

Does State Preschool Crowd-Out Private Provision? The Impact of Universal Preschool  
on the Childcare Sector in Oklahoma and Georgia

Daphna Bassok  
University of Virginia

Maria Fitzpatrick  
Cornell University and NBER

Susanna Loeb  
Stanford University and NBER

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Corresponding Author: Maria Fitzpatrick, Department of Policy Analysis and Management, Cornell University.  
Mail: 103 Martha Van Rensselaer Hall, Ithaca, NY 14853. Email: maria.d.fitzpatrick@cornell.edu Phone: (607)  
255-1272.

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## *Abstract*

Universal preschool policies introduced in Georgia and Oklahoma offer an opportunity to investigate the impact of government intervention on provision of childcare. Since Georgia used a voucher-like program and Oklahoma utilized its existing public schools, the two states offer a case study of how government provision compares to government subsidization alone. Using a synthetic control group difference-in-difference estimation framework, we examine the effects of universal preschool on childcare providers. While there is no crowd-out in Oklahoma, some of the government subsidized preschool in Georgia replaces providers that would have existed otherwise. Importantly, in both states there is an increase in the amount of formal childcare.

## I. Introduction

In both the 2013 and 2014 State of the Union addresses, President Obama put forward a proposal for Preschool-for-All, a federal program to incentivize state universal preschool programs like those in six states, including Georgia and Oklahoma. In 2012, over 40 states had state-funded preschool programs and collectively these states spent over \$5 billion on preschool programs (Barnett et al. 2012). Proponents argue that, by providing equal access to high-quality preschool for all children regardless of their families' income, universal preschool will equalize early childhood development opportunities and improve life outcomes for children. Opponents are concerned that a universal program will serve mostly to supplant private spending on preschool and that publicly provided preschool programs will crowd-out private providers from the childcare market (Burke 2010, Whitehurst 2013).

In this paper, we examine the effects of a state's introduction of universal preschool policy on the number of childcare providers. To answer this question we use a differences-in-differences framework, incorporating both traditional and synthetic control group methods. We utilize two unique administrative datasets, one drawn from tax records on businesses operating in the childcare industry and the other from reported state spending and enrollment in universal preschool in Georgia and Oklahoma. Identification stems from comparing the supply of formal childcare in states with universal preschool to that in states without universal preschool before and after the universal preschool policies were introduced.

These two states' universal preschool policies offer a novel and rich opportunity to investigate the impact of government subsidies on the private sector (Levin and Schwartz 2007). The programs are large in scope, generally providing preschool services to all families with age-eligible children who want to enroll. Importantly, the programs we study, those in Georgia and

Oklahoma, were introduced suddenly and widespread care quickly became available. In both cases the universal program was a distinct shift from the previously existing government subsidized preschool programs providing care to low-income families on a much smaller scale. Moreover, the childcare market is an interesting setting to examine how public subsidization affects private provision because the childcare sector is a mixed market (with public formal providers and both private formal and private informal providers), has low barriers to entry, and is relatively less concentrated than other industries.

In both states there is an increase in the number of formal childcare providers; in Georgia the number of childcare providers increases by 25 percent, while in Oklahoma it increases by more than 30 percent.<sup>1</sup> In this setting, therefore, government intervention increases provision. Of interest is whether the increase is driven by pure expansion of the sector or if there is crowd-out, i.e. displacement of childcare that would have been provided in the absence of government intervention.<sup>2</sup> If crowd-out occurs, valuable public resources may be being used inefficiently.

Although the universal preschool policies in the two states are generally similar, they differ in one important dimension. Georgia's program operates much more like a voucher system, where any type of provider can apply to run a universal preschool classroom (provided they meet certain requirements) and will receive funding directly from the state. The Oklahoma system, on the other hand, operates largely through the public school system because the funds flow through the local school districts, which can either provide preschool themselves or contract out with local providers. As a result of this difference in program design, nearly 80 percent of

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<sup>1</sup> In the working paper version of this paper, we confirmed the results of these state-level analyses with market level analyses. These more micro-level analyses also allow us to examine how the effects of universal preschool differ across communities with different populations. For example, we find that universal preschool had its largest effects on the formal childcare sector in the most rural areas and in places with low pre-existing levels of supply, a finding that may help direct policymaking efforts aimed at expanding the childcare sector. More information on the market-level analyses and their results can be found in Bassok et al. (2013).

<sup>2</sup> Efforts to find empirical support of the theoretical notion of crowd-out have been both relatively limited and mixed in their findings (Cutler and Gruber 1996; Card and Shore-Sheppard 2004; Gruber and Simon 2008; Payne 2009).

universal preschool in Georgia takes place in private childcare centers while 90 percent of universal preschool in Oklahoma is publicly provided (i.e. in public schools). Although there are other differences between Georgia and Oklahoma that may also lead to differential effects of a universal preschool program, we use the comparison of effects in the two states as a case study for comparing government provision (as in Oklahoma) to government funding alone (as in Georgia).

Basic economic theory predicts that government provision of a good should result in decreased private expenditures on the good and may result in less overall consumption than government subsidization through funding alone (Peltzman 1973). This is because when the government provides a specific amount or type of a particular good or service, there may be additional costs to consumers (above the market price) of purchasing additional units. Consider the case we study here, universal preschool, where the government provides a set amount of care (three or six hours a day). In order to obtain daycare for a full workday shift (eight hours), parents have to piece together multiple arrangements, which may be more costly than the hourly cost of childcare (e.g. because of transportation costs). On the other hand, if the government only provides partial care, the private sector may survive if parents demand full workday care and private centers adjust to the new environment (e.g. by providing transportation or operating for different hours). Moreover, with government provision a new competitor to the private sector is introduced. This addition may crowd out private provision of a good relative to an environment where the good is provided through private consumption and government funding. Therefore, despite being partly motivated by the goal of increasing the supply and use of a good,

government provision may result in less use of a good, in part because of its effects on private providers.<sup>3</sup>

We find that in Georgia, the overall increase in care is partly driven by an increase in the supply of formal childcare in the private sector and partly driven by new publicly-provided preschools. This makes sense, given that the government allowed both public and private providers to receive universal preschool funds. However, even though the formal childcare sector expanded, we estimate that at least 60 percent of the publicly funded universal preschool in Georgia took place in pre-existing private childcare settings. As such, there is substantial crowd-out of private consumption of preschool, a finding that is corroborated by evidence on enrollment (Fitzpatrick 2008, Cascio and Schanzenbach 2013).

Meanwhile, in Oklahoma, the increase in childcare providers is driven by expansion in the public sector only, which concords with the flow of funds from the state to public schools. Our results suggest that the resulting competitive pressure of this public sector expansion leads to little decrease in the number of private providers, but may have pulled workers from the private childcare providers into public preschools. Moreover, although theory suggests government provision might crowd out private providers, we can rule out contractions of the private formal care sector in Oklahoma that are larger than one percent.<sup>4</sup>

These results point to a surprising rejection of the Peltzman (1973) hypothesis that government provision will result in less overall consumption of a good (relative to government subsidization). Since we measure childcare for all aged children and universal preschool is only available for four year olds, the lack of crowd out may be driven by the expansion of providers

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<sup>3</sup> Government intervention is sometimes also motivated by increasing the quality of the good or service consumed. In what follows, we abstract from possible changes in the quality of childcare due to a lack of data. Understanding whether government funding and provision have differential effects on childcare quality is a valuable avenue for future research.

<sup>4</sup> This comes from the market level analyses. For more information, see Bassok et al. (2013).

into care for different-aged children. Alternatively, the short hours of part-day care may make it possible for the private providers in Oklahoma to supplement the publicly provided universal preschool.

In the next section, we describe the universal preschool programs in Georgia and Oklahoma. In Section III, we detail the data we use to answer each of the above questions. In Section IV, we describe our research design and the results for each question in turn before concluding the paper in Section V with a discussion of the implications of our results for policy.

## II. What is Universal Preschool?

Before detailing our analyses, it is worthwhile to describe the universal preschool programs that we study in more detail, particularly because the implementation of universal preschool has been somewhat different across states. Georgia's Lottery for Education Act, passed in 1992, instituted a lottery which funds both the HOPE scholarship program and a pre-kindergarten initiative for four year olds.<sup>5</sup> While initially both programs targeted low- and middle-income households, by 1995, when lottery revenues exceeded expectations, the programs had expanded suddenly to include all age-eligible residents. In 2010, approximately 55 percent of four year olds were enrolled in Georgia Pre-Kindergarten (GPK) at a total state cost of \$341 million. In 1998, the Oklahoma legislature expanded its existing means-tested Early Childhood Program for Four Year Olds (ECPFYO) to include all age-eligible children regardless of income. By 2010, enrollment in the program reached 71 percent of four year olds and cost \$167 million.<sup>6</sup> Figure 1 details how enrollment in these programs grew.

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<sup>5</sup> The HOPE scholarship has received much more attention from politicians and economists than its sister program, Georgia Pre-K. For examples, see Dynarski (2000) and Long (2004).

<sup>6</sup> <http://nieer.org/yearbook/pdf/yearbook.pdf> (March 13, 2007)

In both states the programs are voluntary, free, and available to all children irrespective of family income. They operate for the length of the school year, but Georgia mandates a 6.5 hour day while Oklahoma offers both half- (2.5 hours) and full- (6 hours) day options.<sup>7</sup> Educational requirements for teachers exceed those required for licensed child care facilities in both states. Similarly, both programs impose class size, ratio and curriculum regulations that exceed licensing requirements in their respective states.

A wide range of facilities can provide universal preschool care in both states, including public schools, Head Start centers, private child care centers, faith-based centers and other non-profit centers. In practice however, the composition of providers differs substantially across the two contexts. The state of Georgia transfers lottery funds directly to centers. In Oklahoma, public school districts receive money from the general revenue allotted for the program on a first-come first-served basis. The districts may then provide the service themselves or contract out to child care centers that meet the state requirements. This stream of funding in Oklahoma has led to a much different mixed market structure than in Georgia. Indeed, while in Georgia only 20 percent of providers are public schools, in Oklahoma about 90 percent of the universal preschool slots are provided through the public school system. In both states, however, the care provided by the universal preschool program is considered formal classroom-based care for four year olds, a point to keep in mind as we describe the data and our results about the effects of universal preschool.

In 2010-2011, expenditures per child on universal preschool in Georgia averaged \$4,298, though actual reimbursement rates varied slightly based on location and teacher education. In the same year, expenditures averaged \$3,461 per child in Oklahoma, though actual

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<sup>7</sup> Both options in Oklahoma are free to parents but reimbursement rates to providers depend on the length of care provided. Both states encourage centers to offer additional care (after set program hours and during the summer). However, neither pays the cost of this “supplemental” care.



reimbursement rates depended on whether children attended full- or part- day sessions.<sup>8</sup> To place the size of the subsidies in context, average child care costs for full-time center care for four year olds in 2013 was \$6,234 in Georgia and \$5,610 in Oklahoma.<sup>9</sup> These averages are higher than the per pupil spending on universal preschool in part because they are reported for full-time (eight hours per day) care and the universal preschool programs are not full-time childcare.

