

Fiscal Transfer, Education Investment and Long-Term Educational Performance

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Reasonable allocation of educational powers and expenditure responsibilities between central and local government is crucial to the development of education. The reason lies in the fact that local governments have relatively insufficient incentives to invest in education by using local fiscal revenues, while the central government, which pursues the maximization of the interests of the whole society, could promote education and other public services with spatial spillovers. The fiscal transfer payment has made up for the shortage of local investment in education. This paper uses 2010 census (micro data) and macro fiscal data to verify the effects above. Based on the year of birth and place, this paper constructs the proportion of fiscal transfers for compulsory education in the total fiscal revenue (local fiscal revenue and fiscal transfers) to reflect its structural effect. It is found that every 10% increase in the proportion of fiscal transfers brings at least additional 0.2 year of schoolings for local residents, and the effect of special transfer payments accounts for a larger share, among the three types of transfer payment. In the mechanism test, we find that transfer payment can effectively increase local education expenditure and produce an obvious structural effect. Based on this, in order to further improve the long-term educational performance of individuals, we believe that it is necessary to improve the incentive effect of the transfer payment system on common power and the division of expenditure responsibilities in the field of education.

Keywords: fiscal transfer, local fiscal revenue, educational performance

1. Introduction

Education is the foundation of a country and its strength. The development of education is a cornerstone for national rejuvenation and social progress. The report of the 19th CPC National Congress stressed the priority of education and General Secretary Xi Jinping made a judgment on the development of education in China, i.e.,

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“If education is thriving, the country will be strong. If education prospers, the country will prosper.”¹ Why does China attach great importance to education? For economic development, education was the source of human capital which was a key factor stabilizing long-term economic development (Lucas, 1988; Romer, 1990), especially for the future economic development of China (Li *et al.*, 2017). In the view of social development, education was a factor equalizing social distribution of individual income (Schultz, 1990). Clearly, education had a strong spillover effect, and it was reasonable to say education was a quasi-public product that needed the input not only from the household sector, but also from the public investment of the government sector (Fernández and Rogerson, 1998). The proportion of public education expenditure in the GDP of China exceeded 4% for the first time in 2012 and remained above 4% in the years that followed, financially underlying the long-term development of education. By international practices, the proportion of fiscal revenue in GDP will be 30%–40% if public education expenditure reaches around 4% of GDP,² while the proportion of fiscal revenue in the GDP of China stays stable at about 20%, and it indicates the large development space for and national determination to support education in China. As the support for education constantly stepped up, significant progress has been witnessed in the average education of Chinese. As of 2020, the average period of education for working-age population was 10.8 years in China.³

However, the optimal goals pursued by governments at different levels varied, and the results of some public investment differed, especially in the competition with GDP as a standard for assessment in China (Zhou, 2007). Specifically, high-level governments pursued the maximization of social and economic benefits among areas, while low-level governments pursued the maximization of social and economic benefits in local area, causing a mismatch between the supply and demand of public goods with spatial spillover, or the supply motive insufficient for the demand (Shah, 1994; Rosen, 1995). In fact, public goods for education were a microcosm of the above, i.e., incentives for local governments to invest in education by using local fiscal revenues were insufficient, because the local fiscal revenue had certain tax costs and direct economic benefits of the investment in education were relatively low and some local governments even thought that the gains from investing in education were not evident (Li *et al.*, 2017), resulting in insufficient investment in education (Qiao *et al.*, 2005; Fu and Zhang, 2007; Zhou *et al.*, 2013). In view of this, the mission of improving the educational performance of the whole society must be handed to higher-level governments, and fiscal transfers without

¹ Xi Jinping’s remarks at the teacher-student symposium in Peking University on May 2, 2018.

² Source: Giving Priority to Development and Adhering to Strategic Position of Education — One of the Achievements of Education Reform and Development in China since the 18th CPC National Congress, *People’s Daily*, September 7, 2018.

³ Source: A reporting by Changya Liu, head of the Department of Development Planning of the Ministry of Education, at the State Council Information Office Press Conference in April 2021.

direct tax costs makes it possible for increasing the investment in education.

Current research on how fiscal transfers influence education mostly focuses on basic public services represented by education expenditure at the macro level. Some held that the effect of fiscal transfers in the supply of public goods for education was significant (Cheng and Xiao, 2011) and some argued not (Guo and Jia, 2008), especially the public services for compulsory education (Yin and Zhu, 2011). As to the impact of fiscal transfers and local fiscal revenues on education expenditure, some studies have confirmed that fiscal transfers could bring in more investment in education compared with local fiscal revenues (Cheng and Xiao, 2011). The fiscal transfer system accompanying the tax-sharing system reform, to a certain extent, offsets the weaknesses of local governments investing in education with local fiscal revenues and creates conditions for studying the structural effect of fiscal transfers relative to local fiscal revenues. The research logic of this paper is that compared with the local fiscal revenues, fiscal transfers appropriated by high-level governments bring stronger incentives to the investment in local education. That is to say, fiscal transfers exert a larger effect than local fiscal revenues. Obviously, this larger effect will extend to the educational performance of resident individuals, thereby bringing them additional promotion of long-term educational performance. It is regarded as the structural effect of fiscal transfers.

