

The Influence of Educational Expenditure on the Scale of Special Education

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Abstract: With the growing demand for special education in society, the impact of educational funding on the scale of special education has become a key focus of research. As an essential part of the education system, the development of special education is not only related to the protection of educational rights for special groups but also reflects social equity and progress. This paper, based on data from 31 provinces in China from 2007 to 2021, explores the impact of national fiscal education funding, overall education expenditure, and local fiscal education spending on various scale indicators such as the number of enrollments, students, graduates, schools, and full-time teachers in special education. The research results show that overall education expenditure has a significant positive effect on the scale of special education, particularly in the areas of enrollments, students, graduates, and schools. However, national fiscal education funding shows negative or insignificant effects on some indicators, indicating limitations in centralized fiscal investment for the distribution of regional special education resources. In contrast, local fiscal education spending has a significant effect on increasing the number of graduates, schools, and teachers in special education, highlighting the critical role of local governments in resource allocation. (Abstract)

Keywords: Educational Funds; Put In; Special Education Scale

1. Introduction

1.1 Research Background

As economic and social progress advance, and with the government placing greater emphasis on scholastic pursuits, the standing and extent of tailored educational programs in China have seen remarkable upgrades. Being a crucial

element of the educational framework, these specialized instruction services bear the responsibility of nurturing those with unique educational requirements. However, the development of special education relies not only on policy support but is also closely related to the allocation of educational funding. In the modern education system, the reasonable distribution and effective utilization of educational funds have become important factors influencing the quality and equity of education. Particularly in China, with the state's extensive investment in compulsory and general education, ensuring adequate funding for special education within the overall education system has become increasingly crucial. In recent years, the government has continually increased fiscal investment in special education. However, due to differences in economic levels and fiscal resource allocation across provinces, there remain significant disparities in the development of special education. As society's attention to educational equity grows, the issue of financial guarantees for special education has gradually become a focal point of public opinion and academic research. As the country advances its education modernization process, the principle of directing educational funds toward weak sectors and special groups has been progressively clarified, with the goal of achieving educational equity through targeted investment. Consequently, the challenge of fostering the growth of specialized instruction by strategically distributing educational resources has emerged as a critical concern within the present educational landscape.

Merging the progression of special educational services across the nation with the distribution of educational finances across different localities, a meticulous examination of budgetary figures spanning various years and areas elucidates the pivotal influence of financial support on the growth of specialized educational programs. The study not only manifests the tangible impact of

monetary investment on the enhancement of special education but also yields critical insights for impending fiscal policy recalibrations and the strategic distribution of educational assets. Consequently, this article gathers panel data from a cross-section of 31 Chinese provinces over the period from 2007 to 2021, utilizing multivariate regression analysis to delve into the correlation between educational financing and the magnitude of special education services. The objective is to furnish scholarly backing for the refinement of educational fund allocation strategies and to guide policymakers in the judicious deployment of resources within the special education sector.

1.2 Research Significance

On an abstract plane, fostering progress in specialized instruction is integral to the realization of educational fairness, and the distribution of monetary resources for education is fundamental to bolstering the advancement in this specialized field. This paper enriches the research in this field by conducting an empirical analysis to explore the impact of variables such as public education funding, overall educational funding, and local fiscal education expenditure on the scale of special education. This not only deepens the understanding of the mechanisms through which educational funding affects the field of special education but also provides data support and empirical evidence for future academic research.

In terms of tangible application, the research provides directives for fine-tuning the distribution of resources tailored for special education, as well as enhancing the quality of services provided within this sector. Presently, the progression of special education is encountering obstacles, including geographical inconsistencies and an uneven spread of resources. The judicious distribution of educational finances is pivotal to the enduring growth of special education. The insights gleaned from this investigation can equip policymakers with a rational foundation, enabling them to craft and enforce financial strategies more effectively within the domain of special education. This, in turn, fosters the enlargement and upgrading of the calibre of special education services. By delving into the repercussions of educational funding on the magnitude of special education, this inquiry holds constructive real-world implications for protecting the educational entitlements of individuals with special needs

and advancing the cohesive evolution of society.

