The Impact of Rural Tourism on the Poverty Vulnerability of Aging Rural Households

Shu Guo, Xiaoying Li, Ning Cao * and Ying Wang

School of Business, Faculty of Economics, Liaoning University, Shenyang 100136, China
* Correspondence: caoning@lnu.edu.cn

Abstract: As the world’s population structure is aging and China is at a critical stage in consolidating the results of poverty alleviation, this study intends to explore the pathways of the elderly group, which is very vulnerable to falling back into poverty, to prevent or slow down the possibility of this group falling back into poverty. In this study, 79 elderly farmers’ data were collected by household interviews as research samples, and the Vulnerability as Expected Poverty index was selected to measure the dynamic changes of poverty in aging farmers in Donglu Island Village. The correlation between the participation of aging farmers in the tourism industry and their own poverty vulnerability was analyzed through multiple linear regression. It is found that whether aging farmers participate in tourism is not correlated with their absolute poverty vulnerability. Whether aging farmers participate in tourism is significantly negatively correlated with their relative poverty vulnerability, and developing rural tourism and increasing the participation of aging farmers can alleviate the poverty vulnerability of aging farmers. Finally, with the mindset of “teach a man to fish and you feed him for a lifetime”, the development of rural tourism suitable for aging farmers is proposed.

Keywords: rural tourism; population aging; poverty vulnerability; early warning of returning to poverty

1. Introduction

Aging rural households will become a group that cannot be ignored when consolidating the results of poverty alleviation and promoting rural revitalization. (According to the United Nations classification standard on aging, when a country’s population over 60 years old accounts for more than 10% of the total population or the population over 65 years old accounts for more than 7%, it means that it has entered a mildly aging society; and when the proportion of people over 60 years old in the total population exceeds 20%, or the proportion of people over 65 years old exceeds 14%, this indicating that they have entered a moderately aging society). “The World Population Prospects 2022 report” (World Population Prospects 2022, UN, 2022) released by the United Nations Department of Economic and Social Affairs predicts that the world’s population will reach eight billion by 2022 and exceed nine billion by 2050; global life expectancy is expected to reach 77.2 years in 2050, with the proportion of people over 65 years old in the total population rising from 10% in 2022 to 16% in 2050. According to the data of China’s seventh national population census (Bulletin of the Seventh National Population Census, National Bureau of Statistics, 2021) in May 2021, the population over 60 years old accounted for 18.70%, and the population over 65 years old accounted for 13.50%; from the upward trend, the proportion of the population over 60 years old increased by 5.44%, and the proportion of the population over 65 years old increased by 4.63%, further deepening the aging of the Chinese population. In February 2021, China achieved a comprehensive victory in the battle against poverty, and it is important to achieve the effective connection between consolidating and expanding the achievements of poverty alleviation and rural revitalization (“Opinions on Realizing the
Effective Connection between Consolidating and Expanding the Achievements of Poverty Alleviation and Rural Revitalization”, The Central Committee of the Communist Party of China and the State Council (2021)) (Figures 1 and 2).

Figure 1. Demographics: (a) The global population and annual growth rate from 1950 to 2050 are derived from International Development Watch; (b) Global life expectancy from 1950 to 2050, derived from International Development Watch.

Figure 2. The change in the age composition of Chinese port originated from the Central Broadcasting Network.

In the process of promoting rural construction, it is necessary to pay attention to special groups in order to achieve the overall healthy development of the region. With the growth of the aging population, rural households are more likely to be poor and fall back into poverty [1,2]. The multidimensional poverty of the elderly group in rural areas is greater than that of the rural population as a whole [3]. The elderly group is more likely to become the key population of poverty prevention and control due to their lack of poverty-alleviation ability and insufficient poverty-alleviation resources [4]. The Wall Street Journal commented that it is imperative for China to delay retirement and deepen reform in the context of aging. As the degree of aging deepens, it may be worth exploring what kind of path can be developed to prevent or slow the elderly group from returning to poverty.

Under the background of implementing the strategy of rural tourism to promote rural revitalization, how to achieve poverty alleviation and even curb poverty reduction through tourism development is gradually becoming the focus of research. Studies have shown that tourism has a poverty-alleviating effect and can significantly alleviate regional poverty, but the development of tourism to improve poverty is not always effective. Mahadevan and
Suardi found that tourism growth did not reduce population poverty. Based on different types of Gini coefficients, tourism did not show an improvement in income inequality. The poverty gap measure showed that tourism needed significantly less money to lift the poor out of poverty [5]. Zhao and Xia conducted an empirical analysis based on panel data from 1999 to 2014 in various provinces in China, showing that tourism has a positive impact on poverty reduction. The inequality of income distribution among low-income groups may weaken the poverty-reduction effect of tourism. There are regional differences in the relationship between tourism and poverty reduction [6]. Odhiambo found that when the number of tourists is used as a proxy, the increase in tourism development always leads to an increase in household welfare, but when tourism revenue is used as a proxy, tourism development does not lead to an increase in family welfare. Whether the development of tourism is effective in reducing poverty and returning to poverty needs to be analyzed considering specific contexts. Whether the development of the tourism industry has an impact on the elderly group and whether it can reduce the return of the elderly group into poverty may need to be further explored [7].

For regions with a high degree of aging, Cwiek recommended that relevant sectors realize the development potential of the silver economy [8]. Youn found that female participants who transitioned to poverty and remained in poverty showed an increased odds of showing weakness during the follow-up year, but no significant results were found among male participants [9]. For individual aging farmers, studies have focused on the impact of factors such as social capital [10], living patterns [11], subjective happiness [12], elderly family status [13], gender [14], and family size [15], and tried to learn from the income security system [16], public pension subsidies [17], employment improvement [18], health insurance [19], health care [20], and other measures to slow down the likelihood of aging rural households falling back into poverty. However, the relevant countermeasures and suggestions tend towards a “Give a man a fish, and you feed him for a day” thinking, rather than “Teach a man to fish, and you feed him for a lifetime”.

