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Influence of Geographical Elements on Tea Farmers' Participation in Modern Agricultural Value Chain

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Abstract:

China is the largest producer of tea in the world. In recent years, the primary activities and support activities of the Chinese tea value chain have undergone changes, such as the higher demand for raw materials with strict quality standards, the diversification of procurement methods and the cross-regionalization of procurement. Small farmers face more serious difficulties, such as financing problem, production input problem, lack of market information and so on. These problems make it easier for them to be “squeezed out” of the market, and the status of farmers in the market would be lower than before. In this paper, we draw on data from tea farmers in northern, eastern and southern Fujian Province China in July 2017. We found that the participation of tea farmers in the value chain helps to increase their economic performance. And tea farmers participate in different value chain organizations to different extent to their economic performance. Among them, only the participation of tea growers is more conducive to increase their economic performance than joining and setting up the tea value chain organization; tea growers join enterprises more favorably and increase their economic performance than joining cooperatives.

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Key words: Value Chain; Organization Form; Product Characteristics in Thunen Circle

1.Introduction

Value chain organizations take a series of ways to make their products have higher value than ordinary products and market competitiveness, such as production, processing, marketing and other aspects of contractual behavior, vertical integration of productive behavior. In the process of escalating the value chain, major changes have taken place in the forms of various industries, such as the high demands of purchasers on the production of raw materials, the diversification of procurement methods and the cross-regional procurement. On the one hand, these changes improved the competitiveness of products. On the other hand, it also increased the production of the production threshold. The above changes have also had an impact on Chinese agricultural producers. The upgrading of the agricultural product value chain places higher requirements on the input and management of their production. As a result, some small-scale farmers have been "squeezed out" of the market (Reardon Codron,1999). Specifically, in the industries where the value chain is constantly upgrading, farmers face such problems as financing difficulties, large investment in production, and lack of access to market information. In addition, under the influence of human capital and venture capital, peasants have difficulty in sharing the benefits brought about by the upgrading of the value chain (Austin,1981; Swinnen,2007).Existing research suggests that the optimal way for farmers to participate in the upgrading of the value chain is to participate in industrial clusters and cooperatives so as to share the benefits brought by the value chain upgrade and thus avoid "squeezing out" the market (Narro, 2009; Bell, 2009). Such as participating cooperatives (Huang Zuhui, 2007), business (Dong Chong, 2015) and other business

entities.

In addition, the geographical environment not only determines the quality and price of the products, but also affects the decision-making of farmers' production and sales. Among them, the quality and price of agricultural and sideline products in the core area are higher. For example, the core vegetable producing area is Shouguang Village in Shandong Province, China. The core producing areas of tea are Wuyishan, West Lake and Huangshan etc. Although the core area is small, farmers can derive higher profits from them and have the ability to run their own products. The non-core areas are the periphery and remote areas of the core area. The quality and price of the products in this area are lower than those in the core areas, and the farmers in this area can obtain less profits. The non-core area is large in area, but the competitiveness of products is weaker than that of the core area. Therefore, farmers are more likely to solve the problems of production and marketing through cooperation and reduce their costs and increase their income through farmer cooperatives. In summary, geographical environment factors take an important impact on the production and decision-making of farmers.

Therefore, this study draws lessons from the geography division method of Thunen circle and analyzes the influence of farmers participating in the value chain in different regions on their income. Specifically, farmers are divided into two types of participation and non-participation in the value chain organization. Secondly, the farmers participating in the value chain are subdivided. Through analysis, we try to answer the following two questions: Can rural households join the industrial value chain organizations and increase the well-being of rural households? And, what kind of participation decision-making is more beneficial to the farmers to gain benefits in the process of upgrading the product value chain?

2. The literature review

Value chain includes production, processing, marketing and other aspects of a series of processes. Many scholars give attention to the peasants' participation in the transformation of the value chain. Their studies found that peasants faced numerous difficulties in the industry of escalating value chains, such as difficulties in financing, investment in production and lack of access to market information, which made it difficult to share the benefits brought about by the transformation and upgrading. Narrod (2009) and Bell (2009) argue that farmers participate in the value chain upgrade through industrial clusters and cooperatives can share the benefits of upgrading the value chain and thus avoid being "squeezed out" of the market. Relevant scholars represent the following points:

First, the cooperatives have brought more revenue to farmers and shared the benefits brought by the upgrading of the value chain. Huang Zuhui (2007) found that watermelon farmers can effectively reduce transaction costs when they join cooperatives, and help the profits generated from the various links of the value chain stay in the industry so that farmers can share the benefits brought by the upgrade of the value chain and enhance local Watermelon industry competitiveness. Huo Xuexi and Wang Lijia (2013) also come to a similar conclusion in the study of the Apple industry. In addition to the benefits arising from the upgrading of the value chain, the upgrading of farmers' participation in the value chain can also bring them a safe production environment and better products. For example, Hua Hongjuan's study on the involvement of farmers in the grape supply chain shows that farmers participating in supply chain organizations are safer in their production practices (Hua Hongjuan, 2011). However, different cooperatives

have different production, sales and management activities in the basic activities and auxiliary activities in their respective value chains, which lead to great differences among cooperatives and the different effects of increasing farmers' income. For example, Lou Dong (2013) analyzed the competitiveness of cooperatives through different aspects of the cooperative value chain. Cooperatives have more competitive mechanisms such as acquisition mechanism, financial services and technical training. Overall, farmers' participation in farmer cooperatives can increase their income.

