

Effect of Higher Education on Economic Development in Shandong Province

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Abstract: *Shandong Province is a major economic and educational province. The most urgent task at present is to properly handle the relationship between higher education and economic development and properly solve the problems exposed by both sides in the course of development. Accomplishing this task efficiently is of great significance to promote the development of higher vocational education and economy in Shandong Province. The main purpose of this paper is to explore the relationship between higher education and economic development in Shandong Province, and how to make education better promote economic development. On the basis of previous studies, this paper makes a correlation and regression analysis on the level of economic development and the scale of educational development in Shandong Province in the last ten years. There is a significant correlation between education and economic development in the province, and the number of graduates has the greatest impact on economic development. According to the results of the study, the relevant counter measures and suggestions are put forward.*

Keywords: higher education; economic development; Shandong province

1. Introduction

From the point of view of analysis methodology, Regression analysis and cointegration analysis were the most common method. Schuer (2013) made an econometric analysis on the development of higher education and economic growth and concluded that economic growth is the main driving force to promote the development of higher education. Dr. Mao Shengyong (2009) from Guanghua School of Management, Peking University, has an important inspiration for the in-depth analysis of China's higher education problems, China's economic problems and the coordination between them. Yan Wei (2011) concluded that vocational education and economic development are interactive relations which restrict each other and promote each other through correlation analysis, and correctly deal with the relationship between the two, make them coordinate and advance together, and jointly promote socialist construction.

From the point of view of checkout methodology, most literatures choose Unit root test and Granger causality test. Zhang Peigui (2012), Doctor of Tianjin Business School, draws the dialectical relationship between education and economic development: on the one hand, economic development restricts the development of education, which must be adapted to economic development; on the other hand, education can promote and promote economic development. Economic development must depend on education. Tan Siqian (2015) used cointegration analysis, error correction model and Granger causality test to make an empirical study on the annual data between Chinese educational investment and GDP. The results show that there is a long-term stable equilibrium relationship between them. The elastic coefficient of educational input to GDP is 0.8791. In the long run, there is a two-way causal relationship between educational investment and economic growth, and in the short term, economic growth is the reason of educational investment growth. Jiang Minghui (2010) used unit root test, Granger causality test and error correction model to study the relationship between educational investment and economic growth in Shandong

Province. The study shows that there is a certain harmonious and interactive equilibrium relationship between educational investment and economic growth in Shandong Province.

2. The situation of higher Education and Economic Development in Shandong Province

2.1 The situation of higher Education in Shandong Province

In terms of the number of colleges and universities, the number of colleges and universities in Shandong Province is increasing with the development of higher education. On the one hand, the increase in the number of colleges and universities directly reflects the trend and direction of economic scale, quality expansion and improvement; on the other hand, the increase in the number of colleges and universities will increase the number of students enrolled and the number of students trained. More and more high-skilled applied talents have been trained to provide the motive force for the overall development of Shandong Province.

By looking up the statistical yearbook of Shandong Province, we get the number of colleges and universities and the number of graduates in Shandong Province from 2006 to 2015 years, The number of graduates of colleges and universities in Shandong Province shows an overall increasing trend. The number of graduates in 2006 was 268384 and the number of students in 2015 was 474195, which is 1.77 times of the number of students in 2006. 2006 to 2009 is the four years with a straight upward trend, 2006 to 2007, the biggest increase. 2013 reached the highest level of 475858 people, since 20013, the number has declined; From the analysis of the data, we can see that 2011 is the year of rapid development of higher education in Shandong Province, and higher education has been developing since 2012. The trend of exhibition is downward. It can be seen

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that higher education in Shandong Province is not developing smoothly, but fluctuating up and down.

