ISSN: 2710-0723

Research on the Optimization Path of Agricultural Factor Endowment Structure under the Perspective of Rural Revitalization

Hao Meng[a], Xiwang Chen, Kejia Li, Deyu Li[b, *]

School of Economics, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China

[a]mh010913@163.com, [b, *]ldy0048@163.com

Abstract

The strategy of rural revitalization is to adhere to the priority development of agriculture and rural areas, further adjust the urban-rural relationship between agriculture and industry, and accelerate the development of agriculture and rural economy, while optimizing the structure of China's agricultural factor endowment is the key to achieve rapid agricultural development and rural revitalization. Through the perspective of new structural economics, this paper discusses the relationship between agricultural factor endowment structure and agricultural institutional arrangement, agricultural industrialization and upgrading of agricultural factor endowment structure, as well as changes in agricultural factor prices and changes in agricultural factor inputs, and specifically researches how to optimize the existing structure of agricultural factor endowment and puts forward relevant suggestions.

Keywords

Rural Revitalization; Agriculture; Factor Endowment; New Structural Economics.

1. Introduction

The rural revitalization strategy is an important strategy for China in the new era, aiming to achieve agricultural modernization, rural industrial revitalization, increased incomes for farmers and progress in rural society and civilization. In the context of rural revitalization, optimizing the structure of China's agricultural factor endowment is one of the keys to achieving agricultural modernization and rural revitalization.

Agricultural factor endowment structure refers to the combination and allocation of factors such as land, labor, capital and technology in agricultural production. In past studies, scholars have extensively discussed and studied the agricultural factor endowment structure. Justin Yifu Lin (2017) takes the factor endowment structure as the entry point of the new structural economics, and he argues that the factor endowment structure changes over time and has a certain impact on productivity[1]; Hu Ruifa and Huang Ji-kun (2001) suggest that factor inputs can be used to measure the trend of technological progress and development to a certain extent, and that the future development of agriculture depends on the changes in the structure of the factor endowment in agriculture[2]; Tian Tian and Yang Gangqiao (2013) showed that factors such as labor price, capital price, farmers' resource endowment and cultivated land improvement have a significant impact on farmers' agricultural machinery use behavior[3]; Xue Chao and Zhou Hong (2019), by measuring the coupling and coordination between agricultural technology progress preferences and agricultural factor endowment structure, found that the degree of inter-regional coupling is very low, which reflects the incompatibility between agricultural technology progress preferences and agricultural factor structure[4]; Lv

ISSN: 2710-0723

Ming, Tang Ji et al. (2021) and others found that land endowment has a significant effect on food production capacity[5].

The transformation from the traditional agricultural factor endowment structure to the modern agricultural factor endowment structure is not only affected by market demand, policy guidance, technological progress and other factors, but also by agricultural institutional arrangements. In the context of rural revitalization, how to optimize the agricultural factor endowment structure has become one of the focuses of current research. This thesis will explore the path of optimizing the structure of agricultural factor endowment in China from the perspective of new structural economics.

2. Insights from New Structural Economics: The Structure of Agricultural Factor Endowments and Institutional Arrangements in Agriculture

New structural economics is an economic theory proposed by Chinese economist Justin Yifu Lin to explain the mechanism and path of economic growth in developing countries. In the perspective of new structural economics, agriculture, as an important part of the economy of developing countries, its factor endowment structure and agricultural institutional arrangement have an important impact on economic development. This paper will explore the relationship between the structure of agricultural factor endowments and agricultural institutional arrangements from the perspective of new structural economics, and explore how to promote agricultural modernization and rural revitalization by optimizing these factors.

The new structural economics has opened up a new perspective for us to understand the relationship between the structure of agricultural factor endowments and the institutional arrangements in agriculture. The new structural economics emphasizes the important impact of institutional arrangements on resource allocation and economic growth, and believes that the optimization of the structure of agricultural factor endowments needs to be achieved by reforming agricultural institutions. Agricultural institutional arrangements include the land system, the rural financial system, and the rural land transfer system. These institutional arrangements play a crucial role in the formation and optimization of the agricultural factor endowment structure.