The main contributions of this paper are as follows. First, this paper further verifies the driving effect of high-level governments on low-level governments in educational investment, and extends it to the long-term educational performance of individuals. Besides, this paper probes into the structural effect of fiscal transfers appropriated by high-level governments on the long-term educational performance of individuals, i.e., the additional effect brought about by fiscal transfers relative to local fiscal revenues. Finally, this paper provides basic data support for improving the division of expenditure responsibilities for compulsory education, i.e., high-level governments could launch better incentives to public services for local education.

2. Institutional Background

Resolving difficulties of the central finance under the fiscal responsibility system, China has reformed the tax-sharing system, requiring the contributions of local governments to increasing the proportion of fiscal revenue in GDP and the proportion of central finance in fiscal revenue nationwide, essentially the redistribution of revenue between the central and local governments. As the supporting measure to the tax-sharing system reform, the fiscal transfer system is taken as a major way of coordinating intergovernmental fiscal relations—mainly solving the fiscal gap of governments at different levels performing authorities and expenditure responsibilities to balance the development of each area, especially the equality of basic public services of different areas. During this period, related public finance and tax reform caused

certain financial difficulties for counties and townships, and with economic changes, specific sectors and areas were faced with a short of development funds. As a result, China has adjusted and improved the fiscal transfer system multiple times, including the distribution formula of fiscal transfers, standard calculation, the establishment of new types of fiscal transfers, and the cancellation of some types of fiscal transfers.

According to different responsibilities undertaken by different types of funds, fiscal transfers are divided into tax rebates, general transfer payments and special transfer payments. Tax rebates, strictly speaking, should not be in the category of fiscal transfers. As the by-product for smoothly advancing the tax-sharing system reform, tax rebates are funds of the fiscal system but have nothing to do with the purpose of fairness and grow at a fixed rate, which are the fiscal revenue that local governments can purely expect. Besides, in 2019, tax rebates issued by the central to local governments and the fixed-amount subsidies in general transfer payments were amalgamated and were no longer listed separately, i.e., categorized as general transfer payments.¹ Hence some studies, for instance, Ma *et al.* (2016), did not consider the role of tax rebates as they discussed the fiscal transfer structure. In the early reform of the tax-sharing system, however, the proportion of tax rebates in total fiscal transfers was very large. For example, the proportion of tax rebates reached 73.7% in 1995 and 46.5% in 2000, the role of tax rebates is therefore considered here. Of course, it is general and special transfer payments that highlight the goal of equalization.² In recent years, however, the proportion of special transfer payments has been declining on a yearly basis, and for example, its proportion in total fiscal transfers was 41% in 2008 and about 10.17% by 2019,³ mainly for the related policies rolled out by central government which targeted at controlling the scale of special transfer payments, such as canceling the projects that were no longer needed on account of policy expiration, policy adjustment and low performance, and gradually removing special transfer payments in competitive fields.⁴ Furthermore, a concerned fact was that China has gradually adjusted general transfer payments to standardize and improve the fiscal transfer system, such as adjusting some types of fiscal transfers from special transfer payments to general transfer payments in 2009 and 2011, including fiscal transfers for education (Jia *et al.*, 2015).

As the fiscal transfer system gradually improved, the amount of fiscal transfers from the central to local governments has continued to increase, with a rise by at least 31 times from RMB 238.9 billion in 1994 to RMB 7435.986 billion in 2019. More

¹ See 2019 fiscal transfer budget table of the central to local governments for details.

² After 2009, the original “financial transfer payments” was renamed as general transfer payments, and the original “general transfer payments” renamed as balanced transfer payments (Li, 2010). The “general transfer payments” used in this paper is the new name after the 2009 reform.

³ In 2019, special transfer payments were RMB 756.17 billion and general transfer payments (including tax rebates) were RMB 6679.816 billion.

⁴ The State Council released the *Opinions on Reforming and Improving the Fiscal Transfer System from the Central to Local Governments* in 2014.

importantly, fiscal transfers are key to intergovernmental fiscal relations, revealed as the important position of fiscal transfers in the structure of local fiscal revenues. As is shown in Figure 1, fiscal transfers from the central and the local fiscal revenue grew and changed in the same trends¹ and in most years, the proportion of fiscal transfers in the total local fiscal revenue (local fiscal revenue and fiscal transfers) remained basically above 40% and reached 42.38% in 2019. That is to say, more than 42% of the total local fiscal revenue relies on fiscal transfers from the central, which indicates that the behavior of local governments was bound to be influenced by fiscal transfers.