2. Variable Selection and Model Construction

2.1 Variable Selection

This study's empirical examination hinges significantly on the chosen variables. The independent variables consist of the count of individuals enrolling in special education programs (Y1), the total student population within special education (Y2), the figure of special education program completers (Y3), the tally of institutions dedicated to special education (Y4), and the number of educators employed full-time in special education (Y5). Collectively, these factors provide an inclusive depiction of the magnitude and progression of special education services. The independent variables selected are national fiscal education expenditure (X1), total education expenditure (X2), and local fiscal education expenditure (X3), all of which are log-transformed to eliminate heteroscedasticity and nonlinear relationships. Additionally, the study incorporates year-end permanent population (C1) and per capita disposable income (C2) as control variables, which are also log-transformed to account for the effects of population size and economic level on the scale of special education. Through the selection of these variables, the paper aims to systematically analyze the combined effects of fiscal input, population structure, and economic development on the scale of special education, revealing the underlying causal relationships and policy implications.

(1) Annual intake of students in specialized educational programs (Y1): This metric signifies the yearly influx of fresh learners into institutions tailored for special education, serving as a barometer of the appeal and scope of these specialized services.

(2) Total enrollment in special education institutions (Y2): This figure illustrates the cumulative count of learners registered in special education facilities during a specific period, indicating the comprehensive scale of such educational offerings and the degree to which these services are being accessed.

(3) Annual cohort of special education school leavers (Y3): This indicator quantifies the yearly total of students completing their education at special education institutions, providing insight into the productivity and standards of these specialized learning environments.

(4)Inventory of special education institutions (Y4): This count highlights the aggregate number of schools dedicated to special education within a particular timeframe, shedding light on the geographical spread and availability of resources tailored for special needs education.

(5)Corps of full-time educators in special education (Y5): This figure denotes the staffing level of full-time instructors employed in special education schools, which is indicative of the commitment to and investment in the quality of education provided within these specialized settings.

(6)National fiscal education expenditure (X1): This independent variable represents the total national fiscal expenditure on education and is log-transformed to eliminate heteroscedasticity and nonlinearity in the data.

(7)Total education expenditure (X2): This independent variable represents the overall input of education funding and is log-transformed to ensure data stability and the accuracy of the analysis.

(8)Local fiscal education expenditure (X3): This independent variable reflects the total fiscal expenditure on education by local governments and is log-transformed to represent the local government's level of support for education.

(9) End-of-year Resident Count (C1): This regulatory factor signifies the aggregate number of residents settled permanently as of the conclusion of each calendar year. It undergoes logarithmic transformation to mitigate the influence of population magnitude on the dimensions of specialized instructional services.

(10) Average Disposable Earnings per Capita (C2): This regulatory factor denotes the mean disposable income for individuals dwelling within the area, which is also log-transformed to adjust for the effect of financial prosperity on the scope of specialized instructional services.

The investigation centers on the 31 regional divisions of China, spanning from the year 2007 to 2021, utilizing data predominantly acquired from the National Bureau of Statistics. Any gaps in the data were bridged by applying linear interpolation techniques, and the data analysis was conducted utilizing Stata15, an econometric computing program.

3. Model Construction

This research utilizes a longitudinal dataset approach to explore the correlation between educational financing and the extent of

specialized educational programs. The investigation spans across 31 regions of China over a period from 2007 to 2021, showcasing a distinct interplay of temporal trends and geographical variations. Therefore, a fixed effects model is chosen for estimation to control for the influence of individual and time effects on the results. The formula for the fixed effects model is as follows:

$$\ln(Y_{it}) = \alpha_1 + \beta_1 \ln(X1_{it}) + \beta_2 \ln(X2_{it}) + \beta_3 \ln(X3_{it}) + \gamma_1 \ln(C1_{it}) + \gamma_2 \ln(C2_{it}) + \epsilon_{it} \quad (1)$$

