Influences of Government Educational Expenditures on Poverty Alleviation in Rural Areas of China

Jing Ma*

Abstract

This paper examines what role that government educational expenditures played in terms of poverty alleviation in China during 1978-2006. By employing statistical methods – bivariate correlation and multivariate regression, the paper analyzes the relationship between educational expenditures and several indicators of progress in poverty alleviation and living standards improvement. The results show that there is no statistically significant relationship between government educational expenditures and poverty alleviation in China. Many reasons contribute to this conclusion including regional inequality in educational expenditures, lag characteristic of returns to education, mechanization of agriculture and others. This paper does not suggest that government stops investing in education, rather it proposes that the government should focus investments in areas that count towards poverty alleviation.

Introduction

With half of its population living poor according to the International Poverty Line Standard\(^{(1)}\), poverty was a critical issue for China when the country just ended its decade long Cultural Revolution, a political chaos that paralyzed its economy, let alone social development. It was the time when China launched its "Open Door" policy since the beginning of the 1980s that China started its economic reform and led on the right way toward development. Ever since then, China has been investing more and more in areas such as education, agricultural conditions and infrastructure that could benefit the country in the long term. Reducing poverty was one of the major goals that China wanted to achieve at that time.

Over the past decades, China has enjoyed dramatic progress in alleviating its poor population. According to the UN Millennium Development Goals Report 2007, with great effort done in alleviating poverty since 1990, China has reduced the number of people living in poverty from 85 million in 1980 to 26.1 million by the end of 2004, fulfilling the target of halving the proportion of people who live in extreme poverty\(^{(2)}\) (UN 2008).

* (早稲田大学—北京大学ダブルディグリープログラム) 早稲田大学大学院社会科学研究科 博士後期課程 1年
(指導教官 多賀 秀敏)：北京大学国際関係学院 博士 2年
Many factors contribute to reducing poverty. Some of the most influencing factors are economic and social development, education, health improvement and infrastructure construction. However, these factors do not influence independently, rather, they function interdependently. A growing economy will promote social development, which renders a more dynamic and stable society, and people can get more incomes in these society from household operations and other works. Education and health improvement will largely improve labor forces' intellectual and physical conditions, which will contribute to the economic development and income increment in a positive way. Infrastructure construction, in particular transportation, provides people with accesses to better living standards in a way that it becomes much convenient for people and their products to reach out for opportunities to get more money.

In a country where government dominates almost every aspect of its economic and social existence, this success in poverty alleviation in China should be seen as contributed to large amounts of expenditures spent by government. Within these expenditures, education took a noticeable part. The Chinese government has attached much importance to education as it took the point that ”Education Underlies People’s Livelihood.” The government has consistently increased its educational expenditures from 15.6 billion yuan in 1980 to 742.5 billion yuan in 2006. In particular, according to their report, the government highlighted its efforts in promoting education in rural areas since 93.3 percent of the poor in China are rural people (Luo 2008). In 2007, the rural common educational expenditures, which are used to free rural students from paying tuition fees and textbook expenses during the 9-year compulsory education, took up 93 percent of overall common educational expenditures (Li 2005). Moreover, the government has also invested a lot in educational facilities and infrastructures such as building many ”Hope Schools” in remote and poor regions which did not have a primary school before.

However, to what degree government endeavors on education have duly helped with poverty alleviation still remains unclear. This paper aims to conduct an empirical study to answer how deep the role of educational expenditures is regarding China’s poverty alleviation efforts.

Previous Research

Over the past decades, multiples of consistent research has shown that there is evident associations between economic and education variables, and therefore between education and poverty. Educational research has continuously found that socioeconomic status is a critical determinant of educational outcomes (Becker and Luthar 2002; Tilak 2002; Dearing et al. 2001), and economic research has noted that education strongly affects earnings (Deaton 1997; Filmer and Pritchett 1999; Goldin and Katz 1999; Griliches 1970; Orazem et al. 2007).

Education can reduce poverty and improve living standards in several ways. Firstly, more educated people are more likely to get jobs, are more productive, and thus earn more (Jones 2001). The rise in earnings inequality experienced during the 1980s and 1990s in many countries led to renewed interest in estimates of returns to
education (Murphy and Welch 1994). Systematic changes in the production process led to changes in the demand for certain types of labor and education helps labors become more adaptive to the changes and fit the market (Psacharopoulos and Patrinos 2004).

