

## ONLINE APPENDIX

### **“The Impacts of Expanding Access to High-Quality Preschool Education” by Elizabeth U. Cascio and Diane Whitmore Schanzenbach *Brookings Papers on Economic Activity, Fall 2013***

This appendix provides detail on how the estimates in the paper change when we consider alternative specifications. In particular, the specifications in the paper:

- a. Consider Georgia and Oklahoma to be the only treatment states;
- b. Stratify the data and estimates by maternal education;
- c. Use all other states in the country (and Washington D.C.) as comparison states;
- d. Use state-by-year-by-age averages of microdata, weighting by the number of observations used to create the average;
- e. Cluster standard errors on state;
- f. Estimate pooled impacts across the Georgia and Oklahoma programs; and
- g. Use (mothers of) 5 year olds as comparison age groups.

The discussion and accompanying tables and figures that follow pertain to how our estimates change when we deviate from each of these aspects of our preferred specification.

#### **A. Treatment States**

Georgia and Oklahoma have the longest-standing high-quality and universal state-funded preschool programs for 4 year olds in the United States, adopted in fall 1995 and fall 1998, respectively. Today, however, both West Virginia and Washington D.C. have relatively high-quality preschool programs that serve relatively high shares of the 4-year-old population, as shown in Figure 2.

Tables A-1 through A-5 give estimates of the specifications in Tables 2 through 6 where we have coded West Virginia and Washington D.C. as having high-quality universal preschool in 2002 and 2008, respectively.<sup>1</sup> Doing so slightly diminishes the enrollment estimates (Tables A-1 and A-3), has little impact on the estimates for childcare expenses (Table A-2), increases the magnitude of the DDD estimates for maternal employment (Table A-3), and eliminates the program impacts on maternal time use and fourth grade test scores (Tables A-4 and A-5). The quality of West Virginia’s program converged slowly to that of the Georgia and Oklahoma programs after its introduction in 2002, possibly accounting for the changes in our findings.

#### **B. Sample Stratification**

We stratified our main estimates by whether a child’s mother has at least some college education, a correlate of family income that should not have been affected by the introduction of the universal high-quality preschool programs in Georgia and Oklahoma. As a robustness check, we considered two alternative approaches: stratifying the data by whether a child is eligible for free

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<sup>1</sup> We have no need to re-estimate the specifications in Table 7, since the West Virginia and Washington D.C. programs were founded too recently to estimate their impacts on eighth grade test scores.

or reduced-price school lunch (has family income at or below 185% of the federal poverty line) and by whether his or her father has at least college education.

Figure B-1 shows the time trends in these variables for 4 year olds, alongside that for whether a 4-year-old child's mother has at least a college degree, based on our samples from the October CPS. Maternal college attainment converges with paternal college attainment by the end of the period, though both mothers and fathers alike experience tremendous growth in college attendance between 1977 and 2011. The share of the 4 year olds eligible for free or reduced-price lunch sees no trend, bouncing around an average of about 46 percent.<sup>2</sup> As shown in the first column of Table B-1, neither the state average of maternal college-going nor state averages of the alternative stratification variables change significantly with the introduction of high-quality universal preschool (based on estimates of model (1)), consistent with our expectations. However, the next column of Table B-1 shows that the likelihood of observing paternal education fell once the high-quality universal preschool programs in Georgia and Oklahoma were in place.

Whether this occurred as a result of the program or by chance, it suggests that estimates that stratify on paternal college-going could be biased by sample selection. This is the first of four reasons that we prefer the robustness check based on school lunch eligibility. The second is that estimates stratified on lunch eligibility map directly to the NAEP estimates (Tables 6 and 7). Third, children eligible for free or reduced-price school lunch would be considered low- to moderate-income by the parameters of the Preschool for All initiative. Fourth, eligibility for free or reduced-price school lunch can be calculated for nearly all children.<sup>3</sup> By contrast, paternal education is missing for the large non-random subset of children whose fathers are not present in the household. As shown in the first panel of Table B-2, maternal education and eligibility for school lunch can be observed for about 90 percent of 4 year olds in the October CPS, whereas paternal education is observed only 72 percent of the time. Moreover, paternal education is missing more frequently for lower-education mothers, and the differential has grown over time, as women's college enrollment has increased in the mothers with less education have presumably become more negatively selected.

Table B-3 and Table B-4 re-estimate the specifications in Table 2 and Table 4, but stratify the data by eligibility for free or reduced-price school lunch. Table B-5 and B-6 do the same, but stratify by whether a child's father has at least some college education. The take-away message regarding enrollment remains unchanged using school lunch eligibility: lower-SES children experience larger gains in overall preschool enrollment in response to the introduction of high-quality and universal state-funded preschool, while higher-SES children both enter and exit these programs at higher rates. The enrollment impacts are slightly different when we stratify by paternal education—for example, there is evidence of a shift from public to private preschool for lower-SES children—but these estimates are subject to the caveats regard to missing data described above.

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<sup>2</sup> We impute income-to-poverty ratios in the October CPS, where they are not directly provided, using midpoints of the intervals of family income, family (or household) size, and the annual poverty guidelines given at <http://www.ssa.gov/policy/docs/statcomps/supplement/2012/3e.html#table3.e8>.

<sup>3</sup> There are, however, some “seams” from one year to the next in the calculation of imputed free or reduced-price lunch eligibility that weaken our confidence in using it as our main stratification variable.

### **C. Comparison States**

For ease of exposition and understanding, we use all other states in the country and Washington D.C. as comparison units. Using this approach, we uncovered evidence that some of the outcomes of interest were on different trajectories in Georgia and Oklahoma prior to the adoption of their high-quality universal preschool programs. We attempted to address this concern in the paper by adding controls (e.g., state-specific linear trends) to our baseline specification. However, it would be ideal to use a comparison group that “matched” the treatment states in terms of pre-initiative trends. Unfortunately, the synthetic control methods of Abadie, Diamond, and Hainmueller (2010), which produce optimal weights for comparison units based on observables specified by the researcher, do not apply to our baseline estimates, where there are two treatment states for which policy timing differs.

As an alternative approach, we re-estimated the specifications in Tables 2 through 7 limiting the comparison group to other states in the southern census region, to which both Georgia and Oklahoma belong.<sup>4</sup> The results are shown in Tables C-1 through C-6. Limiting the comparison states to the South tends to diminish the effect sizes, suggesting that the policy effects estimated by our baseline approach are partly picking up trends that were experienced throughout the South. However, the impacts on enrollment, childcare spending (for more-educated mothers), and maternal employment and time use (for less-educated mothers) remain statistically significant based on conventional methods of inference (based on standard errors clustered on state; see Appendix E). The estimates for test scores do not.

However, we do not think that this robustness check is dispositive. First, at least some of the “common trends” in the South may have been driven by state-funded preschool, rather than truly confounding factors. Figure 2 shows that many of the states that have made substantial investments in preschool are in the South, so we would expect estimates of program effects to decline on this basis alone. Combined with the fall in sample size, there is then limited power to detect positive effects of a reasonable magnitude. Second, limiting the comparison group to the South may not be improving the credibility of the model’s identifying assumptions. For example, even when the comparison group is limited to the South, some of the outcomes of interest remain on different trajectories in Georgia and Oklahoma prior to the adoption of their universal preschool programs.

### **D. Unweighted Estimates**

We estimated our regressions using (state-by-year-by-age) averages of the October CPS, CEX, and ATUS micro-data. For efficiency purposes, we weighted these regressions by cell size—the number of observations used to calculate the average. In the Tables D-1 through D-4, we show that the point estimates from Tables 2 through 5, respectively, are generally substantively quite similar when we give equal weight to each average. The only exception is for maternal employment, where the unweighted DDD estimate for the employment of mothers with less education falls in magnitude and is no longer statistically significant.

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<sup>4</sup> These states are AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV.

## **E. Inference**

The standard errors reported in the paper were clustered on state. Conley and Taber (2011) outline an alternative approach to inference in DD applications that does not rely on large-sample approximations that are often inapplicable when few cross-sectional units (i.e., states) experience a policy change. In Tables E-1 through E-6, we present confidence intervals based on the first method they outline (p. 117), at selected levels of significance. Our findings for preschool enrollment continue to hold. However, for test scores, the most precisely-estimated coefficients according to this technique are the fourth grade math results in columns (4) and (5), and these are only statistically different from zero at the 20 percent level. The estimates for maternal labor supply, childcare spending, and maternal time use are also no longer statistically significant.