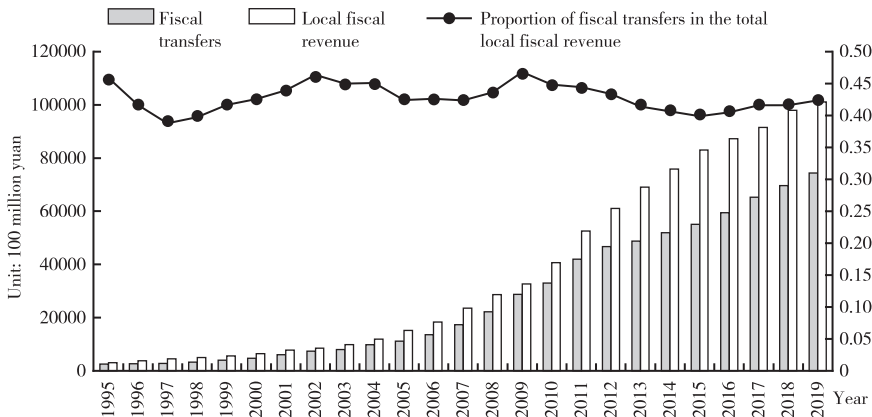


Figure 1. Fiscal Transfers of Local Governments

At the budget level, what is the relationship between fiscal transfers and the local fiscal revenue? As is stipulated by the *Budget Law of the People's Republic of China*, the budget for each level of government differ; general public budget of local governments shall cover the budget for each department (including directly affiliated agencies) and the budget for tax rebates and fiscal transfers, and the people's congresses at and above the county level shall be responsible for examining the budget for corresponding levels. Specifically, the funds of general public budgets are from the tax and non-tax revenue shared by local governments according to public finance administration system of the tax-sharing system, while the funds of fiscal transfers are appropriated from the central to provincial governments based on a fixed distribution formula, and then from the provinces to municipal and county governments (with various approaches to distribution adopted by each province). Notably, the date for the central to issue fiscal transfers to local governments is fixed. For example, general transfer payments are issued within 30 days after the National People's Congress approves the budget and special transfer payments are issued within 90 days after the National People's Congress approves the

¹ The local fiscal revenue here excludes fiscal transfers.

budget, but the funds actually reach local governments at least after March or April.¹ Local governments generally prepare the budget in September of the previous year and convene the people's congress from January to February, by which the budget shall be voted on. The National People's Congress is held later than the local people's congress, making some of fiscal transfer funds issued later than the approval of local budget. As a result, the funds of fiscal transfers are significantly different from the general public budget revenue of local governments. As mentioned above, fiscal transfers share an important part of the total local fiscal revenue, which is the reason that fiscal transfers have an impact on the behavior of local governments.²

Besides, regarding the division of authorities and expenditure responsibilities between the central and local governments in the field of education, the *Reform Plan for Division of Fiscal Authorities and Expenditure Responsibilities between the Central and Local Governments in the Field of Education* released in 2019 has been determined, whose policy requirements highlight the unique effect of fiscal transfers. The considerable fiscal transfers obtained by local governments are a stable source of funds for the rise in education expenditure, and create conditions for improving the educational performance of residents.

3. Data, Variable Processing and Econometric Model

3.1. Data Source and Description

Fiscal data in this paper are from the Public Finance Statistics of Municipalities and Counties in China in 1994–2009 which contains detailed data of fiscal revenue and expenditure of over 2800 counties (municipalities, districts) across China. Micro data are from 2010 census. The area codes showed in the census are matched to county-level data to identify the area in which each household and each individual is located. The screening of 2010 census includes: First, for the sake of analysis, only information of the household head, spouse and children is retained and other persons are excluded. Second, samples born after 2003 are excluded, considering the population born after 2003 had not yet been enrolled in 2010. Third, for all the persons surveyed in countries (municipalities, districts) other than the place of household registration, the data are modified with the area code of the place of household registration. Fourth, student samples are excluded, given that

¹ In practice, the appropriation of fiscal transfer funds adopted the approach of proportional scheduling in budget execution and reconciliation and settlement upon budget completion (Wang, 2020).

² Of course, this is the understanding of the issue only from the perspective of budget and funding. In addition, according to the tax revenue collected each year, the fiscal transfer funds appropriated by superior governments each year were not exactly the same, and the final funds appropriated might be more than the amount released in advance, and these extra funds would be taken into the budget through budget adjustment (except for some funds of special transfer payments appropriated by superior governments without supporting from the government at the same level) (Wang, 2020).

students had not finished school and there was possibility for further education. Fifth, since fiscal transfers appeared with the tax-sharing system reform in 1994, only offspring (individuals) samples obtaining fiscal transfers for compulsory education are analyzed.

Specifically: the object of the research is the (offspring) samples born in 1980–2003, and the area of a household (an individual) is pinpointed based on the code of the county (municipality, district) of the household (individual) registration, and then the code is precisely matched with the county (municipality, district) code of macro data to determine the data of fiscal transfers corresponding to the area of the household (individual).

3.2. Variable Processing

Selection and processing of explanatory variables: The educational performance of individuals is noted as different levels in the questionnaire, i.e., 1 (never attending school), 2 (primary school), 3 (junior high school), 4 (senior high school), 5 (Junior College), 6 (undergraduate) and 7 (postgraduate and above). For facilitating the interpretation and international comparison, i.e., avoiding international difference in the years of different educational performance, the above are converted into years of education here, which means the educational performance marked by level in the questionnaire is converted into specific years, i.e., 0 years, 6 years, 9 years, 12 years, 15 years, 16 years, and 19 years, respectively.

