

The effects of family income on children's education: An empirical analysis of CHNS data

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ABSTRACT: Education is an important way for children in low-income families to change their social status. In order to quantitatively investigate the intergenerational transmission of education in China, an empirical study based on the CSPF2014 data on the effect of family income on the academic achievement of children was done, after controlling the education of parents, father's age, residence and the number of family members. OLS and logistic regression models were used to analyze the influence of family income on children's academic achievement. The results show that family income has a significant influence on children's education level, and the increasing family income can improve their education level; the phenomenon of intergenerational transmission of education is not obvious, and the intergenerational mobility is good. It is also found that although the total sample and urban samples showed the level of family income has no significant influence on academic achievement of children, but in rural families, the increasing income does play a greater role in enhancing children's education level, which provides suggestions for China's education reform accordingly.

Keywords: family income; academic performance; logistic regression model

1 INTRODUCTION

The reform and opening-up has not only brought economic prosperity, but also increased income inequality and severe class solidification. Children from low-income families struggle to promote their social status on their own. Li Yu (2006) pointed out that how well an individual is qualified in education is a major path to change his/her destiny and rise to an upper class^[15]. A higher education through recruitment examination is of great significance to one's development. Given the limited educational resources, not all people can get a good education. Then, what exactly has impacted on individual's performance in the exam? Li Chunling (2003), Guo Congbin (2007), et al. believed that parents' family backgrounds, such as income, education, and social status are key factors to their children's academic attainment^{[14][9]}. Some believed that what family one is born in weighs more than what it used to be. Liang Chen and Li Zhongqing (2012) observed that students in Peking University enjoying the privilege of functionary family were on

the rise in number in the late 1990s. The proportion was up to 39.76% in 1997, which passed that of professionals' children, and far surpassed that of workers and farmers'^[17]. Yang Dongping (2006) noted that the inequality in education brings a widening disparity, of which urban citizens gain the upper hand in receiving education than rural ones, and therefore the proportion of people with bachelor degree in cities is more than that in rural areas^[27]. Cai Hongbin (2011) held that the dualism in education goes against the disadvantaged groups who are desperate to strive for a better life, and probably lowers the social mobility, which may widen the inequality in the long run. Ultimately, the whole country may fall into the middle-income trap before an appropriate solution is found. Therefore, discussions about the affecting factors on academic achievements might be a way out. Of all the indicators in family backgrounds, family income is one of the key variables that can be easily adjusted by governmental policies. If family income does have great influence on children's education level, the governments can subsidize the low-income family to promote their children's educational conditions, which can even narrow the gap of wealth among different social groups in a bigger picture. This paper tries to

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provide relevant theories and demonstrations for a better understanding.

Family should be a place where education is conducted beyond school. As a basic unit of social system, family with good education and tradition can be a stimulus for the development of the country and the nation, and social harmony. As family is regarded as “the first classroom” where parents serve as the first teachers to their children, how family education is progressed will be a lifelong issue for them. Scholars at home and abroad agree that family is where one is born and raised, and is also the starting place of his/her learning and social life. *Coleman Report* and *Plowden Report* in the late 60s revealed a strong correlation between family environment and children’s academic achievements, which explained the differences of their performance in class. However, some scholars didn’t think that could be a factor and tried to look for a better reason. In contrast, academic performance can check students’ learning effect which can be used as reference for school and parents, and can also decide whether students can enter a higher school or go on to further study, which influence the quality of schools the most. Thomson (1981) pointed out that it is easy and accurate to use the score of a standardized academic attainment test to evaluate the input-output effect of education resource. As the all-round development of China’s education is on track, excessive pursuit of score is no more on the schedule of education system, but positive effects of test score should be improved to attenuate the negative one.

This study is intended to explore the tangible effect of family income on children’s education, so as to provide empirical evidences for the reform of income distribution and education in the near future.

2 REVIEW

2.1 Status of foreign research

Foreign researches on family background and academic achievements came up earlier with abundant achievements. The *Plowden Report* in the mid-1960s focused on the relationship among student’s academic record, family background and school education, which broke the stereotype that academic record was only relevant to school education, and aroused the awareness that social background as well as family environment had pivotal effect on students’ development. At the same time, Coleman issued *Equality of Educational Opportunity* after an investigation of 645000 students in five grades. The report noted that family background has a significant impact on student’s school performance, and approximately one-half to two-thirds of the differences in students’ performance can be explained by family and socio-economic status. The subsequent studies had veri-

fied Coleman’s discovery. More than half of the variance can be interpreted by family factor, while school contributes little to the elimination of inequality in learning. Relevant theory emphasizes that both social and economic status of a family are decisive to youth development. According to the theory of family investment, children will process more development resources (e.g. financial support and more family time) when their parents have higher social and economic status, so as to promote students in academic development in a more active way. Children from low-income families, however, suffered from the lack of such resources which resulted in an unsmooth life journey or even hindered their own development.

