



# Factors Influencing on Educational Expenditure and Regional Differences in Educational Expenditure Per Capita: Based on the National Bureau of Statistics in 2020

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**Abstract.** As an important livelihood project, education is often concerned by researchers in various fields. Meanwhile, education equity is also an issue that governments at all levels and all sectors of society pay close attention to. The timeliness of such research is relatively important, which requires the support of new data and research design to obtain new findings and results. Under this background, this paper will collect new data from each province including municipalities and autonomous regions in 2020 from the National Bureau of Statistics, and the core of this study is “educational expenditure”. This study finds that regional GDP, local financial general budget expenditure, and the total number of students in various schools all have a significant influence on educational expenditure. Per capita consumption expenditure of residents does not have a markable effect on educational expenditure. There is no significant regional difference in educational expenditure per capita based on the division of the three regions.

**Keywords:** Educational Expenditure, Regional Differences, Influencing Factors.

## 1 Introduction

Convened on October 16, the 20th National Congress of the Communist Party of China emphasizes some national fields’ significance and the strategic objective in the new stage. The report consists of 15 parts, and the fifth part emphasizes “implementing the strategy of rejuvenating the country through science and education and strengthening the talent support for modernization”, which shows meaning that education should function as a fundamental and strategic supporting role in building a modern socialist country in an all-round way. As socialism with Chinese characteristics has entered a new era, the promotion of both education and relevant research deserves attention.

Cui summarized the methods of estimating the contribution rate of education to economic growth in 1999 <sup>[1]</sup>, then calculated the contribution rate of higher education to the economic growth rate in China during 1982-1990 and compared the results with the data of six western countries. He found that higher education contribution rate in China was still low and further analyzed the reasons <sup>[2]</sup>. Similarly, Ding and Chen made a

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quantitative analysis of the impact of university enrollment expansion on the economy and employment scale <sup>[3]</sup>. Yu used the data of 31 provinces (including municipalities and autonomous regions) in China from 1996 to 2005 to make a classified comparison and empirical research, and found that Chinese government and non-government investment in education had obvious effects on the accumulation of human capital and economic growth <sup>[4]</sup>. Yao and Zhang found that although education difference can hardly explain the per capita output difference, there is an obviously positive impact emerging on regional per capita output growth, and shows a kind of spillover effect in some sense <sup>[5]</sup>.

According to previous researches, it is easily found that education can have a great positive influence on economic growth and social improvement, and the discoveries are almost based on the quantitative study. Given the innovative conversion of research perspective, there is an essential need to regard indicators related to education as the explained variant and find out what will influence it to guide for improving the developmental level of education.

Some of the previous researches have focused on similar topics: Wu investigated the evolution of the disparity between urban and rural compulsory education expenditure in China from 1993 to 2005, and found that the gap between rural and urban public funding in the education per budget of junior high and primary school students was very significant. She also analyzed the influence of factors such as the degree of fiscal decentralization, the gap in economic development, and China's urbanization level on the gap concerning compulsory educational funds in different areas. Finally, countermeasures and suggestions are put forward to close the gap between rural and urban education <sup>[6]</sup>. Xu, Huang, and Ma revised and tested the multiple linear regression model of educational funds established by predecessors with the econometric analysis method to make the model more refined and accurate, so the influencing factors are also more clarified <sup>[7]</sup>. Zhang Xue and Zhang Xuan established a multiple linear regression model and analyzed the main influencing factors of Chinese educational funds input from the perspective of the composition of educational funds themselves <sup>[8]</sup>.

The data of these studies still have the problem of insufficient timeliness, but provide references for the selection of diverse indicators and the establishment of the model. Therefore, this research aims to study factors influencing educational expenditure and regional differences of per capita education expenditure.

## **2 Method**

### **2.1 Data Sources**

All the data of the research subject are collected from the annual data of different provinces on the official website of the National Bureau of Statistics of China. For the sake of ensuring the year unity of various data indicators, all the data selected in this study are from 2020. The explained variable of this study is educational expenditure. In order to find appropriate explanatory variables, based on the previous literature review and data collection, it is found that the most direct influencing factor of educational expenditure is its own components, including the national fiscal expenditure input, social

donation funds, and career income<sup>[8]</sup>. The factors affecting educational expenditure are nothing more than economic factors, social factors, and policy factors<sup>[9]</sup>. Educational expenditure is related to GDP, the total balance of savings deposits of urban and rural residents at the end of the year, and the average annual education expenditure of residents in rural and urban areas<sup>[7]</sup>.

Considering the feasibility of obtaining relevant data, this study temporarily ignores the special policy factors, so the initial data include the regional GDP, the general budget expenditure of local finance, and the per capita consumption expenditure of residents, which reflect the economic factors from different perspectives. The initial data also include the number of students in ordinary colleges and universities, ordinary high schools, middle schools, secondary vocational schools, ordinary primary schools, and special education. Subsequently, six indicators are combined into the total number of students who are receiving education in various schools to reflect the population factor and strive to cover the different groups receiving education, for the sake of achieving the accuracy and rigor of the research. In addition, some reference data comes from China's Economic Net.

