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Impact of Value Perception on Farmers' Willingness to Participate in Farmland Fallow: A Case-Study in Major Grain-Producing Areas of Hubei and Hunan, China

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Abstract: The major grain-producing areas will be the key areas of future China fallow. It is important to explore the influence of farmers' value perceptions on their fallow willingness in these areas. We analyzed this impact of value perception by using an ordered PROBIT model and survey data from the major grain-producing areas of Hubei and Hunan, China. The conclusions of this study are as follows: (1) A considerable proportion of farmers are willing to participate in farmland fallow, while a considerable proportion of farmers are neutral; (2) farmers' value perceptions of farmland fallow have a significant positive impact on their fallow willingness; (3) farmers' ages and education levels have a positive impact on farmers' willingness to directly participate in farmland fallow, while per capita farmland area has a negative impact; (4) the key factors for successful fallow are solving the problem of non-agricultural employment of farmers and appropriately formulating fallow mode, scale, and subsidy standards. This study proposes that the government can develop farmers' good value perceptions of fallow through appropriate subsidies and adequate publicity to strengthen their fallow consciousness.

Keywords: fallow; farmland protection; value perception; farmer willingness; food security; PROBIT model

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1. Introduction

Farmland quality which plays an important role in the use value of farmland, is an important factor in ensuring grain production and food security [1]. However, modern methods of agricultural production greatly increase the agricultural output, causing the supply of agricultural products to exceed demand in many countries and regions [2–5] and leading to farmland overuse, farmland degeneration, ecological damage, farmland pollution, soil, and water loss, serious groundwater overdrawing and other problems. Farmland fallow is an important and artificial measure for protecting farmland that can restore and even improve farmland fertility [6]. Therefore, many developed countries and regions have built well-established systems of farmland fallow in order to balance agricultural products' supply and demand and promote agriculturally sustainable development, like the Conservation Reserve Program in the USA, the MacSharry Reform in the EU, and the Farmland Fallow Plan in Japan [7–10].

China has the largest population of any country in the world, but its farmland is relatively scarce [11]. In order to meet the needs created by the rapid development of urbanization and industrialization, China's farmland has been over-exploited and chemical fertilizers and pesticides have been used excessively, lacking reasonable maintenance. Like

the human body, ecosystems such as farmland, grassland, rivers, and lakes also need rest to be healthy. This way of using farmland has led to great damage and may harm agriculturally sustainable development and food security [12–14]. Therefore, faced with this serious situation, the Central Government of China began to pay great attention to farmland protection. In June 2016, the State Council of China issued the "Exploration of the implementation of the land rotation and fallow system pilot program", beginning a fallow pilot to solve the ecological problems of farmland in several key areas [14]. In contrast to the fallow policies of many developed countries [15–18], China's fallow policy attaches more importance to ecological environmental protection and farmland fertility protection, rather than balancing the supply and demand of agricultural products and stabilizing agricultural product prices. Over the years, China's fallow pilot program has mainly focused on the groundwater funnel areas, heavy metal pollution areas, and ecologically vulnerable areas that urgently need ecological protection [12–14,19]. As an important major grain-producing area in China, Jiangsu Province was the first province to independently carry out the fallow pilot in China. China has a vast territory, with different climates, complex terrain, and different agricultural endowments, which results in differences in the fallow patterns in different areas. For example, the pattern of seasonal fallow was mainly adopted to reduce the use of agricultural underground water in the groundwater funnel area of Hebei Province, while the pattern of cultivating green manure to repair degraded soil was mainly adopted in the major grain-producing area of Jiangsu Province. China's fallow scale is increasing year by year. In 2019, China had 333,300 hm^2 of pilot fallow land, which achieved a good effect and greatly improved the local farmland's ecological environment. For example, Jiangsu Province has implemented fallow since 2016, which raised the fertility of fallow farmland in the pilot areas by an average of 0.5 grades and greatly improved the agricultural ecological environment. China's fallow scale will be further expanded to get a better effect. With the continuous promotion of the fallow policy and China's surplus in grain production, the fallow target has changed from ecological restoration to ecological restoration, farmland fertility restoration, and sustainable development of agriculture. The major grain-producing areas are very important to the food security of China and are facing the danger of farmland fertility degeneration because of long-term overuse. They will be critical areas for the fallow pilot in the future.

The Theory of Planned Behavior (TPB) proposes that people's cognition and attitude toward a certain behavior have a significant influence on their behavior willingness which is a direct determinant of behavior [20–22]. In general, the more favorable their cognition and attitude towards the behavior and the stronger their behavior willingness, the more likely there are to perform this behavior [20–22]. Agricultural production activities provide the main income of farmers [14]. The fallow policy is not only related to the food security of a country, but also directly affects the immediate interests of the farmers who participate in fallow. As the main body of fallow execution and compensation, farmers have an important influence on the effect of a fallow policy. According to the TPB, farmers' fallow willingness greatly influences their fallow behavior, which directly affects the success of the fallow policy. There is no doubt that studying farmers' willingness to participate in farmland fallow is beneficial to carrying out fallow policy successfully on the basis of respecting farmers' willingness and protecting their interests. Therefore, scholars have explored farmers' willingness to participate in farmland fallow and its influencing factors.

