

Transportation Infrastructure and Family Educational Expectations: An Empirical Analysis Based on the China Family Panel Survey

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Abstract: Based on data from the China Statistical Yearbook and China Family Panel Survey (CFPS), this article investigated the influence of regional transportation infrastructure development on family education expectations. Research results show that there is a significant positive correlation between transportation infrastructure and family educational expectations and that the improvement of transportation infrastructure can enhance the family's willingness to engage their children in higher education. According to the results of influencing mechanism analysis, transportation infrastructure development affects family education expectations by increasing family income and changing family reproduction concepts and educational ideas. In addition, the impact of transportation infrastructure construction on family education expectations is heterogeneous: the positive correlation between them is particularly significant in rural areas with less developed transportation infrastructure, in areas with low average education level of parents and slow information communication, and among families of lower social classes; however, the relationship between the two variables is not prominent in urban areas, in areas where information communication is fast and parents have a higher average education level, and among families with higher social classes. These research findings offer the nation and government new implications for better promoting poverty alleviation through education and rural revitalization in underdeveloped areas.

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Introduction

As a prerequisite for the social and economic development of a region or nation, the development of transportation infrastructure lays a crucial foundation for the regional resource exchange, information communication, opportunity sharing and advantages complementation, which also profoundly affect regional education resource availability and family educational ideas. Improved transportation infrastructure help boost the income of local families, as a result, raising family educational expectations; at the meantime, it bolsters the inter-regional flow of people and cultural exchange, popularizes urban culture, transforms the backward educational ideas in underdeveloped areas, and thus heightens local families' awareness of the importance of education,

Family education expectations refer to parents' expectations of their children's future education level and academic attainment, which are a key representation of the family's educational outlook. Generally speaking, the impact of family educational expectations on child educational achievement is mainly reflected in two aspects: positive family educational expectations increase parental investment in child education, including increased money input in as well as time and energy devotion to children's learning; at the same time, there exists Rosenthal effect in family educational expectations (Rosenthal effect means that expectations of others will produce an "aspiration effect" on individuals, thus promoting the actualization of individual goals). In this context, this article utilized data from the China Family Panel Survey (CFPS) and China Statistical Yearbook to establish panel data which contain 17073 subjects to examine the influence of transportation infrastructure development on family educational expectations as well as the influencing mechanisms.

Research Design

Sources of Data

The study sourced data from the *China Statistical Yearbook 2014-2018* issued by China's National Bureau of Statistics and the CFPS 2014, 2016 and 2018 undertaken by Institute of Social Science Survey of Peking University. *The China Statistical Yearbook* contains basic data of China's economy, transportation, and population. The CFPS samples come from 25 provincial administrative regions, with a target sample size of 16,000 households. The survey subjects include all family members of the sampled households, and data on family educational expectations, family economic circumstances, parents' education levels and other related aspects are collected.

The Determination of Variables

The Predicted Variable: Family Educational Expectations

Family educational expectations are the dependent variable in this study. The corresponding question in the CFPS questionnaire is “what is the minimum level of education you expect from your kids?” The value of this variable ranges from 0 to 7. The bigger the value, the higher the family educational expectations it represents, with 0 = “no education expectation for kids,” 1 = “the primary school,” 2 = “the junior secondary school,” 3 = “the senior secondary school/ secondary technical school/ secondary vocational school,” 4 = “the junior college,” 5 = “the bachelor’s degree,” 6 = “the master’s degree,” and 7 = “the doctor’s degree.”

The Core Explanatory Variable: The Index of Transportation Infrastructure

This study chose railway transport as the index to measure the development level of transportation infrastructure in an area, because compared with other transport modes, railway transport has its unique advantages such as the large delivery capacity, cost-effectiveness, long travel distance, wide coverage, independence from weather conditions, etc., which can promote the inter-regional exchange of labor and information and bolster local social and economic development.

Control Variables

Based on the previous research literature and the available data from the CFPS, this article used the education levels of the father and mother and family book collection to represent the family cultural capital; the family’s monthly post and telecommunication expenses as the proxy variable to represent the home social capital; per capita household income and household assets to represent home economic capital. Child characteristics include child gender, age, and being the only child of the family or not. Regional characteristics include the logarithm of the per capita GDP of each province every year along with the core explanatory variable of the regional transportation infrastructure development level.

