# Childcare, Public Schooling and Maternal Labor Supply in the 21st Century*

Yana Gallen  Stephanie Karol  Dmitri Koustas  Ithai Lurie

March 20, 2025

**Abstract**

We examine the response of maternal labor supply to public school availability in the United States. Our key empirical approach is a regression discontinuity around school start date cutoffs which vary by locality. We make several contributions over prior analyses: First, we examine recent data from 1999 to the present day. Second, we incorporate universal pre-K start dates, which have seen notable expansions in recent years. Third, we work with IRS tax data, which allow us to make key advances over prior studies both in terms of the research design and statistical power. Finally, we study the impact on occupational choices of women and how this relates to the alignment between hours in public school and job requirements. Notably, we observe paid childcare usage, allowing us to examine substitution between paid and public childcare.

Keywords: Public School, Gender Pay Gap, Childcare

JEL Codes: J13; J22; J24; J31

*Gallen: University of Chicago, Harris School of Public Policy and IZA. E-mail: yana@uchicago.edu. Koustas: University of Chicago, Harris School of Public Policy. Email: dkoustas@uchicago.edu. Karol: The US Department of the Treasury, Office of Tax Analysis. Email: stephanie.karol@treasury.gov. Lurie: The US Department of the Treasury, Office of Tax Analysis. Email: ithai.lurie@treasury.gov. We thank Gustavo Luchesi for his excellent research assistance. This research was conducted while Gallen, Karol, Koustas and Lurie were employees at the U.S. Department of the Treasury or the Internal Revenue Service (IRS). The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily reflect the views or the official positions of the U.S. Department of the Treasury or the IRS. Any taxpayer data used in this research was kept in a secured IRS data repository, and all results have been reviewed to ensure that no confidential information is disclosed.

# 1 Extended Abstract

The high cost of childcare is often pointed out as a barrier to female labor force participation. States have multiple policy levers to deal with high costs, including subsidizing childcare in the private market, and directly providing childcare. While access to public childcare is limited in the United States for pre-school age children, public school is ubiquitous and compulsory after a certain age. At this age (which varies across states), all parents have access to "free" public childcare.

We use SSA data including the exact birth-date of children, linked with IRS records of parental employment over time to study how being just over vs. just under state-level public schooling cutoffs affects maternal labor supply and other forms of paid childcare. We are able to utilize variation in the age at which children are eligible for public schooling—including universal pre-K for four year olds in some states—to trace how maternal employment responses depend on years out of the labor market. We make use of information on paid childcare usage by examining the take-up of the two federal childcare subsidies available to parental of children under 13: the Child and Dependent Care Tax Credit and Dependent Care Flexible Spending Accounts. Prior to starting school, many households turn to private childcare options, which can be quite costly. These costs may therefore impact the decision to work both on the extensive and intensive margins.

While this is not the first paper to study the impact of access to public school on female labor supply, to our knowledge this is the first paper in the United States to leverage precise age cutoffs for recent cohorts of mothers. Gelbach (2002) provides a seminar study of maternal labor supply in the 1980 census using child's quarter of birth to examine eligibility. However, changes in census data collection make follow-up studies using public census data for more recent cohorts impossible. Fitzpatrick (2010) uses restricted data from the 2000 Census to estimate the impact of being eligible for Geogia and Oklahoma universal pre-k, and finds no impact on female labor supply. Cascio (2009) studies state-level introductions of kindergarten in the 20th century. Like Gelbach (2002), Cascio (2009) finds substantial

response of earlier cohorts of mothers to their children's school eligibility. One potential reason that response to public childcare is so law may be that these programs tend to be short, and do not provide the type of care that working parents need. Two recent papers Gibbs et al. (2024) and Humphries et al. (2024) document a substantial female employment and hours response to full day public childcare. We study occupational choices of women and how these respond when they move from private settings, which are potentially available full-time, full year, to public settings with short hours and summers off.

