

The Role of Education in Employment in Agriculture and Agriculture Performance in China

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Abstract

This study aims to understand the direction of the relationship between employment in agriculture, education, and agriculture performance. This study uses the VAR method to see the response and encouragement between variables so that the dependent variable in this study is employment in agriculture, employment performance, and education in China. We found that education investment has a positive relationship to agricultural performance driven by agricultural performance in the previous period and negatively related to employment in agriculture in China. However, from this it can be seen that productivity which is the result of developing human capital through educational mechanisms is getting bigger. Where labor productivity increases with time. However, looking at the graph of employment in agriculture which continues to decline very sharply, it becomes a threat in itself in the future. Because there is a decline in performance in the future due to a shortage of labor and it is possible that the agricultural sector will be completely destroyed when there is a shortage of labor in this sector if the interest of the Chinese young generation in the agricultural sector is not invested.

Keywords: Agriculture, Employment, China

JEL Classification : C10, J24

Background

Over the years, China's private education industry has been one of the most attractive fields for global investors. Investors have invested billions of dollars in publicly traded companies that have pledged to use hundreds of thousands of families to generate money for their efforts to secure better opportunities through education (Sun et al,2021). The new regulations will also limit new foreign investment, which was once an important way for these companies to raise funds. It is the latest in a series of measures taken by China to rein in the technology industry, impacting the shares of major Chinese companies, spanning areas including online car-hailing services and music copyright services. Regulators say they are tackling privacy, network security, and antitrust concerns, and are targeting a crackdown on China's booming Internet industry in 2021.

In July 2021, Chinese regulators banned the profitability of off-campus training institutions, causing their share prices to plummet, and China's once-hot education industry. lost tens of billions of dollars in market value. After requiring all companies providing extracurricular guidance to register as nonprofits, some of China's largest education companies have shrunk in value, and investors have dumped them. In China, many middle-class families pay extra-curricular tuition to help their children gain an advantage in determining future national exams. Last week, the country's highest administrative body issued an "Opinion" for industry, outlining its plans to "reduce the workload of students' homework and off-campus training in compulsory education. China's 2021 regulations on education are China's efforts to equalize education in China (Bloomberg News,2021). China's agriculture as a whole has achieved

remarkable results. Especially for staple foods such as rice, wheat, and corn, production and demand are basically balanced. The development of agriculture in China is driven by the increase in education of the Chinese population and the development of good human capital in China (Chengjun et al,2021).

Literature review

Agriculture refers to an important industry in China's national economy. Agriculture in China refers to five forms of the industry including plantation, forestry, animal husbandry, fishing, and side industries; agriculture in a narrow sense refers to plantations. Including food crops production activities such as food crops, commercial crops, animal feed crops, and green manure (Jiang & Yuan,2020 ; Chuai et al,2021).

The basic trends and characteristics of contemporary world agricultural development are the high degree of commercialization, capitalization, scale, specialization, regionalization, industrialization, knowledge, socialization, and internationalization, which have greatly increased the rate of land output, agricultural labor productivity, commodity level agricultural products, and power, international market competitiveness. Agriculture is an industry that produces food and industrial raw materials by cultivating animals and plants. Agriculture is the main industry, and the science that studies agriculture is agronomy. Agricultural production is closely related to climate resources, and superior climate resources are an important condition for the birth of agricultural civilization. The elements of climate mainly include temperature, rainfall, and sunlight (Antle & Ray,2020 ; Liu,et al,2021).

Education in a narrow sense refers to specially organized school education, in a broad sense refers to social practice activities that affect the physical and mental development of the community. Educators carry out educational planting for the mental development of educated people in a planned and organized manner and explain various phenomena, problems, or behaviors in order to improve practical abilities, basically based on the thinking of people who are relatively mature or rational to recognize and treat something. In it, people slowly touch things from the senses to a state of cognitive understanding and form relatively complete or rational self-conscious thoughts. But at the same time, people have their own self-conscious thoughts and sensory dimensions. Therefore, any educational conscious thought may not be entirely correct. On the other hand, the direction of thinking must be understood perceptually, as long as it does not deviate from in terms of the goal (Afriani,2021).