## **F. Separate Impacts of the GA and OK Programs**

For simplicity and because preschool programs under the Preschool for All initiative could follow either the Georgia model or the Oklahoma model, we estimated the pooled impact of both programs. However, as described in Section I.A, the Georgia and Oklahoma programs differ; for example, the Oklahoma program is better funded, and the Georgia program allows private childcare centers to operate the state-funded preschools. Table F-1 presents program impacts on preschool enrollment separately by state, otherwise mirroring the specifications shown in Table 2. The differences across states are already discussed at length in the text.

## **G. Comparison Age Group**

For the DD estimates based on the CEX and ATUS (Tables 3 and 5), as well as our DDD estimates for maternal employment (Table 4), we used families with 5 year olds as a comparison group for families with 4 year olds. As a robustness check, we re-estimated the DD specifications for childcare spending in Table 3 and the DDD estimates for maternal labor supply and school enrollment in Table 5 using 3 year olds as the comparison group. The results are shown in Tables G-1 and G-2, respectively. The impacts on school enrollment are not much changed. However, the impacts on childcare spending and maternal labor supply are greatly diminished (if not reversed in sign) using this approach.

## **REFERENCES**

- Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105(490): 493-505.
- Conley, Timothy G. and Christopher R. Taber. 2011. "Inference with "Difference in Differences" with a Small Number of Policy Changes." *Review of Economics and Statistics* 93(1): 113-125.

**Table A-1.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Maternal Education: Add WV and DC as Treatment States<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i> <i>1</i>	<i>Add Demographics</i> <i>2</i>	<i>Add State Linear Trends</i> <i>3</i>
<i>a. Mother Has High School Degree or Less (N=1785)</i>			
Public Preschool Enrollment Rate	16.67*** (2.166)	16.41*** (2.133)	15.02*** (4.201)
Private Preschool Enrollment Rate	0.840 (1.866)	1.162 (1.714)	0.702 (2.021)
<i>Effect of Public on Private</i>	<i>0.0504</i> <i>(0.113)</i>	<i>0.0708</i> <i>(0.105)</i>	<i>0.0468</i> <i>(0.125)</i>
Overall Preschool Enrollment Rate	17.51*** (2.766)	17.57*** (2.678)	15.73** (5.877)
<i>b. Mother Has Some College or More (N=1784)</i>			
Public Preschool Enrollment Rate	20.11*** (2.687)	20.42*** (2.737)	21.58*** (4.671)
Private Preschool Enrollment Rate	-8.160* (4.110)	-9.159* (4.764)	-9.621** (4.186)
<i>Effect of Public on Private</i>	<i>-0.406**</i> <i>(0.154)</i>	<i>-0.449**</i> <i>(0.176)</i>	<i>-0.446***</i> <i>(0.151)</i>
Overall Preschool Enrollment Rate	11.95*** (1.756)	11.26*** (2.233)	11.96*** (3.774)
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for Treatment States	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each non-italicized coefficient is a separate OLS estimate of  $\theta$  from model (1), expanded to include WV and DC as treatment states (adoption years=2002 and 2008, respectively). Each italicized coefficient is the two-stage least squares estimate of the effect of the public preschool enrollment rate on the private preschool enrollment rate, where the instrument for the public preschool enrollment rate is the *post* indicator. Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \* 10 percent, \*\*5 percent, or \*\*\*1 percent level.

**Table A-2.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Monthly Spending on Child Care, by Maternal Education: Add WV and DC as Treatment States<sup>a</sup>

<i>Coefficient on:</i>	<i>Baseline DD</i>	<i>Topcode Spending</i>	<i>Use Median Spending</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Mother Has High School Degree or Less (N=619)</i>			
Age4 x Treatment State	5.921 (11.61)	5.353 (11.55)	-9.774 (12.76)
Age 4	7.580 (5.864)	8.357 (5.688)	-1.283 (3.607)
Treatment State	-18.38* (10.87)	-17.41 (10.77)	1.497 (15.13)
<i>b. Mother Has Some College or More (N=693)</i>			
Age4 x Treatment State	-68.30** (29.01)	-49.27* (26.58)	-66.31*** (20.39)
Age 4	73.18*** (17.00)	66.06*** (15.24)	56.41*** (14.64)
Treatment State	-56.89*** (19.68)	-58.09*** (19.57)	-9.891 (28.50)
Additional Controls:			
Year Fixed Effects	Y	Y	Y

Source: Authors' regressions based on state-by-year-by presence of 4 year old averages of microdata from the Consumer Expenditure Survey, September 2002-June 2011.

<sup>a</sup> Each panel and column represents a separate estimate of model (2), expanded to include WV and DC as treatment states. Monthly childcare spending is in real 2012 dollars. In column 2, we topcode spending at the 99th percentile before collapsing the data to state-by-year-by-age means. In column 3, we collapse the data to cell medians instead of cell means. Regressions are weighted by the number of families used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent level, or \*10 percent level.

**Table A-3.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Maternal Education: Add WV and DC as Treatment States<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 5 Year Olds</i>
	<i>Baseline</i> 1	<i>Add Controls</i> 2	3
<i>a. Mother Has High School Degree or Less</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	1.682 (3.091)	1.250 (2.483)	5.592*** (1.896)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	16.84*** (2.864)	16.44*** (2.437)	13.03*** (3.091)
Private School Enrollment Rate (%)	-0.0968 (1.207)	0.226 (0.855)	0.899 (1.533)
<i>Effect of Public on Private</i>	-0.00575 (0.0710)	0.0138 (0.0533)	0.0690 (0.130)
N (state-by-year-by-age cells)	1,785	1,785	3,570
<i>b. Mother Has Some College or More</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-3.482 (2.535)	-3.319 (2.146)	-3.398 (3.356)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	21.90*** (4.381)	22.50*** (4.495)	14.84** (6.449)
Private School Enrollment Rate (%)	-13.02*** (2.183)	-14.17*** (1.333)	-5.361*** (1.888)
<i>Effect of Public on Private</i>	-0.595*** (0.164)	-0.630*** (0.141)	-0.361*** (0.103)
N (state-by-year-by-age cells)	1,784	1,784	3,568
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> All models include WV and DC as treatment states (adoption years=2002 and 2008, respectively). See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postage4* (in column 3). Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.



**Table A-4.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Mothers' Time Use, by Maternal Education: Add WV and DC as Treatment States<sup>a</sup>

<i>Coefficient on:</i>	<i>Time spent with child present</i> 1	<i>Time spent caring for and/or helping child</i> 2
<i>a. Mother Has High School Degree or Less (N=96)</i>		
Age4 x Treatment State	-54.49** (23.64)	-11.04 (37.82)
Age 4	33.57*** (11.90)	18.12*** (6.496)
Treatment State	51.13 (42.84)	14.39 (31.75)
Constant	475.9*** (12.24)	100.2*** (5.598)
<i>b. Mother Has Some College or More (N=102)</i>		
Age4 x Treatment State	-22.25 (47.14)	-18.63 (11.94)
Age 4	14.40 (10.55)	16.16*** (4.864)
Treatment State	5.427 (32.06)	3.924 (11.82)
Constant	461.5*** (7.842)	120.9*** (3.396)

Source: Authors' regressions based on state-by-presence of 4 year old averages of microdata from the American Time Use Survey, January 2003-December 2012.

<sup>a</sup> Each panel and column represents a separate estimate of model (2), expanded to include WV and DC as treatment states. Time is measured in minutes, and the sample is limited to women in households with a 4- or 5-year-old child, and to non-holiday weekdays from September through June. Regressions are weighted by the number of observations used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent or \*\*5 percent level.