Selection and processing of core explanatory variables: First, the object of the research, individuals, is matched with county-level fiscal data. That is, the year of enrollment and the year of receiving the last year of compulsory education are calculated based on the age of individuals, which are then matched to the period of enjoying fiscal transfers, and finally fiscal transfers (per capita) within the period of compulsory education are added up to conclude the total fiscal transfers in the area during the compulsory education of individuals. At the same time, the local fiscal revenue of the area during the compulsory education of individuals is obtained based on the same approach. For the next, to observe the structural effect of fiscal transfers relative to local fiscal revenues, the proportion of fiscal transfers to the sum of fiscal transfers and local fiscal revenue is taken as the core explanatory variable reflecting the structural effect. Besides, there needs to set the core explanatory variable representing the aggregate effect, i.e., the sum of fiscal transfers and local fiscal revenue benefited by resident individuals during compulsory education (processed with per capita logarithm).¹

3.3. Econometric Model

According to the idea of the research in this paper and referring to the research of

¹ For space limitations, the selection of control variables and the descriptive statistics of variables are not introduced here. Readers may request it from the authors if interested.

Yin and Zhu (2011), the econometric model is set as follows:

$$Y_edu_{i,c,t} = \alpha + \beta trans_{i,c,t} + \gamma revenue_{i,c,t} + \delta X_{i,c,t} + \eta_t + \lambda_c + \varepsilon_{i,c,t} \quad (1)$$

where i denotes the individual, c the county (municipality, district) and t the year of birth; $Y_edu_{i,c,t}$ represents the educational performance of the i th individual born in the year of t in the c th county (municipality, district) at the time of 2010 census; $trans_{i,c,t}$ indicates the fiscal transfers benefited by the individual during compulsory education; $revenue_{i,c,t}$ represents the local fiscal revenue benefited by the individual during compulsory education. At this time, coefficient β reveals the impact of fiscal transfers on the long-term educational performance of residents relative to the local fiscal revenue; if $\beta > \gamma$, it means fiscal transfers have a larger impact on the long-term educational performance of residents than the local fiscal revenue. Besides, $X_{i,c,t}$ represents other factors influencing the educational performance of individuals, including individuals, family and local development; η_t and λ_c denote the fixed effects of the year of birth and the fixed effects of the place of birth, and $\varepsilon_{i,c,t}$ denotes the error term; to control standard errors of the regression coefficient, the standard errors are clustered at the county level.

The structural effect of fiscal transfers is further observed based on the above econometric model. Specifically, the structural effect is expressed by the proportion of fiscal transfers benefited by individuals to the sum of fiscal transfers and local fiscal revenue. Meanwhile, the aggregate effect of fiscal transfers and the local fiscal revenue is controlled. The econometric model is set as follows:

$$Y_edu_{i,c,t} = \alpha + \beta_1 R_trans_{i,c,t} + \beta_2 (trans_{i,c,t} + revenue_{i,c,t}) + \delta X_{i,c,t} + \eta_t + \lambda_c + \varepsilon_{i,c,t} \quad (2)$$

where $R_trans_{i,c,t}$ denotes the proportion of fiscal transfers to the sum of fiscal transfers and local fiscal revenue. The regression coefficient β_1 is expected to be significantly positive, which means fiscal transfers could bring positive structural effect to the long-term educational performance of residents in the area, reflecting the additional effect of fiscal transfers on the long-term educational performance of residents in the area; $trans_{i,c,t} + revenue_{i,c,t}$ represents the sum of fiscal transfers and local fiscal revenue and reveals the aggregate effect.

4. Empirical Test and Result Analysis

4.1. Benchmark Regression Testing

The structural effect of fiscal transfers on the long-term educational performance

of residents is confirmed in Table 1. Each regression controls the fixed effects of areas (counties, municipalities, districts) and the fixed effects of the year of birth, and clusters regression standard errors to the county (municipality, district) level. Column (1) shows the impact of fiscal transfers on the long-term educational performance of residents. It is found that the regression coefficient is significantly positive at 5% confidence level, which suggests that the fiscal transfers appropriated by superior governments effectively improve the long-term educational performance of residents of compulsory education in the area, by which the positive effect of fiscal transfers is pinpointed to a large extent. Furthermore, the impact of fiscal transfers appropriated by superior governments is compared with that of the local fiscal revenue on the long-term educational performance of residents to observe the difference in the role of different sources of fiscal funds. Column (2) includes the local fiscal revenue benefited by local residents during compulsory education. It is found that the regression coefficient of fiscal transfers stays still significantly positive and that of the local fiscal revenue is significantly negative. The former regression coefficient is clearly larger than the latter, revealing that compared with the local fiscal revenue, the impact of fiscal transfers on the long-term educational performance of local residents is far greater than that of the local fiscal revenue, or that fiscal transfers exert a larger effect in it. The reason behind was that fiscal transfers was equivalent to producing an income effect, creating an alternative incentive to local governments to increase (Fisher, 2000) educational expenditure, i.e., county-level governments were more willing to use fiscal transfers for education (Cheng and Xiao, 2011). Besides, the local fiscal revenue has a negative impact on the long-term educational performance of residents, mainly

