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Effects of Land Circulation on the Development of Modern Agriculture

WU Zhe*, LI Jing

Institute of Economics, Yangtze University, Jingzhou 434100, China

Abstract Based on the introduction of modern agriculture, relationship between land circulation and modern agriculture is discussed. This relationship is reflected mainly in two aspects. Firstly, land circulation is a necessary requirement for the development of modern agriculture, which can speed up the adjustment of agricultural structure and realize the scale management, accelerate the transfer of the rural population and improve the agricultural income, enhance the risk resisting ability of agriculture and the response of agriculture to market challenges. Secondly, development of modern agriculture must be based on land circulation. Land circulation can not only provide resource allocation basis for modern agriculture, but also offer economic benefit basis for modern agriculture. According to 2007 *China Statistical Yearbook*, agricultural product output (Y), agricultural employees (L) and other relevant data in 19 provinces are obtained. CES production function is used to reflect the agricultural employees (L), agricultural capital investment (K) and agricultural product output (Y), in order to calculate the agricultural production function. Result shows that contribution of labor force to output is negative, while the contribution of capita to output is positive. Meanwhile, the substitution elasticity of capital for labor is 1.11, indicating that every 1% increase of labor force will lead to the 1.11% enhancement of farmers' capital.

Key words Land circulation; Modern agriculture; Marginal expectation; Scale economy; China

The Third Plenary Session of the Party's 11th Central Committee has initiated the circulation policy of rural land use right and the development of modern agriculture. Practice in recent years also shows that accelerating land use right circulation and promoting the scale of agricultural production are important measures to transform traditional agriculture, to change agricultural growth mode, and to develop modern agriculture, as well as the direction selections of deepening rural reform, and the effective ways to realize the docking of household contract responsibility system and the modern agriculture development. Therefore, circulation policy of rural land use right is not only particularly important for the smooth development of modern agriculture, but also is an inevitable choice for the development of modern agriculture.

1 Connotation of modern agriculture

Xue Liang, the chief economist of the Ministry of Agriculture and the director general of the Department of Finance in China, has pointed out in the China Information Technology Academic Conference that modern agriculture in China mainly refers to implementation of intensive production and integration of production, processing and marketing under the guidance of modern science and technology, the support of advanced agricultural equipment and infrastructure, and the comprehensive effect of market mechanism and government control. It has diversified and multi-function industrial forms and social service system, in order to achieve higher labor productivity, resources output ratio and commodity rate, to protect the supply of agricultural products, to increase peasants' income and to promote

the sustainable development of agriculture^[1]. Lu Liangshu, an academican of China Engineering Academy, argues that modern agriculture is a new stage of agricultural development after primitive agriculture and traditional agriculture. Modern agriculture takes modern industrial equipment as material condition with scientific nature as the core, commercialization as the feature, intensivism as the direction and industrialization as the goal^[2]. Besides, definition and expression of modern agriculture are defined from different angles by Wu Jingxue, a research fellow in Chinese Academy of Agricultural Sciences, Li Ren, a scholar in Chinese Academy of Social Sciences, and other experts. After analyzing these various expressions, their core contents have certain consistency. Therefore, connotation of modern agriculture can be summarized. Modern agriculture is a new stage of agricultural development followed by primitive agriculture and traditional agriculture, with modern technology and advanced equipment as the support through continuously improving labor productivity, resource output ratio and commodity rate, so as to ensure the supply of agricultural products and to promote the sustainable development of agriculture. It has a multi-function industrial system and diversified and industrial forms by using the modern management methods under the comprehensive effect of market mechanism and government control, as well as the implementation of intensive production and integration of production, processing and marketing.

2 Relationship between land circulation and modern agriculture

2.1 Speeding up land circulation is a necessary requirement for the development of modern agriculture

2.1.1 Speeding up land circulation is a necessary requirement of agricultural structure adjustment and scale manage-

ment. A prominent feature of modern agriculture is the industrialized and large-scale management. At present, contradiction between small-scale production of peasant households and large-scale market is becoming increasingly acute. Scale management is hard to be formed due to the decentralized management, which leads to low economic benefits. Therefore, only by speeding up land circulation, can we realize the scale management of land.