From the empirical point of view, two methods from the existing literatures are adopted to identify the possible endogenous problems in the model. The first one uses the data of adopted children, which can effectively control the correlation among the family income, parental education and the unobservable ability of children. Plug (2005), for example, drew a positive correlation by using this method to control the assertive mating^[5]. However, parents may educate different types of children in different ways, and provide a better living environment and more attention to the adopted children. Loken (2007) used Norwegian oil prices from 1970 to 1980 as figures in a natural experiment to establish dummy variables (whether affected by the prices or not) as an instrumental variable, and it turned out that the family income didn’t influence children’s education level obviously. The reason is probably that a prosperous lending market in Norway eased the shortage of funds^[7]. Shea (2000) believed that the father’s status in labor union and industry, and whether he has a job can be taken as the instrumental variables of his income. The evidence shows that the impact of family income on children’s human capital can be ignored^[8]. Dahl & Lochner (2005) used the anti-poverty policy for low-income family provided by the US federal government as an instrumental variable of household income, and the empirical results showed that the increase in income of low-income families is of importance for the school performance of their children^[4].

The social status, cultural structure of family, and the educational level of parents and siblings severely affect students’ academic performance. Besides, parents’ attitude toward education, and whether they are in harmony with their neighbors, will have a huge impact on that too. All the above literatures have confirmed its validity. The academic performance of children in towns is better than those in rural areas, so it is for those in middle class and working class.

2.2 Current status of domestic research

Traditions and folklores have authenticated that China boasts a long history of family education since ancient times. An immense amount of works on family educa-

tion was derived from the Southern and Northern Dynasties whose breadth and depth were beyond comparison. Influencing factors of academic performance have been extensively discussed since 1980s. Ding Yu (1985) carried out a questionnaire survey of 450 middle school students, who were asked about the scores and family (parents' occupation, age and financial situation), and the result showed a significant positive correlation^[10]. Meng Hongwei (1993) analyzed the data of 2797 Grade 3 students in junior high schools from Beijing, Tianjin and Taiyuan respectively, and found that family background can better explain the difference in students' scores of science^[20] than school education. Likewise, Zhou Haiting (2002) used the linear structural equation model proposed by Joreskog, and listed a series of effects of family on the children's math performance. The result indicated that parent's degree of education and family income had quite a great impact on children's academic performance^[28]. Adding a research on personal learning strategy, Mei Hongxing (2008) also brought out a positive result. Tao Hong and Yang Doingping (2007) turned to senior high students and found there was no highlighted difference in academic performance while it was opposite for the junior high students^[23]. Teng Wenfang (2008) saw that the higher degree parents had, the higher their children would rank^[22]. Moreover, a well-educated mother should have more impacts on the student's performance than father. Nevertheless, there still remain inconsistent conclusions of whether scholastic aptitude can be transferred between generations. On these grounds, the first presumption is proposed.

H1: Parental education level has a significant impact on children's academic achievement.

Lu Zhiqian (2000) found that the scores in middle school and college are closely connected to parents' occupation and family income^[13]. Based on the sample data from the *Research on Changes of Chinese Social Structure* in 2001, Li Chunling (2003) analyzed effects of family income (economic capitals) on individual education level since 1940s by linear regression model. Given the limitation of research time-point and data availability, the author left out the figures after the 1990s, so the empirical result couldn't fully support the hypothesis in question^[14]. Li Yu (2006) resorted to Logistic Model and CGSS data and found that children of managers enjoyed an escalating opportunity of education^[15]. Liu Xiaofei and Lu Ke (2008) discovered that the higher the socio-economic index of family is, the better scores students would earn^[16]. The researches of Fang Changchun and Feng Xiaotian indicated that those who graduated first in junior high school are offspring of national or social administrators, followed by children of the professionals, and those from the families without permanent jobs rank last^[19]. After investigating 660 students at compulsory education stage, Wang Changhua (2009) found that the family factors fail to influence the aca-

demics of children in primary education, while there is significant correlation between the academic performance of children and the expectation level and concern level of parents after going to middle school^[25]. Besides, income level shall be considered as an immediate element that embodies parent's social strata. Therefore, this paper put out the second presumption:

H2: The level of family income has a significant positive impact on children's academic achievement.

Jiang Guohe, Wen Guangfen (2006) studied the difference between urban-rural family capital and the academic achievement of junior high school students. It turned out that the gap of family capital (parental occupation, parent education level and family income) between urban and rural areas is widening, which resulted in the difference^[12]. Using a value-added assessment method to build a multi-level regression model, Liang Weiyan and Du Yuhong (2012) focused their attention on family social capital in accordance with the longitudinal data of rural students from five provinces, and the result once again demonstrated that better educational resources will be harnessed by the well-off families^[18]. It can be seen from the above literatures that registered permanent residence might also be one reason, so the last presumption is put forward.