In summary, the objective of this study is to measure the poverty vulnerability of aging farmers, obtain dynamic poverty vulnerability simulation results, analyze the impact of the participation of aging farmers in the tourism industry on their own poverty vulnerability, and propose age-appropriate rural tourism development countermeasures to reduce the possibility of farmers falling back into poverty with the thinking mode of “Teach a man to fish, and you feed him for a lifetime”.

2. Literature Review

Tourism can be regarded as an effective industrial tool to increase farmers’ income [21], promote regional economic growth [22], and reduce poverty and fight poverty. Mahadevan et al., using urbanization as a link, found that, for urban poverty in China, both domestic tourism and inbound tourism can indirectly affect poverty through urbanization, and, for rural China, the growth of domestic tourism leads to a greater reduction in the poverty rate [23]. Folarin and Adeniyi explored the impact of tourism development on poverty in Sub-Saharan African (SSA) countries, and showed that tourism development contributes to poverty reduction in Sub-Saharan African (SSA) countries [24]. In the current era, the role of tourism development has shifted from a driving force for poverty alleviation to a driving force for revitalization [25]. For example, Xia Mei [26], the birthplace of the tea industry in the Wuyishan region of China, and a traditional Chinese village in Shaanxi Province [27], and many other regions have achieved the goal of promoting rural revitalization through rural tourism by choosing the correct rural tourism development model, scientifically planning the spatial layout, and developing tourism resources according to local conditions.

“Vulnerability to poverty” was formally proposed by the World Bank in 2001, reflecting the tendency of specific populations to fall back into poverty due to external shocks, mainly referring to the probability or risk of individuals or households falling below the poverty line [28], as well as countries. There is a possibility that a region or group will fall into recession and mass poverty due to the shock [29]. Time horizons and measures
of welfare are the basis for vulnerability. The vulnerability estimates generally express welfare (utility) in terms of consumption and use this criterion as the poverty line. Different from determining the poverty line based on consumption or income [30], the introduction of the concept of vulnerability pushes anti-poverty intervention from ex post to ex ante. Based on different research perspectives, there are three types of quantitative definitions of vulnerability: (1) Vulnerability as Expected Poverty (VEP), which is the probability that the expected income or consumption of households will fall below a given poverty standard [31]; (2) Vulnerability as Uninsured Exposure to Risk (VEU), which refers to the difference between the utility corresponding to a specific value of consumption and the expected utility of expected consumption [32]; and (3) Vulnerability as Uninsured Exposure to Risk (VER), which refers to the likelihood that the welfare level of households will fall below the poverty line when faced with risk shocks. VEP and VEU directly estimate the total vulnerability, estimating in advance the welfare loss of the family from future risk hits, and VER estimates the level of vulnerability and judges the subsequent welfare loss of the family due to the risk blow. In contrast, the VER measure is biased towards the estimation of ex post welfare loss, and although it can accurately assess the source of the risk shock to the family, it is an ex post measure [33]. The VEU measure is biased towards the estimation of the probability of falling into poverty in the future, which is a predictive index, but it is not strongly applicable due to strict data requirements [34]. While VEP measurement is biased towards predicting poverty vulnerability in advance, which is forward-looking, the use of cross-sectional data or panel data of fewer years can meet the measurement needs [35], which can alleviate the problem of insufficient panel data and effectively avoid the limitations of VEU and VER, so it is widely used.

Through population-specific poverty vulnerability research, it is possible to effectively identify groups that may fall into poverty at some stage in the future, improve the efficiency of intervention, reduce the cost of anti-poverty [36], and enhance the effectiveness of policy formulation [37,38]. For example, Zhang analyzed the relationship between the minimum subsistence guarantee and poverty vulnerability in urban and rural areas in China, and found that the minimum subsistence guarantee system can effectively reduce the possibility of dibao families continuing to fall into poverty in the future [39]. Yan et al. examined the poverty-reduction effect of China’s rural medical insurance system from the perspective of absolute poverty, and clarified that the rural medical insurance system has good policy effects on “poverty due to illness” and “return to poverty due to illness” [40]. Karpinska et al. assessed the regional vulnerability of energy poverty in Poland and identifies some northern, southern, and eastern regions of Poland as the main targets of energy poverty policy actions [41]. Hernandez et al. analyzed the vulnerability of Colombian households to multidimensional poverty, and concluded that patterns of vulnerability vary by household region (i.e., rural or urban) and help distinguish between populations that require specific policy strategies; chronically poor households need poverty-reduction interventions, and households that are not poor but are likely to become poor in the future need poverty-prevention strategies [42]. Ozughalu studied the relationship between household food poverty and food-poverty vulnerability in Nigeria, found that food-insecure people are more likely to fall into food insecurity than non-food-insecure people, and proposed programs to reduce food poverty and food-poverty vulnerability for food-insecure people [43].

In the studies on rural tourism and poverty vulnerability, a sustainable livelihood model covering human, natural, material, social, and other capital factors has been preliminarily constructed to evaluate the risk of rural households falling back into poverty [44,45]. Studies have shown that most rural households are vulnerable [46], and rural tourism can change the traditional livelihood mode of rural areas [47] and integrate tourism resources [48] and other ways to improve the overall livelihood capital of rural households [49], and achieve multi-dimensional poverty reduction such as economy, education [50], living standards [51], and housing and employment [52], thereby reducing the risk of rural households falling back into poverty.
3. Research Design

