RESEARCH-ARTICLE

Study on income increase effect of agricultural production structure adjustment

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Abstract

Abstract: In recent years, with the rapid economic development, in order to help farmers increase their income, China has increased the intensity of agricultural production structure adjustment, but the analysis of the effect of agricultural production structure adjustment on farmers' income increase is not in-depth. In this paper, the regression model is used to analyze the effect of agricultural production structure adjustment on farmers' income. The results show that the adjustment of agricultural production structure in Hubei Province has a positive effect on farmers' income. Therefore, establishing the full coverage system, innovating the development path of the service industry, promoting the modernization of agricultural production, and accelerating the innovation of agricultural science and technology are conducive to increasing farmers' income.

CCS Concepts

• **Applied computing**; • **Computers in other domains**; • **Agriculture**;

Keywords

Rural revitalization, Agricultural production structure, Income-increasing effect

1 Introduction

Agriculture occupies a basic position in the national economy, and the economic development of agriculture and rural areas is of vital importance. Promoting the adjustment of agricultural production structure is an effective way to promote the development of agricultural economy, increase farmers' income and improve farmers' living standards, as well as an important means to promote agricultural modernization and supply-side reform .[1] The structural reform of the agricultural supply side must continuously optimize the structure of agricultural production, the structure of agricultural products industry and the distribution of agricultural productivity, so as to realize the adjustment of the structure of agricultural production, and then effectively promote the growth of agricultural economy, increase farmers' income, and promote the improvement of local residents' living standards .[2] In recent years, Hubei Province has steadily and continuously promoted the rural revitalization strategy, always insisting that "the key to rural revitalization is industrial revitalization", vigorously promoting the prosperous development of rural industries and constantly optimizing the agricultural production structure. Exploring the impact of the adjustment of agricultural industrial structure on the increase of farmers' income in Hubei Province can effectively promote the coordinated and efficient development of various industries and realize the organic unity of economic, social and ecological benefits .[3] Because of the difference of resource endowment in different places, the direction, effect and economic benefit of agricultural industrial structure adjustment are also different. How to use the opportunity of rural revitalization and supply-side reform to promote its own agricultural production structure transformation, promote the rapid development of agricultural economy in Hubei province, farmers efficient and stable increase in income, is the top priority. Based on the actual situation of Hubei Province, this paper analyzes the possibility of adjusting and optimizing the agricultural production structure of Hubei Province and puts forward the optimization path of adjusting the agricultural production structure of Hubei province and the countermeasures of adjusting the agricultural production structure and increasing farmers' income. On the one hand, it is helpful to improve one's own knowledge reserve, consolidate the learned knowledge and perfect the knowledge base; On the other hand, the author analyzed the agricultural production structure of Hubei province with what he had learned, proposed optimization methods to adjust the agricultural production structure of Hubei Province, and made use of what he had learned to serve the economic and social development. Therefore, it is of practical significance to study the income increase effect of agricultural production structure adjustment in Hubei province under the background of rural revitalization.

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2 Factors affecting agricultural production structure and farmers' income

2.1 Factors affecting agricultural production structure

2.1.1 Natural condition. Agriculture has a strong dependence on natural resources and is easily affected by ecological environment. Natural conditions such as soil, water, climate and landform vary significantly in different regions.[4] Therefore, the agricultural industrial structure in different provinces needs to be adjusted accordingly to adapt to local environmental development. The diversified natural conditions directly affect the leading industries in the region and have a certain influence on the adjustment of agricultural industry structure. At the same time, the quality difference of natural resources in the region will also affect the development process of agricultural modernization. Therefore, the difference of natural conditions affects the process of adjustment of agricultural industrial structure, determines the focus of local agricultural management, and forms the agricultural production structure with different characteristics in different regions.