Education is the teaching of thinking, and people have different thinking tendencies because of their own ideology, therefore, education should be the most objective and fairest conscious thought to teach people, so that people's thinking is not too distorted, and gradually matures. and rational because of the wealth of thought, and from this to the most rational self and possessing the most correct thoughts and cognitions, this is the root of education. Education is also a process of teaching and educating humans, can teach the most objective understanding to others, and then acquire the values that a person thinks about in his own life experience. Education is a practical activity to improve the quality of society as a whole (WIDARNI & BAWONO, 2021).

Research Methodology

The type of data used in this research is quantitative data, while the data source in this study is secondary data. Secondary data is data that already exists and is collected for research purposes. Population data can be defined as a collection of all possible observations. The population in this study were all employment in agriculture, rural residents, the added value of agriculture in China. The sample in this study is represented by all users of employment in agriculture, agricultural performance and education in China, which is recorded by the world bank.

This study uses the VAR method to see the response and encouragement between variables so that the dependent variable in this study is employment in agriculture, employment performance, and education in China.

The independent variable is a variable that is believed to be a predictor that causes fluctuations in the dependent variable. The independent variable of this study uses the VAR method to see the response and encouragement between variables so that the independent variables in this study are employed in agriculture, rural residents, the added value of agriculture in China.

Based on mathematical models and literature reviews, it is possible to simulate possible responses and impulses between variables with unknown future economic data. To see the responses and impulses of the main economic variables that we discuss in this journal, we use the Vector Autoregression (VAR) method to estimate the possibility that could happen in the future based on simulations or forecasting. Follows the following equation model:

$$Y_t = C + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + e_t$$

Where $Y_t = (Y_{1t}, \dots, Y_{Kt})$ is the set of K time series variables, c is $K \times 1$ constant vector, A is the coefficient matrix $K \times K$ and e_t is the error term

The vector Autoregression Model (VAR) is an extension of the univariate autoregression model for multivariate time series data. The VAR model is a multi-equation system in which all variables are treated as endogenous (dependent). There is one equation for each variable as the dependent variable.

We focused on simulating pre-corona responses and impulses based on past data sets for the period 2000 to 2019 with the assumption that variables outside the key variables we studied did not change.

Results and Discussion

The table below presents a summary of descriptive statistics of several variables used in this study during the period 2000 to 2019.

Table 1. Descriptive statistics of agricultural performance in USD value in January 2021, education (investment in education in USD value in January 2021), and employment in agriculture (total working population).

	AGRICULTURE_PERFORMANCE	EDUCATION	EMPLOYMENT_IN_AGRICULTURE
Mean	572000000000	132000000000	289000000
Median	530000000000	111000000000	290000000
Maximum	1020000000000	297000000000	373000000
Minimum	178000000000	229000000000	199000000
Std. Dev.	315000000000	949000000000	61697171

Based on Table 1 above, it appears that from the period 2000 to 2019, the average agricultural performance in China is very high at around 572 billion USD which can be seen from the mean value in table 1. with a high level of volatility at 315 billion USD. With an average number of workers 289 million people with an average educational investment value of 132 billion USD. However, this statistical descriptive analysis table is not sufficient to provide a general description of human capital investment through educational mechanisms on agricultural performance as seen from the productivity of workers in China. If it is divided between the average performance in the study period and the average number of workers, it can be seen that the average productivity level of investment in human capital in China is 572 billion USD divided by 289 million workers, which is \$1979 per worker. From the results of the average productivity per worker, it can be seen that the level of effectiveness of China's human capital investment in the agricultural sector is \$1979 per worker divided by the investment per worker of 132 billion USD divided by 289 million people, which is \$457 per worker. So every USD invested can generate \$1979 divided by \$457 = \$4.3.

