Analysis of Factors Affecting the Growth of New Agricultural Operating Entities

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Abstract　Based on the survey data of 718 new agricultural operating entities in Hubei Province in 2016, the principal component analysis method was used to comprehensively evaluate the factors affecting the growth of new agricultural operating entities. The results indicate that the policy environment and administrative environment have a high impact on the growth of new agricultural operating entities, followed by human environment, production and operating characteristics and family characteristics. The household characteristics have the lowest impact on the growth of new agricultural operating entities. Finally, it came up with the policy recommendations.

Key words　New agricultural operating entities, Principal component analysis, Comprehensive evaluation, Growth

1　Introduction

New agricultural operating entities are modern agricultural production and operating entities established on the basis of household contract management, adapting to requirements of market economy and agricultural productivity development, and engaged in specialized and intensive production and operation, and having high level of organization and socialization. The growth of the new agricultural operating entities is a comprehensive project that requires their leaders to scientifically integrate production factors and social resources, as well as the support of relevant government departments. They are also influenced by the farmers' own characteristics and the family environment. Therefore, it is of great significance to survey and study the actual environment of the growth of new agricultural operating entities, analyze the key factors affecting their growth, and come up with policy recommendations for promoting their healthy growth and development, so as to promote China's agricultural modernization.

2　Data source and sample statistical description

The data used in this study came from the survey data of the new agricultural operating entities in Hubei Province in October 2016. We adopted the sampling method, issued a total of 720 copies of questionnaires, collected 718 valid ones, and the response rate was 99. 72%. The influencing factors in the questionnaire included individual characteristics of households, family characteristics, production and operating characteristics, human environment, administrative environment and policy environment.

2.1　Sociological characteristics and production characteristics

For the sociological characteristics of the leaders of the new agricultural operating entities, 584 heads of households were male, accounting for 81. 34%, and 134 heads of households were

female, accounting for 18. 66%. The age of heads of households was mainly 31 - 50 years old, accounting for 74. 79%, mainly because this age group is rural young and middle aged labor. As regards the educational level, the respondents were mainly high school and secondary school graduates (349 people, accounting for 48. 62%), followed by junior high school graduates (205 people, accounting for 28. 55%), and 142 people had college and above education (accounting for 19. 78%). Besides, 486 people had the experience of migrant work, accounting for 67. 69%, while 232 people did not have such experience, accounting for 32. 31%. For the number of family members, 49. 3% families had 4 - 5 members. This is mainly because the new agricultural operating entities currently advocated by the central government are suitable for organizing moderate-scale production on a family basis, and the number of family labor forces will also influence the growth of new agricultural operating entities. From the perspective of the fund base, the annual income of 50 000 - 100 000 yuan accounted for 32. 31%, the 100 000 - 150 000 yuan accounted for 24. 51%, and annual income higher than 150 000 yuan accounted for 31. 2%, and only a few respondents had an annual income lower than 50 000 yuan. The new agricultural operating entities with high income ability also had strong input ability, so they had the possibility of applying advanced technology and production means, and their scale expansion will be faster. As to the perspective of production and operation characteristics, large planting households, family farms and specialized cooperatives accounted for about 30% of the operating entities, and agricultural companies accounted for a small proportion of only 7. 52%. The industries these entities operate were concentrated in planting industry and breeding industry, accounting for 45. 26% and 33. 57% respectively, and the proportion of agricultural processing industry was only 2. 79%. The growth of new agricultural operating entities also depends on the improvement of agricultural commercialization and industrialization. About 57. 10% had operating area below

6.67 ha, 21.17% had operating area of 6.73 – 20.0 ha, and 21.72% had operating area greater than 20 ha, showing that the operating scale of China's new agricultural operating entities is still very small.