Second, enterprises have brought more revenue to farmers and shared the benefits brought by the upgrading of the value chain. In the value chain, there are many kinds of contractual relations, such as contractual relations in order to farming. Liu Fengqin (2003) analyzed the sales contracts of incomplete contracts. Under the circumstances that the products and quantity are clear, the sales of farmers are more secure and the price negotiation is simpler, which in turn reduces the sales risk, price risk and transaction costs of farmers. According to the researches by Goldsmith (1985), Key (1999), Masakure (2005) and Xu Jian (2009), farmers can use the value chain organization to make up for themselves in the market competition while completing the contractual products and quantities. Such as sales of the necessary funds, technology, information and other related services, so as to improve their own product structure farmers, access to higher profits. In addition, Dong Chong (2015) argues that contract farming, a common form of value chain financing, involves farmers, which help to increase farmers' incomes from agriculture and promote factor inputs, and increases the farmers' access to relevant production services. Kong Xiangzhi (2009) that the dairy companies through the signing of the contract with the local milk station to control the raw materials of the product. On the one hand, the milk station promoted the specialized division of labor and improved the production efficiency of the enterprises; on the other hand, the milk station provided the dairy farmers with socialized services such as technical guidance for cultivation, disease prevention and control, feed supply and cash flow, Gain benefits from the value chain upgrade.

Third, farmers set up value chain organizations (enterprises or cooperatives) in order to upgrade the product value chain and thus benefit more from the value chain upgrade. Farmers participate in value chain organizations founded by others. The two sides are mainly business relations, such as labor outsourcing. In the relationship between such contracts, conflicts of interest are prone to occur. Liu Fengqin (2003) argues that each side pursues the maximization of interests and the mismatch of information, and there will be negligent in the contract. Some of negligence can be avoided and the other part is that one side of the contract deliberately does not make the other side aware. In such loopholes in the contract, the phenomenon of peasant household interests is more common. Yuan Peng (2008, 2013) argues that if farmers establish a value chain organization and establish their own independent product supply chain, the space for improving welfare of farmers will be maximized when realizing vertical integration with farmers as the main body. In addition, farmers can join other people's organizations after they start their own businesses or cooperatives. Through the cooperation of both parties, they share the risk and restrain their business activities, which in turn will help to establish a stable quality of agricultural products, extend the industrial chain of agricultural products and share the added value of the agricultural products value chain.

To sum up, scholars use the economic theory derived or empirical methods such as farmers to join or set up a value chain organization in detail demonstrated. However, the above studies did

not consider the impact of natural conditions of the industry on the value chain. Among them, the value chain organizations have different distributions in the "core area" "semi-core area" and "marginal zone", and the options that farmers in the area can participate in participating in the value chain organization are also different. Therefore, this article will combine with the geographical environment to study the value chain in different regions to promote the development of farmers.

3.The model construction and research methods

(1) Hypothesis

According to the characteristics of the product itself, some agricultural products have special requirements for the growth environment, such as temperature, humidity, soil and other special agricultural products such as vegetables, fruits and tea. The natural conditions lead to product quality differences, and this difference is more evident in the special agricultural products. In other words, the quality of the products in some areas is superior to that of the neighboring products under the condition of the same labor force and agricultural inputs. Therefore, this article will be collectively referred to as part of the "core area", with the change of the environment and distinguish between the "semi-core area" and "marginal zone." In the same case of investment, product quality priority order for the core area, semi-core area, the fringe area. This article analyzes the tea industry as follows:

A. Product regional characteristics

(a) Homogeneity

Product homogeneity, refers to the same species, similar quality product features, mainly reflected in the "marginal zone." Analysis of product homogeneity, "marginal zone"> "semi-core area"> "core area". Compared with the "core area" and "semi-core area", the "marginal zone" has a poorer natural environment. Even if more chemical fertilizers and pesticides are put into operation, the quality of the marginal zone will not be able to make up for the difference caused by the natural environment. For example, in the X village, a village where tea is planted in Fujian, local villagers transform paddy or corn into tea plantations with high yield but poor quality. The local "cha cai" does not significantly improve the quality resulting from the improvement of tea making skills.

(b) Heterogeneity

Product heterogeneity, refers to the same variety, product quality characteristics of different products, mainly reflected in the "core area." From product heterogeneity analysis, "core area"> "semi-core area"> "fringe area". In the "core area", differences in the quality of special agricultural products due to environmental differences are even greater. For example, Wu Yishan "three pit two streams"(三坑两涧) in the core, but there still have nuances of the natural environment, which led to greater differences in the quality of the same species, such as Ma Lan pit's (马栏坑) cinnamon is one of the best quality tea in "core area".

