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The impact of universal prekindergarten on family behavior and child outcomes

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ABSTRACT

We measure the impact of universal prekindergarten for four-year-olds by exploiting a natural experiment in which the Australian state of Queensland eliminated its public prekindergarten program in 2007. Using a difference-in-differences strategy, we find that five months of access to universal prekindergarten leads to an increase of 0.23 standard deviations in general school readiness. Cognitive benefits are evident across socioeconomic status, while behavioral improvements of 0.19 standard deviations are restricted to girls. Our evidence suggests that the positive effects of universal prekindergarten provision on children's development are driven by the use of higher-quality formal early education and care.

1. Introduction

Access to universal center-based early education and care has become increasingly common in recent decades. Many countries including France, Germany, Italy, Norway, Belgium, Denmark, Spain, Iceland, the United Kingdom, Japan, and Mexico have achieved over 95% enrollment among four-year-olds. In contrast, enrollment is relatively low in Australia and the United States. In 2010, just over one-half of Australian four-year-olds and two-thirds of those in the U.S. attended prekindergarten (OECD, 2014). However, in the 21st century momentum has grown for increasing prekindergarten access in both countries, with Australia requiring universal provision in all states and territories by 2013 (Dowling & O'Malley, 2009) and 42 U.S. states offering public programs for four-year-olds (Barnett et al., 2016).

Proponents argue that universal prekindergarten can benefit children of all backgrounds. Early childhood education can be used to equalize differences in initial endowments among children. Low-income parents provide less enriching home learning environments than their higher-income peers on average (Hart & Risley, 1995), and high-quality early education and care can help promote disadvantaged children's school readiness and later-life success (Carneiro & Heckman, 2003; Shonkoff & Phillips, 2000). Universal prekindergarten might better serve children from disadvantaged backgrounds than targeted programs by reaching more low-income children and exposing them to a heterogeneous set of peers (Barnett, Brown, & Shore, 2004). Furthermore, prekindergarten enrollment statistics reveal a U-shaped distribution, with the lowest participation rates among children from middle-class families (Barnett & Yarosz, 2007). Many of these children enter kindergarten unprepared (Barnett, 2007), highlighting the need for broader access to public prekindergarten.

Universal programs in the U.S. and abroad have yielded substantial benefits to children's cognitive and socioemotional development, executive functioning, and academic achievement (Cascio & Schanzenbach, 2013; Dumas & Lefranc, 2012; Fitzpatrick, 2008; Gormley, Gayer, Phillips, & Dawson, 2005; Havnes & Mogstad, 2015; Weiland & Yoshikawa, 2013). Although evaluations of universal programs generally find positive impacts *on average*, evidence of benefits across the income distribution is still inconclusive. Children from all socioeconomic backgrounds benefit from Tulsa, Oklahoma's universal program for four-year-olds (Gormley et al., 2005). However, other studies find that relatively disadvantaged children derive most (if not all) of the gains from universal provision (Cascio & Schanzenbach, 2013; Dumas & Lefranc, 2012; Fitzpatrick, 2008; Havnes & Mogstad, 2015; Weiland & Yoshikawa, 2013).

The present study takes up the question of whether public investment in early childhood education is best targeted towards socioeconomically disadvantaged children. In order to align itself with a newly instituted national curriculum, the large Australian state of Queensland eliminated its public provision of prekindergarten for four-year-olds in 2007, funding instead a kindergarten,

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or "Preparatory," year of schooling for five-year-olds. The policy change was associated with dramatic changes in families' child care decisions. We capitalize on this natural experiment in Queensland to estimate the causal impact of access to universal prekindergarten on four-year-old children's cognitive and non-cognitive outcomes and consider heterogeneity in treatment effects by socioeconomic status to determine whether universal prekindergarten might benefit low- and middle-income children alike.

Using a difference-in-differences approach that compares changes in state-level measures of child development in Queensland before and after the 2007 policy change to changes over the same period in the rest of Australia (the comparison group), and controlling for a range of individual-level covariates, we find that universal prekindergarten leads to improvements in children's school readiness. Our results suggest that prekindergarten also improves girls' behavior, which is not the case for boys. Separating children by maternal education—a proxy for relative advantage or disadvantage that might affect financial resources and the home learning environment—we find that all children receive benefits. The positive effects of universal prekindergarten provision appear to be driven by the use of higher-quality formal early education and care, with some indication of increased maternal employment.

Our study makes several contributions to the existing evidence base. We draw on rich, longitudinal data, including child time diary data, to examine key mechanisms giving rise to the impacts of universal prekindergarten. Universal prekindergarten is generally found to be associated with only a modest increase in maternal employment (Bauernschuster & Schlotter, 2015; Havnes & Mogstad, 2015). The limited research on consequent family processes such as parent-child relationship quality also shows little impact (Baker, Gruber, & Milligan, 2008; Cascio & Schanzenbach, 2013). We go even further by directly examining universal prekindergarten quality, on which there is little evidence.

