

An Empirical Study of the Factors Influencing the Structure of Tertiary Education Expenditures

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Abstract

This paper analyzed the factors influencing the structure of tertiary education expenditures by using data on the tertiary education of 33 countries from 1998 to 2015 in the OECD database and identified the problems in the structure of tertiary education expenditure in China based on a comparison with the average level of OECD countries. Our findings show that the proportion of compensation expenditures of faculties and staff to current expenditure is low in Chinese tertiary education institutions which spend too much capital on the infrastructure construction. Additionally, tertiary education funding adequacy, gross enrollment ratio, student/teacher ratio, and labor price have a significant effect on the proportion of compensation expenditures of faculties and staff to current expenditure, while gross enrollment ratio, student/teacher ratio, economic development level, and labor price have a significant effect on the ratio of current expenditure to total expenditures.

Keywords

OECD, compensation expenditures of all staff, current expenditure, international comparison.

1. Introduction

With the development of the economy and the progress of society, China's tertiary education has entered a new stage of development, and the shortage of educational resources and the serious shortage of education investment have brought new challenges to the development of tertiary education. At the same time, the educational resources are serious. The waste phenomenon hinders the healthy development of China's tertiary education. Therefore, tertiary education must achieve healthy and rapid development. On the one hand, it requires the input of all sectors of society and the government to increase investment in tertiary education. On the other hand, it is necessary to optimize the allocation structure of tertiary education resources and improve schooling benefit.

The structure of education expenditure has a great impact on educational performance. Different education expenditure structure will affect the quality of teaching. In recent years, the expansion of China's tertiary education has led to a rapid increase in the demand for tertiary education funds. However, China's tertiary education supply capacity is constrained by the level of economic development, financial support and residents' ability to withstand education. China has fewer resources for the connotative development of tertiary education. A large amount of tertiary education resources are used for basic construction. The allocation of such resources is not in line with the development law of tertiary education. Therefore, how to use limited resources reasonably to achieve the best teaching quality has become a hot spot and focus of current scholars.

Foreign scholars have relatively mature research on the structure of tertiary education expenditures. There are three researches on the structure indicators of education expenditures in the world, including the OECD, World Bank and UNESCO's education expenditure structure research, < OECD: Education at a Glance >, UNESCO provide data on education funding and some indicators for measuring the level of development of tertiary education. Some scholars have also studied the quality evaluation system of tertiary education. For example, Josip Mikulić, Ines Dužević and Tomislav Baković explored the main drivers of student satisfaction in the context of Croatian tertiary education . Sangbok Ree, Young Hyun Park and Hanjoo Yoo use Taguchi improve the quality of tertiary education. Jasmina Dlačić, Maja Arslanagić and Selma Kadić-Maglajlić proposed and tested a conceptual model of tertiary education contexts containing perceived service quality, customer perceived value and repurchase intention.

Domestic research on the structure of tertiary education expenditures focuses on comparative research and the study of the structure of provincial tertiary education expenditures. Xiaofeng Sun (2001) found that China's investment in tertiary education is relatively insufficient through international comparative analysis. Xueyu Liu (2009) also used a comparative method when studying the structure analysis of China's tertiary education expenditures, pointing out that in China, it pays more attention to hardware construction such as infrastructure and neglects the expenditure of personnel. Zenglian Zhang (2010) explored the scale, structure and performance of colleges and universities' expenditures. It was found that since the expansion of enrollment in colleges and universities, the scale of teachers and students has continued to expand, and the rate of allocation of funds has not kept pace with the expansion of scale. Insufficient funds and waste of funds coexist. The expenditure structure is unbalanced, personnel funds are too low, and the proportion of logistics and retirees' expenditures is too high. Zhenyu Li (2015) studied the differences in the educational expenditures of provincial and local colleges and universities, and analyzed the ratio of education expenditures to total expenditures and the proportion of personnel expenditures to education expenditures. The relationship between development level, government size and financial capacity, government's efforts in local tertiary education, quality of tertiary education, scale of tertiary education, and speed of enrollment in tertiary education. Liansheng Yuan (2016) found that the low gross enrollment rate of tertiary education in China, the higher student life, and the lower salary of faculty and staff make the proportion of college staff in China seriously lower. Rui Yang (2017), when studying the factors that affect education expenditures, proposes that education expenditure is affected by at least four factors: student time, teaching time, class size, and compensation of all staff, these four factors determine the level of salary costs per student together.