We make three contributions over prior research: First, we examine recent data from 2000 to 2023. Second, we incorporate universal pre-Kindergarten start dates, which have seen notable expansions in recent years. Third, we work with IRS tax data, which allow us to make key advances over prior studies both in terms of the research design and statistical power. Notably, we have a long panel and measures of paid childcare. We can also observe if a grandmother is nearby who may provide childcare.

We find that when their youngest children become eligible for public school, households' use of paid childcare drops by about ten percent (two to three percentage points). In contrast, we find no evidence of an impact on the propensity of mothers to work in response to being offered public kindergarten or public pre-kindergarten one year earlier than other mothers. These estimates come from all women whose children are eligible for public school, including those who were already using paid childcare. When we restrict analysis to those women who were not using paid childcare in the previous year, we find a small one percentage point increase in the rate of female employment, on a base on slightly over sixty percent employment in this group.

# 2 Data

## 2.1 IRS Tax Data

We draw on the universe of US tax records as well as birth records shared with the IRS from the Social Security Administration (SSA). In particular, we combine tax records on paid childcare usage with tax records on maternal labor supply. We also further examine the filings of firms where mothers work, and examine the location of grandparents in the tax data based on multi-generation mother-child SSA links. We describe each of these data elements in turn. Many labor market and childcare variables of interest are available back to 1999.

### 2.1.1 Paid Childcare in Tax Data

U.S. tax data provide a unique link between a household, their dependent children and care providers. To our knowledge, we are the first to analyze the tax data recording childcare usage. These data are collected when tax units with children claim the Child and Dependent Care Tax Credit (CDCC) or a Dependent Care Flexible Spending Account (DCFSA).

The United States has had a federal CDCC since 1976. In the most recent tax year, a tax unit can receive up to $2,100 in federal tax credits for childcare. The last permanent expansion was in 2003 as part of the Bush tax cuts. The American Rescue Plan Act (ARPA) temporarily but substantially increased the generosity of the CDCTC for tax year 2021 only. In this temporary expansion, the credit was made fully refundable, the maximum spending threshold rose to $16,000, and subsidy generosity increased to as much as 50 cents per dollar spent for households with adjusted gross income less than $125,000. In addition, many states offer top ups to the federal credit. The most generous are in Minnesota, Pennsylvania and New York, which go so far to double the value of the federal credit.

Qualifying tax units are those with any childcare or dependent care expenses that allow the filer (or spouse) to work, look for work, or go to school. Qualifying children must be

under 13 years old.[1] The credit amount is a percentage of the first $3,000 of qualifying expenses, or $6,000 for two or more qualifying children. The federal credit is nonrefundable, and is therefore only relevant for tax units with tax liability. We will return to this point when we compare counts from the tax data with other sources of data on paid childcare usage. Another related tax benefit is the DCFSA, which has been available since 1982. Filers can contribute up to $2,500 into DCFSAs, per filer, pre-tax ($5,000 for a married couple). Taxfilers with a DCFSA may also claim the CDCC, but the DCFSA amount is deducted from the cap on qualifying CDCC expenses.

The CDCC is claimed by filing a tax form known as Form 2441, and tax units receiving a DCFSA also file this form. The important elements of this form are shown in Appendix Figure A.1. Tax units list each care provider, the SSN or EIN of the care provider, and amount paid. They also list the expenses for each of their eligible children.

We report the time series of paid childcare usage in Figure 1. Interestingly, paid childcare usage has been largely stable from 1999-2019, at around 22 percent of mothers. Following a dramatic decline during 2020 due to the COVID-19 pandemic, paid childcare rebounded, but is still substantially below pre-COVID levels as of 2023.

To benchmark our numbers to an outside source, Appendix Figure A.2, panel (a), plots the total number of tax units reporting paid childcare in tax data, alongside the comparable measure in the CPS. Panel (b) reports the dollars spent, conditional on having paid childcare, which is available in the CPS since 2009. While the CPS counts are noisy compared to the tax data, the tax data appears to capture on average 88 percent of the number of households using paid childcare, and around 80 percent of the dollars spent. The second takeaway from this comparison is that in both the CPS and tax data, counts of paid childcare usage are down 10-15 percent since 2019. We view this as encouraging that our measure in the tax data picks up the majority of paid childcare usage in the United States.

