Impact of Education Investment from Local Government on Household Education Expenditure in Primary and High School

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Abstract. The primary and high school stage is the key period for young people to become successful. Each family has to spend corresponding education funds, but the investment in family education in different regions and different periods is different. There are many influencing factors, and the financial investment in the education of local governments is an important part. This paper adopted the variance inflation factor (VIF) test and robustness test, ordinary least squares (OLS) linear correlation coefficient, and ridge regression logarithm data to analyze the impact of education investment from local government on household education expenditure in primary and high school. The information is mainly based on the Family Education Expenditure of *China Institute for Educational Finance Research-Household Survey 2017*. The study found that fiscal expenditures on education per student in primary school have a positive and significant impact on household education spending, and public expenditure has a negative and significant impact on household education spending. In addition, there is no significant relationship between local government financial investment in education and household education spending in the junior and senior high school stages. Furthermore, the impact of local government education investment on household education spending in different stages is different. Based on this, it is suggested that the government is supposed to appropriately adjust education subsidies and improve the education expenditure system. Moreover, the investment in public education funds should be increased and the supervision and management of education funds be strengthened. And it is also crucial for the government to give full play to the guiding role of educational financial policy.

Keywords: Household Education Expenditure, Fiscal Expenditures on Education, Public Expenditures.

1   Introduction

Education has an impact on enhancing the productivity and earnings of labor [1]. This causal relationship can well explain why many countries around the world are increasing their investments in education. For instance, China has intensively issued a series of policies and measures to increase the fiscal expenditure on education in the past two decades, which reached 4,291 billion yuan by 2020 [2]. As a matter of fact, not only countries but also individuals have a strong motivation to spend more on their children's education. Compared with 2020, Chinese household consumption expenditure per capita on Education, Culture, and Entertainment in 2021 increased by 27.9% year-on-year [3]. The growth of this index is contrary to the expectations of the Double Reduction policy [4] which aims to reduce parents' spending on education by easing the over-heated off-school tutoring. Thus, it can be seen, parents' demand for educational resources and their expectations of the payoff on education investment to their children has never diminished.

However, the payoff always comes with financial burdens for parents in some ways. In China, families spend more on education than in most other countries [5], and so does the higher financial pressure on Chinese parents which needs to be adjusted and intervened by the government. The first thing is to find out the causes. Chi, Qian, and Wu point out that the burden of family in-school expenditure is mainly affected by the level of family income [5]. That is the low-income need to spend a larger share of the budget to maintain their children's normal school time. To ameliorate this issue, it is considered useful to increase government education spending.

According to Bailey's pioneering research in the 1970s, there is a crowding-out effect between fiscal investment and resident expenditure [6]. Based on this economic theory, there are scholars point out that rising government input on education has the possibility to drive down family spending on education [7]. At the same time, the appearance of this effect varies with the level of family income and the level of local educational resources. When public education expenditure increases, parents from low-income families and parents who lack educational resources areas are more likely to reduce their expenditure on children's learning. In this way, implementing compulsory is regarded as an effective way to ameliorate the educational burdens for a part of parents in China.

On the contrary, there are studies showing that the government education inputs have a significant crowding-in effect on family education expenditure [8], which means the more the government puts in school, the more the parents may spend on their children's off-school activities. This kind of circumstance is especially seen in families with high socio-economic status [9]. They tend to judge the payoff of education by analyzing the macro situation. Thus, when there is a crowding-in effect, the government inputs may widen the educational inequity. Children from the high-incomes enjoy more educational resources, while those children from the low-incomes still stay in the school provision stage.

In addition to the economic status, the different grades may also lead to the difference in family education expenditure. Hu and Wu found that families with junior high school students have a greater education burden than that in primary school [10]. Even

though both are in the compulsory education stage, students in the grades of junior high or above are facing the transition competition, so parents generally spend more money on their off-school tutoring activities. Not to mention the non-compulsory high school period of preparing for the college entrance examination. However, by reviewing the existing literature, no research explores the impact of education investment from the government on family education expenditure in Chinese primary and secondary school periods separately. It may have a crowding-in or -out effect on both stages, but it may also be different as students get older which worth to be further proving. Thus, the present research aims to fill in the gap above. The results of this research may be helpful to find a better way for easing the family burden and promoting educational equity.

2   Method

2.1   Data

The research data are from Family Education Expenditure of *China Institute for Educational Finance Research-Household Survey 2017, Statistics on the Implementation of National Education Funds, and China Human Capital Report 2017* published by China Center for Human Capital and Labor Market Research of the Central University of Finance and Economics. The data covers 29 provinces (autonomous regions and municipalities directly under the central government), with 14,000 primary and high school students.