2.1.2 Land circulation has great impact on speeding up rural population transfer and on improving agricultural income. The essence of modern agriculture is to increase the income of farmers. At present, farmers' income source becomes diversified gradually, because land is no longer the only income source for farmers and they can go out to work or do business. Low income of decentralized operation contrasts with the high income of nonagricultural industry, which creates conditions for the circulation of land. At present, land circulation can weaken the local complex of farmers, promote the transfer of agricultural population into secondary and tertiary industries, accelerate the pace of urbanization in rural areas, and enhance the rapid increase of farmers' income.

2.1.3 Speeding up land circulation is a necessary requirement for the enhancement of risk resisting ability of agriculture. Modern agriculture must be supported by modern facilities and equipment. At present, farmers have not yet gotten rid of the natural constraints due to the backward condition of agricultural production, fragile agricultural environment and low capacity to resist natural disasters. In order to change the weak quality of agriculture, we should accelerate land circulation, promote the moderate scale management of land, focus on improving the agricultural equipment and conditions, strengthen the construction of agricultural infrastructure, and enhance the risk resisting ability of agriculture.

2.1.4 Speeding up land circulation is a necessary requirement for the optimization of agricultural resources allocation and the improvement of agricultural production efficiency. Development of modern agriculture must be guided by the concept of industrial management with rational allocation of resources, in order to improve the intensive degree and to obtain the maximum benefit at the minimum cost. Speeding up land circulation can concentrate land production, optimize resources allocation, use advanced technology, enhance scientific and technological content, increase agricultural input and maximize the utilization and output ratios of agriculture.

2.1.5 Speeding up land circulation is a necessary requirement for the enhancement of coping capacity of agriculture to market challenges. After entering into the stage of modern agriculture, market mechanism should be established based on the integrative management of production, supply and marketing, as well as the combination of trade, industry, and agriculture^[3]. Therefore, fundamental changes have taken place in market demand accordingly. Only by speeding up land circulation and implementing moderate scale management, can we produce high-quality agricultural products in a large scale and adapt to the diversified demand of market, so as to promote the

demand-led agriculture and to accelerate the modern agriculture by diversified supply.

2.2 Development of modern agriculture based on land circulation

2.2.1 Land circulation provides market basis for the development of modern agriculture. It is assumed that there are two peasant households *A* and *B*. They have similarities in basic condition, such as population and structure of labor force and status of land resources. Their differences are that household *A* has greater marginal expectation of land than household *B*. Marginal expectation refers to the expected value increased by each additional unit of land. Fig. 1 illustrates that *S* is the total supply curve of land, *D* is the total demand curve of land (for the convenience of analysis, we assume that land supply curve is a straight line in the upper right; and supply curves of *S* and *X* axes intersect according to the actual situation of rural areas). Crossover point of *S* and *D* is the land quantity at equilibrium, the value of which is *Q*. Assuming the land quantity *Q*₁, which is the crossover point of supply curve *S* and demand curve *D*_{*a*} of household *A*, is equal to the land given to household *A* according to the state policy. Therefore, the land quantity of household *B* should be *Q*₁ under the household contract responsibility system. Hence, $Q = 2Q_1$, indicating that land resources are not wasted.

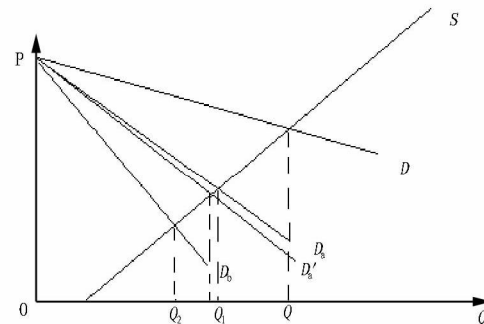


Fig. 1 Allocation of land resources

Because households *A* and *B* have different land marginal expectations, there are differences in the demand elasticity of their land prices. In other words, slope of land demand curve varies. According to the assumption, we have $E_a > E_b$. Hence, $K_a < K_b$. E_a and E_b represent the demand elasticity of land price and K_a and K_b are the slopes of demand curves of two households. Therefore, land demand curve of household *B* should be D_b .

