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Understanding the Causal Relationship Between State-Level Childcare Tax Credits and Female Labor Participation

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Honors Thesis

UNDERSTANDING THE CAUSAL RELATIONSHIP BETWEEN STATE-LEVEL CHILDCARE TAX CREDITS AND FEMALE LABOR PARTICIPATION

by
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ABSTRACT

UNDERSTANDING THE CAUSAL RELATIONSHIP BETWEEN STATE-LEVEL CHILDCARE TAX CREDITS AND FEMALE LABOR PARTICIPATION

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Childcare is an expensive commodity in the United States. However, childcare allows parents the flexibility to work while having children. This paper focuses on the Child and Dependent Care Tax Credit (CDCTC), a tax-related program intended to reduce the stress of childcare costs that could indirectly increase the female labor participation rate in each state. The paper hypothesizes that states with larger CDCTC values show higher female labor participation rates. It reviews budget constraint theory and previous papers that support the hypothesis and outlines the empirical strategy used in the research. It tests how the CDCTC affects female labor supply and income and provides assumptions and setbacks that may affect the results. Finally, it gives an overview of tax credit policy recommendations that can assist families with childcare needs and change labor-force outcomes.

Keywords: Childcare, childcare tax credit, female labor participation

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1 Introduction

The Child and Dependent Care Tax Credit (CDCTC) is a policy tool that addresses the high cost of childcare in the United States. Expensive childcare could affect low-income families' time and budget constraints, changing consumption and labor force decisions. This project will look at the different tax-credit generosity values given by the state-level CDCTC programs and analyze how the amount of aid families receive influences female labor participation. This paper is an extension of research on the relationship between childcare services and female labor participation. Using existing research as a basis for the hypothesis, I predict that states that offer greater childcare tax credits have higher rates of female participation.

Female labor force participation rose steadily until peaking in 1999; since then, it has stayed relatively stable. The current participation rate for women in the workforce with children is 71.2%. The labor force participation rate for men with children is 21.3 percentage points higher, at 92.5% in 2021 (U.S. Bureau of Labor Statistics, 2022). One cause of this disparity between mothers and fathers could be the absence of support for mothers in the workforce. Growing evidence supports the argument that the lack of maternity leave and universal, affordable daycare in the United States creates a divide between feasible and ideal opportunities for mothers.

Childcare costs also have an impact on earnings and the long-term labor supply of mothers. These findings tie into a more significant economic claim of the motherhood penalty (Jee et al., 2018). The fact that mothers are more likely to bear childcare responsibilities is an attribute of this claim. Because childcare is expensive, a woman

might decide that the cost of working outweighs the benefits, leading them to exit the labor force. After having children, women's earnings drop significantly and stay low, while men's earnings are less affected (Kleven et al., 2019). The lower earnings are likely due to the lack of linear work experience. Women adjust their labor supply to meet childcare demands – foregoing work experience rewarded with promotions and higher wages. Gurrentz (2021) examined the effects of a generalized childcare subsidy on the female labor supply over time. The results showed a seven percentage point increase in labor force retention over four years. In addition, the subsidy increased the mother's proportion of household earnings by 7.3 percentage points (Gurrentz, 2021). This implies that childcare subsidies have lasting positive impacts on budget constraints beyond immediate child-rearing responsibilities.

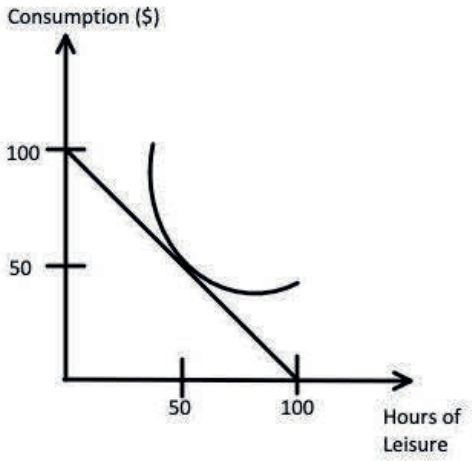
Additionally, mothers are discriminated against in hiring and wage decisions. Correll and Benard (2007) created a fictitious hiring experiment that tested bias against mothers; all other qualifications were held constant. Mothers were rated worse than other candidates in competency and job commitment. Conversely, fathers were rated better than childless men in the same categories (Correll & Benard, 2007). These studies provide a rationale for inclusive policies that support working mothers.

A policy that provides childcare tax credits to families with children could reduce the costs associated with working, leading women to make different labor supply decisions. Not only would this affect household finances, but changing labor force participation could also affect aggregate macroeconomic outcomes, like total output and productivity. This paper is relevant today because Congress is determining how to address childcare tax policy changes in the wake of the Covid-19 pandemic. As part of

the Covid-19 relief bill, federal childcare tax credits have temporarily increased. This new credit will cover 27 million children who were not previously eligible for a tax credit (Reinicke, July 2021). However, this policy will expire in 2025. This leads to uncertainty about future childcare support from the government. The presence of recent childcare tax policies drives a desire to understand the long-term benefits of childcare policy and the most effective ways to support working parents.