2.2   Variables

Dependent Variable
    The study selected "Household Education Expenditure per student", including average household education expenditure in the stage of primary school, junior high school, and senior high school as dependent variables.

Core Explanatory Variable.
    The study selected "Fiscal Expenditures on Education per student" and "Public Expenditures per student" as independent variables, including expenditures in the stage of primary school, junior high school, and senior high school.

Control Variable
    Based on the reference of the existing research, the study selected the variables that may affect the family education expenditure as the control variables, which are "Education Years of Working-Age Population", "Consumption Expenditure per capita", "Fiscal Revenue", and "Core Competitiveness of Regional Higher Education". The statistics involved in this study are shown in Table 1.

Table 1. Descriptive statistics

variables	mean value	Standard deviation	maximum	minimum	Sample size
Household Education Expenditure per student (yuan)	12998.60	6540.50	28782.70	2831.47	87
Fiscal Expenditures on Education per student (yuan)	15243.22	8954.07	61409.06	5759.21	29
Public Expenditures per student (yuan)	4101.47	3169.84	21677.20	2040.36	29
Education Years of Working-Age Population	10.20	0.711	12.21	8.78	29
Consumption Expenditure per capita (yuan)	18762.73	6734.19	39791.90	12658.1	29
Fiscal Revenue (billion yuan)	6545.41	19891.62	111320.35	246.2	29
Core Competitiveness of Regional Higher Education	0.04	0.68	2.52	-0.72	29

2.3   Model

Before the regression analysis, the variance inflation factor (VIF) was applied to test whether there is multicollinearity among each factor. The test results showed that all variables' VIF values of primary and junior high school data are below 10, which demonstrated that there is no serious multicollinearity among the variables. However, there are individual variables with VIF values higher than 10 in senior high school, so ridge regression was adopted for empirical analysis of senior high school data, and the OLS linearly dependent coefficient was used for primary and junior high school data. The regression equation model is as follows.

$$\ln Y = \alpha_0 + \beta_1 \cdot \ln avgstudent + \gamma \cdot X_i + \varepsilon_i \qquad (1)$$

Among them, the dependent variable "Y" is household education expenditure on children's education, and the independent variable "avgstudent" is primary and high school education expenditure per student from the government where the household is located. The coefficient β measures the impact of the local government's compulsory education expenditure on household education expenditure. X_i is the relevant control variable that affects household education expenditure, including education years of the working-age population, consumption expenditure per capita, fiscal revenue, and core competitiveness of Regional Higher Education. ε_i is a random perturbation term. The robustness test was performed by replacing the dependent variable index to test the effectiveness of the model.

2.4   Research Hypothesis

Hypothesis about the impact of government investment in primary and high school education on family education expenditure. Education expenditure has dual attributes of consumption and investment. Income and education investment willingness are two main influence mechanisms for public education investment on family education investment. On the one hand, the government has public education investment increased to improve the level of employment and income of residents, and ultimately promoted various types of consumption, including education consumption, forming a "crowding-out effect". On the other hand, the government's decision to invest in public education may stimulate residents' willingness to invest in education or affect residents' judgment on earnings yield of education, which in turn affects residents' decision of investment ratio in education and decides whether to add more investment in education, forming a "crowding-in effect". Therefore, the impact of public education investment on family education investment is determined by the magnitude of these two effects. This study holds that under the background of invigorating China through science and education with the workforce development strategy, the local government's investment in education plays a positive role in guiding the investment in family education to a certain extent. In addition, it is greatly different for the learning difficulty and the importance of the college entrance examination in primary school, junior high school, and senior high school, so the household educational investment in these three stages may be different accordingly, based on which, the following hypotheses were made in this study.

H1: The increase in the local government's investment in primary and high school education has a significant positive impact on family education expenditure.

H2: It is different for the impact of local government investment on family education expenditure in different school periods.

3   Result

3.1   Benchmark Regression

Based on the data result characteristics of linear regression and ridge regression, the study performed the following preliminary analysis of the data and made reasonable guesses about the causes.