Table 1. Benchmark Regression Testing

Variable	Educational performance				
	(1)	(2)	(3)	(4)	(5)
<i>R_trans</i>			2.1208*** (0.4627)	1.5803*** (0.4033)	1.6465*** (0.4065)
<i>trans</i>	0.0950** (0.0459)	0.2055*** (0.0467)			
<i>revenue</i>		-0.4753*** (0.0488)			
<i>trans & revenue</i>			-0.2356*** (0.0580)	0.2036*** (0.0493)	0.1804*** (0.0511)
Controls_i				Yes	Yes
Controls_a					Yes
County FE	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes
Obs	82576	82576	82576	84528	81372
<i>R</i> ²	0.306	0.307	0.306	0.449	0.433

Note: *, **, and *** represent the significance levels of 10%, 5%, and 1%, respectively. Reported in brackets are the standard errors (the same below), and the standard errors are clustered at the county level.

because that it has tax costs, focuses on short-term economic benefits in use and lacks incentives to invest in education, which are not favorable for improving the long-term educational performance of local residents.

On this basis, we continue to observe the structural effect of fiscal transfers, i.e., the additional impact of the proportion of fiscal transfers benefited by residents during compulsory education in the sum of fiscal transfers and local fiscal revenue on the long-term educational performance of residents. Column (3) presents the regression results reflecting the structural effect and the aggregate effect. It is found that the aggregate effect is still negative but the structural effect of fiscal transfers is positive and significant at 1% confidence level, again confirming the unique effect of fiscal transfers, or the existence of the structural effect of fiscal transfers is verified. Furthermore, in excluding the factors influencing the educational performance from the individual or household level, control variables of individual and household levels are added in column (4), and the regression coefficient of the proportion of fiscal transfers is still significantly positive. Of course, macro factors at the area level are also important for the long-term educational performance of residents. We continue to include variables that could absorb factors at the area level, such as economic development and fiscally supported population. Column (5) regresses the control variables including individual- and household- level factors and area-level factors (macro), and it is found that the regression coefficient representing the structural effect of fiscal transfers remains stable at 1.6465 and is significantly positive at 1% confidence level. It means the higher the proportion of fiscal transfers in the total local fiscal revenue, the larger the impact on the long-term educational performance of local residents. More precisely, this shows the additional effect of fiscal transfers on lifting the long-term educational performance of residents, i.e., 10 percentage point increase in the proportion of fiscal transfers benefited by residents during compulsory education, at least 0.2 additional year of schooling for local residents is added.

4.2. Fiscal Transfer Testing by Type

We continue to test fiscal transfers by type, i.e., tax rebates, general transfer payments and special transfer payments. The testing results are presented in Table 2. Column (1) shows the regression results of tax rebates, and it is found that the coefficient of the proportion of tax rebates in the sum of tax rebates and local fiscal revenue is positive but statistically insignificant. It suggests that in the early reform of the tax-sharing system, the proportion of tax rebates is large, though, it is the revenue that local governments could almost purely expect. In other words, the difference between tax rebates and local fiscal revenue is not so evident that the incentives to invest in education is relatively insufficient. Column (2) shows the proportion of general transfer payments in the sum of general transfer payments and local fiscal revenue.

Similarly, the coefficient is positive but statistically insignificant, revealing the structural effect of general transfer payments of multiple types and with multiple objectives on the long-term educational performance of local residents is not obvious.¹ A possible reason is that this caliber contains a large number of non-educational fiscal transfers to make its structural effect not obvious. On the contrary, funds for education use contained in the special transfer payments which are earmarked and prohibited diverting effectively restricts the expenditure bias of local governments, thereby guiding the investing direction of local governments (Shah, 2006) to facilitate promoting the long-term educational performance of residents. The regression results are presented in column (3). It is found that the regression coefficient is significantly positive, meaning the structural effect of special transfer payments does exist and that among various types of fiscal transfers, only special transfer payments that are earmarked exert a positive effect (the structural effect on the long-term educational performance of residents). Further, considering the different restrictive effects of fiscal transfers with different discretionary authorities on local governments, i.e., some fiscal transfers have discretionary authorities and some not, and different discretionary authorities, to a certain extent, could also influence the impact on the long-term educational performance of residents. Drawing on the research ideas of Yin and Zhu (2011), this paper estimates discretionary transfers. Column (4) presents the regression results of discretionary transfers of local governments. The regression coefficient of the proportion of discretionary transfer in the total local fiscal revenue is negative but statistically insignificant, revealing that

Table 2. Fiscal Transfer Testing by Type & Testing of Fiscal Transfers for Education

Variable	Types of fiscal transfers				Estimated fiscal transfers for education
	Tax rebates (1)	General (2)	Special (3)	Discretionary (4)	Education (Total) (5)
<i>R_trans</i>	0.3018 (0.3609)	0.0187 (0.1057)	0.8211*** (0.2467)	0.0586 (0.0927)	0.7271*** (0.2247)
<i>trans & revenue</i>	-0.3861*** (0.0472)	0.1714*** (0.0584)	0.2941*** (0.0489)	0.3050*** (0.0668)	0.3149*** (0.0461)
Controls	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes
Obs	80633	65133	80820	58447	81372
<i>R</i> ²	0.427	0.414	0.433	0.365	0.434

Note: *trans & revenue* represents the sum of the corresponding type of fiscal transfers and the local fiscal revenue.

