

# The Effects of Texas's Targeted Pre-Kindergarten Program on Academic Performance

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# Disclaimer

“The conclusions of this research do not necessarily reflect the opinions or official position of the Texas Education Agency, the Texas Higher Education Coordinating Board, or the State of Texas.”

# The Outline



- Introduction



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# The Potential Promise of Early Investment



A number of recent papers strongly suggest that early investments in children are an effective means of reducing gaps in academic performance between disadvantaged children and their more advantaged counterparts.



## Previous Research: Model Programs

- Heckman and Masterov (2007), Heckman et al (2010)
- Anderson (2008)

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While there is much to recommend both the Perry Preschool Program and the Carolina Abecedarian Project, the two aspects of these programs that make them straightforward to study also limit the policy relevance of the results from the research on the programs.

- While, random assignment bolsters internal validity, it does not make the results generalizable. The Perry Preschool Program and the Carolina Abecedarian projects started with small samples—123 children and 111 infants, respectively—of disadvantaged children.
- The treatment that the model programs offered are more intensive than the interventions offered by other early intervention programs.

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## Moderate Programs: Head Start

- Currie and Thomas (1995), Deming (2009) Data Source: National Longitudinal Mother-Child Supplement
- Garces, Thomas, and Currie (2002) Data Source: Panel Study of Income Dynamics
- Currie and Thomas (1999) Data Source: National Longitudinal Mother-Child Supplement
- Puma et al (2010), Head Start Impact Study

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- Texas began offering pre-k during the 1985–1986 academic year.
- The purpose of state-sponsored pre-k in Texas is to bolster the academic performance of at risk children.
- The risk factors include the following: free or reduced-price lunch eligibility, Limited English Proficiency, homelessness or unstable housing, foster care participation, or parents who are on active military duty or who have been injured or killed on duty.
- During the 2008–2009 academic year, Texas's pre-k program provided services for 5 percent of 3-year old children and 45 percent of 4-year old children, a total that exceeds 200,000 children, while Head start accounted for 8 percent of 3-year old children and 9 percent of 4-year old children.

# The Questions

- What are the effects of Targeted Pre-K on mathematics and reading performance?
- Do the effects of Targeted Pre-K vary with facility with English language?
- What is the impact of Targeted Pre-K on the likelihood of being retained and the probability that a student receives special education services?

# Preview of Results

- We find that Pre-K participation increases math and reading test scores.
- We find that participation decreases both the likelihood of retention and the likelihood of being designated to receive special education services.

- Texas School Project Micropanel: TSMP is a multi-year panel database composed of administrative data from the TEA (Texas Education Agency) which includes information about student enrollment, staff characteristics and TAAS scores
- Common Core of Data (U.S. Department of Education): 1993-4 survey data, collected by the National Center for Education Statistics, was used to link school district locale codes (urban, rural, suburban) to data from the TSP
- The Dependent Variables include the following: 3<sup>rd</sup> grade TAAS Reading and Math scores, an indicator that assumes a value of one if a student is retained, and an indicator variable that assumes a value of one if a student is designated to receive special education services.

# Descriptive

- 5 cohorts based on statewide kindergarten enrollment 1994–1998
- 682,749 students in total
- 57% attended state-funded pre-K
- 75% economically disadvantage
- 5% Limited English proficient
- 25% Both



# Estimating Equations

When we examine the impact of Targeted Pre-K, we estimate variants of the following models of the following form:

$$Y_{icj} = \alpha + \beta_1 D_{PK} + \beta_2 D_{PK \times LEP} + \beta_3 D_{PK \times Both} + \beta_4' X_{ijc} + \gamma_c + \gamma_j + \varepsilon_{icj}$$

where  $Y_{icj}$  represents the standardized TAAS scores of student  $i$  in cohort  $c$  from district  $j$ .

# Estimating Equations

When we examine the impact of Targeted Pre-K on the likelihood of being retained or the likelihood of receiving special education services, we estimate both linear probability models and logit models of the following forms:

$$P_{icj} = \alpha + \beta_1 D_{PK} + \beta_2 D_{PK \times LEP} + \beta_3 D_{PK \times Both} + \beta_4' X_{ijc} + \gamma_c + \gamma_j + \varepsilon_{icj}$$

$$P_{icj} = \frac{e^{\alpha + \beta_1 D_{PK} + \beta_2 D_{PK \times LEP} + \beta_3 D_{PK \times Both} + \beta_4' X_{ijc} + \gamma_c + \gamma_j}}{1 + e^{\alpha + \beta_1 D_{PK} + \beta_2 D_{PK \times LEP} + \beta_3 D_{PK \times Both} + \beta_4' X_{ijc} + \gamma_c + \gamma_j}}$$

where  $P_{icj}$  is the probability that student  $i$  in cohort  $c$  from district  $j$  is retained or represents the probability that a student receives special education services.