[1]While our focus is on mothers with young children, qualifying dependents can be any age if they cannot provide care for themselves.

## 2.2 School Start Dates

### 2.2.1 Kindergarten entrance age

Kindergarten entrance age comes from the National Center of Education Statistics Database.[2]

### 2.2.2 Universal Pre-K

We collected data on the introduction of universal pre-kindergarten initiatives in the 50 largest U.S. cities using publicly available information from official local government, school district, and local office of education websites. From these sources, we identified the current enrollment requirements for free public pre-K and the adoption dates of universal pre-K initiatives. Additionally, we performed Google searches combining city names with the terms "universal pre-K", "public pre-K" and "free pre-K" to cross validate the pre-K policies and the introduction dates of universal pre-K with news articles coming from local outlets.

We define a pre-K initiative as universal if it is public, cost-free, and has no eligibility criteria beyond the child's age. Importantly, a program may be constrained by available slots and not guarantee participation for all applicants; however, we still categorize it as universal as long as it is free and open to all families wishing to apply. Using this definition, we recorded the school year in which cities began providing universal pre-K. Using data from the American Community Survey, Figure 2 reports the share of children ages 3 to 5 living in MSAs where at least one major city has adopted UPK. We restrict the sample to the MSAs that contain the 50 largest cities in the U.S. Remarkably, the share of children living in a locality with UPK has increased substantially in recent years.

# 3 Regression Discontinuity Design

Our main estimation strategy is a simple regression discontinuity around the state's school start date.

[2] https://nces.ed.gov/programs/statereform/tab5_3.asp

$$Y_i^a = \alpha^a + \beta_{RD}^a \mathbf{1}\{birthday_i \leq birthcutoff_s\} + \gamma_1^a(birthday_i - birthcutoff_s) \quad (1)$$

$$+ \gamma_2^a(birthday_i - birthcutoff_s) \times \mathbf{1}\{birthbirthday_i \leq birthcutoff_s\} + \delta'^a X_i + \epsilon_i^a \quad (2)$$

where $birthday_i$ is the month and day of child $i's$ birthday, and $birthcutoff_s$ is the locality birthday cutoff for starting pre-kindergarten or kindergarten. We run our regression separately for years where children turn key ages: ages 4, 5 and 6. $X_i$ is a vector of controls, including mother's age and year. $\beta_{RD}^a$ this gives the effect on outcome $Y$ for child $i$ around age $a$ of being born before the cutoff. E.g. if the cutoff is September 1, then it is the effect of being born September 1 or earlier in the year.

We structure the panel data to focus on the last childbirth. In our main specification, we restrict a bandwidth of 60 days pre/post and include a doughnut hole of 7 days around the cutoff.

# 4 Main Results

We begin by looking at paid childcare usage around the Kindergarten startdate cutoff at age 5. The birth cutoff shows a large reduction in paid childcare for children born earlier than the cutoff. As reported in Table 1, the reduction is 2.4 for ages 5. Interestingly, the reduction of usage of paid childcare is even larger in the year the child turns 6, which is when kindergarten becomes mandatory. Thus the compliers here are likely those that kept their children out of kindergarten.

In the right hand panels, we examine wage and salary employment by the mother. There is only a slight increase in mother's wage and salary employment over the course of the year, and as shown in Table 1 this difference is not statistically significant. The upper bound of our confidence interval is 1.3 percentage points, which is significantly smaller than the reduction in paid childcare. This suggests either mothers are already working (and likely

using paid childcare), or employment is not responding to children going to kindergarten.