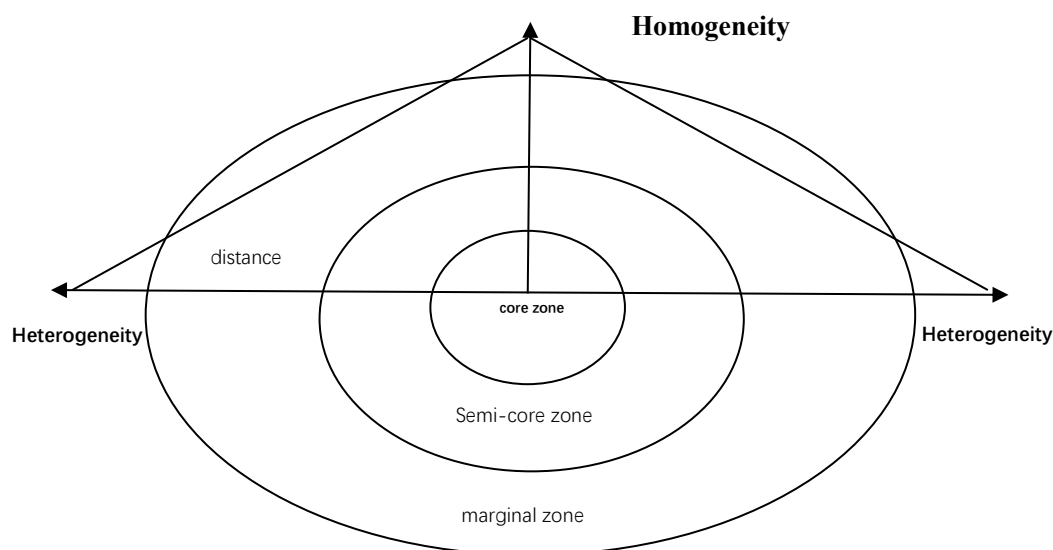


Figure 1 Product Features Thunen Circle

B Regional distribution characteristics of business organizations

The basic demand of peasants to set up cooperatives which can reduce transaction costs, expand sales channels, and obtain product technology and related social services. Combining the characteristics of regional products, products in the "core area" own excellent quality, high price and wide distribution channels. Therefore, farmers who live in the "core area" can solve such problems as sales, technology and financing. The above reasons lead to few "core area" farmers need farmer cooperatives. At the same time, a large number of family-owned processing plants and enterprises are concentrated in the "core area" due to the variety of products.

Farmer who live in the "Semi-core area" can also produce high-quality products, but the price will be lower than the "core area". The quality of products in this part of the region is modest, there is some competition in the market, and the tea leaves in the region have strong homogeneity. Therefore, farmers need to set up management organizations to expand their influence and raise prices. This is mainly reflected in the establishment and development of close and cooperative business organizations, thus avoiding "crowding out" the market, such as farmer cooperatives.

The tea in the "marginal zone" has poor quality, low price and strong homogeneity of products. Therefore, the establishment of cooperatives will be benefit for raising the income of tea. However, because of quality reasons, it is difficult to form a competitive advantage. That is, enterprises and cooperatives are largely unable to promote the development of peasants and avoid being squeezed out of the market, and caused loosely organized organizations.

Table 1 Tissue distribution characteristics

	Core area (Tianxin village)	Semi-core area (Huangbai village)	Marginal zone (Nan'an village)
Close cooperatives	None	Exist	None
Loose cooperatives	None	None	Exist
enterprise	Exist	None	None
Each kind of tea area (mu)	48.64	80.27	92.68

Average price (yuan / kg)	1028.05	218.19	98.58
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Data Source: According to the survey data.

C Research hypothesis

Based on the literature review and the above analysis, this paper proposes the following research hypothesis:

H1: The Import of Value Chain Organization Positively Affects Farmers' Production Performance.

The introduction of value chain organization can effectively increase the income of farmers, such as "farmers + enterprises", "farmers + cooperatives", "farmers + cooperatives + enterprises" and so on.

Farmers seeking income maximization is mainly to increase revenue and reduce costs. On the one hand, the introduction of value chain organizations reduces the transaction costs and production costs of farmers in the distribution of tea leaves. Small farmers in the distribution process can easily cause economic losses due to false information. Through cooperation with tea industry operators, farmers can help farmers identify information such as true and false technologies, markets and production, thus avoiding misjudgment of information and effectively reducing transaction costs. In addition, farmers contract with cooperatives or enterprises also reduce the sales risk of their own products. On the other hand, the value chain organization accumulates a lot of resources, production information and technical skills in its own development process. Through the cooperation with the value chain, farmers have improved the level of production technology and the degree of organization entering the market.

H2: Tea growers only join the value chain organization to better promote their production performance.

The value chain of different organizational models has different impacts on farmers. It is more beneficial to increase their income than joining a founding organization. Although existing scholars think that the establishment of value chain farmers, to achieve vertical integration, extension of agricultural industrial chain, and jump out of the "smile curve" at the bottom. However, founder organization profit margins smaller.

On the one hand, founder organizations face market competition. Compared with the product quality and price in the "core area", "semi-core area" and "fringe area", the price does not have competitive advantages. Therefore, the founding enterprise cannot obtain high profits in the tea sales market and needs to bear higher market risks. In addition, the "core area" is small in size and the company is in a monopoly position. Farmers' founding organizations also cannot gain profit margin. On the other hand, higher agricultural inputs have made farmers look for stable sales channels. Tea is picked only once a year, and planting and management need to use organic pesticides and fertilizers. Farmers in the high capital investment, the need for more stable sales, in order to reduce operational risk. However, when farmers join the value chain, they can effectively reduce their costs and obtain technical and financial support with less risk. Therefore, people who only adding the value chain organization will be more beneficial to their income.

In summary, this paper will use survey data and model analysis to give empirical evidence that tea farmers participate in the impact of value chain organizations on economic performance.

(2) Model

A. Effect evaluation

The purpose of this paper is to analyze the influence of tea farmers participating in the value

chain on their tea income. Assuming that tea farmers' income (Y_i) is a linear function of explanatory variables (X_i) and the willingness of farmers to participate in the value chain (Z_i), the regression equation is assumed to be:

$$Y_i = aX_i + bZ_i + \varepsilon \quad (1)$$

In the above formula, Y_i denotes the income of tea farmers, X_i denotes the variable of exogenous variables that measure the personal characteristics, family characteristics, production and management characteristics of tea farmers, and Z_i denotes the endogenous selection variable. When Z_i is an exogenous variable, it can be analyzed by OLS to get the influence of tea farmers participating in the value chain on their income.

B Sample selection bias and endogenous

(a) Sample selection bias

This paper uses the survey data from non-experimental research. Although 18 villages in Fujian tea production were selected in the actual survey, there is still non-random sample selection, which has selective effect. In order to solve the biased estimation problem caused by the selective bias, this paper uses the treatment-effects model to estimate the influence of tea farmers participating in the value chain on the tea income. In the model processing, the sample selection bias is tested. That is, whether the null hypothesis that rho equals zero will be overthrown.