Although evidence sheds light on how regulation, the other main tool for government intervention in the childcare arena, affects the supply of childcare (Ribar 1992; Blau 1993; Chipty 1995; Chipty and Witte 1997; Hotz and Kilburn 1997; Hofferth and Chaplin 1998; Currie and Hotz 2001; Blau 2003; Hotz and Xiao 2011), we know very little about the effects of government provision and funding on the childcare industry.<sup>10</sup> This lack of understanding is in part because many of the most widely studied interventions have been too small in scope to produce general equilibrium consequences and in part because data sources needed to answer this question have only recently become available. More generally, little research has assessed the effects of government intervention through funding and provision on firms and workers, instead focusing on the effects on consumer decision making (Gruber and Simon 2008, Ganderton 1992, Cohodes and Goodman Forthcoming), charitable giving (Hungerman 2005) or on intergovernmental grants on government spending (Knight 2002, Gordon 2004).<sup>11</sup> Recent exceptions focused on the crowd-out of supply include evaluations of crowd-out in postsecondary education (Cellini 2009), substance abuse treatment (Cohen, Freeborn and

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<sup>8</sup> <http://nieer.org/yearbook/pdf/yearbook.pdf> (October 28, 2011). Centers cannot receive more than a small registration fee from parents in either state.

<sup>9</sup> [http://usa.childcareaware.org/sites/default/files/cost\\_of\\_care\\_2013\\_103113\\_0.pdf](http://usa.childcareaware.org/sites/default/files/cost_of_care_2013_103113_0.pdf) (April 4, 2014)

<sup>10</sup> For a thorough review, see Blau and Currie (2006).

<sup>11</sup> Historically, this literature had trouble identifying a crowd out effect of government provision or funding, but more recent papers using more credible identification strategies have begun to find support for the crowd out theory. For a review, see Payne (2009).

McManus 2013) and rental housing (Eriksen and Rosenthal 2010). Understanding how supply reacts to government intervention is important for understanding the welfare consequences of the intervention, including both the implications for affordability and access and measuring welfare changes that accrue to the providers themselves.

Beyond its use as an example of government intervention, understanding the full impact of government preschool provision is important in its own right, as early childhood educational interventions have received increasing attention as potential tools for improving child development and life outcomes for children and their families. To date, the literature on early childhood interventions has focused largely on how government provision and funding affects child outcomes and family decision making (Schweinhart et al. 1993; Currie and Thomas 1995, 1999; Blau and Currie, 2004; Magnuson et al. 2004; Gormley and Gayer 2005; Gormley et al. 2005; Baker, Gruber and Milligan 2008; Fitzpatrick 2008, 2010; Cascio 2009; Herbst and Tekin 2010; Johnson, Ryan and Brooks-Gunn 2012; Cascio and Schanzenbach 2013).

However, the effect of interventions on these child and family outcomes likely depends in part on provider response to the government program. Specifically, the impact of any government investment in early childhood, either through direct provision or through funding only, will depend on the extent to which it leads to an introduction of new and/or higher quality services, rather than a supplanting of previously provided programs. We aim to fill a gap in the literature by examining the effects of universal preschool on the supply of providers. Our outcome measures of the number of providers and employees in the childcare sector actually incorporate the intersection of supply and demand, but for brevity we refer to our data as measuring the supply side of the childcare market, as is conventional in the literature (Hotz and Xiao 2011). Throughout the paper, we make a distinction between universal preschool

subsidization through provision, when the government opts to provide a good or service itself, versus subsidization through funding alone.

### III. Data on the Supply of Childcare

To examine the effects of universal preschool on childcare providers, we utilize two data sources. First, to measure the number of and size of childcare centers, we use data compiled by the U.S. Census Bureau from Internal Revenue Service tax return data: the Longitudinal Business Database (LBD). These data include information on firms that have employees on payroll from 1990 to 2009.<sup>12</sup> Since childcare centers employ workers as teachers, directors, teacher's aides, etc. and home daycare settings are generally operated and staffed by a single person, we refer LBD firms as childcare centers. Therefore, these data provide us with information on any operating childcare centers that filed tax returns in a given calendar year.<sup>13</sup>

Our second resource for data is public school enrollment information from Common Core of Data (CCD). The CCD collects information on enrollment by grade in public schools, which allows us to capture the preschool provision and employment in public schools, which are not part of the LBD. This is particularly important in Oklahoma where the universal preschool program operated mainly through the public school system. In addition, the CCD allows us to more accurately control for the fact that many other states offer pre-k programs targeted at low-income or learning disabled students.

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<sup>12</sup> In the data, there is a distinction between establishments (single locations of operation) and firms (the overarching company, which may operate several establishments). Since most firms in the childcare industry are single-establishment firms, we will use the terms firm and establishment interchangeably. Future work may distinguish between the two things, in part to determine whether universal preschool has caused a shift towards more multi-establishment firms.

<sup>13</sup> We subset to only those firms in the childcare industry according to their SIC or NAICS code. This means we may be missing childcare provided by employers in other industries (to the children of their own employees, e.g. hospitals, universities, etc.) and in churches. Additionally, these tax-return data are unable to capture anyone working in this market who does not claim income for doing so (i.e. not filing a 1040 Schedule C). Those missing are most likely to be babysitters, nannies and relatives providing care “off the books.”

Using the CCD and LBD, we create several measures of childcare provision at the state-level that we believe proxy for the amount and type of childcare in the market. As a measure of the overall supply of formal childcare we use the total number of both public and private childcare centers and their employment. If universal preschool increases preschool take-up, one or both of these measures should increase upon universal preschool introduction.<sup>14</sup> To capture the role of the private sector in the provision of formal childcare, we use the number of private centers and employees. If the public universal preschool programs crowd-out the private provision of formal care, we should see a decrease in these measures. Finally, because prior work has linked the pay of childcare workers to the quality of care provided, we use the pay per employee in private childcare establishments as a loose proxy for the quality of those centers (Whitebook and Sakai, 2003; Shonkoff and Phillips, 2000).

The average and standard deviations of the supply measures across states are reported in Table 1. There are many more daycare homes than childcare centers, but centers employ more than 10 workers, on average. Generally, on a per child basis, the supply of childcare in Georgia and Oklahoma is similar to other Southern states, but slightly lower than the rest of the states.

Our data offer some distinct comparative advantages over other data that has been or might be used to study the crowd-out driven by government intervention into the preschool market. First, few surveys collect information about childcare use and what survey data exist are limited in sample size and the types of childcare covered.<sup>15</sup> Our data cover the universe of childcare providers and allow us to examine how government intervention into care for four year

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<sup>14</sup> Of course, if providers were operating below full capacity, childcare consumption could increase without any of these measures changing.

<sup>15</sup> For example, the Decennial Census and Current Population Survey, the surveys with the greatest number of respondents, ask parents only whether their child attends preschool, but have no other questions about childcare. The Survey of Income and Program Participation includes more detailed questions about childcare use, but the samples are relatively small and surveys are only done every few years.

olds affects childcare providers more generally. The welfare effects of government intervention differ if a provider is forced out of the market entirely rather than if she just changes the age of children in her care. Second, surveys like the Decennial Census and Current Population Survey contain questions posed to respondents about their childcare providers. This likely renders some information inaccurate. For example, a business is more likely to accurately report their acceptance of public sector funds than a parent is to know whether the center received subsidy income for the children other than her own. Despite these advantages, our data are somewhat limited because they lack information about the quality of childcare centers or the prices paid for care. Such rich data are scarce, and, to our knowledge, data with such information does not exist that would allow for an analysis of universal preschool.

#### IV. Determining the Effects of Universal Pre-Kindergarten

##### *Identifying the Effects of a Statewide Universal Pre-Kindergarten Policy*

We are interested in identifying the effects of a state government's introduction of a universal preschool policy on the supply of childcare in the state. Note that universal preschool introduced in these states was layered on top of an existing network of state and federal child care and early education programs, such as Head Start. For this reason, the question we answer is: what is the effect of the introduction of a universal preschool policy on the supply of childcare above and beyond the effects of preexisting government involvement? Given the existing landscape, we consider this the most relevant policy question. The assumption underlying our use of the difference-in-difference strategies detailed below to answer this question is that the

universal preschool policies in Georgia and Oklahoma were orthogonal to any other changes in the childcare sector in these states (relative to the states in the comparison group).<sup>16</sup>

Our empirical strategy leverages the exogenous introduction of universal preschool programs in Georgia in 1995 and in Oklahoma in 1998 in a differences-in-differences framework. We do this first by estimating the following equation:

$$Y_{st} = \alpha + \beta X_{st} + \theta UPKinGA_{st} + \gamma UPKinOK_{st} + \delta_s + \vartheta_t + \varepsilon_{st}. \quad (1)$$

Equation (1) represents a traditional differences-in-differences framework, in which  $s$  indexes the state and  $t$  the year of the observation. There are controls for state ( $\delta$ ) and year ( $\vartheta$ ) fixed effects.  $Y$  represents an outcome variable from our set of measures of the supply of childcare detailed in the previous section, e.g. the total number of formal care providers. The variables  $UPKinGA$  and  $UPKinOK$  are dummy variables that take a value of one once the universal preschool policy is introduced in Georgia and Oklahoma, respectively.

The identification assumption underlying our use of this specification is that nothing else changed in these states concurrent with the introduction of universal preschool.<sup>17</sup> To reassure ourselves that this is the case, we also control for time-varying factors that might be related to childcare provision, such as spending on other childcare subsidies and Head Start, the unemployment rate, the employment rate of women in the state, the number of children of school age, the number of children ages zero to five, the racial composition of residents, the poverty rate

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<sup>16</sup> For confirmation that universal preschool introduction is not confounded by expansions in other government programs, like Head Start, see Fitzpatrick (2008).

<sup>17</sup> Additionally, the use of a differences-in-differences framework assumes there are no differences in pre-existing trends in the universal preschool states. Support for this assumption is found in event-study-style models in which we replace the treatment variables with a set of distributed leads and lags for each of the treated states. The results from this estimation are presented in the figures in Appendix A. In these figures, there is no evidence of pre-treatment trends. In fact, most of the outcomes in the pre-treatment period in the treated states cannot be statistically distinguished from those in states without universal preschool. Moreover, the results in these figures confirm those presented in the following sections.

and median income of residents.<sup>18</sup> The standard errors are clustered at the state level in order to allow for the possibility of serially correlated errors.

