Empirical Analysis of New Agricultural Operators based on Scale Management: a Perspective of Farmer Household

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Abstract

With the development of agricultural and rural economy, the main body of the new agricultural management has shown more vitality and potential. In this paper, we construct the peasant household model, and analyze the dynamic mechanism for the implementation of large-scale operation. Then we make empirical analysis of agricultural scale operation by using large-scale data, the result shows that the key factor of production factors allocation is the income of Peasant household, and the decline of agricultural operating income will promote the surplus labor force transformation. At the same time, this situation will enhance the farmers' willingness to transfer the land. Therefore, the government should create a good environment for agricultural entrepreneurship and employment, guide and encourage farmers to become the main body of new agricultural management.

Keywords: New agricultural management system, scale management, farmer evolution, household model, large-scale operation

1. Introduction

With the continuous development of China's agriculture and rural economy, agricultural professional large, specialized farmer cooperatives and agricultural enterprises as the representative of the new agricultural enterprises increasingly shows vitality and development potential, has become the core subject of the development of modern agriculture in China. Since the policy of reform and opening up, China's rural established the household contract based agricultural management system, the implementation of the household contract responsibility system with remuneration linked to output, the rural economy and agricultural production has made remarkable achievements, and the rural landscape is a huge difference [1]. However, the essence of the household contract is to restore the small scale of the small peasant economy. The decentralized management of small-scale peasant economy is not conducive to the improvement of the quality of agricultural products, the creation of the brand of agricultural products, but also hinders the use of agricultural machinery and agricultural science and technology promotion [2]. A well-off society is the strategic framework of Deng Xiaoping in the eighties of the last century planning blueprint of China's economic and social development of, Party of 18 for the grand goal of the realization of a timetable: that is, to 2020 achieve fully completed the goal of "well-off society", the reform achievements benefit 1.3 billion population. The key to building a well-off society in an all-round way is to promote the coordinated development of economy and society in rural areas, and to promote the increase of farmers is the key to this key link. Practice has proved that the small-scale production of household contract can solve the problem of food and clothing, but can not solve the problem of farmers to get rich

Combining production market is a widespread and profound change: on the one hand, the market mechanism can not see the hand" principle to guide and regulate the resources flow to achieve resources rational allocation; on the other hand, the agricultural

management main body of production surplus chasing behavior and social production, make full use of commodity exchange and the law of value to expand the market for rural economic development has injected vitality, promote the agricultural productivity of great development, will promote the Chinese agriculture from the household contract, as the core of the self-sufficient small-scale peasant management, to the family farm as the main content of the scale of the business transformation. First of all, the scale of agricultural products brought by the operation of agricultural products, need to be in the market to achieve. Specific to a certain agricultural products, the expansion of the scale of production is the inevitable result of the size of the farmers, and the expansion of the scale of output must be based on a certain market capacity [3]. Otherwise, with the expansion of the scale of agricultural operation, farmers will only be able to get a technical scale, namely agricultural production costs decline, but cannot get the value of the scale of operation, *i.e.* cannot be through the market to achieve agricultural products from commodities to currencies breathtaking leap. From this perspective, the development of the market is the key to the scale of farmers. Without the expansion of the market, it is only a kind of idea to realize the scale management of the farmers. Scale management of farmers, which means there will be more and more proportion of agricultural output, the need to digest through the market. Market transactions will have to face the problem of transaction costs caused by asymmetric information, which increases the difficulty and risk of agricultural market transactions, thus hindering the realization of the scale of farmers. Finally, the flow of land and labor and other factors need to be based on the market. The basis of the scale management of farmers is the moderate scale management of agricultural land, and the fundamental way to realize the scale management of agricultural land lies in the circulation and concentration of the land. Land circulation and concentration, mainly through the market to achieve, but also the family based on economic situation and market decisions made by the family. Therefore, the realization of farmers' land scale management depends on the construction and improvement of the land circulation market.

2. Literature Review

2.1. Agricultural Scale Management

The scale management is the concept of scale economy and scale together. Strictly speaking, economics theory and no scale operation concept, commonly used "economies of scale" or "returns to scale" to describe. The so-called "scale" refers to in certain economic and technological environment, and through the optimal allocation of factors of production, in order to obtain the best economic benefits. From the concept, we can see, scale of operation, on the one hand performance for a variety of factors of production inputs is more economical, production elements of productivity promotion, resources saving, on the other hand performance to enhance the economic benefits of the manufacturers that output growth and economic benefit increased. It is generally believed that the causes of scale economy include: specialization of production, improvement of science and technology, improvement of management level, negotiation advantage of price, learning effect and *so on* [4]. Therefore, the scale of business is not only a "quantity" concept, more of its "quality" of the property. From the "quantity" point of view, in general, if the output growth is faster than the increase in the production factor inputs, this time the manufacturers will get the scale of the economy effect. From the "quality" of the provisions of view, the pursuit of "profit maximization" and "labor productivity" is an indicator of economic efficiency.

