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An empirical analysis of education financial investment on economic growth in Shanghai - a time series study based on the period of 1992-2017

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Abstract: This paper uses various data on education financial investment and economic growth in Shanghai during 1992-2017, conducts smoothness test, Granger causality test, impulse response function and variance decomposition based on VAR model, and constructs a regression analysis model to analyze the impact of education financial investment on economic growth in Shanghai. It is found that: increasing education financial expenditure helps promote the growth of Shanghai's total economy, and for every 1% increase in education financial expenditure, the economy will grow by 0.569%. Based on this, this paper puts forward feasible suggestions to increase education financial investment, broaden education funding channels, and enhance the economic development potential of Shanghai.

1. Introduction

The findings of studies on educational inputs and economic growth broadly fall into two areas:

First, most of the studies point out that education investment has a catalytic effect on economic growth. They argue that education plays an important role in ensuring stable and sustained economic growth, and that there is a mutually reinforcing and interdependent relationship between education and economic growth, and that education funding promotes economic growth but different sources of education funding promote economic growth in different ways. Second, some people believe that the relationship between education investment and economic growth has a negative or insignificant relationship. In the short term, increasing education expenditure will reduce the growth rate of GDP. If the ratio of education expenditure to fiscal expenditure and the ratio of education expenditure to regional GDP in each region are used to measure public education expenditure, a negative relationship between the level of economic development and public education expenditure will be found.

From the existing studies, scholars in China have not yet formed a unified view on the relationship between education and economic growth, and further research is needed on the relationship between financial investment in education and economic growth. In addition, the research on the relationship between education investment and economic growth in Shanghai is almost a blank area, and this

blank area is not conducive to the development of education and economic growth in Shanghai, and it is of great practical significance to study the influence of education financial investment on the economic development of Shanghai.

2. Model Construction

The Cobb-Douglas production function (C-D production function for short) is usually used to determine the impact of the amount of capital input and labor input on the amount of output in the production process, and the impact of each variable on the GNP if the GNP is considered as a product of a special nature. The main factors affecting GNP are: capital input (K), the amount of labor input (L), and the amount of financial input for education (E). Then, the C-D production function can be expressed as follows:

$$GDPt=At*K\alpha\ t*L\beta\ t*E\gamma\ t \quad (1)$$

Where GDPt denotes the regional GDP in period t; At denotes the technological conditions in period t and the production function generally treats the technological level as a constant; K t denotes the capital input in period t; L t denotes the labor input in period t; and E t denotes the financial input to education in period t.

Taking the natural logarithm on both sides of equation (1), we can obtain.

$$lnGDPt=lnAt+\alpha lnK\ t+\beta lnL\ t+\gamma LnE\ t \quad (2)$$

The equations α, β, and γ denote the regression coefficients of capital input, labor input, and financial education expenditure, respectively, which are the output elasticity coefficients of each variable in GNP.

3. Empirical analysis of the model

3.1 ADF unit root test

Table 1: ADF test of variables

Variable	ADF statistics	5% Critical value	Conclusion
LnGDP	1.557733	-1.95809	non-stationary
D(LnGDP)	-2.39535	-1.95568	stationary
LnK	0.93168	-1.95568	non-stationary
D(LnK)	-4.15007	-1.95568	stationary
LnL	0.724405	-1.95568	non-stationary
D(LnL)	-2.25526	-1.95568	stationary
LnE	9.165304	-1.60907	non-stationary
D(LnE)	-4.08641	-3.62203	stationary

Time series analysis and regression analysis usually have many assumptions presupposed, such as the smoothness and normality of the series. However, many economic data are non-stationary, and in this paper, the Augmented Dicky-Fuller test is used to test the stationarity of each variable. The time

series of each variable LnY, LnK, LnL, and LnE are tested for unit root by the econometric software Eviews 11.0. In the test process, all variables were selected without time trend term and constant term for the test, except D(LnE) which was selected with time trend term and constant term, and D(*) denotes the first order difference of each variable, and the test results of each variable are shown in Table 1.

The results of the unit root test are shown in Table 1. From the values of the ADF statistics, the statistical values of the original series variables of LnGDP, LnK, LnL and LnE are all greater than their respective critical values at the 5% confidence level, so the original hypothesis cannot be rejected, i.e., there is a unit root and the original time series shows non-stationarity. After the first-order difference, the statistical values of D(LnGDP), D(LnK), D(LnL), and D(LnE) are all smaller than their respective critical values at the 5% confidence level, so the original hypothesis is accepted, i.e., there is no unit root, and the series of each variable after the first-order difference is smooth.