Secondly, although many scholars find no simple causal relationship between educational achievements and the economic growth of a country, recent research yet indicates that quality-oriented education is important for and promotes economic growth. The influence of high and sustained levels of economic growth on a society and on general development can in turn be very large. More and better education is crucial for a poor country to improve its economic growth and therefore generates economic opportunities and incomes (Zhang et al. 2005; Liu 1998; Filmer and Pritchett 1999). An increase in the economic growth rate of developing countries can reduce poverty dramatically, as has recently been seen in countries such as China and India. In this way, better education can translate into sustained growth which can reduce poverty drastically.

Thirdly, education (especially of girls) brings social benefits that improve the situation of the poor, such as lower fertility, improved health care of children and greater participation of women in the labor market (Schultz 1999; Zhang et al. 2007). The benefits of education result in changes in people’s behavior as a consequence of the knowledge gained. It is well known, for instance, that lower fertility is strongly linked to higher female education. Mothers’ education is also an important factor of health care and sanitation in a household. The education of girls has a further strong and very important effect on the role of women in society. It tends to draw more women into the labor market. This increase in female labor force participation expands income-earning opportunities for many households and better utilizes the labor, skills, and talents of women.

Educational investments play a critical role for a country to achieve its social and economical goals. Noble Economics Laureate Theodore Schultz stated the idea of educational capital, an offshoot of the concept of human capital, relating specifically to the investments made in education. Economic growth can be stimulated by improved human capital by putting in educational investments, as Schultz argues that some important increases in national income are a consequence of additions to the stock of educational capital (Schultz 1960). He conducted research about why post-World War II Germany and Japan recovered from depression so expeditiously. In contrast with UK at the same time, he found that the recovery was due to “healthy and highly educated population.” Education makes people more productive than uneducated. The educational investments thus finally turn out an effective avenue to promote the economic growth.

However, in addition to education, poverty alleviation is also associated with a range of other variables such as socioeconomic development level and infrastructure improvement. Low socioeconomic development and insufficient infrastructure will largely keep the poor from opportunities to become better off (Pouliquen 2000; Gilbert and Gugler 1992). By way of comparison, Psacharopoulos and Patrinos (2002) reported average returns on investment in education of 20 percent for Asia, 27 percent for Latin America and the Caribbean, and 38 percent for Sub-Saharan Africa.
This project approaches this research by examining China's national government educational expenditures as a way for the government to build a dynamic relationship between educational attainment and economic development, and thus education and living standards improvement. They are linked by the fact that educational expenditures promotes people's educational level which results in more opportunities to get better off. Surely there are other factors in addition to government expenditures but this paper will only consider China's national government expenditures' influences on people's living standard improvement in rural areas, in the hope of finding out to what degree China's national government educational expenditures for education has helped improve people's living standards in rural areas, compared with other national government expenditures such as ones for agriculture and general public services.

Dependent Variable, Independent Variables and Control Variables

There are many factors have relations with poverty alleviation in China in addition to government educational expenditures, and they always make a difference at the same time. In order to make sure the influence of government educational expenditures, we can classify them to three kinds of variables.

1)  Dependent Variable

The dependent variable is the level of people's living standards in rural areas in China. Economically speaking, living standard is indicated by people's economic performance like per capita annual net income and per capita annual expenditures. Within net income, income from wages and salaries and income from household operations such as agricultural activities are separated. The rapid increase in income from wages and salaries means more and more people are working as nonagricultural workers but not farmers. It requires certain vocational skills, which is largely owed to education. The increase of vocational opportunities can help rural people improve their living standards by earning more income by means of conducting other professions other than agricultural activities. The raw data are measured in Chinese currency yuan. However, in order to have a linear relationship, the data are transformed by logarithm.

2)  Independent Variables

As the paper tries to examine the role of China's national government educational expenditures in changing rural people's living standards, compared with other national government expenditures such as ones on agriculture and general public services, the independent variables are national government educational expenditures, agriculture expenditures and general public services expenditures. Raw data are measured in hundreds of millions of current Chinese yuan. However, the data are transformed by logarithm to have a linear relationship.