According to the revelations of new structural economics, the structure of factor endowments in a country or region will determine the comparative advantage of its industries. Only industries that follow their comparative advantages can gain competitiveness and maximize economic surplus. Therefore, the optimization of factor endowment structure is crucial for enhancing agricultural competitiveness and promoting rural economic development. At the same time, agricultural institutional arrangements have an important impact on the operating mechanism of the factor market and resource allocation, and are one of the key factors in agricultural modernization and rural revitalization. In order to optimize the structure of agricultural factor endowment, it is necessary to start from several aspects. First, it is necessary to increase investment in agricultural science and technology and improve the technical level of agricultural production in order to increase the productivity of land, labor and capital. Second, it is necessary to reform and improve the rural financial system to solve the problem of capital shortage in agricultural production and promote the upgrading of the structure of agricultural factor endowment. In addition, promoting the transfer of rural land, optimizing the allocation of land resources, and improving the flexibility and adaptability of the agricultural factor endowment structure is also an important step. In addition, it is equally important to improve the agricultural insurance system to reduce the risk of agricultural production and promote the stability and sustainable development of the agricultural factor endowment structure. The optimization of agricultural institutional arrangements is equally crucial. It needs to be realized by reforming the land system, improving the rural financial system, and promoting the transfer

ISSN: 2710-0723

of rural land. In addition, it is important to establish a sound market system for agricultural products and promote the marketization of the price formation mechanism for agricultural products, so as to provide more effective price signals for agricultural factors, thereby guiding agricultural production in the direction of greater sensitivity to market demand and efficiency.

New structural economics provides us with a new perspective to understand the relationship between the structure of agricultural factor endowments and agricultural institutional arrangements. By optimizing the structure of agricultural factor endowments and agricultural institutional arrangements, it is possible to promote agricultural modernization and rural revitalization, improve agricultural competitiveness and farmers' incomes, and achieve sustainable development of the rural economy.

3. Agro-industrialization based on Structural Upgrading of Agricultural Factor Endowments

In the context of rural revitalization, agro-industrialization is one of the key paths to achieving agricultural modernization and rural revitalization. The process of agricultural industrialization includes both the upgrading of the structure of agricultural factor endowments and the evolution of agricultural institutional arrangements. The upgrading of the structure of agricultural factor endowments needs to be realized by means of technological progress, capital investment and human resources training.

This paper divides China's industrialization into labor-intensive, land-intensive, capital-intensive and technology-intensive periods. The four periods of agricultural industrialization development are all based on the enhancement of factor endowment structure. Except for the New World, most countries and regions are characterized by high population density and scarce land resources at the beginning of industrialization, so the factor of labor force is the most abundant at this time, and agricultural production is dominated by labor force; however, after experiencing the first turning point of Lewis, the urban-rural dichotomy was gradually broken, a large number of laborers flowed from the countryside to the cities and towns, and the land also showed a The surplus of agriculture is also growing, and the land and capital factors are also becoming rich, and the production mode of agriculture is also mainly land-intensive; however, after the "Lewis's first turning point", the dual structure of urban and rural areas in China was gradually broken, and a large number of laborers flowed from the countryside to the towns, and the land also became rich, and the production mode of agriculture was also mainly land-intensive. A large number of laborers flowed from the countryside to the cities and towns, and the land also showed a centralized situation, and the surplus of agriculture was also growing, and the factors of land and capital were also developing in a new way in the direction of land-intensity. After the maturity of industrialization and the second turning point of Lewis, there was a shortage of labor, an increasing competition for labor between non-agriculture and agriculture, and an increasing flow of capital from industry and commerce to the countryside, which made the agricultural capital factor more abundant. By this time, the production model of agriculture had shifted to a capital-intensive supply, the functions of agriculture were becoming more diversified, the system of socialized agricultural services was becoming more complete, and the agricultural production model was gradually shifting to a technology-intensive one.

ISSN: 2710-0723

4. Changes in Agricultural Factor Prices and Changes in Agricultural Factor Inputs

4.1. Changes in Agricultural Factor Prices

Changes in the prices of factors of agricultural production, including household labor, hired labor, inputs such as seeds, fertilizers and machinery, are important factors reflecting changes in the costs of the agricultural production process. Figure 1 analyzes the main factors affecting agricultural production based on the price changes and growth of each means of production during 2013-2023 (2013 as 100). In particular, the change in the price of hired labor significantly far exceeds the growth in the price of mechanical work and seeds, which in 2023 has reached 159.46% of the price in 2013, while the price of mechanical work is only 130%, the price of seeds has increased by 121.38% of the price of ten years ago, while the price of domestic labor, fertilizers and tools and materials, despite some fluctuations in prices over the decade, ultimately did not change very much.

As a result of the comparison, in agricultural production activities, the greater influence on the growth of production costs is the growth of the price of hired labor, and the growth of the price of labor has gradually become a constraining factor in agricultural production. In the modern agricultural production system, the appropriate reduction of the use of hired labor and the appropriate increase in the use of machinery and other production tools is an important way to reduce the cost of agricultural production.