Comprehensive research at home and abroad has found that from the perspective of international perspective, the research on the influencing factors of the structure of tertiary education expenditure is lacking through empirical research, but it is of great significance to improve the structure of education expenditure in China at this stage. Therefore, based on such research background, this paper is of great significance to study the influencing factors of tertiary education expenditure structure through the method of quantitative analysis, and to provide reference for improving the structure of tertiary education expenditure in China.

2. A General Classification of The Structure of Education Expenditures

The structure of education expenditure has a great impact on educational performance. Different education expenditure structure will affect the quality of teaching (for example, by affecting teachers' salaries), the status of educational facilities (such as expenditures for educational infrastructure), and the education system. Adaptability to population trends and trends in enrollment (such as the establishment of new schools).

In China, according to the "National Education Funding Statistics Statement Filling Statement and Explanation of Indicators" published by the Finance Department of the Ministry of Education, the expenditure on education in tertiary education institutions is divided into two parts: capital construction investment project expenditure and business expenditure. The expenditure on tertiary education undertakings is divided into personnel expenses and public expenditures. Personnel funding is to ensure the labor compensation of college teachers and other wages, mainly used to pay teachers' salaries, subsidies and welfare guarantees, as well as student scholarships. Public funds include official fees, equipment fees, operating expenses and maintenance costs, and the amount of public funds directly affects the improvement of school conditions and affects the quality of education.

Comparing the international and domestic classification of tertiary education expenditures, we can find that international faculty compensation refers to wages and benefits and social security fees in domestic personnel funds, and other international current expenditures refer to domestic personnel funds. Expenditure grants and expenditures on goods and services in public funds, while international capital expenditures refer to other capital expenditures and capital expenditures in public funds in the country. It should be noted that other capital expenditures refer to schools. Expenditure used for the purchase of land, fixed assets intangible assets, and repair expenses.

3. An analysis of the Factors Influencing the Structure of Tertiary Education Expenditures

There are few articles discussing the structure of college education expenditure in China. Xuexuan Liu (2009), Zhenyu Li (2015), Liansheng Yuan (2016), etc. are the few papers discussing the structure of college expenditures. From the perspective of empirical research, the study of the structure of tertiary education expenditures There are also very few papers. Why is the proportion of college personnel expenditure in China far below the international average? What factors determine the proportion of college personnel expenditure and capital expenditure? There have been no in-depth discussions by researchers, and we will explain this below.

3.1. Theoretical Assumptions

The different flexibility of the various expenditures of tertiary education determines the structure of the expenditure of tertiary education. The compensation of all staff (ie, personnel expenditure) is the most rigid and regular expenditure among all expenditures. The adequacy of tertiary education funding refers to the ratio of financial tertiary education funds to government financial expenditures. From this, we can see that when the funds for college education in a country or region are tight, that is, when the government's fiscal expenditure is limited, the state's expenditure on tertiary education is relatively small. At this time, universities must first guarantee the normal life of teachers and students and the normal operation of the school, the proportion of faculty and staff compensation will be relatively high at this time; conversely, when education funds are sufficient, then the country or region has the ability to expand investment in tertiary education, this period is the best period for the expansion of colleges and universities. Colleges and universities will expand the scale of the school on the basis of maintaining the normal operation of the school, which will increase investment in the construction of school infrastructure. Then capital expenditure will increase, and faculty compensation will be increased. Expenditure and recurring expenditures will decrease. Based on the above analysis, we propose hypothesis one:

H1: In other countries with certain conditions, the more adequate the education funds, the lower the proportion of faculty and staff compensation expenditures to current expenditures, and the lower the proportion of current expenditures to total expenditures.

The high quality requirements of tertiary education in a country or region mean a higher cost per student. The expenditure on education per capita measures the quality of tertiary education in a country or region. When the cost of education per student is higher, the state invests in the increase in manpower funding has correspondingly reduced spending on capital construction. Based on the above analysis, hypothesis 2 is proposed:

H2: In other countries with certain conditions, the higher the per capita expenditure, the higher the proportion of faculty and staff compensation expenditures to current expenditures, and the higher the proportion of current expenditures to total expenditures.