2.2 The situation of Economic Development in Shandong Province

Selected The data from 2006 to 2015 to illustrate the current situation of Shandong's economic development from the GDP of Shandong Province and the GDP per capita of Shandong Province,

According to the relevant data in Shandong Statistical Yearbook, the data of GDP and GDP, per capita in Shandong Province from 2006 to 2015 are summarized and collated. We can find that from 2006 to 2015, The GDP of Shandong Province showed a trend of gradual and steady growth. In 2006, it was 6.300233 trillion yuan in 2015, 4.110214 trillion yuan higher than that in 2006, and 2.88 times the total value in 2006. From 2006 to 2015, GDP per capita in Shandong Province also showed a steady increase year by year. In 2006, it was: 23603 yuan, 64168 yuan in 2015, 40565 yuan higher than 2006, and 2.71 times the per capita GDP in 2006. Through the analysis of the data, we can see that the overall level of economic development in Shandong Province has been rising over the past ten years, and the province's GDP is growing steadily. Although the per capita GDP is growing, the growth rate is not keeping up with the province's GDP.

3. Model Construction and empirical Test

3.1 Selection of indexes

In this paper, the data from 2006 to 2015 are taken as the analysis object. The number of graduates, the number of teaching staff, the number of specialties and the amount of education input are taken as the indicators to measure the scale of higher education in Shandong Province. Educational investment mainly reflects the scale of educational institutions, educational funds and educational management.

In view of the availability of data and the importance of problem research, we select the comprehensive index of education expenditure to reflect education investment. At present, most scholars learn to use national financial funds as an index to reflect the investment in education. GDP as an important index to measure economic development is a question of economic growth for most.

3.2 Multivariate linear regression model

The relation between the variable Y and the related variable X1,X2,X3,X4is $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$, in which $\beta_0, \beta_1, \beta_2, \beta_3$ and β_4 are parameters of the model and the regression coefficient, which indicates that the number of independent variables X1,X2,X3,X4 which causes the increase or decrease of dependent variable Y is an independent variable when each unit of independent variable changes. A random variable is an error term. Among them, X1 = the number of graduates, X2 = the number of teaching staff, X3 = the investment of educational funds, X4 = the total number of years of education.

4. Empirical Research

4.1 Model solution

The process of solving the model is the central part of the multivariate linear regression model. It has a great relationship with the selection of the previous index and the authenticity of the data. If the selection of the index is not appropriate, the data is lacking in authenticity. Then the multiple regression model can not reflect the real situation.

Through the SPSS analysis of the five indexes such as the gross product, the total number of years of education, the investment of educational funds, the number of graduates and the number of teaching staff, the evaluation of the goodness of fit of regression model and the Durbin-Watson test table are obtained, as shown in Table 1.

Table 1: Regression model goodness of fit evaluation and Durbin-Watson test results

model	R	R2	adjust R2	Standard estimation error	Change statistics					Durbin-Watson
					R Squire change	F Change	df1	df2	Sig.F Change	
1	0.996	0.993	0.987	1626.727	0.993	174.136	4	5	0.000	1.453

From Table 1, the results of regression model goodness of fit evaluation and Durbin-Watson test include: correlation coefficient goodness of fit, (R Square), adjustment, goodness of fit, (Adjusted R Square), Durbin-Watson, etc. The correlation coefficient is 0.996, which indicates that there is a strong linear correlation between Shandong higher

education and GDP in Shandong province, and the final coefficient is 0.993, and the adjusted data is 0.987, which indicates that the model can explain the change of GDP90% in Shandong Province, and the goodness of fit is higher. Du The rbin-Watson statistic is 1. 453, less than 2 but close to 2, so there is no pseudo regression.

Table 2: Coefficient table

Model	Non standardized coefficient		Standard coefficient	t	Sig.	Collinear statistics	
	B	standard error				tolerance	VIF
(constant)	245727.588	141597.753		1.735	0.143		
Number of graduates	0.266	0.058	0.310	1.133	0.039	0.019	9.570
Number of staff and staff	0.565	0.616	0.311	0.918	0.031	0.012	8.581
Education expenditure	0.002	0.000	0.705	6.643	0.001	0.127	7.893
Total number of years of education	-0.238	1.948	-0.281	-2.176	0.042	0.085	6.703

a. dependent variable : total output value

From Table 2 we can see that the corresponding significant level of T test of the number of graduates is 0.039 is less than 0.05 so the number of graduates can have a significant impact on economic development. The number of teaching staff, the total investment of educational funds and the total number of years of education are all less than 0.05, so the number of graduates and the number of teaching staff are less than 0.05. The investment of education funds and the sum of the years of education can all have a significant impact on the gross domestic product (GDP).