At the stage of ordinary primary school, the local government's financial investment in education has a significant impact on household education spending. Among them, the investment of fiscal expenditures on education per student has a positive and significant impact on household education spending, and the investment of public expenditures per student has a negative and significant impact on household education spending, which confirmed the research hypothesis H1. According to the data results in Table 2, for every 1 yuan increase in fiscal expenditures on education per student of ordinary primary school students, the average household education spending of primary school students will increase by 0.448 yuan, with a p-value of 0.048, indicating that with the increase of education expenditure, household education spending will also increase. However, for every 1 yuan increase in public expenditures per student of primary

school students, the average household education spending of primary school students decreases by 1.185 yuan, with a p-value of 0.027, indicating the increase in the capital expenditure of maintaining normal education activities and school operation. It can be seen that in the primary school stage, there is not a single linear relationship between the two independent variables and the dependent variables. According to the official definition of the National Bureau of Statistics, the main sources of fiscal expenditures on education include local education surcharges and education funds accrued from land transfer income, which belongs to local government funds. According to the Ministry of Finance's 2010 Notice on Issues Related to the Unification of Local Education Additional Policies, it can be seen that increase in local government funds reflects the increase in value-added tax and consumption tax, and to a certain extent, reflects the increase in residents' consumption level, which in turn may also affect household investment in education and increase the cost of family education.

It is confirmed that increasing government investment in public education increases residents' willingness to invest in education, which is in line with the theory of the "crowding out effect" in the field of economics. However, the increase in the cost of maintaining the normal development of education and teaching activities will reduce the expenditure on family education, such as the government's investment in primary school experimental internships, cultural and sports activities, instruments and equipment, and library materials to meet the needs of students in these aspects, thereby reducing the educational burden of families.

At the junior and senior high school stages, there is no significant correlation between household education spending and fiscal expenditures on education and public expenditures. According to the data results in Table 2, the p-values of the two independent variables in the junior high school stage are 0.371 and 0.522 respectively, and the p-values of the two independent variables in the high school stage are 0.442 and 0.22 respectively. These further complemented research hypothesis H1 and proved that the research hypothesis H2 is true. At this stage, the family's expenditure on education is not much dependent on the public education resource input of local governments, and the supporting role of the economy in education is not obvious at the junior and senior high school stages.

From the perspective of control variables, education years of the working-age population have a positive and extremely significant impact on household education spending at the primary school stage, with a p-value of 0.001, but has no significant impact on household education spending at the junior and senior high school stages, with a p-value of 0.062 and 0.129 respectively. In primary school, parents and elders have a strong intervention in children's education, and their education level will greatly affect the family's attention to children's education. The education concept of "winning at the starting line" will enable parents of Chinese-style families to increase their investment in children's interest classes and cultural etiquette education, such as dance, music, Go, calligraphy, eloquent speech, Chinese etiquette, etc. All aspects are closely related to education expenditure. With the increase of the pressure of the high school entrance examination, parents will spontaneously increase their investment in their children's education, abandon excessive investment in extracurricular interest education, and make children focus on the study of in-class courses. Therefore, there is no significant

relationship between household education spending in the junior and high school stages and the education years of the working-age population. However, consumption expenditure per capita, fiscal revenue, and core competitiveness of regional higher education have no significant impact on household education expenditure at all school stages.

Table 2. Regression results

Variable	Primary school	Junior high school	Senior middle school
Fiscal Expenditures on Education per student(yuan)	0.448 *	-0.269	-0.046
	(0.214)	(0.294)	(0.059)
Public Expenditures per student(yuan)	-1.185 *	-0.371	-0.268
	(0.501)	(0.57)	(0.213)
Education Years of Working-age Population	34.596 **	34.64	20.008
	(8.983)	(17.637)	(12.669)
Consumption Expenditure per capita(yuan)	-0.034	0.098	0.068
	(0.129)	(0.25)	(0.131)
Fiscal revenue (billion yuan)	-0.021	-0.053	-0.055
	(0.021)	(0.042)	(0.037)
Core competitiveness of Regional Higher Education	155.537	3441.258	377.186
	(1091.282)	(2357.599)	(1352.329)
cons	-28491.031	-19445.2	360.775
	(8562.423)	(16681.195)	(12253.322)
Adjusted R2	0.5988	0.2003	0.189
Obs	29	29	29

Note: (1) Relevant data are obtained according to the operation results of Stata/SE 15.1;(2) * and * * are respectively significant at the level of 5% and 1%.

3.2   Robustness Check

To ensure the robustness of the benchmark regression, this study applied the method of replacing the dependent variable index to carry out the robustness test. The dependent variable "household education expenditure" in the benchmark regression is replaced by an indicator that can also measure the degree of family investment in education – "the proportion of family education expenditure in total expenditure", and other independent variables are controlled to remain unchanged to make a robustness test. The results of the robustness test are shown in Table 3, which shows that the regression results of the replacement dependent variable indicators are almost the same as the benchmark

regression results. Therefore, it can be said that the estimation results in this paper are robust.

