



# Study on Influencing Factors of Residents' Education Expenditure from the Perspective of Baumol's Disease

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## Abstract

Data from the National Bureau of Statistics show that in recent years, both the per capita education expenditure of Chinese residents and the national financial expenditure on education have shown a steady rise. Although the intensity of financial support has not been reduced, the per capita education expenditure of Chinese residents has always accounted for more than 10% of the per capita consumption, indicating that the educational burden of residents has not been effectively reduced. From the perspective of Baumol's disease and combined with the panel data of 31 provinces in China, this paper attempts to establish a two-way random effect model to quantitatively analyze the influencing factors of residents' education expenditure in China. The study finds that there is a negative elastic relationship between teachers' salary level and residents' education expenditure, that is, there is no significant Baumol's disease in China's education industry. However, there is a problem that the low salary level of teachers leads to the increase of residents' education expenditure. Further, through regional grouping regression, it is found that the higher the regional economic development level is, the greater the absolute value of this elasticity is, that is, the stronger the reverse effect of teachers' salary on education expenditure is.

**Keywords:** *Baumol's disease; Educational burden of residents; The salary level of teachers; The "double reduction" policy*

## 1. INTRODUCTION

Education industry is the cornerstone of national economic development and national prosperity, talent supply and human resources cultivation is an important foundation of regional economic development. In our country, the fourteenth a five-year plan and 2035 vision outline explicitly pointed out: "to promote national quality in highlight the important position, build a high quality education system and all-round full cycle of health system, optimizing the population structure, expand the population quality bonus, enhance the level of human capital and the all-round development of people". In recent years, China's financial expenditure on education has always maintained a large intensity and scale, and presents a trend of annual growth. In 2020, the government's fiscal expenditure on education will reach 3.635994 trillion yuan, accounting for 14.79% of the total fiscal expenditure. Since 2014, the year-on-year growth rate of fiscal expenditure on education has been above 4% for seven consecutive years. Around 2010, the central and local fiscal expenditure on education increased by more than 15% year on year, and reached a peak in 2012, after

which it maintained a stable trend. Obviously, the steady development of China's education industry cannot be separated from the preferential support of fiscal policy, but the annual growth of financial education expenditure also increases the financial burden of the government to a certain extent.

From the micro individual point of view, in recent years, the per capita education expenditure of Chinese residents has also shown a rapid rise, from 487 yuan in 2002 to 2,032 yuan in 2020, with a year-on-year increase of 317.25%. By further subdividing the per capita education expenditure into urban and rural areas, it can be found that the per capita education expenditure in urban areas is about three times that in rural areas, but the growth rate of the two is almost the same. At the same time, the proportion of per capita education expenditure in per capita consumption expenditure in urban and rural areas is generally stable at more than 10%, and the growth rate of per capita education expenditure is almost the same as the growth rate of per capita consumption expenditure, and even higher than the growth rate of consumption expenditure in some years, indicating that

the burden of Chinese residents' education expenditure is very heavy in recent years.

A strange phenomenon can be found by comparing the education expenditure of the government and residents: Fiscal expenditure on education increased year by year and no reduces the per capita expenditure on education, relative to the extent of consumer spending and income growth, in the growth of per capita expenditure on education is also strong, the government financial input in education and transfer payment seems to be some kind of "new cost" dilution, the cause of the government financial burden increase residents' education at the same time also did not reduce, It is not conducive to the improvement of residents' happiness and satisfaction in life, and also deviates from the policy tone of proactive, quality and efficiency improvement of China's fiscal policy. Therefore, to find out the mechanism of "new cost" is helpful to solve the important problem of "expensive school, expensive education", which involves the national economy and people's livelihood.