2.1.2 Natural condition. Residents' market demand for different agricultural products can continuously improve the existing agricultural production structure and promote the sustainable and stable development of agriculture.[5] For example, the eating habits of the north and the south are different, and the market demand is different, thus forming different agricultural industrial structures. With the change of people's preferences, the market supply has also changed, and the agricultural production structure has gradually optimized and adjusted. At the same time, with the rapid development of transportation and the improvement of logistics and transportation level, the agricultural production structure of each region is more able to produce agricultural products with comparative advantages according to the local resource endowment, and keep up with the changing market demand, so as to constantly improve the existing regional agricultural industrial structure to meet the series of demands put forward by the market and increase the income of local farmers.

2.2 Factors affecting farmers' income

2.2.1 Natural environment. In the process of agricultural production, most farmers still "rely on the sky to eat", agriculture has the characteristics of weak quality, and depends on the market, policy, natural conditions and other factors .[6] When the weather is poor and rainy, the crop yields are low or even difficult to survive. Farmers plant limited varieties on limited land, resulting in low income of farmers, and at the same time, they also need to invest funds such as pesticides, fertilizers and seeds to plant crops in the early stage, making farmers prone to debt. Secondly, the natural conditions are poor, if located in the mountainous area, the road is rugged, the transportation is inconvenient, even if the market demand for products is not easy to transport to the demand for products, it takes a long time, and most of the agricultural products are very perishable in the transportation process, which greatly affects the income of farmers. Therefore, the natural environment has a great impact on farmers' income.
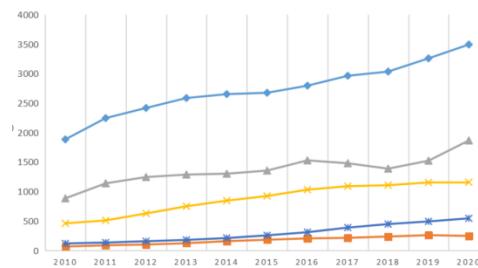

Figure 1: 2010-2020 Output value of agriculture, forestry, husbandry and fishery service industry in Hubei Province

2.2.2 Market factor. The supply and demand of certain agricultural products in the market will directly affect the price change of the agricultural products.[7] Therefore, it is necessary to measure the local industrial structure development according to the transportation cost and market demand intensity between different regions, and whether to focus on the development of local markets or foreign markets, so as to adjust the local agricultural industrial structure and optimize the scale and quality of regional agricultural development. Generally speaking, if the supply of the same agricultural product is in excess under other conditions, the price of the product will decline, and the income of farmers will also decline. Otherwise, it goes up.[8] Therefore, when developing agricultural planting industry, agricultural producers should always accurately grasp the changing trend of market supply and demand and adjust and improve the existing local agricultural production structure accordingly to meet the market changes and increase farmers' income.

3 Analysis on the present situation of agricultural production structure and farmers' income in Hubei Province

3.1 Present situation of agricultural production structure development

Since 2003, China has implemented a new classification standard for national economic industries, and the total output value of agriculture, forestry, animal husbandry and fishery includes the output value of agriculture, forestry, animal husbandry and fishery services. In view of the limited data, the study data in this paper is 2010-2020.

As can be seen from Figure 1, the development of agricultural production structure in Hubei Province is relatively balanced. Planting industry accounted for the largest proportion and continued to grow; Animal husbandry increased in 2018 after a decline in 2016; The fishery industry has been growing steadily, bringing remarkable economic benefits to Hubei Province. Services and forestry developed more slowly and had a weaker effect on farmers' income.

3.2 Current situation of farmers' income in Hubei Province

Considering the availability of data, the per capita disposable income of farmers from 2010 to 2020 is selected as an indicator of farmers' income level. Farmers' income mainly includes wage net

Table 1: Lists the variables

Variable type	Variable name	Variable symbolic representation
Explained variable	Per capita net income of farmers	IN
Explanatory variable	Output value of planting	FA
	Forestry output value	FO
	Output value of animal husbandry	ST
	Fishery output value	FI
	Output value of agriculture, forestry, animal husbandry and fishery services	SE
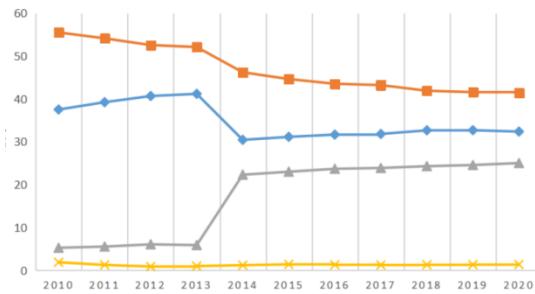
Figure 2: 2010-2020 The proportion of per capita disposable income of farmers

income, operation net income, transfer net income and property net income.