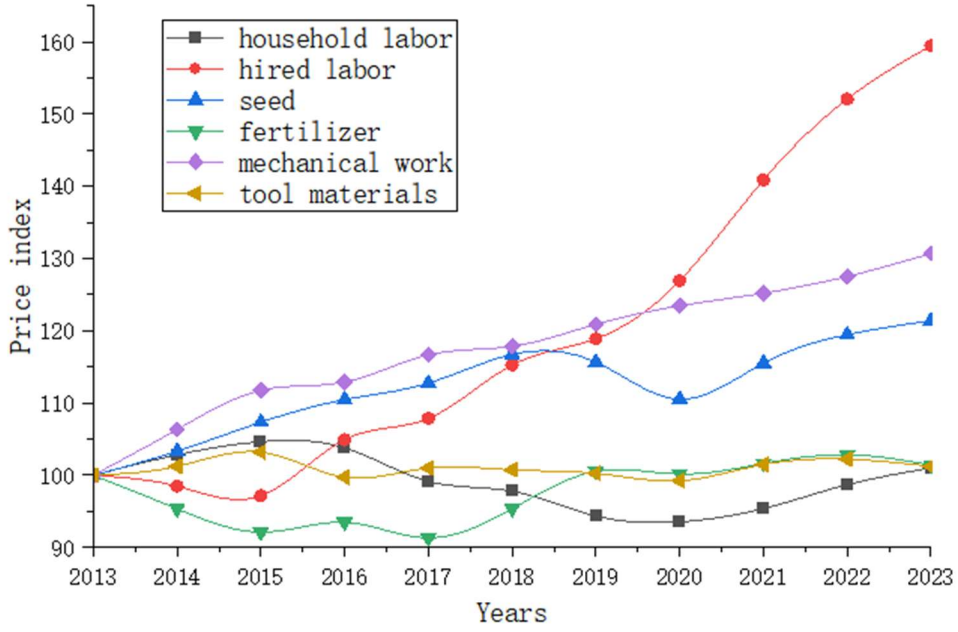

Figure1. Changes in the National Agricultural Factor Price Index

Note: Data sources: China Rural Statistical Yearbook; National Compendium of Cost and Benefit Information on Agricultural Products.

4.2. The Role of Factor Price Changes in Guiding Changes in Factor Inputs

In the long history, due to China's large number of people and little land, food demand, as well as the application of science and technology machinery is not common reality of the country, the traditional agricultural production is often invested in a larger number of laborers, through the artificial precision work, to achieve the effect of increasing production, is the classic labor-oriented industry. In recent years, with the accelerating urbanization process, rural labor force gradually transferred to the city, while the popularity of urban machinery to rural production,

ISSN: 2710-0723

the cost of labor continues to increase, according to the corresponding theory of the impact of changes in factor prices on the product will lead to a gradual increase in the cost of agricultural production, which in turn affects the transformation of the structure of the agricultural industry.

Table 1 describes the changes in the input of labor factors in the production process of crops during the period of 2013-2023, and it can be clearly seen from the table that the labor use of each major crop, including rice, wheat, corn, soybeans, etc., has a downward trend, in which the labor use of edible crops such as rice, wheat, corn, soybeans, etc., have declined by 40%, and the labor use of cotton has decreased from 6,191,900 to 2,910,200 per thousand hectares. From 6,191,900 people per 1,000 hectares to 2,910,200 people, a reduction of more than half of the amount of labor, which may be due to the cotton production process is more complex, the collection of the degree of sophistication is relatively high, and the collection of the appropriate time is more likely to ensure the quality of cotton. The collection efficiency of workers is lower, if not enough laborers are hired, it is not possible to collect all the cotton planted on a large scale in the most suitable time period, affecting the quality of cotton.

Table1. Labor inputs for major crops, 2013-2023 (tens of thousands/thousand hectares)

Years	paddy	wheat	corn	soybeans	peanut	potato	cotton	Melons and fruits
2013	4386.19	3480.35	5268.20	977.36	667.46	810.49	619.79	357.57
2014	4094.08	3243.94	5011.33	917.25	626.42	760.65	581.67	335.58
2015	3962.33	3148.45	5782.86	878.14	556.87	621.12	492.61	278.43
2016	3847.07	3094.38	5540.62	961.77	564.52	606.33	397.25	271.80
2017	3754.58	2983.37	5175.23	1014.75	568.26	588.56	385.61	263.84
2018	3552.46	2849.77	4957.83	995.47	546.53	566.05	390.38	253.75
2019	3394.66	2704.54	4700.30	988.56	522.26	522.26	354.39	261.13
2020	3188.70	2480.10	4357.89	1045.19	496.02	496.02	336.59	230.30
2021	3021.74	2390.08	4387.50	853.60	478.02	460.94	307.30	221.94
2022	2929.53	2350.24	4104.65	844.10	479.98	446.88	314.47	231.71
2023	2829.40	2263.52	4058.17	824.57	468.87	436.54	291.02	210.18

Note: Source: China Rural Statistical Yearbook.

