Exploring the Influencing Factors of China's Education Expenditure

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Abstract

Education expenditure not only reflects the importance attached to education in a region, but also largely determines the level of education in the region and the future development of careers. This experiment uses multiple linear regression analysis to explore which factors are the influencing factors of local financial education expenditure (y), and make predictions. The five variables of gross domestic product, fiscal revenue, the number of ordinary colleges and universities, the ratio of education expenditure to fiscal expenditure, and social donation funds are selected as variables..

Keywords

Education funding; Development; Eviews; Multiple regression.

1. Introduction

The significance of developing education is great. It is not only a guarantee for the personal quality of all citizens of the country, but also concerns the future and destiny of the country. Talents are the most important thing in the 21st century, and the emergence of talents is inseparable from education, and vigorously developing education is also a condition for ensuring national talents.

For a century-old plan, education is the foundation; for a long-term career, education is the first. Adhering to the priority development of education is an urgent requirement to promote scientific development and promote social harmony. We must use a strategic perspective to understand the positive significance and important role of education as a priority.

Education is a leading project related to social progress. We should look at education beyond education, maintain education as a kind of emotion, strengthen it as a concept, advocate it as a consensus, and put it at the strategic height of developing first and giving priority to development. Giving priority to the development of education can play a guiding role in the direction of future social development.

Education is a popular project related to the well-being of the people. Education is the most basic public product, connecting thousands of households and benefiting future generations. "Education is the foundation of people's livelihood, health is the foundation of people's livelihood, distribution is the source of people's livelihood, and health care is the security of people's livelihood." These four sentences are very important, but education still comes first. As far as the family is concerned, a person with a certain degree of education can start a family business. As far as the society is concerned, everyone has education and books to read, which can best reflect fairness and promote harmony.

Education is a basic project related to national development. If you want to prosper the economy, you must first prosper education. In the context of the deepening of economic globalization and the rapid advancement of science and technology, knowledge has increasingly become a decisive factor in improving regional competitiveness, and human resources have increasingly become a strategic resource to promote economic and social development. Prioritizing the development of education can lay a solid foundation for my country to gain future social competitive advantages and realize national rejuvenation

2. Model setting and variable selection

2.1. Selection of variables

The impact of education expenditure may be the result of a combination of factors, but this article focuses on the impact of GDP, fiscal revenue, the number of colleges and universities, the proportion of education expenditure to fiscal expenditure, and social donations.

(1) Gross domestic product

GDP is the final result of production activities of all resident units in a country (or region) within a certain period of time calculated at market prices. There are three forms of gross domestic product, namely value form, income form and product form. From the perspective of value form, it is the difference between the value of all goods and services produced by all resident units in a certain period of time and the value of all non-fixed asset goods and services invested in the same period, that is, the sum of the added value of all resident units; from the perspective of income form , it is the sum of the primary income created by all resident units within a certain period and distributed to resident units and non-resident units; from the perspective of product form, it is the value of final-use goods and services produced by all resident units within a certain period Less the value of imports of goods and services. In actual accounting, there are three calculation methods for GDP, namely production method, income method and expenditure method. The three methods respectively reflect the GDP and its composition from different aspects, and the theoretical calculation results are the same.

(2) Fiscal revenue

Fiscal revenue refers to the sum of all funds raised by the government to perform its functions, implement public policies and provide public goods and services. Fiscal revenue is the monetary revenue obtained by government departments within a certain period of time (usually a fiscal year). Fiscal revenue is an important indicator to measure a country's government's financial strength. The scope and quantity of public goods and services provided by the government in social and economic activities are largely determined by the adequacy of fiscal revenue. According to reports, China's fiscal revenue in the first five months of 2010 was 3,547 billion yuan, an increase of 836.2 billion yuan or 30.8% over the same period. Combined with the forecast for the second half of the year, it may reach 8 trillion yuan for the whole year, which means that the Chinese government will become the second richest government in the world.

Finance is related to the creation and existence of the country. In order to maintain its own existence and function, the state must consume certain social products. However, the state itself usually does not directly engage in production activities, so it must rely on its own political power to forcibly expropriate some social products to meet the needs of various expenditures. The revenue and expenditure of this kind of state is finance, which is the distribution of social products carried out by the state with its political power. It can be seen from the content of this concept that finance is a distribution relationship, a distribution relationship with the state as the main body and a centralized distribution within the social scope. this is the nature of finance

(3) Number of ordinary institutions of higher learning

Ordinary colleges and universities in China refer to schools that implement ordinary higher degree education under the supervision or joint supervision of national ministries and commissions, provincial people's governments, and provincial education administrative departments.