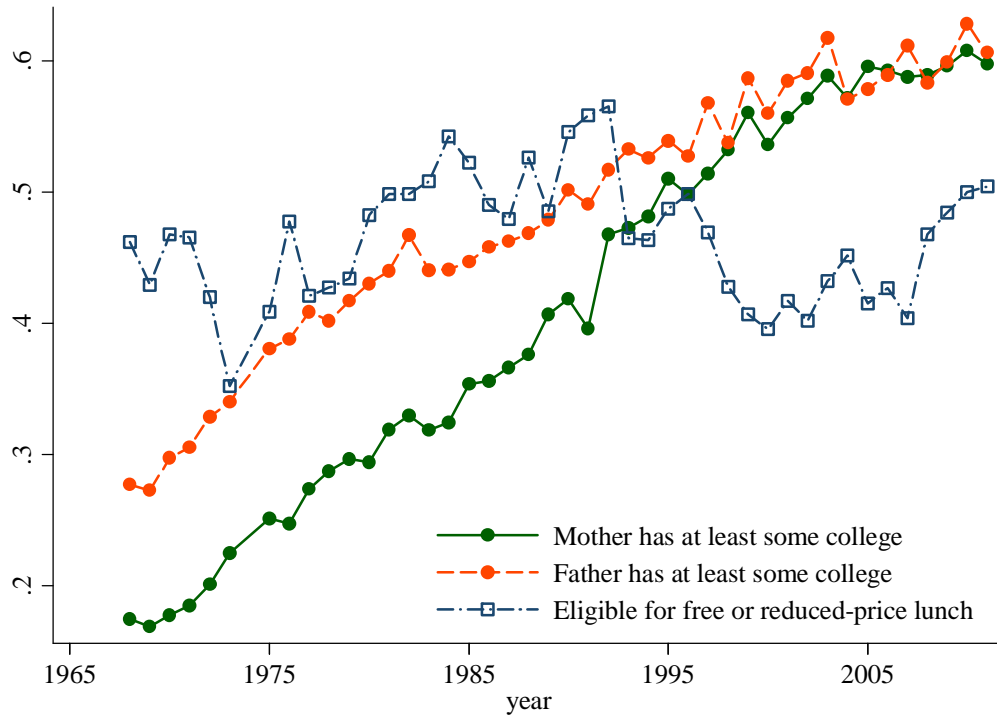
**Table A-5.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Fourth Grade NAEP Mathematics and Reading Scores, by Child's Eligibility for Free or Reduced-Price School Lunch: Add WV as a Treatment State<sup>a</sup>

<i>Dependent variable</i>	<i>Effect Sizes:</i>				
	<i>Baseline DD</i>	<i>Baseline + Indicator for 3+ Cohorts Pre-initiative</i>	<i>Baseline + Add State Linear Trends</i>	<i>Specification 2 + Student Demographics</i>	<i>Specification 4 + Other State Education Policies</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>a. Child Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	-0.658	-0.278	1.275	-0.132	-0.162
	(2.151)	(2.651)	(1.401)	(2.482)	(2.474)
N (state-years)	296	296	296	296	296
Reading Scale Score, 4th Grade	-2.069	-1.654	1.378	-0.885	-0.977
	(2.269)	(3.478)	(1.745)	(2.711)	(2.866)
N (state-years)	339	339	339	339	339
<i>b. Child Not Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	-1.121	-0.666	0.0462	-0.484	-0.343
	(0.945)	(1.180)	(0.734)	(0.968)	(0.991)
N (state-years)	296	296	296	296	296
Reading Scale Score, 4th Grade	-3.622***	-3.071**	0.109	-2.484***	-2.484***
	(1.262)	(1.177)	(0.793)	(0.642)	(0.650)
N (state-years)	339	339	339	339	339
<b>Controls:</b>					
State Fixed Effects	Y	Y	Y	Y	Y
Cohort Fixed Effects	Y	Y	Y	Y	Y
3+ Cohorts Prior to First Affected Cohort (=1)	N	Y	N	Y	Y
Linear Trends for Treatment States	N	N	Y	N	N
Student Demographics	N	N	N	Y	Y
Years with School Accountability	N	N	N	N	Y

Source: Authors' regressions based on state-by-year test score data from NAEP Data Explorer, data on enrollment by race from the Common Core of Data, and dates of consequential school accountability reported in Dee and Jacob (2011).

<sup>a</sup> Each reported coefficient is a separate estimate of  $\theta$  from model (1), expanded to include WV as a treatment state (adoption year=2002). See the text for details. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Figure B-1.** Trends in Parental Educational Attainment and Eligibility for Free or Reduced-Price School Lunch, 1968-2011



Sources: October Current Population Survey, 1968-2011.

**Table B-1.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on the Values and Observation of Alternative Variables for Stratifying the 4-Year-Old Population<sup>a</sup>

<i>Dependent variable:</i>	<i>Baseline DD Effect Sizes:</i>	
	<i>Average Value of Variable for State's 4 Year Olds (as %)</i>	<i>% of 4 Year Olds in State with Variable Observed</i>
	<i>1</i>	<i>2</i>
<i>Stratification variable:</i>		
Mother Has at Least Some College	0.579 (1.445)	0.0422 (1.101)
Father Has at Least Some College	3.637 (3.672)	-3.302*** (0.930)
Eligible for Free or Reduced-Price Lunch	1.875 (2.512)	-2.410 (2.710)
N (state-by-year cells)	1785	1785
<i>Controls:</i>		
State Fixed Effects	Y	Y
Year Fixed Effects	Y	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each reported coefficient is a separate OLS estimate of  $\theta$  from model (1). See the text for details. Regressions are weighted by the number of children used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent level.

**Table B-2.** Presence of Sample Stratification Variables in the October CPS, Overall and in Selected Years<sup>a</sup>

	<i>All Years</i>	<i>Share of (sub)sample</i>		
		<i>1970</i>	<i>1985</i>	<i>2010</i>
<i>A. Full Sample</i>				
Maternal education observed	0.922	0.994	0.975	0.914
Paternal education observed	0.724	0.832	0.757	0.693
School lunch eligibility observed	0.881	0.944	0.961	0.932
<i>B. Mother Has High School Degree or Less</i>				
Maternal education observed	1.000	1.000	1.000	1.000
Paternal education observed	0.646	0.820	0.709	0.590
School lunch eligibility observed	0.876	0.942	0.969	0.928
<i>C. Mother Has Some College or More</i>				
Maternal education observed	1.000	1.000	1.000	1.000
Paternal education observed	0.811	0.886	0.847	0.775
School lunch eligibility observed	0.902	0.955	0.963	0.950

Source: Authors' calculations based on microdata from the October CPS School Enrollment Supplements, 1968-2011.

<sup>a</sup> To reduce noise, the year-specific figures are centered three-year averages: 1969-71 (for 1970), 1984-86 (for 1985), and 2009-11 (for 2010).

**Table B-3.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Eligibility for Free or Reduced-Price School Lunch<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i>	<i>Add Demographics</i>	<i>Add State Linear Trends</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Eligible for Free or Reduced-Price Lunch (N=1785)</i>			
Public Preschool Enrollment Rate	16.35*** (1.348)	16.25*** (1.302)	18.40*** (1.827)
Private Preschool Enrollment Rate	0.233 (2.533)	0.480 (2.534)	1.492 (3.503)
<i>Effect of Public on Private</i>	<i>0.0143</i> <i>(0.155)</i>	<i>0.0295</i> <i>(0.156)</i>	<i>0.0811</i> <i>(0.198)</i>
Overall Preschool Enrollment Rate	16.58*** (2.363)	16.73*** (2.620)	19.90*** (2.011)
<i>b. Not Eligible for Free or Reduced-Price Lunch (N=1784)</i>			
Public Preschool Enrollment Rate	23.34*** (2.747)	23.22*** (2.562)	31.34*** (3.257)
Private Preschool Enrollment Rate	-6.675 (5.025)	-5.752 (4.888)	-15.26*** (4.921)
<i>Effect of Public on Private</i>	<i>-0.286</i> <i>(0.183)</i>	<i>-0.248</i> <i>(0.185)</i>	<i>-0.487***</i> <i>(0.109)</i>
Overall Preschool Enrollment Rate	16.67*** (2.483)	17.46*** (2.573)	16.08*** (1.975)
<b>Controls:</b>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA and OK	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each non-italicized coefficient is a separate OLS estimate of  $\theta$  from model (1). See the text for details. Each italicized coefficient is the two-stage least squares estimate of the effect of the public preschool enrollment rate on the private preschool enrollment rate, where the instrument for the public preschool enrollment rate is the *post* indicator. Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent level.