Because we estimate the relationship between universal preschool introduction and the supply of childcare separately for each state, we essentially have two case-studies of universal preschool introduction. The extent to which our model can be used to estimate the causal impact of universal preschool introduction depends on identification of a comparison group that accurately captures the counterfactual supply of childcare in Georgia and Oklahoma in the absence of universal preschool introduction. We present results using three comparisons: (1) all others states; (2) Southern states (under the hypothesis that patterns of childcare demand are similar in Georgia, Oklahoma and other Southern states); and (3) a synthetic control group.

Synthetic control group methods were recently introduced for estimating the effects of an intervention that has been given to only one treatment group, in this case only to one state (Abadie et al. 2010). In our application, this requires creating a synthetic control group for each of our two universal preschool states that best approximates the counterfactual supply of childcare in these states in the absence of universal preschool and the pre-treatment evolution of other characteristics that may be related to the supply of childcare. Following Abadie et al., we create synthetic control groups for Georgia and Oklahoma by picking the weighted combination of all other states that minimizes the mean squared prediction errors of the outcome variables and a set of observable characteristics in the pre-intervention period. More specifically, we define  $X_i$  as a vector of observable characteristics in Georgia (or Oklahoma) before universal preschool is

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<sup>18</sup> Additionally, we could control for state specific trends in the outcomes, which we did in previous versions of the paper. However, a visual examination of the data (see Figures 3, 4 and those in Appendix B and C) suggests controlling for time trends over-fits the data by parsing some of the treatment effect into the trend. Also, our synthetic control group method explicitly controls for differences in trends by creating a control group with a trend in the outcome variable that most closely mirrors the trend in the outcome in the treated state. As such, we only present results here without state specific trends, but estimates from specifications with trends are available from the authors upon request.

introduced and  $X_0$  is the matrix of these characteristics in other states. We choose a vector of weights,  $W$ , that minimizes the following function, which represents the distance between the pre-treatment characteristics of Georgia and the other states:

$$\|X_1 - X_0W\|_V = \sqrt{(X_1 - X_0W)'V(X_1 - X_0W)}.$$

In what follows, we choose a matrix,  $V$ , that assigns weights to the pre-treatment outcomes and characteristics in order to minimize the mean squared prediction error in the pre-treatment period. We conduct inference by randomly assigning treatment status to each state in the country that does not have universal preschool, conducting synthetic control group analyses using each assigned ‘placebo’ treatment in turn, and obtaining coefficient estimates. The distribution of these ‘placebo’ treatment coefficient estimates serves as the distribution for assigning p-values of statistical significance to our synthetic control group estimates.<sup>19</sup>

### *Universal Preschool in Georgia*

A visual inspection of childcare supply measures over the period suggests that universal preschool had a positive effect on the amount of childcare being provided in Georgia. Figure 2 plots the total number of childcare centers (Panel A), number of employees working at childcare centers (Panel B), the total number of private childcare centers (Panel C), number of employees working at private childcare centers (Panel D), and the amount of pay per employee (in thousands of \$2010, Panel E) over the period studied. The solid black lines in each panel measure the outcome for Georgia, while the dashed black lines plot the outcome for the synthetic

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<sup>19</sup> The predictability (mean square prediction error) of each of these placebo tests for the pre-treatment period is compared to its predictability in the post period. If there really were a shock effect of universal preschool the model should do less well at predicting the outcomes in Georgia in the pre-period relative to the post-period than it does in each of the other states. We conduct these placebo tests for each outcome in each of the other 49 states in our sample and determine statistical significance using the fraction of control group states that have a larger MSPE ratio (post-period to pre-period) than Georgia.



control group.<sup>20</sup> The vertical line in each figure represents the first year in which universal preschool was implemented in Georgia, 1996.

Panels A and B, suggest that the introduction of universal preschool increased the overall formal childcare sector both in terms of the number of centers and employees in Georgia relative to the number of centers and employees in the synthetic control group. The former increased by about 25 percent, while the latter increased by about 33 percent. The increase in the private sector, meanwhile, was less dramatic (Panels C and D). The number of private childcare centers hardly increased, but the number of childcare workers in private centers increased by 25 percent. Finally, the annual earnings per childcare worker remain similar in Georgia and the synthetic control group over the period. These results suggest that universal preschool in Georgia increased the amount of formal childcare taking place in the state by increasing the amount of both publicly and privately provided care.

Of importance, however, is whether these estimated effects of universal preschool introduction are statistically different from zero. In Table 2, we present results, first for a set of traditional difference-in-difference specifications, then using the synthetic control group methods. In column (1), we present the results from equation (1) using the 48 other states as a control group. In column (2), we repeat the estimation using only the other states in the Census Bureau-defined South as the comparison group. The synthetic control group estimates of the effects of universal preschool in Georgia are presented in column (3) of Table 2. Since the

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<sup>20</sup> A separate synthetic control group is chosen for each universal preschool state for each outcome. The list of weights for each state and outcome combination is in Appendix D. Generally, no one state contributes an inordinate amount of weight to the synthetic control group. (The exception is that Washington, DC makes up 41 percent of the synthetic control group for Oklahoma in the analyses with the number of private childcare center employees as the outcome of interest, but results are similar if DC is omitted from the possible control group.) Additionally, the southern states are well-represented in the synthetic control groups. This is probably why the patterns of childcare supply described in Figures 2 and 3 using data on synthetic control groups closely mirrors the patterns that emerge from comparisons of childcare supply in Georgia and Oklahoma with the supply in the rest of the Southern States (Appendix B) and the rest of the U.S (Appendix C). The similarity across analyses with different comparison groups is also confirmed in estimates presented in Table 2.

synthetic control group method renders the closest match between pre-treatment outcomes and other characteristics in the treatment and synthetic comparison states, it is our preferred specification. For this reason, and because the pattern of results is largely consistent across the three columns, we discuss the results in column (3).

The results show that the universal preschool policy increased the overall formal sector by 374 establishments and 5,443 employees (or 23 and 35 percent, respectively). Both of these estimates are statistically significant at the 5 percent level and are close to the traditional difference-in-difference estimates reported in the previous columns. The total number of employees at private childcare centers increased by 4,059, an estimate that is statistically significant at the 5 percent level, while the total number of private childcare centers hardly changed. (Note, however, that the confidence interval on the number of private providers is wide.) Therefore, it appears that universal preschool increased the overall amount of formal childcare in Georgia by increasing the total number of public childcare providers (by 374 centers, or 260 percent) and by increasing employment in both public and private childcare centers, by about 1,400 and 4,000 workers (or 1000 and 25 percent), respectively.<sup>21</sup>

Though the number of government funded pre-k providers in Georgia was about 1,700 in 2005 (Figure 1), our estimates suggest the introduction of the universal preschool policy increased the overall number of childcare centers in the state by just 374. Therefore, universal preschool expanded the formal childcare sector, but the majority of the publicly funded preschool took place in schools and centers that either existed before the introduction of universal preschool took place (and the source of funds switched from parents to the state) or are new publicly funded centers that forced out the previously existing centers.

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<sup>21</sup> Increases in percentage terms are relative to the number of establishments and employees in the public and/or private workforces in Georgia in 1992, before the targeted preschool program was introduced.

### *Universal Preschool in Oklahoma*

Figure 3 presents the number of childcare centers, employees in those centers and payroll per employee for Oklahoma and its synthetic control group. The figures show a distinct increase in the number of formal childcare centers of 30 percent (public and private combined, Panel A) but almost no change in the number of their employees (Panel B). Visually, it appears that universal preschool in Oklahoma may have had a small positive, perhaps temporary, effect (4 percent, Panel C) on the number of private childcare centers while decreasing the number of workers in the private sector by about 16 percent (Panel D). As with Georgia, there was essentially no change in the payroll per employee (Panel E). These results indicate that while universal preschool increased the number of entities providing formal childcare in Oklahoma, it may have resulted in a contraction of the private sector as workers moved from private childcare centers to the new universal preschool classrooms in public schools. Because the overall number of centers does not change, this would imply smaller childcare centers.

To determine whether this is the case, we turn to our methods for inference presented in Table 3, where again we focus the discussion on the estimates in column (3). These suggest that the introduction of universal preschool in Oklahoma led to an increase of 448 formal childcare establishments (41 percent), an estimate that is statistically significant at the 10 percent level and consistent with evidence using other estimation specifications. This expansion took place entirely in the public sector where there was a 300 percent increase in publicly provided preschools. The estimated effect on the number of workers in the private sector is a decrease of 1,293 workers (13 percent), though the estimate in column (3) is statistically indistinguishable from zero at conventional levels. Since there was no concurrent decrease in the total number of

employees (Panel B), universal preschool in Oklahoma may have expanded publicly provided preschool by enticing some of the workers from the formal private sector to move to the newly created publicly provided programs, expanding the number of workers in previously small public sector by 500 percent.

## V. Conclusion

In this paper, we have detailed the effects of both publicly funded and publicly provided preschool using the natural experiment provided by the introduction of universal preschool in Georgia and Oklahoma. Some consistent patterns emerged that are likely linked to the design of the governments' intervention into the early childhood care and education market. First, government funding of universal preschool in Georgia led to increases in the number of childcare providers in the formal sector that were likely driven by increases in both the number of public and private centers operating. Despite the fact that three-fourths of the government funded preschool takes place in the care of pre-existing providers, the childcare sector in Georgia expanded by nearly 20 percent.

Second, publicly provided preschool in Oklahoma led to increases in formal childcare in the state, largely driven by increase in preschools in the public sector. We show that this expansion in public provision of classroom-based preschool for four year olds did not lead to contraction of the private formal classroom-based sector for all ages of children. Whether this is because the additional preschool care was added to the existing preschool care for four year olds or because private providers were able to move into caring for children of different ages will require research using data that is yet unavailable.

The differences in the effects of universal preschool across these two states is likely driven by the subsidization mechanism chosen for the universal preschool program. Subsidization through government funding alone, as in Georgia, encourages private provision more than government provision. Because the two states are case-studies, we cannot rule out that there are other differences between them that drive the differences in effects of universal preschool. However, this empirical evidence is a crucial first step in understanding the effects of government provision and funding of goods and services on the supply side both in the childcare sector and the economy more broadly.

More generally, in both states, the introduction of universal preschool served to expand the childcare sector. This confirms the results of other studies showing universal preschool expanded overall enrollment (Fitzpatrick 2008, Cascio and Schanzenbach 2013). However, the program in Georgia directed a majority of resources towards providers that would have been in existence even in the absence of universal preschool, a finding also confirmed by studies using enrollment of children as an outcome. We find the private sector in Oklahoma did not contract, which is surprising in light of evidence that many children in Oklahoma would have enrolled even in the absence of the program (Cascio and Schanzenbach 2013). This may be because providers adjusted to the introduction of competition from the public provider (e.g. by expanding hours or expanding the types of care offered), but to date no data exist to examine such mechanisms. Regardless, the research clearly shows that universal preschool programs expand preschool enrollment of children by expanding the number of publicly provided preschools and, when program structure allows, privately funded preschools.

