Empirical Research on Impact of Marketization of Agricultural Products on Income of Rural Households Based on Questionnaire Survey of Rural Household

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Abstract　Based on the survey and research on rural households in Changshu City and Jiangdu City of Jiangsu Province，this paper researches the microeconomic subject-commercial decision-making and production behaviours of the rural households，under the circumstance of development of agricultural product market in different regions. We conduct random sampling questionnaire survey on the rural households in 7 villages of Changshu City and Jiangdu City，Jiangsu Province，and obtain data，in order to judge and verify the theory，explore the relationship between market development of agricultural products，behaviours of rural households and income of rural households，and establish the econometric model of impact of market of agricultural products on income per capita of rural households. The research shows that there is difference in the level of socio-economic development in different regions of Jiangsu Province，and the effect of the same factors in different regions is not quite similar；the income structure of rural households and marketization development have great impact on total income per capita of rural households；the planting structure has significant impact on agricultural income per capita. Then the countermeasures and suggestions are put forward as follows：strengthen rural marketization building and broaden sales channel；reinforce information-based building and promote transparency and openness of rural market information；adjust the production structure of rural households rationally，coordinate agricultural production activities and non-agricultural activities of rural households，and balance the planting of cash crops and grain crops.

Key words　Market of agricultural products，Income of rural households，Survey of rural households，Analysis of influence，China

China is a large agricultural country，and the 16th party congress of the Chinese Communist Party definitely puts forward the strategic task of constructing harmonious socialist society，from building a moderately prosperous society and creating a new situation of the socialist cause with Chinese characteristics. The Central Committee attaches great importance to the issues concerning agriculture，countryside and farmers. The 17th party congress of the Chinese Communist Party has clearly sketched the objective of coordinating urban and rural development，advancing the construction of new socialist countryside，strengthening the fundamental role of agriculture，taking the path of agricultural modernization with Chinese characteristics，and forming new pattern of integration of urban and rural economic and social development. China has as many as 250 million rural households，and the income of rural households is not only related to the living standards of the vast majority of farmers in China，but also closely linked with realization of long-term planning goal of China's society and economy. The regional market development of agricultural products，non-agricultural employment of rural households and so on，will exert impact on land use type，level of input and output，and management income of rural households，while the association mechanism of various factors is what this research is particular-

ly concerned about. Only through effectively ensuring the effective supply of agricultural products and continuous increase of farmers' income can we achieve the goal of rural economic development in China[1].

1　Overview of the study area

Jiangsu Province is located in the center of eastern coastal China. Since the reform and opening up，Jiangsu Province has been playing an exemplary role in China，with rapid economic development and obvious urbanization trend. And the conditions of economy and geographic location in all cities and counties of Jiangsu Province is advantageous. Jiangsu Province is also the famous " land flowing with milk and honey"，a major agricultural province in China. Along with different latitudes，there is prominent difference in regional development of Jiangsu Province，and the differences of socio-economic development among South Jiangsu，Central Jiangsu and North Jiangsu loom large. The level of urbanization in South Jiangsu is deep，rural residents' working elsewhere and entrepreneurial behaviour are universal，and farmers' standard of living is high；Central Jiangsu is located in marginal areas of the Yangtze River Delta Economic Circle，the level of development of which is lower than that of South Jiangsu；the economic level of North Jiangsu lags behind in Jiangsu Province，but the local government actively attract investments，thus the economy shows the trend of boom.

We select Jiangdu City，a county-level city subordinate to

Yangzhou City in Central Jiangsu of Jiangsu Province, and Changshu City, a county-level city subordinate to Suzhou City in South Jiangsu, as the study areas. Then we select seven villages in Jiangdu City and Changshu City for survey and research at the level of rural households, namely Xinhang Village, Putang Village, Luyanghu Village, and Hongling Village in Yangzhou City, Bailian Village, Beigang Village, and Dongdun Village in Suzhou City. The location map of the study area can be seen in Fig. 1.