## 2.LITERATURE REVIEW

### 2.1. *Baumol's disease theory*

American economist William Baumol (1967<sup>[1]</sup>) first discussed the phenomenon that wages of "progressive sectors" increase costs of "stagnant sectors" with the increase of labor productivity, and stagnant sectors continue to enhance their ability to absorb employment and occupy an increasing share in the national economy, thus dragging down economic growth. This phenomenon is also known as baumol's cost disease. For the progressive sector, it is easy to replace labor input through the application of new technology or new equipment, so as to improve production efficiency. For the stagnant sector, labor factors play a key role in the production of the sector and cannot be easily replaced by other factors. As wages rise in progressive sectors, stagnant sectors will also demand wage increases, raising the prices and costs of their products and services. Baumol clearly mentioned the cost disease in education, medical and other service fields. The increase of the service cost caused the decline of residents' quality of life and the sudden increase of pressure on the government to provide public services, which made residents and the government need to make trade-offs when making consumption decisions. Blackman (1995<sup>[2]</sup>) noted the trend of rising operating costs and tuition fees paid by college students, and attributed this phenomenon to cost sickness. He proposed that the impact of cost sickness could be alleviated by adjusting practices and reallocating resources. Trombella (2010<sup>[8]</sup>) also paid attention to the expenditure of higher education, pointing out that the particularity of human resources makes it difficult for higher education to improve the quality of

education through the substitution of input of other elements. Meanwhile, the average cost growth rate of higher education is higher than that of other industries, which is the embodiment of baumol's disease. Bowen(2012<sup>[3]</sup>) further studied the Phenomenon of Baumol's disease in higher education and found that the growth rate of education-related expenditures of college students was higher than the inflation rate of public institutions, while public colleges and universities faced greater financial difficulties compared with private colleges and universities. At the same time, he and Bella zhuang with similar views on cause analysis, because in this industry such as education, art, labor elements of irreplaceability is extremely high, at the same time will ask wage growth is consistent with the efficient production industry, leading to the cost per unit is growing faster than other industries, thus baumol's disease are particularly common in labour-intensive services.

Education industry is a service industry with special nature. Its production efficiency increases slowly while production cost and service price continue to increase, which is a typical "stagnant sector". Teaching principles of Economics 30 years ago cost 60 credit hours; it still costs the same today, but the cost has multiplied. Massy (1996<sup>[6]</sup>) pointed out that the production efficiency of higher education is closely related to the student-to-teacher ratio in colleges and universities, and the rising budget expenditure of colleges and universities mainly comes from the rising labor cost of teachers. By sorting out the pathological mechanism of Baumol's disease, this paper aims to explore whether The education industry in China has Baumol's disease, that is, whether the increase of residents' per capita education expenditure is caused by the high salary of teachers..

Integrated the research point of view, can be found that the existing literature from the perspective of teachers' labor costs too few to analyze the growth of spending on education, so the text based on a new perspective of baumol cost disease, to explore the teachers' salaries impact on residents' expenditure on education mechanism, to solve the rising cost of education in our country in recent years, a considerable burden on residents' education to provide certain reference for inspiration.

## 3.TEST OF EDUCATION INDUSTRY

### 3.1. *Variable selection and data statistics*

In view of the availability and completeness of data, this paper selects the relevant data of 31 provinces (excluding Hong Kong, Macao and Taiwan) from 2015 to 2020 to establish a panel model, and the selected relevant variables are shown in Table 1. In order to smooth the data and reduce the impact of heteroscedasticity on the robustness of the model, the per capita education

expenditure of residents and the per capita salary of teachers were logarithmically processed. In the narrow sense, education expenditure mainly includes direct education expenditure, education fund-raising and education taxes and fees<sup>[4]</sup>.The per capita education expenditure referred to in this paper is in a narrow sense, including the cost of teaching materials, tuition fees, accommodation fees, tutoring fees and training classes and other direct education expenditure.

The average number of years of education per capita is calculated as the average number of years of education = (illiterate ×1+ Number of people with primary education ×6+ Number of people with junior middle school education ×9+ Number of people with secondary school education ×12+ Number of people with junior college education or above ×16)/ the total number of people over 6 years old, The average annual salary of teachers in different education stages is multiplied by the weight and accumulated, and the weight is the total number of teachers in the education stage compared with the number of teachers in the region<sup>[7]</sup>. The data come from The columns of "China Statistical Yearbook", "China Education Statistical Yearbook" and "Employment and Salary" and "education" of the National Bureau of Statistics. Considering the differences in economic development and education scale among different provinces, six control variables including per capita disposable income, industrial structure level, financial policy support, development of private education and development of public education are further introduced. The statistical description of all variables is shown in Table 1.