3)  Control Variables

*Rural Labor Force*  Maybe it can be expected that rural people will gain more income by working in urban areas other than on farms. Many migrant nonagricultural workers from rural areas increase their incomes faster
than those who still work on farms. Research shows that working in nonagricultural industries will increase family net income by 19 percent while in agricultural sector, it will only increase by 5 percent. If more rural people are shifting to work in nonagricultural industries, their living standard will be greatly improved (Yang and Ran 2007). This variable will be measured by the percentage of rural population in total population.

*Agricultural Production Basic Conditions*  Agricultural technology plays a critical role in agricultural production. If agricultural production conditions are well improved, agricultural production will be increased, which consequently brings more agricultural returns for farmers. So the agricultural production basic conditions cannot be neglected in this research and it will be judged as a control variable. This variable will be measured by the level of agriculture mechanization in agricultural machinery power, and the raw data will be transformed by logarithm to have a linear relationship.

*Cultivated Land*  Most farmers live their life on cultivated land. Without cultivated land, they lose their source to keep their living, let alone improving living standards. Given the rapid urbanization happening in China, more and more farmers lose their cultivated land, and life becomes harder for them. The role of government educational expenditures on poverty alleviation in rural areas will be weakened severely in this instance. So the cultivated land should be considered as a control variable in this research, and this variable will be measured by area of cultivated land.

**Data and Methods**

This research uses data from National Bureau of Statistics of China’s on-line database\(^{(4)}\), the Ministry of Land and Resources of China\(^{(5)}\), and World Banks' World Development Indicators Online\(^{(6)}\). The dataset contains annual data from 1978 to 2008, a consecutive period of 30 years.

In this research, two specific methods will be used. The first one is bivariate correlation analysis, examining how closely those given independent variable are related with the dependent variable. Then is the multivariate regression analysis, examining how much of positive changes in people's living standard in rural area can be explained by each independent variables. An important consideration must be made of the potential for the type of selection effects that often influences the result. That is the reason in the course of conducting multivariate regression analysis, certain control variables are selected to avoid violation of one another among independent variables.

**Results and analysis**

Graph 1 shows that except the income from wages and salaries suffered a drop from 1982 to 1984, the dependent variable was consistently increasing. The independent variables like government educational expenditures, agriculture and public services were consistently increasing at the same time.\(^{(7)}\) The following will conduct correlation and regression analysis to examine the hypothesis whether educational expenditures
contributed most to the growth of dependent variable compared to other government expenditures.

Graph 1. *The increase of government expenditures and rural people's income and expenditures from 1978 to 2006*

Table 1 shows a strong correlation between certain variables. The Pearson correlation between China's national government educational expenditures and per capita net income, income from wages, and per capita expenditures in rural areas are 0.956, 0.900, and 0.953, respectively. It shows a strong statistic correlation between provided variables, which is significant at the 0.01 level, and the relationship between agricultural expenditure and rural income is also a strong statistic correlation at the same time. However, compared to educational and agricultural expenditures, expenditures spent in general public services, as well as area of cultivated land are less significantly correlated with a low Pearson correlation in this model. This might be due to that expenditures spent in general public services are mostly focus on urban areas, and that many rural people are pouring into cities to find jobs, so area of cultivated land becomes a less critical determinant to rural people's income. These situations can then be well explained by high Pearson correlation between rural population reduction, specific expenditures for agriculture and the improvement of agricultural conditions.
Table 1. Correlation between government expenditures, rural population and rural people’s income and expenditures

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>0.956(**)</td>
<td>0.969(**)</td>
<td>0.905(**)</td>
<td>-0.983(***)(1-tailed)</td>
<td>0.772(**)</td>
<td>0.988(**)</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
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<td>30</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows control variables (the logged agricultural power and rural population percentage) have a strong negative statistic correlation which is significant at the 0.01 level. This indicates that the variables will correlate each other when putting them together in the following multivariate regression analysis. In this respect, each control variable will then be employed separately to avoid violation which could affect the result.

Table 2. Correlation between agricultural conditions and rural population

<table>
<thead>
<tr>
<th></th>
<th>Log Agricultural Power</th>
<th>Rural Population (% of total population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>-0.993 (1-tailed)</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>
Table 3 reports the regression analysis of dependent variables with three independent variables – government educational expenditures, agriculture and public services, and the logged agricultural power as control variable. Table 4 reports the regression analysis of dependent variables with three independent variables but using the rural population as a control variable. All the models produce a high value of $R^2$ (ranging above 0.940), which means more than 94 percent of variance in the dependent variable are explained by the models.