(b) Endogenous

Whether farmers participate in tea value chain organization or not is a complex decision-making process. Whether or not to participate in the tea value chain organization, can be simply divided into two kinds ($Z_i = 1$) or not ($Z_i = 0$). Assuming that peasants are rational economic persons, the pursuit of maximum benefit and risk neutrality, participation in the value chain of organizational income Z_A^* , does not participate in the value chain organization Z_B^* . As a rational economy, tea farmers choose to participate in the value chain organization when their expected benefits of participation in the value chain are greater than those expected when they do not participate in the value chain. In this way, farmers participate in the value chain organization.

As a variable of farmer's behavior decision-making, whether or not to participate in the value chain organization is caused by a variety of factors, including unobservable factors (such as personal abilities and personality) and observable variables (such as age, number of family labors, family land scale, etc.). In the data model analysis, there is a missing variable, there is an endogenous problem between the variables, that is, OLS data analysis results are biased. Before carrying out the model processing, this paper carried out an endogenous test on whether to participate in the cooperative or the enterprise. The endogenous test was carried out by 2SLS with Hausman test. The Hausman statistic was 1.54, and the P value was 0.21. This variable has endogenous problems. If you use OLS to directly estimate model effects, the resulting estimates will be biased, and instrumental variables are the primary ways to reduce the impact of model endogenous variables on outcomes.

The valid instrumental variables are suitable for this paper need to satisfy two conditions, that is, whether the farmers are involved in the value chain organization, but are not related to the error term. In the existing literature, articles on Neighborhood effects provide ideas for this article. For example, Case et al. (1993) studied the public expenditure of residents in a particular area and found that the public expenditure in the area was positively influenced by the residents in the surrounding areas. Thomas C. Schelling (2005) referred to the herding effect in Micro-motivation

and Macro-behavior. Taking the community segregation as an example, the decision of residents to move their neighbors positively affects residents' decision-making and community separation. In the process, the number of residents moving in the community will become more. Michelson (2017) used panel data and the dynamic random effects model to analyze farmers in the US supermarket supply chain. The article finds whether farmer neighbors supplying goods to supermarkets have a significant positive impact on farmer behavior. In summary, neighbors behavior is suitable as a tool for household / resident behavior. Specifically, this paper uses the behavior of tea farmers 'neighbors involved in the tea value chain as a tool for farmers' behavior. In addition, this article will also test this instrumental variable in empirical analysis.

C Measurement methods

The treatment effect model considers the impact of endogenous selection binary processing on another endogenous variable. Compared with the ordinary least squares model, the propensity matching model and the Heckman two-stage model, the treatment effect model can eliminate the endogenous decision-making end-of-life and the bias of sample selection. Second, we can estimate the marginal effect of farmer's decision on its economic performance (Cong and Drukker , 2000).

In (1), we propose a linear function of farmers' participation in the tea value chain on economic performance. Because of the endogenous nature of the decision-making behavior variables of farmers, the tool of neighbor behavior is introduced into the model. (2), Z_i^* is a linear function of exogenous variables W_i (neighbor behavior) and random perturbation term μ .

$$Z_i^* = cW_i + \mu \quad (2)$$

In addition, the behavioral variables of farmers participating in the value chain are:

$$Z_i = \begin{cases} 1, & \text{if } Z_i^* > 0 \\ 0, & \text{if } Z_i^* \leq 0 \end{cases} \quad (3)$$

(1) and (2) where ε and μ are zero-mean bivariate normal distributions, and the covariance matrix is

$$\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}$$

4.Data Sources, Variable Selection and Descriptive Statistics

(1) Data

The data of this paper is from the research group of July 2017 on the investigation of tea farmers in northern, eastern and southern Fujian and collected 402 rural households in 18 administrative villages. The 18 administrative villages under investigation belonged to the areas where the tea production was more intensive. The local residents mainly cultivated tea with the same types of tea and the same planting patterns. In order to obtain more convincing data, the research team adopted a multi-stage sampling method after three cities were identified. Three towns were selected in each county and three villages were selected for each town. According to the size of the village, a random selection of 20 households around tea farmers as a sample survey. In the early stages of the research, the research team first conducted a questionnaire training for the researchers to ensure that each researcher understood the contents of the questionnaire in a consistent manner. In addition, during the specific survey, the survey will first be handed over to the survey tea farmers, and after full discussion, they will be asked about the specific information of a specific adult family, such as the information of the head of household and their spouse to

ensure the integrity of family information. Finally, according to the research contents and model settings, 381 valid samples are deleted after deleting the data missing samples. The sample efficiency is 94.78%.

(2) Variable Selection

In order to study the influence of tea farmers participating in the value chain on their income, the following variables were selected in the model operation:

A. Dependent variable

The dependent variable is the tea income of tea growers. Increasing the income of peasants is the primary issue and the central task of agriculture and rural work. It is also the starting point and the foothold of agriculture and rural work. Fujian is not suitable for growing crops such as corn, rice and wheat due to natural factors such as climate, soil and terrain. The income from planting tea has become the main source of income for local residents. As a major producer of tea in Fujian Province in China, according to the statistical yearbook statistics, Fujian's green tea output accounted for 79.82% of the national output in 2015, while that of white tea accounted for 81.59% of the national output. Therefore, studying the income of farmers operating tea is a reasonable indicator of the local farmers' income.