2.2 Human, social and policy environment From the perspective of human environment factor, 57.79% of the new agricultural operating entities were affected by the attitude of the family members, in which 20.89% were greatly affected and 29.39% were slightly affected. Besides, 303 people were not affected by social connections, accounting for 42.2%, while 415 people were affected by social connections, accounting for 57.8%. About 43.82% and 51.95% were affected by relatives and peers, respectively. This shows that the leaders of the new agricultural operating entities were based on family support and could obtain more business opportunities and entrepreneurial projects through a good social network. From the administrative environmental factors, the new agricultural operating entities believed that the law enforcement departments of industry and commerce, taxation, agriculture, environmental protection, quality inspection and other law enforcement departments provided real support for the development of new agricultural operating entities, accounting for 45.4%, 45.13%, 62.12%, 46.1% and 46.38%, respectively; the proportion of verbal support was 50.56%, 45.13%, 34.68%, 46.96 and 47.21%, respectively, and the proportion of no support was small. From the policy environment factors, the new agricultural operating entities accounted for 54.74%, 56.82% and 48.19% of the national support policies, local government support policies and bank credit support policies, respectively, and the highly recognized proportions were 40.25%, 26.04 and 16.3%, respectively, indicating that the implementation of the policy was not efficient, and some local administrative departments were not active. For example, the full implementation of agricultural loans supported by the national policy only accounted for 15.18%, and the basic implementation was only 48.33%.

3 Principal component analysis (PCA) method

Principal component analysis is a method of simplifying the analysis of the complex relationships between variables. The basic idea is to study a few linear combinations of indicator systems, and the comprehensive indicators of these linear combinations will keep as much information as possible about the original indicator variations. These comprehensive indicators are called principal components.

Suppose in the question we discuss, there is p indicators, we take these indicators as p random variables, denoted as X_1, X_2, ..., X_p. To make principal component analysis, we need change these p indicators into their linear combinations, these new indicators F_1, F_2, ..., F_k($k \leq p$) fully reflect the information of original indicators and they are independent to each other in accordance with the principle of retaining the main information. The usual practice of principal component analysis is to seek a linear combination of the original indicator F_i. The mathematical method is

to use the variance of F_1(selected the first linear combination, the first composite indicator), that is, the greater the Var (F_1), the more information F_1 contains. Therefore, in all linear combinations selected, F_1 has the largest variance, so F_1 is called the first principal component. If the first principal component is not enough to represent the information of the original p indicators, then select F_2, that is, selecting the second linear combination. In order to effectively reflect the original information, the existing information of F_1 does not need to appear in F_2 again, using the mathematical language, it is Cov (F_1, F_2) = 0, then F_2 is the second principal component. In this way, we can construct the third, fourth, ..., and the p-th principal component. The mathematical model of the principal component analysis method is as follows:

$$F_1 = \mu_{11}X_1 + \mu_{21}X_2 + \cdots \mu_{p1}X_p$$
$$F_2 = \mu_{12}X_1 + \mu_{22}X_2 + \cdots \mu_{p2}X_p$$
$$\cdots\cdots$$
$$F_p = \mu_{1p}X_1 + \mu_{2p}X_2 + \cdots \mu_{pp}X_p$$

Suppose α_1 is the vector of $p \times 1$, solving the principal component is to solve the linear function $F_1 = \alpha'_1 X$ under the constraint condition $\alpha'_1 \alpha_1 = 1$, to make the variance reach the largest, i.e. the make var (F_1) $= \alpha'_1 \sum \alpha_1$ reach the largest and $\alpha'_1 \alpha_1 = 1$, where $\sum$ is the covariance matrix of random variable vector $X = (X_1, X_2, \cdots, X_p)'$. Suppose $\lambda_1 \geq \lambda_2 \geq \cdots \lambda_p \geq 0$ is eigenvalues of $\sum$, e_1, e_2, ..., e_p is standard orthogonal eigenvector corresponding to each eigenvalue, in other words, for e_i anyand e_j

$$e'_i e_j = \begin{cases} i, & i = j \\ 0, & i \neq j \end{cases}, \text{ and } \sum = \sum_{i=1}^{p}\lambda_i e_i e'_i, \ \sum_{i=1}^{p}e_i e'_i = I, \text{ thus}$$

$$\alpha'_i \sum \alpha_1 = \alpha'_1 \ (\sum_{i=1}^{p}\lambda_i e_i e'_i) \ \alpha_1 \leq \lambda_1 \alpha'_1 \ (\sum_{i=1}^{p}\lambda_i e_i e'_i) \ \alpha_1 = \lambda_1 \alpha_1 I \alpha'_1$$