The gross enrollment rate of tertiary education also has an impact on the structure of education expenditure. The gross enrollment rate of tertiary education refers to the ratio of the number of students enrolled in tertiary education to the number of people aged 18-22. Therefore, we can see that countries with higher gross enrollment ratios in tertiary education have a certain number of people of appropriate age. The number of people in the age-appropriate population is higher, which also indicates that the level of tertiary education development is higher. Under this circumstance, the pressure of school expansion is relatively reduced or eliminated, and the capital expenditure of colleges and universities will be correspondingly reduced. Correspondingly, the proportion of faculty's compensation expenses has increased. When a country's tertiary education has a lower gross enrollment rate and the school is in an expansion stage, that is, when the population of the appropriate age is small, the country or region has a small population of education, and its tertiary education development level is relatively low, then for the long-term development and improvement of the level of tertiary education development, the state will consider the expansion of scale. At this time, the investment in infrastructure construction (capital expenditure) will be relatively large, and the proportion of personnel will be reduced, that is, the salary of faculty and staff. The expenditure is low. Based on the above analysis, this paper proposes the hypothesis three:

H3: Under certain other conditions, the higher the gross enrollment rate of tertiary education, the higher the proportion of faculty and staff compensation expenditures to current expenditures, and the higher the proportion of current expenditures to total expenditures.

The faculty and staff salaries in the current expenditures of tertiary education are used for faculty's wages and welfare expenditures. Therefore, the efficiency of the use of human resources by colleges and universities will have an impact on current expenditures, according to Ze Chen (2013). In the important indicator of the quality of talent training, we can know that the student-teacher ratio refers to the ratio of the number of students to the number of teachers in a certain educational institution and education in a given year. It is a measure of the quality of tertiary education personnel. Important indicators. From this, we can see that when the number of college students in a country or region is relatively low, the level of education development in the country or region is higher, because they have achieved small class teaching and are more conducive to the cultivation of talents. In the case of the same size of students, the number of teachers in higher countries or regions is less, so the expenditure on teachers will be reduced, and the current expenditure will be reduced accordingly. On the contrary, the students will be lower. Countries or regions, with the same number of students in the school, with more teachers, the salary of the faculty will increase, Regular spending will also increase. Based on the above analysis, this paper proposes the hypothesis three:

H4: Under certain other conditions, the higher the proportion of college students and teachers, the lower the proportion of faculty and staff compensation expenditures to current expenditures, and the lower the proportion of current expenditures to total expenditures.

The size of students in tertiary education will also have an impact on the structure of tertiary education expenditures. The student's scale measures the development level of tertiary education to a certain extent. In countries or regions with a high number of students, it indicates that the region attaches importance to the development of education. When the number of

students increases, the school has to consider how to resettle students. The period is the stage of tertiary education construction scale and campus facilities development, that is, colleges and universities in this period will invest more education funds into capital expenditures, and the corresponding expenditures on school staff compensation will be neglected. Recurring expenses will also decrease. Based on the above analysis, we propose hypothesis five:

H5: Under certain other conditions, the higher the number of students in the school, the lower the ratio of compensation expenses to current expenditures, and the lower the ratio of current expenditure to total expenditure.

The level of economic development of a country or region has an impact on tertiary education, but the path is not clear. When a country or region has a high level of economic development, colleges and universities should have sufficient funds. At this time, in colleges and universities, it is to choose scale expansion, which should increase the investment in infrastructure construction and reduce the expenditure on personnel. With the increase in the level of economic development, the treatment of teachers will also increase, and the proportion of personnel funds will increase. Therefore, based on the above analysis, the hypothesis we propose is:

H6: The structure of tertiary education expenditure is related to the level of economic development of a country or region, but the relevant direction cannot be determined.

3.2. Measurement Analysis

3.2.1. Data

We obtained the structure and related data of college education expenditures from 1998 to 2015 on the OECD database website. After missing the missing values and outliers, the sample obtained covers the basic information of 33 countries.

3.2.2. Variable Definition and Regression Model

Table 1. Variable definition and regression model

Variable type	Variable name	Variable symbol	Variable calculation method
Dependent variable	Ratio of compensation of all staff to current expenditure	SPC	Compensation of all staff /current expenditure
	current expenditure as a percentage of total expenditure	CPT	current expenditure / total expenditure
Independent variable	Adequacy of college education funds	TOGDP	Financial Tertiary education Funds / Government Financial Expenditure
	Quality of tertiary education	SJF	Average expenditure
	Tertiary education gross enrollment rate	GER	Number of students enrolled in tertiary education/ population aged 18-22
	College student-teacher ratio	PTR	Number of full-time teachers/school students
	The level of economic development	LNGDP	Ln (GDP)
	University labor price	PRICE	Per capita funding/per capita GDP of faculty and staff in colleges and universities