B. Endogenous explanatory variables

Endogenous explanatory variables for the farmers involved in the form of tea value chain organization. This article focuses on the tea farmers' participation in the tea value chain's impact on their economic performance. There are two main ways farmers participate in the value chain, joining and setting up value chain organizations. Considering the behavior of farmer households participating in organizations is an endogenous explanatory variable, taking into account the scholars' research on the effect of farmer's neighbor behavior on farmer's behavior, we take the behavior of farmer's neighbors as the explanatory variable of farmer's behavior (David R. Bell, 2007; Michelson, 2017). Therefore, the endogenous explanatory variables are whether the farmer's neighbors join the tea value chain organization, whether the farmer's neighbors set up the tea value chain organization, whether the farmer's neighbors joined and founded the tea value chain organization.

C. Control variables

There are many factors that influence the participation of farmers in the decision-making of organizations in the value chain. In addition to the individual and family characteristics, they also include such factors as the utilization of land resources and planting experience (Liu Tongshan, 2017; Hua Hongjuan, 2011; Zhang Jinhua, 2012). This paper draws on the existing literature, mainly considering the characteristics of farmers, family characteristics, production and management characteristics, age, gender, education time, family labor, whether there is village cadres at home, family tea plantation area, fixed assets investment, home engaged in tea production operating time as a control variable affecting the decision-making of farmers in the value chain.

The specific meaning of variables in the table below. Among them, tea farmers founded and joined the value chain organization in the form of tea enterprises to join others founded their own tea value chain organization, and founded its own tea cooperatives to join others founded tea value chain organization.

Table 2 Definition of variables

variable	Variable Description	Mean	Standard deviation
ln_ tea income	Sales of tea prices * the number of logarithms	11.53	2.20
age	Head of household age (years)	52.66	12.47
education	Head of household years of education (years)	6.73	3.76
Village cadres	Whether there is a village cadres (including former)	0.20	0.40
tea area	Tea planting area (mu)	38.10	100.09
experience	Family members engaged in the longest tea production and management time (years)	25.03	12.86
Fixed assets	unit: yuan	17885	
		2.45	406792.87
Educational experience	Years of education * experience	1365.	
		21	900.85
Family size	The total number of people (people)	4.82	1.89
Labor force	Family labor force (person)	3.18	1.30
Number of tea	Number of households engaged in tea production (person)	2.66	3.17

(3) Descriptive Statistics

Of the 381 valid samples, 197 joined or started the tea value chain organization, accounting for 51.71% of the total sample; 184 households did not join and did not even start the tea value chain organization, accounting for 48.29% of the total sample. Among them, 9.98% of the tea farmers only founded the value chain organization, 23.36% of the tea farmers only joined the tea value chain organization, and 18.37% of the tea farmers founded and joined the tea value chain organization (table 3). As can be observed in the table, regardless of whether the tea growers joined or founded the value chain organization, the logarithm of their incomes was higher than those who did not participate in the value chain. Among them, the average value of the logarithm of income of tea farmers who founded the value chain was the highest of the four groups, accounting for 13.63 logarithmic units, followed by the farmers who founded and joined the value chain.

Table 3 Tea farmers involved in the tea value chain and its relationship to the income logarithm

	Not involved in the organization	Participating organizations	Only join the organization	Join and founder of the organization
Sample size	184	197	89	70
Ln_ tea income	10.39	12.59	11.58	13.31

Table 4 shows the mean value of the two sample sets for tea farmers "joining" and "not joining" tea cooperatives. The comparison shows that the tea farmers who join the tea cooperatives are younger *huzhu* and the longest time their family members are engaged in tea production and management. Elsewhere, tea growers joining tea cooperatives have more years of education, more family tea, more fixed assets in tea, and more families. A simple comparison of

mean values only roughly reflects the difference between two types of samples, with and without tea cooperatives. A more accurate analysis requires the estimation of the treatment effect model. In addition, tea growers join the enterprise, run tea value chain organization in the conclusion similar to the above, only the difference between the data, not described in detail here.

Table 4 Differences in mean values of variables related to the participation of farmers in tea cooperatives

	Not involved in the organization	Participating organizations	Diff	Average
Head of household age	48.44	54.61	-6.17	52.66
Headmaster education	7.82	6.24	1.58	6.73
Village cadres	0.24	0.18	0.06	0.20
Kind of tea area	52.22	31.58	20.64	38.10
experience	24.53	25.26	-0.73	25.03
Fixed assets	242764.03	149467.82	93296.21	178852.45
Educational experience	1214.72	1434.67	-219.95	1365.21
Family size	5.17	4.66	0.51	4.82
Labor force	3.23	3.15	0.08	3.18
Number of tea	2.81	2.60	0.21	2.66

5. Results analysis

With Stata14.0 software, the results of model estimation shown in Table 5 and Table 6 are obtained.

(1) Sample selection bias and endogenous

In the model analysis of tea farmers, rho is significantly negative, ie the null hypothesis of rho = 0 is rejected, indicating that there are significant Treatment Effects. Among them, OLS estimates the result is small, that underestimate the impact of joining the value chain organization on its income. In addition, the instrumental variables of neighbors joining the value chain organization in the two-step estimation of treatment effects are significantly positive, consistent with the conclusions of Michelson and Thomas et al. Above and validated that the variables are suitable as the instrumental variables in this paper. Therefore, it is reasonable to analyze according to the set model. In addition, before carrying out data operations, this paper firstly takes natural logarithms of the income of tea farmers to reduce the heteroscedasticity in model analysis and eliminate the dimension.