The enrollment methods of ordinary colleges and universities mainly include: the general colleges and universities pass the national unified entrance examination for doctoral and master graduate students, the national unified entrance examination for ordinary colleges and universities organized by the Ministry of Education and provincial education administrative departments, and the spring college entrance examination in some provinces and cities , separate admissions examinations for higher vocational colleges, admissions examinations for ordinary higher education colleges and undergraduates, etc.

Ordinary institutions of higher learning and scientific research institutions undertaking postgraduate education tasks include: universities (including vocational universities and vocational technical universities), colleges, independent colleges, and higher specialized schools. Universities and independent colleges mainly implement higher education at the undergraduate level and postgraduate level; vocational technical colleges, vocational colleges, and higher technical schools mainly implement higher education at the specialist level.

(4) Proportion of education expenditure in fiscal expenditure

Fiscal expenditure, also known as public expenditure or government expenditure, is the domination and use of social resources expressed in monetary form that the government collects from the private sector in order to perform its own functions. Here it is necessary to distinguish between the two concepts of "fiscal expenditure" and "fiscal expenditure": in the sense of fiscal budget, fiscal expenditure refers to the amount of money that the government can control, while related fiscal expenditure refers to the amount of money that the government spends within a certain period of time. The total amount of currency actually spent. When fiscal revenue is greater than fiscal expenditure, there will be a fiscal surplus in the government budget; otherwise, there will be a fiscal deficit. Fiscal expenditure is an important aspect of government distribution activities, and the influence of finance on social economy is mainly realized through fiscal expenditure. Therefore, the scale and structure of fiscal expenditure often reflect the scope of activities and policy choices of a government to realize its functions. Therefore, we can understand the meaning of the government's arrangement of expenditures for the provision of public goods for the market from the above two aspects

(5) Social donation funds

Social donation refers to activities in which natural persons, legal persons or other social groups donate property to public welfare social organizations, public welfare non-profit units, a certain group or individual out of love, voluntarily and free of charge.

2.2.   Assumptions of the model

(1) First make five variables: GDP (x1), fiscal revenue (x2), number of ordinary colleges and universities (x3), ratio of education expenditure to fiscal expenditure (x4), and social donation funds (x5) scatterplot of.
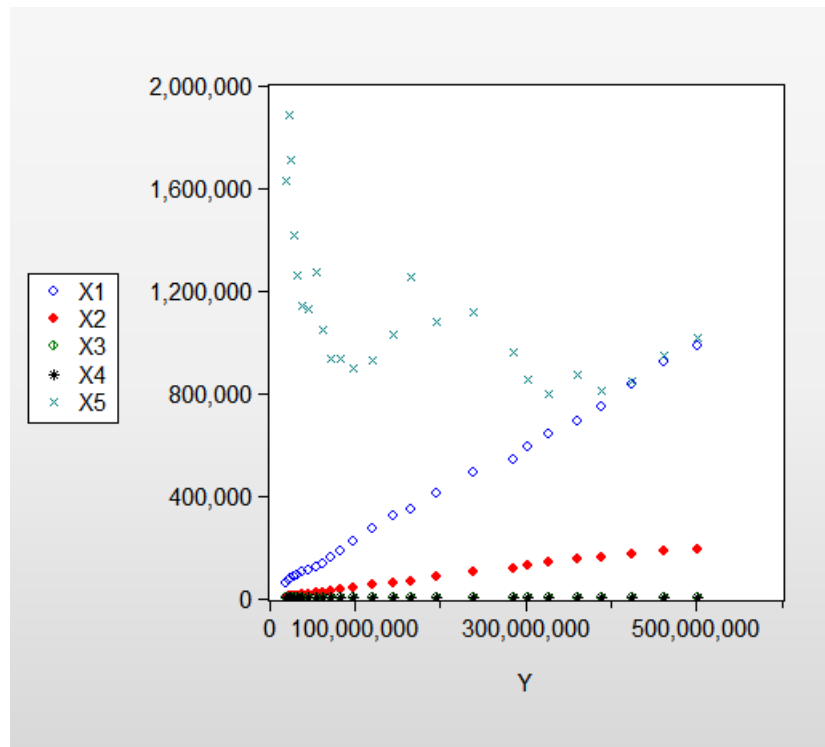
Figure 1: Scatterplot

