables. Since most of the variables designed in the questionnaire cannot be measured directly, measuring these latent variables in the form of a scale can largely reduce the measurement error in the evaluation of abstract concepts, thereby increasing the reliability of variables [35]. Except for the variables such as "the number of family labor force" and "the average annual income of families", the independent variable items were set using the five-point Likert scale, and 1, 2, 3, 4, and 5 represent "completely disagree", "disagree", "general", "agree", and "very agree", respectively. The indexes and descriptive statistics of variables are shown in Table 2. On the whole, farmers' behavior cognition and BI are good, while the positive degree of BR is low.

Table 2. Variable definition and descriptive statistics.

	Latent Variable	Dimension	Observed Variable	Mean	Standard Deviation
Dependent variable	Behavioral intention (BI)	Intention	No intention, intention	0.749	0.433
	Behavioral response (BR)	Responsiveness	Not responding at all—Responding positively	2.401	1.149

Table 2. *Cont.*

	Latent Variable	Dimension	Observed Variable	Mean	Standard Deviation
Independent variable	Attitude toward behavior (AB)	Economic benefits	Increasing crop yield	3.281	1.023
			Increasing farmers' income	3.221	1.067
		Ecological benefits	Preventing sandstorms	3.786	1.086
			Improve the microclimate	3.328	0.981
			Absorbing carbon dioxide	3.618	0.969
		Social benefits	Improving agricultural resilience	3.325	0.896
			Promoting non-agricultural employment	2.949	1.118
	Subjective norms (SN)	Injunctive norms	Perception of forest management technology	2.943	1.122
			Frequency of government propaganda	3.329	0.922
			Village organization promotion	2.446	1.261
		Exemplary norms	Influence of surrounding farmers	2.659	0.967
			Opinions of family members	2.473	1.097
			Education level of main labor force	2.183	0.947
	Perceived behavioral control (PBC)	Perceptual intensity	Income cycle	3.282	1.081
			Initial cost	3.000	1.068
		Belief control	Number of household labor force	2.892	1.186
			Per capita net income of households	2.422	1.156
	Policy and Institutional Environment (PIE)	Bootstrap constraints	Subsidy policy incentives	2.902	1.100
			Logging constraints	1.403	0.491
			Guidance on the reform of collective forest rights	2.767	1.200
Controlled variable	Controlled variable (CV)	-	Age of head of household	2.778	1.199
		-	Are there any Communist Party of China members at home?	0.252	0.434
		-	Cultivated land quality	2.775	1.107
		-	Frequency of natural disasters	2.468	0.921

3.3. Model Setting

Farmers' intention and behavior to manage farmland shelterbelts may be both, or they may be in a state of transformation or regression from one to another. When the two states exist at the same time, the linear probability model can be used to analyze the key factors affecting farmers' intentions and behavior, but the analysis of this kind of model is limited to "quantity". The survey found that the BI and BR of farmers were not consistent. It not only showed "high BI, low BR", but even some farmers had "response but no intention". Therefore, regression based on two types of observations is bound to produce measurement errors. In addition, if the differential index is used for estimation, the problem of variable missing is easy to occur. In this regard, Cragg developed the Double Hurdle model [36–38], a combination of Tobit model and truncated model. Its advantage is that the threshold of the first model can be used as the basis for the deletion of samples of the second model,

that is, to explore the decision first (quality), and then analyze the degree (quantity). In addition, the Double Hurdle model assumes that the reasons for the zero values are not limited to the economic level, and the reasons why some data cannot be observed may be exogenous.

$$\begin{cases} d_p = Z_p\theta + \varepsilon_p \\ y_p = X_p\beta + \mu_p \\ y_p^* = y_p, \text{ if } d_p > 0 \\ y_p^* = 0, \textit{ otherwise} \end{cases} \quad (1)$$

d_p is the willingness of the p-th farmer to participate in the management of farmland shelterbelts. It is a virtual variable, and y_p^* is calculated only when d_p is one. y_p^* is a latent variable, which indicates the behavioral response degree of the p-th farmer to manage farmland shelterbelt when it is determined that the farmer has the management intention. Z_p and X_p are socio-economic variables that affect farmers' willingness and behavior, and θ and β are parameters to be evaluated to explain the impact of variables. ε_p and μ_p are random disturbance terms, which obey independent identically distributed disturbances. If $d_p > 0$, the farmers have management intentions, that is, $d_p = 1$; otherwise, farmers have no intentions, that is, $d_p = 0$. If $d_p > 0$, then $y_p^* = y_p$, otherwise $y_p = 0$.

