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Research on Regional Differences of the Leisure Agriculture's Impact on Farmers' Income—An Empirical Analysis Based on Nonlinear Threshold Regression

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Abstract: As a large agricultural country and a populous country, the development of agricultural and rural areas is the foundation for China to realize a national rejuvenation. Leisure agriculture is the main carrier of industry integration in China's rural areas and it is an effective means to realize rural revitalization and increase farmers' income. Industry convergence refers to a dynamic development process in which different industries or different areas of the same industry penetrate and intersect each other and finally merge into one, gradually forming a new industry. However, there is no empirical study on the staged impact of rural agriculture on rural household income and regional differences. This article breaks down the action mechanisms, analyzes the linear impact of leisure agriculture on the income of farmers and divides the development types of leisure agriculture according to the characteristics of leisure agriculture development. Using the provincial panel data from 2008 to 2016, the panel dual-threshold regression model was used to verify the regional differences in the impact of leisure agriculture on farmers' income, from the perspective of leisure agriculture on farmers' nominal and actual incomes. Then, the robustness model was used to test leisure agriculture's impact on farmers' income. The results show that the impact of leisure agriculture on the income of farmers is staged. Among them, the impact of leisure agriculture on the nominal income of farmers is an "inverted U-shaped" structure and the impact on actual income is an "N-type" structure. At the same time, the paper also finds that the regional differences in the impact of leisure agriculture on farmers' income are significant and the constraints on the development of leisure agriculture in different regions are different. Based on this, it is proposed that the government should respond to the different development stages of leisure agriculture according to the time, and according to the different development areas of leisure agriculture. Responses should also be based on local conditions, and work to strengthen the participation of farmers.



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Keywords: leisure agriculture; farmer income; impact mechanism; regional difference; threshold regression

1. Introduction

As an agricultural country with a large population, agriculture and rural areas are the foundation of China's economic growth and national rejuvenation. The increase of farmers' income is at the core of the problems concerning agriculture, rural areas and farmers. Against a background of extension from urban leisure consumption and rural functions, leisure agriculture has become an effective path to broaden the channels for farmers to increase their income and to promote farmers to continuously increase their income. The 18th CPC National Congress has put forward the rural revitalization strategy and has included it in the Party Constitution. As a significant starting point for rural revitalization, leisure agriculture is an important means to solve the rural hollowing out, as well as the lack of agricultural industry development power, which can stimulate the endogenous driving force for rural development and realize the prosperity of rural industries. As a new way of agricultural management, leisure agriculture is the main vehicle for the

integration of the three rural industries and the internalization process of agricultural or rural externalities [1,2], which play a significant role in China's rural revitalization and increasing farmers' income. In recent years, leisure agriculture with agritainment (a form of rural households using their own houses, courtyards and cultivated land to provide tourism services such as leisure and sightseeing) and picking gardens as the main body began to have blowout growth, showing a blooming, prosperous scene everywhere. In 2017, the income of national leisure agriculture reached 620 billion Yuan and the number of the operating entities reached 330,000. According to data from the Ministry of Agriculture (unpublished data), in 2017, the number of the leisure agriculture practitioners in 151 leisure agriculture and rural tourism demonstration counties reached 807,300, driving the employment and income of 130,000 farmers. Moreover, the poverty-alleviated population from leisure agriculture reached 350,000. However, behind the expansion of the overall scale is the instability of the farmers' actual benefits. With the expanded scale of leisure agriculture, on the one hand, a large number of farmers directly operate or are employed by leisure agriculture enterprises. On the other hand, the bankruptcy, transfer and the withdrawal of production and business households are no longer individual cases. In addition, the one-size-fits-all leisure agriculture incentive policy has gradually separated from farmers' actual production and operation demands and the policy's stimulus effect has gradually weakened. In this case, how the leisure agriculture affects farmers' benefits, and how to enable leisure agriculture to increase farmers' incomes in a long-term and stable manner, have become problems that urgently need to be solved.

Increasing farmers' income has always been the focus of research on leisure agriculture. Economic conditions are a significant aspect of the five functional activities from "Feasible Ability Theory" proposed by Amartya Sen [3]. An important component of farmers' economic conditions, income is a key factor affecting quality of life and it is the basis for farmers to achieve sustainable development. Leisure agriculture, as a general form of rural tourism, is an effective means to improve farmers' income and achieve regional poverty reduction [4–7]. Income and price levels are important factors that determine the living standard of regional residents, while the existing research on leisure agriculture mainly focuses on the impact of the farmers' nominal income or monetary income [8,9]. The calculation of the farmers' actual income is generally calculated for the nominal income through the purchasing power parity (PPP) index and the price index is utilized as a conversion coefficient to convert nominal income [10,11]. From the perspective of the influence path, the existing research on the impact of leisure agriculture on the farmers' income is mainly divided into two paths. The first research path focuses on the indirect impact of leisure agriculture on farmers' income, holding that leisure agriculture promotes regional economic growth and then benefits local farmers through increasing the government's expenditures to increase local farmers' income. This type of study mainly illustrates the strong correlation between leisure agriculture's development and regional economic growth by verifying the TLG (tour-led growth) hypothesis and explains the impact on farmers' income through the positive correlation between the regional economy and fiscal expenditure [12]. According to the TLG theory, tourism development has a significant role in promoting economic growth and it has a positive impact on economic growth through injecting foreign exchange income, creating job opportunities, guiding external investment, stimulating regional consumption and increasing tax revenue [13]. Due to the impact of the government's expenditure, leisure agriculture has a poor effect on increasing farmers' income and there is some uncertainty about the issue. The second research path mainly focuses on the direct impact of leisure agriculture on farmers' income, which believes that under the background of the large withdrawal from agricultural practitioners and aging, leisure agriculture increases farmers' non-agricultural employment opportunities, strengthens the livelihood capital, improves their livelihood diversity and increases farmers' income [14–16]. This study establishes and explains the paths and frameworks for the impact of leisure agriculture on farmers' income [17]. However, it ignores regional differences and phased impacts in the development process. Deller et al. [18] analyzed the

income impact of leisure agriculture on farmers from the perspective of regional differences and category differences of leisure experience, while it lacked the consideration of the timing level. Although some scholars studied the temporal differences and regional differences of the impact from the perspective of the seasonal characteristics and operating scale differences on leisure agriculture [19,20]; however, they did not consider the staged differences in the development of leisure agriculture. Meanwhile, they ignored the influence of the development area type difference. Through this study, readers will gain a new understanding of the stages and heterogeneity of the impact of leisure agriculture development on regional economy.

What is the mechanism of China’s leisure agriculture on farmers’ income? Are there any stage differences? Is there any difference in the impact of leisure agriculture in different areas on farmers’ income in different regions? This paper analyzes the effect mechanism of leisure agriculture on farmers’ income, establishes a nonlinear model from the impact of leisure agriculture on farmers’ income and tests the stage and regional differences empirically in the impact of the leisure agriculture on farmers’ income.

2. Impact Mechanism and Areas Division

2.1. Function Mechanism of Leisure Agriculture on Farmers’ Income

Blake et al. [17] divided the influence of tourism on farmers’ income from the perspective of tourism economy into three paths: income channels, price channels and government income. On the basis of Blake’s analysis framework, the framework of leisure agriculture development on the farms’ income is established from the perspective of affecting the level of farmers’ income (Figure 1).

