More Hours, More Work: Head Start Expansions Boost Maternal Employment

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Abstract

Women's employment remains highly sensitive to childcare constraints, making childcare availability a critical lever for supporting mothers' labor force attachment. We study the effects of expanded full-day programming in Head Start, using the 2016 federal funding initiative that targeted grantees with low full-day enrollment. Linking administrative program data, geo-coded center locations, and household data on employment, we estimate a difference-in-differences design by comparing mothers of young children in treated and untreated areas. The policy increased full-day enrollment by 19 percent and raised single mothers' employment (2.5%), hours (2.9%), and earnings (7%). Results show that extending program duration meaningfully improves maternal labor market outcomes.

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1 Introduction

Understanding the causes and consequences of women's labor force participation is a central economic inquiry, particularly given women's pronounced entry into the labor force over the last five decades. Specifically, there have been notable increases in participation among mothers of young children. Research shows that women's career paths are more likely than men's to be interrupted by childbirth and caregiving responsibilities, making them particularly vulnerable to the disruptions of parenthood (Kleven, Landais and Søgaard 2019; Kleven 2025). However, policies that help mothers remain in or return to work and balance their professional and domestic roles can yield meaningful short- and long-term benefits (Kuka and Shenhav 2024).

Public investment in childcare availability and affordability is a prominent example of such support, facilitating parental labor supply while supporting children's development. The relationship between child care and parents' labor supply is grounded in the economic theory of intrahousehold decisions regarding market work and home production (Becker 1965). Consistent with this framework, empirical evidence suggests that mothers do indeed respond to increased provision and affordability of early childhood care and education (ECE) (Gelbach 2002; Morrissey 2017).

Recently, ECE programs have increasingly expanded instructional time by lengthening program days and years through the growth of full-day preschool. Figure 1 illustrates trends in full- and part-day preschool participation over time, showing that the share of children enrolled in full-day pre-K began rising around mid-2010s, while part-day enrollment declined. This shift reflects a combination of federal, state, and local initiatives to extend program hours. To our knowledge, this is the first paper to test the effect of expanded preschool hours on maternal labor supply. We focus on the federally funded Head Start program, the preschool program for children from low-income households, and examine how access to full-day Head Start affects maternal labor supply by exploiting a recent policy change that expanded program duration. In 2016, the U.S. Department of Health and Human Services announced the availability of $294 million dollars in supplemental funds to extend the duration of Head Start services. Head Start grantees serving fewer than 40% of their center-based slots for a full school day and full school year were eligible to apply.

Our analysis leverages this eligibility rule by combining Head Start full-time enrollment data from the Program Information Reports (PIR) with geo-coded center locations from the Office of Head Start. We link these data to maternal employment information from the 2012 to 2019 American Community Survey (ACS) to explore the impact on labor supply

outcomes.

First, we identify Head Start grantees eligible for supplemental funding based on their share of enrollment in full-day programming before the policy change in 2015. Using their center locations, we then define geographic areas (public use microdata areas or PUMAs, in the ACS) as "treated" if they were served by one or more centers affiliated with eligible grantees, and as "untreated" otherwise.[1] We estimate the effects of the 2016 duration expansion using a difference-in-differences design by comparing changes in outcomes for single mothers with young children in PUMAs with Head Start centers operated by eligible grantees to those without, before and after the policy implementation. This approach controls for time-invariant local characteristics and common shocks, and we further assess its validity through event-study specifications that test for pre-treatment parallel trends. We focus on single mothers, as they are both more likely to be eligible for Head Start and their labor supply is typically more sensitive to changes in childcare availability (Wikle and Wilson 2023).

We find that the 2016 duration expansion significantly increased full-time Head Start enrollment (≈19% of the pre-policy mean), resulting in approximately 100,000 slots shifting from half-day to full-day, which is consistent with the stated policy goal of "up to 135,000 children" (Rodriguez and Parrott 2016).[2] In turn, single mothers of young children significantly increased their labor force participation by 1.9 percentage points (2.5% of the pre-policy mean) and their weekly work hours by 0.8 (2.9%) relative to comparable mothers in untreated PUMAs. Exposure to Head Start full-day expansions also resulted in higher average wage income (7%). Our event studies provide evidence of parallel pre-trends and show that the effects of full-day expansions emerge gradually over time.

We demonstrate that our results are very similar using a continuous measure of treatment exposure (i.e., the share of treated Head Start centers in a PUMA) and are robust to alternative specifications that control for time-varying measures of state pre-kindergarten programming, flexible trends in both 2015 state preschool enrollment and the 2015 unemployment rate, and PUMA-specific linear trends. In placebo tests, we estimate the impact of exposure to full-day expansions on mothers who are unlikely to be exposed to Head Start (i.e., mothers of older children, ages 5–6 and 7–11, who have college education or are married).

[1] Untreated PUMAs are those with Head Start centers but none operated by eligible grantees. Thus, mothers in the comparison group live in places served by Head Start but are unaffected by the policy change.

[2] Total Head Start enrollment was declining slightly during this period (Office of Head Start 2014, 2020). Applying our estimated 19% increase in full-day slots to 2016 enrollment levels — holding total slots fixed — we calculate that expansions led to approximately 100,000 slots transitioning from part- to full-day.

We find no effects for these groups.

This study contributes to several strands of literature on preschool and maternal labor supply. We are the first to examine how an ECE program design feature shapes parental employment responses. While previous research has established that childcare availability can affect maternal labor supply (Baker, Gruber and Milligan 2008; Fitzpatrick 2010; Herbst 2017), most studies focus on the introduction of new programs or changes in eligibility rather than expansions in program intensity. Our focus on extending hours within an established program offers new insights into how the intensive margin of provision affects maternal employment.

Second, we contribute to recent scholarship using contemporary data and quasi-experimental methods to study childcare access. Recent work leveraging state preschool scale-ups and lottery-based admission to universal preschool finds positive effects on parental employment in modern contexts (Ilin, Shampine and Terry 2022; Humphries et al. 2024). We extend this evidence by isolating the causal effect of program duration expansions, whereas previous estimates typically reflect bundled changes in access, eligibility, and program features. This distinction is important because treatment effects at the extensive margin may differ from effects at the intensive margin.

Third, we provide new evidence on the effects of Head Start on parents in recent contexts. Existing research shows mixed impacts of Head Start on maternal employment (Pihl 2022; Sabol and Chase-Lansdale 2015; Schiman 2022; Wikle and Wilson 2023), potentially reflecting both heterogeneity in program implementation and the program's historically limited operating hours. No prior work examines the 2016 duration expansion, which represents one of the most significant changes to Head Start programming in recent decades. Understanding how this targeted, means-tested program affects maternal labor supply is policy relevant given ongoing debates about public investment in ECE and work support for low-income families. We implement a novel approach to constructing measures of local exposure to Head Start, and the specific policy change, by linking administrative program data, collected at the grantee level, with geo-coded center locations. Finally, Head Start increasingly enrolls children aged three and younger (Office of Head Start 2024), so our findings shed light on employment effects during an earlier and potentially more pivotal stage of mothers' careers, when labor force attachment may be more fragile and when interruptions may have longer-lasting consequences (Kleven, Landais and Søgaard 2019).

2 Study Background

The economic theory underlying child care's role in maternal employment decisions builds on the standard labor supply model, where mothers weigh the costs and benefits of market work against home production. Childcare costs represent a significant barrier to employment, particularly for low-skilled mothers whose potential wages may barely exceed childcare expenses (Blau and Currie 2006).

Prior literature examines the impact of early childhood care and education programs on maternal employment, although results vary across countries, program structures, and historical contexts. Evidence from universal childcare programs in developed countries is mixed. While researchers find evidence of substantial increases in maternal employment in Quebec (Baker, Gruber and Milligan 2008), mothers exhibit more muted responses to subsidized child care in Norway and France, with some small effects for single and less-educated mothers in France (Havnes and Mogstad 2011; Goux and Maurin 2010).

Historically in the U.S., Herbst (2017) finds that federally funded child care under the World War II Lanham Act (1943–1946) substantially increased maternal employment in states with higher childcare spending. Cascio (2009) examines the introduction of state-funded kindergarten programs across the U.S., primarily in the 1960s, finding concentrated effects among single mothers with no younger children. Interestingly, work on the earliest iteration of Head Start documents heterogeneity in employment responses in the short run, but finds negative effects on average in the long run (Pihl 2022).

More recent evidence on Head Start and universal preschool generally shows limited or null effects for all women, but positive employment effects of ECE availability or access for marginal mothers (unmarried, low-educated, with no younger children) (Cascio and Schanzenbach 2013; Fitzpatrick 2010, 2012; Wikle and Wilson 2023).[3] Two recent studies suggest broader impacts from state preschool and full-day kindergarten expansions (Gibbs, Wikle and Wilson 2025; Ilin, Shampine and Terry 2022). In their investigation of the impact of full-day kindergarten changes across states over three decades, Gibbs, Wikle and Wilson (2025) document effects on the employment of mothers with kindergarten-aged children, reinforcing the importance of program hours in employment decisions and providing a useful comparison for understanding more targeted Head Start duration expansions.

[3]One recent paper examines the effects of Early Head Start rollout on maternal employment and finds effects concentrated among low-educated and single mothers (Raza 2025).

2.1 Policy Context

In the United States, the landscape of ECE is a patchwork of both public and private providers with programs operating in schools, centers, and homes. Major federal investments in ECE include childcare subsidies and support for state preschool programs, both operated through block grants to the states, as well as the Head Start program, established in 1965 as a cornerstone of the War on Poverty.

