



# Ready for school? Impacts of delayed primary school enrollment on children's educational outcomes in rural China



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## ABSTRACT

This paper estimates the causal impacts of delayed primary school enrollment on children's educational outcomes in rural China. Instrumental variable estimates exploiting the discontinuity in children's enrollment age around the enrollment cut-off date indicate that a one-year delay in school enrollment increases the incidence of first-grade retention by approximately 10 percentage points for boys and reduces the probabilities of middle school enrollment by 6 percentage points for both boys and girls. These results suggest that delayed enrollment, even if it may be an optimal choice made by poor parents in response to financial constraints, is likely to be harmful to children's educational development in rural China.

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## 1. Introduction

Almost all countries specify an appropriate age for primary school enrollment (UNESCO, 2007). However, does it matter when a child is enrolled in formal education? Standard human capital theory (Becker, 1993) suggests that it is optimal to enroll a child in school as early as possible, when the opportunity cost of the child's time is the lowest. Enrolling a child in school earlier also implies that this child can recoup returns to educational investments in the future labor market over a longer horizon and thus enjoy higher lifetime earnings. Evidence from psychological studies also suggests that children can benefit from early school enrollment because the sensitivity of brain development related to cognitive skills declines sharply with age after the age of 5–6 (Shonkoff and Phillips, 2000). However, parents in low-income countries may decide to enroll their children later in response to child health problems, such as malnutrition and stunting (Glewwe and Jacoby, 1995). Parents in low-income countries may also need more time to accumulate sufficient resources to finance their children's education – to purchase basic educational inputs, pay for tuition and school fees, and perhaps purchase private tutoring services (Nonoyama-Tarumi et al., 2010). As a result, delayed primary

school enrollment is commonly observed in low-income countries (Glewwe and Jacoby, 1995; Wils, 2004).<sup>1</sup>

A series of questions naturally arise from observing this phenomenon. How does delayed primary school enrollment affect children's educational attainment in low-income countries? Is the impact of delayed enrollment beneficial because when starting school at an older age children are more "ready" for formal education? Or, is it harmful because children starting school at an older age might have missed the psychologically optimal timing for starting formal education, especially when preprimary education is not easily accessible for the accumulation of schooling readiness? Given the important role cognitive skills play in economic development (Hanushek and Woessmann, 2008),<sup>2</sup> answers to these questions are crucial for informing policy. Unfortunately, not much is known in this regard in low-income settings because relatively few studies have been conducted in low-income economies. Studies focused on rural China, where delayed enrollment is common, are essentially non-existent.<sup>3</sup>

<sup>1</sup> A particular group of children in China that suffer from delayed school enrollment are the children of migrant workers. See Liang and Chen (2007) for a discussion on the schooling opportunities for migrant children in China.

<sup>2</sup> Hanushek and Woessmann (2008) show that cognitive skills account for most of the differences in economic growth rates across OECD countries.

<sup>3</sup> Recent studies in developed countries suggest that, controlling for endogeneity in school enrollment age, children starting school older perform better on in-school tests. See Section 2 for more details.

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To fill this gap, this paper analyzes data collected in 2000 and 2004 from rural areas in a poor province in Northwestern China. The study area, Gansu Province, is among the poorest provinces in China. The GDP per capita in Gansu was 5946 Yuan ( $\approx$ \$719) in 2004, only slightly higher than one half of the national GDP per capita (10,502 Yuan,  $\approx$ \$1270) (National Bureau of Statistics, 2005). According to the World Bank (2001), 23% of the rural population in Gansu was characterized as being poor, approximately four times the figure for China as a whole (6.5%). Despite considerable efforts undertaken by the central government to develop Western China, investments in children's human capital have been behind schedule in Gansu. Gansu had not achieved universal completion of nine years of compulsory education for school age children by 2004, a goal set by the Compulsory Education Law of 1994.<sup>4</sup> Even among those children who completed their compulsory education, many have dropped out before graduating from high school (Zhao and Glewwe, 2010). Delayed school enrollment is also common in rural Gansu. The data used in this paper indicate that more than 30% of children in rural Gansu did not start their primary education until the age of 8. The interplay of poverty, the lack of investments in children's education, and the high prevalence of delayed enrollment renders rural Gansu a suitable area for studying the impacts of delayed school enrollment in a low-income setting.

Using data from the Gansu Survey of Children and Families (GSCF), we examine four educational outcomes for a sample of 2000 children aged 9–12 in the year 2000 in rural Gansu: the incidences of first-grade retention, ever having repeated a grade, primary school completion, and middle school enrollment. Grade repetition is of interest because it is commonly observed among primary school students in developing countries (Glewwe and Kremer, 2006) and in rural China as well (Brown and Park, 2002). Examining this outcome can provide useful information for policy making in countries with both high prevalence of delayed school enrollment and high prevalence of grade repetition. First-grade retention is of particular interest. Since this variable is observed only eight to nine months after primary school enrollment, by which time the impact of schooling is relatively small, the impact of delayed enrollment on the variable mostly captures children's "readiness" for starting formal education.

