

Can Transfer Payment Reduce the Inequality of Compulsory Education in Poor Areas? An Empirical Study Based on the Data from 18 Counties in 6 Provinces in China

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Abstract. *Transfer payment is of great significance for poverty alleviation and balanced regional development. Based on the first-hand survey data from 18 key counties of 6 provinces in China's national poverty alleviation and development program, this paper uses propensity score matching to calculate the effects of transfer payment funds on the results of compulsory education in impoverished areas and uses Shapley value decomposition to decompose correlated factors. It finds that when the characteristics of students, families and schools controlled, transfer payment funds significantly lower student academic achievements in some subjects and aggravate the inequality of educational results, which may be the result of the reduction of local education funds caused by the "crowding out effect" of transfer payment. Suggestions are made in this paper to standardize the utilization of transfer payment funds, establish a linkage mechanism between the educational results of poor students and transfer payment funds, implement the assisting plan for teachers and students in poor areas, strengthen the "pertinent support for intelligence development", and unite multiple agencies to increase input in education, with the purpose of reducing the inequality of compulsory education in poor areas.*

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AMARTYA Sen (as cited in Xiao & Li, 2021) once gave his insights into the relation between poverty and education that measuring poverty by economic standards is only the minimum threshold while the deprivation of the possibility of individual development constitutes the essence of poverty. Alleviating poverty through education is critical to addressing the issue of poverty in knowledge, skills, mental strength, culture, and information in one's disadvantaged times (Fu, 2021) and fundamental to interception of intergenerational transmission of poverty (Li et al., 2020). Registration of impoverished households is a key component in China's targeted poverty alleviation program, basically funded by transfer payment (Chen et al., 2020). To evaluate the effects of transfer payment on student academic achievements in poor areas in China and define its mechanisms is of great significance to sustaining targeted poverty alleviation, improving the efficiency of poverty alleviation through education, reducing relative poverty, and promoting educational equity.

Literature Review

Transfer payment is a redistribution of incomes by the central government to narrow the gaps among regions of different development levels. It includes general transfer payment and special transfer payment. In previous studies of education-related transfer payment, most researchers focus their investigation on whether it has increased input in education and draw differential conclusions. A common belief is that transfer payment should be able to increase educational expenditure as its primary purpose is to provide public goods and rectify externalities across regions. Also, the central government has attempted to secure the educational input standards by legislation. The increase in transfer payment by the central government should stimulate local governments' willingness to implement the former's policies and to enhance their investment in education (Ma & Hou, 2005). Some of the studies confirm the above opinion by presenting the fact that China's general transfer payment has played the role of "helping hand" by making up for the fiscal deficits at local levels and significantly boosting local educational supply (Gong & Li, 2016), for every 100 million yuan increase in general transfer payment, the provincial financial input in education will rise by 18.4 million yuan (Xiao & Hou, 2018). Other studies find that the existing promotion mechanism for local government officials tend to result in their neglect of investment in education and that transfer payment has little influence on local compulsory education due to the problems inherent in China's transfer payment system (Yang, 2016).

In addition, some investigations of the relationship between financial expenditure and equalized development of educational results indicate that general financial expenditure in education has an "inverted U-shaped" impact on educational results. The increase in financial expenditure in education significantly reduces the negative effects of family economic status on student educational results, and thereby, relieves educational inequity to some extent (Chen & Zhi, 2017). Public educational input accounts for 12.6% of the difference in school educational results. Transfer payment, especially the special transfer payment, can promote the intergenerational mobility of human capital and expanding transfer payment can stimulate equalized development of human capital (Fang, 2020). However, empirical research on the relationship between financial expenditure and educational results is insufficient and some problems remain to be ad-

dressed: i) Few studies have investigated the direct association between transfer payment and student educational outcomes. Most of the previous studies ignore the control of selective biases and the difference in sample characteristics between experimental group and control group, thus unable to reach relatively accurate and unbiased evaluation and research results; ii) Most researchers use the general sampling data from all over the country and pay little attention to the special situations of poor areas in China. Given that China is committed to eliminating “relative poverty” in the future, the present study is to focus its exploration on whether transfer payment aids in alleviating inequality in educational results in undeveloped areas and how to improve the human capital quality of children in impoverished households, with the purpose of providing empirical evidence to educational development in poor areas.

Research Design

Sources of Data

To investigate the academic performance and living conditions of compulsory education students in impoverished areas in China, a project team was established in 2018 to conduct a field survey by random sampling on more than 180 primary and secondary schools in 18 key counties listed in the national poverty alleviation and development program in Hubei, Jiangxi, Guizhou, Sichuan, Yunnan, and Shan’xi Province. A total of 7894 questionnaires were distributed and 7439 valid ones drawn after screening, with an effective rate of 94.23%.