(2) Results analysis

A. The influence of tea farmers' behavior which participate in the tea value chain organization on economic performance.

Empirical results of the treatment effect model show that tea farmers participate in the value chain organization is conducive to increasing their tea economic performance. The results of the model estimation show that, under the condition of other conditions being equal, the farmers participating in the value chain organization have higher tea incomes and positively impacting on the 1% level as compared with the tea farmers who are not involved in the value chain organization Tea farmers income. In addition, in the estimation results of some types of farmers' participation in the value chain organization, no matter whether the tea farmers join the tea

cooperatives, the tea enterprises or the value chain organization, the estimated results are positive and significant. The hypothesis 1 proposed in this paper. At the same time, this result also validates the argument of farmers such as Reardon (1999), Narrod (2009) and Bell (2009) that farmers should participate in the value chain to avoid being squeezed out of the market. That is, farmers join the value chain organization, Market costs and risks, and thus expand their own earnings. At the same time, it shows that the tea value chain is similar to the value chains of Chinese watermelons, apples, grapes and other products, that is, the participation of farmers in the value chain helps to improve the well-being of farmers.

B. The influence of tea farmers' behavior which join and establish the value chain of their economic performance.

According to the empirical analysis, tea farmers join the value chain organization is more conducive to improve their economic performance.

As can be seen from Table 4, joining the value chain organization, has a positive impact on the income of tea farmers and is significant at the level of 1%. Tea farmers join the value chain organization can effectively reduce transaction costs, the profits generated by each link in the value chain remain in the industry, thereby enhancing the income of farmers. In addition, the regression results in Table 4 shows that joining and setting up the value chain organization also has a positive impact on the income of tea farmers and is significant at 1%. This result verifies that Yuan Peng (2013) pointed out that peasant households set up an independent industry chain through establishing tea value chain organizations by themselves, getting out of competition with product suppliers at the nodes of the agricultural supply chain and then jumping out of the "Smile curve" at the bottom and expand their own welfare.

Comparing the regression results of the two types of household decision-making under the condition of other variables, the tea farmers who join the tea value chain have a greater influence on the logarithm of their tea income, which confirms the content of H2. Compared to tea growers who only join or do not establish the tea value chain, tea founder organizations need to maintain the stable production of the organization and take more market risks during the operation. In addition, from the perspective of product regions, small farmers face monopolies in the "core area" and face low product quality and low prices in the "semi-core" and "fringe areas". Therefore, after joining the value chain, re-founding enterprises have their own competition. The situation is weak, unable to effectively expand its profit margins. Therefore, as a whole, tea growers join the value chain to a greater extent on their economic performance.

Table 5 Tea farmers involved in the tea value chain organization of the logarithm of the estimated income

	Participating organizations		Only join the organization		Join and founder of the organization	
	OLS	Treatment effects	OLS	Treatment effects	OLS	Treatment effects
ln_tea income	1.342***	2.525***	0.208	4.733***	0.916***	3.199***
age	-6.87	-6.04	-1.08	-3.44	-4.05	-4.14
education	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01
	-0.82	-0.71	-0.97	-0.62	-1.17	-0.96
	0.0724**	0.0713**	0.0985***	0.0911**	0.0919**	0.0885**

	-2.61	-2.74	-3.35	-3.00	-3.18	-3.22
Village cadres	-0.29	-0.35	-0.19	-0.29	-0.19	-0.28
	-1.33	-1.67	-0.77	-1.23	-0.81	-1.28
tea area	0.00568***	0.00554***	0.00647***	0.00605***	0.00582***	0.00562***
	-4.96	-6.56	-4.89	-6.16	-4.54	-6.69
experience	-0.04	-0.04	-0.02	-0.03	-0.03	-0.04
	-1.34	-1.52	-0.74	-0.90	-1.13	-1.30
Fixed ssets	0.0000012***	0.0000013***	0.0000016***	0.0000015***	0.0000013***	0.0000015***
	-4.18	-6.18	-4.59	-6.08	-4.2	-6.9
Educational experience	0.000567	0.000596	0.000289	0.000363	0.000506	0.000553
	-1.11	-1.25	-0.59	-0.66	-1.02	-1.10
Family size	0.172**	0.153**	0.217**	0.188**	0.196**	0.179**
	-2.88	-2.61	-3.32	-2.75	-3.09	-2.91
Labor force	0.162	0.183*	0.168	0.191	0.16	0.179*
	-1.80	-2.15	-1.78	-1.91	-1.73	-1.99
Number of tea	0.04	0.02	0.04	0.02	0.03	0.03
	-0.84	-0.95	-0.78	-0.84	-0.75	-0.98
_cons	9.443***	8.791***	9.593***	8.569***	9.865***	9.395***
	-10.41	-10.11	-10.44	-8.24	-11.02	-10.46
IV		1.219***		0.611***		0.956***
		-8.52		-4.22		-6.01
		-0.854**		-2.759***		-1.421**
hazard lambda		-3.23		-3.42		-3.19
rho		-0.51		-1.00		-0.76

Note: ***, **, *, respectively, at the 0.01,0.05,0.1 significant level.

C Comparison of Economic Performance between Tea Farmers Joining Tea Cooperatives and Enterprise Organizations

According to empirical analysis, tea farmers join tea business organizations more conducive to improving their economic performance.

Based on the above empirical analysis, this paper obtains that tea farmers join the value chain organization more effectively, but there are many types of value chain organizations and can not clarify the driving effect. For example, cooperatives and enterprises can reduce their transaction costs through cooperation with farmers, provide social services to promote the development of farmers. Therefore, this part of the empirical analysis of tea farmers will be divided into the decision-making, that is, distinguish between tea cooperatives and tea enterprises.