2 Model setting of impact of market development of agricultural products on income of rural households

2.1 Basic model setting of impact on rural households

Cobb-Douglas Production Function reflects the quantitative relations between input and output under the given conditions of production technology. The basic expression of the function is as follows:

$$Y = A \, K^{\alpha} L^{\beta} D^{\gamma \mu}$$

where Y is total output value; K, L, D are input amount of fixed assets, input amount of labour forces, and input amount of land, respectively; α, β, γ are the output elasticity of input amount of fixed assets, input amount of labour forces, and input amount of land, respectively; A is coefficient; μ is the impact of random disturbance, $\mu \leqslant 1$.

To analyze the factors affecting income of rural households, generally we can conduct analysis from net income per capita of rural households and net income of households. However, the net income per capita of households is the better an-

gle for consideration, because it also effectively incorporates the differences in family size into the scope of consideration[2].

According to the norms and assumptions of Cobb-Douglas Production Function, there is logarithmic relationship and output of laborer, capital and the amount of land, and we further assume that the production function of the relationship between semi-logarithm of human capital variable and output can be written as:

$$\mathrm{Ln}HNI_i = \gamma_0 + \gamma_l \ln L_i + \gamma_2 \ln K_i + \gamma_3 \ln LL_i + \gamma_4 edu_i + \gamma_5 exp_i + \gamma_6 exp_i^2 + v_i \qquad (1)$$

where L_i is the labour inputs used for household production; K_i is household capital; LL_i is land inputs for household production; edu_i is length of education enjoyed by laborers; exp_i is laborer's market working experience; v_i is random item.

2.2 Model setting of impact of marketization development on income per capita of rural households

The previous studies on the income of rural households, combine the internal and external factors, and focus on the characteristics of the head of the household, family characteristics of rural households, and impact of social environment[3]. We add the factors of the market development of agricultural products, and measure the situation of market development of agricultural products, according to whether the farmers perceive the impact of agricultural product market on their sale or not, and whether the rural households master the market information of agricultural products or not. According to the basic model setting and the previous studies, we select six types, eight variables in total, to research the impact of marketization on the income of rural households (Table 1).

Table 1 Interpretation of model factors

Type of variable	Type of variable	Name of variable	Interpretation of variable	Type of variable
Dependent variable		Y_1	Total income per capita // Yuan	Continuous variable
		Y_2	Agricultural production income per capita // Yuan	Continuous variable
	Variable of rural household characteristics	X_1	Proprietors' educational level (the value of X_1 is 1 – 7)	Discrete variable
	Variable of land inputs	X_2	Farmland area per capita // hm²	Continuous variable
	Variable of social environment	X_3	Distance from the city // km	Continuous variable
	Variable of income structure	X_4	The ratio of agricultural production income and total income // %	Continuous variable
	Variable of planting structure	X_5	The main types of agricultural crops planted	Discrete variable
Independent variable	Variable of market development of agricultural products	D_1	Whether there is sales market of agricultural products or not (Yes =1, No =0)	Virtual variable
		D_2	Whether the market of agricultural products has impact on sales of agricultural products (Yes =1, No =0)	Virtual variable
		D_3	Whether to know market information or not (Yes =1, No =0)	Virtual variable

2.3 Interpretation of model of impact of marketization development on income per capita of rural households

The model setting of impact of the market development of agricultural products on total income per capita of rural households is as follows:

$$\ln Y = \alpha_0 + \alpha_1 \ln X_1 + \alpha_2 \ln X_2 + \alpha_3 \ln X_3 + \alpha_4 X_4 + \alpha_5 D_1 \times D_2 + \alpha_6 D_3 \qquad (2)$$

where α_0 is constant term, and α_1, α_2, α_3 are coefficients. Here we choose the characteristics of rural households, land

inputs, social environment, income structure and the market development of agricultural products, closely related to the family income of rural households, as independent variables, to analyse the effect of them on total income per capita of rural households. X_1 is the educational level of the head of household, and here we set seven educational levels: illiteracy, primary school, junior high school, senior high school, technical secondary school, college and college above, with the value of 1 to 7. D_1 and D_2 are interactive variables, and we use $D_1 \times D_2$

to describe the effect of them.