Definition of Variables

This paper defines students with registration cards (to register households which are entitled to transfer payment) as the transfer-payment-entitled group, that is, the treatment group, and students without registration cards as transfer-payment-unentitled group, that is, the control group. To control individual characteristics, factors including student gender, being left-behind or not (when parents leave hometowns for job opportunities as migrant workers), boarding or not, grades, and urban or rural registered residence are incorporated as variables. Factors like parental education levels, vocations, and family economic status are integrated to be home economic, social, and cultural status (hereafter referred to as home ESCS). Home ESCS, together with family structures and family information capital (family’s possession of IT devices and access to Internet), is treated as variables related to student family backgrounds. As the survey is conducted in public schools, the present study need only to control two properties regarding school type: rural or urban school. To measure student academic achievements, the survey collects students’ scores of the last terminal exams in Chinese, Mathematics, and English. As test scores from different provinces cannot be compared directly, this study manages to standardize the exam papers for each grade in every school and the resulting scores of the three subjects are treated as dependent variables (Chen, Zhang, Chen, & Shi, 2018).

Methodology

Propensity Score Matching

Since the distribution of transfer payment funds is not completely random, there are remarkable differences in individual and family characteristics between the transfer-payment-entitled group and the transfer-payment-unentitled group. A simplified calculation of the effects of transfer payment funds on student educational results is bound to produce biases, and thus, it is necessary to control the selective biases. This paper uses propensity score matching to control individual, family, and school characteristics and then, calculate the effects of transfer payment on compulsory education. To ensure the validity of the results of the model, the study employs different matching methods to verify the results. After computing the propensity value, the nearest neighbor matching is adopted to draw the conclusion, followed by robustness tests by radius matching, kernel matching, and Mahalanobis distance matching.

Shapley Value Decomposition

At the second phase of data analysis, Shapley value decomposition is used to decompose the factors affecting the academic achievements of compulsory education students in poor areas, calculate the contribution of transfer payment to the student academic achievements in different subjects, and put forward specific suggestions for them. In addition, the quadratic terms of family socio-economic status and the interaction terms between transfer payment and home ESCS are included in the model.

Empirical Results

Descriptive Statistics

Descriptive statistics on the full sample, transfer-payment-entitled sample, and transfer-payment-unentitled sample show that there are differences in student characteristics, family characteristics, and student academic achievements between the treatment group and the control group. However, they do not tell whether the differences are of statistical significance. To confirm whether the impact of student overall backgrounds on their access to transfer payment is statistically significant, this study conducts a regression analysis using “access to transfer payment” as dependent variables and student, family, and school characteristics as independent variables. The results indicates that apart from gender, being left behind or not, and school properties, the other variables have significant impact on whether students receive transfer payment or not. Urban students’ probability of access to transfer payment is 74.7% lower than that of rural students; Boarding students’ probability of access to transfer payment is 73.3% higher than non-boarding students; With the promotion of grade, students’ probability of access to transfer payment decreases slightly; The higher the rating of family ESCS, the lower the student’s probability of access to transfer payment; The probability of access to transfer payment of students from the normal family structure is significantly lower than that of students from special family structures; Students’ probability of access to transfer payment is negatively correlated with the quantity of family information capital; The effect of the gender variable is not significant, indicating that there is no significant relation-

ship between the gender of children and the family economic status; The absence of parents as migrant workers has a negative effect on their left-behind children during their first year away from home, which is later replaced by a positive effect since incomes from their jobs in distant localities can improve the overall economic condition of the family, (Gao et al., 2018). Therefore, the access to transfer payment is correlated with individual and family characteristics, and it is necessary to control variables related to student background information.

Propensity Score Estimates

To effectively reduce the impact of individual, family, and school characteristics on student educational results, this study uses the nearest neighbor matching to match the calculated propensity values and then conducts balance tests on the matching results. The results of t-tests denote that before matching, there exist significant differences between variables (except gender) of treatment group and control group while after matching, sample biases of most variables (except grades and being left behind or not) are reduced by over 90% and the absolute values of standard deviations are all below 20.

After matching the sample of the treatment group with that of the control group, the study finds that the calculated results have changed to various degrees and that the overall effect of transfer payment on student educational results decreases, indicating that without the control of the background information of the sample, the results could be overestimated. Before matching, there is a significant negative correlation between transfer payment and student academic achievements. When individual, family, and school characteristics controlled, “counterfactual estimation” can be conducted, which assumes that differences in student academic achievements result exclusively from the accessibility of transfer payment. The calculation of the average treatment effect (ATE) of the treatment group reveals that after matching, the significance of the impact of transfer payment on student educational results is reduced. Transfer payment significantly lowers mathematics results of students in poor areas by 4.2% while its influences on student Chinese and English results are insignificant.