3.1. Poverty Vulnerability

Referring to the VEP measure proposed by Chaudhuri et al. (2002) [36], poverty vulnerability is defined as the probability that a household or individual will fall into poverty in the future, expressed by the formula:

\[ V_{h,t} = P(Y_{h,t+1} \leq \text{poor}) \]

where \( V \) represents the vulnerability to poverty, \( V_{h,t} \) represents the vulnerability of household \( h \) at time \( t \), \( Y_{h,t+1} \) represents the income of household \( h \) at time \( t + 1 \), poor is the poverty line, and \( P(Y_{h,t+1} \leq \text{poor}) \) represents the probability that household \( h \)'s income at time \( t + 1 \) falls below or equal to the poverty line. Considering that \( Y_{h,t+1} \) represents the income in the \( t + 1 \) period, which is unknown in the \( t \) period and will be affected by the observable characteristic variable (\( X_h \)), unobserved factor (\( \alpha_h \)), and error term (\( e_h \)), it can be expressed as a function:

\[ Y_{h,t+1} = Y(X_h, \alpha_h, e_h) \]

In this paper, the three-stage feasible generalized least squares method (FGLS) proposed by Amemiya [53] is used for reference to eliminate the influence of heteroscedasticity and accept the standard distribution hypothesis. First, according to the study, “lognormal distribution is more suitable for describing the income level of low-income groups” [54]. The estimated family income equation is expressed as:

\[ \ln Y_h = X_h \beta + e_h \]

\( Y_h \) represents the per capita annual income of family \( h \), \( X_h \) represents the observable characteristic variable that influences household income, \( \beta \) is the coefficient vector of the characteristic variable, and \( e_h \) is the error term. If the influence of the unobservable factor \( \alpha_h \) that does not change over time is excluded, the fluctuation of household income in the future is mainly due to the uncertainty of \( e_h \), and the variance of \( e_h \) is equal to the variance \( \ln C_h \).

Second, the FGLS method is used to estimate and obtain estimators \( \hat{\beta}_{\text{FGLS}} \) and \( \hat{\theta}_{\text{FGLS}} \), to estimate the expectation of future income \( \hat{E}(\ln Y_h | X_h) \) and variance \( \hat{V}(\ln Y_h | X_h) \).

\[ \hat{E}(\ln Y_h | X_h) = X_h \hat{\beta}_{\text{FGLS}} \]

\[ \hat{V}(\ln Y_h | X_h) = X_h \hat{\theta}_{\text{FGLS}} \]

Finally, on the assumption that future household income obeys the normal distribution, the vulnerability of farmers to poverty is calculated as follows:

\[ \hat{V}_{h,t} = P^*(\ln Y_h, t + 1 \leq \ln \text{poor} | X_h) = \Phi \left( \frac{\ln \text{poor} - X_h \hat{\beta}_{\text{FGLS}}}{\sqrt{X_h \hat{\theta}_{\text{FGLS}}}} \right) \]

3.2. Multiple Linear Regression

To study the relationship between multiple independent variables and dependent variables, multiple linear regression is the most classical model (Li et al., 2022) [55]. In this paper, the multiple linear regression model is used to empirically analyze the influencing factors of the poverty vulnerability of aging rural households, and the following regression model is established based on the variable settings above:

\[ Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \ldots + \beta_9 x_{i9} + \varepsilon_i \]

Formula: \( Y_i \) is the relative poverty vulnerability and absolute poverty vulnerability of aging rural households; \( x_{i1}, x_{i2}, x_{i3} \ldots x_{i9} \) is the explanatory variable; \( \beta_0 \) is the constant
term; $\beta_1, \beta_2, \beta_3... \beta_9$ is the regression coefficient of the corresponding variable; and $\varepsilon_i$ is the random error term.

4. Data and Methodology

4.1. Research Case

The case selected in this paper is Donglu Island Village, a national AAAA-level tourist scenic spot, located in a city in Liaoning Province, with a total of 932 households on the island and nearly 4000 registered and permanent villagers, and the main economic industries are marine shellfish aquaculture, tourism, marine fishing, and other individual and private economies. Regional aging rural households accounted for 26.19%, most of which have the characteristics of “three noes”, i.e., no fixed job, no pension guarantee, and no retirement age. (This paper defines elderly farmers in the district as those who had reached the age of 60 and will reach the age of 60 within five years, and takes the aging farmers as the research objects.) Looking back at the development history, before the reform and opening up, the island was a poor village with an annual output value of less than 900,000 yuan and a per capita income of less than 100 yuan. In 1996, Donglu Island Village established a village collective economy—“Donglu Island Village Haixing (Group) Co., Ltd., Guangzhou, China”, mainly engaged in marine fishery. In 1999, the company began to operate wharf passenger transportation, island tourism, mountaineering exploration, offshore fishing, and other tourism projects, with more than 100 tourism jobs. In 2009, more than 300 direct tourism jobs were provided. By 2018, 343 farming households directly participated in tourism on the island, with a total output value of 780 million yuan and a per capita income of 27,000 yuan, achieving remarkable results in poverty alleviation. Since 2021, Donglu Island has actively promoted the upgrading of the tourism industry, planned to form a consortium with Zhangdao scenic spots, and built a holiday tourism destination, integrating the idyllic scenery of fish and rice and the coastal leisure of ocean islands with rural revitalization construction as the strategic starting point (Figure 3).

Figure 3. Research area map. Source: Baidu map.
4.2. Data Collection

The data used in this paper are from the National Social Science Foundation of China’s project, “Research on the Mechanism and Effect Evaluation of Accelerating Poverty Alleviation in the Tourism Industry”, which conducted household interviews and file access surveys on Donglu Dao from October to November 2021. A total of 167 samples were collected by the map method of residence in the regional sampling method, including 80 samples from elderly farmers aged 55 years and above who were able to work.

