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# How and why do Chinese urban students outperform their rural counterparts?



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## ABSTRACT

This paper aims to measure and understand the rural–urban student cognitive ability gap in China. Using the China Education Panel Survey (CEPS) 2013/2014 data, we find that the cognitive ability test scores of urban students are approximately 1.41 points (17%) higher than those of rural students, on average. This difference is equivalent to 37 and 41% of the standard deviation of urban and rural students' test scores, respectively. Instead of the raw test score, when the cognitive ability is estimated with the 3-parameter Logistic item response theory model, the rural–urban gap is somewhat reduced. The regression and Oaxaca–Blinder decomposition analyses show that nearly one-half of the rural–urban gap can be accounted for by differences in observed characteristics, especially number of siblings, parental education, and interaction between parents and teachers. We then discuss the policy implications of these results and propose a few potential ways to reduce the rural–urban gap in students' cognitive abilities.

## 1. Introduction

Since the 1950s, rural–urban education inequality in China has exhibited a U-shaped change. As shown in Fig. 1, we find that the gaps in years of schooling between cities and rural areas, and between cities and towns, are lowest for the 1967 birth cohort (2.56 and 1.15 years, respectively). From the 1968 birth cohort onward, the gaps in years of schooling have continued to rise, reaching a peak for the 1982 birth cohort (3.22 and 1.68 years, respectively).<sup>1</sup>

The widening gap between rural and urban education has received considerable research interest. However, the existing literature mainly focuses on this gap from the perspectives of educational attainment, enrollment, and education funding (Tsang, 1994, 1996; Tsang & Ding, 2005; Hannum & Liu, 2005; Qian & Smyth, 2008; Wu, 2010, 2014; Li & Wu, 2011). Few studies consider this rural–urban gap on the dimension of cognitive ability. Cognitive ability has been found to be an important predictor of educational attainment (see, for example, McClelland, Acock, & Morrison, 2006; Blair & Razza, 2007; McClelland, Acock, Piccinin, Rhea, & Stallings, 2013, etc.), and it is also in turn affected by education (see, for example, Ceci, 1991; McCrea, Mueller, & Parilla, 1999; Burrage et al., 2008; Stine-Morrow et al., 2014; Ritchie, Bates, & Deary, 2015, etc.). Based on these prior studies, on the one hand, cognitive ability, separated from knowledge, is an input in education production and has an important influence on schooling

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<sup>1</sup> This pattern is the same as the graphs in Meng (2012), which plot the average years of schooling of those holding rural and urban hukou and the difference by birth cohort using the 2005 1% Population Survey data. The reduction in the gap from the 1983 birth cohort onward in Fig. 1 might be because rural–urban migration increased suddenly starting with the 1982/1983 cohorts onward. Appendix Fig. B.1 shows the birth cohort distribution of those rural to urban migrants from the 2009 RUMiC data that are in the same age group as those in Fig. 1. It suggests that there was a jump in migration between the 1981 and 1982 birth cohorts.