Table 3. Robustness check

Variable	Benchmark regression			Regression of replacing dependent variable indicators		
	Primary school	Junior high school	Senior middle school	Primary school	Junior high school	Senior middle school
Fiscal Expenditures on Education per student(yuan)	0.448*	-0.269	-0.046	0.00065*	-0.00036	0
Public Expenditures per student(yuan)	-1.185*	-0.371	-0.268	-0.0017*	-0.00057	0
Education Years of Working-age Population	34.596 **	34.64	20.008	0.0494**	0.0493	0.029
Consumption Expenditure per capita(yuan)	-0.034	0.098	0.068	-0.000054	0.00013	0
Fiscal revenue (billion yuan)	-0.021	-0.053	-0.055	-0.00003	-0.000075	0
Core competitiveness of Regional Higher Education	155.537	3441.258	377.186	0.3287	0.0403	0.67
cons	-28491.0	-19445.2	360.775	-40.675	-27.677	0.008
Adjusted R²	0.5988	0.2003	-0.033	0.6086	0.2073	-0.031
Obs	29	29	29	29	29	29

Note: (1) Relevant data are obtained according to the operation results of Stata/SE 15.1;(2) * and * * are respectively significant at the level of 5% and 1%.

4   Discussion

The study found that the education expenditure per student in the general public budget of local primary schools has a significant positive impact on family education expenditure, while public expenditure per student in the general public budget of local primary schools has a significant negative impact on family education expenditure. The local

government's investment in primary education has a significant impact on family education expenditure, but the local government's investment in junior and senior high schools has no significant impact on family education expenditure. On the grounds of the above results, the paper proposed the following suggestions.

4.1 Understanding the Roles Families and Governments Playing in Education Investment

As can be seen from the empirical results, as the main source of education investment, the relationship between local government investment in education and family education investment should be mutually complementary and mutually reinforcing. For education, family education investment, as a more flexible and personalized form of investment, has largely made up for the lack of government investment in education, providing strong support for local education, science, and technology as well as the economy, affecting the development of education. For families, the government's investment in education infrastructure can provide students with a good learning environment and conditions to reduce the families' burden at the primary stage of education. At the same time, the government's investment in education plays a guiding role in family education to a certain extent. Both of them complement each other and play an important role in the development of national education. In addition, there is no need to worry about the crowding-out effect in the education investment, because invigorating the state through science and education has been already rooted in the majority of family education concepts. In the middle and high education stage, parents always make the best choice from their own standpoint. In order to improve the future competitiveness of the next generation, they will do their best to increase the education investment.

4.2 Improving the System of Expenditure on Public Education

In order to make local government's education investment play an active role in the family education expenditure, governments should increase the public education expenditure in the public finance expenditure, and strive to improve the education expenditure system of governments at all levels. What's more, governments at all levels are supposed to pay full attention to the running conditions of each school and appropriately adjust the education funding subsidies of each school according to the actual situation. Furthermore, financial and educational departments at all levels should strengthen the supervision and management of educational funds, accept audit supervision in accordance with the law, and guarantee timely and full accrual of educational funds to make sure that the use of educational funds by each aided unit is actually based on the interests of students and the educational burden on families is actually reduced. In general, governments must ensure that education funds are used in accordance with the prescribed purposes so as to further enhance educational investment in a practical way and strive to improve the efficiency in the use of educational funds.

4.3   Giving Full Play to the Guiding Role of Educational Financial Policy

In the face of increasingly fierce competition in junior and senior high school education, parents have to spend on optional education expenses such as school selection fees and extra-curricular tuition fees, which cause a huge burden for many families. In this regard, the government's educational financial policy should play a guiding role to promote more scientific and rational investment in family education in primary and high schools. For example, governments should gradually implement the policy of mixing advanced classes with general classes and then make it a certain proportion, and even gradually abolish the division between advanced schools and general schools.

5   Conclusion

Based on Family Education Expenditure of China Institute for Educational Finance Research-Household Survey 2017, this paper started with the behavior of the local government's investment in education, using OLS linearly dependent coefficient and ridge regression to make an empirical analysis. It is found that in the primary school stage, the increase in fiscal expenditures on education will promote the household education expenditure and the increase in public expenditure will reduce the household education expenditure, while the local government's investment in junior high school and senior high school education will not affect the household education expenditure.

In light of the empirical research results, this paper discussed the influencing factors of Chinese families' investment in children's education and focuses on the impact of local government education expenditure on family education investment. Finally, the paper put forward corresponding educational finance suggestions for local governments based on the discussion, hoping to provide some reference for governments to reform the public education finance system and guide family education investment.

There is still much room for improvement in this research in data timeliness, regional comparison, and so on. Therefore, future research can enhance on the grounds of the application of updated statistics and exploration of the influence of regional differences, such as east-west differences and urban-rural differences.

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