## 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.
- Michael Baker & Jonathan Gruber & Kevin Milligan, 2008. "Universal Child Care, Maternal Labor Supply, and Family Well-Being," *Journal of Political Economy*, University of Chicago Press, vol. 116(4), pages 709-745, 08.
- Barnett, W.S., Carolan, M.E., Fitzgerald, J., & Squires, J.H. (2012). *The state of preschool 2012: State preschool yearbook*. New Brunswick, NJ: National Institute for Early Education Research.
- Bassok, Daphna, Maria Fitzpatrick, Susanna Loeb. 2013. "Does State Preschool Crowd-Out Private Provision? The Impact of Universal Preschool on the Childcare Sector in Oklahoma and Georgia." NBER Working Paper No. 18605.
- Blau, David M (1993), "The Supply of Child Care Labor", *Journal of Labor Economics* 11 (2): 324-347.
- Blau, David M. (2003), "Unintended Consequences of Child Care Regulations", unpublished paper (University of North Carolina, Chapel Hill).
- Blau, David, and Janet Currie. 2006. "Pre-School, Day Care, and After-School Care: Who's Minding the Kids?" In *Handbook of the Economics of Education*, edited by Eric Hanushek and Finis Welch, 1163-1278. Amsterdam: Elsevier Science.
- Burke, Lindsey. 2010. "More Government Preschool: An Expensive and Unnecessary Middle-Class Subsidy" The Heritage Foundation Backgrounder #2378.
- Card, David and Laura Shore-Sheppard. 2004. "Using Discontinuous Eligibility Rules to Identify the Effects of the Federal Medicaid Expansions on Low Income Children." *Review of Economics and Statistics*, 86(3): 752-766.
- Cascio, Elizabeth. 2009. "Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools." *The Journal of Human Resources*, 44(1), 140-170.
- Cascio, Elizabeth and Diane Whitmore Schanzenbach. 2013. "The Impacts of Expanding Access to High-Quality Preschool Education." *Brookings Papers on Economic Activity*.
- Cellini, Stephanie Riegg, 2009. "Crowded Colleges and College Crowd-Out: The Impact of Public Subsidies on the Two-Year College Market," *American Economic Journal: Economic Policy*, 1(2), August 2009: 1-30.

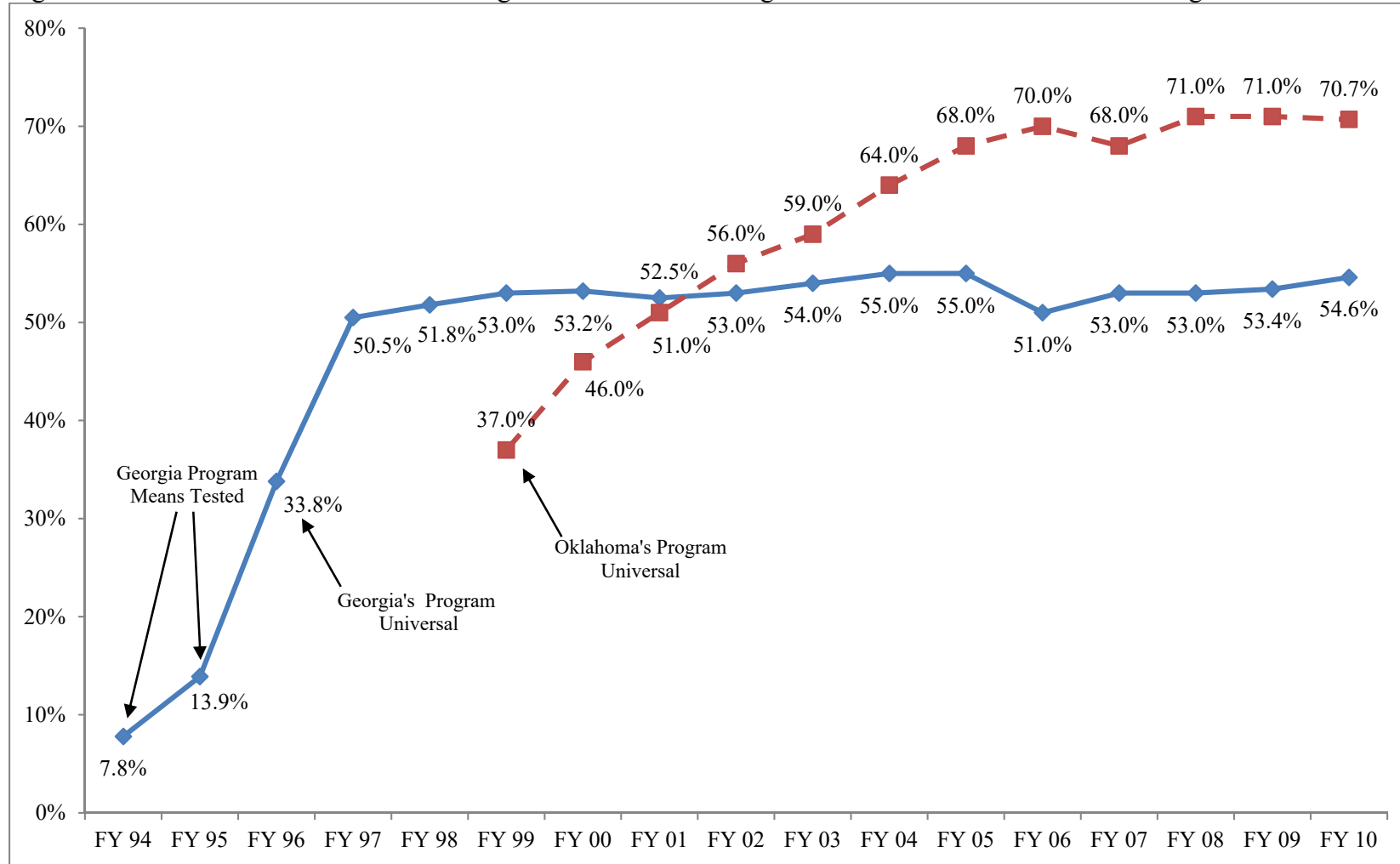
- Chipty, Tasneem and Ann D. Witte (1997), An Empirical Investigation of Firms' Responses to Minimum Standards Regulation (Cambridge MA: NBER) Working Paper #6104, July.
- Chipty, Tasneem (1995), "Economic Effects of Quality Regulations in the Day Care Industry", *American Economic Review*, 85, May 1995, 419-424.
- Cohen, Andrew Milman and Freeborn, Beth A. and McManus, Brian. 2013. "Competition and Crowding Out in the Market for Outpatient Substance Abuse Treatment." *International Economic Review*, Vol. 54, Issue 1, pp. 159-184, 2013.
- Cohodes, Sarah R. and Joshua S. Goodman. Forthcoming. "Merit Aid, College Quality and College Completion: Massachusetts' Adams Scholarship as an In-Kind Subsidy" *American Economic Journal: Applied Economics*.
- Currie, Janet and V. Joseph Hotz (2001) Accidents Will Happen? Unintentional Injury, Maternal Employment, and Child Care Policy, (Cambridge MA: NBER) Working Paper #8090.
- Currie, Janet, and Duncan Thomas. 1995. "Does Head Start Make a Difference?" *American Economic Review* 85 (3): 341-364.
- Currie, Janet, and Duncan Thomas. 1999. "Does Head Start Help Hispanic Children?" *Journal of Public Economics*, 74 (2): 235-262.
- Cutler, David M and Jonathan Gruber. 1996. "Does Public Insurance Crowd Out Private Insurance?" *Quarterly Journal of Economics*, 111(2): 391-430.
- Dynarski, Susan. 2000. "Hope for Whom? Financial Aid for the Middle Class and Its Impact on College Attendance." *National Tax Journal*, 53 (3): 629-661.
- Eriksen, Michael D. & Rosenthal, Stuart S., 2010. "Crowd out effects of place-based subsidized rental housing: New evidence from the LIHTC program," *Journal of Public Economics*, Elsevier, vol. 94(11-12), pages 953-966, December.
- Fitzpatrick, Maria D. 2008. "Starting School at Four: The Effect of Universal Pre-Kindergarten on Children's Academic Achievement." *The B.E. Journal of Economic Analysis & Policy*, 8 (1): Article 46.
- Fitzpatrick, Maria D. 2010. "Preschoolers Enrolled and Mothers at Work? The Effects of Universal Prekindergarten." *Journal of Labor Economics*, 28 (1): 51-85.
- Ganderton, Philip T. 1992. "The effect of subsidies in kind on the choice of a college." *Journal of Public Economics*, 48(3): 269-292.
- Gordon, Nora. 2004. "Do Federal Grants Boost School Spending? Evidence from Title I." *Journal of Public Economics*, 88 (9-10): 1771-1792.

- Gormley Jr., William T., and Ted Gayer. 2005. "Promoting School Readiness in Oklahoma." *Journal of Human Resources*, 40 (3), 533-558.
- Gormley Jr., William T., Ted Gayer, Deborah Phillips, and Brittany Dawson. 2005. "The Effects of Universal Pre-K on Cognitive Development." *Developmental Psychology*, 41 (6): 872-884.
- Gruber, Jonathan, and Kosali Simon. 2008. "Crowd-Out Ten Years Later: Have Recent Public Insurance Expansions Crowded Out Private Health Insurance?" *Journal of Health Economics*, 27 (2): 201– 217.
- Herbst, Chris M., and Erdal Tekin. 2010. "Child Care Subsidies and Child Development." *Economics of Education Review*, 29 (4): 618-638.
- Hofferth, Sandra L. and Duncan D. Chaplin (1998) "State Regulations: and Child Care Choice", *Population Research and Policy Review*, 17: 111-140.
- Hotz, V. Joseph and Rebecca Kilburn (1997), "Regulating Child Care: The Effects of State Regulations on Child Care Demand and its Cost", xerox, Dept. of Economics, UCLA, October 1997.
- Hotz, V. Joseph and Rebecca Kilburn (2000), "The Effects of State Regulations on Child Care Prices and Choices", xerox, Dept. of Economics, UCLA, March 2000.
- Hotz, V. Joseph, and Mo Xiao. 2011. "The Impact of Regulations on the Supply and Quality of Care in Child Care Markets." *American Economic Review*, 101 (5): 1775-1805.
- Hungerman, Daniel M. 2005. "Are the Church and State Substitutes? Evidence from the 1996 Welfare Reform." *Journal of Public Economics*, 89(11): 2245-2267.
- Johnson, A.D., Ryan, R.M. & Brooks-Gunn, J, (2012) Child Care Subsidies: Do they impact the quality of care children experience? *Child Development*, 83(4) 1444-1461.
- Knight, Brian. 2002. "Endogenous Federal Grants and Crowd-out of State Government Spending: Theory and Evidence from the Federal Highway Aid Program." *American Economic Review*, 92 (1): 71–92.
- Henry Levin and Heather Schwartz. 2007. "Educational Vouchers for Universal Preschools," *Economics of Education Review*, 26:3-16.
- Long, Bridget Terry. 2004. "How do Financial Aid Policies Affect Colleges? The Institutional Impact of the Georgia HOPE Scholarship." *Journal of Human Resources*, 39 (4): 1045-1066.