The OLS (Ordinary Least Square) analysis produces a result that is in the opposite direction of the hypothesis. The coefficients of educational expenditures are fairly small (ranging from 0.228 to -0.064) and coefficients are not statistically significant in all eight models. So are the other government expenditures, which produce coefficients that are small and not statistically significant at acceptable confidence levels. The influences of government expenditures on the increase of rural people’s income are weakened.

However, control variables like agricultural conditions and rural population have done much better in these models. The effect of agricultural condition improvement produces coefficients that are fairly bigger than what government expenditures do (ranging from 3.804 to 1.692), and the coefficients are statistically significant in all the models except the one of income from wages and salaries. With advanced agricultural conditions in terms of agricultural mechanization, it is much easier for farmers to produce more agricultural products and sell more. In particular, the effect of agricultural conditions improvement has a strong and positive association with rural people’s increasing income from household operations with a big coefficient of 3.804 that is significant at the 0.001 level. So it is true that agricultural conditions play a more direct role in increasing rural people’s income compared with government expenditures in this analysis. On the other hand, the effect of rural population also produces coefficients. Even though these coefficients are fairly small (ranging from -0.230 to – 0.499), but they are statistically significant in all the models expect the one of income from wages and salaries at the 0.001 level. It shows that the bigger the rural population is, the more difficult it is for them to increase their income.
Table 3. OLS analysis with control variable of agricultural condition

<table>
<thead>
<tr>
<th></th>
<th>Log Per Capita Annual Net Income</th>
<th>Log Per Capita Annual Income from Wages and Salaries</th>
<th>Log of Per Capita Annual Income from household operations</th>
<th>Log of Per Capita Annual Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of National Government Expenditure for Education</td>
<td>0.001(0.085)</td>
<td>-0.030(0.150)</td>
<td>0.037(0.138)</td>
<td>-0.064(0.074)</td>
</tr>
<tr>
<td>Log of National Government Expenditure for Agriculture</td>
<td>0.314(165)</td>
<td>1.269(0.290)**</td>
<td>-0.430(0.267)</td>
<td>0.421(0.143)**</td>
</tr>
<tr>
<td>Log of National Government Expenditure for Public Services</td>
<td>-0.269(0.101)</td>
<td>0.089(0.178)</td>
<td>-0.551(0.441)**</td>
<td>-0.372(0.088)**</td>
</tr>
<tr>
<td>Log of Total Agricultural Machinery Power (10000 kw)</td>
<td>1.692(0.273)**</td>
<td>-0.849(0.480)</td>
<td>3.804(0.441)**</td>
<td>1.709(0.237)**</td>
</tr>
<tr>
<td>Constant</td>
<td>-10.730***</td>
<td>6.647</td>
<td>-27.290***</td>
<td>-10.594***</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>R²</td>
<td>0.983</td>
<td>0.949</td>
<td>0.968</td>
<td>0.986</td>
</tr>
</tbody>
</table>

Note: Main entries are unstandardized OLS coefficients, generated using SPSS 13.0. The robust standard errors, which were used to control heteroscedasticity, are in parentheses. *p < 0.05 (two-tailed). **p < 0.01 (two-tailed). ***p < 0.001 (two-tailed).

Table 4. OLS analysis with control variable of rural population

<table>
<thead>
<tr>
<th></th>
<th>Log Per Capita Annual Net Income</th>
<th>Log Per Capita Annual Income from Wages and Salaries</th>
<th>Log of Per Capita Annual Income from household operations</th>
<th>Log of Per Capita Annual Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of National Government Expenditure for Education</td>
<td>0.078(0.085)</td>
<td>-0.092(0.148)</td>
<td>0.228(0.151)</td>
<td>0.018(0.075)</td>
</tr>
<tr>
<td>Log of National Government Expenditure for Agriculture</td>
<td>-0.477(0.259)</td>
<td>1.447(0.465)**</td>
<td>-2.061(0.477)**</td>
<td>-0.344(0.236)</td>
</tr>
<tr>
<td>Log of National Government Expenditure for Public Services</td>
<td>-0.285(0.103)*</td>
<td>0.080(0.185)</td>
<td>-0.575(0.189)**</td>
<td>-0.385(0.094)**</td>
</tr>
<tr>
<td>Rural Population (% of total population)</td>
<td>-0.234(0.039)**</td>
<td>0.078(0.069)</td>
<td>-0.499(0.071)**</td>
<td>-0.230(0.035)**</td>
</tr>
<tr>
<td>Constant</td>
<td>27.425***</td>
<td>-8.184</td>
<td>55.710***</td>
<td>27.282***</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>R²</td>
<td>0.983</td>
<td>0.946</td>
<td>0.957</td>
<td>0.985</td>
</tr>
</tbody>
</table>