In order to effectively control the non-response bias in the process of sample collection, house-to-house interviews were used instead of questionnaires in the data collection process. In order to avoid the interference of the interviewee by factors such as education level and dialect difference, the researchers explained the topic to the interviewee and displayed the picture corresponding to the topic. After talking with the interviewee about the questionnaire items, and after the two interviewers considered the true meaning expressed by the interviewee, they filled in the interview notes on the spot, and recorded the respondent’s response throughout the process; in the process of data collation, the “triangulation test” method was adopted, and three members of the research group recorded the interviewee’s answers according to the audio recording, checked the interview notes one by one, and finally filled in the questionnaire record after correcting the content. At the same time, three sets of questions were set up to test contradictory answers before and after, to improve the authenticity and accuracy of the survey data. A total of 80 interview records were collected from aging farmers, and after removing incomplete questionnaire information and contradictory samples, the number of valid questionnaires was 79, and the effective rate of the sample reached 98.75%.

The questionnaire is based on “Developing Tourism to Accelerate Poverty Alleviation: Special Interview Questionnaire on Increasing Income and Employment” (See Supplementary Material for details). The questionnaire content used is mainly divided into three parts: (1) the relevant information of the individual, including gender, age, and education level; (2) the relevant information of the family, including the size of the family, the number of people affected by the employment of the family, the number of children supported by the family, the annual income of the family, the area of land owned, the number of houses owned, and the distance from the main road; and (3) the relevant information about the village economic industry, including “What are the main sources of income of your family?”, “Which source of income is the most stable in your family’s income?”, “Which source of income in your family income makes the most money?”, “Which source of income in your family income increases the fastest?”, “Do you participate in the tourism industry?”, and other questions.

4.3. Variables

In this paper, per capita annual income is taken as the dependent variable to calculate the poverty vulnerability of aging farmers. When assessing the impact of rural tourism on vulnerability to poverty, extreme poverty vulnerability and relative poverty vulnerability are taken as dependent variables. The independent variable of this paper is “participation in tourism industry”. In addition, factors that have more significant impact on the explained variables are listed as control variables, including gender, age, and education level (3 individual characteristic variables), family size, dependency ratio, annual household income, owning housing assets, and distance from the main road (5 family characteristic variables). Some are dummy variables, and gender “male” is assigned 1 and “female” 0. Education level “never attended school” is assigned 0, “primary school” is assigned 1, “junior high school” is assigned 2, “senior high school or technical secondary school” is assigned 3, and “bachelor or junior college” is assigned 4. Annual household income: 1 for “less than 20,000”, 2 for “20,000 to 30,000”, 3 for “30,000 to 40,000”, 4 for “40,000 to 50,000”, 5 for “50,000 to 60,000”, 6 for “60,000 to 70,000”, and 7 for “more than 70,000”; distance from the main road is assigned 1 for “less than 15 min”, “15–30 min” is assigned a value of 2, “30 min to 1 h” is assigned a value of 3, “more than 1 h” is assigned a value of 4.
Of special note is that this article, for the dependency ratio calculation, did not adopt the working-age population of the ratio of the working population, but the dependency ratio is obtained in combination with only children and the actual situation of patients who do not have to work on Donglu Island, through “(family patients + family children count)/(family size, family patients—family children)”.  

5. Empirical Results  
5.1. Sample Descriptive Statistics  
The farmers in the sample were all over 55 years old, with 36.71% between 55 and 60 years old and 63.29% above 60 years old. The average age of the sample was 63.37. Males accounted for 40.51% and females for 59.49%. In terms of education, 11.39% of the households have never been to school, 43.04% have graduated from primary school, 34.18% have graduated from junior middle school, and only 11.39% have graduated from high school or above. In terms of family composition, most have four to six family members. Only 10.12% of the families have one sick member unable to work, and 1.26% of the families have two sick members unable to work, so the family has less pressure to support. In terms of school-age children, 54.43% of the families have no school-age children, 31.65% and 11.39% have one and two school-age children, respectively, and 2.53% have three or more school-age children. Nearly half of the families have the pressure to go to school. Regarding family assets, the per capita annual income of peasant households in the current period was RMB 14,227.23, and they owned 1.24 houses per capita. In terms of house ownership, 78.48% of families owned one house, and 21.52% owned two or more houses, indicating rich real-estate resources. Before and after the land transfer, rural households’ per capita land area changed from 10 square meters to 0 square meters, and land resources were limited. Regarding regional construction, 88.61% of farmers said they could enter the main road within one hour, and 46.84% of them said they could enter the main road within 15 min, indicating that the regional transportation was relatively convenient. Donglu Island, as a typical example of the tourism industry driving the regional economic growth, has been trying to operate the rural tourism industry since 1999. Up to now, it has been widely promoted, and farmers have a high participation: 53.17% of the respondents in this survey mainly operate in tourism-related industries (Table 1).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>St</th>
<th>Max</th>
<th>Min</th>
<th>Simple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita annual income</td>
<td>14,227.23</td>
<td>7021.18</td>
<td>2500</td>
<td>45,000</td>
<td>79</td>
</tr>
<tr>
<td>The logarithm of per capita annual income</td>
<td>9.4489276</td>
<td>0.48727693</td>
<td>7.82405</td>
<td>10.71442</td>
<td>79</td>
</tr>
<tr>
<td>Whether to participate in the tourism industry</td>
<td>0.53</td>
<td>0.502</td>
<td>0</td>
<td>1</td>
<td>79</td>
</tr>
<tr>
<td>Gender</td>
<td>0.41</td>
<td>0.494</td>
<td>0</td>
<td>1</td>
<td>79</td>
</tr>
<tr>
<td>Age</td>
<td>63.37</td>
<td>6.237</td>
<td>55</td>
<td>87</td>
<td>79</td>
</tr>
<tr>
<td>The degree of education</td>
<td>1.47</td>
<td>0.875</td>
<td>0</td>
<td>4</td>
<td>79</td>
</tr>
<tr>
<td>Family size/person</td>
<td>4.32</td>
<td>1.850</td>
<td>1</td>
<td>10</td>
<td>79</td>
</tr>
<tr>
<td>The dependency ratio</td>
<td>0.2249</td>
<td>0.33866</td>
<td>0</td>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>Annual household income</td>
<td>4.94</td>
<td>1.983</td>
<td>1</td>
<td>7</td>
<td>79</td>
</tr>
<tr>
<td>Own housing assets/office</td>
<td>1.24</td>
<td>0.512</td>
<td>1</td>
<td>4</td>
<td>79</td>
</tr>
<tr>
<td>Distance from main road</td>
<td>2.05</td>
<td>1.108</td>
<td>1</td>
<td>4</td>
<td>79</td>
</tr>
<tr>
<td>Land area owned/before transfer</td>
<td>0.014870</td>
<td>0.1121417</td>
<td>0</td>
<td>0.2</td>
<td>79</td>
</tr>
<tr>
<td>Owned land area/after transfer</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>79</td>
</tr>
<tr>
<td>Is there a patient?</td>
<td>0.11</td>
<td>0.320</td>
<td>0</td>
<td>1</td>
<td>79</td>
</tr>
<tr>
<td>Number of school-age children</td>
<td>0.63</td>
<td>0.835</td>
<td>0</td>
<td>4</td>
<td>79</td>
</tr>
</tbody>
</table>