**Table B-4.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Eligibility for Free or Reduced-Price School Lunch<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 5 Year Olds</i>
	<i>Baseline</i> 1	<i>Add Controls</i> 2	3
<i>a. Eligible for Free or Reduced-Price Lunch</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-3.456*** (1.032)	-2.972*** (1.002)	8.639*** (0.843)
N (state-by-year-by-age cells)	1,784	1,784	3,569
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	18.96*** (2.559)	18.64*** (2.333)	15.15*** (3.128)
Private School Enrollment Rate (%)	-0.175 (1.630)	0.0831 (1.599)	1.764 (1.478)
<i>Effect of Public on Private</i>	-0.00924 (0.0849)	0.00446 (0.0863)	0.116 (0.120)
N (state-by-year-by-age cells)	1,785	1,785	3,570
<i>b. Not Eligible for Free or Reduced-Price Lunch</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-4.614 (4.342)	-5.393 (4.613)	-5.594 (7.090)
N (state-by-year-by-age cells)	1,784	1,784	3,567
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	25.69*** (3.855)	25.26*** (3.641)	18.77*** (7.009)
Private School Enrollment Rate (%)	-13.85*** (0.807)	-12.89*** (0.812)	-6.336*** (2.279)
<i>Effect of Public on Private</i>	-0.539*** (0.0786)	-0.510*** (0.0748)	-0.337*** (0.0424)
N (state-by-year-by-age cells)	1,784	1,784	3,568
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postage4* (in column 3). Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent level.



**Table B-5.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Paternal Education<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i>	<i>Add Demographics</i>	<i>Add State Linear Trends</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Father Has High School Degree or Less (N=1778)</i>			
Public Preschool Enrollment Rate	19.03*** (1.457)	18.56*** (1.440)	20.90*** (3.726)
Private Preschool Enrollment Rate	-2.089* (1.090)	-1.325 (1.020)	-4.773*** (0.937)
<i>Effect of Public on Private</i>	<i>-0.110**</i> (0.0522)	<i>-0.0714</i> (0.0519)	<i>-0.228***</i> (0.0658)
Overall Preschool Enrollment Rate	16.94*** (1.115)	17.23*** (1.175)	16.13*** (4.004)
<i>b. Father Has Some College or More (N=1783)</i>			
Public Preschool Enrollment Rate	22.41*** (3.957)	22.25*** (4.127)	31.69*** (4.503)
Private Preschool Enrollment Rate	-9.354* (4.809)	-8.342 (5.783)	-11.60*** (2.159)
<i>Effect of Public on Private</i>	<i>-0.417***</i> (0.143)	<i>-0.375*</i> (0.192)	<i>-0.366***</i> (0.0319)
Overall Preschool Enrollment Rate	13.05*** (1.222)	13.91*** (1.900)	20.09*** (2.751)
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA and OK	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each non-italicized coefficient is a separate OLS estimate of  $\theta$  from model (1). See the text for details. Each italicized coefficient is the two-stage least squares estimate of the effect of the public preschool enrollment rate on the private preschool enrollment rate, where the instrument for the public preschool enrollment rate is the *post* indicator. Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table B-6.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Paternal Education<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 5 Year Olds</i>
	<i>Baseline</i> <i>1</i>	<i>Add Controls</i> <i>2</i>	<i>3</i>
<i>a. Father Has High School Degree or Less</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-6.097*** (2.189)	-5.646** (2.549)	5.234 (4.200)
N (state-by-year-by-age cells)	1,776	1,776	3,550
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	21.03*** (1.475)	19.93*** (1.551)	13.36*** (3.056)
Private School Enrollment Rate (%)	-4.420** (1.697)	-3.574* (1.852)	1.283 (1.119)
<i>Effect of Public on Private</i>	-0.210** (0.0804)	-0.179** (0.0871)	0.0961 (0.100)
N (state-by-year-by-age cells)	1,778	1,778	3,558
<i>b. Father Has Some College or More</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-1.152 (1.328)	-1.433 (1.150)	-0.00664 (2.114)
N (state-by-year-by-age cells)	1,782	1,782	3,564
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	25.48*** (5.835)	24.98*** (6.382)	18.23* (9.811)
Private School Enrollment Rate (%)	-17.56*** (2.530)	-16.57*** (1.641)	-9.107*** (3.240)
<i>Effect of Public on Private</i>	-0.689*** (0.252)	-0.663*** (0.227)	-0.500*** (0.106)
N (state-by-year-by-age cells)	1,783	1,783	3,565
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postage4* (in column 3). Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table C-1.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Maternal Education: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i> <i>1</i>	<i>Add Demographics</i> <i>2</i>	<i>Add State Linear Trends</i> <i>3</i>
<i>a. Mother Has High School Degree or Less (N=595)</i>			
Public Preschool Enrollment Rate	11.94*** (2.293)	11.80*** (2.530)	14.84*** (1.548)
Private Preschool Enrollment Rate	-0.0162 (2.679)	0.491 (2.439)	4.095** (1.497)
<i>Effect of Public on Private</i>	<i>-0.00136</i> (0.224)	<i>0.0417</i> (0.211)	<i>0.276**</i> (0.109)
Overall Preschool Enrollment Rate	11.92*** (2.668)	12.29*** (2.458)	18.94*** (2.000)
<i>b. Mother Has Some College or More (N=594)</i>			
Public Preschool Enrollment Rate	16.41*** (4.115)	16.51*** (4.098)	27.04*** (4.079)
Private Preschool Enrollment Rate	-8.045 (5.892)	-7.742 (6.400)	-13.14*** (3.543)
<i>Effect of Public on Private</i>	<i>-0.490*</i> (0.252)	<i>-0.469</i> (0.281)	<i>-0.486***</i> (0.0840)
Overall Preschool Enrollment Rate	8.362*** (2.729)	8.773*** (2.898)	13.90*** (2.428)
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA, OK, and WV	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each non-italicized coefficient is a separate OLS estimate of  $\theta$  from model (1), limiting the sample to AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. Each italicized coefficient is the two-stage least squares estimate of the effect of the public preschool enrollment rate on the private preschool enrollment rate, where the instrument for the public preschool enrollment rate is the *post* indicator. Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \* 10 percent or \*\*5 percent level.

**Table C-2.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Monthly Spending on Child Care, by Maternal Education: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Coefficient on:</i>	<i>Baseline DD</i> <i>1</i>	<i>Topcode Spending</i> <i>2</i>	<i>Use Median</i> <i>Spending</i> <i>3</i>
<i>a. Mother Has High School Degree or Less (N=295)</i>			
Age4 x GA or OK	31.02** (10.64)	30.94** (10.62)	3.829 (4.246)
Age 4	14.22*** (4.712)	14.30*** (4.686)	-4.493 (4.102)
GA or OK	-29.53*** (8.233)	-29.45*** (8.259)	-13.12 (9.643)
<i>b. Mother Has Some College or More (N=318)</i>			
Age4 x GA or OK	-33.66 (26.14)	-23.01 (24.10)	-57.88*** (19.05)
Age 4	43.25** (16.15)	40.96** (14.45)	58.84*** (17.20)
GA or OK	-28.49* (13.80)	-31.76** (11.51)	3.114 (17.84)
Additional Controls:			
Year Fixed Effects	Y	Y	Y

Source: Authors' regressions based on state-by-year-by presence of 4 year old averages of microdata from the Consumer Expenditure Survey, September 1998-June 2011.