¹ Of course, this may also be related to the sample period of research, as the research period is limited to 1994–2009, and part of the reform adjusting fiscal transfers for education from special transfer payments to general transfer payments started after 2009, and the effect of the reform has not been captured yet.

such fiscal transfers have not exerted the structural effect. Based on regression results of the above-mentioned types of fiscal transfers, a finding is that special transfer payments with earmarked funds set up for urgent needs or urgency play a more prominent role in addressing education-related issues, or special transfer payments that are earmarked and prohibited diverting are more applicable in the field of education.

In addition, for the limitation of available public data, the data of fiscal transfers for education of each area could not be found but was only represented by the total amount of each type of fiscal transfers, making it hard to observe the effect of fiscal transfers purely for education. To highlight the unique effect of fiscal transfers for education, we draw on the research approach of Fan (2020), i.e., estimating the data of fiscal transfers for education, and the core idea is to separate fiscal transfers for education from others types. Specific regression results are presented in column (5) of Table 2. The testing is conducted on the total fiscal transfers for education (i.e., fiscal transfers for education and specific transfer payments for education, which are separated from general and specific transfer payments). It is found that the regression coefficient of the proportion of fiscal transfers for education is significantly positive, and it is slightly smaller than that of benchmark regression, though, its sign and significance are consistent with the benchmark regression, further confirming the existence of the positive effect of fiscal transfers for education on the long-term educational performance of resident individuals.

4.3. *Placebo Test*

The structural effect of fiscal transfers is verified previously, i.e., fiscal transfers have an additional impact on the long-term educational performance of residents. However, potential endogeneity issues between the proportion of fiscal transfers and the long-term educational performance of residents cannot be completely eradicated, as the fiscal transfers an area obtains depend on multiple factors. Here, the placebo test is adopted as the solution. The core idea of the placebo is that the implementation of the fiscal transfer system matches the year of birth of individuals. That is to say, if an individual's year of birth is impacted by the fiscal transfer system during compulsory education, the sample is categorized as an impacted sample, and on the contrary, it is not an impacted sample. For this reason, we need to look for false individuals who are not covered by current fiscal transfers, that is, they are not impacted by the fiscal transfer system. Furthermore, if the regression coefficient is still significantly positive when the false sample is used, it means that the endogeneity is serious, or the structural effect of fiscal transfers is not completely certain.

Details of processing: Firstly, the original samples born after 1980 are removed and only those born before 1980 retained. For a good intertemporal match between true and false samples, the period of birth of false samples is set as 1957–1979, i.e., individuals who are not actually impacted by fiscal transfers as the object of the research; secondly,

the birth year of each individual in this age group is added 23 years to obtain a false year of birth; finally, after matching with the real data of fiscal transfers and local fiscal revenues (the specific approach is consistent with that of the benchmark regression), the core explanatory variable, i.e., the proportion of fiscal transfers to the total local fiscal revenue, is obtained. Regression results are presented in Table 3.¹ From column (1), the regression of the proportion of fiscal transfers in the total local fiscal revenue is observed, and the coefficient is negative and statistically insignificant, which suggests fiscal transfers will not bring additional promotion on the educational performance of individuals not impacted by the fiscal transfer system.

Table 3. Placebo Test

Variable	Proportion of fiscal transfers			Proportion of tax rebates	Proportion of general transfer payments	Proportion of special transfer payments
	(1)	(2)	(3)			
R_trans	-1.5656 (1.1045)	-0.0884 (1.7540)	-0.7894 (1.3447)	0.8949 (0.7514)	-0.3785 (0.6388)	0.1095 (1.0756)
$\frac{trans}{revenue}$	-0.2979** (0.1291)	0.0076 (0.1892)	-0.3476* (0.1890)	0.1119 (0.1519)	0.1964 (0.1929)	0.0539 (0.1722)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	19971	5920	13550	5765	5701	5886
R^2	0.464	0.297	0.248	0.423	0.427	0.426

Additionally, the individuals born in 1957–1979 in the false samples include those who might be impacted during the Down to the Countryside Movement,² e.g., the Down to the Countryside Movement might produce positive effect on the development of education in rural areas (Chen *et al.*, 2020) to influence the real effect of this test. Clearly, this impact must be excluded, and the key is to sort out beneficiaries of the Down to the Countryside Movement, whose impacts were almost certain on individuals born in 1957–1979 in rural areas, but not on those in urban areas. Therefore, excluding the impact of this movement must work from the nature of household registration. For this reason, we divide the regression into rural sample and urban sample—the former is based on agricultural status in household registration and the latter on non-agricultural status in household registration. Column (2) presents the impact of the proportion of (false) fiscal transfers on the educational performance of urban individuals. It is found that the regression coefficient is negative and still statistically insignificant, which means the

¹ It should be noted that the false year of birth used in the placebo test is 1985–2003 instead of 1980–2003 because the sample size of the false year of birth from 1980 to 1985 is too small to be typical.

