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Coupling Research on the Process of Transfer of Surplus Labor Forces and Scaling-up of Farmland

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Abstract On the basis of giving an overview of efficiency research on transformation of land from fragmentation to scale economy, by using the concept of coupling in physics, this paper expounds the behavior basis of transfer of surplus rural labor forces in China and transformation of land from fragmentation to scaling up, and analyzes behaviors of all parties and equilibrium outcomes in the three stages concerning the transformation of agricultural land from fragmentation to scaling up as follows. At the first stage of coupling, after multitudinous rural surplus labor forces emerge, the farmers begin to go to city seeking jobs. In this period, the amalgamation of land management has not occurred and the single farmer's land has not yet concentrated. The total land area of single farmer has not yet increased and the total amount of farmers has not yet decreased. At the second stage of coupling, driven by living standards and income, multitudinous rural surplus labor forces begin to live in the city permanently in fact, and the scale management of rural land begins to arise. Foreign funded enterprises begin to enter agriculture, and the industrialization management of agriculture is equipped with the most fundamental conditions due to the occurrence of scaling up of land. At the third stage of coupling, the transfer of rural surplus labor forces basically ends. The property rights of agricultural land or the management forms also, in a large measure, concentrate. The obstacles to agricultural scaling-up management are solved fundamentally, and the income gap between urban areas and rural areas is narrowed. Urban-rural population migration is no longer the main form of China's population migration. This stage has not yet been realized in China and it is the future state of villages. Finally, through the two cases researched by the predecessors, we verify the research results of the preceding two stages, which provides reliable reference for transformation of China's agricultural land management, and policy formulation of transfer of surplus labor forces.

Key words Surplus labor forces, Fragmentation of farmland, Scaling up of farmland, Coupling, China

Under certain technical conditions, the efficiency of agricultural production is not only affected by the positive factors of labour, but also affected by the production and management of land. Since the implementation of household contract responsibility system, agricultural production has grown significantly at one time, which is obviously attributed to land policy. But since the late 1980s, the productive speed of agriculture has slowed down. The researches of many scholars show that it is the land fragmentation which is caused by the equitable distribution of land that hampers the scale management of agriculture. In terms of the objective needs of the agricultural productivity development, this judgement is undoubtedly correct and it is also the direction of the Chinese agricultural development. In developed countries, the scale management of agriculture has been achieved and agricultural productivity has been greatly enhanced. But the special national conditions of China are as follows: the rural population is so large; the land plays the function of social security; the urban-rural discrepancy policy is formed in history; the scientific and cultural quality of the surplus labor in rural areas is not high; a large number of rural surplus labor who migrate between the urban and rural areas have become the main body of the recurrent population at present in China. It is a consistent judgment of many scholars: only by

the permanent transfer of the rural labor can we achieve the scale management of land. In September 2010, China Development Research Foundation released the new urbanization target of China. The Chinese government will take twenty years to solve the "half urbanization" problem from the Twelfth Five-Year Plan. However, there is about 200 million recurrent population in China, which means that every year in China there will be 20 million people pouring into town. It is clear that in a long period of time, the rural to urban migration will be the basic characteristic of the Chinese recurrent population. This will provide opportunity for the scale management of land in China. We analyse the stage association between the transfer of the rural surplus labor and the scale management of agricultural land, and use case to verify it.

1 Overview of literatures

Many scholars get involved in the problems of labor transfer and the scale management of agriculture, but few research the stage association between them. Although no one puts forward the stage coupling concept about the transfer of rural surplus labor and the scale management of land, there are a lot of documents which research the transfer of rural surplus labour, scale management of land as well as the relations between them. The thing that closely relates to the theme is the research of the efficiency that the land transforms from fragmentation to scale economy.

As for efficiency and the transformation of farmland fragmentation to scale, under the current productivity conditions,

the negative influence of farmland fragmentation on the agricultural production is very serious. Fleisher and other scholars study the fragmentation of farmland in China and estimate the Chinese grain production function by using the survey data of 1987 and 1988. They have found that if we reduce the number of sample plots from 4 to 1, the total factor productivity will increase 8%^[1]. Wan Guanghua, *etc.* have carried out the research of land fragmentation and scale economy by using the household survey data and have constructed C-D function model. The estimation result shows that land fragmentation not only reduces the scale economic efficiency, but also affects the grain output seriously^[2].