When $\alpha_1 = e_1$, $e_1 \sum e_1 = e'_1 \lambda_1 e_1 = \lambda_1 e'_1 e_1 = \lambda$, at this time, var ($F_1$) $= \alpha'_1 \sum \alpha_1$ reach the largest, i.e., λ_1. Similarly, var ($e'_i X$) $= \lambda_i$, and cov ($e'_i X$, $e'_j X$) $= E'_i \sum e_j = \lambda_j e'_i e_j = 0$, $i \neq j$; $i, j = 1, 2, \cdots, p$

Then, $F_1 = e'_1 X$, $F_2 = e'_2 X$, $\cdots F_p = e'_p X$

Thus, F_1, F_2, ..., F_p is the p principal components of original variables.

4 Principal component analysis of the growth of new agricultural operating entities

4.1 Description of variable selection Name and description of variables are listed in Table 1. In practice, the data is usually normalized to eliminate the influence of the original variable dimension, but the data in this study is all about the impact index, so there is no need to normalize the data.

4.2 Analysis by the PCA method According to the correlation coefficient matrix between variables given by Eviews 6.0 software, the correlation coefficient between X_{10}, X_{11}, X_{12} and X_{13} is greater than 0.45, and the correlation coefficient between X_{15} and X_{16} is 0.64, the correlation of other variables is low, indicating that the selected indicators in the indicator system are good and there is little repeated information.

Table 1 Meaning and descriptive statistics of variables in the model

Variable	Definition	Mean value	Standard deviation
Gender (X_1)	Male $=0$; female $=1$	0.186 6	0.381 9
Age (X_2)	Younger than 30 years old $=1$; $31-40$ years old $=2$; $41-50$ years old $=3$; older than 51 years old $=4$	2.449 9	2.449 9
Educational level (X_3)	Primary school $=1$; junior middle school $=2$; senior middle school and secondary school $=3$; college and above $=4$	2.851 0	0.764 5
Migrant work experience (X_4)	No $=0$; Yes $=1$	0.676 9	0.468 0
Number of family members (X_5)	3 people or less $=1$; $4-5$ people $=2$; more than 5 people $=3$	1.766 0	0.672 9
Family income (X_6)	Below 50 000 yuan $=1$; $50\ 000-100\ 000$ yuan $=2$; $100\ 000-150\ 000$ yuan $=3$; above 150 000 yuan $=4$	2.749 3	1.026 1
Entity type (X_7)	Specialized cooperative $=1$; agricultural company $=2$; family farm $=3$; large planting and breeding household $=4$	2.635 1	1.211 5
Operating industry (X_8)	Planting industry $=1$; breeding industry $=2$; three–dimensional agriculture $=3$; processing industry $=4$; comprehensive industry $=5$	2.054 3	1.348 0
Operating land area (X_9)	6.67 ha and below $=1$; $6.73-20$ ha $=2$; $20.07-33.33$ ha $=3$; 33.33 ha or above $=4$	1.775 8	1.062 2
Family attitude (X_{10})	No effect at all $=1$; basically no effect $=2$; little effect $=3$; great effect $=4$	2.501 4	1.037 3
Social connections (X_{11})	No effect at all $=1$; basically no effect $=2$; little effect $=3$; great effect $=4$	2.649 0	0.984 9
Relatives and friends (X_{12})	No effect at all $=1$; basically no effect $=2$; little effect $=3$; great effect $=4$	2.344 0	0.905 6
Peers (X_{13})	No effect at all $=1$; basically no effect $=2$; little effect $=3$; great effect $=4$	2.513 9	0.945 8
Security situation (X_{14})	No effect at all $=1$; basically no effect $=2$; little effect $=3$; great effect $=4$	2.498 6	1.010 1
Industrial and commercial law enforcement department (X_{15})	Active obstruction $=1$; passive obstruction $=2$; verbal support $=3$; sincere support $=4$	3.401 1	0.609 6
Tax enforcement department (X_{16})	Active obstruction $=1$; passive obstruction $=2$; verbal support $=3$; sincere support $=4$	3.388 6	0.623 3
Agricultural competent authorities (X_{17})	Active obstruction $=1$; passive obstruction $=2$; verbal support $=3$; sincere support $=4$	3.576 6	0.599 0
Environmental protection department (X_{18})	Active obstruction $=1$; passive obstruction $=2$; verbal support $=3$; sincere support $=4$	3.378 8	0.652 2
Quality inspection department (X_{19})	Active obstruction $=1$; passive obstruction $=2$; verbal support $=3$; sincere support $=4$	3.389 9	0.636 9
National support (X_{20})	Strongly disagree $=1$; disagree $=2$; agree $=3$; strongly agree $=4$	3.350 9	0.578 0
Local government support (X_{21})	Strongly disagree $=1$; disagree $=2$; agree $=3$; strongly agree $=4$	3.064 1	0.709 6
Bank support (X_{22})	Strongly disagree $=1$; disagree $=2$; agree $=3$; strongly agree $=4$	2.729 8	0.824 6
Rural land circulation (X_{23})	Object to leasing $=1$; object to selling $=2$; agree to lease $=3$; agree to sell $=4$	3.182 4	0.610 3
Allocation of agricultural funds (X_{24})	Completely exploited $=1$; basically exploited $=2$; basically allocated $=3$; fully allocated $=4$	2.711 7	0.812 5