Head Start is the largest and only federally funded ECE program in the United States. It intends to prepare children from low-income families for formal schooling and to support families in facilitating their children's healthy development. The program provides comprehensive services that include early education, health, nutrition, and family support. Today, Head Start and its counterpart for younger children, Early Head Start, together serve approximately 800,000 children, reaching roughly 5–10% of all U.S. preschool-aged children in the last decade (Friedman-Krauss et al. 2025; Office of Head Start 2024). The program primarily targets children from families with incomes below the federal poverty line, as well as children experiencing homelessness, those in foster care, and children with disabilities, who are eligible for a fixed number of slots regardless of income. The program has evolved over time, with greater focus on school readiness and academic preparedness, monitoring and evaluation, and availability of slots for working parents contingent with welfare reform in the 1990s.

In its earliest iteration, Head Start was a summer program in the months leading up to formal school entry, and it was fairly low dosage. It quickly pivoted from a summer program to a school-year program, with any remaining summer-only programs required by Congress to convert in 1982 (Office of Head Start 2025*a*). While there was discussion and encouragement of expanding program duration or intensity in 1986, 1997, and 1998, previous Head Start expansions focused on expanding the total number of children served (Office of Head Start 2025*a*). From 2008 (when detailed data became available) until 2016, Head Start programming was full-day (i.e., operated for the number of hours per day of a regular school day and every day of the school week) for approximately 55% of enrollees (Appendix Figure A.1).

On April 25, 2016, the Office of Head Start announced the availability of approximately $294 million in supplemental funding authorized under the Consolidated Appropriations Act of 2016 (U.S. Congress 2015). The goal was to extend the duration of services and increase the share of children receiving a full school day and year, as research shows that longer program hours improve child outcomes (Office of Head Start 2016*a*). Importantly, eligibility for Head Start funds was restricted to programs operating less than 40% of their center-based

slots at the 1,020-hour standard (full-day, full-school-year). This cutoff excluded grantees already meeting or exceeding the threshold. Applications were voluntary and due by June 24, 2016, and successful applicants were required to implement extended service hours by the 2017–2018 program year. Subsequently, the new funding became part of the base grants for the awarded programs.

We use this variation in funding eligibility to estimate the impact of expanded Head Start programming duration on maternal employment outcomes. Using the best available information on which programs were likely eligible for funding, we match this information to maternal employment outcomes by geography, as discussed below.

3 Data

To measure Head Start enrollment, we use the Program Information Report (PIR) data from 2012 to 2019 (Office of Head Start 2025*b*). We supplement PIR data with novel geocoded center-level data to assign grantees' geographical coverage to local service areas in 2015 (the year before the policy change) (Office of Head Start 2015). To examine maternal employment, we combine the PIR data with the American Community Survey (ACS) for the same years (Ruggles et al. 2025).

The publicly available PIR, collected annually by the Office of Head Start (OHS), provides standardized, program-level data on children, families, staffing, and enrollment. Years are labeled by the spring of the service year (e.g., 2017 denotes 2016-2017). Because all federally funded grantees must submit a PIR, it provides comprehensive program-level coverage. For this study, we restrict our sample to Head Start-only (HS) programs, excluding Early Head Start, American Indian and Alaska Native, and migrant/seasonal programs.[4]

Using PIR data, we measure full-time enrollment for each grantee-program unit as the share of children enrolled full-time out of the total enrollment. Appendix Figure A.1 displays the average share of full-time enrollment in Head Start programs from 2012 to 2019. This figure shows that full-time enrollment remained relatively stable through the mid-2010s, fluctuating around 53%. Beginning in 2017, however, there is an upward trend, with the mean share of full-time enrollment reaching its highest point in 2019 (75%), consistent with

[4]We exclude Early Head Start (EHS) because it is a distinct program serving pregnant women and children under age 3, and its service mix includes home-based, family child care, and other program options that differ from Head Start preschool. In 2015-2016, less than 50% of EHS slots were center-based preschool, while for Head Start, 97% of services were (Office of Head Start 2016*b*). Head Start programs also serve infants and toddlers, and 42% of program grantees operate both Head Start and EHS, while one-quarter operate only EHS programs. We also exclude Alaska, Hawaii, and all US territories from our analysis due to differences in geographic definitions and data availability.

the timing of the policy change.

We identify grantee programs with less than 40% full-time enrollment in 2015 (the year before the policy was announced), the threshold used to determine eligibility for supplemental funding. We classify these grantee programs as *treated* (eligible to apply), and those at or above 40% as *untreated* (ineligible to apply). Figure 2 shows trends in the mean share of full-time Head Start enrollment by treatment status. Untreated grantee programs show consistently high levels of full-time enrollment throughout the period, with around a mean of 90%. In contrast, treated grantee programs show significantly lower baseline rates, averaging around 13.5% from 2012 through 2016. Following the April 2016 grant announcement and June 2016 application deadline, full-time enrollment among treated grantees more than doubled, reaching roughly 40% by 2019.[5] This figure also provides suggestive visual support for the parallel trends assumption underlying our difference-in-differences design. Prior to the 2016–2017 program year, both treated and untreated grantee programs exhibited stable and non-converging trends in full-time enrollment rates.

A key feature of Head Start is that some grantees operate across multiple counties, which is not captured in grantee-level PIR data. To address this limitation, we supplement the PIR with center-level data, which provide detailed information on the physical locations of service delivery. For this, we use the center locations obtained from the Head Start Center Locator in 2015 (Office of Head Start 2015). We merge the geocoded center location data with the grantee-program data using the grant number, program number, grantee name, program name, and program state information. Since the geographic level of the ACS labor outcomes data is at the PUMA level, we assign PUMA information to centers and grantees as follows: for centers, we use their longitude and latitude; for grantee programs, we geocode their administrative addresses. For context, in 2015, 1,539 grantee programs served 13,706 centers. The resulting PUMA coverage highlights the value of the center-level data: while grantee addresses map to 1,058 PUMAs, the centers themselves are located in 2,081 unique PUMAs (out of 2,490 U.S. PUMAs in total), providing far greater geographic exposure and variation.

Using the merged PIR-center data, we construct two treatment variables. First, a binary indicator equals one if any Head Start center in a given PUMA is affiliated with a grantee program eligible to apply for supplemental funding, and equals zero if a PUMA has Head Start centers but none are affiliated with eligible grantees.[6] Second, we construct a

[5] We observe 80% of eligible grantees with an increase in the share of full-time enrollment in the post-period. Given that these funds were available as a voluntary supplement to existing grantees, not all eligible grantees applied.

[6] Results are robust to the inclusion of PUMAs with no Head Start centers.

continuous measure capturing the fraction of centers within a PUMA affiliated with eligible grantees. These variables capture both the presence and intensity of exposure to the policy intervention at the local level. Appendix Figure A.3 displays the PUMA-level variation in the share of centers affiliated with eligible grantees. We merge these treatment variables, both defined using 2015 program eligibility, with individual-level data from the ACS through IPUMS USA to analyze maternal employment outcomes.

The ACS is a nationally representative survey administered by the U.S. Census Bureau that collects detailed demographic, social, and economic information from a large sample of households annually. Our sample spans 2012-2019, and we focus on mothers' labor supply outcomes measured over the past 12 months.[7] PUMAs are the most granular geographic unit available in the ACS public-use microdata, each containing at least 100,000 residents.[8] Although PUMAs do not align perfectly with county boundaries, they offer sufficient spatial resolution to approximate local exposure to Head Start full-day expansions. This enables us to link variation in local Head Start program offerings to labor market outcomes of mothers residing in those geographic areas.

Our sample of interest comprises single mothers with young children aged zero to four. In 2015, nearly all grantees (>99%) in our study sample served three- and four-year-olds, and half served two-year-olds.[9] We focus on single mothers for two reasons. First, as Head Start is a targeted program, single mothers are more likely to meet its income eligibility criteria than their married counterparts. Nationally representative surveys on household structures of Head Start children show that, in the fall of 2014, approximately 59% of Head Start children lived in households headed by the mother only or in which the parents were unmarried (Aikens et al. 2017). By 2019, that figure had grown to 68% (Kopack Klein et al. 2021). Second, single mothers face greater childcare constraints. Consequently, their labor supply decisions are expected to be most sensitive to the availability of full-time, subsidized care (e.g., Blau and Tekin 2007; Gelbach 2002).

We present summary statistics in Appendix Table A.1. On average, compared to all mothers of young children (Column 2), single mothers (Column 3) are more likely to work,

[7]ACS respondents take the survey throughout the calendar year. Therefore, the retrospective 12-month reference period means that labor outcomes could combine school years. For example, a respondent surveyed in October 2017 is asked to report on October 2016 through the present, capturing portions of both the 2016–2017 and 2017–2018 school years.

[8]PUMA boundaries were substantially revised following the 2010 Census and first used in the 2012 ACS. Areas defined under the 2000 Census geography (used in ACS data through 2011) were redrawn to reflect updated population distributions, resulting in boundaries that are largely incompatible with the previous definitions. Our analysis begins in 2012 to ensure geographic consistency.

[9]We include mothers of all young children, aged zero to four, in our analyses for precision and the potential for anticipatory effects. Our results are not sensitive to the inclusion of infants.

be non-White, and be Hispanic, and they report lower wages from the previous year. Additionally, 58% of this group are exposed to the Head Start expansions.

4 Methods

We estimate the impact of the Head Start full-day expansion using the following difference-in-differences (DD) specification:

$$y_{ipt} = \alpha + \delta Treatment_p \times Post_t + X_i + \mu_p + \gamma_t + \epsilon_{ipt} \tag{1}$$

where y_{ipt} denotes the outcome of interest (e.g., full-time Head Start enrollment or maternal employment) for grantee/individual i located in PUMA p in year t. The variable Treatment_p is either (1) an indicator equal to one if the PUMA is exposed to at least one Head Start center affiliated with a grantee program that was eligible for the supplemental full-day funding in 2015 or (2) the share of centers within a PUMA that are affiliated with eligible grantee programs in 2015. Post_t is an indicator for post-policy years, defined as post-2016, following the implementation of the funding initiative. X_i includes race and Hispanic indicators in models with maternal outcomes. The term μ_p denotes PUMA fixed effects to account for time-invariant local characteristics, and γ_t represents year fixed effects to control for common time shocks. The error term ϵ_{ipt} is clustered at the PUMA level. The coefficient δ captures the average treatment effect of exposure to the Head Start full-day expansion policy on the outcome of interest.