How to lower the degree of land fragmentation? Theorists have put forward two main methods. One is to promote scale management through administrative directives. But this method is inefficient and it is likely to lead to problems such as rent-seeking by rural cadres, incentive supervision and measurement, thus it is not suitable for national promotion^[3]; secondly, we can lower the degree of land fragmentation through farmland market. At present, most scholars consider the perfection of the farmland market as a feasible way of lowering the degree of farmland fragmentation^[4-5].

The empirical study on whether farmland market can lower the degree of land fragmentation has been proceeding. The agricultural research center of the Ministry of Agriculture has conducted research by using the information from the fixed observation sites in rural areas and the result indicates that farmland adjustment and rural farmland market restrain the land fragmentation to some extent^[6]; Tan Shuhao, *etc.* have conducted the research by using the data from Guangxi Zhuang Autonomous Region, Hubei Province, Jiangxi Province and more than forty fixed observation sites and their researches show that the marketing development of farmland has no influence on the farmland fragmentation at the level of village^[7].

Based on the survey data in Xinghua, Jiangsu and Bin County, Hei Longjiang, Wang Xingwen gives positive analysis on land rental market and land fragmentation. The result shows that it is impossible to solve the problem of land fragmentation only by farmland market among farmers without involving labor force, population migration, decrease of rural residents and scale expansion^[8].

Due to the fact that land plays the role of social security in the Chinese rural areas, the farmland of China can realize scale management only when the rural population can be transferred fully. We need to experience a transition stage of transferring the right of land management. Meanwhile, the pace of the scale process in the coastal areas and inland suburbs of big cities will be faster than that of the main agricultural areas.

2 Coupling analysis of transfer of surplus labor forces and scaling-up process of farmland

2.1 Stage coupling and the reason—the behavior basis of coupling Coupling is a fundamental concept of physics. It generally refers to the phenomenon that multiple systems and

multiple ways of movement affect each other by various interactions so that they can unify as one. It is a dynamic relationship in which various subsystems achieve interdependence, mutual coordination and promotion through positive interaction. We use this concept to describe the stage interaction and correlation between the transfer of the rural surplus labor and the transfer of the scale management of farmland.

A macroeconomic phenomenon takes a large amount of social behaviours as main target and it happens due to the interaction of these behaviours. During the process that rural surplus labor forces transfer to urban areas and the land changes from fragmentation to scale, individual farmer's decision and governmental departments' overall long-term consideration play the fundamental role. For the motive of profit, all kinds of capital will enter into the land market and engage in agricultural investment when the land market and farmland management are lucrative. Specifically speaking, under the premise of social stability, the objective function of the government is to make the land transfer to scale management and to make the rural surplus labor transfer to the urban areas as far as possible. Under normal circumstances, the government will not sacrifice social stability for the development of some certain industry alone. Neither will it implement a radical economic reform because it is unbearable for the society and its loss outweighs the gain. The objective function of the farmer is the maximization of the family benefits both at present and in the future. Farmers not only seek their income, but also maximize the utility of the family. That is to say, besides income, family consumption cost, quality of life, social status and education of children should also be taken into consideration. Various capital aim at seeking opportunities and then obtain agricultural management profits. At each stage, with different profit margins, capital will enter into the agricultural field to different degrees and with various ways of participation.

The research takes the transfer of rural surplus labor as its starting point. With the rural surplus labor transferring to the urban areas little by little, the scale management of farmland will be promoted gradually. Till the completion of the basic transfer of rural surplus labor, the scale management of land can be completed at last.

2.2 Coupling analysis of three stages of transfer of surplus labor forces and scaling-up process of farmland We think that labor transfer will experience three stages. The transfer of land fragmentation to land scale will also experience three stages. Their corresponding stages are mutual coupling. The coupling of three stages is a state of equilibrium when the three parties interact with each other and pursue their own goals. The alternation of the three coupling stages is a game of dynamic equilibrium among the three parties.