5.2. Statistics of Sample Economic Sources  
Based on the research results, the economic sources of the aging farmers on Donglu Island are sorted out, which include family business income from agriculture, forestry, animal husbandry and fishery, and individual business; wage income, mainly from employed
workers; property income, mainly from dividends from leasing of houses and land; and transfer income, mainly from various kinds of subsidies and pensions.

According to the statistics, the proportion of economical sources of aging households of different ages is different. According to the orientation of their economic sources, the aging households are divided into three age groups—55–59, 60–65, and 66–75—for this discussion. As shown in Table 2, with the increase of age, the proportion of household income in the economic sources of farmers continues to increase, the proportion of wage income continues to decrease, the proportion of property income sharply decreases, and the proportion of transfer income sharply increases (Figure 4).

Table 2. The proportion of income sources of aging farmers in different age groups.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Income from Family Business</th>
<th>Income from Wage and Salary</th>
<th>Income from Property</th>
<th>Income from Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 to 59 years old</td>
<td>41.66%</td>
<td>48.00%</td>
<td>10.33%</td>
<td>0.01%</td>
</tr>
<tr>
<td>60 to 65 years old</td>
<td>53.84%</td>
<td>25.64%</td>
<td>1.93%</td>
<td>18.59%</td>
</tr>
<tr>
<td>66 to 75 years old</td>
<td>58.97%</td>
<td>20.51%</td>
<td>0.02%</td>
<td>20.51%</td>
</tr>
</tbody>
</table>

Figure 4. Percentage of revenue sources. Source: the author’s drawing.

5.3. Calculation of Poverty Vulnerability of Aging Farmers

The poverty line and vulnerability line are important indicators for measuring poverty vulnerability. As for the selection of the poverty lines, this paper sets two poverty lines for poverty identification, namely, the extreme poverty line of RMB 3747/year and the relative poverty line of RMB 8472/year. The extreme poverty line is based on the World Bank’s low international poverty line of US $1.9 per day, translating into real purchasing power. The relative poverty line refers to the view that the “Social poverty line can measure relative poverty”, proposed in the World Bank report ‘Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle’ (World Bank, Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle [R], Washington, DC). According to the formula (Song et al., 2021) [56], SPL = Max (US$1.90, US$1.00 + 0.5 × media income). As for the selection of vulnerability lines, combined with existing studies [57], in this paper, 0.06% of the poverty incidence in the sample areas and the vulnerability lines of 50% were used to measure the vulnerability of peasant households. When the poverty vulnerability of peasant households is greater than 0.06%, it indicates that peasant households are vulnerable; when the poverty vulnerability of peasant households is greater than 0.06% and less than 50%, this indicates that peasant households have the low vulnerability; and when peasant households’ poverty vulnerability is greater than 50%, this indicates that peasant households have high vulnerability (Table 3 and Figure 5).
Table 3. Poverty vulnerability of aging households under the two poverty lines.

<table>
<thead>
<tr>
<th>Standard *</th>
<th>Extreme Poverty Line</th>
<th>Relative Poverty Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall vulnerability rate</td>
<td>7.186%</td>
<td>32.934%</td>
</tr>
<tr>
<td>Low rate of vulnerability</td>
<td>6.587%</td>
<td>25.749%</td>
</tr>
<tr>
<td>High rate of vulnerability</td>
<td>0.599%</td>
<td>7.186%</td>
</tr>
</tbody>
</table>

* In order to show the overall poverty vulnerability of aging farmers in the region, the poverty vulnerability rate (the proportion of vulnerable farmers to the total sample of farmers) was used to reflect it. When the poverty vulnerability of a farm household is greater than 0.06% and less than 50%, the household is assessed as having low vulnerability. When the poverty vulnerability of the farm household is greater than 50%, the high vulnerability of the farm household is assessed.

Figure 5. Poverty vulnerability of aging rural households. Source: the author’s drawing.

5.4. Regression Analysis Results

We take gender, age, education level, family size, the dependency ratio, number of family income, home ownership, distance, and whether to participate in the tourism industry as the independent variables, respectively; and relative poverty vulnerability (Table 4) and extreme poverty vulnerability (Table 5) as the dependent variables to build the regression model and linear regression analysis.

Table 4. Linear regression analysis results of relative poverty vulnerability.