To see a more detailed and careful relationship of influence, vector analysis is carried out, namely Vector Autoregressive. Before estimating using Vector Autoregressive, there are several conditions that must be met from several observed variables, namely Stationarity Test, and Optimum Lag Test. This book will also include a cointegration test to see if there is a long-term relationship between variables and a causality test to see a reciprocal relationship between variables. Estimation using the VAR model requires all variables to be stationary at the level, if the variable is not stationary at the level, the estimation is carried out using the VECM model on the condition that all variables formed are cointegrated with each other where the results are shown in Table 2 below:

Table 2. stationarity test

Method			Statistic	Prob.**
ADF - Fisher Chi-square			37	0
ADF - Choi Z-stat			(5)	0
Series	Prob.	Lag	Max Lag	Obs
D(AGRICULTURE_PERFORMANCE,2)	0	1	3	16
D(EDUCATION,2)	0	1	3	16
D(EMPLOYMENT_IN_AGRICULTURE,2)	0	0	3	17

From the results of stationarity testing with Augmented Dickey-Fuller, it can be seen that at the 2nd level the difference is stationary and vector estimation uses Vector Autoregressive. It can be seen that the probability is less than 0.05 in each tested variable. After doing the stationarity test, a cointegration test was conducted to see the long-term integration between variables. If there is cointegration between variables, the estimation is made using the Panel Vector Error Correction Model (VECM) method, but if there is no cointegration, the estimation is made using the Vector Autoregressive method. Cointegration test results are shown in table 3.

Table 3. Cointegration test results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	1	23	30	0.2252
At most 1	0	10	15	0.3116
At most 2	0	0	4	0.6282
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

From the cointegration results, the critical value is greater than the value of Trace Statistics and the value of Max-Eigen Statistics which indicates that there is no cointegration relationship in the variable equation, so the next method that can be used to determine long-term and short-term relationships is the Vector Autoregressive method. Optimum lag test is used to determine the time period of the influence of a variable on other variables which will give optimal results. This is because changes in the movement of a variable are not directly responded to by changes in other variables, but there is still a certain grace period. Therefore it is important to know the lag length. The optimum lag test can be seen in table 4.

Table 4. Optimum lag test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	(1262)	NA	2.14E+57	140.5209	140.6693	140.5414
1	(1185)	118.5631*	1.25E+54	133.0521	133.6457*	133.134
2	(1174)	14	1.04e+54*	132.7626*	133.8013	132.9058*

From the results of the Optimum lag test, it can be seen that the optimum lag is found in lag 1. The results of the autoregression vector estimation are shown in table 5.

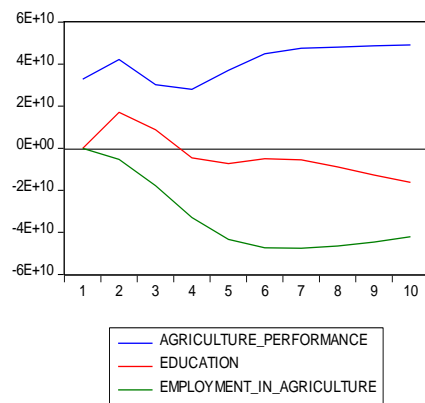
	AGRICULTURE_PERFORMANCE	EDUCATION	EMPLOYMENT_IN_AGRICULTURE
AGRICULTURE_PERFORMANCE(-1)	5.36E-01	-1.03E-01	-9.96E-06
	-6.09E-01	-1.47E-01	-8.20E-05
	[0.88004]	[-0.70131]	[-0.12126]
AGRICULTURE_PERFORMANCE(-2)	4.66E-01	1.10E-01	-8.36E-06
	-8.56E-01	-2.06E-01	-1.20E-04
	[0.54419]	[0.53163]	[-0.07242]
EDUCATION(-1)	3.49E+00	1.31E+00	-5.20E-05
	-3.22E+00	-7.77E-01	-4.30E-04
	[1.08286]	[1.68125]	[-0.11957]
EDUCATION(-2)	-5.08E+00	-7.14E-01	5.77E-05
	-4.17E+00	-1.00E+00	-5.60E-04
	[-1.21805]	[-0.71098]	[0.10259]
EMPLOYMENT_IN_AGRICULTURE(-1)	-1.32E+03	-3.26E+02	1.54E+00
	-1.76E+03	-4.25E+02	-2.37E-01
	[-0.75242]	[-0.76783]	[6.48925]
EMPLOYMENT_IN_AGRICULTURE(-2)	-5.35E+02	-2.65E+02	-6.50E-01
	-2.10E+03	-5.06E+02	-2.83E-01
	[-0.25504]	[-0.52337]	[-2.29622]
C	7.39E+11	2.32E+11	3.81E+07
	-4.60E+11	-1.10E+11	-6.20E+07
	[1.62069]	[2.10690]	[0.61909]
R-squared	9.92E-01	9.95E-01	9.96E-01
Adj. R-squared	9.88E-01	9.93E-01	9.94E-01
Sum sq. resids	1.19E+22	6.89E+20	2.16E+14
S.E. equation	3.28E+10	7.91E+09	4.43E+06
F-statistic	2.38E+02	3.84E+02	4.93E+02
Log likelihood	-4.57E+02	-4.31E+02	-2.97E+02
Akaike AIC	5.16E+01	4.87E+01	3.37E+01
Schwarz SC	5.19E+01	4.91E+01	3.41E+01
Mean dependent	6.16E+11	1.44E+11	2.80E+08
S.D. dependent	3.02E+11	9.23E+10	5.85E+07