- Magnuson, Katherine A., Marcia K. Meyers, Christopher J. Ruhm, and Jane Waldfogel. 2004. "Inequality in Preschool Education and School Readiness." *American Educational Research Journal*, 41 (1): 115-157.
- Payne, A. Abigail. 2009. "Does Government Funding Change Behavior? An Empirical Analysis of Crowd Out." In *Tax Policy and the Economy*, edited by Jeffrey R. Brown and James M. Poterba, 159-184. Chicago: University of Chicago Press.
- Peltzman, Sam. 1973. "Effect of Government Subsidies-in-Kind on Private Expenditures - Case of Higher Education." *Journal of Political Economy*, 81 (1): 1-27.
- Ribar, David (1992), "Child Care and the Labor Supply of Married Women: Reduced Form Evidence", *Journal of Human Resources* 27 (1), Winter: 134-165.
- Schweinhart, Lawrence J. 1993. *Significant Benefits: The High/Scope Perry Preschool Study Through Age 27. Monographs of the High/Scope Educational Research Foundation, No. Ten*. Missouri: High/Scope Educational Research Foundation.
- Shonkoff, Jack P., and Deborah A. Phillips, eds. 2000. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: The National Academies Press.
- Whitebook, Marcy, and Laura Sakai. 2003. "Turnover Begets Turnover: An Examination of Job and Occupational Instability among Child Care Center Staff." *Early Childhood Research Quarterly*, 18 (3): 273-293.
- Whitehurst, Grover J. "Can We Be Hard-Headed About Preschool? A Look at Universal and Targeted Pre-K." Brookings Institution. <http://www.brookings.edu/blogs/brown-center-chalkboard/posts/2013/01/23-prek-whitehurst> (Accessed April 4, 2014)

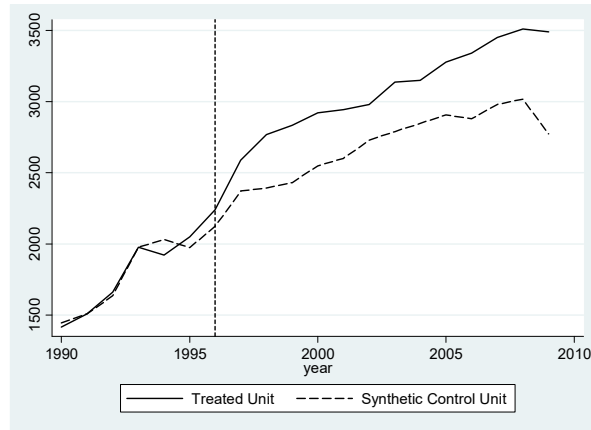
Figure 1. Percent of Four Year Olds in Georgia and Oklahoma Universal Pre-K Programs



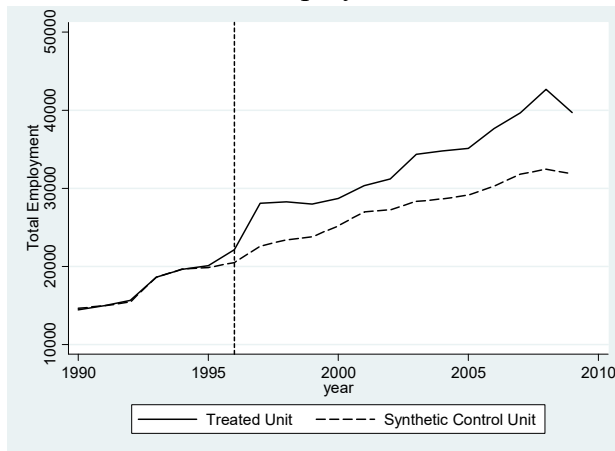
Notes: From Brackett, Henry and Weathersby (1999) and various web sources. A fiscal year runs from October of the previous year to September of the year in its name. For example, FY96 runs from October 1, 1995 to September 30, 1996. Percent of population of four year olds is calculated using the Census Bureau's Time Series of State Population Estimates by Age, which can be found.

Figure 2. Difference-in-Difference Estimates of the Effects of Universal Pre-Kindergarten on Supply of Childcare in Georgia

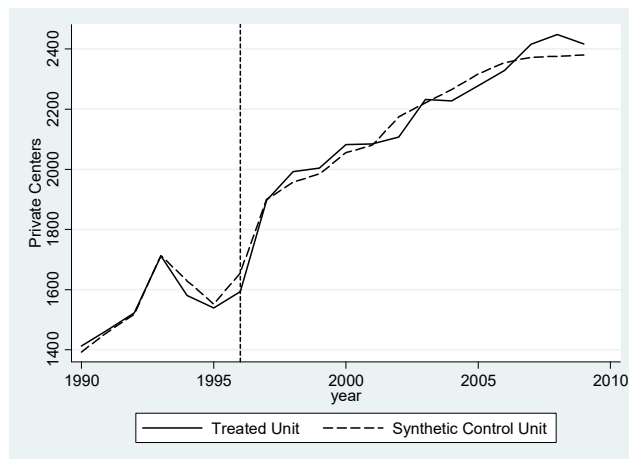
Panel A. Total Number of Childcare Centers



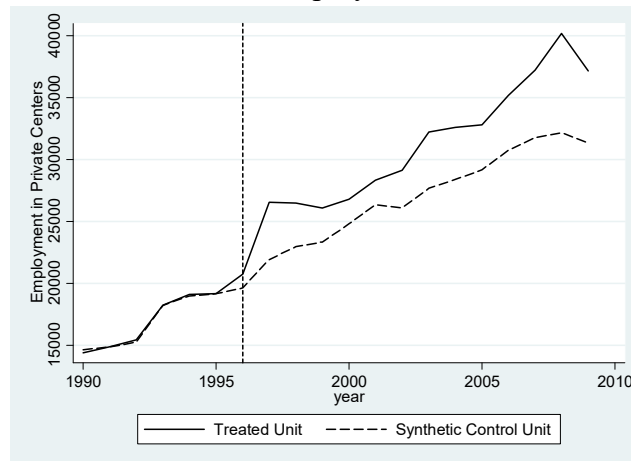
Panel B. Total Number of Childcare Center Employees



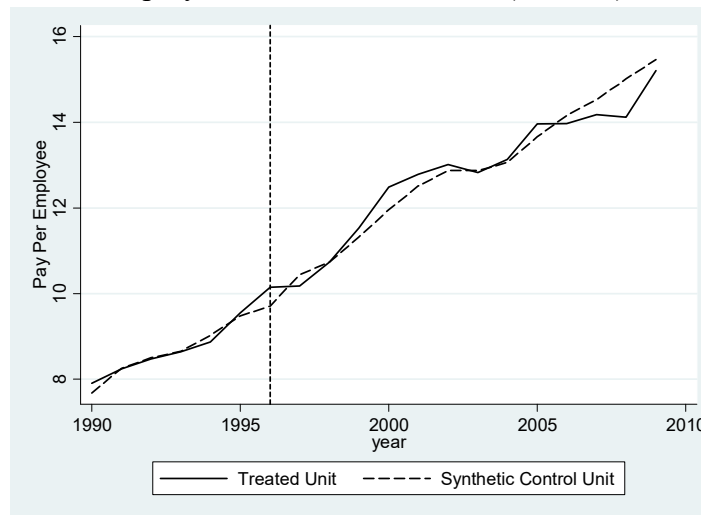
Panel C. Total Number of Private Centers



Panel D. Total Number of Childcare Center Employees in Private Centers



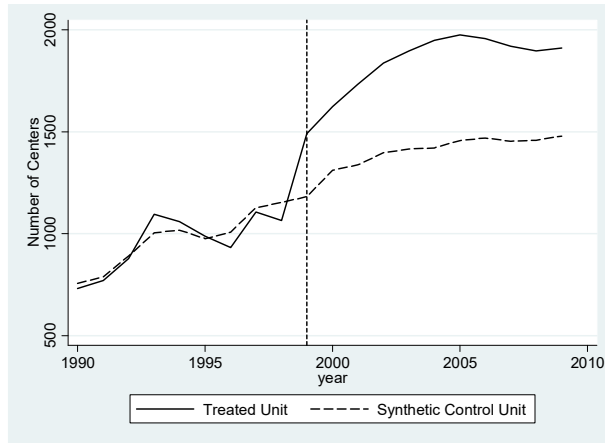
Panel E. Pay per Childcare Employee in the Private Sector (\$1,000s)



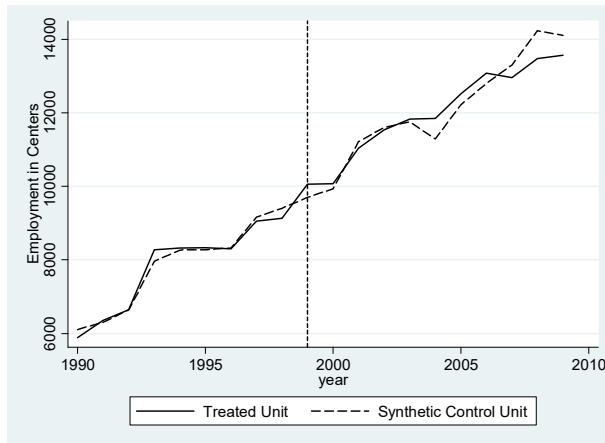
Note: Based on the authors calculations using data from the CBP and CCD. The figures depict the synthetic control group estimate of the difference in a given measure of supply for Georgia (solid line) and a synthetic control group created as described in the paper.