The Research Model

The following model was constructed to explore the causal relationship between transportation infrastructure and family educational expectations:

$$\text{Edu}_{i,t} = \alpha + \beta \text{Tra}_{i,t} + \delta X_{i,t} + \varepsilon_{i,t}$$

In this equation, subscript i denotes the sampled individual, and $\text{Edu}_{i,t}$ represents the parental educational expectation for i in the year of t ; $\text{Tra}_{i,t}$ represents the development level of transportation infrastructure in province i in the year of t ; X_i denotes the family background, child characteristic, regional characteristic, and other control variables; $\varepsilon_{i,t}$ means the residual. The directivity and significance of coefficient β are the main focus in the model. As the predicted variable in this model is an ordinal categorical variable

with a value range of 0-7, this paper chose to use an ordinal logistic model to perform regression after controlling for the fixed effects.

Analyses of Empirical Research Findings

Findings from Main Empirical Models

Estimate results of the variable of family educational expectations demonstrate that the higher the level of transportation infrastructure and the GDP of a province, the higher the family educational expectations there. However, when the variable of household economic capital is added into the model, the variable of the GDP of each province loses its statistical significance, which indicates that the GDP of each province affects family educational expectations mainly through its effect on the economic capital of local families.

The regression results show that: (1) The coefficient of the core explanatory variable - the development level of transportation infrastructure - in all models is significantly positive, indicating that the development of transportation infrastructure plays a substantial role in raising the educational expectations of local families, as it has been a driving force to the social, economic, and cultural advance in the region. It prompts families to change their educational ideas and improves outcomes of family educational input, and as a result, parents have higher requirements and expectations for children's education attainment. (2) The richer the family capital, the higher the family educational expectations for its kids. (3) The coefficient of the variable of child gender is significantly positive. Boys are likely to receive higher family educational expectations, indicating that gender discrimination still exists in children's education. (4) The coefficient of the variable of being the only child of the family or not is significantly positive, signaling that parents have higher educational expectations for the only child than for children with siblings.

Whichever model it is, the advance in transportation infrastructure increases the number of parents who expect their children to obtain doctor's, master's, or bachelor's degrees, and reduces the number of parents who limit their educational expectations for children to the junior college or below. In other words, the development of transportation infrastructure can significantly boost parents' willingness to engage their children in higher education.

The Robustness Check

Altering the Index of Transportation Infrastructure

To test the robustness of the above results, the development level of highways was used as the index to measure the level of regional transportation infrastructure and performed the regression of the main empirical models again; an additional indicator of transportation infrastructure was produced by combining the standardized railway density and per capita railway kilometers and the coefficient of the explanatory variable was estimated again. The regression results show that the symbol and significance of the explanatory

variable remain unchanged, whether the development level of highways or the reconstructed railway-based index is used to replace the original index of transportation infrastructure, which indicates that improved transportation infrastructure can significantly raise educational expectations of local families.

Using the Ordinal Probit Model

The ordinal probit model was used to conduct regression in order to further verify the stability of the regression results of the ordinal logit model. The regression results show that the symbols and significance of the coefficient of the variable of transportation infrastructure have not changed

Propensity Score Matching

This study used the propensity score matching (PSM) method to address the endogeneity issue that may be caused by the sample self-selection bias: (1) The sample was divided into areas with developed transportation infrastructure (N=8964) and areas with ordinary transportation infrastructure (N=8109). The former was set as the experimental group and the latter as the control group. (2) The control variables in the main regression model 5 were used as the predictor variables to predict the probability of the family residing in an area with developed transportation infrastructure and the propensity scores were calculated. (3) One to one matching, one to four matching and one to four radius matching was performed on sample respectively. The results of propensity score matching show that the standardized deviation of variables is substantially reduced, the absolute deviation of all variables is less than 5%, and the t-test results of most variables do not contradict the assumption that there are no systematic differences between the experimental group and the control group, indicating that the matching result is good. The sample regression results based on PSM show that the symbols and significance of explanatory variables are consistent with those in previous analysis, that is, the improvement of transportation infrastructure can significantly heighten the educational expectations of local families. Therefore, the conclusion of this article is robust and reliable.