According to the regression results in Table 5, the participation of tea farmers in cooperatives and enterprises can promote their development. This result is in line with the previous results, all positively affecting the logarithm of the income of tea at the level of 1%. In the case of controlling other variables, enterprises have a greater effect of boosting farmers' income. Due to the low quality and low prices of tea in the areas where the cooperatives are located ("semi-core" and "fringe area"), the quality of tea in the area where the enterprise is located ("core area") is high and prices are high, farmers sell their own products Businesses can get more profits. Meanwhile,

compared with the cooperatives, the cooperation between enterprises and farmers is closer and the management is more perfect. After they join the enterprises, they can get more technical guidance and information services. Therefore, the effect of tea enterprises on the progress of farmers is even more remarkable.

Table 6 Tea farmers join the tea value chain organization of the logarithm of the estimated income

	Join Cooperatives		Join Enterprise Organizations	
	OLS	Treatment effects	OLS	Treatment effects
	0.42*	2.08***	0.74***	3.93***
ln_ tea income	-2.21	-4.61	-3.61	-4.06
age	-0.01	-0.01	-0.01	-0.01
education	-0.76	-0.61	-0.65	-0.44
	0.10**	0.09**	0.09**	0.09**
Village cadres	-3.17	-3.28	-3.11	-3.16
	-0.19	-0.29	-0.14	-0.25
tea area	-0.79	-1.30	-0.60	-1.14
	0.01***	0.01***	0.01***	0.01***
experience	-4.81	-6.71	-4.84	-6.83
	-0.02	-0.03	-0.01	-0.02
Fixed assets	-0.61	-0.84	-0.51	-0.75
	0.00***	0.00***	0.00***	0.00***
Educational experience	-4.50	-7.10	-4.36	-7.05
	0.00	0.00	0.00	0.00
Family size	-0.54	-0.68	-0.49	-0.63
	0.22**	0.20**	0.22***	0.20**
Labor force	-3.29	-3.15	-3.41	-3.22
	0.15	0.16	0.12	0.15
Number of tea	-1.60	-1.75	-1.29	-1.67
	0.04	0.02	0.04	0.03
_cons	-0.80	-0.91	-0.82	-1.03
	9.35***	8.93***	9.26***	8.48***
IV	10.10	9.68	10.11	8.94
		1.30***		0.73***
		8.87		5.03
hazard lambda		-1.21***		-1.98***
rho		-4.26		-3.47
		-0.66		-0.92

Note: ***, **, *, respectively, at the 0.01,0.05,0.1 significant level.

D Other variables analysis

Among the other control variables, variables such as the age of head of household, village cadres at home, interaction of experience, education and experience, the number of labor in the household and other factors have nothing to do with income, the years of education of head of

household, the area of tea family, the number of family members, fixed assets Logarithmic income of tea farmers had a significant effect. Among them, under the condition of keeping other variables unchanged, the number of family members and the number of years of education of huzhu have a positive impact on the income of tea farmers and are significant at the level of 5%. The family tea plantation area and fixed assets have a positive impact at the level of 1%. This shows that the greater the number of families, the larger the tea plantation area, the higher the cultural level of head of household and the more fixed assets, the more conducive to family production and operation of tea and increase the profit of tea.

6. Conclusions

In this paper, we use the household survey data and the treatment effect model to minimize endogenous problems caused by sample selection bias, and analyze the tea farmers' participation in the tea value chain's impact on their income. The model test shows that if we do not consider the endogeneity of the households that join the value chain, it will lead to sample bias and underestimate the impact of farmers participating in the value chain. According to the regression results, we can get the following conclusions:

First, the participation of tea farmers in the value chain positively affects their economic performance significantly. Among them, the value chain organization can effectively reduce the transaction costs of tea farmers, and the profits generated by each link in the industry, thereby enhancing household income. Second, joining more than just joining and founder of organizations to promote farmer income. Among them, tea farmers only join the organization does not need to bear the external risks, thereby reducing production and operation costs. In addition, small-scale farmers start their own organizations in the product area without any competitive advantage and cannot gain more profit margin. Therefore, adding only more conducive to the development of tea farmers. Finally, for farmers who join the value chain only, the tea enterprises bring more benefit to farmers. Among them, cooperation between enterprises and farmers is more closely and the management is more perfect. After tea farmers join the enterprises, they can obtain more technical guidance and information services. In addition, enterprises are more concentrated in the "core area", tea pricing is higher than in other regions, tea farmers and their cooperation can be more profitable. Thus, tea farmers to join the business more conducive to its increased production performance.

In conclusion, the tea farmers participating in the value chain are the most likely to share the benefits arising from the transformation and upgrading of the value chain. The study of tea and watermelon, apple, grape, ginseng and other products operating characteristics similar to the conclusions of the study is also suitable for the above analysis of agricultural products. Based on the above conclusions, this paper proposes the following policy recommendations. First of all, improve the organization level of farmers in the "semi-core area". In the non-core area, the peasant households are small in scale and diversified in operation. In the transformation of the value chain, the small peasant households are organically connected with the main bodies of new agricultural operations to promote the organization of small peasant households and to achieve the scale of service. Second, give full play to the social organizations of cooperatives and enterprises. Through the provision of technical guidance, information services, agricultural resources services and capital services, the operation of small-scale farmers will be enhanced and the comprehensive competitiveness of the tea industry will be further enhanced. Finally, guide small-scale farmers in

the "marginal zone" to grow reasonably and sustainably. In the marginal zone, the farmland transformed by high-yielding farmers is high in output but low in quality and price. The government should guide small-scale farmers to rationally plant and avoid the blind planting in small-scale farmers' production and operation. In addition, farmers should be encouraged to conduct vertically integrated business models, raise the value of agricultural products, jump out of the bottom of the "smile curve", extend the industrial chain and expand the scope for revenue.

