forests

MDPI

Article

What Affects the Willingness of Farmers to Participate in Forest Ticket Trading? Empirical Analysis Based on Incomplete Information Theory

Boyao Song [1], Xiao Han [1], Siyao Lv [1], Qiushuang Fang [2], Zhongping Wang [1] and Hongxun Li [1,*]

[1] School of Economics and Management, Beijing Forestry University, Beijing 100083, China; songboyao@bjfu.edu.cn (B.S.); hangood@bjfu.edu.cn (X.H.); siyaolv1997@bjfu.edu.cn (S.L.); wangzhongping@hcvcchina.com (Z.W.)

[2] Urban Agriculture Research Center, Shanghai Academy of Agricultural Sciences, Shanghai 201403, China; qsfang@saas.sh.cn

* Correspondence: lihongxun@bjfu.edu.cn; Tel.: +86-(10)-13651236761

Abstract: Forest tickets refer to a type of forest resource usufruct certificate characterized by "cooperative operation, quantification of rights and interests, free circulation, and guaranteed dividends". It is an important means to build a market-oriented mechanism for realizing the value of ecological resources. Incomplete information, based on field survey data from thirteen villages in eight townships (towns) in Sanming City, Fujian Province, China, and a binary logit model were used to explore the moderating effects of factors affecting farmers' willingness to participate in forest ticket trading, the heterogeneity of farmers, and social capital. We found the following: In an environment with incomplete information, farmers' willingness to participate in forest ticket trading is influenced by heterogeneity expectations, social capital, government propaganda, and individual family characteristics. There are certain differences in the influencing factors and degree of farmers' willingness to participate in forest ticket trading among different groups of farmers with different levels of education and part-time employment. Social capital can strengthen the positive impact of income expectations and policy sustainability expectations, and alleviate the negative impact of risk expectations.

Keywords: forest ticket trading; farmers' willingness; incomplete information; influencing factors; binary logit model

Citation: Song, B.; Han, X.; Lv, S.; Fang, Q.; Wang, Z.; Li, H. What Affects the Willingness of Farmers to Participate in Forest Ticket Trading? Empirical Analysis Based on Incomplete Information Theory. *Forests* **2024**, *15*, 821. https://doi.org/10.3390/f15050821

Academic Editor: David Ellison

Received: 6 April 2024
Revised: 28 April 2024
Accepted: 2 May 2024
Published: 7 May 2024

1. Introduction

Guided by the global sustainable development goals, the harmonious advancement of socioeconomic development and ecological conservation has emerged as a pressing need of our time [1]. Forest resources, being vital components of the Earth's ecosystem, play an indispensable role in maintaining ecological balance, enhancing living environments, and regulating the global climate [2]. As a major holder of forestry resources worldwide [3], China boasts collective forestlands that account for 60% of the national forest area, implicating over 100 million farm households and 500 million farmers. These areas significantly overlap with regions historically involved in revolutions, ethnic minority regions, border areas, and economically underdeveloped zones, making them pivotal battlefields for advancing rural revitalization and achieving common prosperity [4]. In recent years, China's forestry sector has witnessed rapid growth, with its output value soaring to 8.04 trillion yuan by 2022, marking a multiplication of over 3000 times compared to the founding period of the People's Republic [5]. Accompanying this, ecological restoration efforts have proven highly effective, with China leading the world in afforestation, contributing approximately 70% of the globe's total area. Notably, the forestry sector has not only facilitated the transformation of rural economies but also provided employment for over 52 million

individuals [6], thereby solidifying its position as a robust catalyst for rural rejuvenation and green economic transition.

However, the long-term development of forestry still faces significant challenges such as insufficient capital investment and inadequate financing mechanisms [7,8]. As the main body of the forestry economy, forestry farmers have limited financing channels and high financing costs, which limit the improvement of income and welfare [9,10]. In response to these challenges, since 2008, China has embarked on collective forest tenure reforms, endeavoring to empower forest right holders and facilitating land transfer and mortgaging, thus carving new paths for forestry capital operations [11]. Despite continuous policy endeavors to innovate with diversified financing mechanisms and broaden funding avenues, the disparity between supply and demand for forestry capital remains acute. Structural issues within the forestry capital market, including inadequate investment and a reliance on singular financing channels, persist as formidable challenges [10,11].

In this context, Sanming City, situated in Fujian Province, China, stands as a forefront runner in the realm of Collective Forestry Tenure Reform, having innovatively initiated the Forest Ticket System in 2019. This pioneering system is meticulously designed to invigorate the rural collective forestland resources by leveraging the financial prowess of forest tickets. It seeks to facilitate the asset securitization and market circulation of forestry resources, fostering an efficacious interface between resources, capital, and the marketplace. By enhancing the monetization of ecological assets, it paves the way for augmenting rural incomes. Central to this systemic blueprint are the hallmarks of "collaborative operations, quantified rights, unfettered liquidity, and assured dividends", strategically aimed at transcending the confines of conventional forestry management paradigms and catalyzing the modern transformation of the forestry economy.

Despite the initial successes of the forest ticket reform, the current implementation of the forest ticket system remains heavily government-driven and reliant on public funds, with limited participation from private capital and insufficient trading activity in forest tickets. Central to the objectives of the forest ticket system is the need for these instruments to circulate in the open market, a crucial step toward revitalizing collective forest resources. Here, small-scale forest farmers constitute the bedrock of the forest ticket trading market and are key stakeholders in the system; their active engagement is vital for the sustainability of the forest ticket system. Nonetheless, in practice, the system has encountered hurdles in attracting and accommodating these farmers, resulting in lower-than-anticipated participation levels and a sluggish trading pace, thereby impeding the full realization of market-oriented circulation for forest tickets [12].

So, what exactly restricts farmers from participating in forest ticket trading? The core lies in exploring how the innovative forestry financing model of forest vouchers can be accepted by farmers in complex decision-making environments. Previous studies have revealed three key influencing dimensions: Firstly, macro external environmental factors, such as urban expansion and policy orientation, indirectly affect the transaction decisions of farmers by influencing the stability of forest land rights [13,14]. Secondly, the micro level environmental characteristics cover the social network, information accessibility, investment opportunities, and diversified expectations of farmers, which directly affect their willingness to participate [15–17]. Furthermore, the individual characteristics of farmers themselves, such as educational resources and family asset status, are also important considerations [18]. It is particularly noteworthy that small-scale forest farmers, due to their limited education level and information channels, often have an opaque decision-making environment, which directly affects their understanding and acceptance of forest tickets [19,20]. The quality and quantity of information, as well as the means of obtaining it, are the foundation of farmers' behavioral choices [21,22].

Despite notable advancements in the investigation of farmer conduct, financial mechanisms in forestry, and the nascent forest ticket system, empirical inquiries into this innovative financing model, particularly the forest ticket, remain underdeveloped, a shortfall exacerbated within the milieu of incomplete farmer information. Concurrently, given farm-

ers' pivotal role as the nucleus of the forestry economy, a chasm persists in understanding their behavioral dynamics within the realm of forest ticket transactions. Therefore, this study focuses on farmers as the micro-subject. Through field research and questionnaire surveys, combined with the characteristics of forest tickets as a new thing and the limitations of the information environment of farmers, it deeply analyzes the factors that affect the willingness of farmers to trade forest tickets, and explores the regulatory effect of social capital. This not only provides empirical support for the optimization design of ticket systems and the improvement of market efficiency, but also identifies practical obstacles to the promotion of forest ticket systems. It provides guidance for policy innovation to solve forestry financing difficulties and promote win-win cooperation between forestry and ecology, fills the gap in research on forest ticket systems from the perspective of farmers, and demonstrates significant theoretical value and practical significance.

Furthermore, as the world's foremost developing nation, China shares commonalities with other developing economies in its urban–rural bifurcation, the challenge of effectively gathering farmer information, and the traditional features of rural social capital. The extent to which farmers acknowledge and embrace the nascent forest ticket trading paradigm, along with their subsequent willingness to engage, emerges as a pivotal determinant influencing the efficacy of this policy instrument. Thus, investigating Chinese farmers' inclination towards engaging in forest ticket transactions amidst an incomplete information scenario is instrumental in unraveling the fundamental mechanics and behavioral logic inherent to China's forest tenure transformation. It serves as a beacon, offering valuable insights for the design and execution of comparable policy interventions in varied international settings. Concurrently, this line of inquiry amplifies the theoretical breadth of forestry economics, highlighting its multifaceted significance across empirical analyses, comparative studies, and theoretical explorations.

2. Theoretical Analysis and Research Hypotheses

2.1. Forest Ticket System: Operational Mechanism and Current Trading Status

2.1.1. The Origin of the Forest Ticket System

Sanming City, located within Fujian Province, serves as a pivotal collective forest region in China and was the pioneering comprehensive pilot city for national forestry reform and development. Following the enactment of the collective forest rights system reform, Sanming City implemented a policy that partitioned forest lands among households, thereby enabling independent operation by local farmers. Despite this initiative, issues emerged due to the fragmented nature of forest rights and the dearth of technical expertise and financial resources among forest farmers during the management process. This led to a decline in forest stand quality and exacerbated challenges related to financing, circulation, and monetization for farmers. In response to these challenges, the Shaxian District of Sanming City initiated its exploration from the standpoint of forestry financing, devising a collective forest cooperative operation model characterized by "co-owned equity, co-managed operations, shared capital, and mutual-profit". Legally, this model quantifies the cooperative forest assets into tradable shares known as 'forest tickets'. At a landmark event, in November 2019, 11,700 forest tickets were issued collectively in Chonghou Village and Yuzhu Village of Gaosha Town, amounting to a total value of 1.17 million yuan. These tickets were distributed amongst the village collective and individual villagers. Subsequently, the Sha County Rural Commercial Bank extended a substantial credit line of 80 million yuan to encompass the entire population of both villages. This innovative approach not only addresses the pressing issues faced by forest farmers but also provides a viable framework for leveraging forest resources and enhancing their economic potential through a novel financial instrument—the forest ticket system.