In the first stage, we estimate the policy's impact on full-time Head Start enrollment using PIR data at the grantee-program-year level. Because the geographic unit in the ACS data is the PUMA level, our primary specification defines treatment based on the PUMA in which a grantee operates. For robustness, we also report first-stage results assigning treatment directly at the grantee-program level.

We then examine the impact of the policy on maternal employment outcomes using the ACS. In addition to Equation 1, we estimate an event-study version to examine pre-trends and dynamic responses:

$$y_{ipt} = \alpha + \sum_{j=2008, j\neq 2015}^{2019} \delta_j (Treatment_p \times 1[t = j]) + X_i + \mu_p + \gamma_t + \epsilon_{ipt} \tag{2}$$

In this specification, we interact the Treatment_p indicator with year dummies. The coefficients, δ_j, estimate the difference in outcomes between treated and untreated locations

in year j relative to the base year, 2015. We expect the pre-treatment coefficients (2012-2014) to be close to zero, indicating that treatment and comparison groups followed similar trends before the policy change. The coefficients for 2016-2019 capture the effects after the policy, showing how the policy's impact evolved over time. To further validate our research design, we test whether the Head Start full-day expansion is correlated with observable time-varying PUMA characteristics; Appendix Figure A.4 confirms no such associations exist across several socio-demographic variables.

5 Results

5.1 First Stage Results: Effect on Full-Time Head Start Enrollment

Table 1 presents the first-stage estimates of the effect of the Head Start full-day expansion policy on the share of full-time enrollment at the grantee-program level, using Equation 1 and two alternative definitions of PUMA-level treatment. We report results both with and without population weighting, using the number of children ages zero through four.

Panel A uses a binary treatment indicator for whether a PUMA contains at least one Head Start center affiliated with an eligible grantee. In the weighted specification (Column 1), policy exposure increases full-time enrollment by 10.4 percentage points (≈19% relative to the pre-policy mean). The unweighted estimate in Column 2 is slightly larger at 12.15 percentage points (≈25%). Both of these estimates are statistically significant at the 1% level. Panel B reports results using a continuous treatment measure: the share of Head Start centers in a PUMA affiliated with eligible grantees. The estimated effects are 13.65 and 14.25 percentage points in the weighted and unweighted specifications, respectively, both statistically significant at the 1% level.

We test the sensitivity of the first-stage results to different model specifications in Appendix Table A.2. Column 1 reproduces the main estimates reported in Table 1. In Column 2, we account for contemporaneous policy changes and differential trends by controlling for time-varying state preschool enrollment. Column 3 includes flexible trends based on 2015 state preschool enrollment, and Column 4 adds flexible trends based on 2015 unemployment rates. While our first-stage effects are largely robust to these alternative specifications, the addition of PUMA-specific linear time trends in Column 5, a more demanding test, leads to smaller point estimates that are less precisely estimated.

As an alternative approach, we estimate the first-stage effect using grantee-program-level treatment status (a more granular measure of treatment exposure than the PUMA-level

treatment), interacted with a post-2016 dummy. Specifically, we classify grantee programs as "treated" if they were eligible to apply for supplemental full-day funding, and "untreated" otherwise, based on PIR data. This analysis does not require geographic assignment to PUMAs or the construction of aggregate PUMA-level treatment variables (in contrast to the PUMA-level treatment used with the ACS). Instead, the grantee-level treatment variation provides a more direct assessment of the policy's effect by comparing changes in full-time enrollment between eligible and ineligible grantee programs before and after the policy change.[10] Appendix Table A.3 presents these results. Overall, using finer-grained treatment variation confirms that the policy led to a sizable increase in full-time Head Start enrollment, and the estimates remain robust across all specifications, further validating the first-stage relationship.

We report event study results for the first stage in Appendix Figure A.2, where Panel (a) uses PUMA-level treatment exposure and Panel (b) uses grantee-program-level treatment exposure. In both panels, there is no evidence of differential pre-trends across treatment and control groups, and full-time Head Start enrollment increases gradually in the post-2016 period.

In sum, our first-stage results show that the policy change led to a sizable and meaningful increase in full-time Head Start enrollment. To better understand counterfactual enrollment choices among single mothers—since standard household surveys lack childcare enrollment data—we turn to the Early Childhood Program Participation (ECPP) component of the National Household Education Survey, which provides a limited snapshot. Among all young children in single-parent families, there was no overall change from 2016 to 2019 in the shares who had at least one regular, nonparental care arrangement in a typical week, or those who only experienced parental care. The proportion in weekly center-based care arrangements increased by 3 percentage points (from 36 to 39%), while the share in non-relative care, including home-based child care, decreased from 15 to 11% (Corcoran and Steinley 2019; Cui and Natzke 2021).[11] The next subsection presents maternal labor market responses.

5.2 Maternal Outcomes

Table 2 examines the impact of Head Start expansions on labor market outcomes for single mothers with young children aged zero through four-years old, using Equation 1. Panel A

[10] Note that while this analysis does not rely on PUMA-level treatment assignment, we test the robustness of adding PUMA-specific linear trends using the grantee-PUMA mapping described in Section 3.

[11] "Young children" includes those aged five and under not yet enrolled in kindergarten. Children can be captured in more than one category if they experience multiple care arrangements during a typical week.

defines treatment as the presence of at least one treated center in a PUMA, while Panel B uses the share of treated centers.

Overall, we find exposure to full-day expansions led to statistically significant and economically meaningful improvements in single mothers' labor supply and earnings. In Panel A, at the extensive margin, the policy increased employment by 1.9 percentage points (2.5% increase over the pre-policy mean). Based on ACS population estimates, this employment effect corresponds to roughly 25,000 additional mothers in the workforce as a result of these expansions.[12] We are limited in our ability to scale estimates to implied treatment-on-the-treated effects because we are unable to observe Head Start enrollment, including full- or part-day, in the ACS data, making it impossible to directly estimate a two-stage least squares effect.

At the intensive margin, the increase of 0.8 weekly work hours represents a 2.9% gain relative to the pre-policy mean. Similarly, the 1.7 percentage-point increase in the probability of reporting positive wage income translates into a 2.3% gain, while the $1,257 increase in annual wage income amounts to a 7% increase. Panel B yields comparable relative magnitudes, with employment rising by 2.2%, hours worked by 2.8%, wage receipt by 2.0%, and annual earnings by 7.4%. In sum, the consistent effects across both panels underscore that the estimated impacts are not only statistically significant but also economically meaningful, indicating that Head Start expansions produced notable improvements in labor supply outcomes of single mothers. Separately, married mothers of young children may also be exposed to Head Start if income-eligible. Appendix Table A.4 Panels C and D show that Head Start full-day expansions did not improve labor market outcomes of married mothers, and negative effects may suggest that income effects (from subsidized childcare hours) dominate substitution effects in two-earner households.

Evidence on the labor supply effects of childcare and preschool expansions is mixed and varies by policy design and context. Large-scale reforms such as Quebec's universal childcare program have generated substantial employment gains. For example, Baker, Gruber and Milligan (2008) estimate a 7–8 percentage-point increase in maternal employment, a 15% rise relative to baseline, making it one of the largest documented effects. In contrast, Havnes and Mogstad (2011) find near-zero overall effects of Norway's universal expansion, pointing to crowd-out of informal care. Similarly, Goux and Maurin (2010) show that access to public

[12]There were under 2.3 million single mothers of young children in the U.S. in 2015 (according to ACS population estimates), and 58% of single mothers were in treated PUMAs as displayed in Table A.1. We estimate a 1.9 percentage-point increase in employment among this group in Table 2, corresponding to approximately 25,000 more mothers in the labor force. As discussed, we also show that the policy resulted in approximately 100,000 additional full-day slots in Head Start programming.

preschool in France increased employment mainly among single mothers, with negligible effects for two-parent households. Specific to Head Start, experimental evidence from the Head Start Impact Study suggests no average effect on maternal labor supply (Gelber and Isen 2013), though Schiman (2022) documents important heterogeneity, with mothers of three-year olds increasing full-time employment by 5 percentage points (≈15% relative to baseline). Pihl (2022), finds employment declines among single mothers following Head Start's introduction, suggesting that Head Start operated more as a social service than a childcare substitute.

Recent quasi-experimental work aligns more closely with our results: Wikle and Wilson (2023) show that increased Head Start funding in the 1990s raised single mothers' employment by nearly 2 percentage points (≈2–3% relative gain) and boosted hours and earnings, while Humphries et al. (2024) find that universal pre-kindergarten in New Haven increased parental earnings, underscoring that modern expansions can meaningfully relax childcare constraints. Taken together, these studies suggest that the labor supply effects of early childhood programs are highly context-dependent, with more recent expansions, particularly those offering full-day coverage, yielding modest but consistent gains in maternal employment and earnings, in line with our estimates.

Figure 3 presents event study results relative to 2015. The red vertical dashed lines indicate the policy implementation period. Pre-treatment coefficients for all outcomes are close to zero and mostly statistically insignificant, indicating parallel trends between treatment and comparison groups before policy implementation. Given the timing of grant applications, and the ACS's 12-month retrospective reference period, the earliest we could observe the full-day expansions in post-treatment ACS outcomes is 2017, the survey year capturing employment behavior spanning 2016 and 2017. Consistent with this timeline, our event study figures show positive labor market effects emerging in 2017 and increasing gradually through 2018 and 2019. By 2019, we observe positive and statistically significant effects across all outcomes. Single mothers in treated areas were more likely to be employed, worked more hours, had higher likelihood of any wage income, and experienced higher overall earnings.

Table A.5 examines whether the effects vary by mother's race. Overall, the results suggest that Head Start duration expansions improved labor-market outcomes for both racial groups, with a more consistent pattern of detectable gains among White mothers.