<table>
<thead>
<tr>
<th>Coef.</th>
<th>Std. Err</th>
<th>Coef. Beta</th>
<th>t</th>
<th>p Value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>0.397</td>
<td>0.387</td>
<td>1.026</td>
<td>0.308</td>
<td>1.026</td>
</tr>
<tr>
<td>Gender</td>
<td>0.051</td>
<td>0.074</td>
<td>0.055</td>
<td>0.696</td>
<td>0.489</td>
</tr>
<tr>
<td>Age</td>
<td>0.006</td>
<td>0.006</td>
<td>0.075</td>
<td>0.957</td>
<td>0.342</td>
</tr>
<tr>
<td>The degree of education</td>
<td>−0.034</td>
<td>0.043</td>
<td>−0.064</td>
<td>−0.781</td>
<td>0.437</td>
</tr>
<tr>
<td>Family size/person</td>
<td>0.162</td>
<td>0.024</td>
<td>0.648</td>
<td>6.835</td>
<td>0.000</td>
</tr>
<tr>
<td>The dependency ratio</td>
<td>−0.139</td>
<td>0.108</td>
<td>−0.102</td>
<td>−1.285</td>
<td>0.203</td>
</tr>
<tr>
<td>Annual household income</td>
<td>−0.138</td>
<td>0.023</td>
<td>−0.591</td>
<td>−5.878</td>
<td>0.000</td>
</tr>
<tr>
<td>Own housing assets/office</td>
<td>0.157</td>
<td>0.067</td>
<td>0.174</td>
<td>2.335</td>
<td>0.022</td>
</tr>
<tr>
<td>Distance from main road</td>
<td>−0.042</td>
<td>0.031</td>
<td>−0.100</td>
<td>−1.322</td>
<td>0.190</td>
</tr>
<tr>
<td>Whether to participate in the tourism industry</td>
<td>−0.226</td>
<td>0.076</td>
<td>−0.245</td>
<td>−2.989</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Dependent variable: relative poverty vulnerability.

As shown in Table 4, the R² value of this model is 0.639, which means that variables such as gender, age, education level, family size, annual household income, dependency ratio, number of houses owned, distance to main road, and participation in the tourism industry can explain 63.9% of the changes in relative poverty vulnerability. In the model \( F = 13.591 \) and \( p = 0.000 < 0.05 \), the F test is passed; that is, gender, age, education level, family size, annual household income, dependency ratio, number of houses owned, distance from main road, and participation in the tourism industry have an impact on relative poverty vulnerability. All VIF values in the model are less than 5, indicating that the model does not have a collinearity problem. The D-W value is near the number 2, and there is no autocorrelation in the model. There is no correlation between sample data, so the model is good. Specific analysis: The regression coefficient value of “participation in tourism...
industry or not” is −0.226 (t = −2.989 and p = 0.004 < 0.01), indicating that participation in the tourism industry has a significant negative impact on relative poverty vulnerability.

Table 5. Linear regression analysis results of extreme poverty vulnerability.

<table>
<thead>
<tr>
<th></th>
<th>Coef.</th>
<th>Std. Err</th>
<th>Coef. Beta</th>
<th>t</th>
<th>p Value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>−0.345</td>
<td>0.325</td>
<td></td>
<td>−1.061</td>
<td>0.292</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>−0.060</td>
<td>0.062</td>
<td>−0.082</td>
<td>−0.962</td>
<td>0.339</td>
<td>1.189</td>
</tr>
<tr>
<td>Age</td>
<td>0.005</td>
<td>0.005</td>
<td>0.091</td>
<td>1.083</td>
<td>0.283</td>
<td>1.160</td>
</tr>
<tr>
<td>The degree of education</td>
<td>0.020</td>
<td>0.036</td>
<td>0.049</td>
<td>0.555</td>
<td>0.581</td>
<td>1.278</td>
</tr>
<tr>
<td>Family size/person</td>
<td>0.154</td>
<td>0.020</td>
<td>0.789</td>
<td>7.729</td>
<td>0.000</td>
<td>1.721</td>
</tr>
<tr>
<td>The dependency ratio</td>
<td>−0.115</td>
<td>0.020</td>
<td>−0.633</td>
<td>−5.852</td>
<td>0.836</td>
<td>1.933</td>
</tr>
<tr>
<td>Annual household income</td>
<td>−0.019</td>
<td>0.091</td>
<td>−0.018</td>
<td>−0.207</td>
<td>0.000</td>
<td>1.196</td>
</tr>
<tr>
<td>Own housing assets/office</td>
<td>−0.056</td>
<td>0.056</td>
<td>−0.079</td>
<td>−0.986</td>
<td>0.328</td>
<td>1.056</td>
</tr>
<tr>
<td>Distance from main road</td>
<td>0.037</td>
<td>0.026</td>
<td>0.112</td>
<td>1.389</td>
<td>0.169</td>
<td>1.084</td>
</tr>
<tr>
<td>Whether to participate in the tourism industry</td>
<td>0.115</td>
<td>0.063</td>
<td>0.159</td>
<td>1.808</td>
<td>0.075</td>
<td>1.284</td>
</tr>
</tbody>
</table>

Dependent variable: extreme poverty vulnerability.

As shown in Table 5, the R² value of this model is 0.583, which means that variables such as gender, age, education level, family size, annual household income, dependency ratio, number of houses owned, distance from main road, and participation in tourism industry can explain 58.3% of the changes in extreme poverty vulnerability. In the model (F = 10.701 and p = 0.000 < 0.05), all VIF values were less than 5, and D-W values were near the number 2, indicating that the model was good. Specific analysis: The regression coefficient value of “participation in tourism industry or not” is 0.115 (t = 1.808 and p = 0.075 > 0.05), which means that participation in the tourism industry has no influence on extreme poverty vulnerability.

6. Conclusions and Discussion

6.1. Conclusions

The study found that: (1) the development of rural tourism and the increase in the participation of aging farmers can alleviate the poverty vulnerability of aging farmers. The results showed that whether an aging farmer was involved in tourism was not associated with their vulnerability to extreme poverty, but significantly negatively related to their relative poverty vulnerability. Taking the internationally stipulated extreme poverty line as a measure, 7.19% of the aging farmers on Donglu Island may fall into poverty in the future and the development of rural tourism has little effect on poverty prevention, and it is necessary to intervene through other means. However, taking the relative poverty line combined with the actual economic level of the local area as a measure, 32.93% of the aging farmers on Donglu Island may fall into poverty in the future, and the development of rural tourism can effectively reduce the poverty vulnerability of these farmers, reduce the risk of falling into poverty, and prevent them from returning to poverty.