Cragg suggests that the estimation of the Double Hurdle model adopts the maximum likelihood principle, and the likelihood function is the following [35]:

$$lnL = \sum_{y_i=0} ln\varnothing\left[1 - \left(Z_p\theta\right)\right] + \sum_{y_i>0}\left[ln\varnothing\left(Z_p\theta\right) + ln\frac{\left(y_p - X_p\right)^2}{\sigma^2} - ln\varnothing\left(\frac{X_p\beta}{\sigma}\right)\right] \quad (2)$$

where σ is the density function. The first natural logarithm on the right of the equation corresponds to the result of the Probit model. If farmers' willingness to manage farmland shelterbelt is not zero, then $y_p > 0$, and the second natural logarithm on the right of the equation and the result corresponding to the truncated model reflect the BR of farmers. In particular, if $Z_p\theta = 1$, the likelihood equation of the Double Hurdle model can be transformed into the likelihood equation of the Tobit model. This shows that the interviewed farmers have the intention to manage farmland shelterbelts, and the Tobit model can be directly used for analysis. At this time, the log-likelihood value of the Tobit model is equal to the sum of the log-likelihood values of the two parts of the Double Hurdle model.

Therefore, this study estimated the log-likelihood values of Probit, Truncated, and Tobit models, and tested whether the Double Hurdle model was more effective than the Tobit model in analyzing the willingness and behavior of farmers to manage farmland shelterbelts through the likelihood ratio method. The formula of the likelihood ratio test is as follows:

$$\Gamma = -2[lnL_T - (lnL_P + lnL_{TR})] - \chi_K^2 \quad (3)$$

where L_T, L_P, and L_{TR} are the likelihood values of Tobit, Probit, and Truncated models, respectively, and the K value is the number of independent variables in the model. So we formulated another hypothesis for determining the best model:

H0. *Tobit model should be used to study the willingness and behavior of farmers to manage farmland shelterbelts*.

If $\Gamma < \chi_K^2$, the hypothesis is accepted and the empirical results of the Tobit model will be adopted. Otherwise, the hypothesis is rejected and the Double Hurdle model will be used for making estimations.

In addition, this study used the Akaike information criterion (AIC) to compare the quality of the fit.

$$AIC = 2K - 2lnL \quad (4)$$

The smaller the AIC value, the better the fitting degree of the data. Otherwise, the fitting degree of the model to the data is not high.

3.4. Empirical Test and Result Analysis

3.4.1. Fitness Test of Double Hurdle Model

The model was verified using the Stata14 software [39]. Table 3 shows the effectiveness test results of the DOUBLE HURDLE model and Tobit model. By comparing the likelihood values of the models, it was found that the statistical value of Γ was far greater than the critical value of χ2. Therefore, hypothesis H0 was rejected. The Double Hurdle model is more suitable than the Tobit model to study the mechanism of farmers' behavior to manage farmland shelterbelts. It is more appropriate to divide the demonstration of farmers' willingness, behavior, and influencing factors in arid areas into two stages. The results of the AIC test showed that the AIC values of the DOUBLE HURDLE model were smaller than those of the Tobit model. So the fitting degree of the Double Hurdle model for data is better. Based on the above test results, this study used the Double Hurdle model to analyze the key factors that affect farmers' willingness and behavior to manage farmland shelterbelts empirically.

Table 3. Model comparison and test.

Project	Double Hurdle		Tobit
	Probit	Truncated (Y > 0)	
N	1106	1106	1106
Wald χ2 (LR χ2)	50.285	50.871	62.816
Prob > χ2	0.000 ***	0.000 ***	0.036 **
Log likehood	−319.961	−158.323	−329.675
AIC	84.896	42.632	85.867
Log likelihood ratio test of the models: $\Gamma = 297.22 > \chi2(20) = 9.54$			

Note: *** and ** indicate the significance at $p < 0.01$ and $p < 0.05$, respectively.