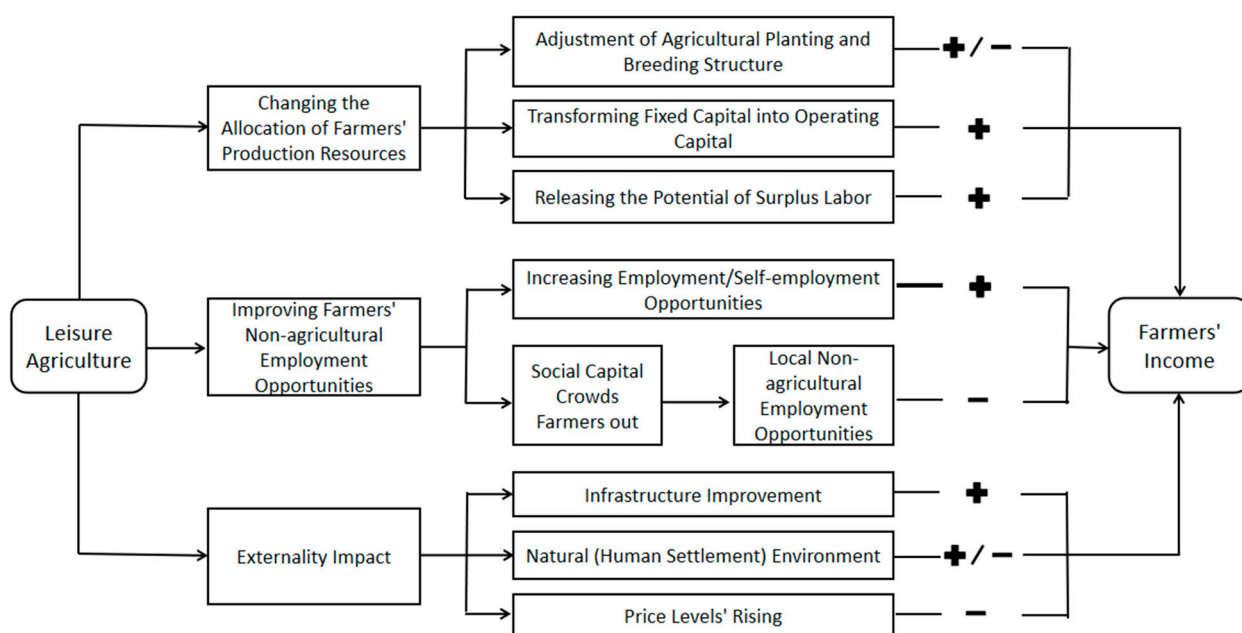


Figure 1. The impact of leisure agriculture’ development on farmers’ income.

The impact of leisure agriculture’s development on farmers’ income can mainly be divided into three aspects, including two internal impact factors (agricultural production and non-agricultural production) and an external environmental factor (externality). The stage differences of different effects lead to the nonlinearity of the overall impact.

(1) Changing the Allocation of farmers’ Production Resources.

The development of leisure agriculture can prompt farmers to change the original planting and breeding structure and change the traditional self-sufficiency or major-commodity agricultural production into the operating commodity planting and breeding. In the case of conforming to the comparative advantage, the structural adjustment can

increase farmers' income. The farmers with more cultivated land tend to flow into the land for large-scale agricultural production, while farmers with less cultivated land tend to plant cash crops [21]. The adjustment direction of the planting structure is different under the above two cases. Meanwhile, due to farmers' weak market analysis ability, the adjustment of the planting and breeding structure makes farmers face higher production risks, which is easy to cause agricultural production to follow the trend, leading to over-supply and production losses. Leisure agriculture enables farmers to transform the fixed family capital such as houses into the operating capital, increasing the capital investment of farmers and heightening the farmers' income. The labor-intensive characteristics of the leisure agriculture has prompted rural surplus labor to turn to the localized agriculture, the agro-products processing industry and the service industry, releasing more family surplus labor and increasing farmers' production input [22].

(2) Improving Farmers' Non-agricultural Employment Opportunities.

The non-agricultural employment can increase farmers' income, while farmers, especially poor farmers, usually have difficulty in entering the non-agricultural niche market with higher profits due to the lack of skills, capital investment and information access [23]. As a new sector, leisure agriculture can provide plentiful employment and self-employment opportunities. On the one hand, leisure agriculture can increase opportunities for farmers to engage in self-employed agritainment and leisure farms through self-employment or other forms; on the other hand, farmers can participate in the employment of the surrounding picking gardens or leisure farms. Some studies believed that although leisure agriculture provides local employment opportunities for young and middle-aged farmers, it also causes a reduction in outbound employment, which reflected for employment replacement rather than creation [24]. For female workers and workers with lack of middle-aged or elderly skills, the localized extension of the industrial chain has brought a large number of employment opportunities and has improved the possibility of local non-agricultural employment. In the process of leisure agriculture's development, with the entry of the external capital, the relevant operators of the local industry chain are easily squeezed out by the external capital in terms of technology and services and the external investment monopolizes tourism resources and agricultural land. This is manifested in the "enclave" and "rural" alienation of the rural tourism and farmers are affected by the external capital. Accordingly, a large number of employment opportunities are occupied by outsiders and local farmers cannot enjoy the fruits of the leisure agriculture's development [25].

(3) Externality Influence on Farmers' Income.

The development of leisure agriculture will bring the improvement of transportation and other infrastructure and improve the livelihood sustainability of the non-participating farmers inside the community [26], which is conducive to the income increase of the non-participating farmers. Leisure agriculture also brings the alienation of "rural nature" when reconstructing the rural living settlements and natural environment. The development of leisure agriculture relies on rural natural scenery, farmland landscape and other resources, which have public goods attributes. Therefore, farmers will not spend money to maintain these resources. With the arrival of tourists, the leisure agriculture scenery has no funds to maintain, the situation will be destroyed. The property attribution of the leisure agriculture resources determine the inevitability of the "public tragedy", leading to the environmental deterioration and the attenuation of the core attractor. The existing tourism studies have analyzed the reduction in the welfare of residents in tourist destinations caused by the tourism industry from the perspective of social welfare [27,28], finding that the development of the tourism industry will increase the regional living cost and reduce the local residents' actual income level. From the perspective of the relative prices, the largest price increase caused by tourism is the commodities consumed by tourists and the tourism-related products and it gradually extends to daily food and other necessities. Therefore, the influence of the price channel will lead to an increase in the price paid by poor households through food [17,29]. The development of leisure agriculture led to the regional inflation, increased local price levels and reduced the income of the local non-participants and low participants.

2.2. Division Methods for Types of Recreational Agriculture Development Areas

The study on the heterogeneity influence of Deller et al. [18] on rural tourism found that there were obvious spatial differences in the influence of the rural tourism on farmers' income. The direct application of the national data as a whole does not reflect the heterogeneity of the impact on farmers' income. However, in the process of the spatial regional division, the traditional Eastern, Central and Western (Northeast) zoning method is mainly based on the regional economic development level and cannot reflect the characteristics of the agricultural dependence and the landscape dependence in the development of the leisure agriculture. Leisure agriculture is the expansion of agriculture-based functions. Meanwhile, as the extension of urban leisure consumption, the development of leisure agriculture is manifested in the consumption-driven characteristics, presenting a distribution pattern of "beside the scenery" and "around the city" [30] and gradually form the characteristics of the scenic dependence and urban dependence.