The studies on farmers' willingness have shown that because of the differences in development levels of the social economy, agricultural production conditions, agricultural labor quantity, and so on, farmers' willingness to participate in farmland fallow also differs in diverse regions. In ecologically vulnerable areas of Guizhou Province and the groundwater funnel areas of Hebei Province in China, farmers' willingness to participate in farmland fallow is high because of low agricultural income resulting from the ecological deterioration of farmland [12,14,23]. In the heavy metal pollution areas of Jiangxi Province and Hunan Province in China, farmers do not support the farmland fallow policy because of their limited awareness of environmental protection [13,24]. Concerning the influencing factors

of farmers' fallow willingness, some believe that farmers' educational levels, family dependency ratio, per capita family farmland area, awareness of the fallow role in improving soil fertility, and degree of understanding of fallow policy have a significant impact on their fallow willingness [12,14,25]. Lu Hua argues that the stronger the farmers' awareness of environmental protection and the clearer their awareness of heavy metal pollution hazards in farmland, the higher their enthusiasm for fallow will be [24]. Therefore, there is a consensus that farmer cognition of farmland fallow has an important impact on their fallow willingness. What is more, the influencing factors of farmers' fallow willingness in heavy metal pollution areas of Jiangxi Province and Hunan Province in China show that influencing factors are different in different regions [26]. The studies have shown that there are differences in willingness to participate in farmland fallow and in its influencing factors among different types of farmers. Hualin Xie and Qing Wu found that pure farmers, part-time farmers, and off-farmers have obviously different degrees of fallow willingness and influencing factors [26].

Farmland protection is inseparable from the farmers' active participation in the building of irrigation and water conservancy infrastructure, cultivated system selection, and so on. Farmers are the main body of agricultural production and the beneficiaries of farmland protection activities. There is no doubt that farmland fallow policy needs farmers' active participation, which will directly affect the outcome of farmland fallow and protection [25]. Whether or not farmers' enthusiasm and initiative for fallow are high will directly affect the success of fallow policy [14]. As rational-economic people, farmers obviously pursue maximized benefits in agricultural production decisions [27,28], and their value perception has an obvious influence on their ideas and behavior [29,30]. There is no doubt that farmers' fallow willingness is inevitably affected by their perceived value of fallow, and their fallow behavior will then be influenced by fallow willingness [20]. Therefore, farmer value perception makes an important impact on the implementation process and effect of a fallow policy. Exploring the impact of value perception on farmers' willingness to participate in farmland fallow has positive significance for the success of the fallow policy. Although there are many studies on farmers' willingness to participate in farmland fallow and its influencing factors in China, the specific influence of value perception on farmers' willingness to participate in farmland fallow remains to be scientifically studied. In addition, farmers' willingness to participate in farmland fallow refers only to the willingness to directly participate in fallow, the willingness to fallow their own farmland [12,14,24]. However, farmers' behavior toward indirectly participating in farmland fallow such as the publicizing of farmland fallow policy, cooperation with the management of farmland fallow, and prevention of damage to farmland fallow, can also promote the smooth implementation of fallow policy. There is also a lack of study on farmers' willingness to indirectly participate in fallow.

This study aims to analyze the impact of value perception on farmers' willingness to, directly and indirectly, participate in farmland fallow based on data from major grain-producing areas in China. The remainder of the paper is organized as follows. Section 2 provides the theoretical analysis. Section 3 presents the materials, methods, and variables. Section 4 displays the results of model analysis and marginal effect analysis. Section 5 includes a discussion of the total paper. Section 6 draws the conclusions of this study.

2. Theoretical Analysis

Value perception refers to the subjective view and overall evaluation of the "good or bad" or "utility" of the object on the basis of the subject's own gain and loss, which is a trade-off between benefits and costs, affecting the subject's behavior toward the object [31–34]. Value perception has an important impact on farmers' fallow willingness [29,30]. As rational-economic people and one of the main fallow interest groups, farmers will weigh the value of farmland fallow when deciding whether to participate in farmland fallow policy [27]. Farmers' active participation is closely related to the voluntary principle. Farmers will voluntarily participate in farmland fallow policy only when the behavior of participants in farmland fallow policy meets the criteria of their value perception [32,35].

Furthermore, farmer value perception is subjective, and there is a significantly positive relationship between farmers' behavioral willingness and their value perceptions [29,30]. In conclusion, the influencing mechanism of farmers' value perception on farmers' participation in farmland fallow is "value perception" to "behavioral willingness" to "behavioral response". It indicates that farmers' value perceptions of farmland fallow affect their fallow willingness, and then affect their fallow behavior. Therefore, farmers' fallow willingness can be predicted with high accuracy from their value perception and their fallow behavior can be predicted [21,22].