Figure 3. Difference-in-Difference Estimates of the Effects of Universal Pre-Kindergarten on Supply of Childcare in Oklahoma

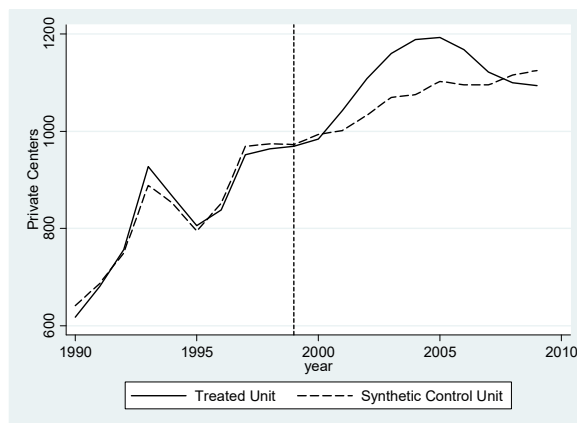
Panel A. Total Number of Childcare Centers



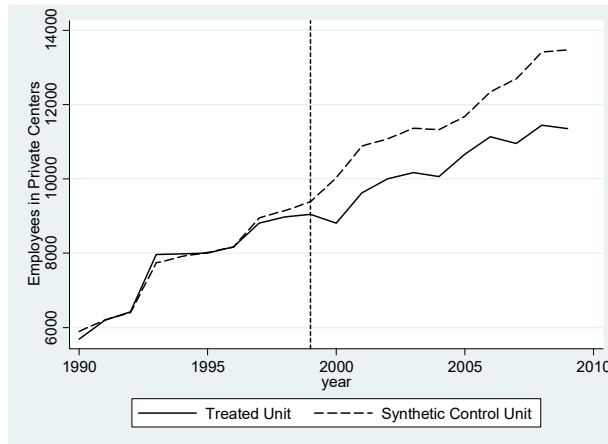
Panel B. Total Number of Childcare Center Employees



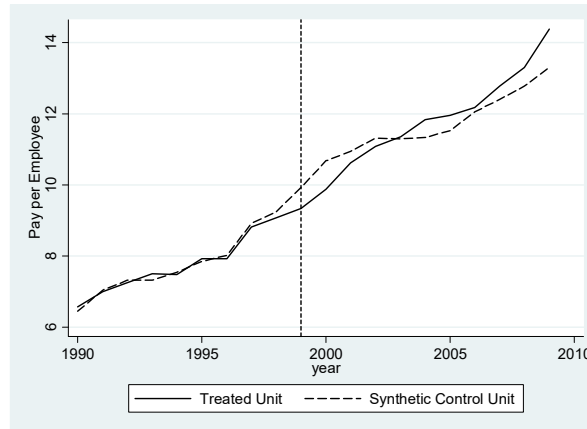
Panel C. Total Number of Private Centers



Panel D. Total Number of Childcare Center Employees in Private Centers



Panel E. Pay per Childcare Employee in the Private Sector



Note: Based on the authors calculations using data from the CBP and CCD. The figures depict the synthetic control group estimate of the difference in a given measure of supply for Oklahoma (solid line) and a synthetic control group created as described in the paper.

Table 1. Average Number and Characteristics of Childcare Centers and Family Daycare Homes, by State Group, 1990-2009

Outcome	Georgia		Oklahoma		Other Southern States		Other States	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Childcare Centers, Public and Private	2,658	691	1,441	471	1,849	1,797	1,553	1,570
Private Childcare Centers	1,967	351	977	172	1,360	1,130	1,211	1,248
Private and Public Childcare Center Employment	28,199	8,882	10,115	2,447	16,596	16,396	13,790	14,922
Private Childcare Center Employment	26,647	8,029	9,078	1,714	15,404	14,429	13,016	13,926
Private Childcare Center Payroll per Employee (\$1,000s)	11.498	2.352	9.912	2.354	11.487	3.244	12.006	3.344
Number of Children, Ages 0 to 5	737,117	98,322	289,911	14,222	501,061	476,988	466,464	553,039

Note: Based on the authors' calculations using the LBD and CCD for 1990 to 2005. Averages and standard deviations across counties over the whole period reported separately for Georgia and Oklahoma.

Table 2. Estimated Effect of Universal Pre-K Policy on the Supply of Childcare in Georgia and Oklahoma

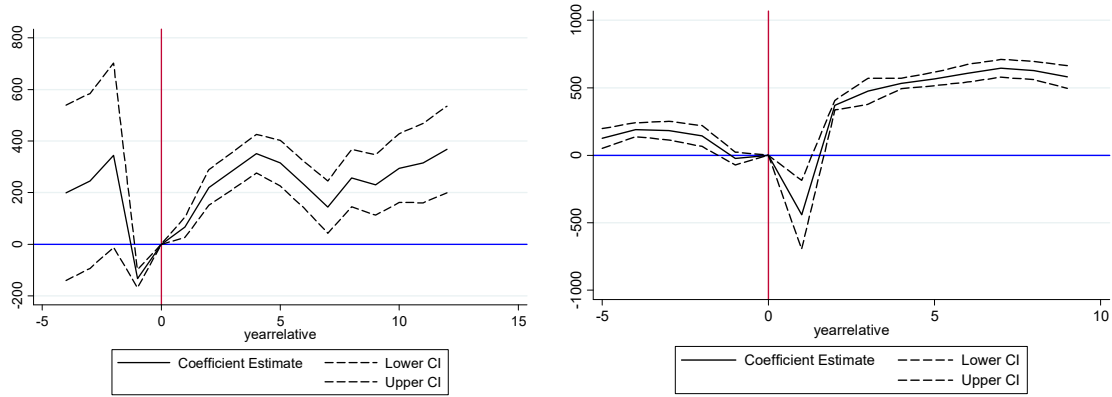
Comparison Group:	All States	Southern States	Synthetic Control
<b>Panel A. Childcare Centers, Public and Private</b>			
UPK in Georgia	265*** (82)	184* (94)	374** {0.02}
UPK in Oklahoma	424*** (32)	439*** (42)	448* {0.06}
<b>Panel B. Childcare Center Employees, Public and Private</b>			
UPK in Georgia	5,782*** (876)	4,215*** (753)	5443** {0.04}
UPK in Oklahoma	-602 (388)	-427 (312)	-38 {0.45}
<b>Panel C. Private Childcare Centers</b>			
UPK in Georgia	75 (59)	25 (64)	6 {0.47}
UPK in Oklahoma	-32 (22)	-10 (28)	22 {0.33}
<b>Panel D. Employees of Private Childcare Centers</b>			
UPK in Georgia	5,387*** (818)	3,928*** (794)	4059** {0.04}
UPK in Oklahoma	-1,634*** (376)	-1,508*** (324)	-1,293 {0.24}
<b>Panel E. Pay per Employee in Private Childcare Centers, \$1000s</b>			
UPK in Georgia	-0.327 (0.221)	-0.358** (0.135)	-0.019 {0.56}
UPK in Oklahoma	-0.148 (0.109)	-0.044 (0.126)	0.119 {0.84}
Number of Obs.	1,019	340	

Note: Based on the authors' calculations using the state-level LBD and the CCD for 1990 to 2009. Standard errors are in parentheses. Each row and column combination presents results for a separate differences-in-differences specification with the dependent variable given by the row header and the sample as listed in the bottom row. All columns include state and year fixed effects. The third column presents difference-in-difference estimates using the synthetic control group method of Abadie et al. (2010) with the corresponding probability levels from placebo tests of inference in brackets {}. \*\*\*, \*\* and \* represent estimates statistically significant at the 1, 5 and 10 percent levels, respectively.

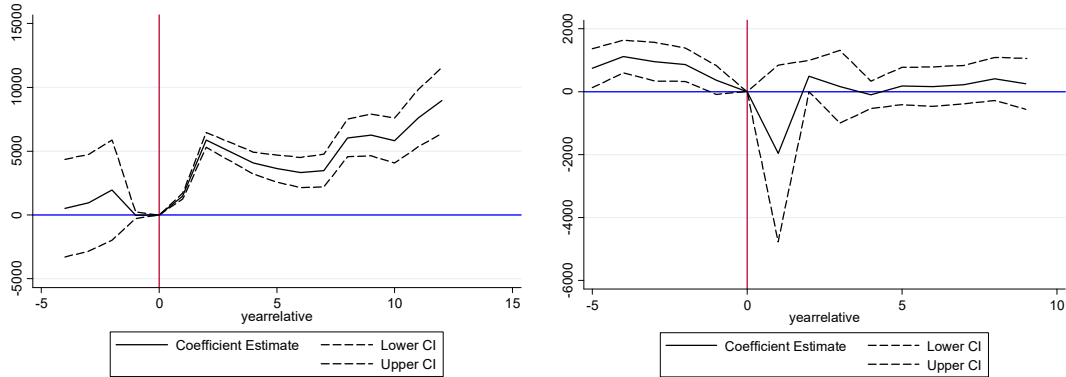


# Appendix A. Event-Study-Style Estimates of the Effects of Universal Preschool on the Supply of Childcare in Georgia and Oklahoma

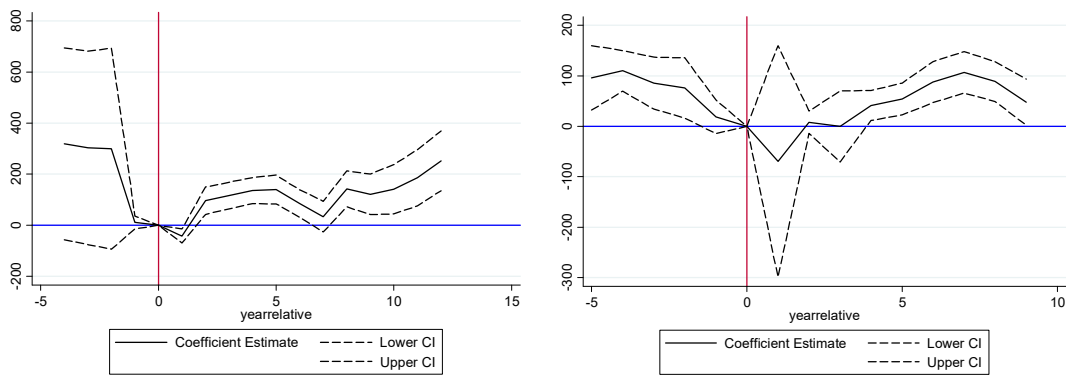
## Panel A. Total Number of Childcare Centers



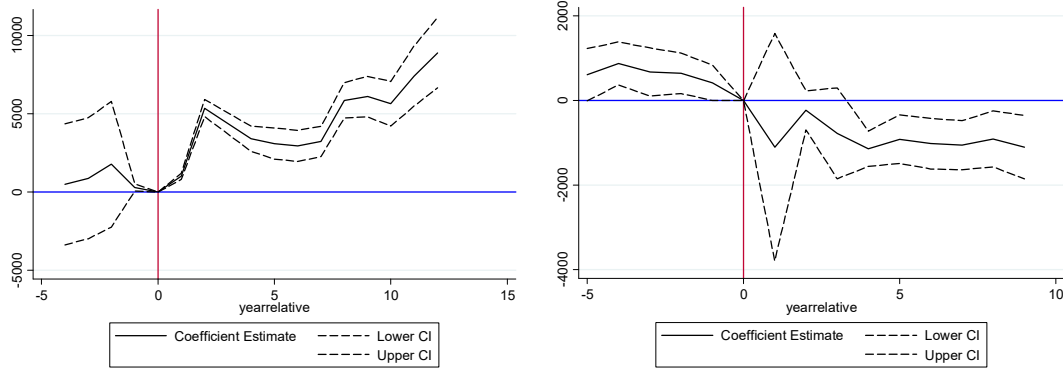
## Panel B. Total Number of Childcare Center Employees