By the close of 2019, the Forestry Bureau of Sanming City promulgated the "Sanming City Forest Ticket Management Regulations," outlining the legal framework for forest tickets. These regulations defined forest tickets as legally tradable, pledgeable, and redeemable equity certificates issued by entities including state-owned forest farms, leading forestry

enterprises, village collective economic organizations, and other participating enterprises or individuals engaged in afforestation or the management of existing forests. The quantity of issued forest tickets corresponds directly to the investment proportion contributed by the cooperating village collectives, units, or individuals. In 2020, building upon this foundation, the initial management measures underwent modification and enhancement, culminating in the widespread promotion of a forest ticket system within Sanming City, emphasizing "cooperative operation, quantified rights and interests, free circulation, and guaranteed dividends" as its core features. By June 2022, this transformative reform had expanded to over 200 villages, units, and individuals across 12 counties and cities in the region, covering a cooperative forest area of 150,000 acres and issuing forest tickets valued at 185 million yuan. The reform has thus far benefited 16,000 households and 67,200 individuals, with an average forest ticket allocation of 736 yuan per villager. The forest ticket reform has effectively addressed the "five major challenges" in forestry, namely financing, forest rights transfer, the realization of forest resources, the improvement of forest stand quality, and fostering a mutually beneficial scenario. The outcomes have been significant, demonstrating that this innovative financial mechanism has not only revolutionized the way forestry resources are managed and utilized but also delivered tangible benefits to a large number of stakeholders.

2.1.2. Operating Mechanism of Forest Ticket System

The operation of the forest ticket system is based on joint operation, with state-owned forest farms having absolute controlling rights, holding more than 50% of the shares, and undertaking the entire process of forest land management. Village collective economic organizations and their members invest in forest land management rights and forest ownership, holding forest tickets in proportion to their equity, but do not participate in specific business activities, and are only responsible for assisting and cooperating with forest land management. The government is responsible for guiding and regulating, thus forming a multi-party cooperative forest ticket system. The term of cooperative operation is generally one rotation period. Secondly, the quantitative allocation of tickets is carried out, with the issuing of forest tickets, and a reasonable determination of the base price of "cooperative assets" and the shares of each shareholding entity is made. In terms of profit distribution, the total timber sales revenue of the jointly operated trees during the intermediate and main logging periods, minus production costs, will be distributed among the remaining operating profits according to the proportion of forest tickets held by the cooperating parties. Finally, it is necessary to carry out market-oriented transactions of forest tickets, allowing them to be listed for trading in the property rights center and applying for pledged loans from financial institutions. Before the trading platform is established, farmers must register with the village committee for transactions, and the village committee will request the forest farm to change its property rights. Otherwise, the transaction will be invalid. In addition, state-owned forestry enterprises and institutions provide a cushion. If forest ticket holders want to withdraw from cooperative operations, they can apply. State owned forestry enterprises and institutions should repurchase the cooperative operation at an annual simple interest rate of 3% based on the amount of forest ticket investment (Figure 1).

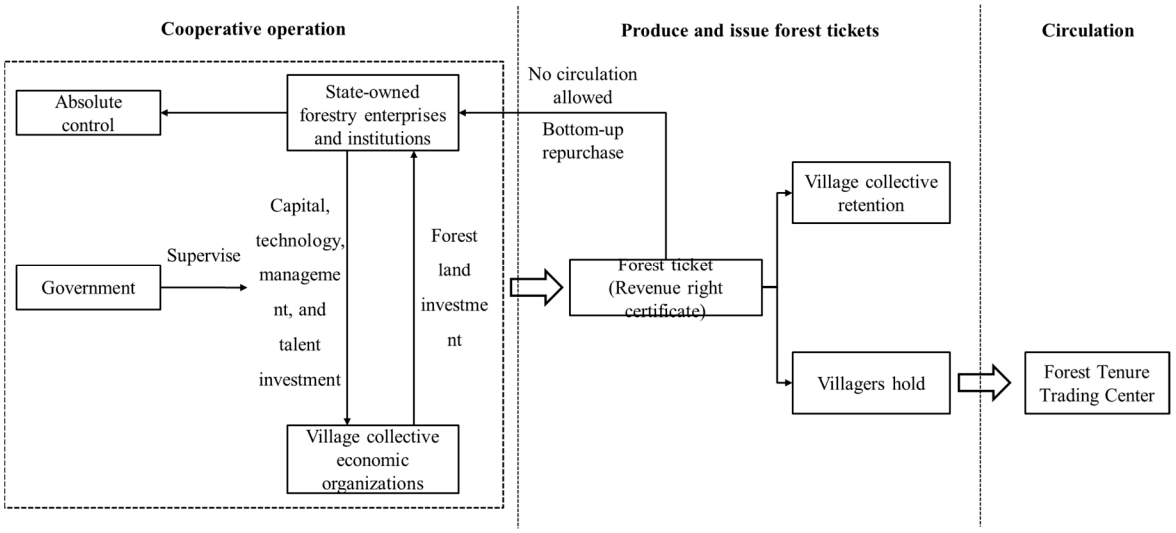

Figure 1. Operation mechanism of forest ticket system.

2.1.3. Current State of Forest Ticket Trading

Under the prevailing forest ticket management framework, for administrative expediency, the forest tickets held by villagers are restricted to circulation within the confines of their village or between affiliated forest farms. However, with the establishment of a dedicated forest ticket trading platform, these tickets are poised to enjoy free trade via the platform. As of July 2022, only a handful of villages, such as Lishu Village in Xiamao Town, have experimented with internal forest ticket transactions, with modest transaction volumes ranging from 10,000 to 20,000 yuan. The main participants in these transactions include ordinary farmers, forest farms, and village administration offices.

According to survey data, more than half of the farmers are unwilling to participate in forest ticket trading, accounting for 61.87% of the sample size. Among the farmers who are willing to participate in forest ticket trading, 24.49% of them hold a cautious attitude and choose to buy or sell according to the situation. In addition, more farmers, accounting for 44.9%, are willing to buy forest tickets. When queried about motivations for engaging in forest ticket trading, more than 70% of the farmers express optimism regarding the future growth potential of forest tickets and are eager to be early adopters, while another considerable portion cites the alleviation of production and living expenses as a driving factor. On the contrary, the primary reasons behind farmers' disinclination to participate in forest ticket trading are twofold: First, the trading channels remain underdeveloped, with many farmers lacking awareness about the tradability of forest tickets or understanding the specifics of the trading process. Secondarily, the current nominal value of forest tickets is perceived as relatively low, coupled with a small average holding per farmer. Consequently, farmers perceive the potential gains from trading to be limited.

2.2. Economic Analysis of Farmer Participation in Forest Ticket Trading under Incomplete Information

Although the behavior of farmers has diverse characteristics, their decision-making can still be considered as economic behavior. Under the theoretical framework of rational small-scale farming theory and maximizing utility theory, the basis for whether farmers participate in forest ticket trading decisions is mainly whether the expected benefits generated after the transaction exceed the expected costs, in order to achieve risk minimization and profit maximization. Let U be the total utility of farmers, and the decision function for their participation in forest ticket trading be expressed as follows:

$$U = [E(X) - E(C)] > 0 \quad (1)$$

Among them, $E\ (X)$ is the expected return of participating in forest ticket trading, $E\ (C)$ is the expected cost of farmers participating in the transaction. If $[E\ (X) - E\ (C)] > 0$, farmers will tend to participate in forest ticket trading, otherwise, they will not participate. In theory, the optimal decision point for farmers will be at $dU/dx = 0$, which maximizes expected utility. At this point, the marginal utility of increasing one unit of forest ticket trading is equal to its marginal cost. However, in the actual decision-making process of farmers, their risk preference will affect the shape of their utility curve. Risk averse farmers will prefer deterministic returns with a relatively flat utility curve, while risk averse farmers prefer steep utility curves, indicating their willingness to bear more uncertainty for high returns under high risk.

In a sense, the essence of decision-making is the process of collecting, transmitting, processing, transforming, and ultimately outputting information, and information is the soul of decision-making. However, in reality, farmers cannot have complete information about forest ticket trading, and the different information they have can lead to different judgments of risk and benefit, which in turn leads to a deviation between their expected returns on forest ticket trading and the actual average return $F\ (X)$. Due to incomplete information, it is assumed that the expected income of farmers is the actual average income multiplied by a certain discount ratio , which is a function of the information m related to forest ticket transactions owned by farmers. m and the actual average income $F\ (X)$ are independent of each other; in addition, $E\ (C)$ mainly includes two costs. On the one hand, for farmers willing to sell their forest tickets, it means giving up the future income represented by the forest tickets for the income provided by selling the ticket. For farmers willing to buy forest tickets, it means giving up the funds from buying the forest tickets, funds that could have been used for other investments that may provide income, which is an opportunity cost. On the other hand, farmers need to pay a certain amount in time and money costs for negotiation, supervision, and other aspects to find ideal trading partners and successfully achieve transactions. Therefore, under incomplete information, the decision function of forest ticket trading for farmers becomes the following:

$$U(m) = [\mu(m) \times F(X) - E(C)] > 0 \quad (2)$$

From the above decision function, it can be seen that when $U\ (m) < 0$, there are two paths to adjust the decision of farmers in forest ticket trading: path one is to alleviate the degree of incomplete information, that is, to correct the value of $\mu(m)$. Path two is to take certain measures to reduce the expected cost of participating in forest ticket exchanges for farmers.

2.3. Theoretical Framework and Research Hypotheses

This research centers on the pivotal dependent variable: farmers' willingness to partake in forest ticket transactions. It comprehensively merges essential tenets from farmer behavior theory, anticipated utility theory, social cognition theory, and social capital theory, alongside pertinent economic analyses, culminating in the construction of a rigorous theoretical framework (Figure 2). This framework believes that the heterogeneity expectations of farmers for forest ticket trading, including cost expectations, benefit expectations, risk expectations, and policy sustainability expectations, as well as their level of understanding of forest tickets and their trading, social capital levels, government propaganda, and individual and family characteristics, will directly affect their willingness to participate in forest ticket trading. Social capital can also influence farmers' trading willingness by influencing their heterogeneity expectations, exerting a moderating effect.