2.2.1 Coupling analysis of the first stage—behaviors of all parties and the equilibrium outcomes at the first stage. The first coupling stage of rural surplus labor transfer and the transfer of land fragmentation to land scale is that after the appearance of a great number of rural surplus labor forces, farmers begin to go out to work in the city, setting the system of urban-rural seg-

mentation as background. The merger of land management has not appeared at this stage and plot of individual farmer hasn't been gathered up, so the total land area of individual farmers hasn't increased and the total number of farmers hasn't decreased. Part of incomes which come from their work in city have turned into productive investment in agriculture. Agricultural machinery begins to appear, so cattle farming quits the stage of history. Rural market becomes active, rural service and town industry begin to appear. With the development of productive forces and the increase of yield, large agricultural machinery emerges. As the cost of buying these machines for each household is too high, rich farmers begin to buy big machines to work for individual farmers in busy season. In this way, individual farmers are not responsible for the most important part in agricultural production and this part is realized by hiring labor. Due to the increase of food production and the reform in the food circulation system, few farmers with special resources begin to manage grain procurement. Actually, all these phenomena have laid a preliminary foundation for the scale management of farmland. Since we couldn't achieve the centralized management of land fragmentation, these phenomena from which we could see that a little bit of scale management could not continue to develop, but to remain stagnant. In need of social stability, government wouldn't take coercive measures for the transfer of land fragmentation to scale management, because income from land is still a main way of income for farmers. The social security function of land has still played a basic role for farmers' living. The government is trying to promote the industrial development in the city, especially the development of labor-intensive industries so as to enhance the ability of absorbing rural surplus labor. At the same time, it also makes efforts to create favorable conditions for migrant workers to work elsewhere, regulates the labor market and strengthens the protection of the rights and interests of migrant workers. At this time, rural folk capital mainly begins to involve in the agricultural management by taking the form of buying machine, being employed by farmers, gaining profit, or engaging in the work of purchasing agricultural product and reselling. This stage has already passed both in developed regions and in suburban areas. In the main agricultural area, that is to say, in the vast rural areas, such as Henan Yudong plain, it has just begun. In this period, there is a slight circulation of land. For example, migrant families let their relatives manage their own land temporarily.

2.2.2 Coupling analysis of the second stage—behaviors of all parties and the equilibrium outcomes at the second stage. The second coupling stage is the stage of further development of urbanization in China. The income of farmers who work in the city has become the main source of income. Because the separate urban-rural political and economic system is replaced by the equal system of urban and rural areas, and the institutional obstacle that farmers migrate to cities permanently have disappeared. With the industrial and service development in small and medium-sized towns, corresponding social security and education mechanism have been constantly improving. Being stimulated by the living standard and income level, a large

number of rural surplus labor forces begins to live in the city permanently. Since a great number of farmers begins to migrate to cities, the transfer of land property rights which is caused by the equitable distribution of land has become an actual urgent need. Rural land property market becomes active. At this stage, rural scale management of land begins to appear. Foreign Funded Enterprises begins to involve in agriculture and the industrial management of agriculture has the most fundamental conditions due to the emergence of land scale. Wage labor becomes the main form of labor in the rural labor market. Driven by the managing strength of farmers and larger profits, agricultural product market begins to exploit channels of sales market actively and pays attention to market forecast. The farmland scale management increases its ability of resisting risk. Considering the cost, we will promote labor-saving and resource-saving machinery and equipment vigorously. At this stage, the biggest obstacle to the scale management of rural land is that the land property market is in chaos and some farmers may be reluctant to give up the property and they want to manage it by themselves. At this time, the importance of the state administrative intervention looms large. Under the national compensation mechanism, problems of property will be solved. At this stage, the proportion of land income in the total income of rural households declines significantly and we no longer need the social security function of land. Governmental intervention in the property market is of great importance at this time. The majority of the eastern coastal regions and big cities of the inland are experiencing this stage. Land is being transferred on a large scale at this stage.

