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# The long-run impacts of early childhood education: Evidence from a failed policy experiment<sup>☆</sup>

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## ABSTRACT

We investigate short and long-term effects of early childhood education using variation created by a policy experiment in British Columbia, Canada. Our findings imply being in kindergarten longer increases the probability of repeating the third grade, and decreases tenth grade math and reading scores. Effects are highest for low income students and males. Estimates suggest that more time in kindergarten may have a detrimental effect on future outcomes.

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## 1. Introduction

Early childhood programmes are an important part of intellectual development, as they allow children to build a solid learning base, accumulate human capital at a higher rate in the future, and therefore perform better in school and in the labour market. The benefits may be especially important for disadvantaged children, since the early skill gap between them and their more advantaged peers can appear early and persist through time (Cunha, Heckman, & Lochner, 2006, chap. 12). Using early childhood programmes to close early skill gaps will help to prevent future skill gaps from forming. There are many empirical analyses of small scale early interventions like the Perry

Pre-School experiment, and larger ones like Head Start, that support these ideas by showing positive impacts on a variety of short and long term outcomes. On the other hand, fewer researchers have examined the effect of universal programmes like kindergarten or pre-kindergarten (pre-k). Kindergarten is arguably the most widespread early childhood education programme, and is continuing to expand. For example, in the U.S. the availability of kindergarten expanded rapidly across the country in the 1960s and 1970s. More recently, several states have launched universal pre-k programmes. In Canada, Ontario and British Columbia (BC) moved from half day to full day kindergarten in 2010, while similar expansions are being considered in other provinces.

This paper examines the effects of a quick sequence of policy changes in BC that had the unintended effect of altering the length of time students spent in kindergarten. In the 1990–1991 school year, BC mandated a new school entry scheme called “dual entry,” whereby students entered school at two different points in the school year, rather than the traditional single entry system. Under dual entry, students whose birthdays fell between May and

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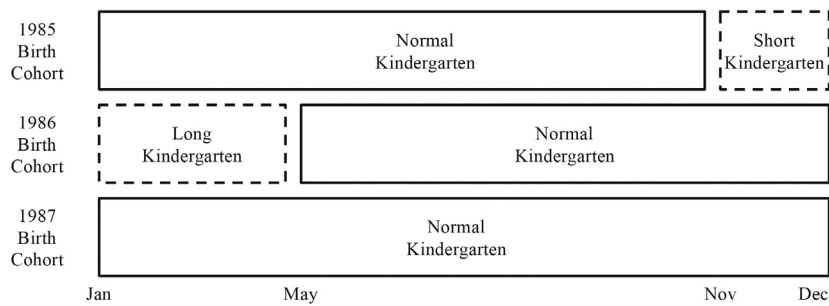


Fig. 1. Effect of dual entry on kindergarten length by birth cohort.

October would enter in September and those whose birthdays fell between November and May would enter in January. The first affected cohort – students born between May, 1985 and April, 1986 – entered under these rules, but by the end of that school year the government unexpectedly terminated the programme. This left all students who entered in January with only 6 months of kindergarten completed. To unwind the programme, financial support was provided for November–December born children to move to first grade at the start of the next school year, but not for January–April students. The end effect was that students born between November and December, 1985 were in kindergarten for as little as 6 months, while those born between January and April, 1986 were in kindergarten for as many as 16 months. Other students stayed in kindergarten for the normal 10 months. The effect of mandating, then quickly repealing, dual entry on expected length in kindergarten is summarized in Fig. 1. Students born at the end of 1985 get short kindergarten, those born at the beginning of 1986 get long kindergarten, and all others get normal kindergarten.

We estimate the impact of both short and long kindergarten on the probability of grade repetition at age nine and fifteen, and on tenth grade math and reading scores, using a difference-in-differences approach. The estimator compares differences in outcomes of short and long kindergarten cohorts and unaffected adjacent cohorts within a policy year to differences between similar cohorts in non-policy years. We find that long kindergarten increases the probability of repeating a grade by up to 2.3 percentage points by age nine, and by up to 2.8 percentage points by age fifteen. We also find that long kindergarten worsens tenth grade reading scores by up to 6.7% of a standard deviations. We find no significant effect of long kindergarten on math scores, and no effect of short kindergarten on any outcomes. The size of the long kindergarten effects is largest for students in the lowest household income quartiles, and for males.

Taken at face value, the estimates imply that spending more time in kindergarten is harmful to student performance. There are several possible explanations for the negative estimated effects. First, all else equal, increasing the length of kindergarten necessarily involves entering school earlier or leaving school later. In our experiment, long kindergarten students spend more time in school by virtue of entering earlier. One explanation for our result is therefore that the negative effect of entering school earlier

outweighs any positive impacts of longer kindergarten. In the absence of entry age effects, our results are also explained by considering the counterfactual to spending more time in the school system. Without long kindergarten, some children would stay at home, and others would enroll in day care. If these alternative uses of time are better for student outcomes than kindergarten, it would support the effects we observe. In support of this explanation, our results are consistent with some studies in the child care literature, which show that preschool care can negatively impact on a variety of child outcomes.<sup>1</sup>

While our results are generated from a fairly specific policy experiment that did not originally intend to alter kindergarten length, we believe they are useful in at least two ways. First, the variation created by this policy experiment approximates the effect of introducing a universal pre-k programme where one did not previously exist (i.e. increasing kindergarten length, and reducing entry age). Thus we can generalize our estimates beyond the context of BC to help inform other jurisdictions of the possible impacts of introducing universal pre-k. This is important because much of the evidence on early childhood programmes is drawn from more targeted experiments (e.g. Head Start), so in spite of the relatively unique nature of the BC policy, we add to the literature by providing estimates on the impact of a more universal programme. The estimates are also useful as an interesting case study. In unwinding the dual entry policy, the government likely did not fully anticipate the impact their actions would have on students who were held back or moved ahead. The results show a long term effect of the government action on the affected students.

## 2. Existing literature

Most of the available evidence on the introduction of kindergarten or pre-k shows positive effects on student outcomes. In Tulsa, Oklahoma, a comparison of students of a similar age who are just about to start pre-k to students who just finished shows that pre-k finishers had improved test scores by 0.24–0.39 standard deviations ( $\sigma$ ) (Gormley and Gayer, 2005). The introduction of universal pre-k in Georgia increased student test scores by 0.12 $\sigma$ , and

<sup>1</sup> See Baker et al. (2008), Lefebvre et al. (2011), Herbst and Tekin (2010), and Magnuson et al. (2007) for examples.

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