<sup>a</sup> Each panel and column represents a separate estimate of model (2), limiting the sample to AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. Monthly childcare spending is in real 2012 dollars. In column 2, we topcode spending at the 99th percentile before collapsing the data to state-by-year-by-age means. In column 3, we collapse the data to cell medians instead of cell means. Regressions are weighted by the number of families used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table C-3.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Maternal Education: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 5 Year Olds</i>
	<i>Baseline</i> 1	<i>Add Controls</i> 2	3
<i>a. Mother Has High School Degree or Less</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	0.991 (2.634)	1.856 (2.629)	5.700** (2.247)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	16.55*** (2.917)	15.51*** (3.155)	14.71*** (4.107)
Private School Enrollment Rate (%)	-1.377 (1.638)	-0.650 (1.473)	-0.448 (2.321)
<i>Effect of Public on Private</i>	<i>-0.0832</i> (0.0907)	<i>-0.0419</i> (0.0890)	<i>-0.0304</i> (0.150)
N (state-by-year-by-age cells)	595	595	1,190
<i>b. Mother Has Some College or More</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-0.853 (2.267)	-1.052 (2.144)	0.344 (4.097)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	22.18*** (6.373)	22.18*** (6.533)	16.69* (8.536)
Private School Enrollment Rate (%)	-10.96*** (1.985)	-10.53*** (1.663)	-5.056** (1.760)
<i>Effect of Public on Private</i>	<i>-0.494**</i> (0.192)	<i>-0.475***</i> (0.161)	<i>-0.303**</i> (0.106)
N (state-by-year-by-age cells)	594	594	1,188
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> These states are AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postxage4* (in column 3). Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table C-4.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Mothers' Time Use, by Maternal Education: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Coefficient on:</i>	<i>Time spent with child present</i> 1	<i>Time spent caring for and/or helping child</i> 2
<i>a. Mother Has High School Degree or Less (N=31)</i>		
Age4 x GA or OK	-34.02 (32.79)	27.32* (15.34)
Age 4	20.58 (23.42)	14.17 (11.61)
GA or OK	24.18 (46.44)	-14.89 (12.47)
Constant	481.1*** (20.19)	100.8*** (7.639)
<i>b. Mother Has Some College or More (N=34)</i>		
Age4 x GA or OK	-14.85 (49.10)	-11.19 (12.83)
Age 4	30.84 (18.47)	18.99 (11.44)
GA or OK	14.59 (36.28)	-5.610 (7.304)
Constant	445.9*** (7.668)	119.2*** (4.960)

Source: Authors' regressions based on state-by-presence of 4 year old averages of microdata from the American Time Use Survey, January 2003-December 2012.

<sup>a</sup> Each panel and column represents a separate estimate of model (2), limiting the sample to AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. Time is measured in minutes, and the sample is limited to women in households with a 4- or 5-year-old child, and to non-holiday weekdays from September through June. Regressions are weighted by the number of families used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.



**Table C-5.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Fourth Grade NAEP Mathematics and Reading Scores, by Child's Eligibility for Free or Reduced-Price School Lunch: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Dependent variable</i>	<i>Effect Sizes:</i>				
	<i>Baseline DD</i>	<i>Baseline + Indicator for 7+ Cohorts Pre-initiative</i>	<i>Baseline + Add State Linear Trends</i>	<i>Specification 2 + Student Demographics</i>	<i>Specification 4 + Other State Education Policies</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>a. Child Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	1.223 (1.948)	2.754** (1.259)	2.334* (1.268)	2.763 (1.593)	2.848 (1.732)
N (state-years)	100	100	100	100	100
Reading Scale Score, 4th Grade	-1.541 (2.251)	2.010 (1.420)	2.687 (2.799)	1.474 (1.544)	1.228 (1.480)
N (state-years)	119	119	119	119	119
<i>b. Child Not Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	-0.758 (1.343)	0.362 (0.893)	0.404 (1.421)	0.736 (1.129)	0.763 (1.162)
N (state-years)	100	100	100	100	100
Reading Scale Score, 4th Grade	-4.073* (2.160)	-2.350 (1.346)	-0.00714 (0.887)	-2.647** (1.178)	-2.642** (1.147)
N (state-years)	119	119	119	119	119
<b>Controls:</b>					
State Fixed Effects	Y	Y	Y	Y	Y
Cohort Fixed Effects	Y	Y	Y	Y	Y
7+ Cohorts Prior to First Affected Cohort (=1)	N	Y	N	Y	Y
Linear Trends for GA and OK	N	N	Y	N	N
Student Demographics	N	N	N	Y	Y
Years with School Accountability	N	N	N	N	Y

Source: Authors' regressions based on state-by-year test score data from NAEP Data Explorer, data on enrollment by race from the Common Core of Data, and dates of consequential school accountability reported in Dee and Jacob (2011).

<sup>a</sup> Each reported coefficient is a separate estimate of  $\theta$  from model (1), limiting the sample to AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. See the text for details. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*5 percent or \*10 percent level.

**Table C-6.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Eighth Grade NAEP Mathematics and Reading Scores, by Child's Eligibility for Free or Reduced-Price School Lunch: Limit Comparison Group to States in the Southern Census Region<sup>a</sup>

<i>Dependent variable</i>	<i>Effect Sizes:</i>				
	<i>Baseline DD</i>	<i>Baseline + Indicator for 7+ Cohorts Pre-initiative</i>	<i>Baseline + Add State Linear Trends</i>	<i>Specification 2 + Student Demographics</i>	<i>Specification 4 + Other State Education Policies</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>a. Child Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 8th Grade	0.539 (1.632)	1.457 (0.958)	3.025 (2.451)	1.066 (0.850)	1.027 (0.859)
N (state-years)	100	100	100	100	100
Reading Scale Score, 8th Grade	-0.0335 (2.933)	1.269 (2.210)	1.079 (1.202)	0.357 (2.132)	-0.0327 (2.141)
N (state-years)	119	119	119	119	119
<i>b. Child Not Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 8th Grade	-2.189* (1.189)	-1.977* (1.070)	-1.792*** (0.602)	-2.493*** (0.821)	-2.504*** (0.831)
N (state-years)	100	100	100	100	100
Reading Scale Score, 8th Grade	-0.916 (2.589)	-0.400 (2.594)	0.504 (1.462)	-0.652 (2.518)	-0.648 (2.530)
N (state-years)	119	119	119	119	119
<b>Controls:</b>					
State Fixed Effects	Y	Y	Y	Y	Y
Cohort Fixed Effects	Y	Y	Y	Y	Y
7+ Cohorts Prior to First Affected Cohort (=1)	N	Y	N	Y	Y
Linear Trends for GA and OK	N	N	Y	N	N
Student Demographics	N	N	N	Y	Y
Years with School Accountability	N	N	N	N	Y

Source: Authors' regressions based on state-by-year test score data from NAEP Data Explorer, data on enrollment by race from the Common Core of Data, and dates of consequential school accountability reported in Dee and Jacob (2011).

<sup>a</sup> Each reported coefficient is a separate estimate of  $\theta$  from model (1), limiting the sample to AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. See the text for details. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent or \*10 percent level.

**Table D-1.** Unweighted Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Maternal Education<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i>	<i>Add Demographics</i>	<i>Add State Linear Trends</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Mother Has High School Degree or Less (N=1785)</i>			
Public Preschool Enrollment Rate	18.85*** (1.189)	18.25*** (1.063)	19.73*** (1.277)
Private Preschool Enrollment Rate	-0.823 (2.545)	-0.339 (2.295)	1.712* (0.954)
<i>Effect of Public on Private</i>	<i>-0.0437</i> (0.134)	<i>-0.0186</i> (0.126)	<i>0.0868*</i> (0.0499)
Overall Preschool Enrollment Rate	18.03*** (2.403)	17.91*** (2.670)	21.44*** (1.421)
<i>b. Mother Has Some College or More (N=1784)</i>			
Public Preschool Enrollment Rate	18.73*** (2.758)	19.01*** (2.596)	30.66*** (2.923)
Private Preschool Enrollment Rate	-9.554* (5.481)	-9.478 (5.778)	-16.63*** (2.411)
<i>Effect of Public on Private</i>	<i>-0.510**</i> (0.224)	<i>-0.499**</i> (0.241)	<i>-0.542***</i> (0.0460)
Overall Preschool Enrollment Rate	9.174*** (3.050)	9.530*** (3.431)	14.04*** (1.636)
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA and OK	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each non-italicized coefficient is a separate OLS estimate of  $\theta$  from model (1). See the text for details. Each italicized coefficient is the two-stage least squares estimate of the effect of the public preschool enrollment rate on the private preschool enrollment rate, where the instrument for the public preschool enrollment rate is the *post* indicator. Regressions give each state-year-age observation equal weight. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table D-2.** Unweighted Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Monthly Spending on Child Care, by Maternal Education<sup>a</sup>

<i>Coefficient on:</i>	<i>Baseline DD</i> <i>1</i>	<i>Topcode Spending</i> <i>2</i>	<i>Use Median</i> <i>Spending</i> <i>3</i>
<i>a. Mother Has High School Degree or Less (N=920)</i>			
Age4 x GA or OK	5.320 (12.60)	4.678 (12.74)	-26.69 (20.94)
Age 4	19.21** (8.848)	19.80** (8.985)	7.180 (9.952)
GA or OK	-27.51*** (8.982)	-26.44*** (9.030)	-12.53 (21.78)
<i>b. Mother Has Some College or More (N=1008)</i>			
Age4 x GA or OK	-60.06*** (17.04)	-44.32*** (13.53)	-54.23*** (15.04)
Age 4	73.30*** (14.04)	63.40*** (11.90)	52.90*** (12.19)
GA or OK	-43.13** (17.19)	-43.24*** (15.06)	-13.29 (18.24)
Additional Controls:			
Year Fixed Effects	Y	Y	Y

Source: Authors' regressions based on state-by-year-by presence of 4 year old averages of microdata from the Consumer Expenditure Survey, September 1998-June 2011.