The model setting of impact of the market development of agricultural products on agricultural production income per capita of rural households as follows:

$$\ln Y = \beta_0 + \beta_1 \ln X_2 + \beta_2 \ln X_3 + \beta_3 X_5 + \beta_4 D_1 \times D_2 + \beta_5 D_3 \quad (3)$$

Given that the agricultural production income of rural households is mainly the sale income from agricultural products, so we choose land inputs, social environment, planting structure and the market development of agricultural products that are closely related to production and sale of agricultural products, as independent variables. X_5 is the planting structure of main agricultural crops, and here if we plant the vegetables based on the specific circumstances of the sample villages, this value is 1; if we plant grain, this value is 0. β_0 is constant term, β_1 and β_2 are coefficients.

3　Acquisition of survey and research data

From July 2010 to August 2010, we choose seven villages in two cities of Jiangsu Province, for random sampling. The questionnaire is mainly from the situation of farmers' family structure, the status of farmland, and the market development of agricultural products to see the impact of them on household income. The index of family structure includes the total number of family, the educational level of head of household, age of head of household, and the amount of labour forces; the index of status of farmland includes the total scale of arable land, planting area and crop yield per unit; the index of status of market development includes whether there is an integrated market of agricultural products, market location, and whether to know the information about agricultural products; the index of income status includes total household income, agricultural income and the income from working elsewhere.

As to the economic conditions of the survey areas, from Fig. 2, we can find that farmers' income per capita in Jiangsu Province in 2009 is above the national average, and the economic level of study areas selected (Changshu City and Jiangdu City) is higher than the provincial average, but at the same time, it also clearly reflects the economic gap between North Jiangsu and South Jiangsu.

We surveyed 392 rural households in 7 villages in the aggregate, and called back 380 effective rural household questionnaires and 6 village questionnaires. Table 3 shows that the agricultural income of Jiangdu City is significantly lower than that of Changshu City, which is mainly related to the planting structure of the two regions, that is, all villages in Jiangdu City mainly grow food crops, while all villages in Changshu City plant vegetables and cash crops. The proportion of diversified management in Changshu City is higher than that in Jiangdu City. The family size of Changshu City is generally smaller than that of Jiangdu City, and people tend to participate in non-agricultural activities in conjunction with agricultural production, to achieve greater gains; in Jiangdu City, the agricultural benefit is low, and the young labour forces no longer grow grain, but work elsewhere.
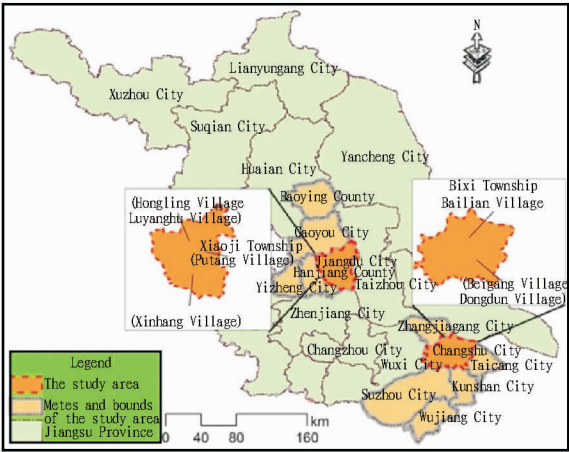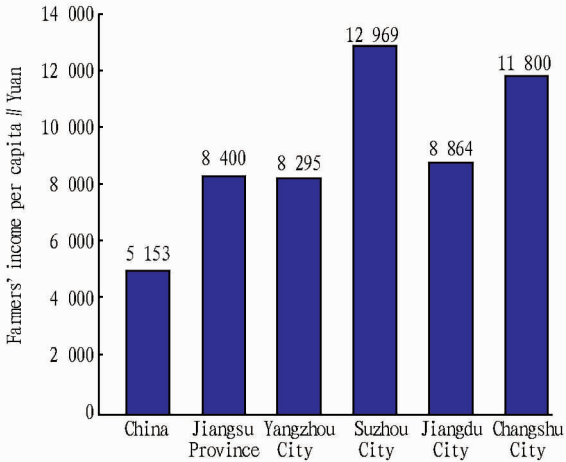