4. Empirical Analysis

4.1 Descriptive Statistical Analysis

Table 1 illustrates the statistical overview of the variables in question. The average figure for the participation in special education programs (Y1) stands at 0.2955, accompanied by a standard deviation of 0.2437. The range of values extends from a low of 0 to a high of 1.32, showcasing considerable variation in the enrollment figures among different regions. The average enrollment of students in special education programs (Y2) stands at 1.7216, accompanied by a standard deviation of 1.3519. The range extends from a low of 0.02 to a high of 7.12, illustrative of a broad spectrum of student distribution within educational institutions. For special education alumni (Y3), the average figure is 0.2233, with a deviation of 0.2107. This figure spans from a negligible 0 to a peak of 1.31, showcasing significant variations in graduate counts among different regions. The average count of special education institutions (Y4) is recorded at 63.0215, with a variation of 41.3303. This count varies from a minimum of 1 to a maximum of 163, highlighting the considerable variation in the number of such schools across provinces. The average number of full-time educators dedicated to special education (Y5) is 0.1598, with a standard deviation of 0.1177. This number fluctuates between 0 and 0.66, indicating a non-uniform allocation of teaching staff.

Regarding the independent variables, the mean values of national fiscal education expenditure (X1), overall education expenditure (X2), and local fiscal education expenditure (X3) are 15.5700, 15.7794, and 6.2563, respectively, with standard deviations of 0.8422, 0.8573, and 0.8446, indicating differences in education funding across provinces. The mean values of the control variables, year-end resident population

(C1) and per capita disposable income (C2), are 8.1158 and 9.7806, with standard deviations of 0.8474 and 0.5564, respectively, reflecting differences in population size and economic level

across provinces. The descriptive statistical analysis reveals significant differences in the variables between provinces, providing a foundation for the subsequent empirical analysis.

Table 1. Descriptive Statistical Analysis

variable	Obs	Mean	SD	Min	Median	Max
Y1	465	0.2955	0.2437	0.0000	0.2300	1.3200
Y2	465	1.7216	1.3519	0.0200	1.3400	7.1200
Y3	465	0.2233	0.2107	0.0000	0.1600	1.3100
Y4	465	63.0215	41.3303	1.0000	62.0000	163.0000
Y5	465	0.1598	0.1177	0.0000	0.1400	0.6600
X1	465	15.5700	0.8422	12.9130	15.6935	17.6220
X2	465	15.7794	0.8573	12.9493	15.8877	17.9130
X3	465	6.2563	0.8446	3.5136	6.3542	8.2419
C1	465	8.1158	0.8474	5.6664	8.2496	9.4481
C2	465	9.7806	0.5564	8.4358	9.8224	11.2648

4.2 Correlation Analysis

Table 2 presents the correlation coefficients between the variables. The results show that the correlation between special education enrollment (Y1) and the number of special education students (Y2) is the highest, reaching 0.9801, indicating a very strong positive relationship between the two. The relationship between the number of special education alumni (Y3) and Y1 and Y2 stands at notable levels of 0.8800 and 0.9085, respectively, showcasing a considerable impact of student intake and school population on graduation rates. Meanwhile, the association between the count of special education institutions (Y4) and the rest of the dependent variables is somewhat weaker, yet it exhibits a robust positive link with the number of full-time special education educators (Y5), with a correlation coefficient of 0.9084, pointing to an

intimate connection between the number of schools and the teaching staff.

Among the independent variables, the correlations between national fiscal education expenditure (X1), overall education expenditure (X2), and local fiscal education expenditure (X3) are extremely high, at 0.9950 and 0.9963 respectively, indicating a high consistency in the allocation of different types of education funding. The control variable, year-end resident population (C1), shows the highest correlation with Y4, at 0.8393, suggesting that population size has a significant impact on the number of special education schools. Per capita disposable income (C2) has relatively lower correlations with the dependent variables but shows higher correlations with X1, X2, and X3, at 0.6814, 0.6558, and 0.6597 respectively, indicating that economic levels influence education funding allocation.