In Table 2, we examine heterogeneity in the maternal employment response by whether or not paid childcare was being used in the previous year.[3] Now, we see that there is a sizable and statistically significant employment effect among mothers not using paid childcare. Employment in the year a child turns age 5 increases by 1.4 percentage points among those with no paid childcare in the prior year. A similar employment effect is also seen in the year the child turns age 6. This can possibly be interpreted as the increase in employment among those who are the most constrained by childcare costs/availability. Once kindergarten is available, those costs go to zero, at least for the part of the day covered by kindergarten.

Finally, we explore the subset of localities that have universal pre-Kindergarten. Results are shown in Table 3. We find a suggestively large employment response. Employment increases 3.5 percentage points around age 4. Note that we do not find a large effect on paid childcare, perhaps because paid childcare is still used earlier in the year or because there are still costs associated with pre-Kindergarten that can be deducted for tax purposes. In future work prior to the conference, we intend to further investigate the characteristics of the childcare provider listed on the tax form to verify if it is a pre-Kindergarten establishment or a complementary childcare program.

[3]Using the lag avoids a mechanical correlation between maternal employment and paid childcare as measured in the tax data, since households only qualify for the CDCTC and thus have an incentive to file 2441 if both parents are working.

# References

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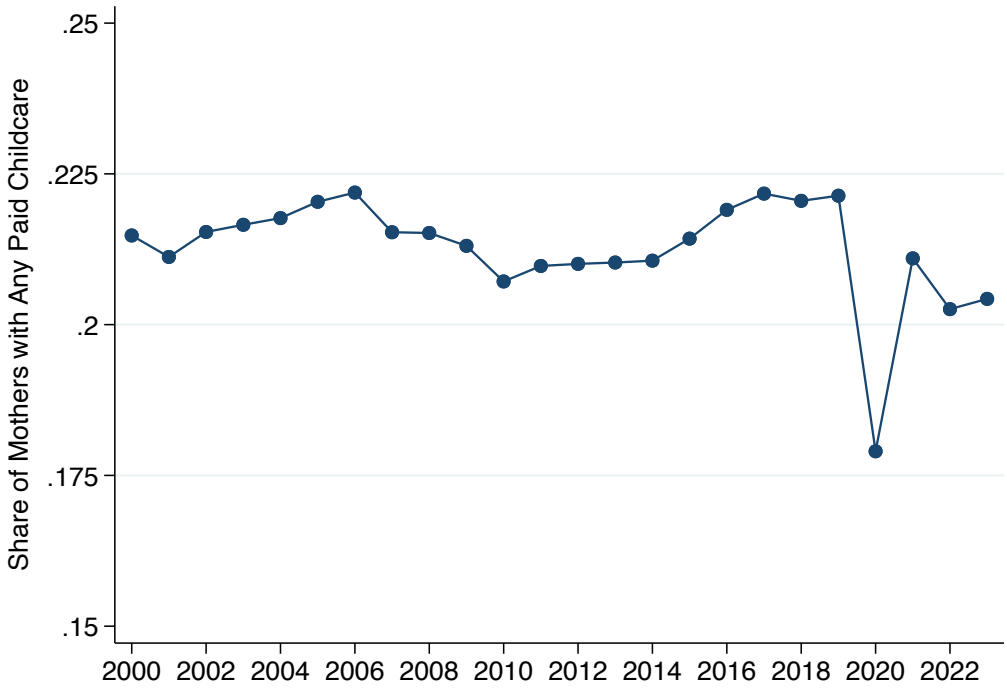
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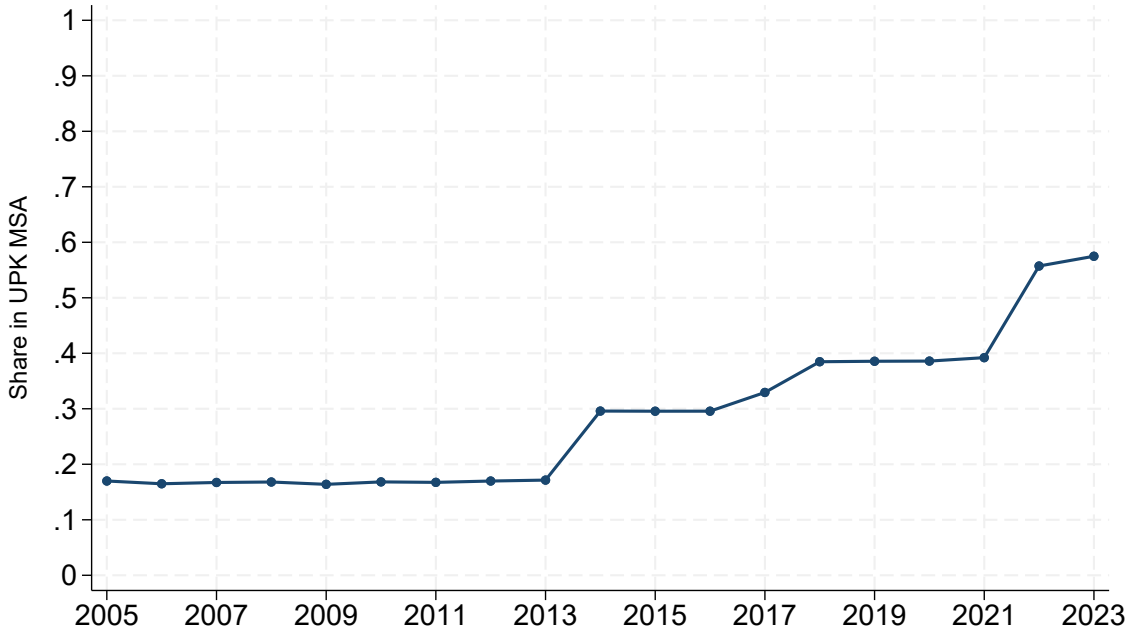
# Figures