The extraction principle for the number of principal components is that the eigenvalue of principal component is greater than 1, and the first m principal components with the cumulative contribution rate $\geqslant 85\%$. From Table 2, it can be known that the cumulative contribution rate of the first seven principal components is $88.51\% > 85\%$, so we extracted the first seven principal components, that is, $m=7$. Besides, it is also possible to determine the appropriate number of principal components using a relatively visual gravel map (Fig. 1). The gravel map is the map of (i, λ_i) for the eigenvalue and the corresponding serial number i, where the abscissa denotes the serial number, and the ordinate denotes eigenvalue λ_i. We selected the turning point with large change of slope and took the serial number corresponding to this turning point as the number of principal components. In Fig. 1, the turning oc-curs in $i=7$, thus $m=7$. Therefore, we used these seven new variables to take the place of the original 24 variables.

Table 2 Extraction of principal components

(Continued)

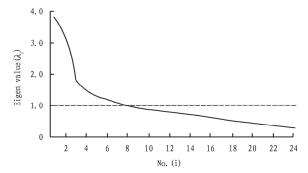| Number of principal components	Eigen value	Contribution rate	Cumulative eigenvalue	Cumulative contribution rate
1	3.765 1	0.256 9	3.765 1	0.256 9
2	3.082 0	0.208 4	6.847 1	0.465 3
3	1.785 1	0.134 4	8.632 2	0.599 7
4	1.437 3	0.109 9	10.069 5	0.709 6
5	1.310 2	0.074 6	11.379 7	0.784 2
6	1.171 6	0.058 8	12.551 3	0.843 0
7	1.009 4	0.042 1	13.560 7	0.885 1

(To be continued)