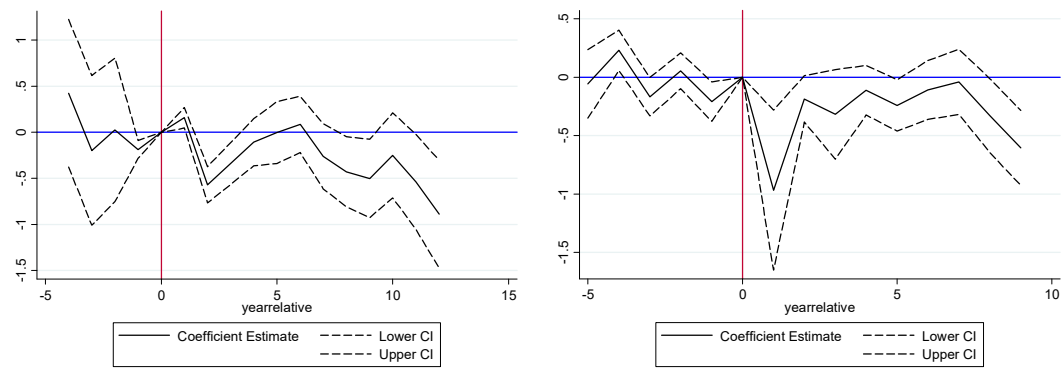
## Panel C. Total Number of Private Centers



Panel D. Total Number of Childcare Center Employees in Private Centers

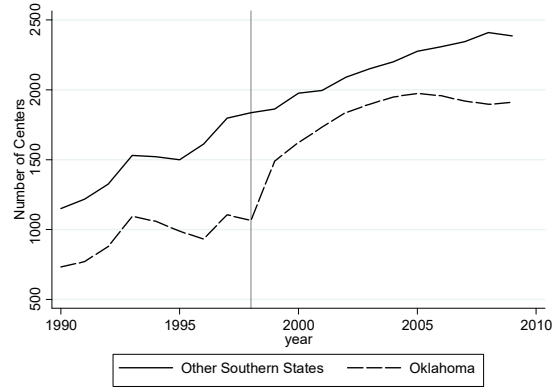
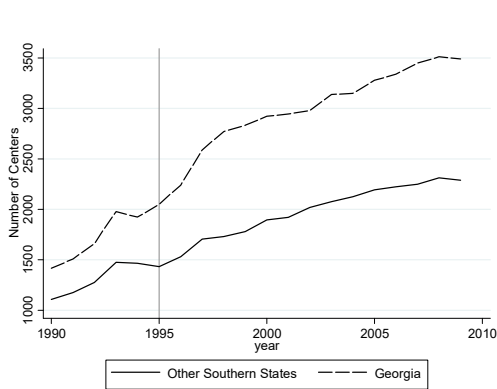


Panel E. Pay per Childcare Employee in the Private Sector (\$1,000s)

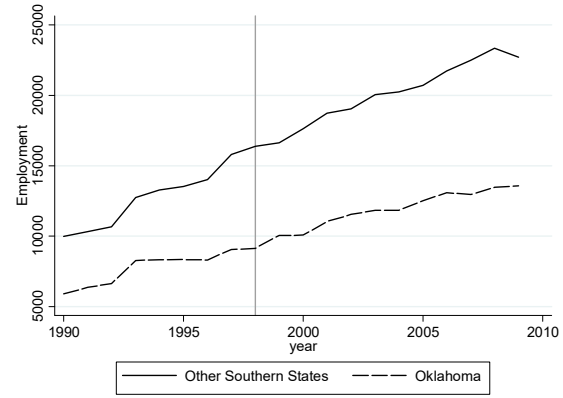
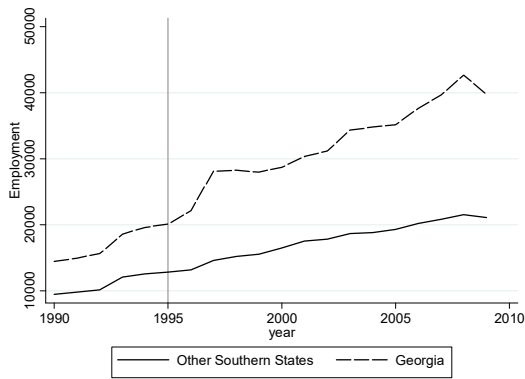


Note: Based on the authors calculations using data from the LBD and CCD. The figures depict results of estimating equation (1) in the text, but replacing the treatment variables with distributed leads and lags in time relative to treatment for Georgia and Oklahoma. Solid lines trace out coefficient estimates and dashed lines trace out 95 percent confidence intervals. In the raw data, there is anomalous recorded data for Oklahoma in 1999, which leads to the large dips in the first year post-treatment. The pattern is such that we regard this as a data entry error.

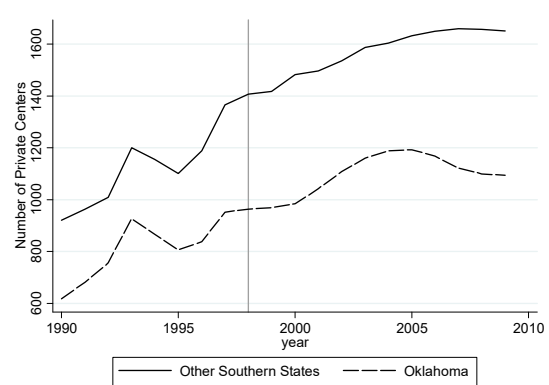
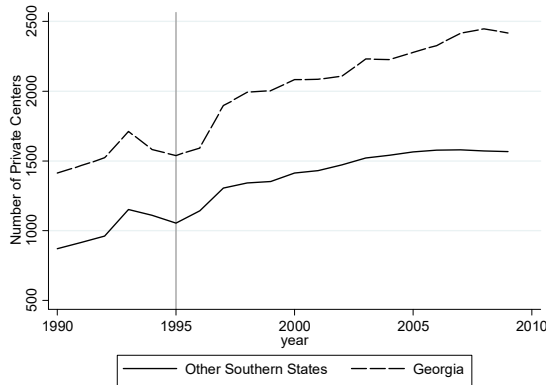
Appendix B. Measures of the Supply of Childcare in Treated States and Other Southern States  
 Panel A. Total Number of Childcare Centers



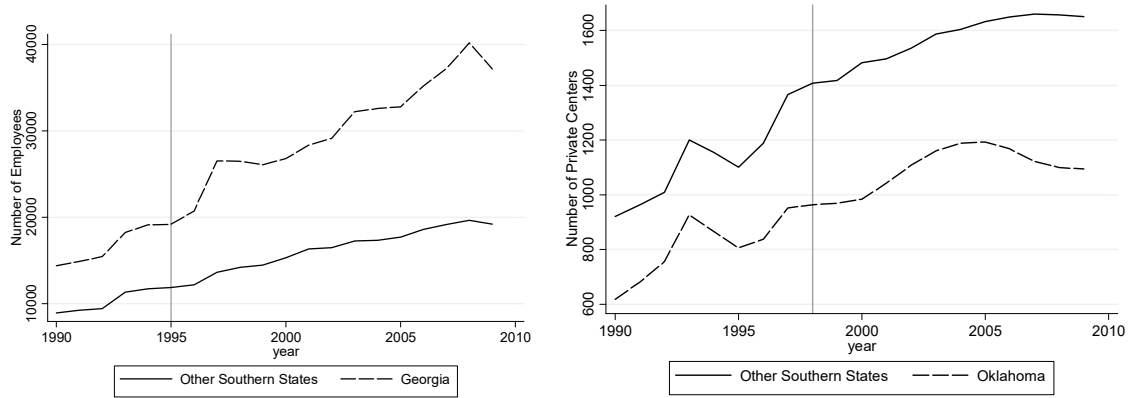
Panel B. Total Number of Childcare Center Employees



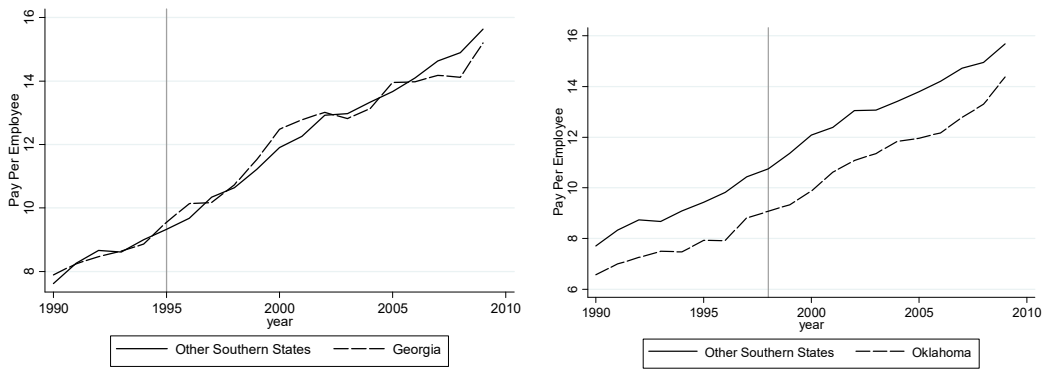
Panel C. Total Number of Private Centers



Panel D. Total Number of Childcare Center Employees in Private Centers

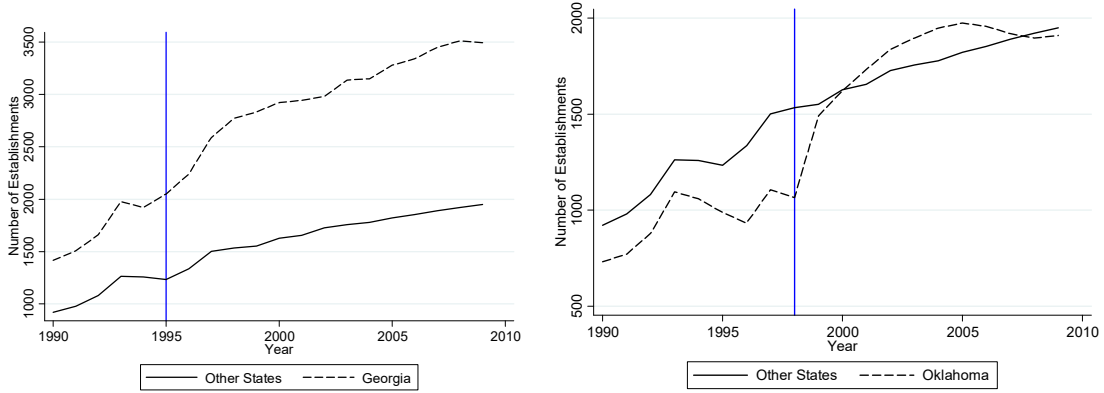


Panel E. Pay per Childcare Employee in the Private Sector (\$1,000s)