Figure 1: Paid Childcare Usage Among Mothers, 2000-2023




Notes: Figure reports the share of mothers with children under 13 who have paid childcare, as indicated by filing of Form 2441 and/or a Dependent Care Flexible Spending Account.

Figure 2: Share of Children Ages 3-5 in UPK MSAs, 2005-2023

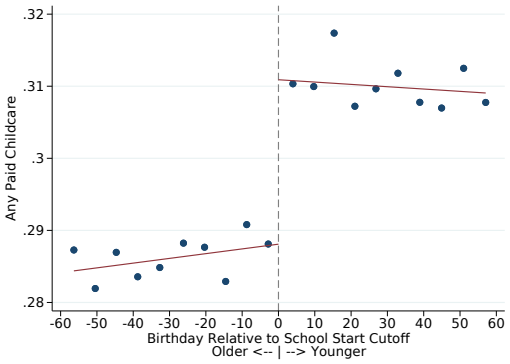



Notes: Figure reports the share of children ages 3 to 5 living in MSAs where a major city has adopted universal pre-K. We restrict the sample to children residing in the 44 MSAs that contain at least one of the 50 largest cities in the United States and were consistently identified in the ACS between 2005 and 2023. Source: American Community Survey.

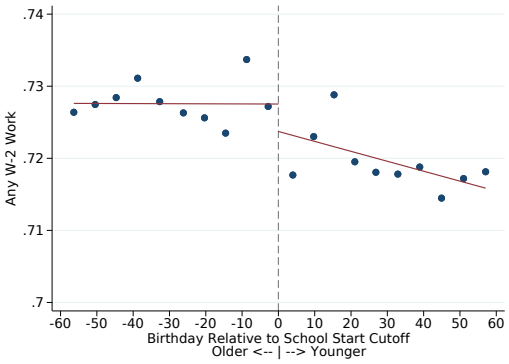
Figure 3: Any Paid Childcare And Wage/Salary Work by Mother, Around Kindergarden Entrance Age Cutoffs