Fig. 1　Location map of study area

Fig. 2　The comparison of income per capita of farmers in 2009

Table 2　Basic information of sample households

| Village | City | Sample | | Farmland area per capita∥hm² | Annual agricultural income per capita∥Yuan | Non-agricultural income per capita∥Yuan | Proportion of diversified management of rural households∥% |
		Number of households	Number of people				
Hongling Village	Jiangdu City	24	96	0.184 7	1 373.88	11 464.17	32.29
Luyanghu Village	Jiangdu City	38	147	0.042 7	307.28	12 061.09	37.41
Putang Village	Jiangdu City	62	270	0.106 0	1 945.07	10 673.19	37.78
Xinhang Village	Jiangdu City	64	254	0.098 7	1 588.96	10 572.24	37.01
Bailian Village	Changshu City	58	233	0.082 7	3 305.29	9 361.34	45.06
Beigang Village	Changshu City	63	273	0.072 0	4 250.61	8 081.02	37.00
Dongdun Village	Changshu City	61	263	0.097 3	5 321.78	9 430.72	42.97

4 Empirical analysis of impact of market development of agricultural products on income of rural households

4.1 The model estimation result of impact of market development of agricultural products on total income per capita of rural households
By SPSS17.0 software, we calculate the collected data concerning 380 rural households, taking the total income per capita of rural households Y1 as dependent variable. According to the setting of model (2), we obtain the following estimate:

$$\ln Y_1 = 8.429 + 0.103 \ln X_1 + 0.185 \ln X_2 + 0.243 \ln X_3 -$$
$$(29.090)(1.193) \quad (4.468) \quad (3.024)$$
$$1.788 X_4 + 0.379 D_1 \times D_2 + 0.342 D_3 \quad (4)$$
$$(14.952)(5.245)(4.514)$$

F value of the model is 41.324, and the equation is significant when the confidence level $a = 0.05$. Then according to t test results of variables, we get that the estimated coefficient of each variable is significant.

By the model (4), we get the following conclusion:

First, from the model calculation results of holistic sample, the factors selected, including educational level of rural households, arable land area per capita, distance from the town, the ratio of agricultural income to total income, and market development, have significant impact on income per capita of rural households.

Second, the ratio of agricultural income to income of rural households, and distance from the town, have negative impact on overall income of rural households. Other factors play a positive role in overall income per capita of rural households. In comparison with non-agricultural activities, the input and output return of agricultural production is not so high, and the efficiency of wage income is high. For rural development, the surrounding regional environment is also an important factor, and the shorter the distance from the town, the higher the level of income per capita of rural households.

Third, the factor of share of agricultural income in income of rural households has the greatest elasticity influencing income of rural households. When declining by 1 percentage point, the income per capita of rural households will rise by 1.788 percentage points. This reflects the importance of income structure, and indicates the importance of adjustment of industrial structure, reasonable arrangement for production activities of rural households, and enhancement of output efficiency of rural households.

Fourth, the market of agricultural products has significant impact on income per capita of rural households. When the survey regions have sale market of agricultural products, and the market of agricultural products has impact on sale of agricultural products, the income of rural households will increase by 0.379 percentage point accordingly. This shows that it is necessary to strengthen the construction of marketization in rural areas.

4.2 Estimation result analysis in different regions
We conduct regression analysis on 182 samples in Changshu City and 188 samples in Jiangdu City, respectively, according to the setting of model (2), and get the following model.