# Identifying Assumption

We use the differences in the availability of pre-k within districts over time to identify the effects of pre-k on third grade math examinations, third grade reading examinations, and retention. If the change in the districts' offering of pre-k is unrelated to other factors that influence the outcomes under consideration, then our estimates have a causal interpretation.

## Changes in Pre-Kindergarten Offering Over Time

Year	DISTRICT DATA				CAMPUS DATA			
	TTL # DIST	TTL # OFFRNG PK	% OFFRNG PK	% CHG PY	TTL # CAMPUS	TTL # OFFRNG PK	% OFFRNG PK	% CHG PY
1990	1,057	549	52 %	-	5,978	1,537	26%	-
1991	1,053	567	54 %	3.28%	6,062	1,583	26%	2.99 %
1992	1,050	613	58 %	8.11 %	6,417	1,728	27%	9.16%
1993	1,048	677	65 %	10.44 %	6,283	1,875	30 %	8.51%
1994	1,046	688	66 %	1.62 %	6,369	1,944	31 %	3.68%
1995	1,045	723	69 %	5.09 %	6,500	2,051	32 %	5.50%
1996	1,044	741	71 %	2.49 %	6,819	2,133	31 %	4.00%
1997	1,059	761	72 %	2.70 %	7,035	2,210	31 %	3.61%
1998	1,061	784	74 %	3.02 %	7,222	2,287	32 %	3.48%
1999	1,103	816	74 %	4.08 %	7,394	2,341	32 %	2.36%
2000	1,183	851	72 %	4.29 %	7,549	2,414	32 %	3.12%
2001	1,199	884	74 %	3.88 %	7,598	2,505	33 %	3.77%
2002	1,234	925	75 %	4.64 %	7,672	2,610	34 %	4.19%

## TAAS Reading and Math: English Version

	Reading		Mathematics	
	OLS	FE	OLS	FE
$D_{PK}$	0.0552*** (0.00320)	0.0417*** (0.00612)	0.0523*** (0.00317)	0.0394*** (0.00549)
$D_{PK \times LEP}$	0.0295* (0.0135)	0.0240 (0.0184)	0.0418** (0.0134)	0.0259 (0.0202)
$D_{PK \times Both}$	0.0555*** (0.00714)	0.0454*** (0.00995)	0.0536*** (0.00706)	0.0383*** (0.00861)
$D_{LEP}$	0.0253* (0.0115)	0.00947 (0.0254)	0.0931*** (0.0114)	0.0722** (0.0240)
$D_{Both}$	-0.146*** (0.00601)	-0.150*** (0.0176)	-0.0195** (0.00594)	-0.0364* (0.0168)
$R^2$	0.039	0.029	0.044	0.032
$N$	493028	493028	503761	503761

**Notes:** Robust Standard errors are in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## TAAS Reading and Math: Spanish Version

	Reading		Mathematics	
	OLS	District FE	OLS	District FE
$D_{PK}$	0.0503* (0.0246)	0.0413 (0.0248)	0.0882*** (0.0249)	0.0620* (0.0291)
$D_{PK \times Both}$	-0.0187 (0.0262)	-0.0198 (0.0287)	-0.0256 (0.0265)	-0.0112 (0.0320)
$D_{Both}$	-0.0482* (0.0206)	-0.00644 (0.0281)	-0.0243 (0.0209)	0.00449 (0.0328)
$R^2$	0.038	0.038	0.025	0.027
$N$	54134	54134	53554	53554

**Notes:** Robust standard errors are in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## Retention and Special Education Designation

	Retention			Special Education		
	Logit	OLS	District FE	Logit	OLS	District FE
$D_{PK}$	-.279*** (.009)	-.032*** (.001)	-.036*** (.002)	-.144*** (.008)	-.02*** (.001)	-.022*** (.002)
$D_{PK \times LEP}$	-.228*** (.035)	-.014*** (.004)	-.013*** (.004)	.052 (.038)	.013*** (.004)	.013** (.004)
$D_{PK \times Both}$	-.067*** (.017)	-.005** (.002)	-.005 (.003)	.014 (.018)	.010*** (.002)	.008*** (.003)

**Notes:** Where appropriate, robust standard errors are in parentheses.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

- We find that having participated in pre-k is associated with increased scores on both the math and reading sections of the third grade English version of the Texas Assessment of Academic Skills. We also find that participating pre-k increases the math scores for students who take the Spanish version of TAAS.
- We find that Targeted Pre-K in Texas leads to reductions in the likelihood of being retained, and reductions in the probability of receiving special education services.