Farmland is not only a means of production and living for farmers, but also serves many non-productive functions such as social security, ecological environment protection, leisure, and entertainment [1,18,28,36]. The motivation for farmers' farmland protection behavior comes from both the productive and non-productive functions of farmland [1,18,28,36]. Farmland fallow is a very important kind of farmland protection measure to promote agriculturally sustainable development, which has the three dimensions of ecology, economy, and society [37]. According to farmland functions and the characteristics of farmland fallow, farmland fallow can not only improve farmland fertility and agricultural yield and quality, increasing farmers' agricultural income, but also promote agriculturally sustainable development, protect the ecological environment, and provide social security for farmers [29,32,38,39]. Therefore, this paper divided the value of farmland fallow into economic, ecological, and social value, and argues that farmers' value perceptions of farmland fallow include their perceptions of economic, ecological, and social value.

Perception of economic value denotes farmer perception of how farmland fallow can increase agricultural output and agricultural income [36]. Implementing the appropriate fallow policy and taking specific conservation measures for farmland according to local conditions will also generate a value of social economy and value of ecological environment [36,40]. Therefore, farmer value perception of farmland fallow also includes the perception of social value and ecological value. Perception of ecological value refers to the perception of positive ecological benefits such as protecting and improving farmland fertility, improving soil property, tackling soil pollution, conserving water and soil, conserving water sources, protecting biological diversity, and so on [37,41–44]. Perception of social value means that farmers perceive the social security of farmland fallow, which is beneficial in providing farmers with basic living security, employment, elderly support, and food needs [1].

As an important means of production and living for farmers, farmland can bring direct economic benefits to farmers [1]. The economic benefits of farmland are the fundamental interests of farmers. The pursuit of economic benefits is still the most important factor for farmers in making agricultural decisions. As rational-economic people, farmers will pursue the maximization of economic benefits in the farmland policy [27,28], and the perception of economic value is the subjective feeling of farmers regarding the economic benefits of directly participating in fallow. Therefore, perception of economic value has a direct impact on farmers' participation enthusiasm for farmland fallow. If perceiving the economic value of farmland fallow, farmers will realize that the production and quality of agricultural products will improve and their agricultural income will increase accordingly by direct fallow participation. In conclusion, farmers' willingness to fallow their own farmland will be higher when their perception of economic value is stronger.

The phenomenon of the concurrent employment of farmers is more and more obvious, and the economic value of farmland is weakened [4,45]. The non-agricultural income has become an important driving force for the increase in farmers' income in China. With the social development and propagation of the ecological concept, farmers have a better understanding of ecological protection. Moreover, farmers' awareness of environmental responsibility plays a driving role in their environmental protection behavior [46]. Modern farmers have become "ecological-economic people" [47]. They have both an economic rationality that monitors agricultural production efficiency and ecological rationality that pursues ecological value [40,48]. While pursuing the maximization of economic benefits,

they will also consider the ecological value in an agricultural decision. As one kind of ecological protection policy, farmland fallow policy can better protect and restore the ecological environment of farmland, which can produce good ecological benefits. Therefore, when farmers perceive the ecological value of farmland fallow, they realize that fallow policy meets their ecological needs, and their enthusiasm to both, directly and indirectly, participate in fallow will increase. In addition, farmland fallow has the social values of basic living security, employment, elderly support, and food needs of farmers [1,28]. Farmland fallow can improve fertilize the soil, remediate pollution, improve farmland infrastructure, and protect the ecological environment of farmland, which promotes agriculturally sustainable development. When farmers' perceptions of the social security value of farmland fallow are higher, they are more likely to fallow their own farmland in order to maintain or improve its ecological environment and productivity in the future. Moreover, when farmers understand the social value of farmland fallow that guarantees social and food security, they are more likely to indirectly participate in fallow. Therefore, this paper draws the following hypotheses:

Hypothesis 1 (H1). *Farmer perception of economic, ecological, and social value has a significant positive influence on farmers' willingness to directly participate in farmland fallow.*

Hypothesis 2 (H2). *Farmer perception of ecological and social value has a significant positive influence on farmers' willingness to indirectly participate in farmland fallow.*