2.2.3 Coupling analysis of the third stage—behaviors of all parties and the equilibrium outcomes at the third stage. At the third coupling stage, the transfer of the rural surplus labor is basically finished. Farmland property rights and the form of land management will be centralized greatly. The obstacle to scale management of agriculture will be solved radically and the income gap between the urban and rural areas is becoming smaller, thus the rural-urban migration is no longer the main form of recurrent population in China. This stage is China's modernization stage of agriculture. Farmers are no longer the farmers in traditional sense. Agricultural capital dominates agricultural management and agricultural industrialization achieves further development. This stage is a natural extension of the second stage and it still hasn't been reached in China, but it will be the future state of the rural areas in China.

3 Case study

3.1 Case analysis of the first stage of coupling The empirical research of the first stage is targeted for the proposition as follows: if the rural surplus labor is not transferred fully, the transformation from the land fragmentation management to the land scale management through the rural land market is impossible.

The proof of the first coupling stage is from the survey and research of Wang Xingwen's PhD thesis *The Transformation of Land Market Among Rural People and Farmland Fragmentation-Based on the Survey and Analysis of Xinghua, Jiangsu*

and Bin County, Hei Longjiang^[8]. The overall goal of his research is as follows: under certain conditions of a high proportion of population and land, a large number of rural surplus labor forces and an imperfect mechanism of rural social security, investigate whether the reform of the farmland property rights can effectively solve the problem of farmland fragmentation and it can supply scientific and detailed empirical basis for government to formulate agricultural production and land policy. The agricultural land market that the research involves is confined to farmland market among farmers, and it doesn't involve the land market which is accompanied by labor force, population migration, decrease of rural residents and scale expansion.

He takes Xinghua, Jiangsu and Bin County, Hei Longjiang as an example and adopts the household survey method. By statistic analysis, program simulation and quantitative analysis, he uses the first-hand survey data to discuss the influence that the first coupling stage has on the quality of farmland and the supply-demand relations from the proportion of population and land of agricultural department. The agricultural land market that the research involves is confined to farmland market among farmers, and it doesn't involve the land market which is accompanied by labor force, population migration, decrease of rural residents and scale expansion. We can get the four conclusions as follows: the first is that now we can't solve the problem of land fragmentation by developing land demand market; the second is that now we can't solve the problem of land fragmentation by developing land renting market; the third is that we can't solve the problem of land fragmentation by developing land dealing market; the fourth is that the utility of land market depends on the number of farmers and their land scale.

That is to say, at the first stage of coupling, land management won't realize scale management and the change of the first stage has laid a preliminary foundation for the farmland scale management.

3.2 Case analysis of the second stage of coupling The case of the second stage is from Fang Zhongyou's PhD thesis *Study on Farmland Circulation Mechanism—Take Nanjing as an Example*^[9]. He describes the current situation of the transfer of the land fragmentation to land scale in Nanjing rural areas in detail. His perspective is the transfer of land property rights in Nanjing. He has made a three-stage classification on the transfer of land property rights. At the initial and developing stage of land transfer, farmers go to city to work with a high income expectation and the transfer of land is spontaneous and smooth without a contract. The phenomena that appear at the stage of regulation and perfection are very enlightening. Conditions that are accumulated by the first stage for the land scale management finally have a qualitative change at the stage of land transfer. There are several new dynamic phenomena at this stage: first, a new trend of land transfer in this period is that large numbers of Foreign Funded Enterprises have involved in agricultural development; second, price mechanism has begun to take effect in the transfer of farmland; third, for local farmers, they are more willing to transfer their land to others instead of transferring others to their own while the arrival of

foreign farmers, large-scale cultivating farmers and agricultural enterprises tends to balance the supply and demand of land; fourth, the cost of transaction determines whether rural land can be transferred through intermediary organization.