Fig. 1 Gravel map

Table 3 Factor loading matrix for principal component analysis

Variable	F_1	F_2	F_3	F_4	F_5	F_6	F_7
X_1	0.094 9	− 0.037 3	0.022 5	− 0.017 4	− 0.009 9	− 0.173 7	− 0.055 6
X_2	− 0.058 5	− 0.177 4	− 0.121 9	− 0.059 7	0.171 9	0.189 9	− 0.339 5
X_3	0.050 8	0.183 6	0.333 3	− 0.037 9	− 0.153 8	− 0.160 0	0.118 8
X_4	0.072 3	0.113 6	− 0.000 8	− 0.033 6	− 0.083 1	− 0.196 2	0.282 6
X_5	0.001 0	− 0.018 6	0.207 5	− 0.021 3	− 0.008 9	0.399 0	0.232 1
X_6	0.118 3	− 0.028 3	0.430 2	0.001 8	− 0.097 1	0.248 7	− 0.017 2
X_7	− 0.176 3	− 0.120 9	− 0.475 4	0.016 4	0.097 3	0.282 7	0.122 4
X_8	0.042 2	0.051 8	0.168 6	0.027 9	− 0.037 7	0.015 1	0.018 0
X_9	0.130 2	0.069 0	0.579 1	− 0.054 9	− 0.162 2	0.089 1	− 0.123 2
X_{10}	− 0.029 7	0.664 3	− 0.030 2	0.031 3	− 0.072 9	− 0.082 6	0.117 2
X_{11}	− 0.123 4	0.784 9	− 0.016 5	− 0.029 5	− 0.019 0	0.048 2	− 0.001 5
X_{12}	− 0.062 0	0.821 8	− 0.021 7	− 0.020 2	0.076 9	0.012 4	− 0.063 4
X_{13}	− 0.094 8	0.722 8	− 0.014 9	− 0.038 6	0.071 2	0.035 1	− 0.060 1
X_{14}	− 0.131 6	0.441 7	− 0.094 6	− 0.047 7	− 0.110 0	0.058 6	0.062 8
X_{15}	0.522 5	0.009 7	0.203 2	− 0.150 6	0.467 0	− 0.052 9	0.054 4
X_{16}	0.561 3	0.002 2	0.126 8	− 0.153 8	0.377 6	− 0.010 2	0.071 1
X_{17}	0.635 7	0.113 4	− 0.023 4	− 0.108 1	0.055 4	0.015 4	0.069 5
X_{18}	0.774 3	0.029 5	− 0.127 3	− 0.291 7	− 0.154 7	0.012 9	− 0.023 4
X_{19}	0.784 3	0.050 4	− 0.094 4	− 0.191 8	− 0.119 1	0.042 9	− 0.022 3
X_{20}	0.360 6	0.090 8	− 0.012 6	0.353 8	− 0.032 7	0.058 8	0.031 1
X_{21}	0.578 8	0.097 2	0.026 9	0.581 7	0.008 1	0.049 0	0.006 8
X_{22}	0.458 9	0.049 8	− 0.118 6	0.378 9	− 0.044 6	− 0.083 5	− 0.057 4
X_{23}	0.153 5	0.010 6	0.017 4	0.126 2	− 0.024 6	− 0.049 2	0.095 2
X_{24}	0.433 4	0.015 7	− 0.071 0	0.192 9	0.065 6	− 0.065 4	− 0.100 7

Through dividing data in factor loading matrix for principal component analysis by the square root of the eigenvalue corresponding to each principal component, we obtained the coefficient corresponding to each variable indicator in each principal component. Then, it is able to obtain the principal component functions of the growth of the seven new agricultural operating entities:

$$F_1 = 0.048\ 9X_1 - 0.030\ 2X_2 + 0.026\ 2X_3 + \wedge + 0.0223\ 4X_{24}$$
(1)

$$F_2 = -0.021\ 2X_1 - 0.101\ 1X_2 + 0.104\ 6X_3 + \wedge + 0.008\ 9X_{24}$$
(2)

$$F_3 = 0.016\ 5X_1 - 0.089\ 2X_2 + 0.244\ 0X_3 + \wedge - 0.009\ 2X_{24}$$
(3)

$$F_4 = -0.014\ 5X_1 - 0.049\ 8X_2 + 0.031\ 6X_3 + \wedge - 0.295\ 1X_{24}$$
(4)

$$F_5 = -0.008\ 6X_1 + 0.150\ 2X_2 - 0.134\ 3X_3 + \wedge - 0.028\ 6X_{24}$$
(5)

$$F_6 = -0.160\ 5X_1 + 0.175\ 4X_2 - 0.147\ 8X_3 + \wedge - 0.060\ 4X_{24}$$
(6)

$$F_7 = -0.055\ 3X_1 - 0.337\ 9X_2 + 0.118\ 3X_3 + \wedge - 0.100\ 2X_{24}$$
(7)