3. Materials, Methods, and Variables

3.1. Data Sources

As the central provinces in China, Hubei Province, and Hunan Province are located at 108°21′–116°07′ E longitude and 24°38′–33°06′ N latitude. Hubei Province and Hunan Province are located in the plain of the middle reaches of the Yangtze River, one of the three greatest plains in China. These two provinces have high natural land productivity and belong to the subtropical monsoon climate zone, where the combination of abundant farmland and superior climate resources is beneficial. Because they are typical major grain-producing areas, their grain yield contributes to the food security of the entire province and the whole country. Hubei Province has not established a province-wide scientific and reasonable fallow system. Currently, the pilot fallow of Hubei Province, which is aimed at "green life" and "healthy ecological environment", is mainly carried out in rocky desertification and soil erosion areas. Hunan Province focuses on the development of "green agriculture", mainly implementing fallow in heavy metal pollution areas of the Chang-Zhu-Tan region. From July to August 2019, the research team conducted a field survey in Wuhan City (Xinzhou County), Jingzhou City (Jiangling County), Jingmen City (Dongbao County), Xianning City (Tongcheng County, Xian'an County) of Hubei Province, and Yueyang City (Pingjiang County) of Hunan Province (Figure 1). These counties are the major grain-producing areas in provinces. The data used in this paper are from this survey. The survey integrated areas with different characteristics of economy and landform, which contributed to a comprehensive survey of farmers' willingness to participate in farmland fallow. We randomly selected 5 villages in 6 different counties and randomly surveyed 20 farmer households in one village to carry out the questionnaire survey. Finally, 600 questionnaires were sent out in this survey and 585 of them were useful. The recovery rate of effective questionnaires was 97.5%.

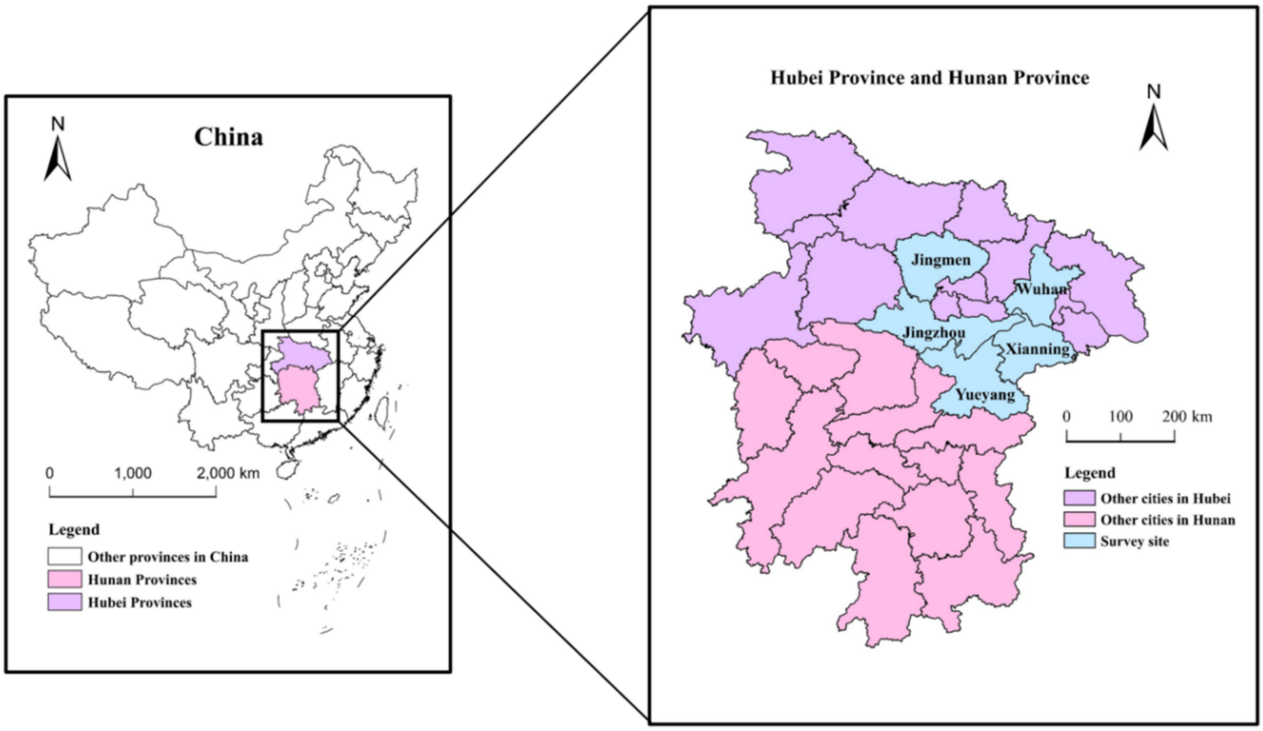

Figure 1. Survey site.

3.2. Sample Characteristics

As seen in Table 1, most farmers in the survey sample were male, accounting for 66.15%; farmers over the age of 50 accounted for 67.52% of the total; farmers with a junior high school education or below accounted for 95% of the total; 81.71% of the farmers were in ordinary, good, or very good health; most peasant households consisted of 4 to 6 family members, accounting for 70.60%. Moreover, 58.97% of the farmers engaged concurrently in agricultural and non-agricultural work. The above results reflected the characteristics of the survey areas, including the aging of the agricultural labor force, low education levels, and universality of concurrent business behavior of farmers.