From the above scatter plot, we can see that the GDP (x1), fiscal revenue (x2), the number of ordinary institutions of higher learning (x3), the proportion of education expenditure to fiscal expenditure (x4), and social donation funds (x5) Among these variables, the gross domestic product, financial revenue, the number of ordinary colleges and universities, and the ratio of education expenditure to financial expenditure all have a relatively obvious linear relationship, which basically conforms to the linear relationship, while social donation funds show a non-linear relationship change. . Therefore, before the multivariate linear model is established, the impact of social donations on education expenditure is not considered.

(2) Model assumptions

$$Y = \beta 0 + \beta 1 X 1 + \beta 2 X 2 + \beta 3 X 3 + \beta 4 X 4 + \mu_i$$

(1)

Among them, Y represents education expenditure, X1 represents gross domestic product, X2 represents fiscal revenue, X3 represents the number of ordinary schools, X4 represents the proportion of education expenditure in fiscal expenditure, and represents a random disturbance item, **μ** indicating that other variables not included in the model have a significant impact on education expenditure impact of spending.

3.   3. Model estimation and testing

3.1.   3.1 Perform multiple linear regression analysis on the model, and the results are as follows:

```
Dependent Variable: Y
Method: Least Squares
Date: 12/26/21   Time: 21:22
Sample: 1995 2019
Included observations: 25
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6240112.	33086556	-0.188600	0.8523
X1	350.5578	41.95835	8.354899	0.0000
X2	908.3814	207.8248	4.370900	0.0003
X3	-8029.076	4930.809	-1.628349	0.1191
X4	27187384	1.12E+08	0.243071	0.8104

R-squared	0.999195	Mean dependent var	1.80E+08
Adjusted R-squared	0.999034	S.D. dependent var	1.57E+08
S.E. of regression	4875863.	Akaike info criterion	33.81435
Sum squared resid	4.75E+14	Schwarz criterion	34.05812
Log likelihood	-417.6794	Hannan-Quinn criter.	33.88196
F-statistic	6203.590	Durbin-Watson stat	1.675536
Prob(F-statistic)	0.000000		

Figure 2: Multiple linear regression results

For parameter estimation, the following model can be obtained:

$Y = -6240112.09768 + 350.5578X1 + 908.3814X2 - 8029.076X3 + 27187384X4$

$t = (-0.188600) \ (8.354899) \ (4.370900) \ (-1.628349) \ (0.243071)$

$= 0.9992 \quad F = 6203.590 \quad DW = 1.675536$

Carry out t-test and F-test on the results. Under the condition of a given significance level $\alpha = 0.05$, GDP and fiscal revenue have a significant impact on education expenditure, the number of ordinary colleges and universities and the proportion of education expenditure to fiscal expenditure The impact on education funding is not significant.

Goodness of fit: $= 0.9992$ is close to 1, indicating that the goodness of fit of the model is very good.

3.2.   Multicollinearity test

Because the experimental data is time series data, multicollinearity test is required for the model, and the variance inflation factor test is used for the model:

```
Variance Inflation Factors
Date: 12/26/21   Time: 21:37
Sample: 1995 2019
Included observations: 25

                        Coefficient   Uncentered   Centered
         Variable         Variance        VIF         VIF

            C            1.09E+15      1151.172        NA
           X1            1760.504      407.1742     155.7228
           X2            43191.14      421.7099     179.9341
           X3            24312873      102.8568     9.993103
           X4            1.25E+16      746.0438     7.350735
```

Figure 3: VIF test results

It can be clearly seen from the figure that the VIF values of X1 and X2 are much greater than 10, so it can be judged from the figure that there is multicollinearity in the model.

4. Modification and analysis of the model

4.1. Using stepwise regression method to correct the multicollinearity of the original model

```
Dependent Variable: Y
Method: Stepwise Regression
Date: 12/26/21   Time: 22:16
Sample: 1995 2019
Included observations: 25
Number of always included regressors: 1
Number of search regressors: 4
Selection method: Stepwise forwards
Stopping criterion: p-value forwards/backwards = 0.05/0.05
Stopping criterion: Number of search regressors = 4