**Table 1:** Statistical description of variables

Type	Name	Symbol	Obs	Mean	Std.	Min	Max
Dependent variable	Per capita cost on education	Lnpedu	186	7.57	0.41	5.75	9.68
Independent variables	Average salary of teachers	lnPwage	186	11.3	0.25	10	12.1
	School years of per capita	Period	186	9.29	1.08	5.4	13.0
Control variables	Per capita disposable income	lnPi	186	10.4	0.247	10	11.2
	Industrial development	lnInd	186	9.19	0.98	6.4	11.0
	Financial policy	lnFiscal	186	6.66	0.67	4.9	8.16
	Private education	lnCompany	186	9.53	0.92	6.9	11.2
	Public education	lnBook	186	4.67	1.29	0.2	7.95

The industrial development level and financial policy support are measured by the added value of the tertiary industry and local financial education expenditure respectively, while the development of private education and public education are measured by the number of educational enterprise legal entity units and the number of effective library cards issued by the library<sup>[9]</sup>. In view of the differences in units and values of the control variables, logarithmic processing is carried out.

### 3.2. Regression result comparison

First, the pooled regression was conducted directly without considering the heterogeneity of region and time, and the results showed that the per capita education expenditure and the average teacher's salary showed a significant negative elasticity relationship, with the elasticity value of -0.494, which preliminarily indicated that teacher's salary was not a positive promoting factor of education expenditure. However, the situation of 31 provinces was different. There may be some unobserved inter-provincial differences in factors. In order to avoid endogeneity affecting the robustness and accuracy of the model, both the individual effect and the time effect are controlled, and the fixed effect model and the random effect model are used for regression respectively. The results show that under the bidirectional fixed effect model, the elasticity between per capita education expenditure and teachers' annual average salary decreases to -0.319 and does not pass the significance test. The regression results of the two-way random effects model show that the elasticity between per capita education expenditure and annual average salary of teachers rises to -0.565, and passes the significance test at 99% confidence level. Meanwhile, the significance level of other control variables is also higher than that of the first two models. The comparison of regression results is shown in Table 2.

**Table 2:** Regression of different models

	(1)	(2)	(3)
Model	Pooled	FE	RE
LnPwage	-0.494***	-0.319	-0.565***
	(0.138)	(0.333)	(0.206)
period	0.196***	0.233*	0.210***
	(0.049)	(0.119)	(0.064)
lnpdi	0.897***	2.563**	0.791***
	(0.156)	(1.126)	(0.214)
lnfiscal	0.0389	-0.207*	0.0907*
	(0.229)	(0.336)	(0.168)
lnind	-0.139	0.180	-0.081*
	(0.161)	(0.485)	(0.201)
lnbooks	0.144***	0.0214	0.111***
	(0.029)	(0.081)	(0.034)
lncompany	-0.0405	-0.103*	-0.103
	(0.062)	(0.184)	(0.080)
Constant	2.778***	-16.94*	4.204
	(1.015)	(10.480)	(2.757)
Time effect	NO	YES	YES
Individual effect	NO	YES	YES
Observations	186	186	186
R-squared	0.704	0.429	
Province		31	31

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3.3. Model selection test

Firstly, the pooled regression model and the fixed effect model can be selected through the F-test. The F

statistic is 3.09 and the P value is 0, which strongly rejects the null hypothesis. In other words, it can be believed that there is significant individual heterogeneity between provinces, and the fixed effect model should be selected to control individual differences between different provinces. So as to avoid the omission of economic variables such as regional economic development level and other endogenous problems. Then, the fixed effect model and the random effect model were selected through the Hausmann test. The Chi-square statistic was 8.098 but the P value was 0.777, so it was obvious that the null hypothesis should be accepted and the random effect model should be selected. It can be seen from Table 2 that the significance degree of all variables under the bidirectional random effect model was also high on the whole. Results of F test and Hausman test are shown in Table 3..