3.4.2. Estimation Results of Double Hurdle Model

The maximum value of the correlation coefficient between variables was 0.577, and the maximum value of the variance inflation factor (VIF) was 1.80. This meets the criteria that the correlation coefficient is less than 0.6 and VIF is less than 10. Therefore, it is considered that there is no multicollinearity between variables, and parameter estimation can be carried out. The chi-square values of the Probit model and Truncated model were significant at $p < 0.01$. This proves that the fitting results of the models are good, and the models have good estimation performance (Table 4).

In the aspect of AB, the test results of the two variables "increasing crop yield" and "increasing farmers' income" measuring economic benefits in the two models did not show a high degree of significance. It indicates that economic benefits are not the decisive factor for farmers' willingness and behavior to participate in the management of farmland shelterbelts, which is consistent with the theoretical analysis of Section 3.2.1. The variables for evaluating ecological benefits "preventing sandstorms", "improving microclimate", and "absorbing carbon dioxide" were all significant in the models. This indicates that ecological benefits are the key incentives for farmers' decision to participate in the management. In particular, the "preventing sandstorms" was significant in both models. It proves the importance of the ecological role of farmland shelterbelts in sand and storm prevention in oases. The above results can comprehensively confirm that the "ecological rationality" of farmers in Xinjiang takes precedence over the "economic rationality" [40], **so hypothesis H8 passes the verification**. The variables to measure social benefits, "improving agricultural resilience" and "promoting non–agricultural employment", are not significant in the two models. This may be due to the thought of bounded rationality inhibits farmers' thinking and consideration of the social benefits. It is important to emphasize separately that we found the following here after the validation of the hypothesis:

Table 4. Estimation results of Probit model and Truncated model.

Latent Variable	Variable	Probit Model		Truncated Model	
		Coefficient	Z	Coefficient	T
Attitude toward behavior (AB)	Increasing crop yield	−0.302	−0.712	0.206	0.521
	Increasing farmers' income	0.104	1.751 *	0.109	0.401
	Preventing sandstorms	0.402	3.531 ***	0.414	2.109 **
	Improve the microclimate	0.104	1.954 *	0.208	0.833
	Absorbing carbon dioxide	0.177	2.493 **	0.251	1.901 *
	Improving agricultural resilience	0.254	0.370	−0.205	−0.141
	Promoting non-agricultural employment	0.402	0.726	0.502	0.908
Subjective norms (SN)	Perception of forest management technology	0.106	0.249	0.107	0.119
	Frequency of government propaganda	0.308	1.787 *	0.111	1.684 *
	Village organization promotion	0.064	0.993	0.110	1.735 *
	Influence of surrounding farmers	−0.305	−0.552	0.143	2.218 **
	Opinions of family members	0.207	0.441	0.010	0.028
	Education level of main labor force	0.070	0.101	−0.204	−0.377
Perceived behavioral control (PBC)	Income cycle	0.160	2.488 **	0.093	1.747 *
	Initial cost	0.106	0.242	−0.047	−0.701
	Number of household labor force	0.201	0.813	0.137	2.097 **
	Per capita net income of households	−0.805	−1.685 *	0.072	1.336
Policy and Institutional Environment (PIE)	Subsidy policy incentives	0.145	2.285 **	0.109	1.740 *
	Logging constraints	−0.922	−2.521 **	−0.430	−1.272
	Guidance on the reform of collective forest rights	0.091	0.716	0.108	0.802
Controlled Variable	Age of head of household	−0.335	−5.403 ***	−0.265	−4.491 ***
	Are there any Communist Party of China members at home?	0.125	2.315 **	0.266	4.750 ***
	Cultivated land quality	0.098	1.508	0.194	2.089 **
	Frequency of natural disasters	0.131	2.079 **	0.164	3.905 ***
Cons	——	3.065	1.427	4.593	6.394 ***

Note: ***, **, and * indicate the significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Among the variables for subjective norms (SN), the "frequency of government propaganda" had a significant positive impact on farmers' willingness and behavior, indicating that government propaganda could deepen farmers' cognition of farmland shelterbelt. In particular, the "village organization promotion" and "influence of surrounding farmers" were only significant in the truncated model. This indicates that the regulation of county and township governments and the behavior of surrounding farmers could not stimulate farmers' subjective cognition and willingness, but they have a great impact on farmers' actual behavior. It can be seen that there is an obvious phenomenon of obedience to management and the "herd effect" in farmers' behavior.