According to the basic theory of modern economics known that economies of scale exist in capital intensive industrial production, then the experience of industrial enterprises applies equally whether on the agricultural production and management,

summarized the domestic and abroad research, on agricultural scale management still exist in the great disputes the findings. In view of the household contract responsibility system with remuneration linked to output in the farmer's production enthusiasm, improve the efficiency of agricultural production and increase the income of farmers has played the positive role of excitation, early in the implementation of scale operation of agriculture [5], many scholars is the problem of agricultural scale operation raised an objection that low demand elasticity of agricultural products determines the farmers of the expansion of the size of the market power shortage. Therefore, economies of scale in the field of agricultural production, and unlike in other industries as evident, to expand the operation scale of agricultural land can not become promote the realistic choice of China's agricultural development [6].

Some scholars think that compared to the large-scale land management and small-scale family farmers and shows no perceptible to the total factor saving advantage and raise yield advantage, and even can be said that the economic efficiency of scale of operations of farmers is not small business high [7]. Belly & Klein (1979) analyze six developing countries (Brazil, Colombia, Philippines, Pakistan, India, Malaysia) agricultural statistical data of time series analysis, the results show that small farms are more efficient than large farms[8].But it is worth noting that these studies are mostly in traditional agricultural country or developing countries as the research object, but not the influence of the progress of agricultural science and technology into the research category, so negative correlations between the agricultural scale management and productivity is often considered to be the typical characteristics of traditional agriculture. Japanese agricultural development economists through analysis of 43 countries 1960-1980 years of agricultural production data, it is found that the agriculture management of high income countries with significant economies of scale, but not the developed countries do not scale effect[9]. Therefore, looking into the future of China's economic development, the scale of operation should be the inevitable trend of China's agricultural development.

2.2. Agricultural Management System

In most countries of the world, farmers are still the basic operating unit of agricultural production in China. But with the adjustment of agricultural structure in China, the rural basic management system reform, the agricultural labor force transfer and industrialization and urbanization speeding up, Chinese farmers groups began to gradually differentiation, agricultural operators differentiation into five main types of traditional farmers, professional planting and breeding households, business and services to farmers, half farming households and non-agricultural household. Among them, professional cultivation and farming households, known as professional large, is a professional production of agricultural industry in the main, the initial implementation of the scale of farmers [9]. Some scholars believe that, compared with the large mechanised farms, labor and capital double intensive appropriate scale of operation of Rural Households (family farms) more in line with Chinese fundamental realities of the country, is the way to solve the recessive rural unemployment, low, industrial upgrading difficulties such as a series of problems in the current urbanization and land transfer level. Chen (2007) by using the relevant data of rural fixed observation points on the development of large agricultural professional meaning and function are discussed and think actively cultivate professional large family to under the current rural basic management system, promoting the agricultural specialization, marketization and modern process [10].

From the beginning of the eighties of the last century, on the basis of agricultural family management of Agricultural Association this new form of organization in China is gradually developing. The main function of the organization is scattered farmers provide agricultural production technical services and skills training, to the mid 1990s, with the rise and development of farmers' specialized cooperative economic organization, the

association of some changes into the specialized cooperative economic organization, its function not only includes the production of technical service and including product marketing. Compared with other provinces (autonomous regions and municipalities), Zhejiang Province quickly completed the farmer professional cooperation organization form choice and stability, farmer organizations from mainly by the professional association quickly to more in line with the development requirements of the times of the professional cooperative transformation [11]. Practice shows that the farmer specialized cooperatives that business entities through innovations in the organizational system, to solve the contradiction between the small farmers and big market, in service members and realize its own sustainable development and to the surrounding farmers produced a certain amount of radiation leading role [12-13]. In the foreseeable future, the majority in the management main body of Chinese rural small-scale farmers will continue to exist, farmer professional cooperatives because it can in some extent help producers to share from the processing and sale of part of the profit and has extensive living space and development potential [14]. Since the reform and opening up, the other development of agricultural management is the main agricultural enterprises. Generally speaking, the agricultural enterprise is the economic organization that uses the modern enterprise management mode, the specialized division of labor, is engaged in the commercial agricultural production and its related activities, and carries out the independent management, self financing. Agricultural enterprises, especially agricultural leading enterprises, have great advantages in adapting to the changeable market environment and facing the fierce international competition. On the basis of continuous improvement and benefit coupling mechanism of farmers, agricultural leading enterprises will play a unique and important historic role as the leading power of industrial management [15].