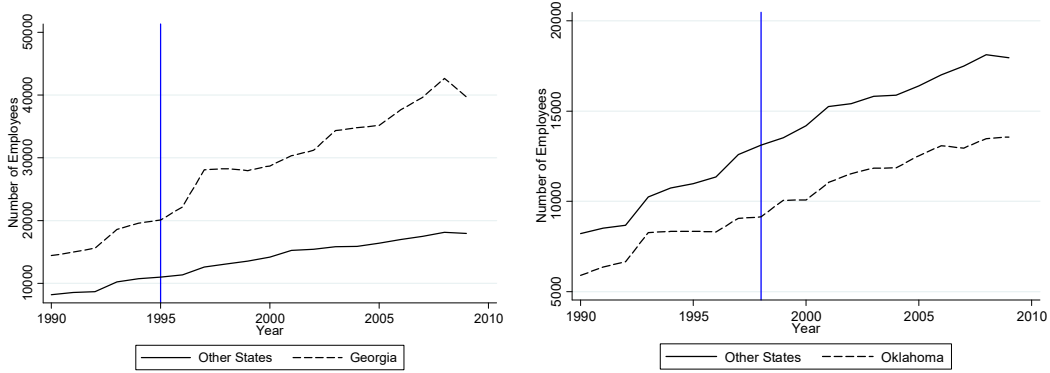


Note: Based on the authors calculations using data from the LBD and CCD. The figures depict the synthetic control group estimate of the difference in a given measure of supply for Georgia (solid line) and a synthetic control group created as described in the paper.

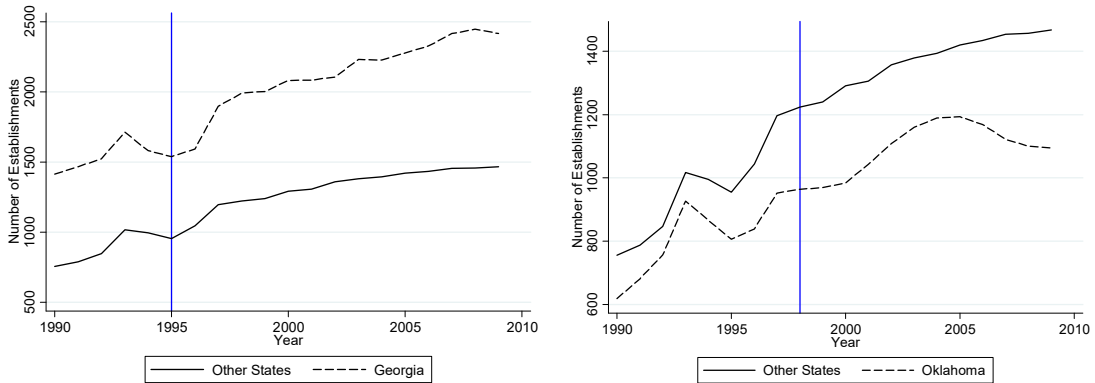
Appendix C. Measures of the Supply of Childcare in Treated States and All Other States  
 Panel A. Total Number of Childcare Centers



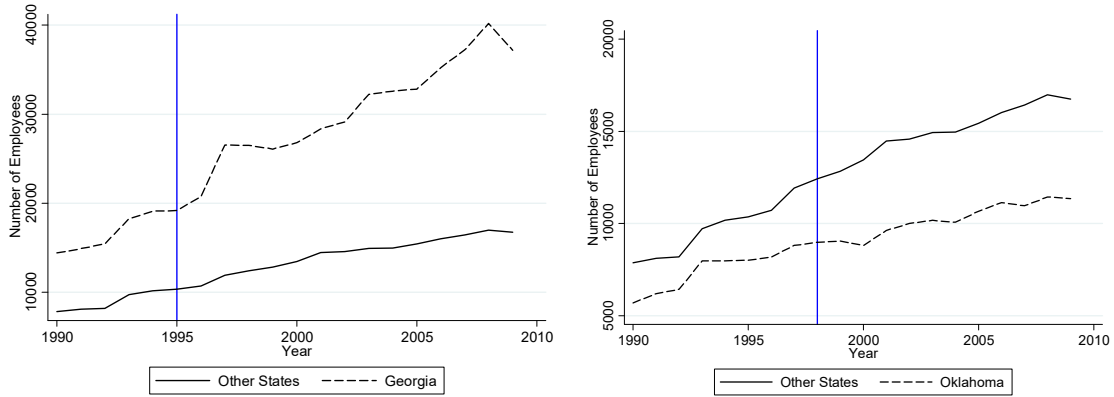
Panel B. Total Number of Childcare Center Employees



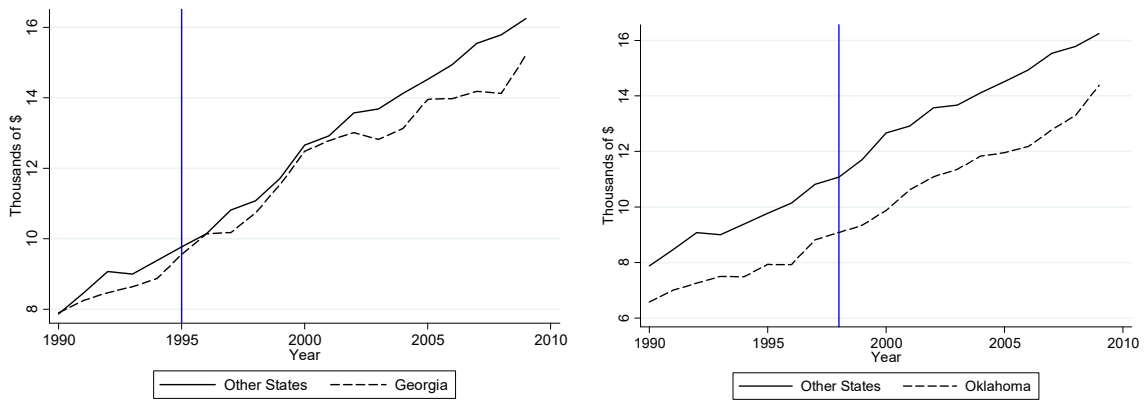
Panel C. Total Number of Private Centers



Panel D. Total Number of Childcare Center Employees in Private Centers



Panel E. Pay per Childcare Employee in the Private Sector (\$1,000s)



Note: Based on the authors calculations using data from the LBD and CCD. The figures depict the synthetic control group estimate of the difference in a given measure of supply for Georgia (solid line) and a synthetic control group created as described in the paper.

Appendix D. Synthetic Control Group Weights, by State and Outcome

State	<u>Georgia</u>					<u>Oklahoma</u>				
	Childcare Centers, Public and Private	Childcare Center Employees, Public and Private	Private Childcare Centers	Employees of Private Childcare Centers	Pay per Employee in Private Childcare Centers, \$1000s	Childcare Centers, Public and Private	Childcare Center Employees, Public and Private	Private Childcare Centers	Employees of Private Childcare Centers	Pay per Employee in Private Childcare Centers, \$1000s
Alabama	0	0	0	0	0	0	0	0	0	0.322
Alaska	0	0	0	0	0	0	0	0	0	0
Arizona	0	0	0	0	0	0	0	0	0	0
Arkansas	0	0.029	0.124	0	0	0	0	0	0	0
California	0.033	0	0	0	0	0.016	0	0	0	0
Colorado	0	0	0	0	0	0	0	0	0	0
Connecticut	0	0	0	0	0	0	0	0	0	0
Delaware	0	0	0	0.15	0	0	0	0	0	0
DC	0	0.057	0	0.052	0	0	0.186	0	0.413	0
Florida	0	0.027	0.29	0.158	0	0	0	0.089	0	0
Georgia						0	0	0	0	0
Hawaii	0.113	0	0	0	0.101	0.128	0	0	0	0.022
Idaho	0	0	0	0	0	0	0	0	0	0.081
Illinois	0	0	0	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	0	0	0	0
Iowa	0	0	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0.106	0	0	0
Louisiana	0.001	0	0	0	0.085	0	0	0.143	0	0
Maine	0	0	0	0	0	0	0	0	0	0
Maryland	0	0	0	0	0	0	0	0	0	0
Massachusetts	0	0.088	0.266	0.098	0	0	0	0	0	0
Michigan	0	0	0	0	0	0	0	0	0	0
Minnesota	0	0.04	0	0	0	0	0	0.343	0	0
Mississippi	0.083	0.122	0.171	0.11	0	0	0	0	0	0.013
Missouri	0	0	0	0	0	0	0	0	0	0

Montana	0	0	0	0	n/a	0	0	0	0	n/a
Nebraska	0.138	0.189	0	0	0.207	0	0	0	0	0.356
Nevada	0	0	0	0	0	0.06	0	0	0	0
New Hampshire	0	0	0	0	0	0	0	0	0	0
New Jersey	0	0	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0.147	0	0	0
New York	0.01	0	0	0	0.041	0	0	0	0	0
North Carolina	0.376	0.264	0.149	0.314	0.258	0	0	0	0	0
North Dakota	0	0	0	0	0	0	0	0	0	0.163
Ohio	0.05	0	0	0	0.029	0.032	0	0	0	0
Oklahoma	0	0	0	0	0	0	0	0	0	0
Oregon	0	0	0	0	0	0	0	0	0	0
Pennsylvania	0	0	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0.209	0	0	0	0
South Dakota	0	0	0	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0	0	0	0
Texas	0.1	0.184	0	0.118	0.169	0.071	0.104	0	0.083	0.043
Utah	0	0	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	n/a	0.484	0.192	0.425	0.064	n/a
Virginia	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	0	0	0
West Virginia	0.096	0	0	0	0.111	0	0.251	0	0.2	0
Wisconsin	0	0	0	0	0	0	0.013	0	0.24	0
Wyoming	0	0	0	0	n/a	0	0	0	0	n/a

Note: Based on the authors' calculations using the state-level LBD and the CCD for 1990 to 2009. Standard errors are in parentheses. Each column presents synthetic control group weights calculated using the method of Abadie et al. (2010).