H3: The registered permanent residence has a significant effect on family income impacting on children's academic achievement.

Based on the studies at home and abroad on the relationship between family and children's academic achievements, the family background can be divided as follows. The first is categorizing the family background into hard environment and soft environment, of which the former contains parental occupation and educational level, family income and structure, while the latter covers parenting style, educational expectation and environment of family education. Most scholars argue that family background is connected to the hard environment. According to the previous studies, parental educational level, family income, father's age, registered permanent residence and number of family member are adopted as control variables in this paper. The adoption of number of family member is innovative, which is because the two-child policy enables more families to raise one or two more children.

3 RESEARCH METHODS

3.1 Empirical model

Family background is a vague and broad concept, which consists of not only parents' occupation, social status, income, education level (parental education), family population, domicile place, race, and ethnic, but also household registration and origin at one time. China boasts a long history of attaching great im-

portance to social and familial relation so the socioeconomic status of grandparents and other relatives or friends can be regarded as a part of family background. In this paper, domicile place and number of family members, along with the above-mentioned factors will be adopted.

Table 1. Description of variables

Variable type	Variable symbol	Meaning
Explained variable	Class f	Class rank
Explanatory variable	Wage	Wage
Control variable	Age	Parental age
	Village	Registered permanent residence (urban/rural)
	Degree	Father's degree
	Wife degree	Mother's degree
	Fnum	Family number

This paper uses a multiple regression model to study the impact of different family income on children's academic achievements, which is shown as:

$$\text{class } f = \beta_1 \text{wage} + \beta_2 \text{age} + \beta_3 \text{village} + \beta_4 \text{degree} \\ + \beta_5 \text{wife degree} + \beta_6 \text{fnum} + \varepsilon$$

The meanings of the variables are shown in Table 1, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the effects of salary income, father's age, domicile place, father and mother's education degree, and number of family members on children's academic performance, respectively.

In the logistics model, the ungrouped regression and grouping regression were conducted successively, in which the number 1 stood for urban areas, and 0 for rural areas. In the study of impacts of household income on academic performance, both urban and rural figures showed heterogeneity.

3.2 Data Description

The data in this study came from China Family Panel Studies (CFPS) in 2014. CFPS aims to track and collect data from individual, family and community, to reflect the changes of Chinese society, economy, population, education and health, and provide a data base for academic research and public policy analysis. It focuses on the economic and non-economic benefits of Chinese residents, as well as multiple topics including economic activity, education acquisition, family relations and dynamics, population migration, and physical and mental health. This paper would look into the information of both children and parents, with the help of STATA13 since the family data are separated from the individual one.

The measurement standard corresponding to each variable in the questionnaire is:

(1) Your class ranking (%). In the last major exam (mid-term or final), your ranking in the class is at: 1. the top 10%; 2. 11% -25%; 3. 26% -50 %; 4. 51-75%; 5. Behind 24%; 6. No read-out. The scores are separated into several intervals by this measurement.

(2) Total income (yuan), including wages, bonuses,

subsidies, in-kind benefits, etc. How much do your families make in total after tax? 0 - 10 million. In the empirical study, the wage-unit is 10,000 yuan.

(3) What is the highest degree of the individual education (graduation)? 1. Illiterate / semi-illiterate; 2. Primary school; 3. Junior high school; 4. Senior high school / Technical school / Vocational school; 5. Junior college; 6. Bachelor; 7. Master; 8. Doctorate. The scores are judged by numbers. The bigger the number is, the higher the degree will be.

(4) What is the highest degree of your spouse (graduation)? 1. Illiteracy / semi-illiteracy; 2. Primary school; 3. Junior high school; 4. Senior high school / Technical school / Vocational school; 5. Junior college; 6. Undergraduate; 7. Master; 8. Doctorate. The scores are judged by numbers. The larger the number, the higher the degree.

All of the data in the above experiment is winsorized at 1% to exclude the interference of anomalies, maximum or minimum on the model.

4 EMPIRICAL ANALYSIS

4.1 Descriptive analysis

The hysteresis of CFPS data has led to a delay of an investigation result of year 2014, which was published in the end of 2016. 1050 samples of family data of CFPS2014 were used, of which the average family revenue was 45,930, the minimum value was 1,800 yuan, and the maximum value was 2,000,000. The mean value of student score in class is 2.282 and the standard deviation is 1.094; that in grade is 2.57, and the standard deviation is 1.087. The parental degrees are categorized as illiterate/semi-illiterate, primary school, junior high school, senior high school / technical school/vocational school, bachelor, master or above, which presented a normal distribution. In the samples, the parents with junior high education are the most, demonstrating. The average number of family members is 4.942, the minimum is 3, and the maximum is 13.