This paper analyzes the ratio of compensation of all staff to current expenditure (SPC) and current expenditure to total expenditure (CPT). Based on comprehensive research, it determines the adoption of fixed effect by Hausmann test. The model is analyzed and the basic model is established as follows, ε is the error term:

$$SPC = \alpha + \beta_1 TOGDP + \beta_2 SJF + \beta_3 GER + \beta_4 PTR + \beta_5 LNGDP + \beta_6 PRICE + \varepsilon \quad (1)$$

$$CPT = \alpha + \beta_1 TOGDP + \beta_2 SJF + \beta_3 GER + \beta_4 PTR + \beta_5 LNGDP + \beta_6 PRICE + \varepsilon \quad (2)$$

3.2.3. Empirical Results

Table 2. Descriptive statistics

variable	SPC	CPT	TOGDP	GER	PTR	SJF	LNGDP	PRICE
count	545	539	539	564	463	522	594	559
mean	67.9589	89.72689	1.451972	60.91695	15.5052	12420.65	10.20011	35207.58
sd	10.44108	6.235471	.4648005	19.38763	6.262989	5406.989	.7548277	19297.33
variance	109.016	38.8811	.2160395	375.8802	39.22503	2.92e+07	.5697649	3.72e+08

According to Table 1, we can see that the average ratio of faculty and staff members' compensation expenditure to current expenditure in the OECD countries is 67.95%, indicating that countries pay more attention to the salary expenses of college faculty and staff. The ratio of current expenditure to total expenditure is 89.72. % indicates that countries pay more attention to the connotation development of tertiary education in the country. The gross enrolment ratio of tertiary education in the world is generally at a relatively high level.

Table 3. Regression results

	(1)	(2)
	rega_1	rega_2
togdp	-4.625** (-2.36)	-2.111 (-1.59)
ger	-0.0680* (-1.76)	0.0751*** (2.80)
ptr	-0.0360* (-0.35)	-0.299*** (-4.25)
sjf	-0.0000801 (-0.52)	-0.000149 (-1.44)
lngdp	0.161 (0.04)	9.400*** (3.37)
price	0.000471*** (3.03)	-0.000248** (-2.29)
_cons	61.25 (1.57)	5.892 (0.22)
r2	0.0785	0.121
N	378	373
F	4.858	7.724

3.2.4. Regression Results

The regression results of the ratio of faculty's salary and expenditure show that the coefficient of sufficiency of tertiary education funds is significantly negative at the level of 5%, which means that within a certain scope, the more funds for tertiary education, the proportion of faculty and staff salaries. The lower the number indicates that the universities in this period are more willing to invest their funds in the construction of basic facilities; the coefficient of gross

enrollment in tertiary education is significantly negative at the level of 10%, but in the regression results of the proportion of current expenditures, The coefficient is significantly positive at the level of 1%, which indicates that, within a certain range, with the increase of the gross enrollment rate of tertiary education, the salary of faculty and staff in universities around the world increases faster than the increase in recurrent expenditure. That is to say, colleges and universities do not pay enough attention to the salary of faculty and staff; the coefficient of tertiary education student-teacher ratio is significantly negative at the level of 10%, and the fewer teachers in higher countries or regions, resulting in fewer teachers. The proportion of faculty's salary expenditure is reduced; the coefficient of labor price of colleges and universities is significantly positive at the level of 1%, indicating that with the increase in labor prices, faculty and staff Compensation expense will increase.

From the regression results of the proportion of current expenditures, the coefficient of gross enrollment in tertiary education is significantly positive at the level of 1%, indicating that with the increase of the gross enrollment rate of tertiary education, the pressure of college expansion will be relatively reduced, and colleges will be more willing. Increasing investment in the school's current expenditures; the increase in the ratio of students to teachers has led to a reduction in the faculty's compensation, which is the most important reason for the reduction in current expenditures; the coefficient of economic development is significantly positive at the level of 1%. This shows that the higher the level of economic development, the higher the proportion of recurrent expenditure; the coefficient of labor price of colleges and universities is significantly negative at the level of 5%, compared with the regression results of faculty and staff salaries, indicating labor the increase in prices will significantly increase the salaries of faculty and staff.

4. International Comparison

According to the regression results, we can find that the adequacy of tertiary education, the gross enrollment rate, the ratio of students to teachers, and the labor price of colleges and universities significantly affect the ratio of faculty's compensation to recurrent expenditure, while the enrollment rate of tertiary education, the ratio of students to teachers, and economic development. The level and the labor price of colleges and universities significantly affect the ratio of current expenditure to total expenditure. The following is a comparative analysis of these factors to explain the proportion of China's tertiary education expenditures.