As can be seen from Figure 2, wage income and household operation net income are still the main income increase in farmers' per capita disposable income, but their proportion is gradually decreasing, while the transfer net income is gradually increasing. From 2010 to 2013, with the development of non-agricultural employment and urbanization, the wage income of farmers increased, and its contribution to farmers' income gradually increased, while the contribution of net household income, as the most basic source of rural income, declined. After 2013, the state continued to implement the policy of strengthening agriculture and benefiting farmers, which promoted the continuous rise of farmers' transfer income. The overall contribution of property income continues to rise and shows small fluctuations.

4 An empirical analysis of the effect of farmers' income increase on the adjustment of agricultural production structure in Hubei Province

4.1 Index selection and data processing

4.1.1 Index selection. In the selection of sample data set, according to the availability and timeliness of the data, and to avoid problems such as intercept and breakpoint of the sample interval, the sample interval was finally determined to be 2010-2020, in which the selected variable indicator data were mainly from the Hubei Statistical Yearbook from 2010-2020.The sample objects include relevant index data of independent samples of 17 municipal units under the jurisdiction of Hubei Province.[9] The per capita net income of farmers IN Hubei Province and the total output value of agriculture (planting industry), forestry, animal husbandry, fishery and service industry is recorded as in, FA, FO, ST, FI and SE respectively.

Set as follows:

(1)Explained variable:The per capita net income of farmers was selected as the explained variable (IN)

(2)Explanatory variable:According to the research content of this paper, the following indicators are selected as explanatory variables of agricultural industrial structure adjustment:①Output value of planting(FA)、②Forestry output value(FO)、③Output value of animal husbandry(ST)、④Fishery output value(FI)、⑤Output value of agriculture, forestry, animal husbandry and fishery services(SE).

4.1.2 Data processing. Considering the volatility and stationarity of variable indicators, it is necessary to divide the above variable series and take the natural pair number to improve the effectiveness of the estimated results, which are recorded as LIN, LFA, LFO and LSE respectively .[10] The empirical analysis in this paper is mainly done by using Eviews10.0 software.

According to the descriptive statistical analysis results of variables in Table 2, the average per capita income of farmers in 17 cities in Hubei Province during the sample period (2010-2020) is 12095.53, and the standard deviation is 4679.259, indicating that the per capita net income of farmers in Hubei Province is relatively balanced on the whole, and the income difference among individuals is at an upper medium level. Plantation industry occupies the largest proportion in the whole agricultural industry structure in Hubei province, and its average value is 158.5567, indicating that plantation industry is still the main industry in the agricultural industry in Hubei Province. The lowest proportion is forestry, with an average of 9.285615.

4.2 Model construction

The panel data model can provide dynamic information of two dimensions, time and cross-section, which can make the sample size larger and improve the accuracy of estimation.[11] Therefore, the panel data model is selected for research. Based on this, in order to investigate whether there is heterogeneity among the municipal units under the jurisdiction of Hubei Province and the differences among the municipal units, this paper collected relevant index data of 17 independent samples of Wuhan, Jingzhou, Jingmen and other cities under the jurisdiction of Hubei Province, and established the panel regression model as follows:

$$IN_i = \alpha_0 + \alpha_1 FA_i + \alpha_2 FO_i + \alpha_3 ST_1 + \alpha_4 FI_i + \alpha_5 SE_i + \beta t + \omega_i$$