Industrial regional division is generally based on the industrial development type, development level or comparative advantage, considering nature, economy and society comprehensively [31–33]. As a product of the extension of urban consumption as well as the expansion of agricultural functions, leisure agriculture has a certain dependence on the agricultural industry, the ecological environment and the regional economy. The agricultural industry foundation and ecological resource environment are the original attraction for the development of the leisure agriculture and the regional economic development level and market conditions are the driving force for the development of the leisure agriculture. According to the feature agriculture's industry foundation, ecological resource environment, market conditions and economic development level, leisure agriculture is divided into three types of development areas: urban-dependent, agricultural industry-dependent and natural resource-dependent. Subsequently, they are classified according to the main characteristics of different provinces in China. For the standard of the province division, the city-dependent type mainly refers to the regional division of large cities and economically developed areas by Zhang [34]. The agricultural industry-dependent type is mainly the main grain-producing areas. Due to the intersection of consumption orientation and agricultural resource orientation in Jiangsu, the characteristics of the urbanization and the external capital investment are more obvious and Jiangsu is classified as an urban type. The natural resource-dependent type mainly refers to the division of the ecological fragile areas by the Department of Development Planning, the Ministry of Agriculture. Since Shanxi is dominated by industry and mining, its natural and agricultural resources are underdeveloped and Fujian is rich in agricultural and tourism resources. Hence, Shanxi and Fujian are not classified (Table 1).

The urban-dependent leisure agriculture is mainly driven by urban consumption, which is mainly to meet the consumer demands of urban residents' weekend travel, commercial meetings and health care, with obvious suburban characteristics. The main operating entities of the urban-dependent leisure agriculture are agritainment and modern agricultural science and technology parks. The agritainment owners establish a stable production and consumption relationship with the tourists and the rural agritainments provide tourists with a "second home". In addition, to directly participating in operations, farmers can participate in the production and operation of the leisure agriculture in the form of land or courtyard lease. Restricted by the cost limit of the urban consumption's upgrading and farmers' operation transformation, the farmers' access degree is relatively low. Due to the external capital entry as well as the reconstruction of rural areas, farmers are easy to be squeezed out by social capital and the sustainability of farmers' benefits is poor.

The agricultural industry-dependent leisure agriculture is mainly based on the agricultural industry. Through the adjustment of production structure and courtyard transformation, farmers can realize the effective docking with consumers, taking picking gardens, agritainment and leisure farms as the main operation form. In the process of consumption, tourists participate in the agricultural production link through picking and agricultural

cultural experience, forming a good relationship between food production and consumption as well as leisure consumption. Families occupy more agricultural resources and the cost of farmers' productive structure adjustment and transforming their own courtyards is relatively low. Thus, the farmers' access degree is very high.

Table 1. Development area types of leisure agriculture.

Types of Development Area	Provinces	Feature Agriculture's Industry Basis	Ecological Resources and Environment	Market Condition	Economic Development Level
City-dependent	Beijing, Tianjin, Shanghai, Jiangsu, Zhejiang, Guangdong, Hainan and Chongqing	Medium to Low	Medium	High	High
Agricultural Industry-dependent	Hebei, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Anhui, Jiangxi, Shandong, Henan, Hubei, Hunan, Sichuan and Guizhou	High	Medium	Medium	Medium
Natural Resource-dependent	Guangxi, Guizhou, Yunnan, Tibet, Gansu, Shaanxi, Ningxia, Qinghai and Xinjiang	Medium	High	Low	Low

The natural resource-dependent leisure agriculture mainly relies on rich natural landscape resources and is mainly operated by farmhouses and folk villages. The natural ecological environment in this area is relatively good and there are many natural ecological scenic spots, which are manifested by obvious characteristics of dependence on natural and ecological landscapes. During the operation of the natural leisure agriculture, tourists and farmers mainly establish connections through tour interaction and the connection between each other is very weak. In addition to the direct operation, farmers mainly participate in the way of migrant work. Due to the superior natural resources conditions, localization and original ecological characteristics of farmers' independent operation are more obvious and the cost of the operation and transformation is low. Hence, the access degree of access is moderate. Due to the public goods attributes of natural resources, it is easy to lead to the "tragedy of the common land" in the development process, causing damage to natural resources and affecting the sustainability of farmers' welfare (Table 2).

Table 2. Regional types of leisure agriculture development and farmer income methods.

Types of Development Area	Specific Forms	Connection between Tourists and Farmers	Farmers' Main Income Methods	Farmers' Access
City-dependent	Modern Agricultural Science and Technology Park and Agritainment	"The Second, Home"	Land or Courtyard Lease, Self-management and Non-agricultural Labor	Low
Agricultural Industry-dependent	Picking Garden, Agritainment and Leisure Farm	Production Participation	Self-employment, Agricultural Workers and Non-agricultural Workers	High
Natural Resource-dependent	Agritainment and Folk Village	Tour interaction	Self-management and Agricultural Workers	Medium

3. Materials and Methods

3.1. Model Setting

According to the main factors affecting farmers' income, the basic model affecting their income is established as follows:

$$Y_{it} = \alpha_i + \beta_0 + \beta_1 agat_{it} + \beta_2 inv_{it} + \beta_3 perland_{it} + \beta_4 peredu_{it} + \beta_5 emp_{it} + \beta_6 fin_{it} + u_{it} \quad (1)$$

where the explained variable Y is the farmers' income per capita; $agat$ is an indicator of the development level of leisure agriculture, which is expressed by the proportion of the income from leisure agriculture to the added value of the primary industry; inv is a variable of the rural fixed capital investment; $perland$ is the land index, which is expressed by the ratio of the effective irrigated arable land in rural areas to the rural employees; $peredu$ is the education level of rural residents, which is expressed as the proportion of the rural illiterate population in population over 15 years old; emp is an indicator of rural employees, expressed as the proportion of total rural employees in the rural population; fin refers to the level of the financial supports for agriculture and the expenditure on agriculture, forestry and water affairs in the financial expenditure is adopted as the variable for financial support for agriculture. i is the region, t is the time, u_{it} is the random interference term, α_i , β_0 is the constant term and β is the corresponding coefficient. Among the variables, factors such as labor, land and capital that affect regional economic development and farmers' income are taken as control variables. In addition, in order to eliminate the influence of the government's financial transfer payment on farmers' income, the level of the financial agricultural supports in the model is introduced as the external control variable.

In order to analyze the nonlinear influence of the leisure agriculture's development on farmers' income, on the basis of the threshold regression model proposed by Bruce [35], this paper establishes a model of the impact of the leisure agriculture's development on farmers' income as follows:

$$Y_{it} = \alpha_i + \beta_0 + \beta'_{11} agat_{it} I(agat_{it} \leq q_1) + \beta'_{12} agat_{it} I(q_1 < agat_{it} \leq q_2) + \beta'_{13} agat_{it} I(q_2 < agat_{it}) + \beta_2 inv_{it} + \beta_3 perland_{it} + \beta_4 peredu_{it} + \beta_5 emp_{it} + \beta_6 fin_{it} + u_i + \varepsilon_{it} \quad (2)$$

where, $I(\bullet)$ refers to the index function. When the function in brackets is established, the value of the indicator function is 1. Otherwise, it is 0. q_1 is the first threshold value and q_2 is the second threshold value.