References

- [1] Austin J E. Agri-industrial Project Analysis[M]. Economic Development Institute of the World Bank, 1981.
- [2] Bell D R, Song S. Neighborhood Effects and Trial on the Internet: Evidence from Online Grocery Retailing[J]. Quantitative Marketing and Economics, 2007, 5(4): 361-400.
- [3] Bell S J, Tracey P, Heide J B. The Organization of Regional Clusters[J]. Academy of Management Review, 2009, 34(4): 623-642.
- [4] Cai Rong, Han Hongyun. Behavioral decision-making of peasant households participating in cooperatives and its influencing factors - A case study of apple growers in Shandong [J]. Chinese Rural Observations, 2012 (05): 32-40.
- [5] Case, A. C., Hines, J. R. Jr., & Rosen, H. S. (1993). Budget Spillovers and Fiscal Policy Interdependence: Evidence from the States. Journal of Public Economics, 52(3), 285-307.
- [6] Cong, R., and D. M. Drukker, 2000, "Sg141-Treatment Effects Model", Stata Technical Bulletin, STB-55.
- [7] Dong Zong, Zhong Zhen, Kong Xiangzhi. Research on the Factors Influencing Peasant Cooperatives to Provide Supply Chain Financing - Evidence from Hundreds of Cooperatives [J]. Journal of Rural Economics, 2015 (05): 66-71.
- [8] Du Yintang. Effects of Agricultural Industrialization Management and Peasant Organization Innovation on Farmers' Income [J]. Chinese Rural Observations, 2005 (2): 34-39.
- [9] Gereffi G, Humphrey J, Sturgeon T. The Governance of Global Value Chains[J]. Review of international political economy, 2005, 12(1): 78-104.
- [10] Goldsmith A. The Private Sector and Rural Development: Can Agribusiness Help the Small Farmer?[J]. World Development, 1985, 13(10-11): 1125-1138.
- [11] Hua Hongjuan, Chang Xiangyang. Study on the Impact of Supply Chain Model on the Quality and Safety of Farmers' Production - Based on the Survey of Major Grapevines in Jiangsu Province [J]. Journal of Agricultural Technical Economics, 2011 (09): 108-117.
- [12] Huang Zuhui, Liang Qiao. Collective Action of Small-scale Farmers to Participate in Large Market - A Case Study of Liangyue Watermelon Cooperative in Zhejiang [J]. Agricultural Economy Issues, 2007 (09): 66-71.
- [13] Kaplinsky R, Morris M. A Handbook for Value Chain Research[M]. Ottawa: IDRC, 2001.
- [14] Key N, Runsten D. Contract Farming, Smallholders, and Rural Development in Latin America: the Organization of Agroprocessing Firms and the Scale of Outgrower Production[J]. World development, 1999, 27(2): 381-401.
- [15] Kong Xiangzhi, Zhong Zhen. An Economic Interpretation of Milk Station Quality Control [J]. Agricultural Economics, 2009 (09): 24-29.
- [16] Liu Fengqin. Incomplete contracts and performance barriers - Taking order agriculture as an example [J]. Economic Research, 2003 (04): 22-30.
- [17] Liu Tongshan. Will the farmer contracted to withdraw from the land will affect the grain yield? - Based on the econometric analysis of the treatment effect model [J]. Chinese Rural Economy, 2017 (01): 68-81.
- [18] Lou Dong, Gao Qiang, Kong Xiangzhi. Value Chain Integration and Enhancement of Competitiveness of Farmer Cooperatives - A Survey Based on 138 Farmer Cooperatives [J] 12-20.
- [19] Masakure O, Henson S. Why do Small-scale Producers Choose to Produce Under Contract? Lessons from nontraditional vegetable exports from Zimbabwe[J]. World Development, 2005,

33(10): 1721-1733.

[20] Michelson H C. Influence of Neighbor Experience and Exit on Small Farmer Market Participation[J]. American Journal of Agricultural Economics, 2017: aaw097.

[21] Narrod C, Roy D, Okello J, et al. Public-private Partnerships and Collective Action in High Value Fruit and Vegetable Supply Chains[J]. Food policy, 2009, 34(1): 8-15.

[22] Porter M E. Competitive Advantage: Creating and Sustaining Superior Performance[M]. Simon and Schuster, 2008.

[23] Reardon T, Codron J M, Busch L, et al. Global Change in Agrifood Grades and Standards: Agribusiness Strategic Responses in Developing Countries[J]. The International Food and Agribusiness Management Review, 2000, 2(3): 421-435.

[24] Swinnen J F M, Vandeplas A. Quality, Efficiency Premia, and Development[J]. 2007.

[25] Wang LiJia, Huo Xuexi. Comparative Analysis of Transaction Costs of Members and Non-members in Cooperatives - A Case Study of Shaanxi Apple Growers [J]. Chinese Rural Observer, 2013 (03): 54-64.

[26] Xu Jian, Wang Xuhui. An Empirical Analysis of the Impact of Order Agriculture and Its Organization Patterns on Peasant Household Income [J]. Chinese Rural Economy, 2009 (04): 39-47.

[27] Yuan Peng. Discussion on Farmers' Professional Cooperatives Leading to the Company - A Case Study of Beijing Shengzelin Pear Cooperative [J]. Management World, 2008 (07): 62-69.

[28] Yuan Peng. Four Agricultural Industrialization Models under "Company + Cooperative + Farmers" - From the Perspective of Farmers' Welfare Improvement [J]. China Cooperative Economy, 2013 (7): 13-18.

[29] Zhang Jinhua, Feng Kaiwen, Huang Yingwei. An Empirical Study on Farmers' Professional Cooperatives' Performance to Farmers' Income [J]. Chinese Rural Economy, 2012 (09): 4-12.