As a placebo check, we estimate the effects of Head Start expansions on the labor supply of mothers whose youngest child is aged 5–6 and 7-11 separately, the groups unlikely to be directly affected by access to early childhood care. Table A.6 presents the results for this placebo sample across two subgroups less likely to be eligible for Head Start: married mothers

(Column 1/3) and highly educated mothers[13] (Column 2/4). The estimated coefficients are small in magnitude and statistically insignificant across all labor outcomes. These null results provide reassurance that the positive effects we document for single mothers with young children are not driven by broader labor market shocks or spurious correlations with Head Start expansions, but rather reflect causal impacts on the population most directly exposed to the policy.

Table A.8 demonstrates our results are robust to alternative specifications, where Column 1 reproduces our main specification. One potential concern is that contemporaneous changes in state preschool programs may confound our analyses. To explore and address this, Column 2 controls for time-varying state preschool enrollment, while Column 3 controls for flexible trends based on 2015 state preschool enrollment. In Column 4, we additionally include flexible trends based on 2015 unemployment rates to control for potential differential evolution in labor markets. Finally, in Column 5, we include PUMA-specific linear trends to control for local differential trends. Our findings are similar across specifications for most outcomes, which provides evidence that our results are not driven by contemporaneous policy changes or spurious trends.[14] Finally, to ensure our results are not driven by chance, we perform a randomization test. Appendix Figure A.5 plot the distributions of coefficients from 1,000 random permutations of PUMA treatment and timing, confirming that our estimated effects lie far in the tails of these placebo distributions.

6 Conclusion

This study provides new evidence that expansions in the duration of Head Start services can yield meaningful labor market benefits for single mothers of young children. Using a difference-in-differences model that exploits variation in grantee eligibility for supplemental funding, we show that the 2016 federal initiative to extend Head Start hours significantly increased the share of children enrolled full-time. In turn, these expansions led to higher employment rates, greater work hours, and increased earnings among single mothers with young children. In sum, the expansions converted 100,000 slots to full day and allowed 25,000 single mothers of young children, in affected places, to join the workforce.

These findings highlight that even marginal expansions in publicly provided early child-

[13] Highly educated mothers are defined as those with a college degree or more.

[14] Panel D reports the robustness results for wage income, where the point estimate falls from 1,153 to 865 when we include PUMA-specific linear trends, and it becomes statistically insignificant. While the point estimate remains positive and of a similar order of magnitude, standard errors increase in this more demanding specification.

hood education can alleviate childcare constraints and promote maternal labor force participation. The results underscore the importance of program design, particularly the availability of full-day care, in shaping the economic outcomes of low-income families. As policymakers continue to evaluate investments in early childhood education, our findings suggest that extending service duration can be a powerful tool for supporting both parental employment and potentially children's development.

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Tables and Figures

Table 1: Effect of Head Start Expansions on Full-time Enrollment:

First Stage Using PUMA-level Treatment

	Weighted	Unweighted
	(1)	(2)
A: At least one treated center in a PUMA		
PUMA had at least one treated center*Post	10.402***	12.148***
	(1.824)	(1.116)
Preperiod Mean Y (Percent)	53.42	47.74
% Effect (100*Coef/Mean)	19.47	25.45
Obs	7156	7156
B: Share of treated centers in a PUMA		
PUMA share of treated centers*Post	13.650***	14.251***
	(2.243)	(1.175)
Preperiod Mean Y (Percent)	53.42	47.74
% Effect (100*Coef/Mean)	25.55	29.85
Obs	7156	7156
PUMA FE	Y	Y
Year FE	Y	Y

Notes: Table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1. The outcome is grantee-program enrollment. The treatment is assigned based on (1) a binary indicator that equals one if any Head Start center located in a given PUMA is affiliated with a grantee program eligible to apply for supplemental funding in Panel A, and (2) the fraction of centers within a PUMA that are affiliated with eligible grantee-programs in Panel B. The post dummy is an indicator for post-policy years, defined as post-2016. Column 1 uses the county population of 0 to 4-year olds as weights in the regression, and Column 2 reports unweighted regression results. The outcome data come from the PIR data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

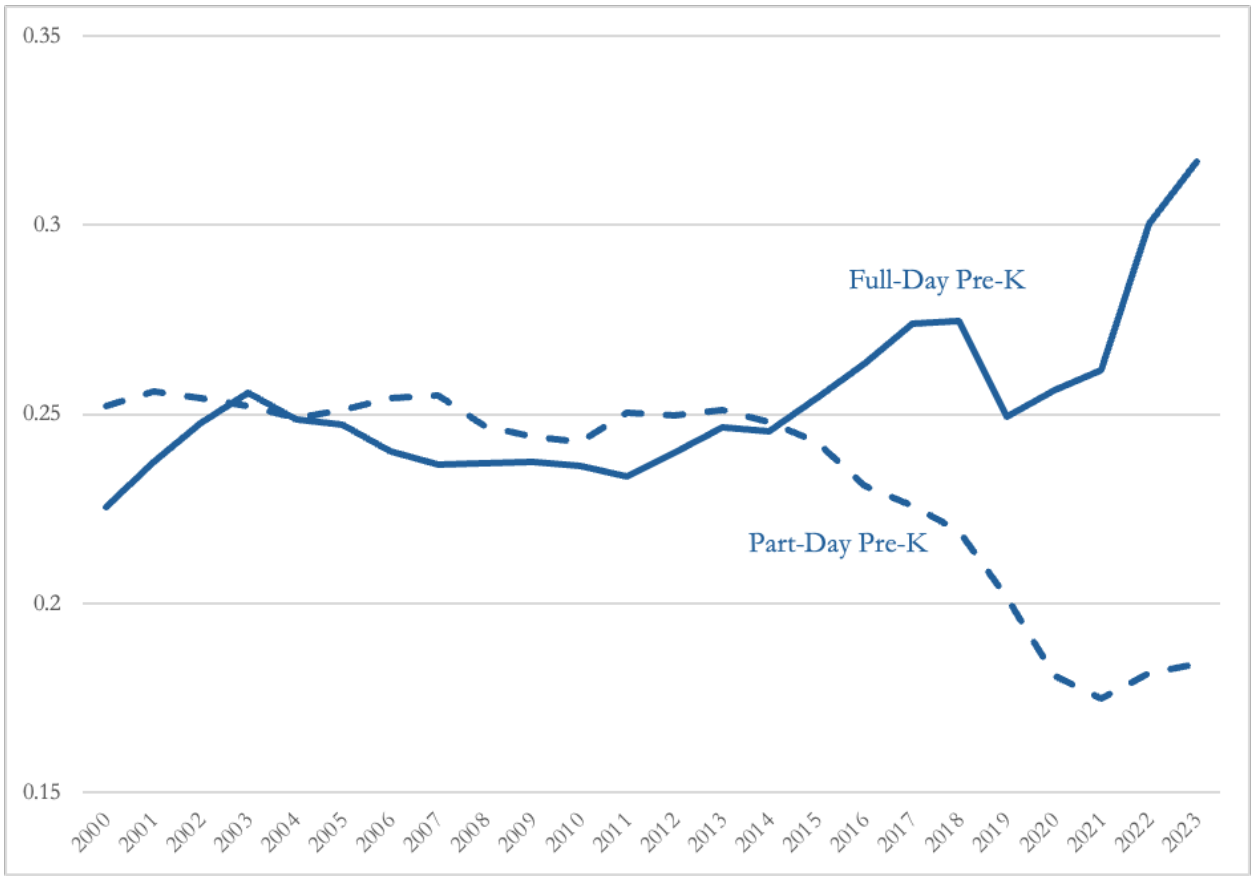
Table 2: Effect of Head Start Expansions on Maternal Labor Supply,

for Single Mothers with Young Children 0–4

	Past 12 months			
	Employed (1)	Usual hours worked per week (2)	Wage income > 0 (3)	Wage income (2015 USD) (4)
Panel A: At least one treated center in a PUMA				
PUMA had at least one treated center*Post	0.019***	0.799***	0.017***	1256.711***
	(0.006)	(0.254)	(0.006)	(337.410)
Mean Y (pre)	0.775	27.692	0.748	17889.977
Mean Y (post)	0.809	29.465	0.779	20609.184
Post-Pre Mean Y	0.034	1.774	0.031	2719.207
% Effect (100*Coef/Mean)	2.464	2.885	2.272	7.025
Mean X (Dummy)	0.596	0.596	0.596	0.596
R-Squared	0.052	0.055	0.051	0.114
Obs	140118	140098	140118	140118
Panel B: Share of treated centers in a PUMA				
PUMA share of treated centers*Post	0.017***	0.766***	0.015**	1328.171***
	(0.006)	(0.266)	(0.006)	(351.316)
Mean Y (pre)	0.775	27.692	0.748	17889.977
Mean Y (post)	0.809	29.465	0.779	20609.184
Post-Pre Mean Y	0.034	1.774	0.031	2719.207
% Effect (100*Coef/Mean)	2.220	2.764	2.058	7.424
Mean X (Share)	0.515	0.515	0.515	0.515
R-Squared	0.052	0.055	0.051	0.114
Obs	140118	140098	140118	140118
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Notes: Table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on (1) a binary indicator that equals one if any Head Start center located in a given PUMA is affiliated with a grantee program eligible to apply for supplemental funding in Panel A, and (2) the fraction of centers within a PUMA that are affiliated with eligible grantee-programs in Panel B. The post dummy is an indicator for post-policy years, defined as post-2016. Each column reports the results from a separate regression using the labor market outcomes listed in the header. The outcome data come from the ACS data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Figure 1: Share of Preschoolers in Full- and Part-day Settings in the U.S. Over Time