In terms of PBC, the "income cycle" had significant ($p < 0.05$) and highly significant ($p < 0.01$) positive impacts on the Probit model and Truncated model, respectively. This indicates that farmers are generally concerned about the growth cycle of trees and are worried about the phased benefits of farmland shelterbelts. Therefore, the income cycle of farmland shelterbelts could lead to significant differences in farmers' behavior. "Per capita net income of families" had a certain negative impact on the Probit model. This indicates that the management of farmland shelterbelts is not the primary choice for wealthy families, while poor families have greater demand for the management of farmland shelterbelts. "The number of household labor force" had significant effects on the two models. This

indicates that the management of farmland shelterbelts is a long-term process, and farmers will fully consider whether there is enough labor at home in the decision-making process. It is worth noting that "education level" and "initial cost" had no significant effects in the two models. This indicates that farmers are not worried about the initial investment in the management of farmland shelterbelts, and farmers with a higher level of education may have to shift the focus of their work away from the countryside.

Among the variables for PIE, "subsidy policy incentives" had a highly significant ($p < 0.01$) positive correlation with farmers' willingness, and it had only a significant ($p < 0.05$) correlation with farmers' actual behavior. This proves that the agricultural subsidy system has various effects on farmers' decision-making processes. That is, if the subsidy can meet farmers' needs, farmers will face relatively less regulatory pressure, which can promote farmers' willingness. However, interested farmers will have more expectations for management. At this time, the BR of farmers is not limited to agricultural subsidies. "Logging constraints" had a significant negative impact on the Probit model. It indicates that the logging quota system could greatly reduce the management willingness of farmers. It also reveals the contradiction between logging quotas and forest ownership and highlights the necessity of ecological compensation. "Guidance on the reform of collective forest rights" was not significant in the two models. This is contrary to the relevant research results [21]. However, it is objective and reasonable that the slow progress of the collective forest reform pilot in Xinjiang has no significant impact on farmers' behavior.

3.5. Structural Model and Path Analysis

3.5.1. Factor Analysis and Reliability and Validity Test

The factor analysis was used to reduce the dimension of multiple variables. The principal components of the first-order latent variables AB, SN, PBC, and PIE were obtained, and then the transformation mechanism between each latent variable and farmers' willingness and behavior was revealed through path analysis. Before factor analysis, the reliability and validity of variables were tested. Cronbach's Alpha coefficient was used to test the reliability of the samples in this study [16], The formula is as follows:

$$Cronbach's\ Alpha = \frac{k}{k-1}\left(1 - \Sigma_{i=1}^{k}\frac{s_i^2}{s_p^2}\right) \quad (5)$$

The "k" is the number of measured items; "s_i^2" is the score variance of each item; "s_p^2" is the total score variance. The results showed that Cronbach's α was in the range of 0.6–0.8. Meanwhile, the results of Bartlett's test showed that the KMO (Kaiser–Meyer–Olkin) values of the variables were greater than 0.6, and the results were significant at the level of sig = 0.000, indicating a high validity. It should be pointed out that the KMO test and the Bartlett's test were used to examine the correlation and partial correlation between the variables. The closer the KMO statistic is to 1, the stronger the correlation between the variables, the weaker the partial correlation is, and the better the subsequent factor analysis is. Factor analysis was performed by using principal component analysis and "Maximum Variance Method", and 3, 2, 2, and 2 principal components were extracted for the variables of AB, SN, PBC, and PIE, respectively, according to the criteria of eigenvalue > 1 and cumulative contribution rate > 85%. Then, with the help of SPSS analysis software [41], four factors were obtained, corresponding to the latent variables AB, SN, PBC, and PIE respectively (Limited to the length of the article, the results of the factor analysis are omitted here).

