Correlation Analysis between Household Income and Education Expenditure

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Abstract. Education possesses characteristics of both consumption and investment as a special consumer good, the expenditure of education with consumption characteristics will increase with the improvement of income levels, but education with investment characteristics may turn education into a "necessity," meaning that the improvement of income will not significantly increase the expenditure of education. The paper empirically examines the relationship between household education expenditure and family economic conditions using the data of 2015 Chinese Comprehensive Social Survey. The results of the correlativity show that there is a significant positive correlation between household income level and education expenditure, which means that the higher the household income, the more the investment in education.

Introduction

As a "special" consumer product, education has not only the characteristics of consumption, but also the characteristics of investment. People more tend to use them as investments, looking forward to the revenue returns in the future when they choose to spend for educational products. There is an old saying in China that "Education should be strengthened in spite of the poor economic condition," which shows people’s recognition on education as a particular consumer product, so consumption on this part may not vary significantly according to different family economic conditions. The paper will conduct a research on the relationship between household income and education expenditure in an attempt to explore whether there is a difference between "poor" and "non-poor" households in education which combines "consumption" and "investment."

Literature Review

The influence factors of family education expenditure have been paid much attention by scholars, and there are numerous relevant research results, especially empirical research. The influence of different family characteristics, particularly family income, and family members’ characteristics on education expenditure is basically consistent in most documents.

Wu Qiang (2011) [1] used the sample survey data of residents in Hubei region from 1991 to 2007 to thoroughly analyze and empirically examine the relationship between public finance and education expenditure, and the research shows that education expenditure is a necessity for residents, economic growth can significantly improve education expenditure, and financial investment in public education expenditure has a significant substitution effect on residents’ education expenditure. Li Yawei, Liu Xiaorui (2011) [2] analyzed the impact factors of family education expenditure based on CHNS data in 2006, the study found that family income is an important variable affecting family education expenditure, and the higher the education level of the parents, the more investment in children's education. Zhou Xuehan, Zhang Yu (2013) [3] studied the factors influencing the expenditure of education in high school using the household education expenditure survey data of high school students in Jinan City. It is found that the family economic income does not significantly affect the family education expenditure. What's more, the family economic status, the entrance examination result for senior middle school, and the gender of students all have significant impact on the expenditure of education.
After conducting a questionnaire survey on family education expenditure, Gu Hongwei and Yang Qiuping (2013) [4] found that the expenditure on family education was significantly influenced by family income and parents' expectations through empirical analysis. The higher the household income, the more spending on education; and the higher the parents’ expectation on their children's future education, the more they invest in education. Qian Xiaoxuan, Shi Xiaoxuan and Shi Wei (2015) [5] analyzed the structure of family education expenditure at the stage of compulsory education using survey data from the National Bureau of Statistics in 2007 and 2011, and found that the increase in the cost of education expenditure was mainly manifested in the sharp rise of the cost of non-compulsory education (except for school fees and books). And the proportion of non-compulsory education cost in total education costs increases more significantly in low-income families. Yi Xingjian, Zhang Jiawei, Yang Biyun (2016) [6] used survey data of urban household from six provinces in 2002 and 2009, including Beijing and Liaoning, to study the decisive factors of family education expenditure, the empirical results show that the age of the householder and the expenditure of family education show a U-shaped relationship, girls are likely to achieve more education funds. Training costs are most affected by the disposable income of the family, and the education background of the wife and husband also has a significant impact on education expenditure.

It can be found that the family characteristics, especially family income have significant influence on education expenditure through the summary of the existing literature. The paper will use micro-survey data to empirically test the relationship between household income and education expenditure, thus finding out whether the higher income is, the higher the family education expenditure.