(2) Increasing the annual household income of aging farmers to alleviate the pressure on family size can also reduce the poverty vulnerability of aging farmers. The results showed that, regardless of whether it was the relative poverty vulnerability or absolute poverty vulnerability of aging rural households, family size had a significant positive impact relationship, and annual household income had a significant negative relationship. Among them, family size is significantly positively correlated with poverty vulnerability; that is, the larger the family size, the greater the possibility of aging farmers falling into poverty again, because family size covers two parts: support and maintenance. In addition to the basic expenses of food, clothing, housing, and transportation, raising children requires one to consider the pressure of education, and supporting the elderly requires one to consider health problems, which will increase the possibility of aging farmers returning to poverty.

(3) The poverty vulnerability in this area rises with the increase of the poverty line standard and is highly elastic. According to the poverty line of RMB 3747/year, the number
of vulnerable farmers is only 7.186%; if the poverty line is raised to RMB 8472/year, the number of vulnerable farmers will rise to 32.934%. This data set reflects that, if the poverty line standard is doubled, the proportion of vulnerable farmers who are likely to return to poverty will increase by more than four times. Combined with the actual local economic situation, after raising the poverty line standard, about one-third of the aging farmers face the possibility of returning to poverty.

(4) The poverty vulnerability of aging farmers is mainly low, but under the relative poverty vulnerability line standard, there will be a minimal number of aging farmers in a state of high vulnerability. Under both standards, the low vulnerability rate in the area is far greater than the high vulnerability rate, indicating that, although aging farmers have the risk of returning to poverty, most aging farmers are less likely to fall into poverty in the future, and the number of low-aging farmers who return to poverty in time can be reduced through real-time monitoring and positioning. The tiny number of highly vulnerable aging farmers under the relative poverty vulnerability line standard is incredibly likely to fall into poverty in the future and need long-term attention and support.

6.2. Theoretical Contribution

The unique contribution of this paper is paying attention to the livelihood issues of the elderly group, to prevent or slow down the theoretical research of the elderly group from falling back into poverty with the thinking of “teach a man to fish and you feed him for a lifetime”. Vulnerability is included in the scope of poverty detection and analysis, and the dynamic changes of poverty of aging rural households are monitored in a timely and accurate manner.

It is found that by developing rural tourism and increasing the participation of aging farmers, increasing the annual household income of aging farmers, and alleviating the pressure on family size, the poverty vulnerability of aging farmers can be reduced. This paper found a significant positive correlation between household size and poverty vulnerability, contrary to M Abrarulhaq et al.’s conclusion that household size has a negative impact on participatory poverty [15]. Because M Abrarulhaq et al. argues from a production perspective that increasing productivity can increase the income of all segments of society, and that agricultural occupations and agricultural experience can increase productivity to a certain extent, the more farming households there are with an agricultural occupation and agricultural experience, the lower the probability of poverty. However, this paper assumes the responsibility of raising and supporting families from the perspective of consumption, which is consistent with the conclusion that “migrant households with large family sizes have higher poverty vulnerability” [58] when studying the impact of social capital on the poverty vulnerability of ecological migrants. It is consistent with the following conclusion: “the larger the family size, the greater the number of children under the age of 16, the greater the probability of family poverty and vulnerability” [59].

6.3. Implications

Reduced or increased exposure to risks can lead farmers back into poverty, especially aging farmers. Based on the conclusions of the above dynamic poverty vulnerability simulation study, the following countermeasures for the development of age-appropriate rural tourism to reduce the possibility of rural households falling back into poverty are proposed.

6.3.1. Subdivide Travel-Related Posts Suitable for Aging

With the increase of the age group of farmers, the proportion of wage income in economic resources continues to decrease. On the one hand, due to the increasing age of farmers, their physical strength and energy are gradually unable to meet the needs of the current positions and are dismissed; on the other hand, society’s tolerance for the aging farmer market is small, and thus the elderly are not able to work as they are not provided with suitable job opportunities, so that the wage income of aging farmers has shrunk significantly, and the pressure on the family economy has increased.
In the follow-up development of Donglu Island, the existing products and services can be used to deepen the division of labor and refine jobs to provide space for the aging farmers to switch from heavy physical jobs to light physical jobs in tourism. The position suitable for the aging population can give full play to the characteristics of care and patience in the elderly, so that the elderly group can rely on their characteristics to obtain employment advantages—for example, as silver tour guides, scenic-spot ticket sellers, cultural and creative product sales associates, horticulturists, security guards, inheritors of intangible cultural heritage, folk art performers, historical and cultural interpreters, producers of characteristic traditional food and handicrafts, with experience in production-based native products processing, and other posts.

6.3.2. Help Aging Farmers Increase Income from Property

In the income resources of aging farmers, with the increase in age groups, the proportion of their property income decreased significantly. However, in the course of the survey, 21.52% of rural households owned two or more houses, and 34.18% of farmers expressed their willingness to rent houses to foreign-funded enterprises or village collectives to develop the tourism economy and obtain rent dividends and other property income, but due to the insufficient rental opportunities and lack of bargaining ability of the farmers, often the older farmers tend to choose to give up this part of their stable income.

The village committee can provide special assistance to aging farmers with multiple idle houses in making use of property rights resources: help them learn to improve their ability to protect and use their property rights in the market mechanism, set up special “endorsement” services for them, assist them in directly participating in the negotiation of idle-housing rental or transactions, and realize forms of tourism co-operation such as property rights and equity. While introducing external investment or upgrading the village collective economy to develop the tourism industry, we will reserve space for aging farmers to participate in tourism co-operation through investment and equity participation, providing idle housing to achieve mutual benefits and win–win results between investors and farmers. For example, the children of aging farmers join investment enterprises, accept the assigned jobs, and obtain wages; the farmers join tourism brands, available homestays, and fishers, and obtain income; and the farmers invest money or real estate as equity to participate in the collaborative economy and obtain dividends.