3.5.2. Structural Model Fit Test

Through factor analysis, the dimensions of the variables were reduced and the connection to the latent variables was built to construct a structural model. Before fitting the model, the absolute fitness index, the value-added fitness index, and the reduced fitness index were used to judge whether the structural model was tenable. The absolute fitness index includes RMSEA (Root Mean Square Error of Approximation), GFI (Goodness-of-fit

index), and AGIF (Adjusted goodness-of-fit index). The value-added fitness index includes NFI (Normed fit index), IFI (Incremental fit index), CFI (Comparative fit index), and The Reduced fitness index includes PNFI (Parsimonious normed fit index), PGFI (Parsimonious goodness-of-fit index), $\chi 2/df$ (The ratio of chi-square to degrees of freedom). The judgment criteria and results are shown in Table 5. Although the IFI did not strictly meet the requirement that the critical value should be greater than 0.9, combined with the judgment results of model fitness, the potential variables in this study could be applied to the path coefficient analysis of the structural equation.

Table 5. Statistical test of fitness of structural models.

Test Statistics	Index	Critical Value	Fitted Value	Result
Absolute fitness indexes	RMSEA	<0.080	0.052	Satisfied
	GFI	>0.900	0.990	Satisfied
	AGFI	>0.900	0.969	Satisfied
Value–added fitness indexes	NFI	>0.900	0.998	Satisfied
	IFI	>0.900	0.894	Approach
	CFI	>0.900	0.912	Satisfied
Parsimony fit index	PGFI	>0.500	0.683	Satisfied
	PNFI	>0.500	0.756	Satisfied
	$\chi 2/df$	<3.000	2.514	Satisfied

3.5.3. Results of Path Coefficient Test

In this study, by using the SPSSAU software [42], the maximum likelihood estimation method was selected to test the standardized path coefficient of latent variables and the significance was tested. The results showed that (Table 6) the standard path coefficient of AB and BI was 0.301, with a significant level of 1%. This indicates that farmers' AB has a significant positive impact on their willingness, which confirms that AB is the most effective explanatory variable of BI. The path coefficient of SN and BI was 0.247, with a significant level of 5%. This indicates that farmers' SN has a positive effect on the BI, verifying its significant impact on risky behaviors [33], and also further reflecting that the management of farmland shelterbelts in ecologically fragile areas is risky [7]. The path coefficient of PBC and BI was 0.412, with a significant level of 5%. This indicates that the PBC of farmers has a positive impact on farmers' BI. Therefore, the research hypotheses H1, H2, and H3 are verified, which also confirms the functional relationship between the three in TPB theory and BI, and enriches the theoretical value and connotation of TPB. At the same time, the path coefficient of PIE and BI was 0.328. This fully proves that the PIE has a significant impact on the BI of farmers to manage farmland shelterbelts, and hypothesis H4 passes the test. It also shows that the theoretical framework constructed by this study through the expansion of TPB theory is suitable for the study of farmers' management of farmland shelterbelts in Xinjiang.

Table 6. The path coefficients for the structural model.

X → Y	Nonstandard Estimated Coefficients	Standard Estimated Coefficients	S.E	CR	Hypothesis Testing
AB → BI	0.328	0.301 ***	0.035	8.600	Accept H1
SN → BI	0.275	0.247 **	0.119	2.076	Accept H2
PBC → BI	0.515	0.412 **	0.201	2.050	Accept H3
PIE → BI	0.419	0.328 ***	0.108	3.000	Accept H4
PBC → BR	0.046	0.036	0.073	0.493	Reject H5
PIE → BR	0.147	0.133	0.085	1.564	Reject H6
BI → BR	0.206	0.171 *	0.096	1.781	Accept H7

Note: ***, **, and * indicate significance level of 1%, 5% and 10%, respectively.

In addition, hypothesis H5 did not pass the test. This is contrary to the initial assumption of TPB. The path coefficient of BI and BR was 0.171. Thus, hypothesis H7 was confirmed. This indicates that farmers' BI has a direct and significant impact on farmers' behavior, and BI is an important part of behavior logic. This is consistent with many research results [43,44]. In addition, this study also tested the direct effect of PIE on BR, and the results showed that this path could not pass the test. So hypothesis H6 does not hold. In the basic framework of TPB, PBC can directly affect actual behavior under certain conditions [26,27]. However, in this study, hypothesis H5 also failed to pass the test. Based on the above path analysis results, farmers' awareness of managing farmland shelterbelts in ecologically fragile areas can enhance farmers' BI, but could not directly contribute to farmers' management behavior. It can be seen that farmers' consideration of substantialism and formalism makes them maintain a cautious attitude towards the management of farmland shelterbelts, and the final actual behavior is the "rational decision" of farmers after weighing the advantages and disadvantages and thinking over and over again. The above results can reflect the good intermediary effect of BI between behavior cognition and BR: Farmers' cognition of farmland shelterbelt can indirectly affect farmers' behavior through BI, and farmers' BR to manage farmland shelterbelt is also based on their BI.