In order to make a comprehensive evaluation of the growth environment of the new agricultural operating entities, it is necessary to construct a comprehensive score model through weighting the variance contribution rate of each principal component. The formula is as follows:

$$F = (F_1 \times 0.256\ 9 + F_2 \times 0.208\ 4 + F_3 \times 0.134\ 4 + F_4 \times 0.109\ 9 + F_5 \times 0.074\ 6 + F_6 \times 0.058\ 8 + F_7 \times 0.042\ 1)/0.885\ 1$$
(8)

Using the formula (1) to (8), it is able to calculate the comprehensive scores of the growth factors of the new agricultural operating entities, the results are as follows:

$$F = -0.004\ 1X_1 - 0.044\ 0X_2 + 0.049\ 8X_3 + \wedge + 0.075\ 1X_{24}$$
(9)

The coefficient corresponding to each variable indicator in the comprehensive score model is the weight of each variable indicator. When the coefficient is positive, the variable score is higher and it will promote the growth of new agricultural operating entities; when the coefficient is negative, the variable score is lower, and it will inhibit the growth of new agricultural operating entities. Only the corresponding coefficients of X_1 (gender), X_2 (age) and X_7 (type of operating entity) are negative, indicating that the male leaders of households are more favorable for the growth of new agricultural operating entities than female leaders; young and middle aged are more suitable as leaders of new agricultural operating entities than old people, and specialized cooperatives and agricultural enterprises grow faster than family farms and large planting households. The influence degree of each variable indicator on the growth of the new agricultural operating entities is expressed by the absolute value of each variable indicator coefficient. The ranking of the influence degree of the 24 variable indicators X_1 to X_{24} is shown in Table 4.

4.3 Evaluation of growth factors of new agricultural operating entities

4.3.1 Factor load of each principal component. From the factor load of each principal component, the variables of administrative environment including industrial and commercial law enforcement,

tax enforcement, agricultural authorities, quality inspection and environmental protection departments, and the variables of policy environment including local government support, national support and bank support have higher load in the first principal component (F_1), which can be called administrative and policy environment factor, and the contribution rate of this principal component is 25.69%, indicating that the growth of the new agricultural operating entities is highly correlated with changes in the administrative environment and policy environment. The variables representing the human environment factor including the family attitude, social connections, friends and relatives, and peers have the largest load in the second principal component (F_2), which can be called human environment factor, and the contribution rate of this principal component is 20.84%. The variables representing the production and operating characteristics including the type of operating entity, type of operating industry, and operating land area have a higher load in the third principal component (F_3), which can be called the operating characteristic factor, and the contribution rate of this principal component is 13.44%. The variables representing policy environment factor including national support, bank support, and local government support have a higher load in the fourth principal component (F_4), which can be called the policy environment factor, and the contribution rate of this principal component is

10.99%. These indicate that the principal components F_1 and F_4 jointly explain the effects of changes in policy environment on the growth of new agricultural operating entities. The variables representing qualification conditions of entities including industrial and commercial law enforcement environment and the tax enforcement environment have a higher load in the fifth principal component (F_5), which can be called the entity qualification factor, and the contribution rate of this principal component is 7.46%. The variables representing the family environment characteristics including family income and family population have a higher load in the sixth principal component (F_6), which can be called the family environment factor, and the contribution rate of this principal component is 5.88%. The variables representing the characteristics of head of household including the age and migrant work experience have a higher load in the seventh principal component (F_7), which can be called the individual characteristic factor, and the contribution rate of this principal component is 4.21%. The results indicate that the policy environment and administrative environment have a high impact on the growth of new agricultural operating entities, followed by human environment, production and operating characteristics and family characteristics. The household characteristics have the lowest impact on the growth of new agricultural operating entities.