Table 2 shows that 44.44% of the farmers were willing to fallow their own farmland, 44.27% were neutral, and the portion of unwilling farmers was 11.28%. In terms of farmers' willingness to publicize farmland fallow, 35.56% of the farmers were willing, 45.30% were neutral, and 19.15% were unwilling. In terms of farmers' willingness to cooperate with the management of farmland fallow, 58.97% of the farmers were willing, 34.36% were neutral, and 6.67% were unwilling. We also found that 34.19% of the farmers were willing to prevent damage of fallow, 32.65% o were neutral, and 33.16% were unwilling. This indicated that with the popularization of the concurrent employment of farmers and the decline in the proportion of non-agricultural income, even in major grain-producing areas, farmers' willingness to plant crops has decreased, and a considerable proportion of farmers preferred fallowing their farmland to engaging in non-agricultural production.

Table 1. Basic situation of the sample.

Farmer Characteristics	Option	Ration (%)
Gender	Male	66.15
	Female	33.85
Age	16 to 22 years old	0.85
	23 to 35 years old	2.74
	36 to 50 years old	28.89
	51 to 65 years old	39.49
	over 65 years old	28.03
Education levels	Uneducated	24.27
	primary school	39.83
	junior high school	31.45
	senior high school	3.59
	college and above	0.85
Healthy conditions	Poor	18.29
	ordinary	38.80
	good	29.40
	very good	13.50
Family population	1–3 people	7.18
	4–6 people	70.60
	More than 6 people	22.56
Whether the farmer is concurrently	Not concurrently	41.03
	Concurrently	58.97

Note: Calculated from the survey data.

Table 2. Farmers' willingness to participate in farmland fallow.

Explained Variables	Option	Ration
Willingness to fallow their own farmland	Unwilling to participate	11.28%
	Attitude is neutral	44.27%
	Willing to participate	44.44%
Willingness to publicize farmland fallow policy	Unwilling to participate	19.15%
	Attitude is neutral	45.30%
	Willing to participate	35.56%
Willingness to cooperate with the management of farmland fallow	Unwilling to participate	6.67%
	Attitude is neutral	34.36%
	Willing to participate	58.97%
Willingness to prevent damage of farmland fallow	Unwilling to participate	33.16%
	Attitude is neutral	32.65%
	Willing to participate	34.19%

3.3. Research Methods

In this study, farmers' willingness to participate in farmland fallow was selected as the dependent variable, which is an ordered variable. It was recorded as "1 = farmers are unwilling", "2 = farmers' attitude is neutral" and "3 = farmers are willing". Moreover, the survey data were cross-sectional. Therefore, this paper used an ordered PROBIT model to analyze the influence of value perception on farmers' willingness to participate in farmland fallow [14]. The model is as follows:

$$y_i^* = \beta X_i + \varepsilon_i \quad (1)$$

In Formula (1), y_i^* represents the latent variable corresponding to the dependent variable and cannot be directly measured. X_i is an independent variable, representing the influencing factors of farmers' fallow willingness; β is the coefficient of independent

variables; ε is a random disturbance term. The observed value of the farmers' fallow willingness is y_i (i = 1, 2, 3), and its definition rule is as follows:

$$y_i = \begin{cases} 1, \text{ if } y_i^* \le r_1 \\ 2, \text{ if } r_1 < y_i^* \le r_2 \\ 3, \text{ if } y_i^* > r_2 \end{cases} \quad (2)$$

In the formula above, $r_1 < r_2$ is the parameter to be evaluated, the cut point.

3.4. Variable Selection and Design

In this study, independent variables were divided into core explanatory variables and control variables. The core explanatory variables were the farmers' value perception of farmland fallow, which included farmer value perceptions of the farmland fallow effect on improving farmland output, protecting and improving the ecological environment, and improving farmland fertility. They corresponded to farmer perception of the economic, ecological, and social value respectively. When evaluating farmers' willingness to directly participate in fallow, the model used all core explanatory variables. When evaluating farmers' willingness to indirectly participate in fallow, the model uses two core explanatory variables of protecting and improving the ecological environment and improving farmland fertility.

In terms of control variables, we selected variables from the individual characteristics and family characteristics of farmers [5]. The variables of individual characteristics included farmers' genders, ages, education levels, and health conditions. The variables of family characteristics included farmer household total income, non-agricultural income proportion, the proportion of labor force, farmland quality, per capita farmland area, and distance from the county. Descriptions of the variables are shown in Tables 3 and 4.

Table 3. Variable paraphrase, assignment, and expectation.