4. Conclusions and Suggestions

Based on the survey data of 1106 farmers in Xinjiang and the expanded TPB theory, this study constructed a research framework to explore the mechanism of farmers' choice to manage farmland shelterbelts in ecologically fragile areas and the influencing factors by using the Double Hurdle model and path analysis. The main conclusions are as follows:

(1). Farmers in ecologically fragile areas have a positive awareness and intention for the management of farmland shelterbelts, but subject to the external risks of managing farmland shelterbelts, farmers' enthusiasm is not high, and their actual management behavior is relatively cautious.

(2). Farmers' cognition of farmland shelterbelts has a significant impact on farmers' behavioral intentions but has a minor effect on their behavioral responses. Among them, the ecological benefits, perceived intensity, belief control, and policy and institutional environment have the most significant impact on farmers' behavior intention.

(3). The behavior logic of farmers' management of farmland shelterbelts in ecologically fragile areas follows the path of "cognition → intention → behavior", and farmers' behavior intention is comprehensively affected by their attitudes toward behavior, subjective norms, perceptual behavior control, and policy and institutional environment.

(4). "Ecological rationality" takes precedence over "economic rationality" in the behavior and decisions of farmers in ecologically fragile areas.

Based on the above conclusions, suggestions to stimulate farmers' enthusiasm to participate in the management of farmland shelterbelt are put forward: (1) guiding farmers to manage farmland shelterbelts should be based on the principle of voluntariness and fully respect farmers' behavioral intentions; (2) Relevant departments should issue systems and regulations to determine the management right, use right, and ownership in legal form, so as to protect the legitimate rights and interests of farmers; (3) The publicity of farmland shelterbelt management should be strengthened to improve the cognition and ecological awareness of farmers in ecologically fragile areas, eliminate farmers' concerns about risks, and widely induce farmers' actual behavior response; (4) The government should deeply understand the needs of farmers in the process of forest management and protection, make rational use of farmers' intentions, and reasonably solve problems such as thresholds in farmers' management, so as to stimulate farmers' actual behavior; (5) The ecological compensation mechanism should be implemented and improved, to ensure that the full amount of subsidies and compensation are distributed to farmers on time and the economic losses brought to farmers by ecological cutting quotas and "external diseconomy" are made up to the greatest extent, to dispel farmers' misgivings.

5. Research Limitations and Perspectives

Based on the first-hand survey data of farmers in the Xinjiang province, this study constructs a theoretical analysis framework by expanding the existing theory, using the metrological empirical model to verify the factors affecting the management decision of farmers 'farmland shelterbelts, and further exploring the potential transformation mechanism of farmers' behavior. In view of the novel data and scientific methods of the study, the conclusions of the study can be applied to the research areas of green production behavior and pro-environmental behavior of farmers in ecologically fragile areas.

However, given the previous setting of the study area and the basic theory, this study now has some limitations:

(1) Since the focused study area is ecologically fragile, the conclusions of the study are not very representative of the whole country.

(2) In view of the promotion of collective forest right reform, the cognition and management decisions of farmers in Xinjiang may change.

(3) If this research conclusion extends to the whole field of green agriculture, it will still face more rigorous verification later.

There are two next research perspectives that can be expanded upon from the author's research perspective:

(1) With the increasingly close connection between green agricultural production and sustainable forest management, farmers 'cognition of farmland shelterbelts and management decisions may change. Therefore, it is necessary to design a new micro survey and carry out the latest empirical analysis according to the changes in farmers' decision-making processes.

(2) With the exploration and attempt at the forestry carbon sink trading market, the motivation of farmers' production decisions in ecologically fragile areas may change due to the sound development of market factors, which may be a key point that could be supplemented in the next step of farmland shelterbelt research.