Variable Selection and Descriptive Statistics

Variable Selection and Measurement

The study in this paper needs to choose measurement methods of the main variables "poor family" (describing the family economic status) and "education expenditure." In the past, many documents on the economic conditions of the family used per capita disposable income of household, or per capita income of household for measurement, the scope of measurement is also different relying on the different Statistical caliber for measuring the education expenditure. The annual total education expenditure is generally used; some documents can obtain more detailed education expenditure data, such as compulsory education fees, training fees, teaching materials fees and so on. The paper uses statistical data of urban household survey from the national bureau; the questionnaire divided family education expenditure into teaching materials and education expenses. Teaching materials mainly include textbooks and reference books, educational software and other teaching materials; and education costs mainly include compulsory education fees, non-compulsory school fees, training fees, child-care fees and so on. The paper holds that the school fees for compulsory education is not able to reflect the relationship if the expenditure on education is related to the economic conditions of the family. Since compulsory education is enforced by the State and the amount of cost is set by the State, this part of the cost must be bearded by the family as long as the child received compulsory education, and there is no obvious price difference between different families. In contrast, other expenses deducted from compulsory education fees mainly include child-care costs, training fees, etc., belonging to the costs that families can decide on their own whether to expend and how much they spend according to their economic conditions and other factors, and there may be differences between families in different economic conditions. Therefore, the paper intends to divide the measurement of education expenditure into two parts, which include compulsory education fees and other education expenses deducted from the cost of compulsory education.

Household income is measured in the form of per capita disposable income. In addition, the paper includes other factors affecting family education expenditure such as family members’ education level, child sex status, and the age of the householder into the model based on previous
research literature and survey data. The symbol and measurement method of the related variables is shown in the following Table:

Table 1. Variable Measures and Symbols [7].

| Explained Variable | Measure | Symbol |
|--------------------|---------|--------|
| per capita Education expenditure of Household | Total expenditure on family education Divide by number of students | Ex |
| Expenditure on non-compulsory education per capita | Total expenditure on family education deducted from compulsory education fees Divide by number of students | Fex |

| Explain Variable | Measure | Symbol |
|------------------|---------|--------|
| Household income | Annual income per household | In |

| Control Variable | Measure | Symbol |
|------------------|---------|--------|
| Age of the household | Years of education | Age |
| Level of education of the household | | Edu |
| Student sex | 1 represents all are female, and 0 represents other cases | Sex |
| Highest degree in the family | Years of education | Mdu |

Data Source
The sample is derived from the 2015 China Integrated Social Survey Data (CGSS2015). A total of 4234 samples were eventually used for empirical analysis in this article after delete samples of incomplete indicators.

Descriptive Statistics
Table 2 shows a descriptive analysis of the indicators of the relevant variables, the statistics presented in the table shows that, the difference in per capita spending on household education is not very large, with an average of 7.623 for Ex and a median of 7.921, the average of Fex is 7.383 with a median of 7.843, and the standard deviations are 1.637 and 1.723 respectively. The Variable In of Per capita Household Annual Income is -0.324 in average with a median of 1.076, and a mode of 0.993. The maximum value is 3.674, the minimum value is 0.027, and there is a significant difference in revenue.

Table 2. Descriptive Statistics on Related Variables.

| Variable | Mean | Median | Mode | Standard deviation | Min | Maximum | Observations |
|----------|------|--------|------|--------------------|-----|---------|--------------|
| Ex       | 7.623| 7.921  | 6.267| 1.637              | -0.568| 12.019  | 4234         |
| Fex      | 7.383| 7.843  | 6.015| 1.723              | -0.632| 10.858  | 4234         |
| In       | 1.231| 1.076  | 0.993| 1.313              | 0.027 | 3.674   | 4234         |
| Age      | 3.856| 3.864  | 3.865| 0.381              | 3.358 | 4.510   | 4234         |
| Edu      | 1.818| 1.945  | 1.613| 0.429              | 0.000 | 2.197   | 4234         |
| Sex      | 0.498| 0.125  | 0.012| 0.631              | 0.000 | 1.000   | 4234         |
| Mdu      | 2.715| 2.865  | 2.765| 0.229              | 1.792 | 2.944   | 4234         |

The results of Table 3 show that are a differential test between education expenditure spending for poor and non-poor households, the mean equality test shows that education expenditure (Ex and
Fex) for non-poor households is significantly higher than that of poor households." The mean equality test results are only to compare the correlation between household economic spending and education expenditure preliminary, and other control variables should be added to obtain more accurate correlation and causation in the following text.