Table 2. Correlation Analysis

variable	Y1	Y2	Y3	Y4	Y5	X1	X2	X3	C1	C2
Y1	1									
Y2	0.9801***	1								
Y3	0.8800***	0.9085***	1							
Y4	0.6604***	0.6841***	0.5409***	1						
Y5	0.6472***	0.6766***	0.5442***	0.9084***	1					
X1	0.6772***	0.6714***	0.5864***	0.6941***	0.7534***	1				
X2	0.6859***	0.6869***	0.5976***	0.7200***	0.7699***	0.9950***	1			
X3	0.6667***	0.6592***	0.5710***	0.7064***	0.7572***	0.9963***	0.9918***	1		
C1	0.6308***	0.6587***	0.5258***	0.8393***	0.7604***	0.7468***	0.7914***	0.7576***	1	
C2	0.2439***	0.2405***	0.2729***	0.1532***	0.3450***	0.6814***	0.6558***	0.6597***	0.1242***	1

4.3 Regression Analysis

The regression analysis results in Table 3 reveal that national fiscal education expenditure (X1), overall education expenditure (X2), and local

fiscal education expenditure (X3) have significant and differentiated impacts on various special education scale indicators. Total educational investment (X2) positively correlates with the increase in special education

participation (Y1), the student population (Y2), the count of graduates (Y3), and the total number of educational institutions (Y4). Specifically, the regression coefficients linked to Y2, Y3, and Y4 stand at 3.0063, 0.5165, and 39.2671, each statistically significant at the 0.01 level. This suggests that enhanced educational financing can substantially bolster the growth of specialized educational programs. On the other hand, the influence of government-funded educational spending (X1) is nuanced, exhibiting a notable adverse effect on the quantity of special education facilities (Y4), while not significantly affecting the other dependent variables. This suggests that national-level fiscal investment alone may not be sufficient to directly expand the distribution of special education resources and teaching staff.

Local fiscal education expenditure (X3) has a positive and highly significant impact on the number of special education graduates (Y3), schools (Y4), and teachers (Y5), highlighting the crucial role of local governments in educational investment. Additionally, the control variable, year-end resident population (C1), shows a negative effect on most dependent variables, while per capita disposable income (C2) has a particularly significant negative effect on the number of teachers, indicating a potentially complex interaction between economic development levels and the supply of special education teachers.

Overall, the models demonstrate a high degree of fit, with adjusted R^2 values in each model approaching or exceeding 0.85, confirming the models' explanatory power and robustness.

Table 3. Regression Analysis

variable	Y1	Y2	Y3	Y4	Y5
X1	-0.1983 (0.1907)	-1.3971 (1.0303)	-0.4752*** (0.1771)	-37.3263** (15.3638)	-0.0265 (0.0609)
X2	0.5012*** (0.1734)	3.0063*** (0.9368)	0.5165*** (0.1610)	39.2671*** (13.9694)	0.0469 (0.0553)
X3	0.1627 (0.1002)	0.6609 (0.5413)	0.2727*** (0.0930)	22.0311*** (8.0717)	0.1116*** (0.0320)
C1	-0.3244** (0.1291)	-1.8046** (0.6978)	-0.4735*** (0.1199)	-23.7071** (10.4055)	0.0240 (0.0412)
C2	-0.3793** (0.1614)	-1.3290 (0.8721)	0.1306 (0.1499)	-7.5802 (13.0042)	-0.1794*** (0.0515)
Individual effect	Controls	Controls	Controls	Controls	Controls
Time effect	Controls	Controls	Controls	Controls	Controls
_cons	0.7999 (1.9021)	-0.4532 (10.2784)	0.3315 (1.7667)	153.2911 (153.2665)	0.6923 (0.6071)
N	465	465	465	465	465
adj. R2	0.8606	0.8677	0.8390	0.9685	0.9391

4.4 Analysis of Empirical Results

The regression results indicate that education expenditure (X2) has a significant positive impact on multiple dimensions of special education, which is in line with expectations. This reflects that overall educational investment can effectively promote the expansion and improvement of special education resources. Particularly, the influence of education expenditure (X2) is most pronounced in the areas of special education enrollment (Y1), the number of students in school (Y2), the number of graduates (Y3), and the number of schools (Y4), showing that increased funding directly enhances the coverage of educational services and the quality of teaching.