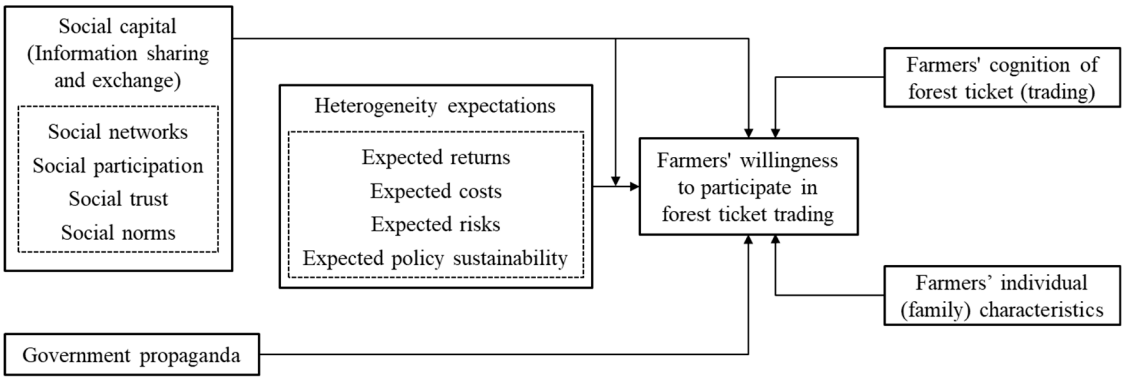

Figure 2. Theoretical framework of farmers' willingness to trade forest tickets.

Specifically, according to the expected utility theory, in the decision-making process of farmers, their heterogeneous expectations of the benefits, costs, risks, and policy sustainability of forest ticket trading directly shape the intensity of their participation motivation. Hastings and Tejeda-ashton [23] pointed out that only by accurately evaluating the expected costs, benefits, and risks of investment projects can rational investment decisions be made. Forestry, as a relatively high-risk industry, has weak capacities for farmers to cope with natural and market risks. Their economic activities often tend to follow the "safety first" rule of thumb. When farmers anticipate higher uncertainty in the environment, market, and behavior of their counterparts, it becomes more detrimental for them to engage in forest ticket trading. Moreover, as micro-entities, farmers possess dual identities as economic and social individuals. The introduction of forest tickets represents a localized exploration, which can be regarded as a contract between local governments and farmers. When farmers have sufficient confidence in the forest ticket system, they will make reasonable plans based on the anticipated policy trajectory, aiming to maximize their own utility. Conversely, if farmers perceive policy volatility or unpredictability in the future, leading to low expectations of policy continuity, their participation in forest ticket trading may become more cautious and conservative due to the increased difficulty or risk associated with rational decision-making [24,25]. Based on the above analysis, the following hypotheses are proposed:

H1. *Income expectations positively influence farmers' willingness to engage in forest ticket trading;*

H2. *Cost expectations negatively impact farmers' willingness to engage in forest ticket trading;*

H3. *Risk expectations negatively affect farmers' willingness to engage in forest ticket trading;*

H4. *Expectations of policy continuity positively affect farmers' willingness to engage in forest ticket trading.*

Incorporating the Theory of Planned Behavior, it is posited that a thorough understanding precedes farmers' engagement, with their level of cognition toward the subject matter directly or indirectly influencing their preference tendencies and willingness to participate [26]. Firstly, heightened comprehension by farmers of the conceptual, intrinsic, economic, and ecological facets of forest tickets heightens the probability of their involvement in trading, fostering a favorable behavioral attitude. Conversely, deeper familiarity with the specifics of forest tickets and the mechanics of trading simplifies the process, fostering a sense of manageable control over the activity [27]. Based on social capital theory, rural China is characterized by a distinct "hierarchical pattern," marked by close-knit neighborhood relationships, solid acquaintance networks, and frequent group activities. Individuals exchange information extensively to make more informed decisions [28–30]. Consequently, the social capital of farmers, encompassing social networks [31,32], social trust [33,34], so-

cial norms [35,36], and social participation, positively influences their productive activities, thereby affecting their willingness to engage in forest ticket transactions. Furthermore, social capital diminishes anticipated transaction costs and risks through improved information flow, trust building, and collective action capabilities, thus fostering greater enthusiasm for participation and mitigating or moderating the impact of heterogeneous expectations on farmers' willingness to engage in forest ticket transactions [37]. External factors, such as the information environment, also come into play. Official propaganda, as a key source of information, positively contributes to elevating farmers' knowledge levels and receptiveness. Perceptions of strong government endorsement for forest tickets and the tangible benefits they bring encourage proactive engagement in trading. Consequently, the government's promotional efforts and the establishment of trading policies have a profound bearing on farmers' willingness to engage in forest ticket transactions [38]. Based on the above analysis, the following hypotheses are proposed:

H5. *Farmers' awareness of forest tickets has a positive impact on their willingness to participate in forest ticket trading;*

H6. *Social capital has a positive impact on the willingness of farmers to participate in forest ticket trading;*

H7. *Social capital can alleviate or enhance the impact of heterogeneity expectations on farmers' willingness to participate in forest ticket trading;*

H8. *Government propaganda has a positive impact on the willingness of farmers to participate in forest ticket trading.*

Furthermore, individuals with varying preferences assume distinct social roles in reality, which are predominantly expressed through characteristics such as educational attainment and income level. These characteristics, in turn, influence personal preferences and subsequently shape behavioral choices. This suggests that reinforcing the distinct social roles of individuals can significantly affect their varied behavioral patterns [39]. On the other hand, considering that the rationality of farmers is shaped by certain choices and constraints, their actions are grounded in the resources at their disposal. Therefore, this study aims to elucidate how the resource endowments of different farmers influence their intention to engage in forest ticket trading. It selects variables such as the age, gender, level of education of the household head, whether they serve as village cadres, the number of laborers, total annual household income, and whether they engage in part-time work to represent the individual and family characteristics of farmers, and proposes the following hypothesis:

H9. *Individual family characteristics significantly affect farmers' willingness to engage in forest ticket trading.*

3. Methods

3.1. Overview of the Research Area

Sanming City is located in the western part of Fujian Province, China, with a total area of 22,900 square kilometers. It has one city, two districts, and eight counties under its jurisdiction, with a permanent population of 2.49 million. In 2022, the gross domestic product of Sanming City was 311.014 billion yuan, a year-on-year increase of 3.1%. The forestry output value was 11.356 billion yuan, a year-on-year increase of 3.6%. As of the end of 2021, the forest area of Sanming City was 1.8968 million hectares, accounting for 82.6% of the total land area. The forest area was 1.812 million hectares, with a forest coverage rate of 78.88%. The forest volume was 191 million cubic meters, and the average per mu forest volume was 8.8 cubic meters, ranking first among all districts and cities in the province.

3.2. Data Sources

The data in this article are sourced from a questionnaire survey conducted twice in December 2021 and July 2022 in eight townships and thirteen villages under the jurisdictions of Shaxian District, Yong'an City, Jiangle County, and Taining County in Sanming City, Fujian Province. A questionnaire survey and in-depth interviews were conducted on the basic information, forest management status, information resources, forest ticket awareness, transaction status, and transaction willingness of farmers holding forest tickets at various research points. A total of 266 questionnaires were collected during the survey, of which 257 were valid, with an effective rate of 96.6%.

3.3. Basic Characteristics of Samples

In this article, we chose the head of the household as the research object, so the sample size of males is relatively large, accounting for 77.82%, and females account for 22.18%. In terms of age, the population age group with the largest proportion is 51–60, accounting for 38.91%, and the aging phenomenon is relatively serious. In terms of education level, only 53.3% have a junior high school or higher education, indicating a relatively low level of education. From the perspective of part-time employment, only 45.14% of them are administrative farmers, indicating a relatively severe degree of part-time employment among farmers. From the perspective of the characteristics of rural households, the number of household laborers is mainly no more than four, and most families can achieve an annual income of over 20,000 yuan. In summary, the characteristics of the sample farmers are basically in line with the current situation of rural society in China and indicate good representation (Table 1).

Table 1. Basic characteristics of sample farmers and respondents.

Feature	Indicators	Options	Frequency	Ratio (%)
Personal characteristics	Gender	Male	200	77.82
		Female	57	22.18
	Age (years)	[0,30]	4	1.56
		(30,40]	20	7.78
		(40,50]	46	17.90
		(50,60]	100	38.91
		Over 60	87	33.85
	Education level	Unschooled	32	12.45
		Primary school	88	34.24
		Junior high school	84	32.68
		High school and above	53	20.62
	Whether they serve as a village cadre	Yes	77	29.96
		No	180	70.04
	Whether they work concurrently	Yes	141	54.86
		No	116	45.14
Family characteristics	Total annual household income (10,000 rmb)	2 and below	58	22.57
		(2,5]	73	28.40
		(5,8]	50	19.46
		(8,15]	51	19.84
		Over 15	25	9.73
	Number of household members in the labor force (person)	2 and below	120	46.69
		(2,4]	119	46.30
		Over 4	18	7.00

3.4. Model Building

The dependent variable studied in this article is the willingness of farmers to participate in forest ticket trading, with values of 1 (willing to participate in forest ticket trading) or 0 (unwilling to participate in forest ticket trading), which indicate a binary variable.

Therefore, we chose a binary logit regression model to further explore the influencing factors for farmer participation in forest ticket trading. The logit regression model with X_j as the independent variable is constructed as follows:

$$logit\mathrm{P_i} = \ln\left(\frac{\mathrm{P_i}}{1-\mathrm{P_i}}\right) = \partial + \sum_{\mathrm{j}=1}^{\mathrm{n}} \beta_\mathrm{j} \mathrm{X_{ij}} + \varepsilon_\mathrm{i} \quad (3)$$

$\mathrm{P_i}$ represents the probability that the i-th farmer is willing to participate in forest ticket trading, ∂ is a constant term, β_j is the regression coefficient, n represents the number of explanatory variables, $1 - P_i$ is the probability of unwillingness to participate in forest ticket trading, $\frac{P_i}{1-P_i}$ represents the proportion of participation in forest ticket trading, and ε_i is the error term.