Obviously, the major agricultural professional cooperatives and agricultural enterprises are the backbone of China's agricultural development at this stage. They reflect the historical regularity of the transformation of traditional agriculture, leading the development direction of modern agriculture, in accordance with the basic requirements of improving agricultural modernity.

3. Model Design

Under the condition of market economy, the behavior of farmers equal to the standard "manufacturers" behavior, farmers than entrepreneurs favorably, the key of transformation of traditional agriculture is incentive for farmers to the pursuit of profit maximization, Schultz Popkin proposition: as long as external conditions have, in under the control of the goal of income maximization, farmers will consciously social allocation of their elements. With the goal of maximizing revenue, we build a farm household model, based on the previous research, to investigate the dynamic mechanism of the implementation of large-scale operation.

3.1. Agricultural Production Function

There are two primary factors: labor time L and land T, and labor surplus when the quantity of the land is constant, and it is assumed that there is only one kind of output. Set agricultural production function as:

$$Q = ef(L, T, K) \tag{1}$$

Q means agricultural output, L means farmers actually invested in the labor time of agricultural production (including since the dawn of time and length of employment), t means farmers the actual business of the amount of land, K for farmers into agricultural management in the amount of capital, e represents the farmers to implement scale management ability.

Farmers can in the non-agricultural sector and the agricultural sector and industry, La is a member of the family into their land labor time in agricultural production, LN and LR for family members to the non-agricultural sector and the agricultural sector and industry provided the labor time. Under the background of economies of scale, farmers need to in agricultural busy season to hire labor to increase labor input, LH to hire the nominal labor time, s (T, LA) for hired labor supervision function, farmers' investment agricultural production of the actual working time as:

$$L = L_a + s(T, L_a)L_h \tag{2}$$

The quantity of land in the actual operation of the farmers is:

$$T = T_0 + T_h - T_r \tag{3}$$

Farmer's income projects include the income of agricultural production Pef, non farm employment income, the transfer of land rental income, *etc*, therefore, the household income function is:

$$y = Pef(L, T, K) + \theta(W_r - C_L)L_r + W_h(L_n - L_h) + (R - C_T) - rK \tag{4}$$

The utility function of a household household is:

$$U = U(y, l) \tag{5}$$

Y means that the income level of farmers, L representatives of leisure time, the two are complementary relationship, that is, with the growth of the income of farmers, the increase of the "leisure" spending power, leisure consumption increases.

3.2. Construction of Peasant Household Model

According to the given above the household of the function of agricultural production, income and utility function, the construction of the household utility maximization problem, by constructing the Lagrangian function method, are farmers in the allocation of resources F.O.C respectively is:

$$L_h : \frac{\partial y}{\partial L_h} = Pes \cdot f_L' - W_h \tag{6}$$

$$L_r : \frac{\partial y}{\partial L_r} = -Pesf_L' - Pesf_L's'L_h + \theta(W_r - C_L) \tag{7}$$

$$L_n : \frac{\partial y}{\partial L_n} = -Pesf_L' - Pesf_L's'L_h + W_h \tag{8}$$

$$T_h : \frac{\partial y}{\partial T_h} = Pesf_T' - Pesf_T's'L_h - (R + C_T) \tag{9}$$

$$T_r : \frac{\partial y}{\partial T_r} = -Pesf_T' - Pesf_T's'L_h + (R - C_T) \tag{10}$$

Therefore, farmers are willing to rent the land to expand the scale of business conditions:

$$R + C_T \leq Pesf_T' + Pesf_T's'L_h$$

That is, the marginal revenue of land rent is greater than the marginal cost of the leased land, otherwise, the farmers will maintain the existing scale, and neither increases the scale of operation, nor reduces the size of the business. In the context of agricultural scale management, whether the farmers are willing to expand the capital investment is the farmer's agricultural investment income is greater than the cost of agricultural investment, in summary; we put forward the following four hypotheses.

Hypothesis 1: land flow is positively correlated with agricultural management income.

Hypothesis 2: land transfer and agricultural business income is negatively correlated.

Hypothesis 3: Non-farm employment of the labor force and the income of agricultural operations into a negative correlation.

Hypothesis 4: The agricultural investment behavior of peasant households is positively related to the land management.