² Thanks to anonymous reviewers for their valuable comments and suggestions on this issue.

placebo test in this paper is not affected by the Down to the Countryside Movement and stays valid. Column (3) shows the impact of the proportion of (false) fiscal transfers on the educational performance of rural individuals, and the regression coefficient is statistically insignificant, once again verifying the validity of the placebo test. Columns (4) to (6) (urban sample) present the regressions of fiscal transfers by type, respectively. The three regression coefficients are insignificant, and the results are similar. Generally speaking, fiscal transfers do not bring positive impact on individuals not benefiting from the policy.

4.4. Dealing with the Endogeneity Issues

Even with the placebo test carried out above, endogeneity issues caused by other variables omitted or reverse causality are not ruled out.¹ From the data point of view, as the raw data used in this paper are cross-sectional data, which are processed as unbalanced panel data according to the year of birth and place, the fixed effects at the individual level are not controllable and individuals in different areas may differ largely. Therefore, a better instrumental variable must be sought to handle the above endogeneity issues. Current scholars and their research have basically found it difficult to look for a better instrumental variable for fiscal transfers, especially in this paper, as the data used here is the proportion of fiscal transfers but not the total amount of fiscal transfers, making it hard to use existing instrumental variables such as national poverty-stricken counties (Yuan *et al.*, 2008; Liu and Ma, 2015; Ma *et al.*, 2016) and national compulsory education projects in poverty-stricken areas for breakpoint, or to apply one-period-lagged fiscal transfers, the number of central committee members in each area (Fan and Zhang, 2013), and the association between the sum of national fiscal transfers and dummy variables in the central and western regions (Wu *et al.*, 2019). Taking into account the data structure and research purpose of this paper, we draw on the research ideas of Zhong and Lu (2015), the association of areas within the jurisdiction is taken as the basis for setting, considering differences between different years of birth on the basis of the data structure.

Details: First, grouped by year of birth and province, the average value (of the proportion of fiscal transfers to the total local fiscal revenue) of areas except for a specific county (municipality, district) within a province of different years of birth is calculated as an instrumental variable; second, grouped by year of birth and municipality, the average value (of the proportion of fiscal transfers to the total local fiscal revenue) of areas except for a specific county (municipality, district) within a municipality of different years of

¹ For this issue, the influence of other possible factors is also considered, and the following steps are adopted: firstly, the interactive fixed effects of control variables and the year of birth are added to relax the parallel trends assumption; secondly, the time of implementing compulsory education in each area is controlled; thirdly, the factors of free compulsory education are controlled; fourthly, the factors of expanding enrollment in colleges and universities are controlled; fifthly, the expenditure bias of local governments is controlled; sixthly, the area development is controlled. The testing results support the conclusions of this research. Of course, the above testing results are not reported here for space limitations.

birth is calculated as an instrumental variable. The endogenous issues of the sum of fiscal transfers and local fiscal revenue which reflects the aggregate effect are also handled in this way. The above approach satisfies the exogeneity and correlation of instrumental variables. In terms of exogeneity, the instrumental variable contains factors that do not depend on the local level but on the higher level, and the proportion of fiscal transfers in this area is difficult to influence the higher level, that is, it is difficult to influence the average value of other areas; in terms of correlation, the amount of fiscal transfers an area obtains is closely associated with other areas under higher levels of government, e.g., the area may also obtain more fiscal transfers when other areas receive more fiscal transfers, and thus each area's proportion of fiscal transfers is also closely associated.

Table 4. Instrumental Variable Testing (Phase II)

Variable	Provincial dimension	City dimension
<i>R_trans</i>	4.0940*** (0.6903)	2.7277*** (0.5563)
<i>trans & revenue</i>	-0.6091*** (0.1184)	-0.2160** (0.0859)
Controls	Yes	Yes
City FE	Yes	Yes
Cohort FE	Yes	Yes
Obs	81416	81297
<i>R</i> ²	0.392	0.398

This paper uses the above two instrumental variables to test separately to improve the robustness of empirical results. Empirical tests contain the same control variables, municipality-level fixed effects, and year-of-birth fixed effects, clustered at the county level. The testing results are presented in Table 4.¹ In respect of Phase II regression results, the regression coefficient of the proportion of fiscal transfers is found significantly positive in the instrument variables on the provincial dimension and the municipality dimension respectively, and sign and significance of the regression coefficients are consistent with benchmark regression results, further verifying the robustness of regression results in this paper.²

5. Conclusions and Policy Implications

With the fiscal transfer system since the tax-sharing system reform, based on macro and micro data, this paper dives into the structural effect of fiscal transfers on the long-term educational performance of resident individuals. Results show that fiscal transfers

¹ Regression results of Phase I are not presented for space limitations. Of course, readers may request it from the authors if interested.

² Besides, this paper also examined the mechanism of the structural effect of fiscal transfers on education expenditures. It is not shown here for space limitations.

are found to bring additional promotion on the long-term educational performance of residents. This research is of guiding significance for China to perfect the fiscal transfer system and to allocate intergovernmental educational authorities and expenditure responsibilities. That is to say, compared with low-level governments, fiscal transfers appropriated by high-level governments exert a better effect in supporting the development of local education, which means the educational authorities and expenditure responsibilities for compulsory education should be moved up so higher-level governments bear principal responsibilities. The positive effect of special transfer payments on education expenditure is confirmed. More efforts are needed to make more specialized and targeted fiscal transfers for education.