3.5. Variable Selection and Data Processing

3.5.1. Core Independent Variables

The dependent variable studied in this article is the willingness of farmers to trade forest tickets. Based on theoretical analysis and previous research, four core explanatory variables were selected: the heterogeneous expectations of farmers (expected returns, expected costs, expected risks, and expected policy sustainability), social capital level of farmers (social network, social trust, social participation, and social norms), cognitive level of farmers on forest tickets, and external environmental factors (this article mainly considers government propaganda). Due to the many factors that affect the willingness of farmers to participate in forest ticket trading, the computational workload is large and there may be multiple collinearity issues when constructing the model. Therefore, this article uses factor analysis to measure the level of social capital and the level of forest ticket cognition. Prior to this, reliability and validity tests were conducted on the sample data. The test results show that the Cronbach's coefficient (Cronbach's alpha) values for social capital and farmers' forest ticket awareness level were 0.865 and 0.910, respectively, both passing the difference test. The KMO values were 0.850 and 0.933, respectively, which were higher than the minimum standard by 0.5. The approximate chi square values of Bartlett's sphericity test were 1370.671 (Sig. = 0.000) and 1053.361 (Sig. = 0.000), respectively, indicating good significance. Therefore, the sample data can be subjected to factor analysis, and the rotated factor loading matrix is shown in Table 2.

Table 2. Rotated factor loading matrix.

Dimension	Index	Variable Assignment	Component			
			1	2	3	4
Social network	Are there any relatives or friends who are village officials or work in government departments or banks	No = 1, almost no = 2, generally = 3, relatively many = 4, very many = 5	-	-	-	0.793
	How many households have relatives and friends who move around all year round	5 households and below = 1, 6–10 households = 2, 11–15 households = 3, 16–20 households = 4, 20 households and above = 5	-	-	-	0.827
	The number of people who can borrow money to assist in times of difficulty	Rarely = 1, relatively few = 2, generally = 3, relatively many = 4, very many = 5	-	-	-	0.810
Social trust	Trust level towards relatives	Very distrusted = 1, not very trusted = 2, neutral= 3, relatively trusted = 4, very trusted = 5	0.763	-	-	-
	The level of trust in the surrounding villagers		0.750	-	-	-
	The level of trust in village cadres		0.728	-	-	-
	The level of trust in the forest ticket system and policies		0.751	-	-	-

Table 2. *Cont.*

Dimension	Index	Variable Assignment	Component			
			1	2	3	4
Social participation	The frequency of participating in collective activities organized in the village	Rarely = 1, relatively few = 2, generally = 3, relatively many = 4, very many = 5	-	-	0.823	-
	The level of daily attention to national affairs and social news		-	-	0.805	-
	The frequency of making recommendations in village public affairs decision-making		-	-	0.798	-
Social norms	Believing that establishing good interpersonal relationships with people around is helpful for borrowing money	Strongly disagree = 1, somewhat disagree = 2, neutral = 3, somewhat agree = 4, strongly agree = 5	-	0.819	-	-
	It's not good if everyone participates in the collective activities in the village and they don't participate		-	0.786	-	-
	The implementation level of regulations in the village is very high		-	0.814	-	-
Measurement results of social capital level	Characteristic root		2.496	2.271	2.222	2.185
	Variance explanatory rate (%)		19.201	17.496	17.089	16.805
	Cumulative variance explanatory rate (%)		18.201	36.670	53.760	70.564
Cognitive level of forest ticket	Forest tickets are voucher for future participation in dividends	Completely disagree = 1, disagree = 2, uncertain = 3, agree = 4, strongly agree = 5				
	Forest tickets can alleviate the pressure of production and living funds					
	Forest tickets are beneficial for improving the quality of forest land and trees					
	The future revenue of forest tickets is related to the benefits of forest management					
	Forest tickets have tradability					
	Participating in forest ticket trading does not affect forest land ownership					
	Basic understanding of forest ticket trading process					
Measurement results of forest ticket's cognitive level	Characteristic root			4.623		
	Variance explanatory rate (%)			66.042		
	Cumulative variance explanatory rate (%)			66.042		

The measurement results for social capital level show that its cumulative contribution rate of variance is 70.564%, exceeding 70%, which can better reflect the overall situation of farmers' social capital. The calculation formula for social capital is as follows: social capital = (19.201% × social trust + 17.469% × social norms + 17.089% × social participation + 16.805 × social network)/70.564%, and the scores for each dimension are the standardized values calculated after extracting common factors. The measurement results for forest ticket cognitive level show that the cumulative variance contribution rate is 66.042%, which can reflect the overall situation of farmers' forest ticket cognitive level.

3.5.2. Control Variables

In addition, previous studies have shown that individual and family characteristics can have an impact on the behavioral willingness of farmers [40]. Therefore, we introduced age, gender, education level, whether they serve as a village cadre, and whether they work part-time, as well as the number of household members in the labor force and total

household income, as control variables. The specific variable settings and descriptive statistics are shown in Table 3.

Table 3. Variable description and descriptive statistics.

Variable Type	Variable Name	Assignment Description
Dependent variable	Willingness to trade forest tickets	1 = willing; 0 = unwilling
Core independent variables	Expected revenue	Very small = 1, small = 2, generally = 3, large = 4, very large = 5
	Cost expectations	
	Risk expectations	
	Policy sustainability expectations	
	Forest ticket's cognitive level	
	Social capital	Calculated through factor analysis
	Social network	
	Social trust	
	Social participation	
	Social norms	
	Government propaganda	With promotion = 1, without promotion = 0
Control variable	Age	30 years old and below = 1, 31–40 = 2, 41–50 = 3, 51–60 = 4, 61 years old and above = 5
	Education level	Unit: Year
	Number of household members in the labor force	Unit: Person
	Total household income	Unit: 10,000 RMB
	Whether they serve as a village cadre	Yes = 1, No = 0
	Whether they concurrently work	Yes = 1, No = 0
	Gender	Male = 1, Female = 0

4. Results and Discussion

4.1. Analysis of Influencing Factors on Farmers' Willingness to Participate in Forest Ticket Trading

4.1.1. Benchmark Regression Results

We used Stata 15.1 to conduct binary logistic regression analysis on 257 valid instances of sample data with the core explanatory variable as the independent variable, constructing Model (1), and added control variables to construct Model (2). The regression results indicated that after adding control variables, the Pseudo R^2 of the model was improved, which to some extent explains the rationality of the theoretical framework of farmers' willingness to participate in forest ticket trading constructed earlier. The estimated results of the model and the marginal effects of each variable are shown in Table 4 of the benchmark regression results. According to the classification table of Model 1 (Table A1) and Model 2 (Table A2), 89.49% and 90.27% of the values were correctly specified, respectively.

The estimation results of the benchmark regression model (Model (2)) show that all 10 core explanatory variables have a significant impact on the willingness of farmers to participate in forest ticket trading. Among them, the expected returns, expected risks, expected policy sustainability, cognitive level of forest tickets, social network, social trust, and social norms significantly affected the willingness of farmers to participate in forest ticket trading at the 1% level. Cost expectations and social participation significantly affected the willingness of farmers to participate in forest ticket trading at a 5% level. Government propaganda had a significant impact on it at a 10% level. In addition, having a higher level of education, serving as a village cadre, and being purely engaged in forestry significantly increased the willingness of farmers to participate in forest ticket trading.

Table 4. Regression results of the baseline model.

Willingness to Participate in Forest Ticket Trading	Model (1)	Model (2)	
	Coefficient	Coefficient	Marginal Effect
Expected revenue	1.026 ***	0.990 ***	0.067 ***
	(4.34)	(3.72)	(4.47)
Cost expectations	−0.568 **	−0.656 **	−0.044 **
	(−2.42)	(−2.27)	(−2.45)
Risk expectations	−0.731 ***	−0.750 ***	−0.051 ***
	(−3.35)	(−2.96)	(−3.23)
Policy sustainability expectations	1.002 ***	1.284 ***	0.087 ***
	(3.96)	(4.13)	(5.03)
Forest ticket's cognitive level	1.101 ***	1.150 ***	0.077 ***
	(4.97)	(4.16)	(4.32)
Social network	0.870 ***	1.087 ***	0.073 ***
	(3.06)	(3.01)	(3.51)
Social trust	0.715 ***	1.015 ***	0.068 ***
	(3.00)	(3.32)	(3.60)
Social participation	0.583 **	0.705 **	0.048 **
	(2.15)	(2.02)	(2.03)
Social norms	1.123 ***	1.245 ***	0.084 ***
	(3.54)	(3.49)	(3.99)
Government propaganda	1.048 **	1.193 *	0.080 **
	(2.01)	(1.92)	(2.12)
Age		0.147	0.010
		(0.44)	(0.44)
Education level		0.225 **	0.015 ***
		(2.56)	(2.72)
Number of household members in the labor force		0.034	0.002
		(0.15)	(0.15)
Total household income		−0.011	−0.001
		(−0.73)	(−0.72)
Whether they serve as a village cadre		1.690 ***	0.114 ***
		(3.10)	(2.84)
Whether they concurrently work		−1.829 ***	−0.123 ***
		(−2.86)	(−3.15)
Gender		0.649	0.044
		(1.04)	(1.05)
Constant term	−4.746 ***	−8.106 ***	
	(−3.37)	(−3.40)	
Observations	257	257	257
Wald $chi^2(10)$	68.10	83.41	
Prob > chi^2	0.0000	0.0000	
Pseudo R^2	0.5994	0.6714	

The z statistic is enclosed in parentheses, and "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

4.1.2. Discussion of Benchmark Regression Results

- Heterogeneity expectations

Specifically, at the 1% level, expected returns had a significant positive effect on the willingness of farmers to engage in transactions. Hypothesis H1 is supported. For every unit increase in expected returns, the probability of willingness to engage in transactions increased by 6.7%. At the 5% level, cost expectations had a significant negative impact on the willingness of farmers to engage in transactions. Hypothesis H2 is supported. Previous studies have also shown that the expected benefits of farmers have a significant impact on their behavioral decision-making, which is consistent with the results of this study [41]. For every unit increase in cost expectations, the probability of farmers being willing to engage in transactions decreased by 4.4%. Risk expectation had a significant inhibitory effect on the willingness of farmers to engage in forest ticket trading at the 1% level. Hypothesis H3

is supported. For every unit increase in risk expectation, the probability of farmers being willing to participate in trading decreased by 5.1%. The expectation of policy sustainability had a positive impact on the willingness of farmers to participate in transactions at a significance level of 1%. Hypothesis H4 is supported. The more positive the expectation of farmers for the sustainability of forest ticket policies, the more conducive it was to forming their willingness to participate in transactions. The probability of farmers being willing to participate in transactions increased by 8.7% for every unit increase in their expectation of policy sustainability. Farmers have a rational economic side and an innate trait of pursuing maximum economic benefits. Therefore, the judgment of costs and benefits is an important factor affecting their behavioral willingness. At the same time, as a new phenomenon, in an environment of incomplete information, conservative bounded rational economic individuals tend to overestimate the risks of unknown decisions and prefer to maintain the status quo. Therefore, risk expectations will suppress the willingness of farmers to trade [42]. Farmers with stronger policy sustainability expectations may have a more optimistic attitude towards the forest ticket system and its related policies, which may encourage them to try to participate in the trading process. This is consistent with previous research findings [43].