4.Empirical Analysis

4.1.Descriptive Analysis

The scale of operation is to the market demand for commercial production of oriented, it on the quality of the operators require a higher: one hand to have the basic knowledge of agricultural production and operation, and master the modern agricultural science and technology; on the other hand require the operator to have the management consciousness of the entrepreneur. The operator's quality determines the border and operating efficiency of agricultural scale management, and then affects the success of agricultural scale management.

From the perspective of cultural and educational level, the cultural quality of the agricultural labor force is relatively low, most of which have not received any professional training. At present, China's agricultural labor force, primary and secondary schools accounted for more than half of the labor force. Agricultural laborer's quality is relatively low, which leads to the agricultural science and technology extension and agricultural machinery can not be applied to the field of agricultural production, and this is the driving force to promote the development of large-scale operation of farmers.

Table 1. Age Distribution of Rural Population in China

Year	0-19 year	20-39 year	40~49 year	More than 50 year
2000	33.28	33.76	12.96	20.00
2005	28.05	30.87	15.45	25.63
2010	26.15	29.25	17.04	27.56
2015	23.48	28.30	19.02	29.19

Table 2. Cultural Education Level of Agricultural Laborers

Area	Never	primary schoolr	Junior school	High school	college
The national	0.095	0.411	0.451	0.041	0.002
eastern region	0.077	0.385	0.488	0.048	0.002
central region	0.089	0.370	0.492	0.046	0.002
western region	0.128	0.470	0.367	0.033	0.002

Peasant household income is the inevitable result of economic behavior and economic activity, and it is the premise of all economic activities, and it is the starting point of the organization's production and management. Analysis of the economic behavior of farmers, we must seriously study the income of farmers. Generally speaking, farmers' income is mainly composed of two parts: the cash income of the sale of agricultural products, the income of labor supply and so on. The difference in cash income of farmers reflects the differences in the nature of the production and operation between farmers, and wage income is the main source of income growth of farmers. Affected by the price fluctuation of agricultural products and the price rise of agricultural production materials, the proportion of agricultural income has declined year by year, and wage income growth has become the main force to promote the growth of farmers' income. As shown in table 3.

As can be seen from the table 3, in the income structure of farmers, the proportion of wage income from 18.1% in 1985, an increase of 45% in 2014, and this proportion will continue to rise. Wage income growth mainly from farmers to work, since the last century since the 90's, the farmer's income has been a 2 digit income growth, while the proportion of agricultural income fell 2 percentage points per year. 2014, the per capita net income of rural residents reached 8896.58 yuan, of which 4034.46 yuan of wage income, accounting for 45.55%, while agricultural income was 3059.52 yuan, accounting for the proportion has dropped to 34.39%.

Table 3.The Proportion of Peasant Household Income

year	Proportion of wage income	year	Proportion of wage income	year	Proportion of wage income
1980	52.9	2005	36.1	2010	41.2
1985	18.1	2006	38.3	2011	43.0
1990	20.2	2007	38.6	2012	44.8
1995	22.4	2008	38.9	2013	46.3
2000	31.2	2009	40.5	2014	45.1

4.2. Model Setting

Empirical test of the above quantity model, in the model, the use of EM to express the non farm employment level of farmers, the use of LA to show the level of the land transfer of farmers, the use of PR to express the profit margins of agricultural operations, the use of WA to show the income level of nonfarm employment. Model (1) and (2) assume that the land circulation of farmers is influenced by the operating profit rate of the agriculture and the wage level of nonfarm employment. Therefore, the setting model is:

$$EM_t = \beta_0 + \beta_1 PR_{t-1} + \beta_2 WA_{t-1} + \mu \tag{11}$$

$$LA_t = \alpha_0 + \alpha_1 PR_{t-1} + \alpha_2 WA_{t-1} + \varepsilon \tag{12}$$

$$INV_t = \gamma_0 + \gamma_1 PR_{t-1} + \xi \tag{13}$$

4.3. Test Result

From the regression results of the model, the model results are significant, which can verify the basic conclusions of the previous mathematical model. In model (1), PR variable coefficient is negative, WA coefficient is positive, and through the test of significance level of 5% and 1%, which means that the family farmers non-agricultural employment level and the annual agricultural business profits are negatively correlated, and nonfarm employment wage income are related. From the regression model (2) the results can be seen, agricultural business profit rate (PR) and the land transferred negative correlation, and land into the positive correlation; nonfarm wages Wa and the land transferred positive correlation, and with the land into negative correlation. In the model (3), the agricultural operating income of PR has passed the significant test at the 1% significant level, which is consistent with the expected 4 of the hypothesis.