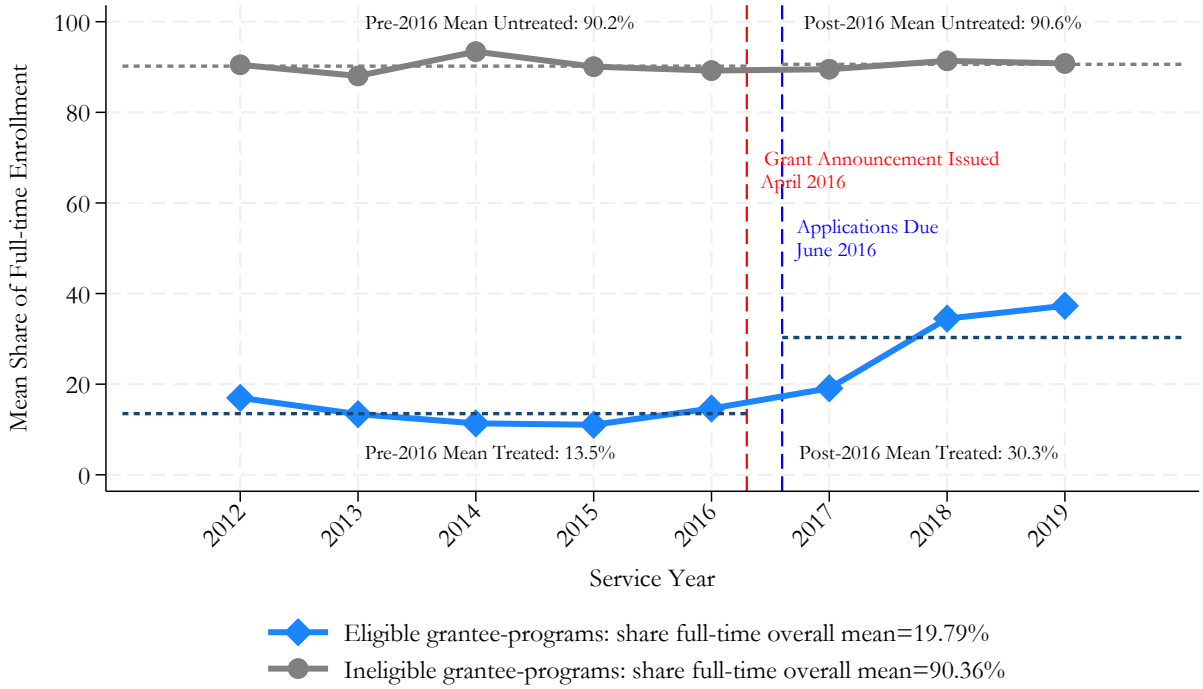


Notes: Figure displays share of 3- and 4-year olds in preschool settings. Data are reported as 3-year moving averages (endpoints are single years).

Source: Current Population Survey, October School Enrollment Supplement, 2000–2023.

Figure 2: Full-time Share of Head Start Enrollment,

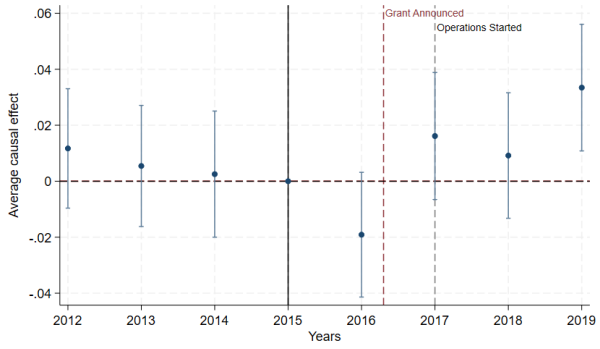
by Eligibility to Apply for Expansion Grant



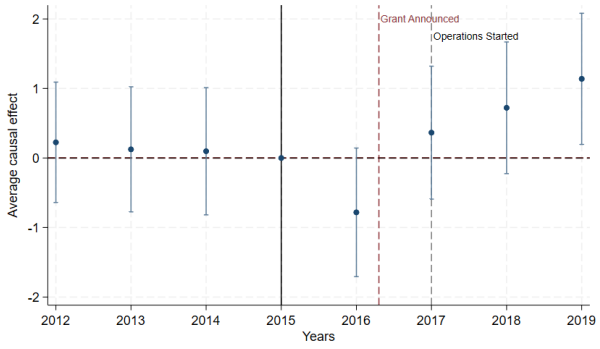
Notes: Figure displays annual full-time enrollment in Head Start by grantee eligibility to apply for duration expansion funding. We define the treatment group based on a binary indicator that equals one if any Head Start grantee is eligible to apply for the supplemental grant because they had less than 40 percent full-time enrollment in 2015 at the grantee-program level.
Source: Head Start Program Information Reports (PIR), 2012–2019. The PIR is a publicly available administrative dataset collected annually by the Office of Head Start (OHS) for the program years labeled by the spring of the service year (e.g., 2017 refers to the 2016–2017 service year).

Figure 3: Event Studies: The Effect of Head Start Expansions on Labor Supply of Single Mothers with Young Children 0–4

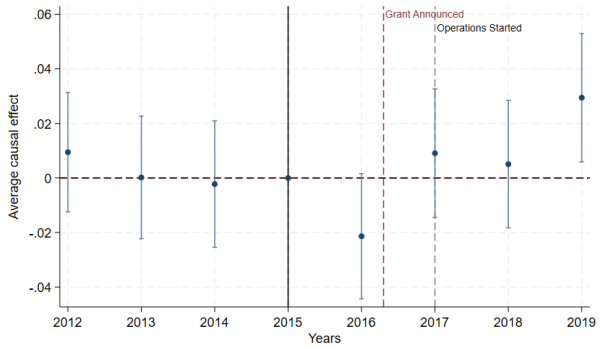
(a) Employed



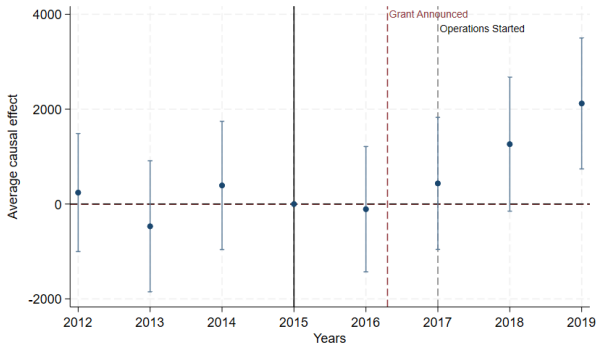
(b) Hours worked



(c) Wage income >0



(d) Wage income (2015 USD)



Notes: Figures present estimated coefficients and 95% confidence intervals using a event-study type specification described in Equation 2. The outcome data come from the ACS data. Treatment variable is determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. The regression specification uses PUMA and year fixed effects, and control variables for race and ethnicity. Standard errors are clustered at the PUMA level.

Online Appendix: Supplemental Tables and Figures

Tables

Table A.1: Summary Statistics for Mothers Using Treatment Status

	All mothers	Mothers 0-4 children	Single mothers 0-4 children	Single mothers 0-4 children treated PUMAs	Single mothers 0-4 children untreated PUMAs
	(1)	(2)	(3)	(4)	(5)
Employed	0.75	0.70	0.79	0.79	0.79
	(0.43)	(0.46)	(0.41)	(0.41)	(0.41)
Usual hours per week	27.57	25.11	28.33	28.12	28.63
	(18.60)	(19.03)	(17.33)	(17.29)	(17.38)
Wage > 0	0.71	0.67	0.76	0.76	0.76
	(0.45)	(0.47)	(0.43)	(0.43)	(0.43)
Wages (2015 USD)	28928.48	25589.78	18864.76	18580.63	19264.31
	(41852.38)	(39742.92)	(25453.22)	(24312.55)	(26970.94)
Non-White	0.28	0.28	0.45	0.38	0.54
	(0.45)	(0.45)	(0.50)	(0.49)	(0.50)
Hispanic	0.20	0.21	0.25	0.25	0.25
	(0.40)	(0.41)	(0.43)	(0.43)	(0.43)
PUMA-at least one treated center	0.61	0.61	0.58	1.00	0.00
	(0.49)	(0.49)	(0.49)	(0.00)	(0.00)
PUMA-Share of treated centers	0.55	0.55	0.51	0.87	0.00
	(0.47)	(0.47)	(0.47)	(0.26)	(0.00)
N	2015027	711405	140118	83456	56662

Notes: Labor outcomes come from the American Community Survey (ACS), 2008–2019. Treatment variables are constructed from geocoded Head Start center data from the Head Start Center Locator, merged to Public Use Microdata Areas (PUMAs) using a geographic crosswalk. Treated PUMAs are those containing at least one treated center (i.e., a center operated by a grantee-program eligible to apply for supplemental funding.)