The cost of machinery, as a fixed cost in production, shows value as it gradually depreciates. The application of machinery in agricultural production greatly improves the efficiency of agricultural planting and collection, at the same time, compared with the use of more labor, the use of machinery tends to produce less cost, which in turn improves the grower's income. With the continuous transformation and upgrading of China's science and technology as well as rural production structure, coupled with the increase in labor costs and many other factors, the application of machinery in agricultural production is gradually expanding, mechanical operations are more common in the process of agricultural cultivation.

Table 2 shows the changing status of major agricultural machinery holdings in China's current agricultural production regions, from which it can be seen that the total power value of agricultural machinery has increased by about 10% in the past ten years, and the number of large and medium-sized tractors has steadily increased to 5,613,000 units, while the number of small tractors has declined to 15,430,000 units in 2023, which may be due to the gradual reduction of individually operated agricultural production and the shift to large-scale enterprises for large-scale production, coupled with changes in the structure of agricultural

ISSN: 2710-0723

production and many other reasons. Grain harvesters, motorized threshing machines, electromechanical wells and agricultural water pumps are also steadily increasing in use.

Table2. Main agricultural machinery holdings and level of mechanization in the country

Years	Total power of agricultural machinery /10,000 kilowatts	Large and medium tractors /10,000 units	Small tractor /10,000 units	Grain combine harvester /10,000 units	Motorized threshing machine /10,000 units	Mechanical and electrical well /10,000 holes	Agricultural water pumps /10,000 units
2013	103906.8	527.0	1752.3	142.1	1007.6	467.6	2206.8
2014	108056.6	568.0	1729.8	158.5	1049.0	473.9	2224.5
2015	111728.1	607.3	1703	173.9	1061.8	483.2	2249.2
2016	97245.6	645.4	1671.6	190.2	1063.8	487.2	2241.3
2017	98783.3	670.1	1634.2	198.5	1041	496	2232.7
2018	100371.7	422	1818.3	205.9	1039.5	510.1	2289.2
2019	102758.3	443.9	1780.4	212.8	1050	511.7	2304.3
2020	105622.1	477.3	1727.6	219.5	1058.2	517.3	2300
2021	107764.3	498.1	1675	223.8	1057.2	522.2	2299.7
2022	110597.2	525.4	1618.7	227.4	1069.3	529.3	2286.3
2023	114966.8	561.3	1543	236.1	1065.6	533.8	2305.4

Note: Source: China Statistical Yearbook; China Rural Statistical Yearbook.

5. Conclusion

In order to realize the optimization of China's agricultural factor endowment structure, we need to take a series of measures. First, we need to increase investment in agricultural science and technology, improve the technical level of agricultural production, and increase the efficiency of optimizing the agricultural factor endowment structure. Secondly, we need to reform the rural financial system to solve the problem of capital shortage in agricultural production and promote the upgrading of the agricultural factor endowment structure. In addition, it is also necessary to accelerate the transfer of rural land, promote the optimal allocation of land resources, and improve the flexibility and adaptability of the agricultural factor endowment structure. Finally, it is necessary to improve the agricultural insurance system to reduce the risk of agricultural production and promote the stability and sustainable development of the agricultural factor endowment structure.

In summary, optimizing the structure of agricultural factor endowment is one of the important paths to achieve rural revitalization. Through the revelation of new structural economics, we can better understand the relationship between the structure of agricultural factor endowment and the institutional arrangement of agriculture, and at the same time, the two dimensions of the process of agricultural industrialization also provide us with important ideas to achieve the optimization of the structure of agricultural factor endowment. It is hoped that the research of this thesis can provide certain reference and reference for the optimization of agricultural factor endowment structure in China.

Acknowledgments

This study was funded by Anhui University of Finance and Economics National College Student Innovation and Entrepreneurship Training Program Project, "Research on Optimization Path

ISSN: 2710-0723

of Agricultural Factor Endowment Structure under the Perspective of Rural Revitalization" (No. 202210378034).

References

[1] Lin Yifu. Theoretical foundation and development direction of new structural economics[J]. Social Science Digest,2017,(05):53-56.

[2] HU Ruifa, Huang Jikun. Changes in the structure of agricultural production input factors and the direction of agricultural technology development [J]. China Rural Observation, 2001,(06):9-16.

[3] Tian Tian,Yang Gangqiao. The impact of farmland consolidation on farmers' behavior of using agricultural machinery - based on a survey of farmers in some areas of Hubei Province[J]. Journal of Huazhong Agricultural University(Social Science Edition), 2013,(02):84-89.

[4] Xue Chao, Zhou Hong. Analysis of regional differences in the direction of agricultural technological progress and the matching degree of factor structure in China[J]. Statistics and Decision Making, 2019,35(05):136-140.

[5] Lv Ming, Tang Ji, Zhang Yuxia et al. An empirical study on the impact of land endowment and factor input intensity on the food production capacity of farm households[J]. Grain Science and Economy, 2021,46(05):8-14.