3.2. Data Source

This paper uses the provincial panel data of 30 provinces (cities and autonomous regions) in China from 2008 to 2016 (the data of Tibet are deleted due to missing data on some recreational agriculture). Among them, the income data of provincial leisure agriculture from 2014 to 2016 mainly come from China's Leisure Agriculture Yearbook (2015–2017) and the provincial leisure agriculture data from 2008 to 2013 come from the statistics data of the Ministry of Agriculture. The farmers' nominal income data from 2008 to 2013 come from China's Regional Statistical Yearbook (2009–2014), which is expressed by rural residents' net income per capita. The farmers' nominal income data from 2014 to 2016 come from China's Regional Statistical Yearbook (2015–2017), which is expressed in terms of rural residents' disposable income per capita. The farmer Engel coefficient data come mainly from China's Health Statistics Yearbook (2009–2017). The data of the rural fixed assets investment come from China's Rural Statistical Yearbook (2009–2017). The rural practitioner data from 2008 to 2012 come from China's Rural Statistical Yearbook (2009–2013). The data of the rural employees from 2013 to 2016 use the sum of the number of employees in the primary industry, the number of the rural individual employment and the number of employees in rural private enterprises as the total number of rural employees. The total agricultural output value, the area of the effective irrigated farmland in rural areas and the level of financial support for agriculture are from the National Bureau of Statistics, among which the level of financial supports for agriculture is represented by expenditures on agriculture, forestry and water affairs. The education quality data of labors come from China's Yearbook of Population and Employment Statistics (2009–2017), which are expressed by the proportion of the rural illiterate population over the age of 15.

Due to the inconsistent statistical caliber of the data, the relatively different data are represented by the mean value and the individual missing values are treated by Exponential Smoothing (ES). Descriptive statistical analysis table is shown in Table 3.

Table 3. Variable descriptive statistical analysis table.

Variable Category	Variables	Variable Expression	Mean	Standard Deviation	Minimum	Maximum	Sample Capacity
Dependent Variable	Farmers' Nominal Income	ri	3932.10	224.75	2723.80	25,520.40	270
	Farmers' Engel Coefficient	engle	37.86	6.45	26.50	53.40	270
Core Explanatory Variables/ Threshold Variables	Development Level of Leisure Agriculture	agat	0.06	0.06	0.002	0.40	270
	Rural Fixed Capital Investment	inv	0.20	0.09	0.01	0.46	270
Control Variables	Cultivated Land Area Per Capita	perland	0.95	0.78	0.27	4.02	270
	Educational Level of Rural Residents	peredu	8.54	4.25	2.70	24.80	270
	Number of Rural Employees	emp	0.51	0.24	0.22	2.05	270
	Financial Support for Agriculture	fin	0.37	0.45	0.07	3.42	270

4. Results

4.1. Impact of Leisure Agriculture on Nominal Income

Income is a significant factor that reflects the farmers' living standards. The nominal income is the amount of money obtained by farmers' labor and it is the income under the influence without considering market and external factors. In order to analyze the difference of the impact of the leisure agriculture on farmers' nominal income, the disposable income per capita and the net income per capita are adopted to express the nominal income of the rural residents. STATA13.0 was applied to test the threshold effect and the F value of the model as well as its confidence interval is obtained through the self-sampling method, determining whether the model has a threshold effect (Table 4). From Table 5, we can see as follows: with the development level of leisure agriculture (the proportion of leisure agriculture's income in the primary industry) as the threshold variable, the single threshold effect passed 10% significance level and the double threshold effect passed 1% significance level, so that the double threshold model is selected as the threshold regression model in this paper.

After determining the form of the model, we take the development level of the leisure agriculture (the proportion of the leisure agriculture income in the first industry) as the threshold variable to conduct threshold estimate. As is shown in Table 5 and Figure 2, the estimated results of the first threshold and the second threshold are 0.007 and 0.105, respectively. The first threshold value is within the interval [0.007, 0.144], the second threshold is within the interval [0.011, 0.326]. The likelihood ratio is less than the critical value at the 5% significance level, so that it is within the acceptance interval. Both threshold values are considered equal to the actual threshold value.

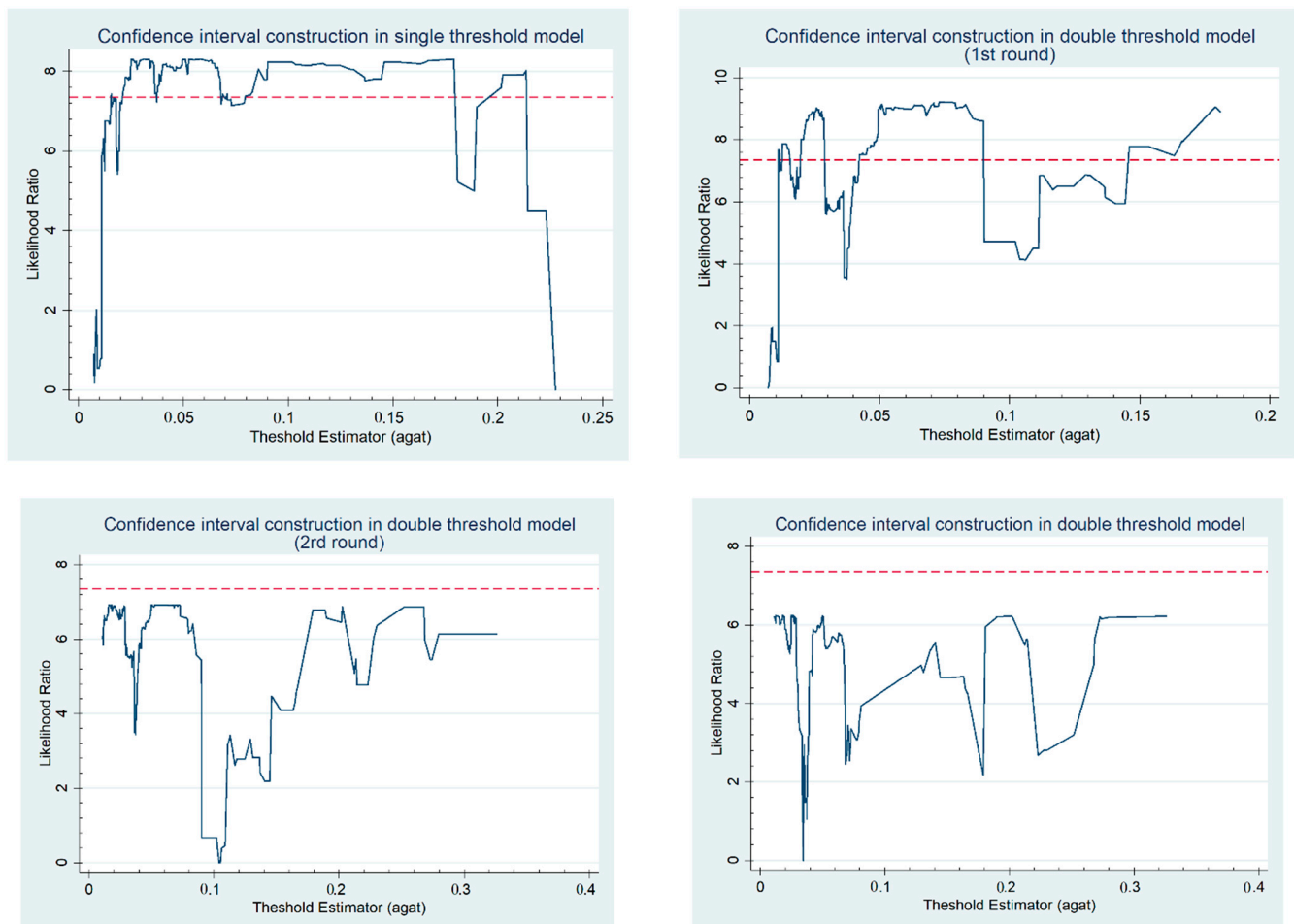
Table 4. Threshold effect test results.