<sup>a</sup> Each panel and column represents a separate estimate of model (2) in the text. Monthly childcare spending is in real 2012 dollars. In column 2, we topcode spending at the 99th percentile before collapsing the data to state-by-year-by-age means. In column 3, we collapse the data to cell medians instead of cell means. Regressions give equal weight to each state-year-age cell. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table D-3.** Unweighted Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Maternal Education<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 5 Year Olds</i>
	<i>Baseline</i> 1	<i>Add Controls</i> 2	3
<i>a. Mother Has High School Degree or Less</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-3.424 (2.170)	-2.861 (2.367)	2.776 (1.789)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	21.28*** (2.082)	20.26*** (1.340)	17.52*** (4.204)
Private School Enrollment Rate (%)	-2.910** (1.329)	-2.319** (1.100)	-1.045 (1.891)
<i>Effect of Public on Private</i>	<i>-0.137**</i> (0.0518)	<i>-0.114**</i> (0.0494)	<i>-0.0596</i> (0.0944)
N (state-by-year-by-age cells)	1,785	1,785	3,570
<i>b. Mother Has Some College or More</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-5.557** (2.126)	-5.418** (2.098)	-0.132 (3.906)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	23.71*** (5.007)	23.97*** (4.958)	20.13*** (7.455)
Private School Enrollment Rate (%)	-16.29*** (2.872)	-16.19*** (2.547)	-10.67*** (1.169)
<i>Effect of Public on Private</i>	<i>-0.687**</i> (0.260)	<i>-0.675***</i> (0.240)	<i>-0.530**</i> (0.227)
N (state-by-year-by-age cells)	1,784	1,784	3,568
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postage4* (in column 3). Regressions give each state-year-age observation equal weight. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table D-4.** Unweighted Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Mothers' Time Use, by Maternal Education<sup>a</sup>

<i>Coefficient on:</i>	<i>Time spent with child present</i> <i>1</i>	<i>Time spent caring for and/or helping child</i> <i>2</i>
<i>a. Mother Has High School Degree or Less (N=96)</i>		
Age4 x GA or OK	-61.47** (29.53)	31.93* (16.51)
Age 4	36.18* (18.63)	7.166 (13.30)
GA or OK	36.36 (43.65)	-23.33 (14.01)
Constant	479.1*** (15.57)	111.6*** (10.19)
<i>b. Mother Has Some College or More (N=102)</i>		
Age4 x GA or OK	-27.51 (54.37)	5.861 (10.64)
Age 4	13.95 (15.80)	5.856 (8.261)
GA or OK	25.19 (42.75)	-12.21 (8.678)
Constant	459.7*** (11.40)	122.2*** (6.042)

Source: Authors' regressions based on state-by presence of 4 year old averages of microdata from the American Time Use Survey, January 2003-December 2012.

<sup>a</sup> Each panel and column represents a separate estimate of model (2). Time is measured in minutes, and the sample is limited to women in households with a 4- and/or 5-year-old child, and to non-holiday weekdays from September through June. Regressions give equal weight to each state-age average. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table E-1.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Maternal Education, With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i>	<i>Add Demographics</i>	<i>Add State Linear Trends</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Mother Has High School Degree or Less (N=1785)</i>			
Public Preschool Enrollment Rate	17.49	16.99	17.13
95%	[-7.64, 32.40]	[-9.13, 31.77]	[-8.99, 31.91]
90%	<b>[3.04, 27.98]</b>	<b>[2.91, 27.17]</b>	<b>[3.04, 27.31]</b>
85%	<b>[3.71, 27.93]</b>	<b>[3.00, 27.14]</b>	<b>[3.14, 27.28]</b>
Private Preschool Enrollment Rate	1.191	1.822	3.035
95%	[-10.12, 9.35]	[-9.79, 10.16]	[-8.56, 11.38]
90%	[-8.81, 7.92]	[-7.82, 8.88]	[-6.61, 10.09]
85%	[-5.86, 7.29]	[-4.92, 7.53]	[-3.71, 8.76]
Overall Preschool Enrollment Rate	18.68	18.81	20.17
95%	[-2.01, 35.85]	[-1.69, 36.02]	[-0.37, 37.36]
90%	[-0.27, 34.85]	[-0.20, 34.99]	<b>[1.18, 36.35]</b>
85%	<b>[5.84, 32.93]</b>	<b>[6.18, 33.11]</b>	<b>[7.51, 34.47]</b>
<i>b. Mother Has Some College or More (N=1784)</i>			
Public Preschool Enrollment Rate	19.63	19.72	28.66
95%	<b>[2.67, 28.49]</b>	<b>[3.49, 28.99]</b>	<b>[12.37, 37.97]</b>
90%	<b>[9.62, 28, 36]</b>	<b>[9.83, 28.90]</b>	<b>[18.86, 37.91]</b>
85%	<b>[10.38, 25.88]</b>	<b>[10.78, 26.14]</b>	<b>[19.74, 35.15]</b>
Private Preschool Enrollment Rate	-8.296	-8.044	-14.90
95%	<b>[-25.58, -0.63]</b>	<b>[-24.64, -0.43]</b>	<b>[-31.50, -7.19]</b>
90%	<b>[-20.94, -1.11]</b>	<b>[-19.58, -1.11]</b>	<b>[-26.41, -8.01]</b>
85%	<b>[-18.30, -1.18]</b>	<b>[-19.00, -1.40]</b>	<b>[-25.91, -8.35]</b>
Overall Preschool Enrollment Rate	11.34	11.67	13.77
95%	[-6.28, 21.62]	[-5.36, 20.80]	[-3.25, 22.89]
90%	[-4.97, 20.89]	[-3.17, 19.68]	[-1.06, 21.79]
85%	[-0.91, 19.52]	<b>[0.61, 19.66]</b>	<b>[2.72, 27.76]</b>
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA and OK	N	N	Y



Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Each reported coefficient is a separate OLS estimate of  $\theta$  from model (1). See the text for details. Regressions are weighted by the number of observations used to calculate the dependent variable.

**Table E-2.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Monthly Spending on Child Care, by Maternal Education: With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Coefficient on:</i>	<i>Baseline DD</i>	<i>Topcode Spending</i>	<i>Use Median Spending</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Mother Has High School Degree or Less (N=920)</i>			
Age4 x GA or OK	35.48	34.94	-1.723
90%	[-7.1, 81.0]	[-7.6, 80.6]	[-51.8, 45.1]
80%	[-4.1, 70.4]	[-4.4, 70.9]	[-44.2, 34.4]
<i>b. Mother Has Some College or More (N=1008)</i>			
Age4 x GA or OK	-65.86	-49.69	-56.17
90%	[-200.8, 37.6]	[-169.6, 46.3]	[-184.0, 33.8]
80%	[-154.0, 13.5]	[-130.1, 23.8]	[-154.8, 18.8]
Additional Controls:			
Year Fixed Effects	Y	Y	Y

Source: Authors' regressions based on state-by-year-by presence of 4 year old averages of microdata from the Consumer Expenditure Survey, September 1998-June 2011.

<sup>a</sup> Each panel and column represents a separate estimate of model (2). Monthly childcare spending is in real 2012 dollars. Sample is limited to families with a 3- and/or 4-year-old child. In column 2, we topcode spending at the 99th percentile before collapsing the data to state-by-year-by-age means. In column 3, we collapse the data to cell medians instead of cell means. Regressions are weighted by the number of families used to calculate the dependent variable. Confidence intervals calculated using the method of Conley and Taber (2011) are in brackets.