Table 2: Descriptive statistics

variable	Observed number	Mean value	median	Maximum value	Minimum value	Standard deviation	skewness	kurtosis
IN	187	12095.53	11887	24776	3255	4679.259	0.2139	2.259128
FA	187	158.5567	144.98	465.35	1.68	115.3533	0.651315	2.478571
FO	187	9.285615	6.92	134	0.09	12.18388	6.121387	60.17788
ST	187	93.83979	79.34	345.11	0.77	73.69818	1.15364	4.146407
FI	187	53.1677	45.33	241.25	0.01	47.84421	1.866408	7.444216
SE	187	14.15513	7.63	77.8	0.03	17.04982	1.550891	4.519948

Table 3: Results of regression model selection

	F test	p-value	LR test	p-value	Hausman test	p-value
Test result	34.707727	0.0000	275.592210	0.0000	185.808082	0.0000

Table 4: Correlation analysis

	LNIN	LNFA	LNFO	ST	FI	SE
LNIN	1					
LNFA	0.301673	1				
LNFO	0.322218	0.791706	1			
ST	0.167565	0.717049	0.575961	1		
FI	0.461326	0.423823	0.311093	0.262074	1	
SE	0.621421	0.855676	0.708800	0.623045	0.495595	1

Firstly, independent regression is carried out on the five core explanatory variables of the proportion of output value of farming industry, animal husbandry, fishery, forestry, agriculture, forestry, animal husbandry and fishery service industry in total household income respectively. Finally, five variables are added into the same model for total regression. Therefore, according to formula, a total of 6 panel regression models are derived..

4.3 Regression model selection and estimation

In order to select the appropriate form of the panel data model for this paper, the corresponding test of the panel data model is carried out in Table 3. The null hypotheses of F test and LR test are compared with the fixed effects model, the mixed effects model is more effective; Hausman tests the null hypothesis that the random effects model is more efficient than the fixed effects model.[12] The test results are shown in the table 3 below

As can be seen from Table 3, the corresponding P-values of F test, LR test and Hausman test are all less than 0.05, and the null hypothesis is rejected at the 10% level. To sum up, panel data regression model chooses fixed effects model.

4.4 Panel regression analysis and empirical results

4.4.1 Correlation analysis. As can be seen from Table 4, there is a significant correlation among variables, but the overall correlation coefficient is basically below 0.8, which can initially eliminate the interference of multicollinearity among variables. In addition, the correlation coefficients between the variables are all positive, indicating that there is a significant positive promoting effect between the selected variables.

4.4.2 Panel regression result. According to the regression results in Table 5, all factors of agricultural production structure have a significant impact on farmers' income, and the model coefficients in the independent regression analysis are all positive and are significant at least at the 10% level. The promotion effect of fishery income and animal husbandry income is relatively low, only 0.019 percentage points and 0.006 percentage points. Therefore, in the actual adjustment of agricultural industrial structure, from the perspective of promoting the improvement of farmers' income level, we should first pay attention to the adjustment of the internal structure of planting industry and increase the proportion of cash crops in farmers' total income to increase farmers' income. At the same time, protection measures such as returning farmland to forest should be taken to speed up forestry development. Finally, vigorously promote the integration of the service industry and other industries, and constantly extend and expand the industrial chain, to help farmers obtain higher incomes.

Acknowledgments

Table 5: Panel regression results

variable	(1)	(2)	(3)	(4)	(5)	(6)
LNFA	1.655***					0.757***
	(33.805)					(9.798)
LNFO		0.504***				0.106 ***
		(22.660)				(4.652)
ST			0.006***			0.001***
			(5.556)			(3.411)
FI				0.019***		0.004***
				(28.657)		(6.407)
LNSE					0.334***	0.092***
					(26.446)	(6.296)
Constant term	1.653**	8.503***	8.718	8.295	8.752	5.113***
	(7.285)	(221.162)	(0.111)	(221.993)	(356.176)	(16.564)
Adjust R2	0.884	0.821	0.335	0.848	0.841	0.933

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