Model	Critical Values					
	F	p-Value	BS-Reps	1%	5%	10%
Single Threshold	8.163 **	0.023	300	9.563	6.899	5.714
Double Threshold	15.565 ***	0.003	300	12.900	5.189	2.164
Triple Threshold	0.000	0.243	300	0.000	0.000	0.000

Notes: *** and ** indicate significant at the level of 0.01 and 0.05.

Table 5. Threshold estimate results.

	Thresholds	95% CI
Single Model(g1)	0.228	[0.007, 0.228]
Double Model		
Ito1 (g1)	0.007	[0.007, 0.144]
Ito2 (g2)	0.105	[0.011, 0.326]
Triple Model(g3)	0.034	[0.011, 0.326]

**Figure 2.** Confidence interval and threshold value graph.

After determining the threshold, we carried out the Hausman test first. The Hausman results revealed that the fixed effect model was more appropriate. In this way, the model of the fixed effect and panel threshold regression were applied to determine the impact of the leisure agriculture on farmers' income across the country and in different regions.

From the national point of view (Table 6), the coefficient of farmers' nominal income is 16.21 and it is significantly under the significant level of 1%, indicating that the development of the leisure agriculture can significantly improve farmers' income. The threshold regression results of the national data indicate that the "inverted U" structure appears between the national leisure agriculture's development and the farmers' nominal income and there is a phased difference in the impact on the farmers' nominal income. In the development level of leisure agriculture is low, i.e., $agat \leq 0.007$, the influence coefficient of the leisure agriculture on farmers' nominal income is 1.08, significantly under the significance level of 10%, indicating that leisure agriculture has a positive impact on the farmers' income-increasing effect when the degree of development is low, while the coefficient is

very small. When the development level of the leisure agriculture reaches a certain stage, i.e., $0.007 < agat \leq 0.105$, the influence coefficient of the leisure agriculture on farmers' nominal income is 3.01, which is significantly under the 5% significance level. Namely, in this case, the development of leisure agriculture can promote the improvement of farmers' nominal income. The coefficient is greater than the first stage coefficient of 1.08, indicating that the role of promotion is enhanced. When the development level of the leisure agriculture is higher ($agat > 0.105$), the influence coefficient of the leisure agriculture on farmers' nominal income is -2.25 , which is significant under 10% significance level. The coefficient is negative, indicating that the development of leisure agriculture has brought the reduction of farmers' nominal income.

From the sub-regional perspective, the panel regression results reveal that the influence coefficients of the leisure agriculture on the nominal income of the urban-dependent, agricultural industry-dependent and natural resource-dependent farmers are 20.00, 27.39 and 13.15, respectively, all of which are significant at the 1% significance level, indicating that the development of the leisure agriculture has significantly increased the nominal income of the urban-dependent, agricultural industry-dependent and natural resource-dependent farmers. However, the coefficient of the agricultural industry-dependent type is greater than that of the urban type, followed by the natural type. The size of the coefficient indicates that the agricultural industry-dependent leisure agriculture has a better effect on increasing farmers' income, while the natural resource-dependent leisure agriculture has less effect on increasing farmers' income than that of the urban type and the industrial type. The threshold regression results further decompose and highlight the influence difference between regions. The impact of the urban-dependent leisure agriculture on farmers' nominal income presents the "inverted U" structure, which is not significant when the development level of the leisure agriculture is low. When the leisure agriculture's development level is $0.007 < agat \leq 0.105$, the coefficient is 4.30, which is greater than the national coefficient of 3.01. When the development level of the leisure agriculture is very high, the coefficient is negative, indicating that the development of the leisure agriculture is not conducive to the increase of farmers' income in the later development of the leisure agriculture. The impact coefficient of the agricultural industry-dependent leisure agriculture on farmers' nominal income has always been positive. Moreover, the stage coefficient of the leisure agriculture's development level is greater than the national coefficient, indicating that the effect of agricultural industry-dependent leisure agriculture on farmers' income improvement is higher than the national average. The natural resource-dependent leisure agriculture presents a "U-type" structure on the farmers' nominal income. In the early stage of development, the coefficient is -3.63 , which is not significant, indicating a negative impact on the farmers' nominal income. When the leisure agriculture's development level is $0.007 < agat \leq 0.105$, the time coefficient is 1.02, which is significant at the 10% significance level, while the coefficient is smaller than the national average, indicating that although there is some promotion, the promotion effect is very small.

Through the analysis on the impact of the control variables, it is found that the rural fixed capital investment has an obvious effect on promoting the agricultural industry-dependent leisure agriculture and the education level of land, rural residents and rural practitioners has a significant influence on the farmers' nominal income. The impact coefficient of the rural residents' education level on urban-dependent farmers' income is greater than that of the industrial type and the natural type. Land has a greater effect on increasing urban-dependent farmers' income than that of the natural resource-dependent type, followed by the agricultural industry-dependent type. The improvement impact of the rural practitioners on the agriculture industry-dependent farmers' income is obvious, indicating that the agricultural industry-dependent type is in lack of personnel. The financial supports for agriculture have an obvious effect on the income of farmers who rely on the agricultural industry.

Table 6. Regression results of leisure agriculture to household nominal income.

Variables	Panel Regression Model				Panel Threshold Regression Model			
	The Whole Country	City-Dependent	Agricultural Industry-Dependent	Natural Resource-Dependent	The Whole Country	City-Dependent	Agricultural Industry-Dependent	Natural Resource-Dependent
Rural Fixed Capital Investment	2.60 (2.15)	4.16 (4.36)	6.96 ** (2.89)	2.51 (2.45)	2.04 (2.32)	7.61 (5.89)	8.65 *** (2.81)	2.09 (2.83)
Cultivated Land Area Per Capita	2646 *** (377.7)	6243 *** (1528)	−268.1 (339.1)	719.1 *** (156.8)	4.395 *** (486.7)	8.39 *** (1868)	1.228 ** (523.6)	5.47 *** (1.31)
Educational Level Of Rural Residents	−135.8 *** (46.75)	−240.7 ** (103.0)	−141.7 ** (59.34)	−119.1 *** (35.09)	−137.6 *** (49.91)	−221.9 * (124.4)	−108.7 (68.68)	9.39 (52.71)
Employed Population Proportion in Rural Areas	9.87 *** (876.8)	6.32 *** (1.72)	13.05 *** (1.22)	9.77 *** (1.05)	9.62 *** (3.06)	7.02 *** (2.28)	11.22 *** (1.24)	6.47 *** (1.77)
Financial Support for Agriculture	568.0 (587.9)	278.0 (1.01)	16.87 *** (2.79)	213.0 (1.19)	1.19 * (641.8)	1.72 (1.27)	21.68 *** (2.71)	7.18 *** (1.47)
Leisure Agriculture's Development Level	16.21 *** (2.57)	20.00 *** (5.83)	27.39 *** (2.32)	13.15 *** (12.67)				
$agat \leq 0.007$					1.08 * (4.66)	2.72 (8.07)	3.50 * (5.01)	−3.63 (26.80)
$0.007 < agat \leq 0.105$					3.01 ** (1.46)	4.30 ** (3.34)	5.12 * (1.57)	1.02 * (2.22)
$agat > 0.105$					−2.25 * (3.10)	−5.69 * (5.17)	1.33 (6.08)	3.12 (4.24)
Constant Term	1.76 ** (888.4)	4.56 ** (1.87)	902.8 (1.01)	−1.26 (883.8)	1.11 (838.4)	5.32 *** (1.94)	−505.20 (1.05)	−6.46 *** (1.21)
Sample Size	270	72	108	72	270	72	108	72
Area Number	30	8	12	8	30	8	12	8

Notes: ***, ** and * indicate that the estimated results are significant at the level of 0.01, 0.05 and 0.1; the numbers in parentheses are standard errors.