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References

1. Cao, X. *Farmland Shelterbelt*; China Forestry Press: Beijing, China, 1983.
2. Fan, Z.; Zeng, D.; Ji, X.; Liu, D. Advances in management of farmland shelterbelt ecosystem. *J. Beijing For. Univ.* **2004**, *26*, 81–84.
3. Amadi, C.C.; Farrell, R.E.; Van Rees, K.C.J. Dynamics of soil-derived greenhouse gas emissions from shelterbelts under elevated soil moisture conditions in a semi-arid prairie environment. *Agrofor. Syst.* **2018**, *92*, 321–334. [CrossRef]
4. Sang, B.; Atongguli, M.; Chen, Q. Wind tunnel simulation of windbreak efficiency of shelterbelts with different spaces and vegetations. *J. Northwest For. Univ.* **2022**, *37*, 57–63+132.
5. Xiang, K. The active affects of shelterbelts on environment in the semiarid region of northeast China. *J. For. Res.* **2018**, *4*, 1–5.
6. Zhang, Z. Stability evaluation of ecological project of farmland shelterbelt network in arid area based on the investigation of Y County. *J. Arid. Land Resour. Environ.* **2017**, *3*, 107–112.
7. Zhang, H.; Cheng, P.; Li, J. An analysis on contracting intention and influencing factors of farmers' farmland shelter-belt in arid land—Based on the survey data of 529 farmers in 8 counties (townships) in Xinjiang. *East China Econ. Manag.* **2018**, *4*, 71–77.