Note: Main entries are unstandardized OLS coefficients, generated using SPSS 13.0. The robust standard errors, which were used to control heteroscedasticity, are in parentheses. *p < 0.05 (two-tailed). **p < 0.01 (two-tailed). ***p < 0.001 (two-tailed).

Conclusion

The goal of this research has been to provide some empirical test of the hypothesis that China's poverty alleviation has been greatly contributed by government educational expenditures. The first set of bivariate
correlation analysis suggested some strong and positive correlation between educational expenditures and increase of rural people's income. When the analysis progressed to more sophisticated multivariate regression analysis of the influence of the educational expenditures and other government expenditures, the influence disappeared in a dramatic way when some other control variables are employed.

Overall, this research suggests that perhaps the role of government educational expenditures in helping achieve China’s poverty alleviation goals maybe overestimated. The results did not show a strong influence on the increase of rural people's income from government educational expenditures. Compared to other variables such as agricultural condition improvements and rural population reduction, influences from government expenditures are fairly small.

Returns to education vary with factors such as the level of development, the supply of educated workers, and shifts in the demand for such workers in the development process. It is well known that the demand for more educated labor rises as a country develops (Murphy and Welch 1994). This increase in demand for highly skilled workers requires educational output to adjust accordingly, raising the relative returns to higher levels of education. But education is often poorly measured, and the influences do not always show up as statistically significant in cross area economic growth regressions (Levine and Renelt 1992). More indicators such as the quality and the distribution of education should be involved to explain the role of education in this research other than government expenditures and rural incomes. Also, there is a reciprocal effect when measuring educational expenditures because the investment returns will not be delivered in a short period of time. There is thus a time lag to be expected in the influence of educational expenditures on income increases.

Even though this research has limitations to creditably explain the relationship between education and poverty reduction, it reveals some ideas in understanding the issue in China. The research might indicate that educational expenditures were not equally distributed among urban and rural areas. Otherwise, educational investments should reveal some changes in rural people’s income. This research concludes that there is no noticeable influence on rural people’s income from government educational expenditures, which might indicate that educational resources are not balanced. Also, with huge differences across regions in China in terms of socioeconomic development level and education inequality, it might be reasonable to understand excessive priority is given to urban areas since the educational expenditures works better in urban areas than in rural areas (Liu 1998).

Many rural people who started working in urban areas received vocational training in the factories where they work. These educational investments are not done by government. So the educational expenditures spent by government do not have an influence in this regard which also contributed to increasing rural workers' income. The flexibility of migrant workers from rural areas also makes the issue complicated and untraceable. The data based on rural areas may only cover rural people still residing in rural areas, and exclude those who moved out to urban areas.
Although China has achieved much in reducing its poverty, there is a plenty of work yet to be done. Multiple emphasis should be given to various aspects that could contribute to poverty alleviation and improving people’s living standards. Education definitely plays a role but the quality of the education is the key regardless how much expenditures are spent on education.

Notes
(1) According to the World Bank, the International Poverty Line is the cost of living for each person less than 1.25 U.S. dollars every day, and according to the Chinese government, the Poverty Line is the cost of living each person less than 1300-1400 yuan a year.
(2) According to World Bank, Extreme Poverty is the income of each person can not to meet the lowest needs of food.
(3) “Hope School” is a Chinese word, means new primary schools constructed under the “Hope Project” conducted by the Chinese government in some remote poor rural areas.
(7) The educational expenditures in 2007 is noticeably less than the previous years since the bureau of statistics applied new measurements to estimate expenditures for education. It is expected to grow though.

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