Agricultural performance in the previous period has a positive relationship with current agricultural performance with a t-statistic value of 0.88004 and a regression coefficient of

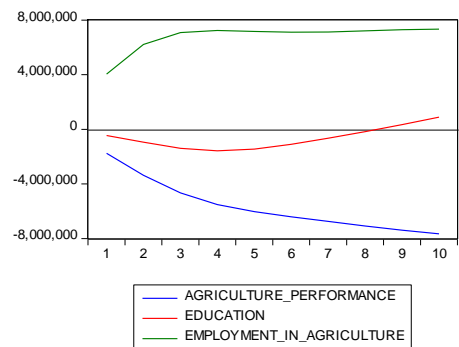
0.53611. The significance of the variable is seen by comparing the t-statistical value of the variable with the T-table. when the T-table is greater than the regression coefficient, it can be said to be significant. Agricultural performance has a significant negative relationship with employment in agriculture with a t table value of [-0.12126] with a coefficient value of -0.00000996. Education has a negative and insignificant relationship with agricultural performance with a t-table value of 1.08286 and a coefficient of 3.490987. And has a significant negative relationship with employment in agriculture with a t-table value of -0.11957 and a coefficient of -0.00052. Employment in Agriculture has no significant negative correlation with agricultural performance with a t-table value of -0.75242 with a coefficient value of -1324.78. There is no significant negative correlation with education with a t-table value of -0.76783 and a coefficient value of -325.9688. Employment in Agriculture in the previous period had a significant positive relationship with a t-table value of 6.48925 and a coefficient value of 1.540744. The value of the coefficient of determination (Adj. R-Square) shows the degree of truth of the estimate of 0.988176. This means 98% accuracy of the calculation rate of the autoregressive vector. Impulse Response Function (IRF) describes the response of an endogenous variable to shock that occurs in other variables in a dynamic VAR system. IRF can be used to see the effect of fluctuations or shocks from onevariable on the value of another variable either now or in the future. The results of the Impulse Response Function (IRF) of the Infrastructure variable against other variables are shown by the following Impulse Response graph:

Response to Cholesky One S.D. (d.f. adjusted) Innovations

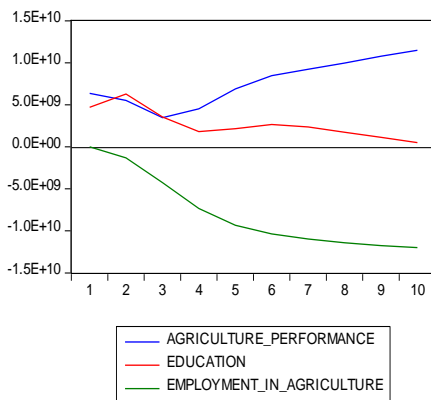
Response of AGRICULTURE_PERFORMANCE to Innovations