Table 4 Principal component coefficient matrix and ranking

Variable	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F	Ranking
X_1	0.048 9	−0.021 2	0.016 5	−0.014 5	−0.008 6	−0.160 5	−0.055 3	−0.004 1	24
X_2	−0.030 2	−0.101 1	−0.089 2	−0.049 8	0.150 2	0.175 4	−0.337 9	−0.044 0	19
X_3	0.026 2	0.104 6	0.244 0	−0.031 6	−0.134 3	−0.147 8	0.118 3	0.049 8	18
X_4	0.037 3	0.064 7	−0.000 6	−0.028 0	−0.072 6	−0.181 3	0.281 2	0.017 7	23
X_5	0.000 5	−0.010 6	0.151 9	−0.017 8	−0.007 8	0.368 7	0.231 0	0.053 3	17
X_6	0.061 0	−0.016 1	0.314 9	0.001 5	−0.084 8	0.229 8	−0.017 2	0.069 2	14
X_7	−0.090 9	−0.068 9	−0.348 0	0.013 6	0.085 0	0.261 2	0.121 8	−0.063 4	16
X_8	0.021 7	0.029 5	0.123 4	0.023 3	−0.033 0	0.014 0	0.017 9	0.033 9	21
X_9	0.067 1	0.039 3	0.423 9	−0.045 8	−0.141 7	0.082 3	−0.122 7	0.075 1	12
X_{10}	−0.015 3	0.378 4	−0.022 1	0.026 1	−0.063 7	−0.076 3	0.116 6	0.079 7	11
X_{11}	−0.063 6	0.447 1	−0.012 0	−0.024 6	−0.016 6	0.044 5	−0.001 5	0.083 4	9
X_{12}	−0.031 9	0.468 1	−0.015 9	−0.016 8	0.067 2	0.011 4	−0.063 1	0.099 9	6
X_{13}	−0.048 9	0.411 7	−0.010 9	−0.032 2	0.062 2	0.032 4	−0.059 8	0.081 7	10
X_{14}	−0.067 8	0.251 6	−0.069 2	−0.039 8	−0.096 1	0.054 1	0.062 5	0.022 6	22
X_{15}	0.269 3	0.005 5	0.148 7	−0.125 6	0.408 0	−0.048 9	0.054 1	0.120 2	2
X_{16}	0.289 3	0.001 2	0.092 8	−0.128 3	0.329 9	−0.009 4	0.070 8	0.113 0	3
X_{17}	0.327 6	0.064 6	−0.017 1	−0.090 2	0.048 4	0.014 2	0.069 2	0.104 8	4
X_{18}	0.399 1	0.016 8	−0.093 2	−0.243 3	−0.135 2	0.011 9	−0.023 2	0.063 7	15
X_{19}	0.404 2	0.028 7	−0.069 1	−0.160 0	−0.104 1	0.039 7	−0.022 2	0.086 5	8
X_{20}	0.185 9	0.051 7	−0.009 2	0.295 1	−0.028 6	0.054 3	0.031 0	0.104 0	5
X_{21}	0.298 3	0.055 4	0.019 7	0.485 2	0.007 0	0.045 2	0.006 8	0.166 8	1
X_{22}	0.236 5	0.028 4	−0.086 8	0.316 1	−0.039 0	−0.077 1	−0.057 1	0.090 3	7
X_{23}	0.079 1	0.006 0	0.012 7	0.105 2	−0.021 5	−0.045 5	0.094 8	0.039 1	20
X_{24}	0.223 4	0.008 9	−0.052 0	0.160 9	0.057 3	−0.060 4	−0.100 2	0.075 1	13

4.3.2 Comprehensive influence degree. As listed in Table 4, as to the policy environment, local government support, national support and bank support have a significant role in promoting the growth of new agricultural operating entities. The allocation of ag-

ricultural funds and implementation of rural land transfer policies cannot meet the growth of new agricultural operating entities. In the aspect of administrative environment, the support attitudes of local administrative departments in direct contact with new agricul-

tural operating entities, including industrial and commercial law enforcement departments, tax law enforcement departments, and agricultural authorities, are particularly important for the growth of new agricultural operating entities. In the aspect of the human environment, the influence degree of the growth of new agricultural operating entities is ranked below: relatives and friends, social connections, peer relationships, and family attitudes. When doing the covariance, we found that the correlation between these variables is very strong. In the aspect of production and operation characteristics, the larger the operating land area, the easier it is to obtain the scale effect of the operation, and the faster the growth of the new agricultural operating entities. Agricultural companies and specialized cooperatives have better growth than family farms and large planting households; new agricultural operating entities of three-dimensional agriculture, comprehensive agriculture and processing agriculture have better growth than traditional planting industry. From the perspective of family characteristics, the influence of family income is greater than that of the family population. The higher the family income, the higher the enthusiasm of the new agricultural operating entities to introduce advanced technology and expand reproduction. From the perspective of individual characteristics of the head of household, the educational level of the heads of the new agricultural operating entities is greater than that of the age and gender.