4.2. Impact of Leisure Agriculture on Farmers' Actual Income: From the Perspective of Engel Coefficient

As the leisure agriculture operators, farmers can achieve income improvement from leisure agriculture. Meanwhile, farmers are also consumers. The prices of the agricultural and industrial consumption by farmers are affected by the regional price levels and farmers' nominal income cannot reflect the farmers' actual benefits. Although the nominal income can be converted through the purchasing parity index, farmers' dual identity (the producer and consumer) makes the revised price income unable to fully reflect the farmers' actual purchasing ability. As the main indicator of the residents' family consumption structure, the Engel coefficient can reflect farmers' actual family benefits. The less the household income is, the greater the proportion of the family income used to buy food is. With the increase of family income, the proportion of the expenditure used to buy food in the family income will decrease. Further, we include the external influence caused by the development of the leisure agriculture into the model analysis, use the practice of Zhang [36] on the poverty reduction analysis of farmers and adopts the farmer Engel coefficient as the factor variable to analyze and verify the influence of the leisure agriculture on the farmers' actual income from the perspective of Engel coefficient. Engel factor is a significant index to measure residents' living standards. The higher the coefficient is, the lower the farmers' actual income level is. The threshold effect test reveals that the single threshold effect passes the 10% significance level and the double threshold effect passes the 1% significance level (Table 7). Thus, we select the double threshold model as the threshold regression model in this paper.

Table 7. Threshold effect test results.

Model	Critical Values					
	F	p-Value	BS-Reps	1%	5%	10%
Single Threshold	7.780 *	0.077	300	13.531	8.652	6.867
Double Threshold	24.471 ***	0.000	300	14.818	10.445	8.172
Triple Threshold	0.000	0.160	300	0.000	0.000	0.000

Notes: *** and * indicate significant at the level of 0.01, 0.1.

The estimation of the threshold values is shown in Table 8 and Figure 3. The estimated results of the first and second thresholds are 0.037 and 0.104, respectively. The first threshold is within the interval [0.037, 0.045] and the second threshold is within the interval [0.089, 0.104]. The likelihood ratio is less than the critical value at the 5% significance level. Therefore, the two threshold values are considered to be equal to the actual threshold.

After determining the threshold value, we adopt the fixed effect panel regression and threshold regression to determine the impact of the leisure agriculture on farmers' income across the country and sub-regions.

Table 8. Threshold estimation results.

	Thresholds	95% CI
Single Model(g1)	0.105	[0.037, 0.109]
Double Model		
Ito1 (g1)	0.037	[0.037, 0.045]
Ito2 (g2)	0.104	[0.089, 0.104]
Triple Model(g3)	0.064	[0.089, 0.104]

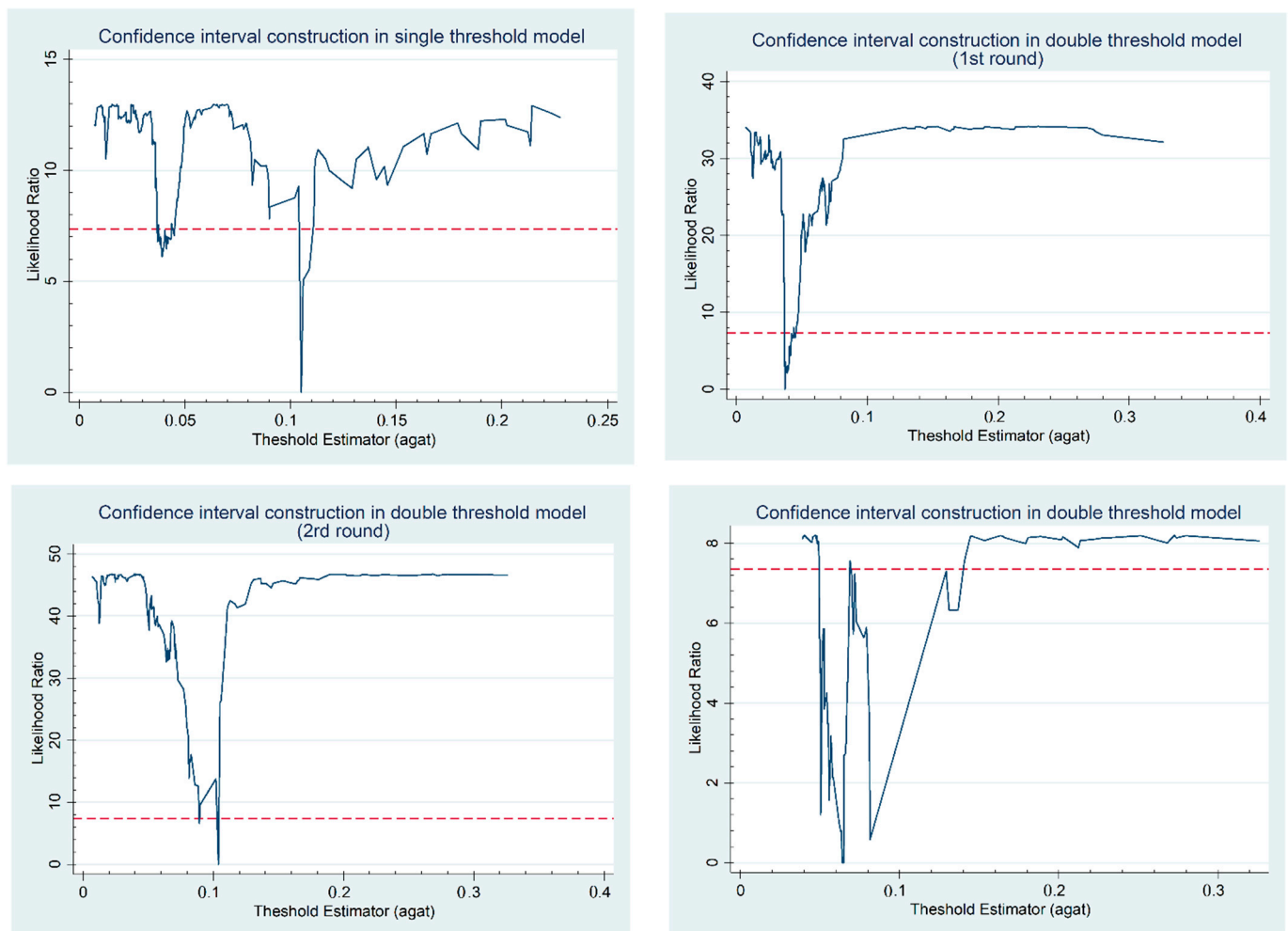


Figure 3. Confidence interval and threshold value graph.