At the same time, it can be seen that the VIF of these four factors are all relatively small, and their values are all less than 10, which are 9.570 ~ 8.581 ~ 7.893 ~ 6.703, respectively, so the conclusion can be drawn that there is no multiple collinearity between them. The coefficients of these four independent variables are 0.266U 0.565U 0.022 and -0.238, respectively, and the constant is 245727.588, so the linear regression model is as follows:

$$Y=0.266X_1+0.565X_2+0.022X_3-0.238X_4+245727.588$$

4.2 Empirical Test of the Model

Through the SPSS analysis of the five indexes of GDP, total number of years of education, investment of educational funds, number of graduates and the number of teaching staff, the ANOVA table is obtained, as shown in Table 3.

From Table 3, we can see that FG 174.136 corresponds to a significant level less than 0.001, so we can conclude that there is at least one independent variable that can have a significant impact on dependent variables. The results are consistent with the total number of years of education, the investment of educational funds, the number of graduates and the number of faculty and staff, which show that the model is accurate.

5. 5. Conclusion and Enlightenment

5.1 Conclusion

From the results of the model can not be difficult to see: higher education on economic development has a strong role in promoting the number of graduates and education expenditure and education years have a significant impact on the economic development indicators GDP. Therefore, if a place wants to get a better and faster economic development, the level of education must be improved with the introduction of high-level talent in all major places is echoing. Implications and Suggestions.

5.2 Implications and Suggestions

The ultimate purpose of this study is to promote the coordinated development of higher education and regional economy in Shandong Province. Through the study, we find that there are many phenomena of uncoordinated development between higher education and regional economy in Shandong Province. This chapter puts forward some countermeasures and suggestions from three angles of government, colleges and enterprises.

(1) Strengthen the government's macro-control over higher education

First, Increase government policy support, The government must understand the current situation of higher education and economy, find out the way to deal with these problems, find the right way, make scientific plan, and then make macro policy. Secondly, the applicability of policy is the premise of making relevant laws and regulations, which is the most important part of policy making, so we should try our best to improve the applicability of policy. Finally, the government should play a comprehensive role and construct a new mechanism of government macro-control and market demand. It is the premise for colleges and universities to fulfill the function of personnel training well. Only the government can perform the function of macro-control and provide the motive force for the development of social economy.

(2) Capacity-building of institutions of higher learning

To improve the applicability of the profession, colleges and universities should construct their profession according to the industrial structure and industrial policy of the region, and adhere to three principles to enhance the adaptability of the profession. The first is to adhere to the standard, in order to reduce the randomness of professional settings, reduce investment, in order to simplify the professional setting to train the needs of the community talent. The second is to adhere to flexibility, adhere to the principle of leniency. Finally, adhere to the principle of practicality, the professional setting of colleges and universities must focus on the economic development of the shortage of talent. In the process of cultivating talents, we can take various forms and different school systems to run schools flexibly. The second is to strengthen the construction of the teaching staff, the establishment of characteristic advantages of the profession, teacher resources for education is the most important, most of the professional teachers in institutions of higher learning theoretical knowledge is relatively solid, but in practice lack of ability, compared with the experts of enterprises there is still a certain gap.

(3) The implementation of the structure of higher education and industrial structure docking

First of all, professional and industry are two topics of closed share, higher education should study the development direction of industrial structure in the region, carefully comb the pre-natal and post-natal, pre-sale and after-sales industrial chain, and then seek the corresponding professional chain. As a prerequisite for planning a professional layout. Professional setting and job market docking, employment-oriented, to a certain extent reflects the essence of higher education, graduate employment rate to a certain extent can reflect the quality of teaching in colleges and universities, reflecting the professional setting rain economic and social development, professional setting and graduate job market between the degree of integration. Track ingress career development and job market trends in accordance with the needs of enterprises, and develop future-oriented professional division and professional design through the establishment of self-adaptation mechanisms to achieve a close interface between professional settings and

employment markets

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