



The impact of education on income inequality and intergenerational mobility



Juan YANG^a, Muyuan QIU^{b,*}

^a School of Economics and Management, Beijing Normal University, 19, Xijiekouwai Dajie, Beijing 100875, China

^b Institute of World Economics and Politics, Chinese Academy of Social Sciences, No.5 Jianguomennei Street, Beijing 100732, China

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ABSTRACT

This paper analyses the effects of innate ability, compulsory education (grades 1–9), and non-compulsory education (grades 10–12 and higher education) on inequality and intergenerational mobility of income, by constructing a four-period overlapping-generation model. We find that innate ability and family investment in early education play important roles in explaining income inequality and intergenerational income mobility. Though children from the wealthiest families are only 1.36 times 'smarter' than those from the poorest, the gap in human capital expands to 2.35 at the end of compulsory education and to 2.89 at the end of non-compulsory education. One important reason for the increase is that poor families invest relatively less in children's early education than do wealthy families; therefore, their children attend lower-quality schools, which results in them being much less likely to participate in higher education. By simulating policy experiments for different types of government education expenditure, we find that direct subsidies to poor parents are the most efficient and effective policy for mitigating poor families' budget constraints with regard to early-education investment in their children.

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1. Introduction

For quite a long time, economists have been more concerned with income inequality than with intergenerational income mobility, because most economic models assume that income inequality is caused by the random assignments of ability and other market factors. However, over the past several years, scholars have found that the assignment of high levels of ability is not a random process but instead determined by parents' inheritance (Plug, 2004; Björklund, Lindahl, & Plug, 2006). Therefore, intergenerational income mobility has become a popular topic, because it affects a country's long-run economic situation and the equality of economic opportunities for the country's citizens. Becker and Tomes (1979) proposed that income distribution should include two components: income inequality between generations (i.e., intergenerational income mobility) and income inequality among families within the same cohort. Combining intergenerational income mobility and income inequality in a model may lead to a better understanding of income distribution.

Many empirical studies have found that China's income inequality has reached a warning level. Li and Lu (2011) showed that the income of the wealthiest 10% of the population was 32.8 times the income of the poorest 10% and the average income in urban areas was 3.87 times the average income in rural areas. In addition, the income gap is still widening (Ravallion & Chen, 2007; Meng, Shen, & Xue, 2013). As a developing country, China has much lower intergenerational income mobility than many developed countries (e.g., Denmark 0.089, Sweden 0.141, UK 0.198, and US 0.357). Using data from Chinese Household Income

* Corresponding author.

E-mail addresses: yangjuan@bnu.edu.cn (J. Yang), qiumuyuan@126.com (M. Qiu).

Project, [Deng, Gustafsson, and Li \(2013\)](#) estimates the urban income precipitancy of father-son pairs is 0.47 in 1995 and 0.53 in 2002. They found that intergenerational income mobility had a declining trend, similar to the findings of [Eriksson and Zhang \(2012\)](#) who used rural data. [Gong, Leigh, and Meng \(2012\)](#) used the UHEE dataset and obtained an even higher persistence by incorporating income fluctuation and life-cycle bias.

This situation may affect economic development or social stability. Therefore, it is urgent for Chinese government to put in place public policies to decrease income inequality and promote intergenerational income mobility. However, designing effective public policy requires that the sources of income inequality and intergenerational income mobility first be determined. Many studies in China have found that the expansion of education plays an important role in explaining income inequality ([Lai, 2004; Bai, 2004](#)); however, they have not considered individuals' heterogeneity and the reasons for intergenerational income mobility. This paper proposes an overlapping-generations model to analyse the effects of innate ability, compulsory education, and non-compulsory education on income inequality and income persistence across generations and explores how to design effective education policy based on the findings from the model.

Specifically, we construct an equilibrium model of income inequality and intergenerational income mobility. Among the factors that determine the equilibrium of the model, innate ability and educational investment play the most important role while other factors such as the tax rate and public education policy can also affect the equilibrium. Another main contribution of our model is as education has been divided into compulsory and non-compulsory stage, we analyse separately the effects of innate ability, compulsory education, and non-compulsory education on income inequality and intergenerational income mobility. By computing early-education investment, senior high school attendance rates, and higher education attendance rates for various income groups, we determine the sources of income inequality. Finally, we examine the effectiveness of different types of public education investment policy in reducing income inequality and increasing intergenerational income mobility.

The rest of the paper is composed as follows: In [Section 2](#), we summarize the literature about the effect of education on income inequality and intergenerational income mobility; [Section 3](#) describes the setting of the benchmark model; we calibrate the parameters of the model in [Section 4](#); analyse the sources of income inequality and income persistence across generations in [Section 5](#); [Section 6](#) conducts an analysis of the model behaviour to some key parameters; [Section 7](#) studies the model implication for different designs of public education expenditure and the conclusions are provided in [Section 8](#).

2. Literature review

Early human capital theory indicates that education may increase income, and thus, educational expansion or increasing public expenditure on education will decrease income inequality and increase intergenerational mobility. However, the empirical evidence shows that educational expansion augments income gaps because the rate of return on higher education is much higher than the rate of return on compulsory education. In addition, when more and more people acquire higher education, the rate of return on higher education still remains at a comparatively high position; in other words, educational expansion does not reduce income inequality ([Mincer, 1974](#)). Consequently many scholars have used different data and methodologies to explain the reasons why increased higher education subsidies or decreased tuition fees (i.e., more equal educational opportunity) will not significantly promote the equal distribution of income.

[Checchi, Ichino, and Rustichini \(1999\)](#) found that family background is an important factor of the performance in the labour market. Under such circumstances, the equal opportunity of higher education will bring many benefits to children from poor families. The explanation by [Hendel, Shapiro, and Willen \(2005\)](#) is similar to signal theory. If high school graduates are able to go to college through acquiring loans, those who do not attend college will indicate one of two potential attributes to potential employers: that they have low levels of ability, or that they have high levels of ability but are from poor families. If budget constraints do not exist; in other words, if all high school graduates can afford to go to college, then only low-ability individuals will not participate in higher education. Because those who do not participate in higher education will not indicate that they have high levels of abilities, employers will squeeze the wages of non-skilled workers and enlarge the wage gap between graduates with higher education and those without higher education. The research by [Sylwester \(2002\)](#) reached different results. Using samples from 50 countries including those from the OECD, East Asia, Latin America and Africa, he found that increased public education expenditures relieved income inequality represented by Gini coefficients. The results are quite robust in different countries. In addition, the effect of reducing income inequality in high income countries is more significant.

Several economists have researched the relationship between education and intergenerational mobility. [Becker and Tomes \(1979\)](#) constructed a basic theoretical model of intergenerational mobility to explain the effect of education on income inequality and intergenerational income mobility. Based on this model, many scholars have used empirical evidence to analyse the relationship between educational expansion (an increase in expenditures on education) and income inequality and intergenerational mobility. For example, [Restuccia and Urrutia \(2004\)](#) estimated the impact of innate ability, compulsory education and higher education on income gaps and income persistence across generations using US data-adjusted parameters. They found that parents' early educational investment could explain approximately 50% of intergenerational mobility, and income inequality was mainly due to higher education. [Solon \(2004\)](#) points out three fundamental institutions determining generational mobility—the family, the labour market and the state by constructing a standard intergenerational mobility model. Families differing in their capacities and resources to invest in their children, results their children have different school achievements. [Nakamura and Murayama \(2011\)](#) demonstrated that income distribution and intergenerational mobility were mainly attributable to the proportion of education costs on income through setting up a model about intergenerational mobility and economic growth.

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