It should be pointed out that at the stage of regulation and perfection, there was a phenomenon that farmers didn't want to transfer their land but to reclaim their land. However, this exactly proves that land scale management is profitable. The motive of farmers who want to reclaim their land or are unwilling to transfer their land is the same as that of Foreign Funded Enterprises. The above two cases support the division of the first and second coupling stage of the research effectively. Limited by the status of rural surplus labor transformation, China hasn't the case of the third coupling stage. But if we refer to the land management history of developed countries in Europe and America, it is not difficult for us to find that the third stage will come sooner or later.

4 Conclusion

The above research has innovative significance to the coupling analysis between the transfer of the rural surplus labor stage and the transfer of the land fragmentation to land scale stage. It is a long-term understanding about agriculture and rural surplus labor. This understanding fills a gap of research in this area in China to some extent. The research has certain policy significance as follows: China has vast land, and we have an uneven economic development in different regions experiencing different coupling stages, so we should formulate corresponding policies and measures according to different stages. For individual farmers, they should be able to distinguish big trend and follow the trend of development. For various capital, we should choose chance and move according to region circumstances. Of course, due to data constraints, we only use other people's study as an indirect empirical research. Collecting relevant data to make statistical analysis and econometric analysis will be the next step.

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sides, the governmental department should promote and perfect rural new cooperative medical care system; solve the most concerned problems of old age insurance and medical care; continuously deepen the reform on education system, intensify the fiscal support on the education of farmers' sons and daughters and provide comprehensive social security such of old age insurance, medical care and education of farmers' sons and daughters for farmers' land transfer. As for the farmers, whose land has been transferred, the government should provide good services for them to ensure that they have found good job in other fields and obtained higher income. As for those farmers, who have not found jobs, the government should establish the minimum subsistence allowances according to regional economic development level and prices of local products to ensure the minimum standard of living. The governmental departments should well prepare the education and training for farmers; improve farmers' knowledge and skills and provide favorable public services for transferring rural labors to urban areas.

4.3 Changing the thought pattern and style of local officials and guiding farmers to foster scientific outlook on land transfer Local officials should set up the political performance outlook and establish the farmer-oriented idea and eliminate the conspiracy with commerce. It should not force farmers to transfer their land and promote local economic growth by damaging farmers' willingness. Under the background of launching new village construction and implementing the policies of "three agriculture", the local government should take pro-agriculture projects as a new growth point of governmental performance; well promote and educate farmers about rural land transfer; explain national laws, regulations and national policies for farmers; open the relevant work to let farmers know the policies, support the policies and seize the opportunities of policies to transfer land vigorously to get maximum profits. At the same time, the governmental department should change the traditional administrative way and realize the change from single mandatory way to persuasion and education to direct farmers to set up correct land transfer outlook. The government should try to change the conservative status of farmers; eliminate the small peasant ideology of farmers and improve farmers' market awareness, so as to eliminate thought obstacles of rural land transfer; motivate farmers' enthusiasm on land transfer and liberate farmers from land.

4.4 Promoting the system construction and vigorously cultivating rural land transfer market Perfect system is the basis for protecting the regulation and order of rural land transfer. In the first place, rural land property system should be defined and the authorized and unified standard on rural farmland, forest, home stead and house should be made to eliminate the

differences and uncertainty of systems in different areas to protect the legal property rights of resources owned by farmers. In the second place, the scientific land management system should be established. The government should make rational system arrangement in view of the actual situation of land use to intensify the supervision on land transfer; normalize the signing process and form of rural land transfer contract; direct and interfere the trade price and responsibility, establish special interest coordination and arbitration institution and provide convenient coordination channels for solving contradicts and disputes in land transfer. In the third place, the government should support and cultivate rural land transfer market and expand the demonstration effects of minor developed areas as soon as possible to continuously promote advanced experiences and establish a relatively normal land property right trade market nationwide and strike the behaviors of violating the laws and farmers' land rights. In the fourth place, the government should encourage and support the cultivation and development of land trade organization and market intermediary organization to provide smooth organization channels for rural land transfer and timely land transfer information to help them find appropriate land transfer subjects, so as to improve the efficiency of rural land transfer.

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