Difference-in-difference estimation is often used to evaluate universal programs, comparing trends in areas where universal prekindergarten has been introduced to trends in areas without universal provision, but inference in this context may be misleading (Bertrand, Duflo, & Mullainathan, 2004; Cameron & Miller, 2015; Conley & Taber, 2011). To the best of our knowledge, there is no method of inference that fully accounts for clustering in the error terms in a setting with few clusters and a low proportion of treated clusters, but we take several measures to assure that our results are robust. Specifically, we present results that cluster at the postcode level as a lower bound of the true p-value and use wild cluster bootstrap-t-based inference to find an upper bound, as these strategies are known to over- and under-reject, respectively. We also apply more conservative methods of inference, including a two-step method and stepdown p-values that account for multiple hypothesis testing. Our results for school readiness hold even under these conservative methods.

Lastly, our study investigates a policy change that *eliminated* public prekindergarten provision, whereas most studies in the existing literature investigate the *introduction* of such policies. We can therefore examine whether the effects of an implicit child care subsidy are symmetric. That is, we can assess whether the removal of a policy has the opposite effect of an introduction, with important implications in an era of government austerity.

We begin by describing the policy setting in Australia, and in the state of Queensland in particular, in Section 2. Section 3 describes our data and analytic sample. Next, we outline our empirical strategy in Section 4. Section 5 presents findings of the impact of universal prekindergarten provision on children's cognitive and non-cognitive development and investigates potential mechanisms giving rise to these effects. We also provide evidence of the validity of our approach. Section 6 concludes with a discussion of the study's implications.

2. Background

2.1. Universal prekindergarten in Australia

Our study takes place in Australia, where early childhood education has traditionally been highly fragmented across states and localities. Between 1986 and 2007, the states and territories were the sole funders and providers of prekindergarten education, with the exception of Commonwealth funding for indigenous children's schooling (Australian Education Union, 2007; Walker, 2004), which amounted to only 0.7% of total prekindergarten spending during the 2006-07 school year. Enrollment rates varied greatly by state, from a low of 65% among four-year-olds in New South Wales to nearly 100% in Western Australia, Queensland, and Tasmania in 2006 (Parliament of Australia, Parliamentary Library, 2008).

The system of early childhood education in Australia has been reformed in recent years, and is now characterized by better coordination across states and more Commonwealth involvement. A National Quality Standard for early education and care took effect in 2012 (Guide to the National Quality Standard. Australian Children's Education & Care Quality Authority. September 2013). Each state government also pledged to offer voluntary, universal prekindergarten education to four-year-olds by 2013 with a goal of 95% enrollment (Dowling & O'Malley, 2009), and the federal government agreed to contribute nearly one billion AUD to the states for the implementation of universal programs (Parliament of Australia, Parliamentary Library, 2008).

2.2. Policy change

Prior to 2007, prekindergarten was available to four-year-olds in all states, and formal schooling in most of Australia began with a voluntary kindergarten (or "Preparatory") year at age five, followed by compulsory schooling at age six. The sole exception was the state of Queensland, which did not offer a Preparatory year, such that formal schooling consisted of only Years 1 through 12. In addition, compulsory education began at age five (Dowling & O'Malley, 2009). As part of a reform process that attempted both to standardize prekindergarten education across the country and enact a national K-12 curriculum, the states agreed to a uniform age of compulsory school entry of six years old beginning in the 2007–08 school year, a requirement that affected only the state of Queensland, as the other states and territories were already in compliance. Queensland made two significant changes in order to comply with the federal policy. First, it instituted a voluntary, full-time Preparatory Year for five-year-olds, increasing the school-entry age for formal schooling by six months, and pushing back Years 1–12. Second, in order to fund its new Preparatory Year, Queensland cut its public provision of prekindergarten for four-year-olds. Queensland's prekindergarten services were then nearly universally managed by the non-profit Creche & Kindergarten Association with some government funding (Hard & O'Gorman, 2007; Walker, 2004).

Before the 2007 policy change, more than one-half of Queensland's prekindergarten programs were managed by the government, while immediately afterwards only 7% of prekindergarten programs were government-run (Dowling & O'Malley, 2009). Correspondingly, enrollment among four-year-olds in publicly provided or funded prekindergarten dropped from approximately 100 to 26% between the 2006 and 2007 school years (Australian Government, Productivity Commission, 2009).[1] The state-level funding cut was associated with a large drop not only in public prekinder-

[1] Enrollment in public prekindergarten and public management were not entirely eliminated immediately. This fact may be due to the phasing-in process that was used to terminate prekindergarten provision and initiate the Preparatory Year's introduction.