**Table 3:** Model selection test

Methods	Statistics	P-value
F-test	F(30, 143) = 3.09	0.0000
Hausman-test	Test value=8.185	0.7705

Under the premise of controlling other variables, the per capita education expenditure will increase by 0.565% when the per capita salary of teachers is reduced by one unit, that is, the increase of teacher manpower cost is not the cause of the increase of residents' education expenditure, which is not consistent with the transmission path of Baumol's cost disease. Before the "double reduction" policy was fully implemented in China, students' demand for extracurricular training was widespread. If teachers' fixed salary was low, they would be encouraged to increase their personal income by charging extracurricular training fees through "extracurricular tutoring". At the same time, due to the existence of school or school district barriers, it is always difficult to improve the ratio of students to teachers in elite schools, so that students restricted by barriers can only get high-quality education by participating in extracurricular training, which further aggravates the demand for extracurricular training, and even the phenomenon of inversion of in-school teaching and off-campus training. According to the table 1, the variables of per capita education years, per capita disposable income and development of public education have a significant positive relationship with education expenditure. The higher the level of education and the longer the education period, the higher the goals and requirements of career planning will be, the more attention will be paid to the cultivation and investment in education. However, the elasticity of financial policy support is positive, indicating that the investment of government financial education funds has no significant help to reduce the educational burden of residents, indicating that there are certain problems in the structure of financial expenditure and the utilization efficiency of

financial education funds. The estimated coefficients of industrial development level and private education development were -0.081 and -0.103 respectively, indicating that the more prosperous the tertiary industry and the more perfect the cultural infrastructure and service supporting facilities in a certain area, the higher the possibility of residents to obtain public welfare cultural and educational services. In the early stage of development, private educational institutions often adopt the drainage marketing strategy of providing free courses in order to enter the market and win public praise. For consumers with high price elasticity of demand, this strategy can reduce their education expenditure.

### 3.4. Regional heterogeneity analysis

According to the geographical division of China, 31 provinces can be divided into eastern, central and western regions respectively. The relevant data of 31 provinces from 2015 to 2020 are also selected to perform grouping regression for the three regions of China using the two-way random effect model. The regression results are shown in Table 4. There is a negative relationship between per capita education expenditure and teachers' average salary in the three regions, and the absolute elasticity decreases successively from the eastern, central and western regions.

**Table 4:** Regional grouping regression results

	(1)	(2)	(3)
Region	East	Middle	West
Ln <sub>p</sub> wage	-0.656*	-0.415*	-0.222
	(-1.93)	(-1.82)	(-0.69)
period	0.025	0.203***	0.407***
	(0.31)	(2.98)	(5.59)
ln <sub>p</sub> di	1.467***	1.696***	0.384
	(3.59)	(3.57)	(0.91)
ln <sub>f</sub> fiscal	-0.150	-0.121	0.602***
	(-1.13)	(-0.69)	(3.19)
ln <sub>i</sub> nd	0.208**	0.534***	-0.374***
	(0.92)	(3.21)	(-2.59)
ln <sub>b</sub> ooks	-0.004	-0.345**	0.276***
	(-0.06)	(-2.15)	(3.06)
ln <sub>c</sub> ompany	-0.112*	-0.323***	-0.383***
	(-0.96)	(-2.98)	(-2.77)
Constant	-0.405	-6.544**	4.225*
	(-0.39)	(10.48)	(1.67)
Time effect	YES	YES	YES
Individual effect	YES	YES	YES
Observations	66	48	72
R <sup>2</sup> -between	0.704	0.885	0.930
R <sup>2</sup> -within	0.527	0.530	0.189

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

There is a negative relationship between per capita education expenditure and teachers' average salary in the three regions, and the absolute elasticity decreases successively from the eastern, central and western

regions. This further indicates that at the regional level, teachers' salary level is not the cause of rising costs in the education sector. However, salary level will directly affect teachers' behavioral decisions, and thus indirectly affect residents' education expenditure, and the degree of influence is closely related to regional economic development level, education development level and education emphasis. The regression results show that the estimated coefficient of per capita education expenditure and average teacher salary decreases successively in eastern and western regions, indicating that the higher the level of economic development is, the greater the negative impact of teacher salary level on residents' education expenditure. From the point of social reality in our country, talent employment tend to flow into the developed areas, developed a surplus of human resources situation of developed areas, which can only improve the degree of employees, skill and quality standard of screening, this indirectly stimulate the local education training requirements, at the same time the supply of high quality teachers obviously slower than the rapid growth of education demand. Living costs and expenses in developed areas are inevitably higher than those in other areas. Therefore, on the premise of a certain salary, teachers have a strong incentive to obtain additional income from training sideline besides fixed salary due to subjective and objective factors, thus exacerbating the growth of residents' education expenditure. According to the results of model regression, there is a positive relationship between the impact degree and regional economic development level.