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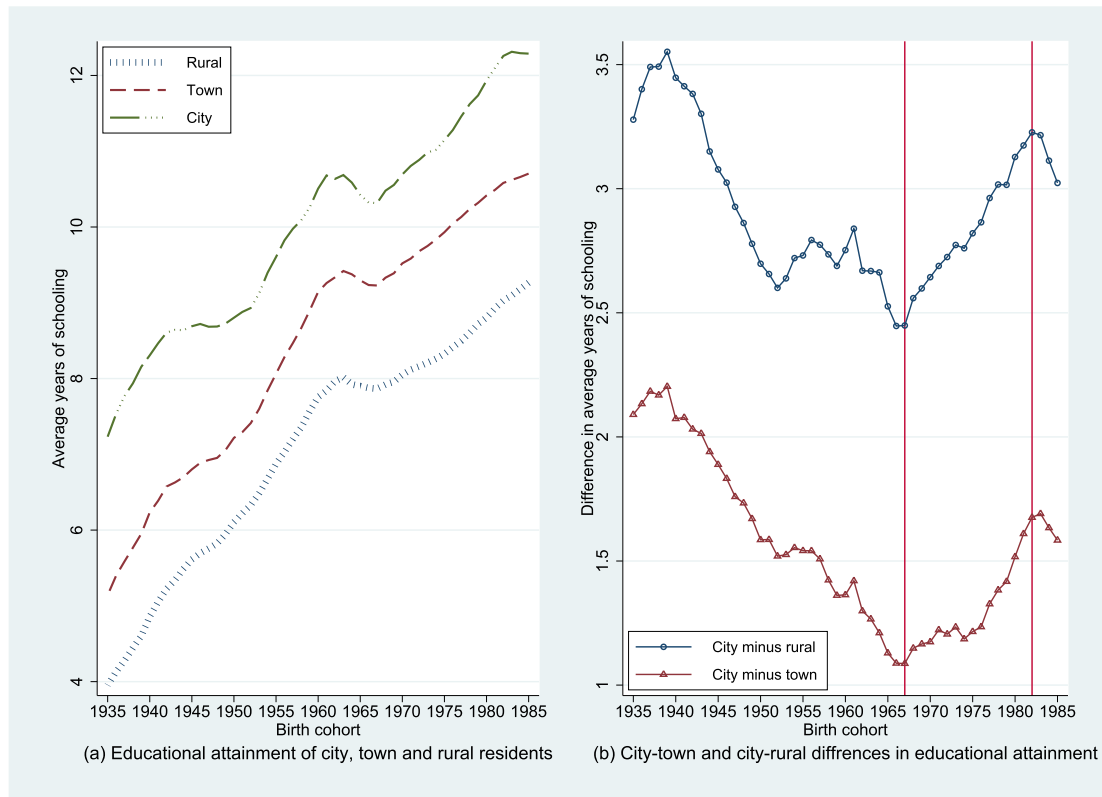


Fig. 1. Educational attainment and the town-city and rural-city differential.

Source: Data source: Tabulation on the 2010 Population Census of the People's Republic of China.

achievement; on the other hand, the specific measure of cognitive ability, usually some test score, should partially depend on the testee's education. Thus, to a certain degree, the cognitive ability both predicts and reflects the testee's education<sup>2</sup>.

In this paper, we attempt to measure the rural–urban inequality in cognitive ability, and quantify the contributions of different factors to the inequality. This work is meaningful and becomes increasingly important for at least three reasons.

First, cognitive ability provides an alternative perspective to understand the rural–urban education gap in China. Education funding is an input of education production; educational attainment and enrollment should be a mixture of input and output because they are determined by the investments of governments and households in education, especially in the elementary and secondary education stages. Because higher and better education resources are always scarce and competitive, these indicators are important but are more related to the length of education and less related to ability/productivity. In contrast, cognitive ability should be more related to the likelihood of winning better education resources in the competition, and also more related to the ability/productivity holding the education level fixed.

Second, the rural–urban gap in cognitive ability will become more profound over time compared to the usual measures of educational attainment. After more than 10 years of expansion in higher education, in 2014, more than 74% of students participating in the National College Entrance Examination (NCEE) were enrolled in a college or university (China Education Online, 2014), and this enrollment rate is expected to continue to rise. At the same time, nine-year compulsory schooling has been universalized, and some regions have attempted or are considering the implementation of 12-year compulsory schooling (e.g., Zhuhai City in Guangdong Province and Wuqi County in Shaanxi Province). Thus, from a long-term point of view, the rural–urban gap in education quantity (e.g., years of schooling) will narrow gradually, while rural–urban differentials in other metrics of educational attainment become clearer, such as admission to elite colleges/universities. This type of disparity is not desirable for social mobility, and it may date back to the cognition development in the periods of the childhood and adolescence.

Third, the human capital of Chinese workers, most of whom received their education in rural schools, has a decisive influence on economic growth through labor productivity. The one-child policy was strictly enforced in urban China, but in rural China, a couple could have the second or even third child if the previous children were girls (Peng, 1991). This discrimination in enforcement of the one-child policy between rural and urban families has led to a situation wherein new entrants into the labor force over the next

<sup>2</sup> Unfortunately, mostly due to data limitation, distinguishing the degree to which the cognitive ability predicts the schooling achievement and the degree to which the specific measure of the cognitive ability reflects the knowledge and skills obtained through education is beyond of the scope of this paper. We appreciate the anonymous referee very much for pointing this out.

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