Age 5

(a) Any Paid Childcare

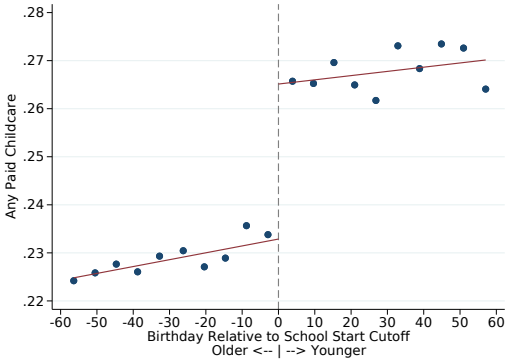



(b) Any W2

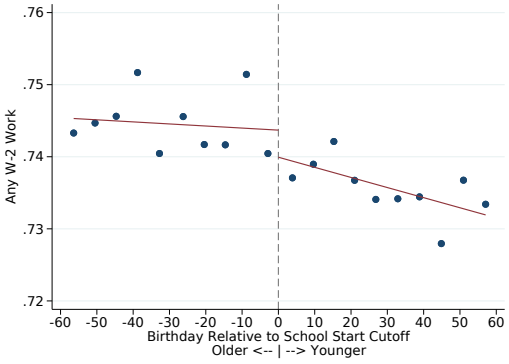



Age 6

(c) Any Paid Childcare




(d) Any W2




Notes: Each panel is the year the child turns the indicated age. X-axis is birthday minus school start date. Therefore, those to the left of zero are born before the school start date cutoff, and those to the right are born after the cutoff. Source: IRS tax data and SSA data.

# Tables

Table 1: All Mothers, 1999-2017

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Any Paid Childcare | | | Mother Has Wage/Salary Employment | | |
| | Age 4 | Age 5 | Age 6 | Age 4 | Age 5 | Age 6 |
| Born Pre Cutoff | -0.00815* | -0.0236*** | -0.0319*** | 0.00690 | 0.00276 | 0.00571 |
| | (0.00477) | (0.00482) | (0.00462) | (0.00514) | (0.00515) | (0.00503) |
| Birthay - Cutoff | -0.000235*** | -0.0000160 | 0.000143 | -0.0000281 | -0.000150* | -0.0000786 |
| | (0.0000865) | (0.0000873) | (0.0000881) | (0.0000924) | (0.0000907) | (0.0000890) |
| (Born Pre Cutoff) | 0.0000513 | 0.0000436 | -0.0000482 | 0.000120 | 0.000133 | 0.0000327 |
| × (Birthday - Cutoff ) | (0.000122) | (0.000125) | (0.000120) | (0.000131) | (0.000132) | (0.000130) |
| Constant | 0.309*** | 0.310*** | 0.263*** | 0.707*** | 0.724*** | 0.737*** |
| | (0.00343) | (0.00343) | (0.00339) | (0.00366) | (0.00351) | (0.00348) |
| *N* | 306920 | 305491 | 304300 | 306920 | 305491 | 304300 |

Notes: Standard errors clustered on days relative to birth cutoff in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Source: IRS tax data and SSA data.

Table 2: Mother Has Wage/Salary Employment, By Usage of Paid Childcare in Previous Year

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | No Paid Childcare Prior Year | | | Paid Childcare Prior Year | | |
| | Age 4 | Age 5 | Age 6 | Age 4 | Age 5 | Age 6 |
| Born Pre Cutoff | 0.00574 | 0.0135** | 0.0154** | 0.00789 | -0.00888 | 0.00121 |
| | (0.00641) | (0.00674) | (0.00652) | (0.00584) | (0.00546) | (0.00530) |
| Birthay - Cutoff | 0.0000399 | -0.0000451 | -0.0000619 | 0.000137 | -0.000112 | -0.0000736 |
| | (0.000113) | (0.000118) | (0.000117) | (0.000108) | (0.0000995) | (0.0000890) |
| (Born Pre Cutoff) | 0.0000439 | 0.000183 | -0.0000148 | -0.0000320 | 0.0000130 | -0.00000975 |
| × (Birthday - Cutoff ) | (0.000163) | (0.000174) | (0.000168) | (0.000148) | (0.000141) | (0.000131) |
| Constant | 0.627*** | 0.633*** | 0.653*** | 0.915*** | 0.923*** | 0.920*** |
| | (0.00448) | (0.00466) | (0.00464) | (0.00428) | (0.00381) | (0.00357) |
| $N$ | 213699 | 203313 | 203972 | 78487 | 87443 | 85362 |