Variables	Definition	Expected Direction
Improving farmland output	Very ineffective = 1; ineffective = 2; farmers' attitude is neutral = 3; effective = 4; very effective = 5	Positive
Protecting and improving the ecological environment	Very ineffective = 1; ineffective = 2; farmers' attitude is neutral = 3; effective = 4; very effective = 5	Positive
Improving farmland fertility	Very ineffective = 1; ineffective = 2; farmers' attitude is neutral = 3; effective = 4; very effective = 5	Positive
Gender	Female = 0; male = 1	?
Age	16 to 22 years old = 1; 23 to 35 years old = 2; 36 to 50 years old = 3; 51 to 65 years old = 4; over 65 years old = 5	Positive
Education levels	Uneducated = 1; primary school = 2; junior high school = 3; senior high school = 4; college and above = 5	Positive
Healthy conditions	Poor = 1; ordinary = 2; good = 3; very good = 4	?
Total income	The number of farmer household's income in a year (unit: CNY)	?
Non-agricultural income proportion	The ratio of farmer household's non-agricultural income to total income	Positive
Proportion of labor force	The ratio of farmer household's population of labor force to total population	Negative
Farmland quality	The ratio of farmer household's first and second-class farmland to total farmland area	Negative
Per capita farmland area	The total farmland area divided by the total population of farmer household (unit: mu)	Negative
Distance from the county	The distance of farmer household from the county (unit: km)	Positive

Note: Mu is a unit of land area in China. One mu is about 667 m^2. The "?" indicates that the expected direction of the variable is uncertain whether it is positive or negative.

Table 4. Descriptive statistical analysis of variables.

Variables	Mean	S.t.d	Min	Max
Improving farmland output	3.34	0.79	1.00	5.00
Protecting and improving the ecological environment	3.47	0.76	1.00	5.00
Improving farmland fertility	3.32	0.80	1.00	5.00
Gender	0.66	0.47	0.00	1.00
Age	3.91	0.87	1.00	5.00
Education levels	2.17	0.87	1.00	5.00
Healthy conditions	2.38	0.93	1.00	4.00
Total income	7.29	4.10	0.80	40.00
Non-agricultural income proportion	0.92	0.14	0.00	1.00
Proportion of labor force	0.75	0.17	0.20	1.00
Farmland quality	0.80	0.34	0.00	1.00
Per capita farmland area	0.94	0.87	0.00	14.03
Distance from the county	15.28	5.73	5.00	30.00

4. Results

Before performing model analysis, we used VIF analysis to test whether the variables had multicollinearity. Table 5 shows that the tolerance of each variable was greater than 0.5, and the VIF was less than 3. Therefore, there was no multicollinearity of variables, and model analysis could be carried out.

Table 5. Variable's VIF analysis.

Variable	VIF	1/VIF
Improving farmland output	1.84	0.54
Protecting and improving the ecological environment	1.27	0.79
Improving farmland fertility	1.86	0.54
Gender	1.09	0.92
Age	1.78	0.56
Education levels	1.5	0.67
Healthy conditions	1.76	0.57
Total income	1.23	0.81
Non-agricultural income proportion	1.05	0.95
Proportion of labor force	1.08	0.93
Farmland quality	1.10	0.91
Per capita farmland area	1.21	0.82
Distance from the county	1.35	0.74
Mean VIF	1.39	

The ordered PROBIT model and OLS model were used for the regression analysis and robustness test respectively to enhance the credibility and persuasiveness of the results. The core explanatory variables showed relatively consistent significance in the estimation results of the two models, indicating that the model results had strong robustness. The analyses and explanations in this paper were based on the results of the ordered PROBIT model.

Table 6 shows that all core explanatory variables were at a 1% significance level. It can be seen that the coefficient of "Improving farmland output" was 0.259, which showed the variable had a significant positive influence on farmers' willingness to fallow their own farmland. It showed that when farmers perceived the economic value of fallow in improving agricultural production and their agricultural income, they were more likely to directly participate in fallow. According to the survey, 23.86% were willing to fallow their own farmland when the farmers thought that fallow was ineffective or very ineffective in improving farmland output, while 60.77% were willing to fallow their own farmland when the farmers thought that fallow was effective or very effective in improving farmland output.

The coefficient of "Protecting and improving the ecological environment" was 0.286, which indicated it had a positive impact on farmers' willingness to fallow their own farmland. We learned that when farmers perceive the economic value of fallowing their own farmland to protect and improve the ecological environment, they will show a higher willingness to directly participate in fallow to enjoy a better ecological environment. According to the survey, when farmers thought that fallow was ineffective or very ineffective in protecting and improving the ecological environment, the number of farmers who were willing to fallow their own farmland accounted for 26.79%; 54.48% were willing to fallow their own farmland when they thought that fallow was effective or very effective in protecting and improving the ecological environment. In addition, the core explanatory variable of "Improving farmland fertility" also had a positive impact on farmers' willingness to fallow their own farmland. It indicated that when farmers perceive the social value of fallowing their own farmland, they are more likely to directly participate in fallow in order to improve farmland quality and ensure sustainable farmland use for the future security of basic living, employment, elderly support, and food needs. According to the survey, when farmers thought that fallow was ineffective or very ineffective in improving farmland fertility, only 27.37% of them were willing to fallow their own farmland, while 60.55% were willing to fallow their own farmland when they believed that fallow was effective or very effective at protecting and improving farmland fertility.

Table 6. Model results of farmers' willingness to directly participate in farmland fallow.