However, national fiscal education expenditure (X1) exhibits either negative or insignificant effects on certain indicators, especially demonstrating a significant negative effect on the number of graduates (Y3) and schools (Y4). This suggests that national-level fiscal investment may be limited in addressing the regional distribution of special education resources and may fall short of meeting local needs. In contrast, local fiscal education expenditure (X3) shows significant positive effects across multiple aspects, particularly in terms of the number of graduates (Y3), schools (Y4), and teachers (Y5). This underscores the critical role of local governments in resource allocation, likely due to their better understanding of regional special education needs and their ability to more

effectively allocate resources.

Among the control variables, the year-end resident population (C1) mostly shows a negative effect, indicating that an increase in population size may dilute educational supply in the context of limited resources. The negative effect of per capita disposable income (C2) on the number of special education teachers reflects that as the economic level improves, competition for human resources in other sectors may intensify, exacerbating the shortage of teaching staff in the special education field.

The characteristics presented by the regression results can be attributed to a variety of deep-seated factors that collectively influence the dynamics of the development of special education.

The negative or insignificant influence of the state fiscal expenditure on education (X1) on some indicators indicates that an overly centralized financial system may lead to a low level of investment in education resources, insufficient or even loss. On the one hand, the financial resources of the state may be scattered in multi-level education policies, resulting in insufficient investment proportion of basic, protective and subsidized education funds. On the other hand, the bureaucratic system and inefficient public decision-making system at the national level will seriously delay the timely distribution and use of educational resources, affecting the balance between education income and expenditure between regions.

The significant positive effect of education expenditure (X2) on multiple dimensions of special education scale indicates that general education expenditure has a positive promoting effect on special education in terms of resource acquisition and geographical distribution. This is consistent with the view that resource allocation may improve the quality of education in externality theory. Education is increasingly seen as a form of human capital, and the more investment in education, the more educational facilities and teachers will be improved, and the easier it will be for educational institutions to recruit students, thereby expanding the scale and improving the conditions for human capital investment. Special education funds also need to be used to purchase special education teaching equipment, design personalized teaching tools and textbooks for deaf students, carry out special teacher training and other means to provide effective special services for students with

cognitive disabilities.

Local fiscal expenditure on education (X3) has a significant positive impact on the scale of special education, reflecting the role of local governments in meeting the educational needs of special groups. Local governments have a better understanding of the problems and needs of their own regions, have a more targeted ability to invest resources, and are more likely to increase investment in special education. On the basis of striving to provide good education, it is also easier for local governments to improve education services for special groups through special operations, tailor-made services, and professional and institutional assistance.

The permanent population (C1) at the end of the year is negatively correlated with special education factors, which may be due to the great pressure on the limited supply of educational resources with the expansion of urban development and population size. If the relevant capital investment and resource allocation are not in place, the per capita use of educational resources for ordinary students will become less and less, the class size is too large, the school and teachers will pay less attention to the individual needs of students, and even lead to a decline in the quality of education, especially in the field of special education, where additional resources and professional knowledge are needed.

The negative influence of per capita disposable income (C2) on the number of special education students (Y1) and special education teachers (Y5) may be related to the labor market. In general, the higher the per capita disposable income of residents, the more job opportunities, people are more willing to choose other better occupations, which will promote the adjustment of social labor structure. Therefore, the field of special education may face a brain drain, resulting in a shortage of teachers, which in turn affects the enrollment and teaching quality of special education.