Since the land marginal expectation of household *B* is relatively small, household *B* thinks that cultivating too much land is not worthwhile. According to demand curve D_b , household *B* only plants land Q_2 . Hence, land $Q_1 - Q_2$ is abandoned. If we rent, mortgage or sell shares of land $Q_1 - Q_2$ to household *A*, demand curve of Q_b is moved to the demand curve of Q_a . Theoretically, demand curve of Q_a should be moved down to the Q_a' . This is because that with the land increase of household *A*, marginal expectation of land is reduced, and the slope of land demand curve increases. For simplicity, this situation is

$R^2 = 0.87$, $DW = 1.89$.

Coefficients of CES are $\alpha_1 = 1.74$, $\alpha_2 = -0.79$, $m = 0.9012$, and $\rho = -0.1$.

It can be concluded that substitution elasticity of factor is $\sigma = \frac{1}{1+\rho}$, and the substitution elasticity of capital for labor is 1.11. At the same time, agricultural production function is $Y = (1.72K^{0.01} - 0.72L^{0.01})^{9.012}$. (5)

According to equation (5), we can obtain that contribution of labor force to output is negative and the contribution of capital to output is positive. Meanwhile, the substitution elasticity of capital for labor is 1.11, indicating that every 1% increase of labor force will lead to the 1.11% enhancement of farmers' capital, that is, more capital is needed to replace labor. This means that to realize agricultural modernization, we should take capital as the output basis for agricultural development but should not rely on labor like the small peasant economy. The only way to achieve this is to produce scale economy of agriculture through land circulation, because only the large-scale production of peasant households can implement production specialization and improve the application of production technology. Investment combination of production factors can be changed by production technology and more capital is used to replace labor, so as to reduce cost and to improve productivity.

4 Conclusion

Land circulation has created prerequisites for the strategic adjustment of agricultural structure, the scientific and technological innovation, and the intensive management. Process of land circulation is considered as an opportunity to aggregate land, to promote agricultural scale management, and to gradually form the specialization and modernization of agricultural production in large scale, which can help to realize the regional production of agriculture and to promote the rational flow and optimized combination of land, capital, technology and labor. Establishment of land circulation mechanism has changed the status of rural labor forces as both workers and peasants, has released the restriction of land on farmers, and has promoted

the non-agricultural industry transfer of rural labor force in order to increase the income of farmers, to provide a means of employment, and to solve the problem of rural surplus labor forces.

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土地流转对发展现代农业的作用分析

吴浙, 李静 (长江大学经济学院, 湖北荆州 434100)

摘要 在介绍现代农业内涵的基础上,探讨了土地流转和现代农业的关系。这种关系主要表现为以下2个方面。①指出土地流转是发展现代农业的必然要求。即可以加快农业产业结构调整,实现规模经营;加快农村人口转移,提高农业收入;增强农业体育风险的能力;增强农业应对市场挑战。②发展现代农业必须以土地流转为基础。既可以为发展现代农业提供资源配置基础,又可以为现代农业提供经济效益基础。从2007年中国统计年鉴上获取19省农产品产量(Y)、农业就业人数(L)、农业机械总动力代替农业资本投入(K)数据,利用CES生产函数来反映农业就业人数(L)和农业资本投入(K)对农产品产量(Y)影响情况,计算得到了农业生产函数。结果表明,劳动力对产出贡献为负,资本对产出贡献为正,同时资本对劳动的替代弹性为1.11,表明劳动力每增加1%,农户将会使资本增加到1.11%。

关键词 土地流转;现代农业;边际期望;规模经济