Analyses of Influencing Mechanisms

The Effect of Family Income

A three-step mediation analysis was undertaken: (i) to regress the effect of transportation infrastructure on family educational expectations with the results showing that the influence of transportation infrastructure on family educational expectations remains prominently positive when the control variable of family income is not included in the model; (ii) to regress the effect of transportation infrastructure on per capita household income with the results displaying that the improvement of transportation infrastructure can significantly bolster local family income; (iii) to refer to the regression results of the main empirical models which have proved that both household income and transportation infrastructure are positively correlated with family education expectations. The

above analysis indicates that household income can mediate the effect of transportation infrastructure on family educational expectations. In other words, the improvement of transportation infrastructure can heighten educational expectations of local families by promoting the increase of family income.

The Effect of Cultural Concepts

The advance in transportation infrastructure not only has a positive impact on the regional economy, but also speeds up inter-regional information communication, expand people's travelling spheres, and thus boost inter-regional cultural exchange. As a result, some new concepts and thoughts are introduced into the lives of residents, gradually transforming the local culture and residents' ideas. Further, the change in regional cultural background and family cultural capital significantly modifies family educational expectations.

Further Heterogeneity Analyses

The foregoing analyses focus on the influence of transportation infrastructure on family educational expectations and its mechanism --- transportation infrastructure enhances the educational expectations of local families by promoting the economic development of areas within its coverage and changing the family educational concepts. To go further, is there any heterogeneity in the effect of transportation infrastructure on family education expectations? To address this question, this study performed a heterogeneity analysis in the four dimensions: urban and rural division, internet penetration, parental education level, and family social capital, with reference to previous research on this topic.

The Urban vs. Rural Heterogeneity

Regression analyses were carried out on rural and urban households separately and demonstrated that the improvement of transportation infrastructure has a significant positive effect on educational expectations of rural families but has no significant impact on educational expectations of their urban counterparts.

Disparities in Education Level among Parents

To investigate the differences in the impact of the advance in transportation infrastructure on parents with varying education levels, this paper divides the whole sample into two groups: families with high education levels (N = 8,566) and with low education levels (N = 8,507), according to the median of the average education level of parents in a family and conducted regression on them separately. The regression results reveal that improved transportation infrastructure is positively related to educational expectations of parents with lower education levels but has no significant influence on educational expectations of those with higher education levels.

The Divide in the Internet Use

This article chose the Internet penetration rate of each region in every year as the proxy variable of information communication speed and divided the sample into the fast information communication group (N = 9,006) and the slow information communication group (N = 8,067) in accordance with the median of the Internet penetration rate. According to the results of group regression, the coefficients of the variable of transport infrastructure in both the two groups are positive and significant at the 1% level. By comparing the coefficients of the two groups, it is easy to find that the positive impact of transportation infrastructure advancement on family educational expectations is stronger in the slow information communication group.

Disparities in Social Capital

To investigate the heterogeneous effects of the improvement of transportation infrastructure on educational expectations of families with differential social capital, this study divided the sample into two subsamples: higher social class families and lower social class families and conducted group regression. The results show that the development level of transportation infrastructure is positively correlated with educational expectations of lower social class families but has no significant impact on educational expectations of higher social class families.

Conclusions

Through the ordinal logit model analysis of data from the CFPS, the article drew the following conclusions: (i) The more developed the regional transportation infrastructure, the higher the family educational expectations. The improved transportation infrastructure results in stronger intention of families to engage children in higher education. (ii) The advanced transportation infrastructure positively affects family educational expectations by increasing local household income and transforming parents' family reproduction concepts and educational ideas. (iii) The improvement of transportation infrastructure in underdeveloped rural areas can significantly heighten educational expectations of local families but that in cities has no prominent influence on educational expectations of urban families. (iv) The advance in transportation infrastructure imposes a significant positive impact on family educational expectations in both fast and slow information communication regions, with a stronger impact on the latter. (v) Upgrading transportation infrastructure leads to higher educational expectations in families with lower parental education levels and less social capital but has no remarkable influence on educational expectations of families with higher parental education levels and rich social capital.

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