In summary, the regression results validate the importance of fiscal investment in the development of special education, while also revealing the differentiated effects of various levels of fiscal investment. This provides empirical evidence for formulating more targeted policies.

5. Research Conclusions and Suggestions

5.1 Research Conclusion

The present research undertaking performs a quantitative investigation into the dataset pertaining to special education across 31 Chinese regions over a 15-year span from 2007 to 2021. It delves into the influence that financial allocations for education have on the expansion of special education programs. The investigation employs the count of special education registrations, the student population, the total number of individuals completing their education, the total institutions, and the cadre of full-time educators as the dependent measures. Concurrently, the study treats central and local government allocations for educational purposes, as well as local educational fiscal disbursements, as the independent factors. Additionally, the year-end resident population and per capita disposable income are introduced as control variables. Through regression analysis using Stata 15 software, this paper reveals the differentiated impact of fiscal inputs at various levels on the scale of special education.

The investigation outcomes suggest that allocations for education play a crucial role in enhancing various aspects of the special education spectrum, especially concerning the increase in special education student registrations, the total student population on campus, the count of students completing their education, and the expansion of educational institutions. National fiscal education funding exhibits negative or insignificant effects on some indicators, suggesting limitations of singular national-level fiscal inputs in distributing regional special education resources. In contrast, local fiscal education expenditure shows a significant positive impact on the number of special education graduates, schools, and teachers, highlighting the critical role of local governments in resource allocation.

In the future, we can further investigate the long-term impact of financial input on the performance of special education, and explore how financial resources can continuously promote the special education cause through the right "quantity" and "quality". For example, whether the non-general transfer payment between financial institutions can help to improve the homogenization level of special education in the long run; It can also be combined with the new highlights of educational supervision and other practical cases with "demonstration" significance, based on the conclusion of this paper, learn from the

beneficial attempts in some parts of our country to improve the efficiency of financial expenditure, so as to make the thesis more targeted and operable.

5.2 Policy Suggestions

5.2.1 Increase local government spending on education

The research findings indicate that local fiscal education expenditure has a significant positive impact on the number of special education graduates, schools, and teachers. Therefore, it is recommended to further increase local fiscal investment in special education, particularly in resource allocation and faculty strength. Local governments should develop specific financial support plans based on the special education needs of their regions, ensuring the effective use and distribution of funds to enhance the coverage and quality of special education. Boosting regional educational budget allocations can effectively cater to the specific requirements of special education within the area, enhance the availability and fairness of learning resources, thereby fostering holistic advancement in the field of special education.

5.2.2 Optimize the use of national fiscal education funds

Although national fiscal education expenditure exhibits negative or insignificant effects on some indicators, its overall investment remains a crucial guarantee for the development of special education. It is suggested to optimize the use of national fiscal education funds, focusing on supporting areas where special education resources are scarce, and enhancing the precision and efficiency of resource allocation. At the same time, it is essential to strengthen the supervision and evaluation of fund usage to ensure that fiscal investments truly benefit the special education sector. By optimizing fund usage, the effectiveness of fiscal investment can be improved, resource waste can be avoided, and special education resources can be reasonably allocated and fully utilized, thereby enhancing the overall quality of special education.

c) Strengthen the coordination between economic development and special education

The research found that per capita disposable income has a significant negative impact on the number of special education teachers, reflecting that the increase in economic development levels may lead to competition for human resources in other fields. Therefore, it is recommended to

focus on talent cultivation and recruitment in the special education sector while promoting economic development. This can be achieved by improving the salary and career development opportunities for special education teachers, attracting more talented individuals to engage in special education, alleviating the shortage of teaching staff, and enhancing educational quality. Moreover, it is imperative to enhance the training and career advancement opportunities for educators specializing in special education, in order to elevate their expertise and instructional proficiency. This, in turn, will foster the continuous growth of the special education sector. By aligning the correlation between economic growth and the field of special education, we can create a mutually beneficial scenario that benefits both the economic sphere and the educational domain, propelling comprehensive societal advancement.

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