- Forest ticket's cognitive level

At a significance level of 1%, the cognitive level of farmers on forest tickets had a positive impact on their willingness to participate in forest ticket trading, and for every unit increase in their cognitive level on forest tickets, their probability of participating in forest ticket trading increased by 7.7%. The higher the level of basic concepts, economic benefits, and ecological awareness of forest tickets among farmers, the more favorable it was for them to form a positive attitude towards forest tickets. The more they understand the basic trading process of forest tickets, the less likely they are to overestimate the obstacles they may encounter in participating in forest ticket trading, and the reduced cognitive bias may enhance their willingness to participate in trading, which is similar to the impact mechanism of farmers' awareness and willingness to participate in e-commerce in previous studies [44]. Based on this, hypothesis H5 is confirmed.

- Social capital

Different dimensions of social capital will have a significant impact on the willingness of farmers to participate in forest ticket trading. Among them, social networks had a significant promoting effect on the willingness of farmers to engage in forest ticket trading at the 1% level, and for every additional unit, the probability of farmers being willing to participate in forest ticket trading increased by 7.3%. Overall, the expansion of social network scale, the increase in frequency, and the improvement in quality all contribute to the spillover of policy or transaction information and the dissemination of knowledge [45]. When encountering difficulties, more help may be sought, which is conducive to increasing the probability of farmers participating. At a significance level of 1%, social trust had a significant positive effect on the willingness of farmers to participate in forest ticket trading, and for each additional unit, the probability of their willingness to trade increased by 6.8%. Among farmers, an increase in trust in their loved ones and surrounding villagers can enhance their expectations of receiving assistance in emergency situations. The trust of farmers in village officials, forest ticket systems, and related policies to a certain extent enhances their confidence in the implementation ability of government departments and related policies, reduces their concerns about policy uncertainty, and thus enhances their willingness to participate in forest ticket transactions [46]. At a significance level of 5%, social participation had a promoting effect on the willingness of farmers to engage in forest ticket trading. With each increase of one unit of social participation by farmers, the probability of willingness to participate in forest ticket trading increased by 4.8%. The higher the frequency of farmers regularly paying attention to national affairs or social news, participating in village collective activities, or actively making suggestions for village public affairs decisions, the broader their horizons, and the stronger their ability to participate, the

more likely they are to actively respond to the implementation of the forest ticket system, and the stronger their willingness to try to participate in forest ticket transactions [47]. At a significance level of 1%, social norms had a positive impact on the willingness of farmers to engage in forest ticket trading, and for each additional unit, the probability of farmers participating in forest ticket trading increased by 8.4%. When there are farmers participating in forest ticket trading in surrounding villages or villages, the demonstration of successful cases in neighboring villages, or reasons such as comparison and a sense of belonging, may increase the willingness of farmers to participate in forest ticket trading. Based on this, hypothesis H6 is confirmed.

- Government propaganda

At a significance level of 10%, government promotion had a positive impact on the willingness of farmers to participate in forest ticket trading, and the probability of farmers participating in forest ticket trading increased by 8% with government promotion compared to without government promotion. Hypothesis H8 is confirmed. Previous studies have shown that government propaganda has a significant promoting effect on the willingness and behavior of farmers to participate [38,48]. Government propaganda, on the one hand, boosts the confidence of farmers in the forest ticket system. On the other hand, expanding the channels for farmers to obtain information related to the forest ticketing system helps to form their rational cognition and expectations, thereby enhancing their willingness to trade.

- Individual household characteristics

In terms of controlling variables, the benchmark regression results indicate that at the 1% significance level, the head of the household serving as a village cadre has a positive impact on increasing the willingness of farmers to participate in forest ticket trading. The probability of being willing to trade forest tickets increased by 11.4%, while part-time employment significantly reduced the willingness of farmers to participate in forest ticket trading. Compared to pure farmers, the probability of being willing to trade forest tickets decreased by 12.3%. This may be due to the participation of village cadres in the implementation of relevant policies. Through training and learning, they have a deeper understanding of the content of the forest ticket system. At the same time, as local elites, their social capital is more abundant, they have a wider social network to update their information reserves in a timely manner, and have a stronger sense of demonstration. Therefore, their willingness to participate in transactions is stronger. However, some part-time farmers mainly rely on non-agricultural employment as their main source of income and do not attach importance to information related to forest land management or participate in related production activities, so their willingness to participate is not strong. At the 5% level, the education level of the household head had a significant positive impact on the willingness of farmers to trade forest tickets. For every one unit increase in education level, the probability of willingness to trade forest tickets increased by 1.5%. Perhaps due to the fact that farmers with higher levels of education are more likely to accept the new concept of forest tickets, have a deeper understanding of related concepts and policies, and have a more forward-looking awareness, they are more willing to use forest tickets as an investment tool and show a strong willingness to participate in transactions [49]. The age, gender, total household income, and labor force of the controlling variables had no significant impact on the willingness of farmers to participate in forest ticket trading. Based on this, hypothesis H9 is partially supported.

4.2. Heterogeneity Analysis of Willingness of Farmers with Different Characteristics to Participate in Forest Ticket Trading

Previous studies and benchmark regression results have shown that the individual or family characteristics of farmers can have an impact on their behavioral intentions. In order to provide a more intuitive comparison of the factors that affect the willingness of farmers with different characteristics to participate in forest ticket trading, as well as the differences in their degree of participation, we also grouped the sample farmers based

on their part-time work and education level in this section. The regression variables are centralized to further analyze the factors that affect the willingness of different types of farmers to trade forest tickets.

4.2.1. Heterogeneity of Differentiation Degree

We divided the sample into non-part-time farmers and part-time farmers based on their part-time employment situation. The results of benchmark regression, marginal regression, and inter-group coefficient difference test are shown in Model (3) in Table 5. According to the classification table of non-part-time famers(Tables A1 and A3) and part-time farmers (Table A4) in Model 3, 91.38% and 93.62% of the values were correctly specified, respectively.

Table 5. Part-time situation subgroup.

Willingness to Participate in Forest Ticket Trading	Model (3)				
	Non-Part-Time Farmers		Part-Time Farmers		Coefficient Difference
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	
Expected revenue	0.878 *	0.052 *	1.730 ***	0.086 ***	−0.853
	(1.71)	(1.86)	(2.65)	(3.60)	(p = 0.303)
Cost expectations	−1.451 ***	−0.087 ***	−0.329	−0.016	−1.122 *
	(−2.89)	(−3.07)	(−0.89)	(−0.95)	(p = 0.072)
Risk expectations	−1.365 ***	−0.082 ***	−1.137 ***	−0.057 ***	−0.228
	(−3.24)	(−4.09)	(−2.58)	(−2.72)	(p = 0.708)
Policy sustainability expectations	2.582 ***	0.154 ***	1.043 **	0.052 ***	1.540 *
	(3.63)	(4.80)	(2.41)	(2.72)	(p = 0.064)
Forest ticket's cognitive level	0.869	0.052 *	1.725 ***	0.086 ***	−0.856
	(1.61)	(1.72)	(4.39)	(3.86)	(p = 0.199)
Social network	1.152 **	0.069 **	2.048 ***	0.102 ***	−0.895
	(2.23)	(2.21)	(4.48)	(4.95)	(p = 0.193)
Social trust	1.118 **	0.067 **	1.336 ***	0.067 ***	−0.218
	(2.34)	(2.37)	(2.84)	(3.20)	(p = 0.745)
Social participation	1.415 ***	0.085 ***	−0.002	−0.000	1.417 *
	(2.65)	(3.03)	(−0.00)	(−0.00)	(p = 0.093)
Social norms	1.897 **	0.113 ***	1.560 **	0.078 ***	0.337
	(2.57)	(3.32)	(2.38)	(2.69)	(p = 0.732)
Government propaganda	2.159 ***	0.129 ***	1.358	0.068	0.800
	(2.97)	(3.36)	(1.20)	(1.45)	(p = 0.552)
Control variable	Controlled	Controlled	Controlled	Controlled	
Constant term	−0.517		−2.556 ***		
	(−1.12)		(−4.10)		
Observations	116	116	141	141	
Wald $chi^2(16)$	39.48		61.78		
Prob > chi^2	0.0009		0.0000		
Pseudo R^2	0.7178		0.7471		

The z statistic is enclosed in parentheses, and "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

From the perspective of heterogeneity expectations of farmers, expected returns, expected risks, and expected policy sustainability had a significant impact on the transaction willingness of both part-time and non-part-time farmers, which is basically consistent with the regression results of the overall sample. However, there is a significant difference in the impact of cost expectations on transaction willingness between non-part-time farmers and part-time farmers. This is consistent with the research findings of Zhang et al. [18]. Specifically, at a significance level of 1%, cost expectations had a negative impact on the willingness of non-part-time farmers to participate in forest ticket trading. For every unit increase in cost expectations, the probability of non-part-time farmers being willing to participate in forest ticket trading decreased by 8.7%, while the impact of cost expectations

on the transaction willingness of part-time farmers was not significant. At the same time, there were differences in the impact of policy sustainability expectations on the transaction willingness of non-part-time and part-time households. Policy sustainability expectations had a stronger promoting effect on the transaction willingness of non-part-time households. For every unit increase in policy sustainability expectations, the probability of their willingness to participate in transactions increased by 15.4%, while for part-time households, it increased by 5.2%. The possible reason for the above results is that non-part-time farmers have a higher degree of dependence on land and more sufficient experience in forestry production and operation activities. Their sensitivity to the cost of participating in forest ticket transactions and related policy changes may be higher than that of part-time farmers. However, for part-time farmers, income from forestry is no longer the main source of income, and their sensitivity to costs is less than the former. Therefore, cost expectations have a more significant impact on the willingness of non-part-time farmers, and policy sustainability expectations have a stronger promoting effect on non-part-time farmers. In addition, the social participation dimension in social capital had different impacts on the willingness of part-time and non-part-time households to participate in forest ticket trading. The impact on the former was not significant, but it had a significant promoting effect on the latter at the 1% level. As the social participation of non-part-time households increased by one unit, their willingness to participate in transactions increased by 8.5%. The reason may be that compared to part-time households, their daily production and life activities are often concentrated within the village, which is their main scope and channel for obtaining information. Therefore, the more they participate in village activities or provide suggestions for decision-making on public affairs in the village, and the more they pay attention to national affairs and social news on a daily basis, the more it is beneficial for them to obtain forest ticket systems. Policy-related information, deepening understanding, and forming a more positive attitude thereby enhance their willingness to trade.