Table A.2: Effect of the Head Start Expansions on Full-time Enrollment:

First Stage Sensitivity Using PUMA-level Treatment

	Main specification	Time-varying state Pre-K enrollment	2015 state Pre-K enrollment flexible trends	2015 state Pre-K enrollment& 2015 unemployment flexible trends	PUMA linear trends
	(1)	(2)	(3)	(4)	(5)
A: Weighted by Population 0-4					
PUMA had at least one treated center*Post	10.402***	11.405***	7.649***	5.649***	3.258
	(1.824)	(1.883)	(2.005)	(2.023)	(2.480)
Preperiod Mean Y	53.42				
% Effect (100*Coef/Mean)	19.47	21.35	14.32	10.57	6.10
Obs	7156	7156	7156	7156	7156
B: Not weigthed					
PUMA had at least one treated center*Post	12.148***	12.271***	11.969***	11.888***	2.844**
	(1.116)	(1.151)	(1.309)	(1.296)	(1.357)
Preperiod Mean Y	47.74				
% Effect (100*Coef/Mean)	25.45	25.70	25.07	24.90	5.96
Obs	7156	7156	7156	7156	7156
PUMA FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
State Pre-k enroll.		Y			
2015 Pre-k enroll. trends			Y	Y	
2015 unemployment trends				Y	
PUMA Linear Trend					Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1. The outcome is full-time Head Start enrollment at the grantee-program level. The treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. Panel A uses the county population of 0 to 4 year olds as weights in the regression, and Panel B reports unweighted regression results. The outcome data come from the PIR data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Table A.3: Effect of Head Start Expansions on Full-time Enrollment:

First Stage Sensitivity Using Grantee-program-level Treatment

	Main specification	Time-varying state Pre-K enrollment	2015 state Pre-K enrollment flexible trends	2015 state Pre-K enrollment& 2015 unemployment flexible trends	PUMA linear trends
	(1)	(2)	(3)	(4)	(5)
A: Weighted by Population 0-4					
Treatment*Post	14.274***	14.465***	12.561***	11.981***	9.340***
	(1.791)	(1.810)	(1.920)	(1.898)	(2.920)
Preperiod Mean Y	53.42				
% Effect (100*Coef/Mean)	26.72	27.08	23.51	22.43	17.48
Obs	7156	7156	7156	7156	7156
B: Not weigthed					
Treatment*Post	14.898***	15.031***	14.879***	14.914***	8.224***
	(1.059)	(1.078)	(1.226)	(1.224)	(1.651)
Preperiod Mean Y	47.742				
% Effect (100*Coef/Mean)	31	31	31	31	17
Obs	7156	7156	7156	7156	7156
Program-Grantee FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
State Pre-k enroll.		Y			
2015 Pre-k enroll. trends			Y	Y	
2015 unemployment trends				Y	
PUMA Linear Trend					Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1. The outcome is full-time Head Start enrollment at the grantee-program level. The treatment is assigned based on a binary indicator that equals one if any Head Start grantee is eligible to apply for the supplemental grant because they had less than 40 percent full-time enrollment in 2015. The post dummy is an indicator for post-policy years, defined as post-2016. Panel A uses the county population of 0 to 4 year olds as weights in the regression, and Panel B reports unweighted regression results. The data come from the PIR data, 2012–2019. Each regression uses grantee-program and year fixed effects. Standard errors are clustered at the grantee-program level. $*$ $p<0.10$, $**$ $p<0.05$, $***$ $p<0.01$.

Table A.4: Effect of Head Start Expansions on Maternal Labor Supply, for Mothers with Young Children, by Marital Status

	Past 12 months			
	Employed (1)	Usual hours worked per week (2)	Wage income > 0 (3)	Wage income (2015 USD) (4)
Single Mothers				
Panel A: At least one treated center in a PUMA				
PUMA had at least one treated center*Post	0.019***	0.799***	0.017***	1256.711***
	(0.006)	(0.254)	(0.006)	(337.410)
Mean Y (pre)	0.775	27.692	0.748	17889.977
Mean Y (post)	0.809	29.465	0.779	20609.184
Post-Pre Mean Y	0.034	1.774	0.031	2719.207
% Effect (100*Coef/Mean)	2.464	2.885	2.272	7.025
Mean X (Dummy)	0.596	0.596	0.596	0.596
R-Squared	0.052	0.055	0.051	0.114
Obs	140118	140098	140118	140118
Panel B: Share of treated centers in a PUMA				
PUMA share of treated centers*Post	0.017***	0.766***	0.015**	1328.171***
	(0.006)	(0.266)	(0.006)	(351.316)
Mean Y (pre)	0.775	27.692	0.748	17889.977
Mean Y (post)	0.809	29.465	0.779	20609.184
Post-Pre Mean Y	0.034	1.774	0.031	2719.207
% Effect (100*Coef/Mean)	2.220	2.764	2.058	7.424
Mean X (Share)	0.515	0.515	0.515	0.515
R-Squared	0.052	0.055	0.051	0.114
Obs	140118	140098	140118	140118
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Married Mothers				
Panel C: At least one treated center in a PUMA				
PUMA had at least one treated center*Post	-0.009***	-0.199	-0.009***	-791.591**
	(0.003)	(0.141)	(0.003)	(322.490)
Mean Y (pre)	0.665	23.732	0.632	26318.052
Mean Y (post)	0.689	24.750	0.655	29925.840
Post-Pre Mean Y	0.024	1.018	0.023	3607.788
% Effect (100*Coef/Mean)	-1.322	-0.837	-1.442	-3.008
Mean X (Dummy)	0.632	0.632	0.632	0.632
R-Squared	0.051	0.047	0.046	0.097
Panel D: Share of treated centers in a PUMA				
PUMA share of treated centers*Post	-0.009***	-0.226	-0.009***	-679.704**
	(0.003)	(0.144)	(0.003)	(329.579)
Mean Y (pre)	0.665	23.732	0.632	26318.052
Mean Y (post)	0.689	24.750	0.655	29925.840
Post-Pre Mean Y	0.024	1.018	0.023	3607.788
% Effect (100*Coef/Mean)	-1.340	-0.952	-1.487	-2.583
Mean X (Share)	0.565	0.565	0.565	0.565
R-Squared	0.051	0.047	0.046	0.097
Obs	571287	571070	571287	571287
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. Each column reports the results from a separate regression using the labor market outcomes listed in the header. The sample is restricted to mothers of children ages 0 to 4 years old. Outcome data come from the ACS data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Table A.5: Effect of Head Start Expansions on Maternal Labor Supply, for Single Mothers with Young Children, by Race

	Past 12 months			
	Employed (1)	Usual hours worked per week (2)	Wage income > 0 (3)	Wage income (2015 USD) (4)
Whites				
Panel A: At least one treated center in a PUMA				
PUMA had at least one treated center*Post	0.023***	0.747**	0.021**	1526.299***
	(0.008)	(0.335)	(0.008)	(520.240)
Mean Y (pre)	0.781	27.956	0.749	18960.440
Mean Y (post)	0.809	29.338	0.773	21396.709
Post-Pre Mean Y	0.028	1.381	0.024	2436.269
% Effect (100*Coef/Mean)	2.943	2.672	2.766	8.050
Mean X (Dummy)	0.658	0.658	0.658	0.658
R-Squared	0.069	0.069	0.067	0.145
Panel B: Share of treated centers in a PUMA				
PUMA share of treated centers*Post	0.027***	0.862**	0.024***	1798.945***
	(0.008)	(0.346)	(0.008)	(523.266)
Mean Y (pre)	0.781	27.956	0.749	18960.440
Mean Y (post)	0.809	29.338	0.773	21396.709
Post-Pre Mean Y	0.028	1.381	0.024	2436.269
% Effect (100*Coef/Mean)	3.401	3.083	3.193	9.488
Mean X (Share)	0.583	0.583	0.583	0.583
R-Squared	0.069	0.069	0.067	0.145
Obs	83638	83619	83638	83638
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Blacks				
Panel C: At least one treated center in a PUMA				
PUMA had at least one treated center*Post	0.019	1.094**	0.017	992.193*
	(0.012)	(0.496)	(0.012)	(557.345)
Mean Y (pre)	0.776	27.772	0.761	16343.500
Mean Y (post)	0.813	29.946	0.798	19540.776
Post-Pre Mean Y	0.037	2.174	0.037	3197.276
% Effect (100*Coef/Mean)	2.399	3.941	2.278	6.071
Mean X (Dummy)	0.424	0.424	0.424	0.424
R-Squared	0.095	0.102	0.093	0.142
Panel D: Share of treated centers in a PUMA				
PUMA share of treated centers*Post	0.013	1.109*	0.012	1276.511*
	(0.013)	(0.574)	(0.013)	(654.854)
Mean Y (pre)	0.776	27.772	0.761	16343.500
Mean Y (post)	0.813	29.946	0.798	19540.776
Post-Pre Mean Y	0.037	2.174	0.037	3197.276
% Effect (100*Coef/Mean)	1.636	3.994	1.581	7.811
Mean X (Share)	0.322	0.322	0.322	0.322
R-Squared	0.095	0.102	0.093	0.142
Obs	36882	36880	36882	36882
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on (1) a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding in Panel A, and (2) the fraction of centers within a PUMA that are operated by eligible grantee-programs in Panel B. The post dummy is an indicator for post-policy years, defined as post-2016. Each column reports the results from a separate regression using the labor market outcomes listed in the header. The sample is restricted to mothers of children ages 0 to 4 years old. Outcome data come from the ACS data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Table A.6: Placebo Comparisons: Effect of Head Start Expansions

on Labor Supply of Mothers with Older Children

	Youngest Child Aged between 5 and 6		Youngest Child Aged between 7 and 11	
	Married Mothers	High Educated Mothers	Married Mothers	High Educated Mothers
A: Employed				
PUMA had at least one treated center*Post	0.0035	0.0077	0.0035	0.0003
	(0.0061)	(0.0069)	(0.0039)	(0.0044)
Y-mean	0.731	0.829	0.767	0.853
X-mean	0.630	0.606	0.630	0.603
R-Squared	0.063	0.070	0.045	0.045
Obs	162126	81110	380086	190814
B: Usual hours worked per week				
PUMA had at least one treated center*Post	0.3604	0.3217	0.1592	0.1176
	(0.2556)	(0.3146)	(0.1688)	(0.2060)
Y-mean	26.078	30.870	27.599	32.032
X-mean	0.630	0.606	0.630	0.603
R-Squared	0.059	0.071	0.043	0.050
Obs	162057	81073	379917	190739
C: Wage income last year > 0				
PUMA had at least one treated center*Post	0.0033	0.0061	0.0057	0.0024
	(0.0063)	(0.0072)	(0.0041)	(0.0048)
Y-mean	0.690	0.792	0.722	0.812
X-mean	0.630	0.606	0.630	0.603
R-Squared	0.059	0.068	0.043	0.047
Obs	162126	81110	380086	190814
D: Wage income (2015 USD)				
PUMA had at least one treated center*Post	-641.0183	-718.1806	376.6434	745.6158
	(632.4389)	(1095.2831)	(420.8377)	(715.1391)
Y-mean	30749.091	48488.367	32329.963	50465.128
X-mean	0.630	0.606	0.630	0.603
R-Squared	0.094	0.075	0.072	0.047
Obs	162126	81110	380086	190814
Ind. Control: Race, Hispanic	Y	Y	Y	Y
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. For each outcome panel, separate regressions are estimated for each of the four column-defined subgroups. Outcome data come from the ACS data, 2012–2019. Highly educated mothers are defined as those with a college degree or more. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. The Y-mean refers to the analytical sample mean. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Table A.7: Alternative Specifications: Effect of Head Start Expansions on Labor Supply of Single Mothers with Young Children