The model estimation result of Changshu City is as follows:

$$\ln Y_1 = 10.618 + 0.148 \ln X_1 + 0.354 \ln X_2 - 0.319 \ln X_3 -$$
$$(8.210)(1.076)(4.394)(-0.887)$$
$$1.932 X_4 + 0.157 D_1 \times D_2 + 0.535 D_3 \quad (5)$$
$$(-11.019)(1.297)(4.354)$$

F value of the model is 24.633, and the equation is significant at confidence level $a = 0.05$

The model estimation result of Jiangdu City is as follows:

$$\ln Y_1 = 8.789 + 0.125 \ln X_1 + 0.126 \ln X_2 + 0.100 \ln X_3 -$$
$$(33.412)(1.301)(2.947)(1.363)$$
$$1.937 X_4 + 0.438 D_1 \times D_2 + 0.201 D_3 \quad (6)$$
$$(-11.839)(5.459)(2.380)$$

F value of the model is 28.345, and the equation is significant at confidence level $a = 0.05$

Through model (5) and (6), we combine Jiangdu City and Changshu City, and find that:

First, the factor of farmland area per capita, factor of income structure and factor of marketization have significant impact on income per capita in two regions. In terms of family income for rural households, the land input is an important factor influencing land yield, while the sale of agricultural products is inseparable from the market, so the two factors have great impact on income of rural households. But from the perspective of input and output, the efficiency of farmers' wage income obtained from non-farm activities, is higher than that of income from agricultural products.

Second, when the market development of agricultural products has impact on two regions, the effect is different. In terms of Changshu City, mastering market information of agricultural products has greater impact on increase of income of rural households, while in terms of Jiangdu City, the sale market of agricultural products has significant impact on agricultural income. It is because the development degree of market of agricultural products in Changshu City is better than that of Jiangdu City. In addition to planting structure difference in two regions, the time of growing vegetables and storage is limited in Changshu City, and the price of seasonal crops is influenced by the seasonal market greatly; it mainly grows grain in Jiangdu City, the storage time of grain crops is long, and the price is uniform in a given period of time, less affected by market conditions.

4.3 The market development of agricultural products has impact on agricultural production income per capita of rural households
We conduct model calculation on the survey data concerning 380 rural households by SPSS17.0 and eliminate 50 samples without agricultural production income. There are 330 effective samples left, and then we use the setting of model (3) to conduct model estimation, thus getting the following model:

$$\ln Y_2 = 8.426 + 0.565 \ln X_2 - 0.601 \ln X_3 + 0.951 X_5 +$$
$$(21.169)(7.523)(-4.962)(8.774)$$
$$0.330 D_1 \times D_2 + 0.766 D_3 \quad (7)$$
$$(3.370)(7.594)$$

F value of the model is 59.08, and the model is significant at confidence level $a = 0.05$.

From the results of model (7), we can find that in terms of agricultural income, the impact significance of all factors is

good, and the planting structure has the greatest impact. It is positively correlated with the factor of distance from town and the factor of agricultural income, and the other factors are negatively correlated with agricultural income impact. In addition, the variable of planting structure has great impact on agricultural production income. The agricultural income of Changshu City which grows vegetables with high economic value, is higher than that of Jiangdu City which grows the grain crops with relatively low economic benefits. The factor of market development of agricultural products has great impact on agricultural income of rural households, and especially the market conditions of agricultural products have great impact on improvement of agricultural income. Knowing the market conditions and growing the products with profitability can improve agricultural income of rural households.

5 Conclusion and suggestions

5.1 Conclusion   First, there is difference in the level of socio-economic development and non-agricultural employment environment in different regions of Jiangsu Province, therefore, there is regional difference in influencing factors of income per capita of rural households, and the same influencing factor may have different effects in different cities.

Second, the impact of factor of income structure-the proportion of agricultural income to total income, within a large region or a sample region of single city, on income per capita of rural households, assumes negative correlation prominently, and the elasticity coefficient is big.

Third, the development of marketization has great impact on total income per capita in Changshu City and Jiangdu City. For Changshu City where cash crops are grown, the mastering of market conditions has greater impact on sale of agricultural products and income of rural households than the market of agricultural products, while for Jiangdu City where the grain crops are grown, it is otherwise.