Delayed school enrollment is also likely to reduce the probabilities of primary school completion and middle school enrollment in low-income countries, where markets for child labor are active, because the opportunity cost of children's time spent in school increases with their age in such a context. Some children would be old enough to legally work for wages near the end of their primary education if delayed school enrollment caused them to repeat one or more grades, thereby generating a strong incentive for them to leave school. Thus, the link between delayed enrollment and these two outcomes has important implications on labor market regulations in developing countries.

The major difficulty encountered in estimating the causal impacts of delayed school enrollment on children's educational outcomes is the potential endogeneity in children's school enrollment age. If rural parents choose to hold back their children based on factors unobserved to the researcher (e.g. health status), simple comparisons of educational outcomes of children with different school enrollment ages (e.g. using ordinary least-squares techniques) could be misleading because such comparisons are likely to reflect effects of these unobserved factors. To circumvent this problem, we exploit a source of exogenous variation in children's enrollment age generated by China's school enrollment

rules. China's Compulsory Education Law requires children who would have reached their 6th birthday by the enrollment date to be enrolled in primary school.<sup>5</sup> Because academic years in China uniformly start in September, children turning age 6 in September or in later months in a given year will be enrolled in the next calendar year. Thus, September-born children will be almost one year older than their August-born classmates upon enrollment, which creates a discrete jump in children's enrollment age around the enrollment cut-off. We exploit such a jump to create instrumental variables (IV) for children's school enrollment age to achieve identification.

Our IV estimates indicate that delayed primary school enrollment has a harmful impact on children's educational outcomes in rural Gansu. More specifically, for boys (but not for girls), a one-year delay in primary school enrollment increases the incidence of first-grade retention and the incidence of ever repeating a grade by 10 and 15 percentage points, respectively. The statistically significant, harmful impacts of delayed school enrollment we find for boys are at odds with the common findings in previous studies conducted in the developed world, which tend to suggest a beneficial impact of delayed enrollment. This contrast is likely to be explained by the lack of access to preprimary education,<sup>6</sup> as well as the low level of parental education (four years of maternal education and six years of paternal education) in rural China,<sup>7</sup> which make primary schools the most important, if not the only, place for children to efficiently develop their cognitive skills. In such a context, being delayed in primary school enrollment may lead children to receive much less mental stimulation in promoting cognitive development than they would have received in the absence of delayed enrollment.

We also found that delayed primary school enrollment reduces children's probabilities of primary school completion and middle school enrollment by 5 percentage points. This effect is likely to be a pure age effect, since there are no primary school exit tests or middle school entry tests and thus children's cognitive skills do not play a key role in determining these two outcomes. Given the findings for grade retention, compared to children who started primary school on time, children who started primary school at age 8 or 9 are more likely to be held back. Thus when these (older) children were about to complete primary school, they would be 15–16 years old, old enough to legally work as wage earners, which substantially raises the opportunity cost of their time spent in school.

The rest of this paper proceeds as follows. The next section reviews the recent literature. Section 3 presents the analytical framework employed and discusses several important methodological issues. Section 4 describes the data and key variables used in the analysis. Section 5 presents and discusses the main results. The final section concludes.

## 2. Relevant literature

### 2.1. Studies in developed countries

Though numerous studies have been conducted in developed countries to examine the impacts of delayed primary school

<sup>4</sup> In 2002, the completion rate of compulsory education in Gansu was approximately 55.4%, only higher than Tibet (41.2%), Ningxia (49.8%), Qinghai (53.9%) and Hainan (54.8%) among all provinces in mainland China in the same year (Shen and Wang, 2003).

<sup>5</sup> In areas that have difficulty in enrolling all children aged 6 in school, children can be enrolled in school when they have reached 7 years old. This is the case in Gansu, where primary school age is defined as 7–12 years old; see <http://www.jyxjyj.com/Article/ShowArticle.asp?ArticleID=182> (accessed 05.04.12).

<sup>6</sup> A recent World Bank report (Wu et al., 2012) indicates that the number of rural kindergartens fell from 130,030 in 1986 to 71,588 in 2010. In 2009, only one third of rural children in China had access to preprimary education, and for those who attended preprimary education, most of them attended only one year of kindergarten.

<sup>7</sup> Chen (2012) found that the very low level of mothers' education in rural Gansu masks its potentially positive impact on children's academic skills.

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