At the same time, this study involves the analysis of regional differences, so the variable of region division is added to the data set. The eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Guangdong, Fujian, Shandong, Guangxi, and Hainan. The middle region includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hunan, and Hubei. The western region includes Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang<sup>[10]</sup>. All data exclude Hong Kong SAR, Macao SAR, and Taiwan Province.

## 2.2 Research Tools

The main tools used in this study are WPS Office and Stata SE-64. First, obtain the original data and download it into Excel format, use WPS to delete, add and integrate the data. Next, modify it into Excel data set that can be recognized by Stata, and import it into Stata for analysis.

## 2.3 Research Process

### Summation of Variables.

Generate a new variable named "total", symbolizing the totality of students in various schools.

### Correlation Analysis and Significance Test.

Calculate Pearson Correlation Coefficient between each variable and APEI, and figure out whether each variable can pass the significance test. The variables are filtered according to the test results.

### Stepwise Regression.

To ensure that there are only significant variables existing in the regression equation

before each new variable is included, the stepwise regression method is adopted for regression analysis.

### **Multidisciplinary Test.**

Test the resulting model for multicollinearity risk.

### **Introduction of Dummy Variables.**

The starting point of the preliminary regression is to explore the economic, social, and other factors that affect education funds, and quantify the factors as specific indicators. Therefore, the variables introduced are continuous, and the samples by province are presented with specific values. However, considering that educational equity is also a hot issue, the developmental level of education in the scope of the whole China presents an imbalance from multiple perspectives. The objective unfairness in China's education is mainly reflected in the differences among regions, rural and urban areas, and various schools<sup>[9]</sup>. To further explore whether there are significant regional differences in education expenditure, the dummy variable "region" is introduced in this study after the preliminary regression.

### **Generation of a New Variable Called "Average" and Mean Comparison.**

Educational expenditure is divided by a total number of students, obtaining "per capita educational expenditure" named "average". Make mean comparison towards "average".

### **The Final Linear Regression.**

Make final linear regression with those quantifiable variables and the dummy variable "region".

## **2.4 Research Hypotheses**

Based on the objects and theme, the research proposes 5 hypotheses. H1 is that regional GDP has a significant influence on educational expenditure. H2 is that local financial general budget expenditure has a significant influence on educational expenditure. H3 is that the per capita consumption expenditure of residents has a significant influence on educational expenditure. H4 is a total number of students in various schools have a significant influence on educational expenditure. H5 is that there is a significant regional difference in educational expenditure per capita based on the division of three regions.

## **3 Results**

### **3.1 Factors Influencing Educational Expenditure**

The correlation coefficient matrix is as follows, where "GDP" represents the regional

GDP, and “Finance” represents the local financial general budget expenditure. “Consumption” represents the per capita consumption expenditure of residents, “Students” represents the total number of students in various schools, and “Education” represents the educational expenditure. The sample size is 31.

**Table 1.** The correlation coefficient matrix of 4 factors

Variables (Factors)	Education	P value
GDP	0.9514*	0.0000
Finance	0.9709*	0.0000
Consumption	0.3062	0.0939
Students	0.8624*	0.0000

Note: \*p < 0.05.

As Table 1 shows, the per capita consumption expenditure of residents as an explanatory variable does not pass the significance test, because the P value is greater than 0.05. The null hypothesis is accepted: there is no significant correlation between the per capita consumption expenditure of residents and the educational expenditure.

Stepwise regression is used to further test the significance of explanatory variables. Based on the above correlation analysis and significance test, the “Consumption” is excluded from the regression analysis. It is found that “Finance” has the strongest correlation with education expenditure. Therefore, it is taken as the starting point of stepwise regression, and other control variables are introduced successively. Additionally, the multicollinearity tests aiming at the regression model is also done.

**Table 2.** The stepwise regression

	Model 1	Education Model 2	Model 3
Finance	2959.937** (135.6555)	2054.833** (385.854)	1345.485** (403.4513)
GDP		127.1928* (51.29861)	152.2142** (45.30411)
Students			4195.123** (1324.866)
cons	-4311268** (1035795)	-2306647 (1250918)	-1385282 (1126052)
Adjusted R <sup>2</sup>	0.9406	0.9496	0.9619
Obs	31	31	31

Note: \*p < 0.05; \*\*p < 0.01.

**Table 3.** The multicollinearity tests

Variables	VIF	1/VIF
Finance	13.77	0.072606
GDP	9.83	0.101777
Students	3.41	0.292952
Mean VIF	9.00	-

As Table 2 shows, the adjusted R square also increase continuously on the premise that all the 3 variables passed the significance test, indicating that the fitting effect was optimized and the regression model became more accurate. Meanwhile, all variables are macro data, and VIF is low and within the acceptable range in Table 3. It is considered that there is no serious multicollinearity risk in this regression model of Table 2.