8. Wiesmeth, H. *Public Goods in Environmental Economics*; Springer Texts in Business and Economics: Berlin/Heidelberg, Germany, 2022.
9. Lin, W. *Private Supply of Rural Public Goods: Influencing Factors and Policy Choices*; China Development Press: Beijing, China, 2007.
10. Bragaglio, A.; Napolitano, F.; Pacelli, C.; Pirlo, G.; Sabia, E.; Serrapica, F.; Serrapica, M.; Braghieri, A. Environmental impacts of Italian beef production: A comparison between different systems. *J. Clean. Prod.* **2018**, *172*, 4033–4043. [CrossRef]
11. Hyman, D.N. *Public Finance: The Application of Modern Theory in Policy*, 6th ed.; China Finance and Economic Press: Beijing, China, 2001.
12. Weisbrod, B.A.; Dominguez, N.D. Demand for collective goods in private nonprofit markets: Can fundraising expenditures help overcome free-rider behavior? *J. Public Econ.* **2006**, *30*, 83–96. [CrossRef]
13. Timothy, K.; Kao, T.; Lu, Y. Political dynamics, public goods and private spillovers. *J. Econ. Behav. Organ.* **2020**, *177*, 237–254.
14. Kong, F.; Liao, W. An analysis of farmer households' woodland transferring behaviour based on their differential income structure—Taking Jiangxi Province as example. *Chin. Rural Econ.* **2011**, *8*, 89–97.
15. Nee, V.; Young, F.N. Peasant entrepreneurs in China's "Second Economy": An institutional analysis. *Econ. Dev. Cult. Chang.* **1991**, *39*, 293–310. [CrossRef]
16. Wen, N.; Zhou, H.; Zhang, H. Research on influencing factors of farmer's farmland shelterbelt management behavior response-based on 1106 survey data of farmers in Xinjiang. *For. Econ.* **2021**, *43*, 71–83.
17. Zheng, X.; Zhu, J.; Xing, Z. Assessment of the effects of shelterbelts on crop yields at the regional scale in Northeast China. *Agric. Syst.* **2016**, *143*, 49–60. [CrossRef]
18. Zhu, Y.; Wang, Y.; Chen, Q.; Wu, W.; Chu, F. Soil-coerced effect of farmland shelterbelt of Xinjiang 150 regiment. *Prot. For. Sci. Technol.* **2010**, *4*, 9–11.
19. Wang, M.; Zhai, Y. Based on the externality characteristics of farmland shelterbelt ecological compensation research. *Ecol. Econ.* **2013**, *5*, 52–55.
20. Miao, Y.; Zhou, Y.; Yang, C.; Sun, Z. Developmental status and suggestions of under-forest economy in China. *For. Eng.* **2015**, *31*, 35–39.
21. Kang, Q.; Zhang, H.; Lin, G. Influence of property rights cognition on farmer's willingness of farmland shelterbelt contracting in five forest tenure reform pilot counties in Xinjiang. *J. Arid. Land Resour. Environ.* **2020**, *34*, 22–28.
22. Wang, G.; Lu, Q. The paradox between willingness and behavior: Factors influencing farmers' willingness to cooperation and real payment behavior on small-scale irrigation facilities in rural communities. *J. Huazhong Univ. Sci. Technol.* **2013**, *3*, 68–75.
23. Qian, W.; Ying, Y. Analysis of farmers' willingness to participate in rural public infrastructure supply and its influencing factors. *Chin. Rural Econ.* **2014**, *11*, 39–51.
24. Yu, W.; Luo, X.; Li, R.; Xue, L.; Huang, L. The paradox between farmer willingness and their adoption of green technology from the perspective of green cognition. *Resour. Sci.* **2017**, *39*, 1573–1583.
25. Yan, Y. A Review on the origins and development of the theory of planned behavior. *Chin. J. Commun.* **2014**, *7*, 113–129.
26. Ajzen, I. The theory of Planned Behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *2*, 179–211.
27. Ajzen, I.; Fishbein, M. *Understanding Attitudes and Predicting Social Behavior*; Prentice-Hall: Englewood Cliffs, NJ, USA, 1980.
28. Sheeran, P.; Trafimow, D.; Finlay, K.A.; Norman, P. Evidence that the type of person affects the strength of the perceived behavioral control intention relationship. *Br. J. Soc. Psychol.* **2002**, *41*, 607–630. [CrossRef] [PubMed]
29. Kiriakidis, S.P. The theory of planned behavior to recidivism: The role of personal norm in predicting behavioral intentions of re-offending. *J. Appl. Soc. Psychol.* **2008**, *38*, 2210–2221. [CrossRef]
30. Lao, K.; Wu, J. Research on influencing mechanism of consumer green consumption behavior referring to TPB. *Financ. Econ.* **2013**, *299*, 91–100.
31. Wei, S. North's theory of institutional change: From institutions, institutional change and economic performance to understanding the process of economic change. *China Econ. Q.* **2009**, *2*, 743–768.
32. North, D.C. Institutional change and economic history. *J. Inst. Theor. Econ.* **1989**, *145*, 238–245.
33. Scott, J.C. *The Moral Economy of the Peasant*; Cheng, L., Translator; Yilin Press: Nanjing, China, 2001; pp. 100–251.
34. Zhou, S.; Chen, C. *Management*, 4th ed.; The Higher Education Press: Beijing, China, 2014.
35. Wooldridge, J.M. *Introductory Econometrics: A Modern Approach*, 4th ed.; Tsinghua University Press: Beijing, China, 2009.
36. Cragg, J.G. Some statistical model for limited dependent variables with application to the demand for durable goods. *Econometrica* **1971**, *39*, 829–844. [CrossRef]
37. Ma, S.; Swinton, S.M.; Frank, L. Farmers' willingness to participate in payment-for-environmental-services programmes. *J. Agric. Econ.* **2012**, *63*, 604–626. [CrossRef]
38. Teklewold, H.; Dadi, L.; Yami, A.; Dana, N. Determinants of adoption of poultry technology: A double-hurdle approach. *Livest. Res. Rural Dev.* **2006**, *18*, 40–45.
39. Yang, W.Z. *Stata for Statistical Analysis and Experimental Guidance*; Tsinghua University Press: Beijing, China, 2022.
40. Deng, J. Famer's rationality and innovation in rural social governance in ethnic minority areas—Village S in Kashgar as an example. *J. Xinjiang Univ.* **2015**, *3*, 37–41.
41. Yu, S. *Econometrics Experimental Guidance Tutorial: Based on the Comprehensive Application of EViews and SPSS*; The Economic Management Press: Beijing, China, 2021.
42. The SPSSAU Project (2019). SPSSAU. (Version 19.0) [Online Application Software]. Available online: https://www.spssau.com (accessed on 10 October 2022).

43. Zhang, Z. Behavioral logic of farmers' participation in sloping land conversion program: Economic rationality or ecological rationality. *Issues For. Econ.* **2019**, *39*, 449–456.
44. Shi, Z.; Zhang, H. Farmers' green production behavior examined through the value-belief-norm theory. *J. Arid. Land Resour. Environ.* **2020**, *34*, 96–102.