References

- Chen, Y., Fan, Z., Gu, X., & Zhou, L. (2018). Arrival of Young Talents: Send-Down Movement and Rural Education in China. *American Economic Review*, 110(11), 3393–3430.
- Cheng, G., & Xiao, J. (2011). The Impact of Intergovernmental Fiscal Transfers on the Supply of Basic Education in Counties—Based on Evidence from Jiangxi Province. *Peking University Education Review (Beijing Daxue Jiaoyu Pinglun)*, 9(2), 143–161.
- Fan, Z., & Zhang, J. (2013). Fiscal Transfers, Public Goods Supply and Government Scale Expansion. *World Economic Papers (Shijie Jingji Wenhui)*, 2, 1–19.
- Fan, Z. (2020). Fiscal Transfers and Intergenerational Mobility of Human Capital. *Social Sciences in China (Zhongguo Shehui Kexue)*, 9, 48–67.
- Fernández, R., & Rogerson, R. (1998). Public Education and Income Distribution: A Dynamic Quantitative Evaluation of Education-Finance Reform. *The American Economic Review*, 88(4), 813–833.
- Fu, Y., & Zhang, Y. (2007). Chinese Decentralization and Fiscal Expenditure Structure Bias: Cost of Competition for Growth. *Management World (Guanli Shijie)*, 3, 4–11.
- Guo, Q., & Jia, J. (2008). Central Fiscal Transfers and Local Public Service Provision. *The Journal of World Economy (Shijie Jingji)*, 9, 74–84.
- Jia, X., Yue, X., & Wang, Y. (2015). Classified Appropriation, Local Government Expenditure and Equalization of Basic Public Services—Reform of Fiscal Transfer System. *Finance & Trade Economics (Caimao Jingji)*, 4, 5–16.
- Li, H., Loyalka, P., Rozelle, S., & Wu, B. (2017). Human Capital and China's Future Growth. *The Journal of Economic Perspectives*, 31(1), 25–47.
- Li, P. (2010). *A Concise Diagram of Fiscal System*. Beijing: China Financial & Economic Publishing House. (in Chinese)
- Li, P., Lu, Y., & Wang, J. (2016). Does Flattening Government Improve Economic

- Performance? Evidence from China. *Journal of Development Economics*, 123, 18–37.
- Liu, C., & Ma, G. (2015). Will Fiscal Transfers Produce “Flypaper Effect”?—New Evidence from Breakpoint Regression. *China Journal of Economics (Jingji Xuebao)*, 1, 25–46.
- Lucas, R. E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22(1), 3–42.
- Ma, G., Guo, Q., & Liu, C. (2016). Fiscal Transfer Structure and Regional Economic Growth. *Social Sciences in China (Zhongguo Shehui Kexue)*, 9, 105–125.
- Qiao, B., Fan, J., & Feng, X. (2005). Fiscal Decentralization and Compulsory Primary Education in China. *Social Sciences in China (Zhongguo Shehui Kexue)*, 6, 37–46.
- Romer, P. (1989). Human Capital and Growth: Theory and Evidence. NBER Working Papers.
- Ronald, C., & Wu, J. (1993). *State and Local Public Finance*. Beijing: China Renmin University Press. (in Chinese)
- Rosen, H. (1995). *Public Finance*. Illinois: Richard D. Irwin, INC.
- Schultz, T., & Wu, Z. (1990). *Investment in Human Capital*. Beijing: Capital Economic and Trade University Press. (in Chinese)
- Shah, A. (2006). A Practitioner’s Guide to Intergovernmental Fiscal Transfers. *Policy Research Working Paper*, 44(2), 127–186.
- Shah, A. (1994). The Reform of Intergovernmental Fiscal Relations in Developing and Emerging Market Economics. Policy and Research Series 23, The World Bank, Washington DC.
- Wang, F. (2020). *Budget Knowledge Manual*. Beijing: China Financial & Economic Publishing House. (in Chinese)
- Wu, M., Liu, C., & Fan, Z. (2019). Fiscal Transfers and of Local Government Expenditure Expansion: An Empirical Explanation Based on the Budget System in China. *Journal of Financial Research (Jinrong Yanjiu)*, 3, 74–91.
- Yin, H., & Zhu, H. (2011). Bias of County-Level Fiscal Productive Expenditure. *Social Sciences in China (Zhongguo Shehui Kexue)*, 1, 88–101.
- Yuan, F., Tao, R., Xu, Z., & Liu, M. (2008). Fiscal Transfers and Expansion of Population by Fiscal Support amid Fiscal Centralization. *Economic Research Journal (Jingji Yanjiu)*, 5, 70–80.
- Zhong, H., & Lu, M. (2015). How Do Fiscal Transfers Influence Local Government Debts? *Journal of Financial Research (Jinrong Yanjiu)*, 9, 1–16.
- Zhou, L. (2007). Promotion Tournament Pattern of Local Officials in China. *Economic Research Journal (Jingji Yanjiu)*, 42(7), 36–50.
- Zhou, Y., Zong, Q., & Chen, X. (2013). Scale Competition of Education Expenditure of Municipal Governments under the Fiscal Decentralization System. *Economic Research Journal (Jingji Yanjiu)*, 11, 127–139.