4.2.2. Heterogeneity of Education Level

We divided the surveyed farmers into two groups based on their average years of education, high and low. The benchmark regression, marginal regression, and inter-group coefficient difference tests for farmers with different levels of education are shown in Model (4) in Table 6. According to the classification table of low education level (Tables A1, A3 and A5) and high education level (Table A6) in Model 4, 96.92% and 93.70% of the values were correctly specified, respectively. From the regression results, it can be seen that social participation had a significant difference in the willingness of farmers to participate in forest ticket trading between the two groups. Compared to the group with higher education, social participation had a positive promoting effect on farmers' willingness to participate in trading at a 10% significance level. Moreover, for every one unit increase in social participation, the probability of farmers being willing to trade increased by 13.3%. The possible reason is that, on the one hand, farmers with higher education levels are usually more capable of seeking more job opportunities outside of farming, and have lower dependence on the income brought by forestry production activities; on the other hand, farmers with high levels of education have relatively high human capital and a strong ability to engage in production and operation activities and accumulate wealth [50]. They often form a more rational understanding of forest ticket trading based on their own situation. Therefore, social participation does not have a significant impact on their willingness to participate in forest ticket trading. However, frequent participation in village collective activities and other behaviors can help farmers with low levels of education to form a certain understanding of the unfamiliar forest tickets, to obtain relevant information, and to some extent play a positive role in the formation of their willingness.

Table 6. Education level subgroup.

Willingness to Participate in Forest Ticket Trading	Model (4)				
	Low Level of Education		High Level of Education		Coefficient Difference
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	
Expected revenue	2.056 *	0.070 **	1.631 ***	0.105 ***	0.425
	(1.69)	(2.28)	(2.81)	(4.03)	(p = 0.752)
Cost expectations	−1.851	−0.063	−0.852 *	−0.055 *	−0.999
	(−1.21)	(−1.48)	(−1.70)	(−1.94)	(p = 0.535)
Risk expectations	−0.618	−0.021	−0.790 **	−0.051 **	0.172
	(−1.37)	(−1.41)	(−2.21)	(−2.55)	(p = 0.764)
Policy sustainability expectations	3.593	0.122 *	1.090 **	0.070 ***	2.503
	(1.43)	(1.81)	(2.20)	(2.75)	(p = 0.327)
Forest ticket's cognitive level	2.006 ***	0.068 ***	1.578 ***	0.102 ***	0.428
	(2.64)	(5.76)	(4.01)	(3.92)	(p = 0.616)
Social network	1.457	0.049	1.681 ***	0.109 ***	−0.225
	(1.04)	(1.21)	(4.06)	(4.66)	(p = 0.878)
Social trust	2.121	0.072	1.309 ***	0.085 ***	0.812
	(1.25)	(1.46)	(2.68)	(3.28)	(p = 0.644)
Social participation	3.920 *	0.133 **	−0.011	−0.001	3.931 *
	(1.83)	(2.37)	(−0.02)	(−0.02)	(p = 0.075)
Social norms	2.555 *	0.086 ***	1.348 ***	0.087 ***	1.207
	(1.69)	(2.67)	(2.96)	(2.88)	(p = 0.443)
Government propaganda	2.644 ***	0.089 ***	0.944	0.061	1.701
	(3.26)	(3.37)	(1.05)	(1.15)	(p = 0.159)
Control variable	Controlled	Controlled	Controlled	Controlled	
Constant term	−3.323 *		−0.777 *		
	(−1.86)		(−1.68)		
Observations	130	130	127	127	
Wald $chi^2(16)$	34.33		58.06		
Prob > chi^2	0.0049		0.0000		
Pseudo R^2	0.8020		0.6965		

The z statistic is enclosed in parentheses, and "*", "**", and "***" indicate significance at the 10%, 5%, and 1% levels, respectively.

4.3. Analysis of the Regulatory Effect of Social Capital

The social capital of farmers is a mutually beneficial intermediary resource with strong risk sharing and matching capabilities. On the basis of the previous text, the interaction terms between social capital and expected returns, risk expectations, cost expectations, and policy sustainability expectations were included in the regression equation to further explore the moderating effect of social capital on the heterogeneity expectations of farmers and their willingness to participate in forest ticket trading. In order to avoid more severe multicollinearity issues between the core explanatory variable and the interaction term after incorporating the interaction term into the model, based on the research of Robinson and Schumacher [51], we centralized the variables before regression to weaken the collinearity between the single variable and the interaction term. The regression results are shown in Table 7. The correctly classified values for Model (5)–(7) are 88.72%, 89.49%, and 92.61% (Tables A7–A9).

Table 7. Analysis of moderating effect of social capital.

Willingness to Participate in Forest Ticket Trading	Model (5)	Model (6)	Model (7)
Expected revenue	0.989 ***	0.970 ***	1.474 ***
	(4.20)	(3.70)	(3.81)
Cost expectations	−0.568 **	−0.671 **	−1.203 ***
	(−2.40)	(−2.36)	(−2.99)
Risk expectations	−0.716 ***	−0.739 ***	−1.601 ***
	(−3.41)	(−3.05)	(−4.47)
Policy sustainability expectations	0.936 ***	1.222 ***	1.242 ***
	(3.76)	(4.03)	(3.66)
Forest ticket's cognitive level	1.052 ***	1.117 ***	1.615 ***
	(4.86)	(4.13)	(3.88)
Social Capital Index	4.771 ***	5.920 ***	8.492 ***
	(6.35)	(6.17)	(6.71)
Expected revenue × Social Capital			2.177 ***
			(3.58)
Cost expectations × Social Capital			−0.703
			(−0.97)
Risk expectations × Social Capital			2.040***
			(3.56)
Policy sustainability expectations × Social Capital			2.958 ***
			(4.00)
Government propaganda	1.128 **	1.301 **	1.789 *
	(2.09)	(2.03)	(1.95)
Age		0.141	0.152
		(0.42)	(0.37)
Education level		0.223 **	0.358 ***
		(2.57)	(2.94)
Number of household members in the labor force		0.057	0.123
		(0.27)	(0.42)
Total household income		−0.007	−0.012
		(−0.48)	(−0.62)
Whether they serve as a village cadre		1.704 ***	2.465 ***
		(3.23)	(3.02)
Whether they concurrently work		−1.811 ***	−2.801 ***
		(−3.00)	(−2.79)
Gender		0.668	0.271
		(1.05)	(0.28)
Constant term	−4.444 ***	−7.900 ***	−6.818 **
	(−3.26)	(−3.46)	(−2.34)
Observations	257	257	257
Wald chi^2	69.93	80.56	69.05
Prob > chi^2	0.0000	0.0000	0.0000
Pseudo R^2	0.5933	0.6676	0.7686

The z statistic is enclosed in parentheses, "*" "**" "***" significantly at the 10%, 5%, and 1% levels, respectively.

According to the results of Model (5) and (6), it can be seen that the impact of variables such as heterogeneity expectations and social capital index on the willingness of farmers to participate in forest ticket trading is consistent with the results of Model (1) and (2). Through Model (7), it can be seen that after decentralization, the interaction term between income expectations and social capital, risk expectations and social capital, and policy sustainability expectations and social capital all promote the willingness of farmers to participate in forest ticket trading at a significance level of 1%, indicating that social capital strengthens the promoting effect of income expectations and policy sustainability expectations on farmers' trading willingness, and alleviates the inhibitory effect of risk expectations on forest ticket trading willingness. Farmers form a "differentiated pattern" social circle linked by geography and blood ties due to their long-term living in specific

geographical locations. On the one hand, social capital, as an important channel for farmers to obtain information related to forest tickets, plays an important role in breaking down their cognitive biases. Through the same group effect, knowledge spillovers occur. Moreover, this transmission process is often based on their own experience, which makes it easier for farmers to understand and trust, eliminate their unfamiliarity with forest ticket transactions, reduce their risk expectations and uncertainties, and enhance their willingness to trade. On the other hand, in a group, the behavior choices of other members often affect an individual's value judgment of that behavior. Therefore, pioneers will create a certain role model effect for followers, because farmers often have cognitive biases in decision-making and tend to overestimate risk costs when measuring cost–benefit. However, when other farmers within the group implement relevant behaviors, farmers can effectively observe the benefits of others and improve their cost–benefit evaluation of participating in forest ticket trading [52]. However, the interaction term between cost expectations and social capital has not reached a statistically significant level on the willingness of farmers to trade. The reason is that although social capital can transmit information about trust, this transmission is related to the "trust radius" of farmers. Therefore, farmers' judgment of cost expectations is still dominated by individual rationality, resulting in social capital not having a significant alleviating effect [53]. Based on this, hypothesis H7 is partially supported.