Table 2. Property of variables

variable	mean	sd	min	p50	max	N
class f	2.282	1.094	1	2	5	1050
grade f	2.570	1.087	1	3	5	1050
wage	4.593	3.575	0.180	4	20	1030
age	45.70	11.52	27	42	78	1050
village	0.646	0.479	0	1	1	1050
degree	2.964	1.365	1	3	6	1050
wife degree	2.973	1.363	1	3	6	1039
fnum	4.942	1.928	3	5	13	1050

4.2 Regression analysis

The presumption was examined by OLS and logistic regression analysis to further confirm the result. For starters, OLS method was used to analyze the popula-

Table 3. Regression result

	M1 class_f	M2 class_f	M3 class_f	M4 class_dum	M5 class_dum	M6 class_dum
wage	0.00678 (0.66)	-0.0192* (-1.71)	0.0642** (2.55)	0.0125 (0.67)	-0.0302 (-1.33)	0.124*** (2.80)
age	-0.00232 (-0.74)	-0.00525 (-1.31)	0.000910 (0.18)	-0.00319 (-0.51)	-0.00988 (-1.22)	0.00556 (0.54)
degree	-0.0201 (-0.62)	-0.0239 (-0.58)	-0.0210 (-0.39)	-0.0264 (-0.45)	-0.0495 (-0.67)	0.00462 (0.04)
wife_degree	-0.00656 (-0.20)	0.00405 (0.10)	-0.0421 (-0.77)	-0.00750 (-0.13)	-0.0111 (-0.15)	-0.0256 (-0.24)
fnum	-0.0173 (-1.08)	0.0143 (0.78)	-0.0527* (-1.71)	-0.0293 (-0.85)	-0.0230 (-0.56)	0.00660 (0.11)
_cons	2.519*** (11.26)	2.662*** (9.38)	2.375*** (6.05)	-0.0172 (-0.04)	0.637 (1.13)	-1.170 (-1.62)
N	1019	661	358	1019	661	358
R ²	0.002	0.009	0.039			

Notes: t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

tion, urban and rural samples respectively, and the regression equation M1-M3 shown in Table 3 below was obtained. It can be seen from M1 that the family income had no significant impact on children's educational level in the population samples, as well as in the urban samples. However, the income of rural family plays a greater role in promoting children's academic performance in M3. M4-M6 showed the consistent result. In this case, some believed that parents with advanced degrees are capable of teaching the required or high-level knowledge to their kids. This point of view, however, didn't earn the support from the empirical result, which indicates that the intergenerational transmission in education is not evident, and the intergenerational mobility is good.

5 CONCLUSIONS AND RECOMMENDATIONS

Family income has significant impacts on children's educational level, which is assumed to be elevated with the increasing income. A financially well-off family is able to give more, especially educational resources. For lower-income families, parents are bustle around for life and expect little from their kids, and moreover they may put subsistence before children's learning. This also means those who yearn for the improvement of their life by studying hard are naive as the bar is raising and the income gap is widening. On that account, governments should provide more fair education opportunities and subsidies in order to cut down the inequality of intergenerational transmission. On the other hand, the educational bureaux should level off the disparity of resource distribution between urban and rural areas by:

Firstly, governments should act as a designer for the entire process of educational system and the policy of fair education, to ensure the equitable distribution of educational resources in particular. Relevant authorities are supposed to further develop the urban-rural educational industry in local area, so that the rural and underdeveloped regions are able to enjoy high-quality

teaching resources. Reform of household registration system should be accelerated and regulations over migrant population should be reinforced so that the trailing children can achieve trans-regional education without limits of household registration. The family income gap can be narrowed by a reform on distribution system and the income level of low-income family should endeavor to be improved. It is manifested that the family economic status would have a bearing on family education. The low-income family can provide a better condition for their children's education if their income can be increased.

Secondly, parents should play their part well and create a comfortable and positive atmosphere for their children's to cultivate good learning habits. The priority should be given to in-class learning resources, which can propel a better transcript as long as it is abundant enough. Investment in education is related to not only their economy but also the emotion, and parents' participation and enthusiasm will be a booster for them. By effective supervising children and rethinking the roles played in teaching, parents can create a peaceful environment of family education, so as to improve children's academic achievements.

As a place of imparting knowledge and educating people, schools should not shirk any responsibility to students' study, so they should get a comprehensive understanding of students' family. For those students from disadvantaged backgrounds, such as parents with low educational level, or lack of parents' concern, teachers should give special care to their learning and mentality. They should also be in constant contact with parents who should be aware of their important role in children's education. Only by the strong link between schools and families can the educational level of the disadvantaged family be enhanced. Such school activities for parents, discussion on children's homework, school-home information system on courses and subjects can be taken into consideration. Those from disadvantaged backgrounds need particular care, so one-on-one tutoring is also an option.

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