     Variable      Coefficient    Std. Error    t-Statistic     Prob.*

        C           1679982.      5617552.      0.299059       0.7678
       X1           351.7834      40.71044      8.641111       0.0000
       X2           900.0241      200.3167      4.493006       0.0002
       X3          -8721.494      3933.500     -2.217235       0.0378

R-squared              0.999192   Mean dependent var       1.80E+08
Adjusted R-squared     0.999077   S.D. dependent var       1.57E+08
S.E. of regression     4765378.   Akaike info criterion    33.73730
Sum squared resid      4.77E+14   Schwarz criterion        33.93232
Log likelihood        -417.7162   Hannan-Quinn criter.     33.79139
F-statistic            8659.423   Durbin-Watson stat       1.692431
Prob(F-statistic)      0.000000

                        Selection Summary

Added X1
Added X2
Added X3

*Note: p-values and subsequent tests do not account for stepwise
       selection.
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Figure 4 : Correction results of stepwise regression method

Get the corrected model:

Y=1679981.74146+351.783394041*X1+900.024118438*X2 -8721.49393414*X3

t=(0.299059) (8.641111) (4.493006) (-2.217235)

=0.9992 F=8659.423 DW=1.692431

4.2. Autocorrelation test

The BG test is used for the revised model, and the results are as follows:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.493163	Prob. F(2,19)	0.6183
Obs*R-squared	1.233750	Prob. Chi-Square(2)	0.5396

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/26/21   Time: 22:36
Sample: 1995 2019
Included observations: 25
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-618734.0	5852752.	-0.105717	0.9169
X1	8.551208	42.71939	0.200172	0.8435
X2	-40.24393	210.3687	-0.191302	0.8503
X3	232.0080	4089.996	0.056726	0.9554
RESID(-1)	0.176569	0.239038	0.738664	0.4691
RESID(-2)	-0.200154	0.249344	-0.802724	0.4321

R-squared	0.049350	Mean dependent var	7.51E-08
Adjusted R-squared	-0.200821	S.D. dependent var	4457603.
S.E. of regression	4884730.	Akaike info criterion	33.84669
Sum squared resid	4.53E+14	Schwarz criterion	34.13922
Log likelihood	-417.0836	Hannan-Quinn criter.	33.92782
F-statistic	0.197265	Durbin-Watson stat	1.830285
Prob(F-statistic)	0.959693		

Figure 5 :BG test results

According to the results, the value of LM, that is, Lagrangian statistics, is 1.2958, and the accompanying probability is P=0.5231<0.05=α, so the null hypothesis is accepted, that is, there is no autocorrelation in the model.

4.3. Heteroscedasticity test

The White test was applied to the revised model, and the results are as follows:

Heteroskedasticity Test: White

F-statistic	2.458056	Prob. F(9,15)	0.0596
Obs*R-squared	14.89831	Prob. Chi-Square(9)	0.0938
Scaled explained SS	9.351835	Prob. Chi-Square(9)	0.4055

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/26/21   Time: 22:38
Sample: 1995 2019
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.93E+14	3.92E+14	-1.254952	0.2287
X1^2	-20968.52	10031.36	-2.090297	0.0540
X1*X2	315700.5	127724.8	2.471724	0.0259
X1*X3	-13623449	5216607.	-2.611554	0.0196
X1	1.57E+10	7.76E+09	2.026177	0.0609
X2^2	-961419.9	354269.3	-2.713811	0.0160
X2*X3	56157805	21491660	2.613004	0.0196
X2	-7.14E+10	3.69E+10	-1.936690	0.0719
X3^2	1.62E+08	2.43E+08	0.668395	0.5140
X3	2.86E+11	5.03E+11	0.567984	0.5784

R-squared	0.595932	Mean dependent var	1.91E+13
Adjusted R-squared	0.353492	S.D. dependent var	2.60E+13
S.E. of regression	2.09E+13	Akaike info criterion	64.46673
Sum squared resid	6.54E+27	Schwarz criterion	64.95428
Log likelihood	-795.8341	Hannan-Quinn criter.	64.60195
F-statistic	2.458056	Durbin-Watson stat	3.295071
Prob(F-statistic)	0.059574		

Figure 6: White test results

Similarly, the model's nR^2=18.14972, the corresponding accompanying probability Prob. Chi-Square(14)=0.2000>0.05=α, so the null hypothesis is rejected, and it is concluded that the model does not have heteroscedasticity.