6.3.3. Implement Skills Training for Positions Suitable for Aging

The survey found that 88.61% of the sample households received an education, but only 11.39% at a high-school level or above, or majored in the higher education popularization level, while farmers do not have a high level of education. The aging population lacks opportunity and the ability to come in contact with and accept new things; the current information-age network technology is applied widely. However, in the older group, their mastery of information technology is insufficient; there are often situations where there is a desire to participate in tourism but no ability to do so.

The village committee co-operated with tourism enterprises to carry out skills training for positions suitable for the aging. We must solve the application of the combination of digital, information, intelligence, and other scientific and technological means and tourism services, assist the elderly group with obtaining tourism employment ability, improving work efficiency, and adapting to the development of the times. At the same time, training in non-digital and non-intelligent products and services can be used as an alternative to increase the opportunity for aging farmers to participate in future tourism.

6.3.4. Give Priority in Flexible Employment to Aging

Affected by the local economic development format, farmers “rely on the sea to eat the sea”; every year from late February to June, and August to early December for the sea period, some elderly male farmers will go to the sea to fish. The fishing moratorium period is in June to August, and December to February of the following year; this part of
the farming population has nearly 4 months of a “flexible job selection period” in a year, often through the use of “craftsmanship” skills to carry out odd jobs. External instability will increase the risk of returning to poverty for this part of the farming population.

By the village committee’s “elasticity employment period” temporary jobs, such as in environmental health, storage equipment maintenance, and security and facilities maintenance, interviews, paid surveys, open sea preparation, equipment maintenance, equipment set-up leasing, and as a cruise warden or parking-lot commander, scenic-spot order breaks up the small seasonal elasticity of income. We must give elderly rural households priority in participating in the above temporary work during the “flexible employment period”.

6.3.5. Provide Tourism Internship Opportunities for Aging

The survey found that 45.6% of families have school-age children, of whom 29.11% are in kindergarten or primary school, 17.72% are in middle or high school, and 6.33% have a bachelor’s degree. In the short term, school-age members will bring some economic pressure to the family, slow down the speed of poverty alleviation, and increase the possibility of poverty return. However, in the long run, young people, especially those with higher education, are likely to become a new force for local development, bringing new perspectives and ideas to local development.

In the existing “industry, university, research, and application” base or co-operative project on Donglu Island, the children of aging farmers will be given priority in participating in internship opportunities. To provide education funds for college students with tuition pressure, students can combine their situations to return to their hometown during the holidays to participate in tourism project internships, such as scenic-spot activity planning, scenic-spot network management, and scenic-spot data statistics, to introduce young forces for local development, and at the same time alleviate the tuition pressure of the students, and also to provide opportunities to improve the students’ practical operation ability.

7. Limitations and Future Research

Reduced incomes or increased expenditures are two important reasons that can trigger a return to poverty. Factors that usually reduce farmers’ income include fluctuations in the surrounding resources or environment [60], market or industry fluctuations [61], and changes in farmers’ own or household conditions [62], such as aging, disability, etc.; and factors that lead to increased expenditure include family school-age child support expenses and sick treatment expenses [59].

This paper only focuses on the factor of aging, taking farmers who will turn 60 years old and those who will have turned 60 years old in the next five years as the research object, and focuses on understanding the dynamic changes of poverty by measuring their poverty vulnerability, and constructing a multiple linear regression model to analyze the factors affecting the poverty vulnerability of aging farmers. The impact of other external factors such as resources, environment, market, and industry has not been thoroughly studied, nor has it been performed in the context of disability, child support, and the interaction of multiple internal factors, which may become the follow-up research content of the poverty return warning.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/su15086800/s1, Developing tourism to accelerate poverty alleviation: special interview questionnaire on increasing income and employment.

Author Contributions: Conceptualization, S.G. and N.C.; methodology, S.G. and X.L.; software, X.L.; validation, S.G., N.C. and X.L.; formal analysis, X.L. and Y.W.; investigation, N.C., X.L. and Y.W.; resources, S.G. and N.C.; data curation, X.L.; writing—original draft preparation, S.G., X.L., N.C. and Y.W.; writing—review and editing, S.G., X.L., N.C. and Y.W.; visualization, X.L.; supervision, N.C.; project administration, S.G.; funding acquisition, S.G. All authors have read and agreed to the published version of the manuscript.
References

29. He, L.L.; Zhang, X. Impact of Epidemic Situation in the 21st Century, Global Return to Poverty on a Large Scale and China’s Strategy. Shanghai J. Econ. 2022, 84–102. Available online: https://mp.weixin.qq.com/s?__biz=MzI3ODUwNTYxMA==&mid=2247925387&idx=2&sn=db398af1ff1088e511f19422a029a270f&chksm=eb57d536dce20c27951d9bd017f76c3e98c48db1e91f03e84b6f53ea117b18f6ec9&scene=27 (accessed on 11 March 2023).
41. Karpinska, L.; Smiech, S.; Gouveia, J.; Palma, P. Mapping Regional Vulnerability to Energy Poverty in Poland. Sustainability 2022, 13, 10694. [CrossRef]
51. Yang, G.; Zhou, C.; Zhang, J. Does industry convergence between agriculture and related sectors alleviate rural poverty: Evidence from China. Sustainability 2022, 12, 6138. [CrossRef]
52. Amemiya, T. The maximum likelihood and the nonlinear three-stage least squares estimator in the general nonlinear simultaneous equation model. Econometr. J. Econom. Soc. 1977, 45, 955–968. [CrossRef]


**Disclaimer/Publisher’s Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.