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Does inequality in educational attainment matter for China's economic growth?

Nannan Yu [a,b,*], Bo Yu [a], Martin de Jong [b,c], Servaas Storm [b]

[a] School of Management at Harbin Institute of Technology, China
[b] Faculty of Technology, Policy and Management at Delft University of Technology, the Netherlands
[c] School of International Relations and Public Affairs at Fudan University, China

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ABSTRACT

Using panel cointegration techniques, this paper empirically estimates the long-run effect of inequality in educational attainment on economic growth during the period 1990–2010 in China. We identify a robust non-linear nexus between inequality in educational attainment and economic growth in Chinese provinces and find evidence pointing to differing effects of inequality in educational attainment on growth depending on the level of economic development of an area. Specifically, our results show that the inequality is more relevant for economic performance than educational attainment in the economically less developed Western region. Thus, given limited social resources for education investment, education policies that create more equal distribution of educational resources will promote higher growth, especially in less developed areas.

1. Introduction

China has experienced a remarkable economic growth during its economic reform since 1978, but also a dramatic rise in economic inequality. From the foundation of the PRC to the end of 1980s, inequality across major regions measured by the coefficient of variation of per capita real GDP showed a downward trend, but it went up sharply in the 1990s (Fleisher et al., 2010). China's policy-makers are serious about keeping a balance between economic growth and social equality; as a result relevant public policies aimed to reduce the gap between regions have been enacted for the sake of social stability and sustainable development. One of the important policies is the increasing investment in education as well as notable infrastructure investment in the lagging regions. Proponents of the endogenous growth theory argue that the difference in the average education attainment could affect total factor productivity, which will raise economic growth in the long run through its strong externalities (Romer, 1990; Barro, 1991; Benhabib and Spiegel, 1994). In other words, nations (or regions) with a high level of education attainment may keep a high growth rate for a long period. Thus, education is always considered an essential factor to influence regional disparity. The Chinese government expected the increase in education investment to stimulate productivity growth in the lagging regions. During the period 1998–2010, the average growth rate in education investment was about 20.6% in the Western Region, but only 16.2% and 17.1% in the Eastern and Central Regions (Li, 2013). Since 2008, the average investment in education per capita of the Western Region has exceeded that of the Eastern Region because of the high growth rate for the last decade in the Western Region (NBS, 2009–2012). However, the fact remains that the gap in economic disparity among regions did not narrow in the last decade; it even widened (Fleisher et al., 2010).

It is widely hypothesised that education has a direct impact on the economy through the generation of worker skills and also indirect effects through the facilitation of technology diffusion (Benhabib and Spiegel, 1994; Bils and Peter, 2000; Fleisher et al., 2010), but why was the massive education investment poured into the poor west provinces not helpful to catch up with the coastal areas in China? Indeed, despite significant investment in education in many developing countries, economic development in those countries has not met expectations (Lopez et al., 1999; Castello and Domenech, 2002; Castello, 2010a; Wail et al., 2012), even though theories suggested a strong causal link from education to growth (Romer, 1990; Barro, 1991). One common explanation for this puzzle is that the distribution of education is often neglected in

* Corresponding author at: West Dazhi Street No.92, Harbin, China. Tel.: +33 0619054120.
E-mail addresses: nyuhit@gmail.com (N. Yu), yub@hit.edu.cn (B. Yu), W.M.deJong@tudelft.nl (M. de Jong), S.T.H.Storm@tudelft.nl (. Storm).

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education investment planning and public policies. However, given the amount of investment in education, who gets educated matters a great deal (Lopez et al., 1999). The distribution of educational resources may also explain the regional variance in growth as well as the level of education attainment itself. Education cannot be fully traded on the free market as physical capital, thus the market mechanism cannot guarantee that education investments for different people generate equal marginal returns (Park, 2006). In that case, the aggregate production function depends on the distribution of education (equality in educational attainment) as well as on average educational attainment itself. Here, the increased equality in educational attainment means more equal distribution of education resource-expanding primary, junior secondary, and senior secondary towards much closer to universal enrollment rates as a priority, and not expanding higher education enrollment rates at a rapid pace right at first-and vice versa.