From the national point of view (Table 9), the regression results of the panel regression model reveal that the influence of the leisure agriculture on the regional Engel coefficient is -17.36 , which is significant under 1% significance. Namely, the improvement of the development level of the leisure agriculture can cause the reduction of the farmers' Engel coefficient, which has a positive impact on farmers' income. The threshold regression results indicate that the "N" structure appears between the leisure agriculture's development level and the farmers' Engel coefficient. There are stage differences in the impact on the farmers' actual income, which presents the "inverted N" structure on the farmers' actual income. When the development level of the leisure agriculture is very low ($agat \leq 0.037$), the influence coefficient of the leisure agriculture's development on the Engel coefficient is 6.65, which is significant under the 5% significance level, i.e., the development of leisure agriculture brings the increase of the regional Engel coefficient and reduces the farmers' actual income level to a certain extent. When the development level of the leisure agriculture reaches a certain stage of ($0.037 < agat \leq 0.104$), the influence coefficient of the leisure agriculture's development on the Engel coefficient is -17.42 , which is significant under the 1% significance level, i.e., the development of leisure agriculture can promote the reduction of the Engel coefficient, which is conducive to the increase of the farmers' actual income. When the development level of leisure agriculture is higher ($agat > 0.104$), the influence coefficient of the leisure agriculture's development on the Engel coefficient is 3.58, which is significant at the level of 10% significance. Namely, in this case, the development of the leisure agriculture brings the increase of the regional Engel factor, i.e., the reduction of the farmers' actual income.

Table 9. Regression results of leisure agriculture to peasant households' actual income.

Variables	Panel Regression Model				Panel Threshold Regression Model			
	The Whole Country	City-Dependent	Agricultural Industry-Dependent	Natural Resource-Dependent	The Whole Country	City-Dependent	Agricultural Industry-Dependent	Natural Resource-Dependent
Rural Fixed Capital Investment	−16.89 *** (4.62)	−26.99 *** (4.29)	−18.77 *** (7.19)	−5.84 (7.82)	−13.80 *** (5.21)	−7.58 (8.99)	−20.81 *** (7.73)	−9.53 (8.59)
Cultivated Land Area Per Capita	−5.38 *** (0.75)	−14.55 *** (1.41)	−1.92 * (1.05)	−2.52 * (1.31)	−7.50 *** (1.08)	−12.02 *** (2.74)	−1.80 (1.33)	−4.60 (3.61)
Educational Level Of Rural Residents	0.10 (0.11)	−0.17 (0.18)	−0.10 (0.17)	0.02 (0.136)	0.11 (0.11)	0.05 (0.17)	−0.28 (0.19)	−0.10 (0.15)
Employed Population Proportion in Rural Areas	−14.97 *** (1.89)	−0.92 (2.16)	−20.98 *** (3.11)	−29.14 *** (3.23)	−14.44 *** (2.17)	−3.44 (3.42)	−21.35 *** (3.21)	−26.50 *** (4.95)
Financial Support for Agriculture	3.29 *** (1.26)	−2.90 ** (1.29)	−31.12 *** (6.86)	−9.32 ** (4.51)	2.89 ** (1.43)	−1.32 (1.91)	−39.87 *** (7.42)	−16.68 *** (4.70)
Leisure Agriculture's Development Level	−17.36 *** (5.63)	−17.67 ** (7.54)	−36.82 ** (5.84)	−8.34 * (44.82)				
$agat \leq 0.037$					6.65 ** (4.60)	1.99 (9.43)	8.31 (7.94)	12.80 (15.82)
$0.037 < agat \leq 0.104$					−17.42 *** (3.54)	−18.84 ** (5.34)	−24.89 *** (4.54)	−13.16 ** (6.41)
$agat > 0.104$					3.58 * (6.73)	5.59 (7.72)	−3.21 (16.73)	6.21 (5.41)
Constant Term	52.87 *** (1.79)	58.26 *** (1.77)	59.43 *** (2.83)	62.25 *** (3.42)	52.98 *** (1.88)	48.13 *** (2.70)	62.57 *** (2.88)	66.76 *** (3.65)
Sample Capacity	270	72	108	72	270	72	108	72
Area Number	30	8	12	8	30	8	12	8

Notes: ***, ** and * indicate that the estimated results are significant at the level of 0.01, 0.05 and 0.1; the numbers in parentheses are standard errors.

From the sub-regional perspective, the panel regression results show that there are effect differences in the development of the urban-dependent leisure agriculture, the agricultural industry-dependent leisure agriculture and the natural resource-dependent leisure agriculture on farmers' income. The regression coefficient of the urban-dependent leisure agriculture's development level is -17.67 , which is significant under the 5% significance level; the coefficient of the agricultural industry-dependent leisure agriculture is -36.82 , which is significant at the 5% significance level; the coefficient of the natural resource-dependent leisure agriculture is -8.34 , which is significant under the 10% significance level. The threshold regression results further decompose and highlight the influence difference between regions. When the urban-dependent leisure agriculture's development reaches a certain degree, i.e., $0.037 < agat \leq 0.104$, the coefficient is -18.83 , which is significant under the 5% significance level. The coefficient is negative, indicating that the development of the leisure agriculture improves farmers' actual income. The influence of agricultural industry-dependent leisure agriculture is sustainable. The impact of the agricultural industry-dependent leisure agriculture is continuous. When the development of leisure agriculture reaches a certain level, i.e., $agat > 0.037$, the farmers' actual income in the development of the leisure agriculture has always been negatively affected, while it is not significant when the development level is very high. When the natural resource-dependent leisure agriculture has developed to a certain degree, i.e., $0.037 < agat \leq 0.104$, its impact on farmers' income is significant and the coefficient is negative. However, its coefficient is smaller than the national average and the other two regions.

Through the influence analysis on the control variables, it is found that the rural fixed capital investment on the urban-dependent leisure agriculture and the agricultural industry-dependent leisure agriculture is significantly at the 1% significant level. The regression results of the panel threshold indicate that the land ownership per capita has a significant impact on the actual income of the urban-dependent farmers, with a coefficient of -12.02 , which is significantly under the 1% significance level. The education level of the rural residents is not significant to various areas. The improvement impact of the rural practitioners on the agriculture industry-dependent and the natural resource-dependent farmers' income is obvious, which is significant at the 1% significance level. The level of the financial supports for agriculture does not have a significant impact on the urban-dependent type. However, it has a significant impact on the agricultural industry-dependent type and the natural resource-dependent type at the 1% significance level. Moreover, the absolute value of the coefficient from the agricultural industry-dependent type is greater than that of the natural-dependent type, indicating that the financial supports for agriculture has increased the farmers' actual income in industrial areas more significantly.

4.3. Robustness Test

In order to further explore the difference of the leisure agriculture's development on farmers' actual income, this paper learns from the practice of Zhao [37] on tourism research and adopts the leisure agriculture's income ratio (the ratio of the leisure agriculture to the tourism income, represented as *ppa*) as the threshold variable to analyze the impact of the leisure agriculture on farmers' Engel coefficients under different income's ratio.

The robustness test further shows the nonlinear and "inverted N" structure of the leisure agriculture's development on the farmers' actual income (Table 10). Through the threshold return, we find as follows: when the *ppa* is less than 50.56, it will have a positive impact on the Engel coefficient of the national, urban-dependent, agricultural industry-dependent and natural resource-dependent farmers. Namely, it will cause an increase in residents' Engel coefficient; when the *ppa* is greater than 50.56 and less than 364.83, it will have a negative impact on the Engel coefficient of national, urban-dependent and agricultural industry-dependent farmers. Namely, it will cause a decrease in farmers' Engel coefficient and farmers' actual income; when the *ppa* is greater than 364.83, it will have a

positive impact on the Engel coefficient of national and the agricultural industry-dependent farmers. Namely, it will cause a decrease in farmers' Engel coefficient.