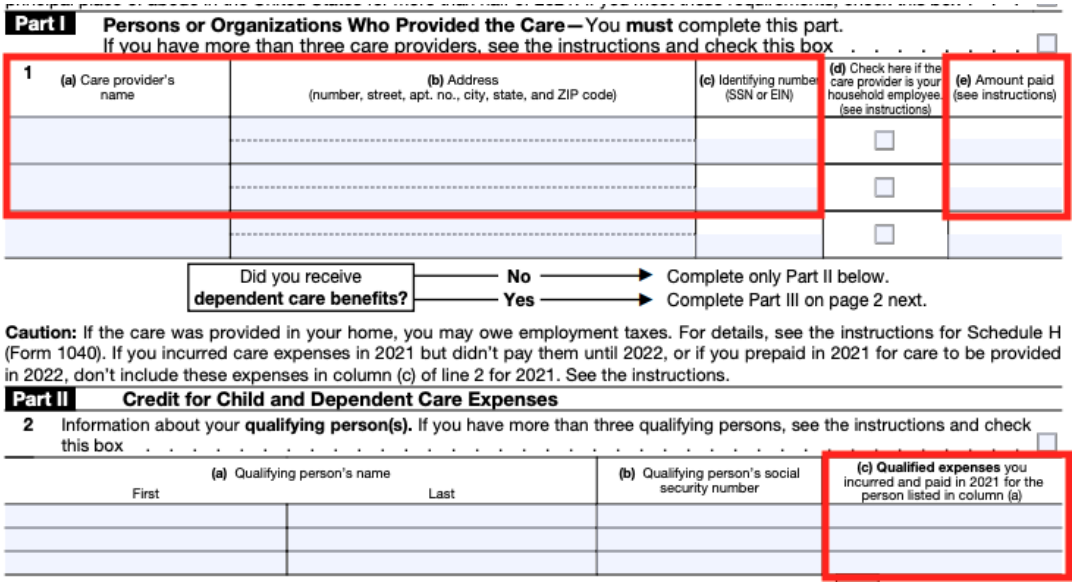
Notes: Standard errors clustered on days relative to birth cutoff in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Source: IRS tax data and SSA data.

Table 3: Localities with Universal Pre-K

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Any Paid Childcare | | | Mother Has Wage/Salary Employment | | |
| | Age 4 | Age 5 | Age 6 | Age 4 | Age 5 | Age 6 |
| Born Pre Cutoff | 0.00398 | -0.0485** | -0.0209 | 0.0353* | 0.0234 | 0.0153 |
| | (0.0218) | (0.0214) | (0.0209) | (0.0201) | (0.0195) | (0.0196) |
| Birthay - Cutoff | 0.000109 | -0.000570 | 0.000197 | -0.0000991 | -0.000454 | -0.000363 |
| | (0.000419) | (0.000378) | (0.000389) | (0.000380) | (0.000350) | (0.000360) |
| (Born Pre Cutoff) | -0.000204 | 0.000856 | 0.0000120 | 0.000721 | 0.00109** | 0.000571 |
| × (Birthday - Cutoff ) | (0.000557) | (0.000544) | (0.000533) | (0.000518) | (0.000488) | (0.000499) |
| Constant | 0.323*** | 0.357*** | 0.286*** | 0.695*** | 0.726*** | 0.734*** |
| | (0.0164) | (0.0147) | (0.0156) | (0.0149) | (0.0143) | (0.0143) |
| *N* | 15649 | 15621 | 15528 | 15649 | 15621 | 15528 |

Notes: Standard errors clustered on days relative to birth cutoff in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Source: IRS tax data and SSA data.