**Table E-3.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Maternal Education: With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>	
	<i>Baseline</i> <i>1</i>	<i>Add Controls</i> <i>2</i>
<i>a. Mother Has High School Degree or Less</i>		
<i>Maternal Employment:</i>		
% Mothers at Work Prior Week	-1.874	-1.114
95%	[-18.72, 11.03]	[-18.38, 13.58]
90%	[-14.01, 10.31]	[-12.12, 9.27]
<i>Child's School Enrollment:</i>		
Public School Enrollment Rate (%)	19.94	18.91
95%	[-3.57, 32.20]	[-6.29, 30.81]
90%	<b>[7.73, 32.19]</b>	<b>[7.10, 30.67]</b>
Private School Enrollment Rate (%)	-1.361	-0.638
95%	[-12.31, 6.08]	[-11.20, 7.22]
90%	[-11.48, 4.90]	[-11.10, 6.26]
N (state-by-year-by-age cells)	1,785	1,785
<i>b. Mother Has Some College or More</i>		
<i>Maternal Employment:</i>		
% Mothers at Work Prior Week	-4.62	-4.518
95%	[-18.40, 7.90]	[-17.63, 7.71]
90%	[-15.49, 6.24]	[-15.57, 5.08]
<i>Child's School Enrollment:</i>		
Public School Enrollment Rate (%)	23.32	23.35
95%	<b>[6.80, 34.24]</b>	<b>[7.15, 34.38]</b>
90%	<b>[13.20, 32.68]</b>	<b>[13.43, 33.31]</b>
Private School Enrollment Rate (%)	-15.18	-14.9
95%	<b>[-33.60, -3.61]</b>	<b>[-32.56, -4.45]</b>
90%	<b>[-24.11, -8.37]</b>	<b>[-24.11, -8.37]</b>
N (state-by-year-by-age cells)	1,784	1,784
<i>Controls:</i>		
State Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
Nonwhite (%), Female (%)	N	Y
State Unemployment Rate	N	Y
All controls x <i>age4</i> indicator	N	N

Source: Authors' regressions based on state-by-year-by age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> See the text for further details on model (1) and model (3). Regressions are weighted by the number of children used to calculate the enrollment rate. Confidence intervals calculated using the method described in Conley and Taber (2011) are in brackets.

**Table E-4** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Mothers' Time Use, by Maternal Education: With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Coefficient on:</i>	<i>Time spent with child present</i>	<i>Time spent caring for and/or helping child</i>
	<i>1</i>	<i>2</i>
<i>a. Mother Has High School Degree or Less (N=96)</i>		
Age4 x GA or OK	-46.18	24.96
90%	[-173.7, 59.2]	[-61.7, 108.0]
80%	[-128.6, 53.0]	[-41.9, 68.3]
<i>b. Mother Has Some College or More (N=102)</i>		
Age4 x GA or OK	2.702	-7.703
90%	[-93.4, 132.9]	[-68.9, 38.9]
80%	[-90.1, 121.1]	[-64.7, 35.9]

Source: Authors' regressions based on state-by-presence of 4 year old averages of microdata from the American Time Use Survey, January 2003-December 2012.

<sup>a</sup> Each panel and column represents a separate estimate of model (2). Time is measured in minutes, and the sample is limited to women in households with a 4- and/or 5-year-old child, and to non-holiday weekdays from September through June. Regressions are weighted by the number of observations used to calculate the dependent variable. Confidence intervals calculated using the method described in Conley and Taber (2011) are in brackets.

**Table E-5.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Fourth Grade NAEP Mathematics and Reading Scores, by Child's Eligibility for Free or Reduced-Price School Lunch: With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Dependent variable</i>	<i>Effect Sizes:</i>				
	<i>Baseline DD</i>	<i>Baseline + Indicator for 3+ Cohorts Pre-initiative</i>	<i>Baseline + Add State Linear Trends</i>	<i>Specification 2 + Student Demographics</i>	<i>Specification 4 + Other State Education Policies</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>a. Child Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	1.769	3.201	2.643	3.146	3.138
90%	[-2.22, 4.82]	[-0.77, 6.27]	[-1.36, 5.69]	[-1.00, 6.02]	[-1.00, 6.03]
80%	[-1.95, 4.06]	[-0.49, 5.51]	[-1.08, 4.93]	<b>[0.12, 5.50]</b>	<b>[0.09, 5.50]</b>
N (state-years)	296	296	296	296	296
Reading Scale Score, 4th Grade	0.398	3.288	2.468	3.011	3.154
90%	[-6.79, 4.52]	[-3.87, 7.44]	[-4.74, 6.57]	[-3.40, 6.84]	[-3.17, 7.04]
80%	[-3.59, 3.80]	[-0.66, 6.74]	[-1.54, 5.86]	[-0.45, 6.15]	[-0.71, 6.40]
N (state-years)	339	339	339	339	339
<i>b. Child Not Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 4th Grade	-0.256	0.834	0.467	0.725	0.857
90%	[-3.50, 1.82]	[-2.39, 2.92]	[-2.78, 2.53]	[-1.91, 2.81]	[-1.93, 2.79]
80%	[-2.35, 1.40]	[-1.25, 2.50]	[-1.64, 2.11]	[-1.06, 2.46]	[-1.03, 2.43]
N (state-years)	296	296	296	296	296
Reading Scale Score, 4th Grade	-2.968	-1.332	-0.653	-1.585	-1.589
90%	<b>[-7.05, -0.17]</b>	[-5.40, 1.48]	[-4.75, 2.13]	[-5.62, 0.61]	[-5.64, 0.62]
80%	<b>[-6.08, -0.94]</b>	[-4.42, 0.72]	[-3.77, 1.37]	[-4.57, 0.16]	[-4.59, 0.15]
N (state-years)	339	339	339	339	339
Controls:					
State Fixed Effects	Y	Y	Y	Y	Y
Cohort Fixed Effects	Y	Y	Y	Y	Y
3+ Cohorts Prior to First Affected Cohort (=1)	N	Y	N	Y	Y
Linear Trends for GA and OK	N	N	Y	N	N
Student Demographics	N	N	N	Y	Y
Years with School Accountability	N	N	N	N	Y

Source: Authors' regressions based on state-by-year test score data from NAEP Data Explorer, data on enrollment by race from the Common Core of Data, and dates of consequential school accountability reported in Dee and Jacob (2011).

<sup>a</sup> Each reported coefficient is a separate estimate of  $\theta$  from model (1). See the text for details. Confidence intervals calculated using the method described in Conley and Taber (2011) are in brackets.

**Table E-6.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Eighth Grade NAEP Mathematics and Reading Scores, by Child's Eligibility for Free or Reduced-Price School Lunch: With Conley-Taber Confidence Intervals<sup>a</sup>

<i>Dependent variable</i>	<i>Effect Sizes:</i>				
	<i>Baseline DD</i>	<i>Baseline + Indicator for 7+ Cohorts Pre-initiative</i>	<i>Baseline + Add State Linear Trends</i>	<i>Specification 2 + Student Demographics</i>	<i>Specification 4 + Other State Education Policies</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>a. Child Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 8th Grade	2.015	2.724	2.455	2.252	2.152
90%	[-3.27, 5.59]	[-2.53, 6.33]	[-2.82, 6.03]	[-1.12, 5.06]	[-1.12, 5.17]
80%	[-1.59, 5.31]	[-0.90, 6.05]	[-1.15, 5.76]	[-0.89, 4.82]	[-0.79, 4.72]
N (state-years)	295	295	295	295	295
Reading Scale Score, 8th Grade	0.193	1.014	0.155	0.899	0.819
90%	[-3.93, 3.33]	[-3.10, 4.14]	[-3.96, 3.30]	[-3.38, 4.33]	[-3.48, 4.05]
80%	[-2.39, 3.20]	[-1.55, 4.01]	[-2.41, 3.17]	[-2.01, 4.04]	[-1.92, 3.88]
N (state-years)	334	334	334	334	334
<i>b. Child Not Eligible for Free or Reduced-Price Lunch</i>					
Math Scale Score, 8th Grade	-1.115	-1.009	-1.756	-1.260	-1.293
90%	[-6.75, 2.28]	[-6.64, 2.39]	[-7.40, 1.63]	[-5.59, 1.92]	[-5.56, 1.76]
80%	[-4.54, 1.24]	[-4.43, 1.35]	[-5.18, 0.59]	[-4.26, 1.31]	[-4.38, 1.31]
N (state-years)	295	295	295	295	295
Reading Scale Score, 8th Grade	-1.078	-0.763	0.111	-0.769	-0.813
90%	[-3.67, 1.17]	[-3.35, 1.49]	[-2.45, 2.39]	[-3.08, 1.55]	[-3.13, 1.37]
80%	[-3.19, 0.58]	[-2.86, 0.90]	[-1.97, 1.80]	[-2.87, 1.06]	[-2.83, 0.93]
N (state-years)	334	334	334	334	334
Controls:					
State Fixed Effects	Y	Y	Y	Y	Y
Cohort Fixed Effects	Y	Y	Y	Y	Y
3+ Cohorts Prior to First Affected Cohort (=1)	N	Y	N	Y	Y
Linear Trends for GA and OK	N	N	Y	N	N
Student Demographics	N	N	N	Y	Y
Years with School Accountability	N	N	N	N	Y



Source: Authors' regressions based on state-by-year test score data from NAEP Data Explorer, data on enrollment by race from the Common Core of Data, and dates of consequential school accountability reported in Dee and Jacob (2011).