Table 10. Results of robustness regression.

Variables	Panel Threshold Regression Model			
	The Whole Country	City-Dependent	Agricultural Industry-Dependent	Natural Resource-Dependent
Rural Fixed Capital Investment	−14.84 *** (5.16)	7.31 (7.64)	−14.76 (10.17)	−13.10 ** (5.84)
Cultivated Land Area Per Capita	−7.58 *** (1.07)	−10.83 *** (2.63)	−2.18 (1.84)	−2.53 (3.01)
Educational Level of Rural Residents	0.09 (0.11)	0.05 (0.16)	−0.61 * (0.43)	−0.08 (0.17)
Employed Population Proportion in Rural Areas	−13.71 *** (2.16)	−3.57 (3.42)	−23.43 *** (4.27)	−22.16 *** (3.02)
Financial Support for Agriculture	1.92 (1.55)	−1.01 (2.01)	−33.47 *** (8.57)	−16.98 *** (3.69)
ppa ≤ 50.564	14.69 *** (4.62)	3.27 ** (1.18)	199.7 (135.8)	64.89 * (35.67)
50.564 < ppa ≤ 364.827	−2.26 *** (0.96)	−1.65 ** (0.83)	−2.23 ** (1.01)	−4.70 (4.71)
ppa > 364.827	3.52 *** (1.16)	5.46 (9.34)	0.72 ** (0.39)	8.00 (9.92)
Constant Term	53.44 *** (1.88)	44.73 *** (2.47)	66.02 *** (4.29)	60.78 *** (2.19)
Sample Capacity	270	72	108	72
Area Number	30	8	12	8

Notes: ***, ** and * indicate that the estimated results are significant at the level of 0.01, 0.05 and 0.1; the numbers in parentheses are standard errors.

5. Conclusions and Policy Suggestions

5.1. Conclusions

Based on the provincial panel data of 30 provinces (cities and autonomous regions) from 2008 to 2016, we verified the stage characteristics of China's leisure agriculture on farmers' income. Among them, there is a threshold effect on the development level of the leisure agriculture (*agat*) on the farmers' nominal income. Specifically, the development of the leisure agriculture has a positive effect on the farmers' nominal income at first and then has a negative effect, presenting an "inverted U-shaped" structure. It will reach a peak when $agat = 0.105$. Furthermore, after considering the price level, the study on the influence of the Engel coefficient reveals that the influence of the leisure agriculture's development level (*agat*) on the Engel coefficient also has a threshold effect. The development of the leisure agriculture presents an "N-type" impact on the farmers' Engel coefficient, which promotes first and then inhibits and then promotes. $agat = 0.037$ and $agat = 0.104$ are two threshold values. Therefore, in order to promote farmers' continuous income increase and the sustainable growth of leisure agriculture, we should conduct timely policy intervention before the threshold value to make the smooth transition of the leisure agriculture.

The sub-regional research has verified the regional differences of the leisure agriculture on farmers' income. The influence results of the nominal income indicate that the influence of the urban-dependent leisure agriculture on farmers' nominal income presents an "inverted U" structure and the agriculture-dependent leisure agriculture has a positive impact on farmers' nominal incomes. The development of the natural resource-dependent leisure agriculture presents a "U-type" structure for the farmers' nominal income. After the introduction of the external factors such as price level, the influence of the urban-dependent leisure agriculture on farmers' Engel coefficient presents an "N-type" structure; the influence of the agricultural industry-dependent leisure agriculture is sustainable; the influence of the natural resource-dependent leisure agriculture on farmer Engel coefficient presents an "N-type" structure. The difference of this regional influence reflects the heterogeneity characteristics of China's leisure agriculture development and is conducive to understanding the regional differences of the farmers' enthusiasm to participate in leisure agriculture.

The reason why the Chinese government supports the development of leisure agriculture is that it has the potential to improve farmers' income significantly. This paper provides some theoretical basis for promoting the sustainable development of China's leisure agriculture and continuously increasing farmers' income by developing rural tourism and leisure agriculture, which has some practical guiding significance.

However, there are also some aspects to be improved: due to the limited data, it is impossible to separate farmers' benefiting incomes of the leisure agriculture from the total income, which may lead to a high coefficient of the model estimation result; the process of regional division may lead to neglecting the diversity of the leisure agriculture, resulting in the deviation. This is the difficulty of this paper and the area where the future leisure agriculture zoning needs to be further improved. With the maturity of the leisure agriculture industry, the data statistics of the leisure agriculture will be further improved and the mechanism of the leisure agriculture on farmers' income will become the focus of the future research.

5.2. Policy Recommendations

This paper provides an important reference for the government to understand the industrial life cycle of leisure agriculture and to formulate corresponding development strategies for leisure agriculture based on the characteristics of different development stages in different regions.

Firstly, the government should adopt different guiding policies in different periods from the development of the leisure agriculture. In the early stage of the development leisure agriculture's development, the government should carry out normative guidance to improve the accessibility and the leisure agriculture's market intervention to avoid the increase in the farmers' Engel coefficient due to the homogenization and the inflation. When the leisure agriculture develops to a certain stage, the government should conduct the targeted training through establishing cooperatives to improve the service level and professional level of the leisure agriculture. Before the development of leisure agriculture is relatively mature, the government should adopt leasing and land use intervention in advance to prevent farmers from being squeezed out by the external social capital, conduct differential guidance on the basis of maintaining the rural nature and realize the "labor-division symbiosis" and "cooperative symbiosis" of the external capital and the local capital.

Secondly, the government should adopt differentiated policies for different regions to promote farmers' income increase. The leisure agriculture cannot be applied as a general path for all regions to improve farmers' income in all regions and different regions should have targeted industrial introduction and layout. Due to the scarcity of the land, the government should strengthen the difference and quality of our self-owned B&Bs. While carrying out leisure agriculture, the government should strengthen skills training and guidance for people returning home to start businesses, make a targeted application of the financial funds to support agriculture and benefit farmers and form a batch of boutique leisure agricultural attractions. The conditions for the development of the natural resources-dependent leisure agriculture are not mature and the financial supports for agriculture and labor employment level have a great impact on the income increase of the natural resource-dependent farmers. The government can raise farmers' income by strengthening regional exchanges and strengthening infrastructure construction.

Thirdly, the government should strengthen farmers' participation in all development stages of the leisure agriculture. In the early stage of the leisure agriculture's development, we should improve the overall bargaining power and market docking degree through the establishment of cooperatives or enterprises and improve the poor farmers' participation of the leisure agriculture by means of land or housing shares and dividends. When the development of leisure agriculture reaches a certain stage, the government can improve the local employment rate through the professional farmers' skill training. In the mature period

of the leisure agriculture, the government should encourage migrant workers to take leisure agriculture as an opportunity to return to their hometown to start their own businesses.

The policy recommendations put forward in combination with the research conclusions of this article have certain limitations. Since the actual income of leisure agriculture in various regions is not comprehensive, the turning point obtained in this article may have a certain deviation from the turning point in the actual process; although this does not affect the main conclusions obtained, it may render the policy conclusions Imperfect. Nevertheless, for the sake of the rigor of the policy recommendations, the previous policy conclusions mainly put forward policy recommendations on the evolutionary trends and regional differences and did not make more detailed recommendations on the turning points of each region.

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