Figure A.1: Form 2441 Child and Dependent Care Expenses



**Part I** **Persons or Organizations Who Provided the Care**—You **must** complete this part.
If you have more than three care providers, see the instructions and check this box . . . . . ☐

| 1 (a) Care provider's name | (b) Address (number, street, apt. no., city, state, and ZIP code) | (c) Identifying number (SSN or EIN) | (d) Check here if the care provider is your household employee (see instructions) | (e) Amount paid (see instructions) |
|---|---|---|---|---|
| | | | ☐ | |
| | | | ☐ | |
| | | | ☐ | |

Did you receive **dependent care benefits?** — **No** → Complete only Part II below.
— **Yes** → Complete Part III on page 2 next.

**Caution:** If the care was provided in your home, you may owe employment taxes. For details, see the instructions for Schedule H (Form 1040). If you incurred care expenses in 2021 but didn't pay them until 2022, or if you prepaid in 2021 for care to be provided in 2022, don't include these expenses in column (c) of line 2 for 2021. See the instructions.

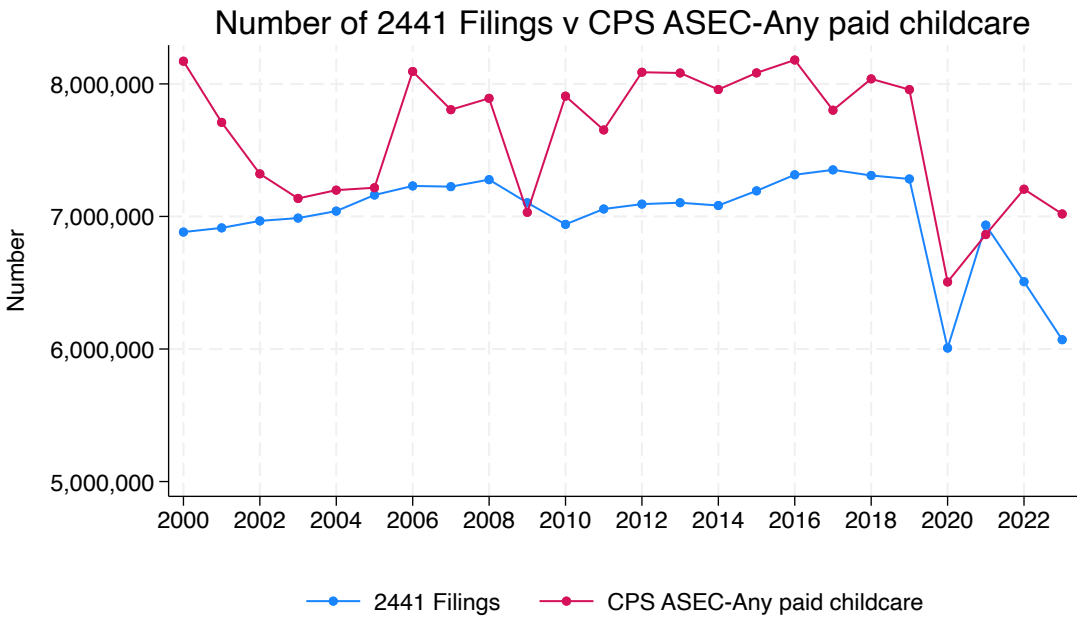
**Part II** **Credit for Child and Dependent Care Expenses**

2 Information about your **qualifying person(s).** If you have more than three qualifying persons, see the instructions and check this box . . . . . ☐

| (a) Qualifying person's name First | Last | (b) Qualifying person's social security number | (c) **Qualified expenses** you incurred and paid in 2021 for the person listed in column (a) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Figure A.2: Use of Paid Childcare: IRS data v Current Population Survey

(a) Counts




(b) Dollars