<sup>a</sup> Each reported coefficient is a separate estimate of  $\theta$  from model (1). See the text for details. Confidence intervals calculated using the method described in Conley and Taber (2011) are in brackets.

**Table F-1.** State-Specific Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Preschool Enrollment Rates of 4 Year Olds, by Maternal Education<sup>a</sup>

<i>Dependent variable (%)</i>	<i>Effect Sizes:</i>		
	<i>Baseline DD</i>	<i>Add Demographics</i>	<i>Add State Linear Trends</i>
	<i>1</i>	<i>2</i>	<i>3</i>
<i>a. Mother Has High School Degree or Less (N=1785)</i>			
		<i>Georgia</i>	
Public Preschool Enrollment Rate	17.35 (1.401)	17.25 (1.511)	17.85 (1.415)
Private Preschool Enrollment Rate	3.677 <sup>†</sup> (0.569)	3.841 <sup>†</sup> (0.631)	3.576 (0.986)
Overall Preschool Enrollment Rate	21.03 <sup>†</sup> (1.300)	21.09 <sup>†</sup> (1.384)	21.42 (1.378)
		<i>Oklahoma</i>	
Public Preschool Enrollment Rate	17.73 (1.214)	16.55 (1.187)	16.26 (1.242)
Private Preschool Enrollment Rate	-3.028 (0.561)	-1.63 (0.752)	2.376 (1.211)
Overall Preschool Enrollment Rate	14.7 (1.224)	14.92 (1.214)	18.63 (1.946)
<i>b. Mother Has Some College or More (N=1784)</i>			
		<i>Georgia</i>	
Public Preschool Enrollment Rate	15.42 <sup>†</sup> (0.805)	15.38 <sup>†</sup> (0.851)	25.26 <sup>†</sup> (1.331)
Private Preschool Enrollment Rate	-1.512 <sup>†</sup> (0.871)	-0.377 <sup>†</sup> (0.846)	-10.75 <sup>†</sup> (1.009)
Overall Preschool Enrollment Rate	13.9 <sup>†</sup> (1.067)	15 <sup>†</sup> (1.119)	14.52 (1.304)
		<i>Oklahoma</i>	
Public Preschool Enrollment Rate	24.65 (0.707)	24.88 (0.732)	32.22 (1.018)
Private Preschool Enrollment Rate	-16.38 (0.739)	-17.16 (0.756)	-19.23 (1.435)
Overall Preschool Enrollment Rate	8.275 (0.900)	7.718 (0.868)	12.98 (1.611)
Controls:			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
Linear Trends for GA and OK	N	N	Y

Source: Authors' regressions based on state-by-year-by-age averages of microdata from the October CPS School Enrollment Supplements, 1977-2011.

<sup>a</sup> Regressions give each state-year-age observation equal weight. Standard errors clustered on state are in parentheses. Daggars represent a statistically significant difference from the corresponding Oklahoma-specific estimate at the † 1 percent level.

**Table G-1.** Differences-in-Differences Estimates of the Impact of High-Quality Universal Preschool on Monthly Spending on Child Care, by Maternal Education: Use Families With 3 Year Olds as a Comparison Group<sup>a</sup>

<i>Coefficient on:</i>	<i>Baseline DD</i> <i>1</i>	<i>Topcode Spending</i> <i>2</i>	<i>Use Median</i> <i>Spending</i> <i>3</i>
<i>a. Mother Has High School Degree or Less (N=924)</i>			
Age4 x GA or OK	12.38** (5.296)	12.25** (5.289)	-16.21*** (2.964)
Age 4	4.387 (5.103)	4.469 (5.104)	3.274 (2.781)
GA or OK	-8.940 (7.940)	-8.400 (7.882)	4.680 (5.217)
<i>b. Mother Has Some College or More (N=1000)</i>			
Age4 x GA or OK	-44.02 (30.25)	-42.24 (30.17)	17.75 (16.39)
Age 4	8.909 (11.66)	6.136 (10.56)	16.67 (13.35)
GA or OK	-49.75** (20.42)	-35.72* (18.66)	-67.76*** (17.10)
Additional Controls:			
Year Fixed Effects	Y	Y	Y

Source: Authors' regressions based on state-by-year-by presence of 4-year-old averages of microdata from the Consumer Expenditure Survey, September 1998-June 2011.

<sup>a</sup> Each panel and column represents a separate estimate of model (2), using families with 3 year olds as a comparison group. The sample is limited to families with a 3- and/or a 4-year old child. Monthly childcare spending is in real 2012 dollars. In column 2, we topcode spending at the 99th percentile before collapsing the data to state-by-year-by-age means. In column 3, we collapse the data to cell medians instead of cell means. Regressions are weighted by the number of families used to calculate the dependent variable. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.

**Table G-2.** Differences-in-Differences and Triple-Difference Estimates of the Impact of High-Quality Universal Preschool on Employment Rates of Mothers of 4 Year Olds, by Maternal Education: Use Families with 3 Year Olds as a Comparison Group<sup>a</sup>

<i>Dependent Variable</i>	<i>Coefficient on post (Model 1):</i>		<i>Coefficient on post x age4 (Model 3), Comparison Group is (Mothers of) 3 Year Olds</i>
	<i>Baseline</i> 1	<i>Add Controls</i> 2	3
<i>a. Mother Has High School Degree or Less</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-1.874 (2.533)	-1.114 (2.700)	2.214 (2.735)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	19.94*** (1.408)	18.91*** (1.386)	15.89*** (3.509)
Private School Enrollment Rate (%)	-1.361 (1.137)	-0.638 (0.820)	-2.655*** (0.862)
<i>Effect of Public on Private</i>	-0.0683 (0.0544)	-0.0337 (0.0424)	-0.167*** (0.0327)
N (state-by-year-by-age cells)	1,785	1,785	3,570
<i>b. Mother Has Some College or More</i>			
<i>Maternal Employment:</i>			
% Mothers at Work Prior Week	-4.620*** (1.389)	-4.518*** (1.394)	-0.696 (1.728)
<i>Child's School Enrollment:</i>			
Public School Enrollment Rate (%)	23.32*** (5.746)	23.35*** (6.000)	21.84*** (6.830)
Private School Enrollment Rate (%)	-15.18*** (1.542)	-14.90*** (0.989)	-11.04** (4.931)
<i>Effect of Public on Private</i>	-0.651*** (0.216)	-0.638*** (0.189)	-0.505*** (0.0755)
N (state-by-year-by-age cells)	1,784	1,784	3,569
<i>Controls:</i>			
State Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
Nonwhite (%), Female (%)	N	Y	Y
State Unemployment Rate	N	Y	Y
All controls x <i>age4</i> indicator	N	N	Y

Source: Authors' regressions based on state-by-year-by age averages of microdata from the October Current Population Survey, 1977-2011.

<sup>a</sup> See the text for further details on model (1) and model (3). Coefficients in italics are two-stage least squares estimates of the effect of the public school enrollment rate on the private school enrollment rate, where the instrument for the public school enrollment rate is either *post* (in columns 1 and 2) or *postxage4* (in column 3). Regressions are weighted by the number of children used to calculate the enrollment rate. Standard errors clustered on state are in parentheses. Asterisks indicate statistical significance at the \*\*\*1 percent, \*\*5 percent, or \*10 percent level.