5　Policy recommendations

5.1　Improving land transfer policies and strengthening system construction and innovation
(ⅰ) it is recommended to accelerate the right confirmation, registration, and issue of rural land, establish a rural property system with clear property ownership, well defined power and responsibility, strict protection and smooth circulation, to create a suitable institutional environment for the transfer of contracted land operating right. (ⅱ) It is recommended to accelerate the construction of rural land transfer market, explore the establishment of a benchmark price system for the transfer of land contractual operating relations, and reduce the transaction costs of land transfer. (ⅲ) It is recommended to improve the rural social security system, weaken the social security function of land to farmers, and promote the smooth land circulation. (ⅳ) It is recommended to establish a monitoring system for the transfer of land contractual operating right, and resolutely put an end to the problem of changes in use during the land circulation.

5.2　Strengthening grassroots administrative supervision and increasing the efficiency of policy implementation
It is recommended to implement the policies of benefiting and favoring farmers and agriculture at the grass-roots administrative departments. The industrial and commercial, tax enforcement departments shall provide quality services in the qualification registration of new agricultural operating entities, trademark registration and tax incentives; the agricultural competent authorities shall improve the agri-

cultural support projects and fund management systems, strengthen the supervision of the use of agricultural funds, and improve the financial management, and increase the use efficiency of agricultural support funds. Besides, it is recommended to effectively strengthen the construction of administrative staff, increase the intensity of work supervision, strictly regulate the inaction and arbitrary behavior of administrative law enforcement departments, vigorously investigate and deal with cases that violate the interests of farmers, regulate administrative behavior, and fully and adequately implement various policies concerning agriculture, farmers, and rural areas.

5.3　Making innovation in the organizational form of agricultural operation and bringing into play advantages of various operating entities
It is recommended to build agricultural industrialized operating system with "company + specialized cooperatives + base + family farm (farmer)" as the major form. Traditional crops such as grain, cotton, and oil are suitable for scale operation, so it is recommended to take the organizational form of "large planting household (family farm) + social service organization"; fruit and vegetable, and tea products should adopt the "production base + specialized cooperative", and the breeding industry should adopt the "breeding farm + leading enterprise" form.

5.4　Creating agricultural entrepreneurial environment and strengthening the development force of new agricultural operating entities
It is recommended to establish a rural financial system with orderly competition, multiple level, and wide coverage, strengthen the innovation of agricultural financial products and services, alleviate the conflict in the fund shortage of new agricultural operating entities, integrate rural training resources, strengthen the quality education of agricultural operating entities, promote the application and extension ability of agricultural science and technology, build the modern agricultural service system, and raise the specialized production capability of new agricultural operating entities, and satisfy the demand of constantly strengthening new agricultural operating entities.

References

[1] HUANG HY, ZHANG OX. Influencing factors of agricultural operational entities and regional differences in Anhui Province[J]. Journal of Shanxi Agricultural University: Social Science Edition, 2014, 13(9): 891–897. (in Chinese).

[2] YU KK, ZHU XK, WANG H. The change trend and motive of modern agricultural management subject——Based on the analysis of nationwide county-level questionnaire survey[J]. Chinese Rural Economy, 2012, 28(10): 78–90. (in Chinese).

[3] WANG FY, LUO K. A comparative analysis on the difficulties and wishes of the new agricultural operation subjects in plain and mountainous areas——A case study of the trainees of 10 agricultural entrepreneurship training bases in Hubei Province[J]. Academic Forum, 2014, 37(7): 41–45. (in Chinese).