5. Conclusions

5.1. Conclusions

Based on micro farmer survey data in Sanming City, Fujian Province, China, a theoretical analysis framework was constructed to examine the factors influencing the willingness of farmers to participate in forest ticket trading in an incomplete information environment. The factors influencing the willingness of farmers to participate in forest ticket trading were empirically tested, and the heterogeneity of farmers' willingness to participate in forest ticket trading was examined under different part-time job and educational levels. Furthermore, the moderating effect of social capital was analyzed. The following conclusions can be drawn from this study:

1. In an environment of incomplete information, the willingness of farmers to participate in forest ticket trading is influenced by heterogeneous expectations (profit expectations, cost expectations, risk expectations, and policy sustainability expectations), social capital, government propaganda, and individual family characteristics.
2. There are certain differences in the influencing factors and degree of willingness of farmers to participate in forest ticket trading among different groups of farmers with different levels of education and part-time work. Cost expectations and social participation have a more significant impact on the transaction willingness of non-part-time farmers, while policy sustainability expectations have a stronger promoting effect on non-part-time farmers. Social participation has a more significant impact on the transaction willingness of farmers with lower levels of education.
3. Social capital plays a moderating role in the impact of expected returns, expected risks, and expected policy sustainability on the willingness of farmers to participate in forest ticket trading. Social capital can strengthen the positive impact of expected returns and expected policy sustainability, and alleviate the negative impact of expected risks.

5.2. Suggestions

Based on the research findings and considering the current situation in the study area, we propose the following policy recommendations.

Firstly, strengthen social capital and communication. Bolster the social capital of farmers by leveraging social networks and new media platforms to construct multi-tiered communication channels. Foster active rural collective activities, enforce democratic oversight mechanisms, and thereby boost farmers' confidence in government policies and forest ticket transactions. Cultivate rural leaders and influencers to set positive examples and spearhead broader engagement in the system.

Secondly, enhance publicity and education. Amplify public awareness campaigns aimed at educating farmers about the value and utility of forest tickets. Employ a hybrid strategy combining online and offline outreach to disseminate relevant knowledge and policy updates, bridging the information divide among farmers. Strengthen grassroot-level information service systems to provide farmers with easily accessible consultation services.

Thirdly, optimize participation policies. Tailor participation policies to cater to diverse farmer profiles. For instance, incentivize non-farming professionals and societal investors by lowering transaction costs and mitigating risk perceptions. Offer financial backing to farmers who treat forest tickets as investment instruments.

Fourthly, diversify trading targets and value enhancement. Broaden the range of entities that can trade forest tickets to enhance their intrinsic value. Grounded in sustainable forest management, develop a green supply chain to imbue forest tickets with greater economic significance. Work towards the securitization of forest tickets and introduce a market maker system in secondary markets to boost liquidity and augment farmer incomes.

Fifth, establish a robust trading platform. Create a dedicated forest ticket trading platform that supplies essential information to buyers and sellers. Rely on regulated exchanges to standardize transactions, enact appropriate laws, regulations, and trading norms. Enhance market supervision, encompassing forest resource monitoring, pricing controls, and so forth. Implement a risk mitigation framework by setting up forestry insurance schemes against natural hazards, refining the intermediary service ecosystem, and instituting a legal protection system. Ensuring fair and transparent dealings will minimize uncertainties and mitigate potential disputes, thereby promoting a stable and secure environment for farmers to transact in forest tickets.

5.3. Research Limitations and Prospects

Indeed, while this study makes strides in examining the determinants of farmers' inclination to partake in forest ticket trading and introduces an empirical analysis grounded in incomplete information theory, several constraints merit acknowledgment:

1. Relying on data sourced from a 2022 field survey conducted in Sanming, Fujian, China, the generalizability of findings might be circumscribed.
2. While recognizing social capital's multidimensionality (encompassing social networks, trust, norms, and participation), capturing its full complexity remains a challenge. Its intangible qualities necessitate sophisticated measurement techniques, and current methodologies might inadequately reflect its true impact on farmers' participatory inclinations. This could lead to an underestimation of social capital's pivotal role in fostering engagement with forest ticket trading.
3. As an innovative financial instrument unique to China's forestry sector, forest ticket trading is still in its nascent stages, with comprehensive market dynamics yet to unfold. The incomplete information theory framework, though insightful, oversimplifies the intricate decision-making calculus of farmers in real-world scenarios. Factors unaccounted for in this study, such as evolving market prices, policy shifts, psychological, cultural, and historical nuances, are likely to exert influence on farmers' decisions as the system matures. Future research should strive to incorporate these multifaceted aspects, delving deeper into individual farmers' experiences, behaviors, and resultant benefits to enrich our understanding of this emergent economic phenomenon.

Author Contributions: Conceptualization, Z.W. and H.L.; Data curation, Q.F.; Investigation, X.H. and S.L.; Methodology, H.L.; Software, X.H.; Visualization, B.S.; Writing—original draft, B.S., X.H., S.L. and Q.F.; Writing—review and editing, B.S., Z.W. and H.L. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Central University Basic Research Business Fee Special Fund Project (2021SRY10).

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to the involvement of personal identity information in the data.

Acknowledgments: The authors are particularly grateful to all researchers and institutes for providing data for this study. The authors are also very grateful to the editors and reviewers for their comments and suggestions for improving this study.

Conflicts of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1. Classification matrix for Model (1).

Model (1)	Classification	Actual Values		
		D	~D	Total
Predicted values	+	83	12	95
	−	15	147	162
	Total	98	159	257
Correctly classified			89.49%	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A2. Classification matrix for Model (2).

Model (2)	Classification	Actual Values		
		D	~D	Total
Predicted values	+	86	13	99
	−	12	146	158
	Total	98	159	257
Correctly classified			90.27%	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A3. Classification matrix for Model (3) non-part-time farmers group.

Model (3-1)	Classification	Actual Values		
		D	~D	Total
Predicted values	+	43	5	48
	−	5	63	68
	Total	48	68	116
Correctly classified			91.38%	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A4. Classification matrix for Model (3) part-time farmers group.

Model (3-2)	Classification	Actual Values		
		D	~D	Total
Predicted values	+	44	3	47
	−	6	88	94
	Total	50	91	141
Correctly classified			93.62%	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A5. Classification matrix for Model (4) low level of education group.

Model (4-1)	Classification	Actual Values		
		D	**~D**	**Total**
Predicted values	+	28	1	29
	−	3	98	101
	Total	31	99	130
Correctly classified			**96.92%**	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A6. Classification matrix for Model (4) high level of education group.

Model (4-2)	Classification	Actual Values		
		D	**~D**	**Total**
Predicted values	+	61	2	63
	−	6	58	64
	Total	67	60	127
Correctly classified			**93.70%**	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A7. Classification matrix for Model (5).

Model (5)	Classification	Actual Values		
		D	**~D**	**Total**
Predicted values	+	81	12	93
	−	17	147	164
	Total	98	159	257
Correctly classified			**88.72%**	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A8. Classification matrix for Model (6).

Model (6)	Classification	Actual Values		
		D	**~D**	**Total**
Predicted values	+	85	14	99
	−	13	145	158
	Total	98	159	257
Correctly classified			**89.49%**	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

Table A9. Classification matrix for Model (7).

Model (6)	Classification	Actual Values		
		D	**~D**	**Total**
Predicted values	+	87	8	95
	−	11	151	162
	Total	98	159	257
Correctly classified			**92.61%**	

Classified + if predicted Pr(D) >= 0.5. True D defined as y != 0.

References

1. Rees, W.E. Economic development and environmental protection: An ecological economics perspective. *Environ. Monit. Assess.* **2003**, *86*, 29–45. [CrossRef]
2. Kauppi, P.E.; Sandstrom, V.; Lipponen, A. Forest resources of nations in relation to human well-being. *PLoS ONE* **2018**, *13*, e0196248. [CrossRef]