		Control for			
	Main specification	Time-varying State Pre-K Enrollment	2015 State Pre-K Enrollment Flexible Trends	2015 State Pre-K Enroll. & Unemployment Flexible Trends	PUMA Linear Trends
A: Worked last year (past 12 months)					
PUMA had at least one treated center*Post	0.0191***	0.0169***	0.0198***	0.0203***	0.0347***
	(0.0059)	(0.0061)	(0.0064)	(0.0064)	(0.0108)
Y-mean	0.790	0.790	0.790	0.790	0.790
X-mean	0.596	0.596	0.596	0.596	0.596
R-Squared	0.052	0.052	0.052	0.052	0.075
Obs	140118	140118	140118	140118	140118
B: Usual hours worked per week (past 12 months)					
PUMA had at least one treated center*Post	0.7989***	0.7577***	0.7356***	0.7527***	1.2156***
	(0.2540)	(0.2621)	(0.2743)	(0.2738)	(0.4582)
Y-mean	28.303	28.303	28.303	28.303	28.303
X-mean	0.596	0.596	0.596	0.596	0.596
R-Squared	0.055	0.055	0.055	0.055	0.079
Obs	140098	140098	140098	140098	140098
C: Wage income last year > 0 (past 12 months)					
PUMA had at least one treated center*Post	0.0170***	0.0137**	0.0157**	0.0163**	0.0298***
	(0.0062)	(0.0063)	(0.0067)	(0.0067)	(0.0113)
Y-mean	0.761	0.761	0.761	0.761	0.761
X-mean	0.596	0.596	0.596	0.596	0.596
R-Squared	0.051	0.051	0.051	0.051	0.073
Obs	140118	140118	140118	140118	140118
D: Wage income 2015 USD (past 12 months)					
PUMA had at least one treated center*Post	1256.7107***	1187.8750***	1343.8719***	1345.0096***	865.8008
	(337.4105)	(348.1856)	(356.3819)	(357.1990)	(637.9898)
Y-mean	19421.553	19421.553	19421.553	19421.553	19421.553
X-mean	0.596	0.596	0.596	0.596	0.596
R-Squared	0.114	0.114	0.114	0.114	0.138
Obs	140118	140118	140118	140118	140118
Ind. Control: Race, Hispanic	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
PUMA FE	Y	Y	Y	Y	Y
State Pre-k enroll.		Y			
2015 Pre-k enroll. trends			Y	Y	
2015 Unemployment trends				Y	
PUMA Linear trends					Y
N States	49	49	49	49	49
N Puma	2080	2080	2080	2080	2080

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. For each outcome panel, separate regressions are estimated for each of the specifications in each column. The sample is restricted to mothers of children ages 0 to 4 years old. Outcome data come from the ACS data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. The Y-mean refers to the analytical sample mean. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Table A.8: Effect of Head Start Expansions

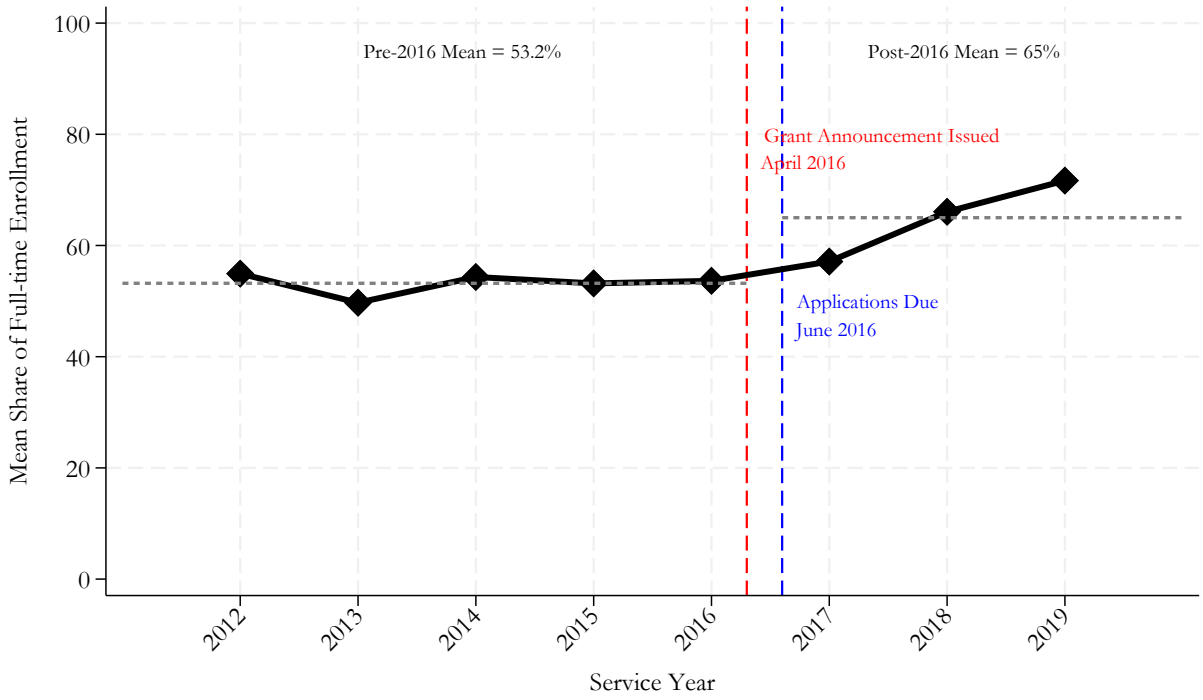
on Labor Supply of Single Mothers with Young Children (age 2-4)

	Past 12 months			
	Employed	Usual hours worked per week	Wage income > 0	Wage income (2015 USD)
	(1)	(2)	(3)	(4)
PUMA had at least one treated center*Post	0.020***	0.806**	0.018**	1597.723***
	(0.007)	(0.328)	(0.008)	(448.923)
Mean Y	0.801	28.989	0.771	19548.249
R-Squared	0.067	0.070	0.065	0.128
Obs	81754	81721	81754	81754
PUMA FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

Notes: This table reports estimated coefficients and standard errors using a difference-in-difference (DD) model described in Equation 1, where treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. For each outcome panel, separate regressions are estimated for each of the specifications in each column. The sample is restricted to mothers of children ages 2 to 4 years old. Outcome data come from the ACS data, 2012–2019. Treatment variables are determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. The Y-mean refers to the analytical sample mean. Standard errors are clustered at the PUMA level. $*$ p<0.10, $**$ p<0.05, $***$ p<0.01.

Figures

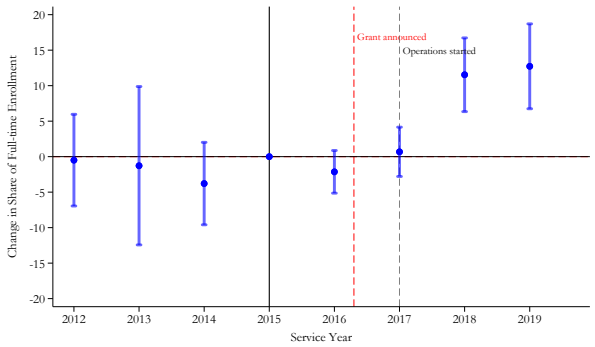
Figure A.1: Full-Time Share of Head Start Enrollment, 2012– 2019



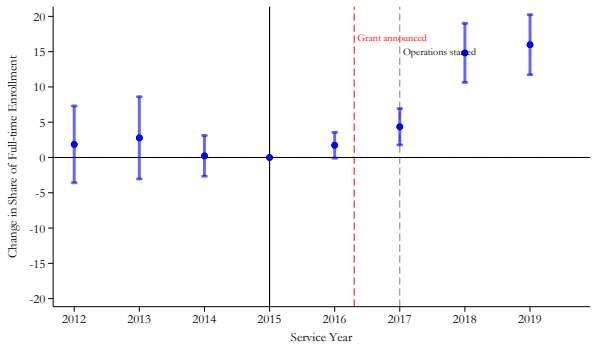
Notes: This figure shows annual full-time enrollment in Head Start, weighted by the county-level number of 0 to 4 year olds.
Source: Head Start Program Information Reports (PIR), 2012–2019. The PIR is a publicly available administrative dataset collected annually by the Office of Head Start (OHS) for the program years labeled by the spring of the service year (e.g., 2017 refers to the 2016-2017 service year).