Robustness Tests

To verify the reliability of the matching results, after analyzing data by the nearest neighbor matching, the study carries out radius matching, Kernel matching, and Mahalanobis distance matching and confirms the results of the nearest neighbor matching. The pre-matching results indicate that transfer payment significantly lowers students’ Chinese and Mathematics results yet has no significant impact on English results; The post-matching results show that transfer payment has a significant negative impact on students’ mathematics results yet has no significant impact on Chinese and English results.

Shapley Value Decomposition

To make more detailed analysis of the effects of transfer payment on the student educational results in poor areas in China, Shapley value decomposition is applied to decompose the factors influencing students’ Chinese, Mathematics, and English performance

based on the results from propensity value matching. The results of SVD indicate that when individual and family characteristics controlled, the access to transfer payment poses significant negative effects on students' mathematics test scores, confirming the results of propensity score estimates. According to SVD results, transfer payment accounts for 11.34% of the disparity in Mathematics results among students and has no impact on Chinese and English results, which denotes that transfer payment does not aid in alleviating the inequity of educational results in poor areas but rather aggravate the inequality. In addition, there is gender difference in student academic achievements in that boys' English and Chinese results are much lower than those of girls, while their mathematics results significantly higher than those of girls; Urban and boarding students' Chinese results are remarkably lower than those of rural and non-boarding students; Home ESCS yields the most significant effect on student academic achievements, accounting for 54.07%, 49.24%, and 47.34% differences in student Chinese, Mathematics, and English results respectively; Students' family structures significantly impact their mathematics and English results in that academic performance of students from normal families are superior to that of students from single-parent families; The school properties make significant differences to students' English and Chinese results as urban students typically perform better in English and Chinese than their rural counterparts; The coefficient of interaction terms between home ESCS and entitlement to transfer payment is significantly negative, indicating that among students of same home socio-economic level, transfer payment poses negative impacts on their academic achievements.

Conclusions

The present study, based on the survey data from 18 counties in 6 provinces in China, concludes different results from some of the previous studies. It finds that compared to students who are not entitled to transfer payment, those entitled to it perform worse in Mathematics and that transfer payment has no significant effects on student English and Chinese results. According to the educational production function, the decrease of educational output is caused by the reduction of educational input. The reasons for the results of this study are summarized as follows:

The increase in transfer payment funds does not necessarily result in the rise of educational input at local levels.

Numerous studies of the relationship between transfer payment and local educational input have revealed the existence of "crowding effect" in educational funding, which means that the increase in transfer payment does not necessarily encourage the local government's investment in education, but rather curtail local educational funds and weaken the local government's commitment in boosting educational supply (Fu & Cui, 2010). The follow-up empirical studies further confirm that transfer payment has a significant negative impact on educational input. Typically, 1% increase in transfer payment leads to 0.03% decreases in investment in education (Yang, 2016). The present study reinforces the point of view of the previous studies by clarifying the negative effects of transfer payment on student academic performance.

The most problematic counties included in the national poverty alleviation and development program have had long-standing financial difficulties.

When the central government allocates them part of the transfer payment funds for poverty alleviation purpose, it is hard for those counties to prioritize education in decision-making of funding. They are inclined to use the funds on more pressing issues and take the economic development and infrastructure construction as top priorities. The continual increase in transfer payment results in shrinkage of educational funding.

Most transfer payment funds allocated to registered households are typically designated as funds for poverty alleviation through start-up business or employment.

Such funds are often “earmarked” to encourage poor households to engage in reproduction. Meanwhile, funds for poverty alleviation through education are usually distributed by means of school operations, such as exemption from tuition and miscellaneous fees at compulsory education level, yearly subsidies of cash, and free lunch, etc. These measures may lead to parental neglect of family input in education. Parents would believe that the state should take charge of their children’s education and it is no longer their responsibility to make investment in child education. As a result, the input in child education is reduced, and the inequality of educational results is further aggravated.

Differences in the effects of transfer payment on distinct subjects may be caused by their inherent features.

For instance, transfer payment impacts student mathematics results most significantly because short-term efforts can make a difference to mathematics learning. The insignificant impact of transfer payment on student English and Chinese performance is attributed to the fact that the overall English level of students in poor areas is relatively low and that the learning of Chinese subjects requires long-term accumulation.

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