Table 3. Differences in Education Expenditure Spending between Poor and Non-poor Households.

| Variable | Poor  | Non-poor | T-value |
|----------|-------|----------|---------|
| Ex       | 7.521 | 7.663    | -4.297  |
| Fex      | 7.334 | 7.602    | -3.996  |
| Sample   | 2351  | 1883     | -       |

Note: *, ** and *** represent the significance level of 10%, 5% and 1% respectively.

The Empirical Test of the Relationship between Household Income and Education Expenditure

Tables 4 and 5 empirically test the correlation between household income and education expenditure using a multi-regression analysis approach, and the F values of the model shows that the significant levels of the two multiple regressions are all relatively good as a whole, which means that the addition of variables in the model are meaningful. The test results of Table 4 shows that the coefficient of In variable is 0.223 and the T value is 5.002, with a coefficient significantly greater than 0, which indicates a significant positive correlation between household income and per capita education expenditure, and the age of the householder Age all shows no significant correlation with household income in the regression analysis of either per capita expenditure on education or non-compulsory education. The level of education of the householder is significantly positively correlated the expenditure on family education, as well as the expenditure on non-compulsory education. The relationship between the variable of child's gender and related education expenditure varied in two regression analysis, and female students seem to receive more educational resources for the per capita non-compulsory education expenditure of household (the estimated result of coefficient is 0.603 with T-value of 2.367, which matches with the conclusion of Zhou Xuehan and Zhang Yu (2013) [8], but the correlation is not statistically supported for the per capita expenditure of household on education. Finally, it shows that the highest education level has a significant positive correlation with both per capita expenditure on education and per capita non-compulsory education expenditure of household.

Table 4. Correlation between Per Capita Expenditure of Household on Education and Household Income.

| Variable       | Coefficient | T-value | P value |
|----------------|-------------|---------|---------|
| In             | 0.223       | 5.002   | 0.000   |
| Age            | -1.314      | -0.296  | 0.262   |
| Edu            | 0.685       | 3.922   | 0.008   |
| Sex            | 0.025       | 1.024   | 0.162   |
| Mdu            | 0.793       | 2.957   | 0.000   |
| Intercepting moment | 4.271   | 6.230   | 0.000   |
| Adjust R²      | 0.074       |         |         |
| F value        | 29.301      |         |         |

Note: *, ** and *** represent the significance level of 10%, 5% and 1% respectively.
Table 5. Correlation between Per Capita Expenditure on Non-compulsory Education of Household and Household Income.

| Variable | Coefficient | T-value | P value |
|----------|-------------|---------|---------|
| In       | 0.009       | 4.274   | 0.000   |
| Age      | -1.113      | -0.807  | 0.401   |
| Edu      | 0.274       | 1.892   | 0.089   |
| Sex      | 0.603       | 2.367   | 0.016   |
| Mdu      | 1.297       | 7.289   | 0.000   |
| Intercept| 4.731       | 3.605   | 0.000   |
| Adjust $R^2$ |          | 0.070   |         |
| F value  |             | 30.296  |         |

Note: *, ** and *** represent the significance level of 10%, 5% and 1% respectively.

Conclusion

The paper empirically tests the relationship between household income and education expenditure using the comprehensive social survey data in 2015, and it is found that there is a significant positive correlation between household income and education expenditure, which is confirmed in both the mean equality test and the multiple regression analysis. The higher the income level of the family, the more expenditure on children's education, the family’s human capital investment in children has a significant positive correlation with income, which is vital for China in the economic transformation, human capital investment is the key factor of high-quality economic development. The government should encourage families to spend more on education and improve the human capital investment of society from the perspective of improving the living standard and income level of the residents.

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