Figure A.2: First Stage Event Study: The Effect of Head Start Expansions on Full-Time Share of Head Start Enrollment

(a) PUMA-level Treatment

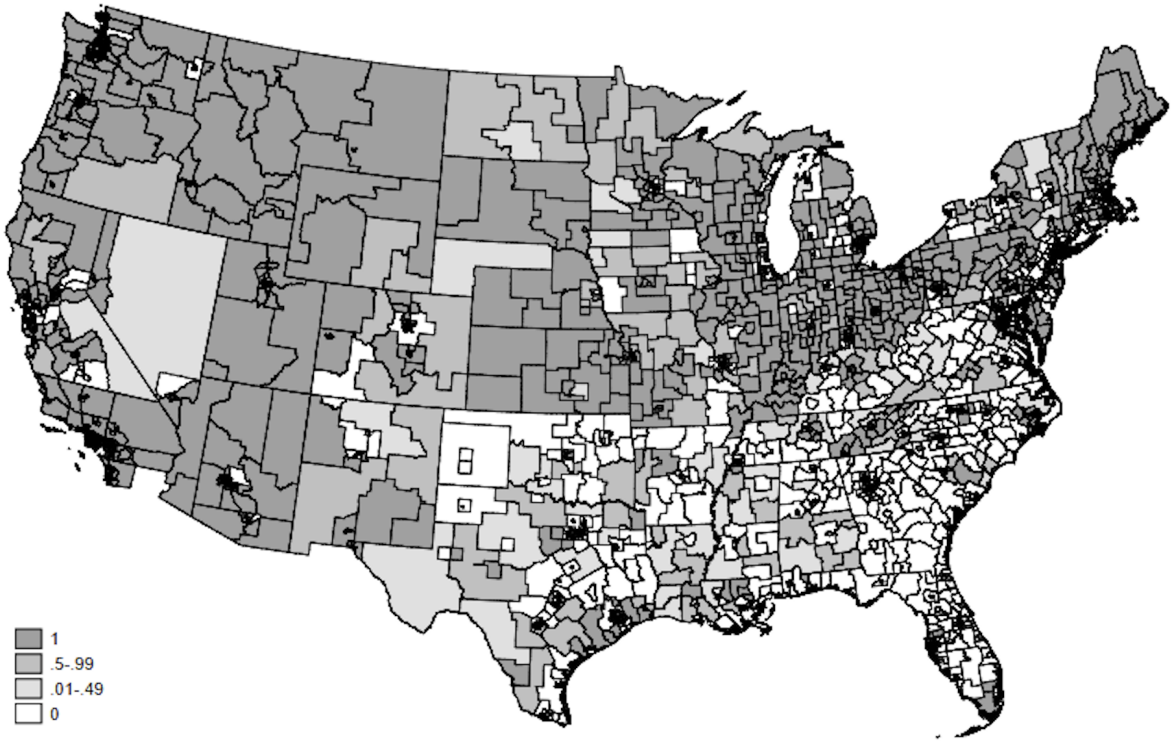


(b) Grantee-program-level Treatment



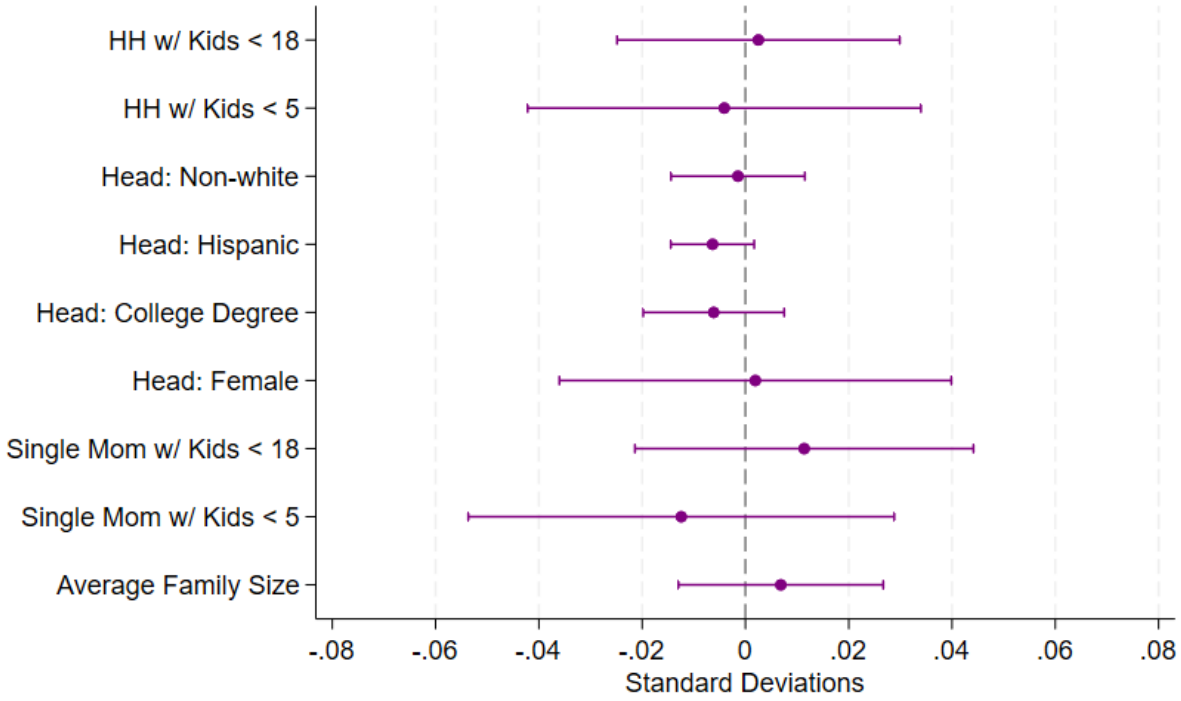
Notes: Figures present estimated coefficients and 95% confidence intervals using a event-study type specification described in Equation 2. The outcome data come from the PIR data: share of full-time enrollment in Head Start. In Panel (a), the treatment variable is determined based on Head Start center data merged with the PUMA crosswalk, which are from the Head Start center locator. The regression specification uses PUMA and year fixed effects, and standard errors are clustered at the PUMA level. In Panel (b), the treatment variable is determined at the grantee-program based on eligibility criteria for the grants. The regression specification uses Grantee-program and year fixed effects, and standard errors are clustered at the grantee-program level. Source: Head Start Program Information Reports (PIR), 2012–2019. The PIR is a publicly available administrative dataset collected annually by the Office of Head Start (OHS) for the program years labeled by the spring of the service year (e.g., 2017 refers to the 2016-2017 service year).

Figure A.3: Share of Head Start Centers Operated by Eligible Grantees in Each PUMA



Notes: This figure displays the share of Head Start centers within a geographic area, as defined by PUMAs, operated by grantee-programs eligible to apply for supplemental duration expansion funding.

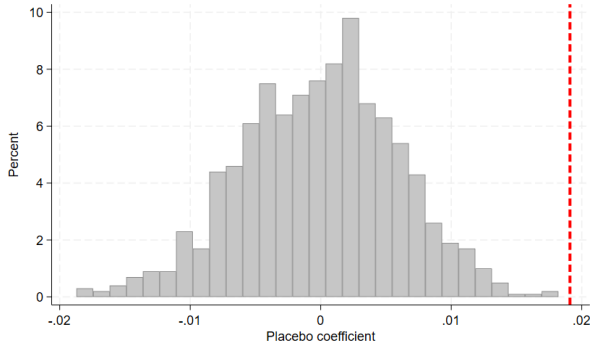
Figure A.4: Balance Test: Correlations Between Head Start Full-Day Expansions and PUMA Socio-Demographic Characteristics



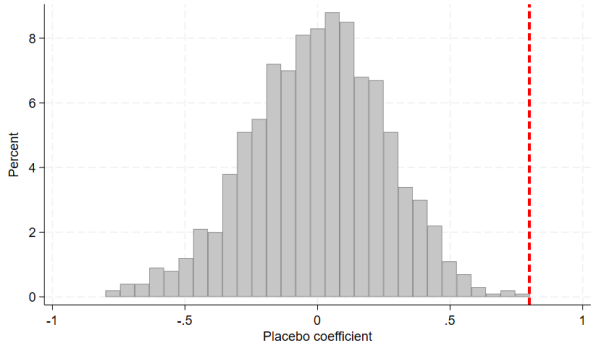
Notes: The unit of analysis is PUMA-year. The variables correspond to aggregated household characteristics. The figure plots estimated coefficients and 95% confidence intervals using Equation 1, where treatment is assigned based on a binary indicator that equals one if any Head Start center located in a given PUMA is operated by a grantee-program eligible to apply for supplemental funding. The post dummy is an indicator for post-policy years, defined as post-2016. The data come from the ACS data, 2012-2019 aggregated at the PUMA-year level.

Figure A.5: The Effect of Head Start Expansions on Labor Supply of Single Mothers with Young Children 0–4, Randomized Treatment Timing

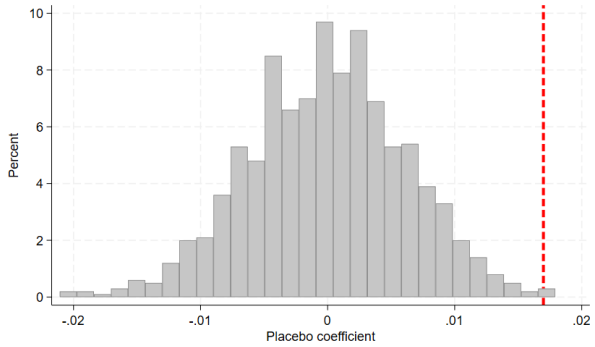
(a) Employed



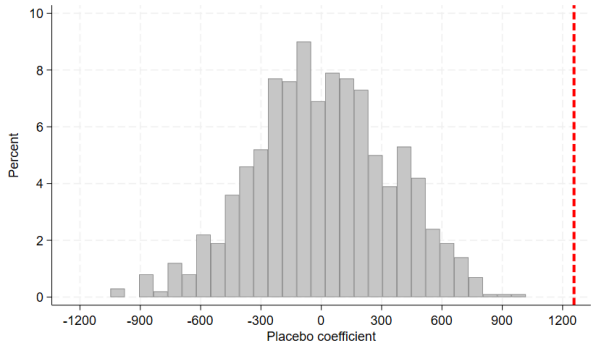
(b) Hours worked



(c) Wage income >0



(d) Wage income (2015 USD)



Notes: This figure plots the estimated coefficients from 1000 permutations of our preferred specification. The red line represents the true estimated effect. The outcome data come from the ACS data, 2012–2019. For these figures, PUMA treatment assignment and post policy year have been randomized. Each regression uses PUMA and year fixed effects, and control variables for race and ethnicity. Standard errors are clustered at the PUMA level.