Realizing this, some scholars have tried to explore the link between educational distribution and growth. In empirical studies the relationship between inequality in educational attainment and economic growth was analysed using cross-country data (Castello and Domenech, 2002; Bowman, 2007; Kumar and Kober, 2012); intra-country data (Hassan and Mirza, 2007; Digdowiseiso, 2009; Rodriguez-Pose and Tselios, 2010; Gungor, 2010; Zhang and Kong, 2010) or panel data (Lopez et al., 1999; Park, 2006; Klasen and Lamanna, 2009; Baliamoune-Lutz and McGillivray, 2009; Castello, 2010b). A good empirical literature review on the effects of inequality (including inequality in educational attainment) on economic growth can be found in Neves and Silva (2014). The impression emerging from the initial empirical studies is that inequality is negatively associated with growth (Birdsall and Londono, 1997; Lopez et al., 1999; Thomas et al., 2001; Castello and Domenech, 2002), suggesting a decreasing inequality in educational attainment with a higher economic growth and vice versa. However, this negative inequality-growth nexus argument has been challenged in other studies, suggesting an uncertain relationship between inequality and growth, and even positive association in several developed countries (Rehme, 2007; Rodriguez-Pose and Tselios, 2010; Castello, 2010a). Recent literature also identifies a robust non-linear link between inequality in education and economic development (Gungor, 2010; Wail et al., 2012). To summarise, there is no consensus on the question of whether inequality in education affects growth positively, negatively or at all.

For the case of China, most previous papers have focused on the impact of education attainment level on China's total factor productivity (Fleisher and Chen, 1997; Demurger, 2001; Fleisher et al., 2010; Zhang and Kong, 2010; Zheng and Hao, 2011), but little attention has been devoted to the influence of education distribution on economic growth. Recent empirical studies tried to measure inequality in educational attainment in China using education inequality indicators, but shed no light on the inequality-growth relationship (Qian and Smyth, 2005; Yang and Li, 2007; Cheng, 2009; Yang et al., 2014). In this article, we will examine the long run effect of inequality in educational attainment on China's growth using advanced heterogeneous panel cointegration techniques. The purpose of this paper is to identify whether inequality in educational attainment matters for regional growth in China, and whether this inequality is more relevant for growth than educational endowments. The contribution of this paper resides in a new effort to address the relevance of inequality in education distribution for China's economic performance and regional disparity, which may have important implications for education investment policy. This study also contributes to the methodology by overcoming the endogeneity problem of explainable variables plaguing previous studies on the inequality-growth nexus, since the changes in inequality in educational attainment may be a consequence of economic growth. Our paper tries to deal with this problem by employing panel cointegration techniques, which is a valid methodological technique to estimate a long-run relationship without the requirements of instrumental variables (Stock and Watson, 1993; Pedroni, 2000).

The remainder of this paper proceeds as follows. Section 2 provides a brief review of education development in China and the variance across China's three macro-regions. Section 3 presents the extent of inequality in educational attainment for China's 31 provinces measured by Gini coefficients of education distribution. In Section 4, we explain our methodology, describe our data, and report our empirical results and detailed discussion on long-run relationship between China's inequality in educational attainment and growth. Section 5 concludes and provides policy recommendations.

2. Education development in China and its regions

The Chinese government started to invest heavily in education in the 1950s, providing a nine-year compulsory education. Its social indicators outperformed those of other low-income countries. Chinese people enjoyed better health and education status than their counterparts in low-income countries even before the policy reform (Lopez et al., 1999). Since the economic reform in 1978, especially accelerating after the fiscal reform in 1994, education in China has experienced remarkable changes both quantitatively and qualitatively.

There is evidence for China's fast education development. The illiteracy rate of the Chinese population has dwindled from 33.58% in 1964 to 4.08% in 2010, and the number of people receiving the secondary education per 10^5 persons rose to 38,788 in 2010 from 4680 in 1964 (NBS, 2011). Meanwhile, the number of students enrolled in tertiary school rose steadily since the economic reform and rises dramatically particularly after the 2000s. This is mainly because of an increase in the demand for higher education leading the government to implement an expansion policy for higher education in 1999. The total number of fresh college graduates increased more than six-fold from 960,000 in 2001 to 6.35 million in 2010, at an annual increment of 1 million per year (NBS, 2011). Moreover, the increase in the number of domestic college graduates is only a part of the entire picture. Constant et al. (2011) demonstrate that the numbers of Chinese students studying abroad have also increased dramatically because of the booming economy and the support from the Chinese government. That is to say, China's impressive achievements in education have not been fully appreciated in the scholarly literature (Li and Xing, 2010; Fleisher et al., 2010; Heckman and Yi, 2010).

Along with the rapid economic growth and expansion in higher education, disparity in education among regions in China was also obvious during the last two decades. That is possible since public schools are funded mainly at the local level: rich provinces tend to produce more human capital per capita than poor provinces. Resource constraints differentially affect access to schools for individuals in different segments of Chinese society. Particularly hard hit are children in rural areas and those in the West. Fig. 1 shows the numbers of students enrolled in tertiary school per 10,000 persons in China's three macro-regions. It is obvious that the gap in higher education students between regions has been there since 1990, kept increasing after 2000, but slightly decreased since 2008.

Moreover, the regional disparity in expenditure per pupil at the primary and secondary level (nine-year compulsory education) is also remarkable in China. At the primary level, public expenditure within the budget per pupil in the relatively well developed eastern region is much higher than the ones in the central and western regions, and this gap is gradually expanding since the