Fourth, the planting structure has great impact on agricultural income per capita. The agricultural income of rural households in Changshu City where vegetables with higher economic value are grown, is higher than that of rural households in Jiangdu City where the grain crops are planted. The agricultural production structure of rural households is a very important factor, and reasonable production structure will help improve the income of rural households.

5.2 Suggestions

5.2.1   Strengthen rural marketization building and broaden sales channel. Through deepening reform and managing urban affairs according to law, we should establish sound operating mechanism of rural market, establish and improve the cost, price, market supply and demand, and interest distribution mechanism of agricultural products[4]. The relevant administrative institutions should enact a set of laws and regulations in line with socialist market economy, improve market trading rules, create and maintain good market environment of agricultural products.

5.2.2   Reinforce information-based building and promote transparency and openness of rural market information. Strengthening the work of rural market information is the urgent requirement of development of modern agriculture, and building of new socialist countryside. If the market is alive, the rural areas will be prosperous, and if there is quick information, the farmers will get rich[5]. The government should establish and improve information-based network system in rural areas, and provide more ways to know market conditions for rural households via network, radio, newspaper, magazine and other media means, to make information more open and transparent and guide production and sale behaviours of rural households.

5.2.3   Adjust the production structure of rural households rationally, coordinate agricultural production activities and non-agricultural activities of rural households and balance the planting of cash crops and grain crops.

If the efficiency of agricultural production is low, the rural households will be inclined to choose non-food industry, particularly non-agricultural industry. We should pay attention to the sustainable development of agricultural production, so as to ensure unity of supply of agricultural products and farmers' income increase[6].

References

[1] HU X. Cause analysis and countermeasure discussion of increase of farmers income characteristics[J]. Economic Survey, 1992(2): 46 −49. (in Chinese).

[2] KUZNETS SS. Demographic aspects of the size distribution of income: an exploratory essay[J]. Economic Development and Cultural Change, 1976, 25(1): 1 −94.

[3] HAN SC, XIE YS, HAO MD, *et al.* Research on the difference of investment behavior of different farm household type[J]. Research of Soil and Water Conservation, 2005, 12(5): 84 −86. (in Chinese).

[4] SHANG QJ. Cause analysis of staggered transformation of increase of agricultural labour force income in China[J]. Rural Economy, 1998(5): 4 −6. (in Chinese).

[5] LIN YF. Some opinions on rural modernization and urban development in China[J]. Anhui Policy Making Consultation, 2001(8): 18 − 19. (in Chinese).

[6] GUO JL, ZHANG XY. Function analysis of structure change on economic growth mode[J]. The Journal of Quantitative & Technical Economics, 1998(9): 38 −40. (in Chinese).

[7] LI Y. Consumer behavior analysis under the "Lemon Dilemma" in the market of agricultural products[J]. Asian Agricultural Research, 2010, 2(11): 17 −19, 25.

[8] LI HM. Study on influencing factors of staple agricultural products market competitiveness[J]. Journal of Anhui Agricultural Sciences, 2011, 39(34): 21456 −21458, 21463. (in Chinese).

[9] SUN LB. The empirical analysis of the dynamic prices relationship between cotton spot market and futures market in Xinjiang[J]. Asian Agricultural Research, 2011, 3(2): 101 −104.

[10] WEI J, LIU WJ. Study on the cooperative supervision system for the agricultural products market based on intelligent agent [J]. Journal of Anhui Agricultural Sciences, 2011, 39(20): 12510 − 12512. (in Chinese).

[11] LIN Y, REN DP. Research on the legal regulation of market access for agricultural products in China[J]. Asian Agricultural Research, 2011, 3(4): 9 −14, 17.

[12] HE H. Application of GARCH model in research on price of agricultural products[J]. Journal of Anhui Agricultural Sciences, 2011, 39 (30): 18956 −18958. (in Chinese).