Table 4. Regression Results

variable	Model 1	Model 2		Model 3
		Land transfer out	Land transfer in	
PR	-0.0012** (-1.9207)	-0.004* (-0.1495)	0.5505* (2.9302)	1.2534* (2.1288)
WA	1.5704** (4.2821)	0.5217 *** (2.7666)	-0.0183** (-0.6238)	
Constant	-0.1866* (-1.5097)	0.1310** (2.0609)	1.1205* (1.8339)	108.934*** (6.4096)
R2	0.8843	0.9563	0.9354	0.9361
F value	26.7541	6.7752	6.8392	4.5317

Based on the construction of the model of farmers, this paper discusses the allocation of factors of farmers' households in the context of scale management. First, according to the results of empirical test, family farmers factor allocation (non-agricultural employment and the transfer of land) the key is business income of agricultural and non-agricultural employment relationship of contrast: thrust decline in operating profit of agricultural and non-agricultural wage employment rising tension, promote non-agricultural employment of labor she left households; on the other hand, enhance the farmer family transferred land will. Second, the agricultural comparative income growth is attracting scale operation of Rural Households (subcontract land and increase investment in agriculture) the key factors.

5. Conclusions

At this stage, to speed up the cultivation and development of new agricultural business entities is the key to the development of the requirements, the development of efficiency, the strength of development, the development of mechanisms to seek a breakthrough, basic train of thought is: accelerate the land, capital and other production factors market orientation reform, transformation of government to agricultural support, and create a favorable environment for entrepreneurship and employment of agricultural, agricultural operators to establish the exit and entry mechanism.

5.1. Accelerate the Reform of Factor Market

In the management of the rural land use right, further giving village collective and new agricultural business entities on their own land for agricultural use, the right to use and the right to the deployment, in the reasonable plan, the leeway foundation, the agricultural products processing and storage, farmer professional cooperative office with the agricultural industry closely related land shall be regarded as agricultural land and adopt a flexible policy, be priority support. In the reform of the rural financial system, support all kinds of private financial institutions in the rural grass-roots level to establish agricultural credit outlets. Increase the support of policy finance to agriculture, simplify the procedures of agricultural credit, accelerate the pace of the pilot and promotion of farmers cooperative finance. The establishment of a new type of mortgage, guarantee and credit system of agricultural business entities. Specifically support business entities to agricultural products or other assets as collateral or guarantees, loans from financial institutions; allow have conditions of village will provide loan guarantees for farmers; and actively explore financing pattern based on the supply chain, allowing cooperatives in the name of its in the supply chain in the position, role and identity for itself or its members loan guarantees. Improve the small credit products, the establishment of a flexible and efficient agricultural financing guarantee system to ease the problem of new agricultural business entities financing difficulties.

5.2. Create Agricultural Employment Environment

On the one hand, continue to increase the agricultural infrastructure, platform facilities and other public investment and policy support efforts, and improve the agricultural public policy and public investment performance appraisal. On the other hand, the specific agricultural support measures and policies, as far as possible directly to the implementation of the new agricultural business entities. In addition, allowing the grassroots level of agricultural support for agricultural funds and policy to sort out and integrate, improve the efficiency of agricultural support policies. The main source of new agricultural business entities is the entrepreneurs to invest in agriculture, farming to return home to the migrant workers "," grass-roots entrepreneurship of college students "," rural leaders. Because of their educational background, work background and their respective advantages and disadvantages are not the same, need to be classified guidance and provide targeted support policies. College students is an important reserve force of the new agricultural business entities, should improve the agricultural entrepreneurship and employment policy system, so that they have to go, do well, stay, have a development". Specifically, in the rural construction college students Pioneering Park, the establishment of agricultural university students venture fund and venture discount loans, especially to encourage college students as "village official" in the new agricultural enterprises entrepreneurship and employment. In order to reduce farmers' professional cooperatives and agricultural users the introduction of university students economic burden, consider the related business entities given into college students' salary and social insurance subsidies.

5.3. Establishment of Agricultural Exit Mechanism

In particular, the withdrawal mechanism of the traditional agricultural operators should be established. The premise is not to change the basic system of rural land family contract management. Can be considered a single idea, is heir to establish a farmers' land contractual operation right of family inheritance system. This can make the farmers' land rights for a long time, and can avoid the fragmentation of land management. Two is to establish a retirement system for agricultural operators. Three is to improve the rural land transfer trading platform and service system. Four is to improve farmers' land contract and

management rights replacement employment and social security, farmers' homestead and housing replacement urban housing system mechanism. For agriculture into the mechanism, the focus is on processing into and out of the interest relationship, into the cognizance of qualification and ability, enter to the fair competition and preferential into business behavior and business in the field of control.

Acknowledgments

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