As can be seen from Table 4:

(1) From the perspective of the proportion of faculty's salary expenditure, China's personnel expenditure is far lower than the average level of OECD countries, and from the analysis of current expenditure ratio, China is actually close to the average level of OECD countries, and some age is even higher than the average level of OECD countries. This shows that colleges and universities in China pay little attention to the expenditure of faculty and staff, but the capital expenditure is more concerned by colleges and universities. This part of expenditure refers to the use of schools for basic facilities. expenditure.

(2) From the perspective of the adequacy of tertiary education funding, China is lower than the average level of OECD, but with the passage of time, China's tertiary education funding is gradually increasing, and the difference with the international level is gradually narrowing, which indicates China pays more and more attention to tertiary education, but the degree of university financial adequacy has a negative impact on the ratio of faculty and staff's compensation expenses to recurring expenditures, without affecting the proportion of current expenditures. This proves that the more funds for tertiary education, the more colleges and universities It is to spend more on education for other current expenditures.

Table 4. International Comparison of the Structure of Tertiary education Funds and Its Influencing Factors

Year		1999	2002	2005	2008	2011	2014	2015
Compensation of all staff / Current expenditure	OECD average	70.21	67.02	67.89	68.73	67.05	67.42	67.45
	China	49.36	48.13	46.79	40.91	38.50	41.90	43.18
Current expenditure / total expenditure	OECD average	87.55	88.72	90.33	90.99	89.82	90.57	89.56
	China	78.68	82.41	83.90	93.08	96.13	97.95	96.50
Adequacy of education funding	OECD average	1.36	1.38	1.43	1.44	1.54	1.53	1.51
	China	0.62	0.98	1.14	1.14	1.10	1.23	1.40
Gross enrollment rate	OECD average	47.53	54.32	60.68	62.75	69.62	71.05	70.88
	China	10.50	15.00	21.00	23.30	26.00	37.50	40.00
Student-teacher ratio	OECD average	16.00	15.72	15.33	14.85	15.69	15.78	14.50
	China	12.63	17.86	14.67	16.74	17.42	17.68	17.73
Labor price	OECD average	10.39	10.45	10.46	10.50	10.49	10.52	10.54
	China	7.39	7.62	7.91	8.25	8.50	8.72	8.78

(3) From the perspective of gross enrollment rate, China's gross enrollment rate is far lower than the average level of OECD countries. Although this is not unrelated to China's population base, it is less negative than its faculty's salary and expenditure. Impact, the positive impact on the ratio of current expenditures, it can be seen that China's colleges and universities will spend more on the construction of basic facilities.

(4) The ratio of students to teachers in China's colleges and universities is significantly higher than the average level of OECD countries. The ratio of student-teacher-student ratio to current expenditures and the ratio of current expenditures to total expenditures has a negative impact. High has a certain impact on the low proportion of faculty and staff salaries in China.

(5) China's labor price is close to the international average, but there is still a certain gap. This shows that the relatively low salary expenditure of faculty and staff in China has a certain relationship with the low labor price level.

5. Policy Suggestions

Based on the above research conclusions and international comparison, this paper proposes the following policy recommendations:

First, the relevant departments should re-examine the rational use of tertiary education funds. The infrastructure of tertiary education is of course important, but we cannot ignore the important role of faculty and staff in the development of tertiary education. The faculty and staff salaries of tertiary education account for current expenditures. The proportion should be maintained at a moderate level, and the current proportion of faculty and staff salaries in China reflects the lack of attention paid by faculty and staff in China's colleges and universities. In recent years, the state's demand for tertiary education has focused on connotation development and improving teacher treatment. The proportion of the salary and expenditure of faculty and staff in tertiary education in China needs to be further improved.

Second, China's emphasis on tertiary education is gradually increasing, but there is still a gap relative to the international average. Therefore, China needs to do a good job in tertiary education and increase the proportion of faculty's salary and expenditure. Learning from a higher international level of the country requires the attention of the relevant departments.

Third, the enrollment expansion of tertiary education inevitably makes colleges and universities use more education funds for capital construction. However, for China's tertiary education, it is no longer feasible to pay attention to enrollment expansion and neglect the protection of faculty and staff. Caused the attention of relevant departments.

Fourth, the low proportion of faculty and staff salaries in China is inseparable from the increase in the ratio of students to teachers, which indicates that teachers who have increased year by year have not met the growing number of students receiving tertiary education. This requires the relevant departments to pay attention to it. The school's faculty needs are considered comprehensively, and the construction of the teaching staff can be strengthened in the future.

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