In summary, the revised model is obtained:

Y = 1679981.74146 + 351.783394041*X1 + 900.024118438*X2 - 8721.49393414*X3

t=(0.299059) (8.641111) (4.493006) (-2.217235)

 =0.9992 F=8659.423 DW=1.692431

Three tests of the model

(1) Economic significance test

The coefficient of X1 is 351.7834, indicating that for every unit increase in GDP, education expenditures will increase by 3,517,834 yuan, and the coefficient of X2 is 900.0241, indicating that for every unit increase in fiscal revenue, education expenditures will increase by 9,000,241 yuan. The coefficient of X3 is -8721.4939, indicating that every time the ratio of education expenditure to fiscal expenditure increases by one unit, education expenditure will decrease by 87,212,939 yuan.

(2) Statistical inference test

Goodness of fit test: R^2=0.9992, indicating that the sample regression model fits the sample data very well.

t-test: The p-values of the t-tests for X1, X2, and X3 are 0.0000, 0.002, and 0.0378, respectively, which are less than the set p-value 0.05, and the test results are all significant. It shows that the

gross national product, fiscal revenue, and the number of ordinary institutions of higher learning have a significant impact on education expenditure.

F test: F=8659.423>=2.87, so the null hypothesis is rejected, and the regression equation's overall explanation of the explained variables is significant.

(3) Econometric test

After BG test and LM statistics test, the model does not exist heteroscedasticity and autocorrelation.

5. Model analysis and policy recommendations

According to statistics, my country's educational expenditures from 2016 to 2019 were 3,888.8385 billion yuan, 4,256,200,691 million yuan, 4,614,299,799 million yuan, and 5,017,811,662 million yuan, accounting for 5.21%, 5.15%, 5.02%, and 5.08% of GDP in that year. It can be seen that the proportion of my country's education expenditure in GDP is increasing year by year. This trend reflects that my country realizes that the accumulation of knowledge and human capital is the two key factors to promote long-term, stable and sustainable economic growth, which further affects my country's education expenditure factor analysis and emphasizes the investment in education, especially higher education. Especially since the implementation of the education industrialization policy in the late 1990s, my country's colleges and universities have expanded the number of students enrolled, improved the quality of running schools, and the investment in education funds has increased significantly compared with the past. The investment in education funds in 2019 has more than doubled that in 2011. At the same time, the problems in the investment of education funds are still highlighted in the above models. The model we finally obtained is easy to know from the model. Every time GDP increases by one unit, education expenditure increases by 0.0351 units. The growth is extremely disproportionate; every unit increase in fiscal revenue will lead to a corresponding increase of 0.09 units in education expenditure, that is, the growth rate of education expenditure cannot catch up with the growth rate of fiscal revenue, and the growth rate of education expenditure is in line with the number of colleges and universities. The same problem exists between. This will directly lead to several problems that the per capita share of educational funds is insufficient, which will seriously affect the quality of education after the expansion of college enrollment. In the future policy formulation, we need to make further analysis and trade-offs on the relationship between education expenditure, fiscal revenue, GDP and the number of ordinary colleges and universities, and continuously improve the quality of education and scientific research in our country with the guarantee of sufficient education funds. , so as to effectively promote the realization of the strategic goal of rejuvenating the country through science and education. Science and technology are primary productive forces, such an indisputable fact tells us the great significance of developing education. It is the development of education that promotes the continuous accumulation of knowledge and human capital, and promotes the improvement of our country's productivity and comprehensive national strength. Therefore, we need to put our country's education on a new strategic height, in order to achieve the grand strategic goal of rejuvenating the country through science and education.

References

[1] An Empirical Analysis of Regional Differences in Per-Student Expenditures for Education in my country [J]. Cai Wenbo, Liu Shuang. Vocational Technical Education. 2020(15)

[2] An Empirical Study on the Efficiency of my country's Educational Funding Investment—Based on DEA-BCC Model Evaluation [J]. Su Hui, Sun Yi. Continuing Education Research. 2017(11)

[3] An Empirical Study on the Difference of Expenditure Per Student in Provincial Secondary Vocational Schools—Based on Panel Data Analysis from 2000 to 2011 [J]. Ran Yunfang, Shi Weiping. Educational Science. 2014(01)

[4] Achievements, Problems and Policy Suggestions of my country's Educational Funding Investment [J]. Su Min. Vocational Education Forum. 2013(25)