#### 4. CONCLUSION

According to the estimation results of the model, the salary level of teachers is not the reason for the high cost of China's education industry and the rapid rise of residents' education expenditure, that is, there is no significant Baumol's cost disease in China's education industry, but the level of salary level will directly affect teachers' behavioral decisions, and thus indirectly affect per capita education expenditure. There is a positive relationship between the degree of influence and the level of regional economic development. Since the increase of our residents' education expenditure is not caused by Baumol's disease, then why? Confucianism has been regarded as an orthodox thought in China for more than two thousand years and still has a deep influence on the development of our education<sup>[10]</sup>. In today's environment, people generally regard education as the best way to obtain scarce resources. The educational function of education is constantly weakened while the instrumental function is constantly strengthened, which makes the essence of education appear "alienated". When the instrumentality of education is constantly amplified, the starting point of all educational activities is to obtain scarce opportunities or results, which is highly utilitarian. Meanwhile, educational activities are naturally more

regarded as an investment behavior. It is this morbid educational concept that leads to the internalization of education at different stages, resulting in a large number of unnecessary educational expenditures, which further increases the educational burden of residents. Inputs, if the education as a personal development, blindly follow suit to a large number of investment, the law of diminishing marginal returns will also happen in evolution in the vortex of education, the students put money, energy and other costs are increasing, but the education return growth relative to the inputs is lagging, partly or even less. Therefore, the roll-in of education has caused "inflation" in qualification requirements such as diplomas, certificates and skills, resulting in an increase in per capita education expenditure.

Through the above analysis of the influencing factors of China's residents' education expenditure, we can get the following enlightenment. First, formulate a reasonable and effective teacher salary system and performance appraisal system. Although according to this article conclusion, education does not exist obvious baumol's disease, namely teachers pay levels does not lead to higher education spending, but if the teacher didn't get a reasonable manifest the value of their labor income, teachers have incentive to do outside training and obtain additional income, the asymmetric information or the implementation of effective supervision is extremely difficult circumstances, Then there will be the entrustment agent problem between the education management department and teachers. According to the comprehensive and multi-dimensional performance appraisal, timely improvement of fixed salary income and floating performance income of teachers can effectively reduce opportunistic behavior and make teachers focus on in-school teaching rather than out-of-school training, thus reducing the educational burden of students. Second, the use of financial education funds should improve the quality and efficiency, and regulate the inflow of other capital into the education industry. In recent years, the disorderly expansion of a large amount of profit-seeking capital has boosted the development of the after-school discipline training market, which has harvested a large number of innocent families through the "arbitrage model" of creating anxiety and then selling anxiety, and the education market has failed. Although the Opinions on Further Reducing the Homework Burden and Off-campus Training Burden of Students in Compulsory Education issued by The State Council in 2021 have curtailed the chaos in time, residents' demand for education still exists and keeps growing, which is an inevitable law of economic and social development and the evolution of human civilization. Therefore, in order to meet the growing educational needs of Chinese residents, government finance is bound to play a cornerstone role. On the one hand, education has the property of public goods, which needs government-led

supply to avoid market failure. On the other hand, education industry is a basic industry related to national economy and people's livelihood. The profit-seeking of social capital is incompatible with the universality of education, so it needs government-led supervision. Second, the financial education funds should be sound money on budget management and expenditure use whole process supervision system, the introduction of independent third party audit institutions to evaluate the effectiveness of the use of public funds and normative, avoid financial fund misuse, theft etc. Phenomenon, effectively guarantee the financial education to improve the service efficiency of funds.

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