Thus, these further prove that “Finance”, “GDP”, and “Students” are significant factors influencing educational expenditure. H1, H2, and H4 are true, while H3 is rejected.

### 3.2 Regional Difference in Educational Expenditure per Capita Based on the Division of Three Regions

The means of educational expenditure per capita of Chinese three regions are compared, and the results are displayed in Table 4. The “average” represents educational expenditure per capita, and “region” represents the dummy variable of the 3 regions in Table 4.

**Table 4.** Anova “average” “region”

R-squared	Adj R-squared	Prob>F
0.1414	0.0800	0.1184

Table 4 shows that the P value of the F test is 0.1184, which is greater than 0.05, suggesting that there exists no significant difference in per capita educational expenditure in the three regions. Under such a premise, a series of dummy variables generated by “region” are introduced into the regression equation.

**Table 5.** The final regression

	Education Model 1
Finance	1420.99** (390.261)
GDP	135.5778** (47.84705)
Students	4660.439** (1288.2)
Dumregion1(East)	1665121 (1013084)
Dumregion3(West)	1986123* (946913.2)
<i>cons</i>	-2983307* (1291374)
Adjusted R <sup>2</sup>	0.9657
Obs	31

Note: \*p<0.05; \*\*p<0.01.

In Table 5, the P value of T of the dummy variable “region” is relatively great than other variables, which also proves that H5 is rejected.

## **4 Discussion**

The “GDP” and the “Finance” tend to reflect economic and governmental aspects, and the “Students” reflects the objective factor of population. “Consumption” reflects the individual perspective of society. As it is shown, the individual factor cannot have a significant influence on educational expenditure or input, while the most important factors influencing education are those public and macroscopical factors, such as economy, government, and so on. Therefore, in general, education mainly belong to public utilities. According to the above results, this paper puts forward the following suggestions.

### **4.1 Economic Development Contributes to Higher Levels of Education**

For the influencing factors of educational expenditure, macroscopical economic factors are more controllable than population factors and have a stronger influence, indicating that to improve the level of educational expenditure, the emphasis should be placed on promoting economic development. Besides, there is no doubt that promoting economic development is the fundamental career of a country.

### **4.2 The Government Plays a Leading Role in the Development of the Educational Field**

The function of government can never be ignored. The regulating role of government finance should be effectively played to promote the level of educational expenditure, strengthening infrastructure construction in the field of education. In that case, the economy can better promote the improvement of education expenditure and the progress of education. In turn, a virtuous circle will be formed so that education can better play its role as a crucial driving force for economic contribution.

### **4.3 The Gap in the Level of Education Funding Per Student has Narrowed but the Imbalance Also Should Be Noticed**

The good news is that there is no significant regional difference in educational expenditure per capita based on the division of the three regions. To some extent, the imbalance in the regional development of education has eased in recent years based on the analysis of the data from 2020. It seems that every student can have an access to receive a good education from the perspective of expenditure. Nevertheless, it is undeniable that at the regional level, no matter whether between provinces or urban and rural areas, the imbalance of education development still exists objectively, which can be seen from many previous researches. The investment level of educational expenditure is still decreasing from east to west. The overall direction of promoting the balance of education level and

narrowing the differences of development level between regions and between cities and countryside needs long-term adherence.

#### 4.4 Educational Development Requires Policy Support

For purpose of achieving the above goals, the role of policy factors is also necessary: implement and adhere to the long-term reform of the education system and economic system, constantly improve various supporting facilities and infrastructure, and endeavor to promote the joint development of the two fields of economy and education.

## 5 Conclusion

In this study, the educational expenditure of 31 provinces (including municipalities and districts) in China in 2020 is taken as the explained variable, the regional GDP of the same year, local financial general budget expenditure, and the per capita consumption expenditure of residents are taken as explanatory variables reflecting the economic significance, covering the macro level of local government and the micro level of residents. At the same time, the explanatory variable “the number of students studying in various schools” reflecting the social factors of population is introduced. It covers the number of students of different categories in primary school, junior high school, senior high school, secondary vocational school, colleges and universities, special education, and other different segments. The linear regression model of “influencing factors of educational expenditure” is established, and then the new explained variable “per capita educational expenditure” and different series of dummy variables related to regions are generated to further explore the relationship among those variables. On a whole, it mainly uses correlation analysis method, linear regression method, multicollinearity test, mean comparison and other methods. The following conclusions are drawn.

Regional GDP, local financial general budget expenditure, and a total number of students in various schools all have a significant influence on educational expenditure. Per capita consumption expenditure of residents does not have a markable effect on educational expenditure. There is no significant regional difference in educational expenditure per capita based on the division of the three regions.

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