3. Augustynczik, A.L.D.; Asbeck, T.; Basile, M.; Bauhus, J.; Storch, I.; Mikusiński, G.; Yousefpour, R.; Hanewinkel, M. Diversification of forest management regimes secures tree microhabitats and bird abundance under climate change. *Sci. Total Environ.* **2019**, *650*, 2717–2730. [CrossRef] [PubMed]
4. Yang, G.; Wang, H.; Hou, Y.; Jiang, X.; Hu, M. The Impact of Collective Forest Tenure Reform on Timber Production in China: An Empirical Analysis Based on Provincial Panel Data. *Forests* **2024**, *15*, 312. [CrossRef]
5. SFA (State Forestry Administration). *China Forestry Statistics Yearbook (1978–2022)*; China Forestry Press: Beijing, China, 2024. (In Chinese)
6. Li, H. How to achieve transformation and upgrading in the forestry industry? *China For. Ind.* **2018**, *Z1*, 62–63. (In Chinese)
7. Starfinger, M.; Tham, L.; Tegegne, Y.T. Tree collateral—A finance blind spot for small-scale forestry? A realist synthesis review. *For. Policy Econ.* **2023**, *147*, 102886. [CrossRef]
8. Liu, X.; Guo, X.; Li, L.; Xie, F. Impacts of Tenure Security on Rural Households' Forestland Investment: Evidence from Jiangxi, China. *Forests* **2023**, *14*, 1806. [CrossRef]
9. Liao, W.; Yuan, R.; Zhang, X.; Zhang, C.; Li, N. Influence of risk perception and policy support on the deviation of rural households' demands and adoption behavior of the forestry socialized service. *Front. Environ. Sci.* **2023**, *11*, 1211310. [CrossRef]
10. Chen, K.; Liu, C.; Liu, H.; Guo, Y.; Zhu, W.; He, D.; Shi, X.; Liu, H.; Zhang, T.; Yang, S.; et al. Rural Forestry Investment and Financing Policies: Review and Implementation—Based on Research and Analysis in Fujian, Zhejiang, and Liaoning Provinces. *For. Econ.* **2019**, *41*, 81–91. (In Chinese) [CrossRef]
11. Hyde, W.F.; Yin, R. 40 years of China's forest reforms: Summary and outlook. *For. Policy Econ.* **2019**, *98*, 90–95. [CrossRef]
12. Wang, W.B.; Li, S. Practice and Exploration of Forest Ticket System Reform in Sanming City, Fujian Province. *For. Resour. Manag.* **2021**, *4*, 17–22. (In Chinese) [CrossRef]
13. Das, R.C.; Chatterjee, T.; Ivaldi, E. Co-movements of income and urbanization through energy use and pollution: An investigation for world's leading polluting countries. *Ecol. Indic.* **2023**, *153*, 110381. [CrossRef]
14. Huang, Y.; Hou, Y.; Ren, J.; Yang, J.; Wen, Y. How to Promote Sustainable Bamboo Forest Management: An Empirical Study from Small-Scale Farmers in China. *Forests* **2024**, *15*, 12. [CrossRef]
15. Ma, L.L. A Study on the Factors Influencing the Utilization of Futures Markets by Chinese Farmers: Theory, Evidence, and Policy. *J. Manag. World* **2010**, *5*, 1–16. (In Chinese) [CrossRef]
16. Huang, Z.S.; Chen, Z.Q.; Chen, Q.; Huang, S.T. Analysis of Factors Influencing the Willingness of Forest Farmers to Manage Carbon Sequestration Forests: An Empirical Test Based on Carbon Sequestration Afforestation Pilot Areas. *Ecol. Econ.* **2017**, *33*, 34–37+4. (In Chinese)
17. Markowski-Lindsay, M.; Stevens, T.; Kittredge, D.B.; Butler, B.J.; Catanzaro, P.; Dickinson, B.J. Barriers to Massachusetts forest landowner participation in carbon markets. *Ecol. Econ.* **2011**, *71*, 180–190. [CrossRef]
18. Zhang, S.; Xie, X.; Luo, Y.; Liu, X.; Zhao, M. The influence of asset specificity on farmers' willingness to participate in fallow from the perspective of farmer differentiation. *Front. Environ. Sci.* **2023**, *11*, 1107545. [CrossRef]
19. Dewang, P.; Indranil, B.; Amit, A.; Sriparna, G. A small farmer's market choice in the presence of multiple markets: The Indian case. *Eur. J. Oper. Res.* **2023**, *311*, 739–753. [CrossRef]
20. Fan, X.; Wang, Z.; Wang, Y. Rural Business Environments, Information Channels, and Farmers' Pesticide Utilization Behavior: A Grounded Theory Analysis in Hainan Province, China. *Agriculture* **2024**, *14*, 196. [CrossRef]
21. Chen, Z.; Li, X.; Xia, X.; Zhang, J. The impact of social interaction and information acquisition on the adoption of soil and water conservation technology by farmers: Evidence from the Loess Plateau, China. *J. Clean. Prod.* **2024**, *434*, 139880. [CrossRef]
22. Wang, J.; Xu, Y.; Zou, L.; Wang, Y. Does Culture Affect Farmer Willingness to Transfer Rural Land? Evidence from Southern Fujian, China. *Land.* **2021**, *10*, 594. [CrossRef]
23. Hastings, J.S.; Tejeda-Ashton, L. Financial literacy, information, and demand elasticity: Survey and experimental evidence from Mexico. *Natl. Bur. Econ. Res.* **2008**. [CrossRef]
24. Chayanov, A. *The Theory of Peasant Co-Operatives*; The Ohio State University Press: Columbus, OH, USA, 1991.
25. Scott, J.C. *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*; Yale University Press: New Haven, CT, USA, 1977.
26. Ariely, D. *Predictably Irrational: The Hidden Forces That Shape Our Decisions*; HarperCollins: New York, NY, USA, 2010; p. 68.
27. Hong, M.H.; Hu, C.P.; Gu, L.; Zhang, X.; Bao, J. The willingness of farmers to participate in carbon sequestration trading in forest management under the REDD+mechanism and its influencing factors. *J. Zhejiang AF Univ.* **2017**, *34*, 207–2014. (In Chinese)
28. Stern, F.; Putnam, R. Making democracy work: Civic traditions in modern Italy. *Foreign Aff. (Counc. Foreign Relat.)* **1993**, *72*, 202. [CrossRef]
29. Flora, J.L. Social capital and communities of place. *Rural Sociol.* **1998**, *63*, 481–506. [CrossRef]
30. Michelini, J.J. Small farmers and social capital in development projects: Lessons from failures in Argentina's rural periphery. *J. Rural Stud.* **2013**, *30*, 99–109. [CrossRef]
31. Zheng, W.; Luo, B. Understanding pollution behavior among farmers: Exploring the influence of social networks and political identity on reducing straw burning in China. *Energy Res. Social. Sci.* **2022**, *90*, 102553. [CrossRef]
32. Granovetter, M. The Strength of Weak Ties. *Am. J. Sociol.* **1973**, *78*, 1360–1380. [CrossRef]
33. Uslaner, E.M.; Conley, R.S. Civic engagement and particularized trust: The ties that bind people to their ethnic communities. *Am. Politics Res.* **2003**, *31*, 331–360. [CrossRef]

34. He, K.; Zhang, J.B.; Zhang, L.; Wu, X.L. Interpersonal trust, institutional trust, and farmers' willingness to participate in environmental governance: A case study of agricultural waste resource utilization. *J. Manag. World* **2015**, *5*, 75–88. (In Chinese) [CrossRef]
35. Lyon, F. Trust, networks and norms: The creation of social capital in agricultural economies in Ghana. *World Dev.* **2000**, *28*, 663–681. [CrossRef]
36. Bagheri, A.; Bondori, A.; Allahyari, M.S.; Damalas, C.A. Modeling farmers' intention to use pesticides: An expanded version of the theory of planned behavior. *J. Environ. Manag.* **2019**, *248*, 109291. [CrossRef] [PubMed]
37. Sun, P.F.; Zhao, K.; Zhou, S.Q.; He, J. Risk Expectation, Social Networks, and Rural Homestead Withdrawal: Based on a Sample of 626 Farmers in Jinzhai County, Anhui Province. *China Land Sci.* **2019**, *33*, 42–50. (In Chinese)
38. Jiao, J.; Yang, Z.; Zhang, Y.; Shi, B.; Dogot, T.; Yin, C. Are Farmers Willing to Pay for Centralized Mode Provision of Rural Domestic Sewage Treatment? A Large-Scale Assessment in North China. *Front. Environ. Sci.* **2022**, *10*, 861871. [CrossRef]
39. Chen, Y.; Li, S.X. Group identity and social preferences. *Am. Econ. Rev.* **2009**, *99*, 431–457. [CrossRef]
40. Feng, L.; Dai, J.; Tian, L. Review of the technology for high-yielding and efficient cotton cultivation in the northwest inland cotton-growing region of China. *Field Crops Res.* **2017**, *208*, 18–26. [CrossRef]
41. Lu, H.; Chen, Y.; Zhang, P.; Huan, H.; Xie, H.; Hu, H. Impacts of farmland size and benefit expectations on the utilization of straw resources: Evidence from crop straw incorporation in China. *Soil. Use Manag.* **2022**, *38*, 929–939. [CrossRef]
42. Tian, M.L.; Zheng, Y.Y.; Sun, X.L.; Zheng, H.C. A research on promoting chemical fertiliser reduction for sustainable agriculture purposes: Evolutionary game analyses involving 'government, farmers, and consumers. *Ecol. Indic.* **2022**, *144*, 109433. [CrossRef]
43. Liu, Z.; Sun, J.; Zhu, W.; Qu, Y. Exploring Impacts of Perceived Value and Government Regulation on Farmers' Willingness to Adopt Wheat Straw Incorporation in China. *Land* **2021**, *10*, 1051. [CrossRef]
44. Wei, X.; Ruan, J. Influences of Government Policies and Farmers' Cognition on Farmers' Participation Willingness and Behaviors in E-Commerce Interest Linkage Mechanisms during Farmer–Enterprise Games. *Agriculture* **2022**, *12*, 1625. [CrossRef]
45. Han, M.; Liu, R.; Ma, H.; Zhong, K.; Wang, J.; Xu, Y. The Impact of Social Capital on Farmers' Willingness to Adopt New Agricultural Technologies: Empirical Evidence from China. *Agriculture* **2022**, *12*, 1368. [CrossRef]
46. Guo, B.; Yuan, L.; Lu, M. Analysis of Influencing Factors of Farmers' Homestead Revitalization Intention from the Perspective of Social Capital. *Land* **2023**, *12*, 812. [CrossRef]
47. He, Y.; Tang, P. Understanding the Role(s) of Social Networks in the Transition from Farmers' Willingness to Behavior Regarding Withdrawal from Rural Homesteads: A Research Study Based on Typical Regions of Sichuan Province. *Land* **2023**, *12*, 1505. [CrossRef]
48. Chuan, L.; Zhao, J.; Zhao, J.; Shan, N.; Zhang, H.; Wang, A. Agrochemical Input Behavior and Cleaner Production Adoption Willingness of Farmers in Beijing–Tianjin–Hebei, China. *Sustainability* **2023**, *15*, 8479. [CrossRef]
49. Wei, X.; Khachatryan, H.; Zhu, H. Poyang lake wetlands restoration in China: An analysis of farmers' perceptions and willingness to participate. *J. Clean. Prod.* **2021**, *284*, 125001. [CrossRef]
50. Xinyu, W.; Jianjun, J.; Shenghong, R.; Tong, G.; Xin, Q. Are Farmers Willing to Substitute Tobacco Cultivation? Evidence From Lichuan City, China. *Nicotine Tob. Res.* **2022**, *24*, 897–903. [CrossRef]
51. Robinson, C.; Schumacker, R.E. Interaction effects: Centering, variance inflation factor, and interpretation issues. *Mult. Linear Regres. Viewp.* **2009**, *35*, 6–11.
52. Kan, L.; Liu, R.; Su, F.; Bao, Y. Effect of Farmers' Perceptions of Sustainable Development Value on Their Willingness for Agricultural Land Secured Financing. *Sustainability* **2022**, *14*, 5984. [CrossRef]
53. Liu, F.; Xia, X. Heterogeneity expectations, social capital, and effective participation of farmers in the integration of rural industries. *Reform* **2021**, *4*, 121–135. (In Chinese)