School starting age and academic achievement: Evidence from China's junior high schools☆

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ABSTRACT

This paper examines the effect of school starting age on the academic achievement of junior high school students using the newly available data from the China Education Panel Survey. Regression discontinuity design estimation based on an exogenous entrance cutoff date indicates that a one-year delay is associated with a 0.303 decrease in standard deviations of cognitive scores. However, this negative effect is caused by human capital accumulation prior to primary school entry.

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1. Introduction

Recently, the question of the optimal age at which a child can join school has generated considerable interest among economists and social scientists. In numerous Western countries, particularly the United States, many parents keep their children out of school even when they are legally eligible to attend because they believe that children who start school later are more physically and mentally mature and thus can do better in school (e.g., Bedard & Dhuey, 2006; Datar, 2006). However, there is no strong causal evidence to support this positive association. In contrast, some studies have found a negative link between age of school entry and education and labor marker outcomes (see a survey by Deming & Dynarski, 2008).

In China, the optimal age at which a child should enter primary school is a widely debated topic. However, unlike Western countries (1), the preprimary education system is not well developed and (2) an early start to primary school is more prevalent in Chinese society. Traditionally, parents have favored an early start as they do not want their children to lose out. Thus, they are more likely to send their children to school early, rather than let them wait an additional year and be part of an older cohort.

Despite being a controversial topic, it is surprising that little research has been conducted on the effect of school starting age (hereafter, SSA) on student outcomes in China. To the best of our knowledge, two previous studies relate to this topic. Liu and Li (2015) examine the relationship between birth months and educational outcomes in middle school. They find indirect evidence

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that show that children born in July and August lag behind more with respect to various outcomes than those born in other months.[1] Chen (2015) estimated the causal impacts of delayed primary school on children's educational outcomes from rural areas in a poor province in Northwestern China. The results suggest that delayed enrollment is negatively associated with middle school enrollment and increases the probabilities of first-grade retention.

However, Liu and Li (2015) could not provide direct evidence of the effect of SSA. More importantly, they could not account for the endogenous entrance age. Although Chen (2015) takes the endogenous problem into account, the results are limited to a special poor rural area in China; therefore, this study also lacks evidence regarding the effect of SSA on the outcomes of children in the population. Moreover, the potential mechanisms between entrance age and educational outcomes were not investigated.

To fill this gap, this paper identifies the causal effect of SSA on cognitive ability test scores by using school entrance cutoff as a quasi-natural experiment to separate the entrance-age effect from other factors, such as parents' decision about the age at which to send their children to school or student ability; as these may be also correlated with student outcomes. We employ a newly available micro data set from the China Education Panel Survey (CEPS), an ongoing nationwide survey of junior high school students. Our regression discontinuity design (RDD) results indicate that a one-year delay is associated with a 0.303 decrease in standard deviation of cognitive scores. Moreover, this result is very robust to numerous specifications. Overall, we do not find any positive association between SSA and test scores.

We further investigate the potential mechanisms between entrance age and cognitive scores. First, heterogeneous results indicate that the negative effects of age of entry are larger and statistically significant for children from rural schools but smaller and statistically insignificant for children from urban schools. Second, we re-estimate the effect of SSA on preschool attendance and find that starting age is negatively associated with the length of preschool participation. Given the lack of preschools in China, these results imply that children with delayed entry are more likely to receive little skills development before they enter primary school. As a result, the late joiners will inevitably experience an academic disadvantage in school.

The remainder of this paper is organized as follows: Section 2 summarizes the existing literature. Section 3 introduces the Compulsory Education Laws and SSA in China. In Section 4, we describe the identification strategy. Section 5 describes data used in this analysis and presents summary statistics by the timing of school entry. Section 6 presents the empirical results. Section 7 discusses the potential mechanisms between SSA and cognitive scores. Section 8 concludes the paper and discusses policy suggestions.

2. Previous studies

In many Western countries, especially the United States, the popular explanation for the optimal age for school entry is that older students benefit academically in subsequent learning because older students acquire greater "readiness" for learning and thus can acquire skills more quickly (see Stipek, 2002). Some studies support this viewpoint such as that by Bedard and Dhuey (2006) who find that children who are relatively older when they enter school have higher test scores in fourth and eighth grade across countries in the Organization for Economic Cooperation and Development (OECD). They use children's predicted school entry age as an instrument for their actual school entry age, thus accounting for the endogenous entrance age. Datar (2006), and McEwan and Shapiro (2008) confirm similar results for the US and Chile, respectively. Note that it is impossible to identify the pure effect of SSA in these studies because of perfect co-linearity between school entrance age and age at test. Therefore, these results should be interpreted as their combined effects.

In addition, some studies suggest that the long-term effects of SSA are very modest. For example, Fertig and Kluve (2005) indicate that there is no effect of age at school entry on educational outcomes both in terms of schooling degree and probability of having to repeat a grade in Germany. Black, Devereux, and Salvanes (2011) also do not find any long-term effects of SSA on education and earnings for boys or girls in Norway. Fredriksson and Ockert (2013) find that school entry age raises educational attainment but has no effect on prime-age earnings in Sweden.

There are also some studies such as that by Elder and Lubotsky (2009) that indicate that older students perform better in school simply because they are older when they take the test (age-at-test effects). Moreover, such effects can fade over time because one year of maturation represents more learning among young children than among adolescents. Black et al. (2011) attempt to distinguish the effects of SSA from pure-age effects by using data for Norway, where at the time of military enrollment, an IQ test is given at age 18. They find that age at the time of taking the test has large positive effects on IQ scores while age at school entry has a small but significant negative effect. They also find that starting school when one is older has a significant negative effect on the probability of teenage pregnancy, but has little effect on educational attainment and long-term earnings.

In sum, there is no strong evidence to support that delayed enrollment meaningfully improves student outcomes. In their study, Dobkin and Ferreira (2010) have found that parents with high socioeconomic status are more likely to postpone their children's school enrollment. This implies that the effect of age of school entry is mainly relevant to families of low socioeconomic status because they are more likely to comply with the law. Obviously, this effect could be significantly different from the average treatment effect for the population.

The study by Elder and Lubotsky (2009) is among the few that explicitly examines the mechanisms regarding the relationship between entrance age and educational outcomes. They find strong age-at-test effects by observing the difference in test scores in

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[1] The enrollment cutoff date is August 31 in China. Therefore, children born in July or August start school at a relatively young age. For further details, see Section 3.