Response of EMPLOYMENT_IN_AGRICULTURE to Innovations

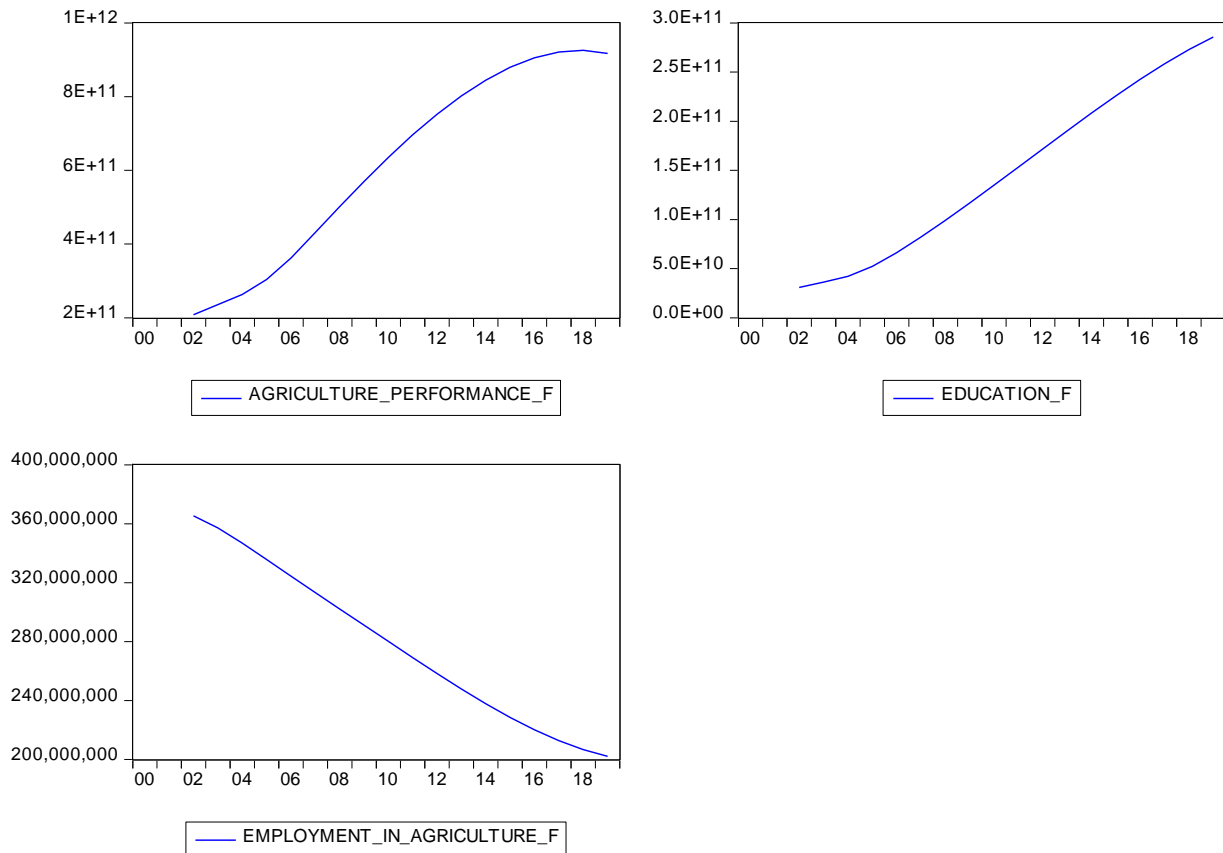


Response of EDUCATION to Innovations



Based on the response and impulse graphs, it can be seen that each variable responds to each other since the first time period with a lag of 1. This shows that in China the three variables

influence each other. To see the direction of influence can be seen in the following forecasting chart:



From the forecasting results, it can be seen that education investment has a positive relationship to agricultural performance driven by agricultural performance in the previous period and negatively related to employment in agriculture in China. However, from this it can be seen that productivity which is the result of developing human capital through educational mechanisms is getting bigger. Where labor productivity increases with time. However, looking at the graph of employment in agriculture which continues to decline very sharply, it becomes a threat in itself in the future. Because there is a decline in performance in the future due to a shortage of labor and it is possible that the agricultural sector will be completely destroyed when there is a shortage of labor in this sector if the interest of the Chinese young generation in the agricultural sector is not invested

Conclusion

Education investment has a positive relationship to agricultural performance driven by agricultural performance in the previous period and negatively related to employment in agriculture in China. However, from this it can be seen that productivity which is the result of developing human capital through educational mechanisms is getting bigger. Where labor productivity increases with time. However, looking at the graph of employment in agriculture which continues to decline very sharply, it becomes a threat in itself in the future. Because there is a decline in performance in the future due to a shortage of labor and it is possible that the agricultural sector will be completely destroyed when there is a shortage of labor in this sector if the interest of the Chinese young generation in the agricultural sector is not invested

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