3.2 variance decomposition

The variance decomposition is a method to study the dynamic characteristics of the VAR model, mainly to analyze the contribution of each structural variable to the changes in the endogenous variables, and thus to further evaluate the importance of each shock structure to the endogenous variables of the model. The variance of the economic growth rate LnGDP is shown in Table 2.

Table 2: Variance decomposition of LNGDP

Period	S.E.	LNGDP	LNK	LNL	LNE
1	0.041884	53.66791	42.72089	3.611202	0
2	0.049697	51.56603	41.6342	5.105484	1.694287
3	0.067426	46.57624	40.91968	4.239817	8.264263
4	0.08364	48.07722	40.70323	3.661234	7.558316
5	0.09349	48.29724	40.05919	3.885052	7.758522
6	0.100506	48.52859	39.19665	4.675748	7.59901
7	0.10514	47.9605	37.13353	7.649015	7.256954
8	0.105682	48.29476	35.92649	8.87738	6.901368
9	0.106473	47.80618	35.50647	9.987012	6.700338
10	0.107824	47.56951	34.78591	11.1162	6.528381

From Table 2, we can see that: (1) without considering the contribution of economic growth itself, the contribution of capital input is the most significant, up to 42.72%, but the significance of the impact of fixed asset investment gradually decreases. (2) The contribution of labor input to economic growth continues to increase after the 4th period, and the contribution is gradually significant after the 7th period. (3) The contribution of financial education expenditure to economic growth gradually decreases after reaching the maximum in the 2nd period, and its contribution tends to be gradually stable over time.

3.3 OLS regression analysis

With the help of SPSS software, Ordinary Least Squares (Ordinary Least Square) was applied to regression analysis of model (2) and the regression results were.

LnGDP=-1.189+0.161LnK+0.133LnL+0.569LnE

F-statistic=6542.177, R2=0.999

Based on the regression results, the following conclusions can be obtained: (1) The R2 (decidable coefficient) is about 0.999, and the F-statistic value is greater than the critical value at the 5% significant level, indicating that the model fits well. (2) The regression coefficients of the three variables are all greater than 0, indicating that capital input, labor input and education financial input all have positive effects on economic growth. (3) The three variables have different promotion effects on economic growth. For each 1% increase in fixed asset input, GDP will increase by 0.161%; for each 1% increase in labor input, GDP will increase by 0.133%; for each 1% increase in education financial input, GDP will increase by 0.569%.

4. Conclusion

4.1 There is a long-term dynamic equilibrium relationship between capital input, labor input, education financial input and economic growth in Shanghai.

4.2 Fiscal expenditure on education is an important factor influencing the economic fluctuation and promoting economic growth in Shanghai, and increasing fiscal expenditure on education helps promote the growth of Shanghai's total economy.

4.3 The contribution of education expenditure to Shanghai's economic growth first increases and then gradually decreases, and finally stabilizes at about 6.5%. (4) The regression of the model shows that the contribution of education expenditure to economic growth is 0.569%, that is, for every 1% increase in education expenditure, the economy will grow by 0.569%.

References

[1] Wu Zuoyin. The effect of education and economic growth: the relationship between education and economic growth [J]. Journal of Nanchang University (Engineering Edition), 1985(04): 60-69.

[2] Liu Chunling. An empirical analysis of the relationship between investment in education and economic growth in China [J]. Science and Technology Entrepreneurship Monthly, 2008(10): 129-130+137.

[3]Liu B. An empirical study on the impact of fiscal expenditure on higher education on economic growth in China [D]. Capital University of Economics and Business, 2018.

[4]Wang J, Sun L. VAR time series analysis of economic growth and the growth of budgeted education expenditure in China [J]. Finance and Trade Research, 2005(06): 72-78.

[5] Wang Rong, Yang Jianfang. An empirical study on the behavior of local government education expenditure in China [J]. Journal of Peking University (Philosophy and Social Science Edition), 2008(04):128-137.

[6] Liu Youxin. Study on the relationship between fiscal education expenditure and economic growth in China [J]. Statistics and Decision Making, 2013(11): 153-155.

[7] He Shichao. Problems and countermeasures of China's fiscal education expenditure [J]. Modern trade industry, 2020, 41(01): 89-92.