Variables	OLS		Ordered PROBIT	
	Coefficient	**S.t.d**	**Coefficient**	**S.t.d**
Improving farmland output	0.131 ***	0.043	0.259 ***	0.083
Protecting and improving the ecological environment	0.146 ***	0.037	0.286 ***	0.072
Improving farmland fertility	0.133 ***	0.043	0.258 ***	0.083
Gender	−0.029	0.055	−0.057	0.108
Age	0.061	0.039	0.138 *	0.078
Education levels	0.046	0.036	0.132 *	0.075
Healthy conditions	0.010	0.036	0.038	0.071
Total income	0.002	0.007	0.002	0.013
Non-agricultural income proportion	−0.189	0.188	−0.466	0.419
Proportion of labor force	−0.030	0.149	−0.079	0.291
Farmland quality	−0.028	0.078	−0.097	0.155
Per capita farmland area	−0.140 ***	0.032	−0.255 ***	0.060
Distance from the county	0.001	0.005	0.004	0.010
Number of obs	585		585	
R2	0.18		0.11	

Note: *, ***, respectively, indicate that statistical tests were at a 10%, 1% significance level.

In terms of control variables, in Table 6 "Age" is at a 10% significance level and had a positive impact on farmers' willingness to fallow their own farmland. As farmers get older, their physical power to participate in agriculture decreases and they hope to obtain income through non-agricultural means. Therefore, they are more likely to directly participate in fallow. The "Education levels" had a coefficient of 0.138 and it was at a 10% significance level, which showed it had a positive impact on farmers' willingness to fallow their own farmland. The main reason for this is that when farmers attain higher education levels, they are able to realize the positive effect of fallow, which improves their enthusiasm for it. In addition, "Per capita farmland area" was at a 1% significance level, so it had a negative impact on farmers' willingness to fallow their own farmland. When the farmers' family has enough per capita farmland area, they are able to carry out the scale management to obtain more agricultural benefit. Their willingness to fallow their own farmland and engage in non-agricultural work to earn more income is lower.

From Table 7, we also see that the core explanatory variables of "Protecting and improving the ecological environment" and "Improving farmland fertility" had a significantly positive impact on farmers' willingness to indirectly participate in fallow. This indicated that when farmers realize the effect of fallow on protecting and improving the ecological environment, they will feel the ecological value of farmland fallow, and are very likely to indirectly participate in fallow to enjoy a better environment. Moreover, when farmers realize fallow's additional effect of improving farmland fertility and maintaining farmland, they will understand the social value of fallow in guaranteeing future food security and their willingness toward indirect participation in fallow is stronger.

Table 7. Model results of farmers' willingness to indirectly participate in farmland fallow.

Variables	Publicize Fallow Policy		Cooperate with Fallow Management		Prevent Damage to Fallow	
	OLS	PROBIT	OLS	PROBIT	OLS	PROBIT
Improving farmland output	—	—	—	—	—	—
Protecting and improving the ecological environment	0.166 *** (0.035)	0.329 *** (0.073)	0.192 *** (0.044)	0.300 *** (0.070)	0.174 *** (0.036)	0.336 *** (0.070)
Improving farmland fertility	0.095 *** (0.036)	0.208 ***(0.077)	0.125 *** (0.045)	0.170 ** (0.0730)	0.1980 *** (0.037)	0.381 *** (0.073)
Individual characteristics	Joined	Joined	Joined	Joined	Joined	Joined
Family characteristics	Joined	Joined	Joined	Joined	Joined	Joined
Number of obs	585	585	585	585	585	585
R2	0.09	0.07	0.19	0.12	0.16	0.10

Note: **, *** represent the 5%, 1% significance levels, respectively. The values inside the parentheses are standard errors.

Although the coefficients above reflected the impact of value perception on farmers' willingness to participate in farmland fallow, they cannot fully and accurately reflect the influence degree of value perception. Therefore, on the basis of the model results, this paper adopted the marginal effect analysis to conduct a more in-depth study, reflecting the probability of a change in the core explanatory variable leading to a change in farmers' willingness to participate in fallow [12]. The results of the marginal effect analysis are shown in Table 8.

Table 8. Marginal effect of farmers' willingness to participate in farmland fallow.

Farmers' Willingness to Participate in Farmland Fallow		Improving Farmland Output	Protecting and Improving the Ecological Environment	Improving Farmland Fertility	Control Variables
Fallow their own farmland	Y = 1	−0.043	−0.047	−0.043	Joined
	Y = 2	−0.047	−0.051	−0.046	
	Y = 3	0.089	0.098	0.089	
Publicize farmland fallow policy	Y = 1	—	−0.039	−0.025	Joined
	Y = 2	—	−0.079	−0.050	
	Y = 3	—	0.118	0.075	
Cooperate with management of farmland fallow	Y = 1	—	−0.093	−0.052	Joined
	Y = 2	—	−0.002	−0.001	
	Y = 3	—	0.094	0.053	
Prevent damage to farmland fallow	Y = 1	—	−0.056	−0.064	Joined
	Y = 2	—	−0.061	−0.069	
	Y = 3	—	0.117	0.133	

In terms of the willingness to directly participate in fallow, when the core explanatory variables of "Improving farmland output", "Protecting and improving the ecological

environment" and "Improving farmland fertility" was valued at Y = 3, their marginal efficiency was positive. As these variables increased, the possibility of farmers' willingness to fallow their own farmland becomes greater. In terms of the willingness to indirectly participate in fallow, the marginal efficiency of "Protecting and improving the ecological environment" and "Improving farmland fertility" was positive when Y = 3. It indicated that as the variables increased, farmers are more likely to indirectly participate in fallow. In conclusion, the estimation results of the marginal effect analysis were basically consistent with the estimation results of the ordered PROBIT model.

5. Discussion

Related research has explored the influence of farmer cognition on fallow willingness from their fallow understanding, compensation satisfaction, environmental awareness, and awareness of fallow role in improving soil fertility [12,14,24,25]. This study explored the impact of farmer value perception on their fallow willingness, which was more consistent with the psychology of farmers who are rational people. The research showed that the theoretical hypotheses are consistent with the empirical analysis (Tables 6–8). Farmer value perception has a positive effect on their willingness to, directly and indirectly, participate in fallow. Lu Hua argues that farmers' environmental awareness and awareness of fallow role in improving soil fertility plays a positive effect in enhancing their fallow willingness [24,25]. It indirectly reflects the positive effect of farmers' value perception on farmers' fallow willingness. We also analyzed farmers' willingness toward direct participation and indirect participation in fallow. Although the implementation of fallow in Hubei Province and Hunan Province is not stable, a considerable proportion of farmers are willing to participate in fallow. This provides a good willingness basis for local fallow implementation, but it should also improve the fallow enthusiasm of neutral farmers. In addition, many farmers have a low level of education and poor skills in non-agricultural employment, and there are few non-agricultural employment opportunities in countries. Solving the problem of non-agricultural employment of farmers will benefit from implementing fallow [12]. Therefore, it is important to solve the non-agricultural employment problem of farmers by holding non-agricultural employment training and providing agricultural employment opportunities.

Based on the above analysis, we found that improving farmer value perception will strengthen their fallow willingness. China is gradually expanding its fallow scale in many regions. For example, Hubei Province has decided to establish a reasonable fallow system for different regions across the province by 2030. Therefore, it is necessary for the government to pay attention to the impact of farmer value perception when carrying out farmland fallow policy. The government should actively publicize the fallow policy to help farmers understand it in order to strengthen their value perception and fallow initiative [12].

The EU started the MacSharry Reform in 1992 to encourage farmers to fallow their farmland, and it has achieved good ecological benefits and balanced the food supply and demand [49]. This paper argues that the EU's fallow system can enlighten China. Firstly, the fallow scale in the EU is flexible and can be adjusted according to the actual situation [50,51]. China's degradation of farmland fertility and fragile agricultural ecological environment need fallow to reach a certain scale for a significant effect. At present, it is necessary for China to expand fallow scale. However, China has a huge population base and its farmland resources are relatively scarce. Too much fallow area will lead to the reduction of the agricultural production scale and problems of food security. We must learn from the EU how to flexibly adjust the fallow scale in order to achieve a balance between agriculturally sustainable development and the current food supply. Furthermore, the EU compensation measures of fallow are accurate, and the subsidies of different countries and areas are determined by actual local situation, which protects the interests of farmers [7]. China's fallow subsidies are about 500 CNY/mu in many fallow areas, which must be more specific to the economic development level, farmer income, and market price. In the short term, proper subsidies can improve the fallow enthusiasm of farmers, but in the long term, fallow

requires high participation consciousness and the green development concept of farmers to achieve good results. In Europe, environmental protection awareness is widespread, and the public generally supports the EU's agricultural greening measures, which contributes to the good results of fallow [52]. The farmers' value perceptions of the fallow subsidies and pleasant ecological environment in the EU encourage them to support and participate in fallow. The Chinese government needs to accurately formulate fallow's subsidy policies and enhance farmers' environmental awareness to enhance farmer value perception and farmer awareness of fallow participation [12,14].

6. Conclusions

In this study, the ordered PROBIT model was used to analyze the impact of value perception on farmers' willingness to participate in farmland fallow in major grain-producing areas of Hubei Province and Hunan Province, and farmer fallow willingness was determined. According to the results, the conclusions are as follows:

(1) A considerable proportion of farmers are willing to, directly and indirectly, participate in farmland fallow, while a considerable proportion of farmers are neutral on fallow.
(2) Farmer value perception has a significant positive impact on farmers' willingness to, directly and indirectly, participate in farmland fallow.
(3) The farmers' ages and education levels have a positive impact on farmers' willingness to directly participate in farmland fallow, while the per capita farmland area of farmer households has a negative impact.
(4) The key factors of successful fallow implementation are solving the problem of non-agricultural employment of farmers and appropriately formulating fallow mode, scale, and subsidy standards according to realistic conditions.

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