The economic theory behind childcare tax credits to improve female labor outcomes is well established. Clavet and Duclos (2014) described the basic setup of a household budget constraint as used in economic theory. Figure 1 illustrates a household's consumption possibilities; hours spent in leisure rests on the x-axis, while consumption in dollars represents the y-axis. A straight line connecting points on each axis describes the possible combinations of leisure and consumption a household can make. The more time an individual decides to spend on leisure, the less time they have to earn income and consume. Introducing new income measures, such as a tax credit, changes the possible income levels of the household.

Figure 1: Consumption and Leisure Budget Constraint



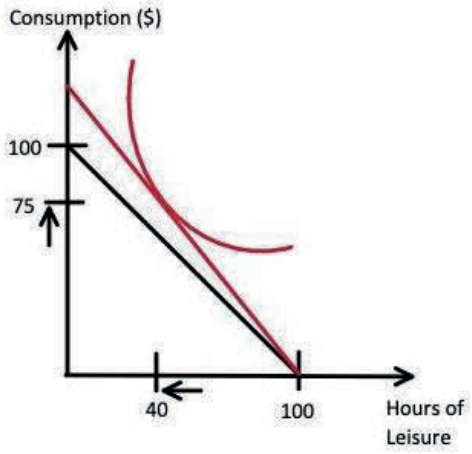
The value of the tax credit from the CDCTC is a function of income levels and provides a financial benefit to a household if and only if they participate in childcare. The program effectively increases a household's potential income by decreasing childcare costs through the childcare expense credit. Introducing the CDCTC to the original budget constraint increases the possible leisure-consumption combinations of the household at different income levels.

Economic theory describes two incentive forces from the increased returns of the budget constraint: an income effect and a substitution effect. An income effect would decrease the hours of work for pay households engage in. The income effect dictates that because individuals prefer leisure, an increase in income means they spend more time at leisure than at work (Clavet & Duclos, 2014). Conversely, the substitution effect suggests that the individual will work more because the relative price of leisure has changed, as shown in Figure 2. A household's net wage is the cost of leisure – the tradeoff between spending one hour in leisure and one-hour working. A subsidy decreases childcare costs, increasing the net wage, meaning the relative cost of leisure increases. A higher relative cost of leisure encourages people to shift their labor-leisure decisions towards less leisure and more work. Therefore, an individual will choose the option with the higher wage, leading them to work more (Mammen et al., 2009). Studies show that men and women respond strongly to different budget constraint effects.

Ashenfelter and Heckman (1974) found that the income effect tends to dominate for men, while the substitution effect tends to dominate for women. This difference means women will be more likely to work due to increased income. If a household with

children is not paying for childcare, the household members spend less time in leisure and more time performing childcare duties (although unpaid).

Figure 2: Adjusted Consumption and Leisure Budget Constraint



Regardless of the theoretical response to an increase in income, there are limitations to the flexibility of labor choices by workers. Gong and Breunig (2014) explained two critical facets of income choices: different types of workers will respond uniquely to tax policies, and hours worked adjustments are found through changes in the job. Hourly wage positions and salaried jobs provide a significant distinction between workers. Salaried positions do not adjust income directly based on hours worked; therefore, salaried workers respond differently to changes in their budget constraints. Increasing working hours from part-time to full-time may require moving to a different job. Notably, this paper hypothesizes that the demographic most responsive to policy changes are mothers who are not in the labor force or working part-time at hourly wage positions.

Empirical evidence has corroborated theoretical labor supply responses. One study by Jiang (2021) analyzed the impact of the CDCTC on the female labor supply.

The study found that the childcare tax credit positively impacted the labor force participation of married women more than single mothers. The author concluded that the childcare tax credit made it more affordable for mothers to work outside the home. Jiang found that increasing the childcare tax credit value by $1000 raised the labor force participation rate between two and six percentage points. Jiang's study focuses on the different labor force reactions of married and single mothers and mothers with older or younger children. This paper's analysis builds on Jiang's conclusions by focusing on married mothers and examining heterogeneous effects of the CDCTC on income and hours worked by education level and race. Additionally, this study addresses the impact of the childcare tax credit on mothers who begin to work.

Additional studies have found heterogeneous responses to the CDCTC across demographic groups. Hispanic women are less likely to use external or formal childcare services, as well as families with more children (Averett et al., 1997). Education also plays a differentiating role. Like Averett et al. (1997), Azmat and Gonzales (2010) found that women with lower levels of education tend to participate in the labor force at higher rates than those with more education. These higher participation rates appear among families with children under three years old. While children up to 13 are eligible under the CDCTC, families with younger children are uniquely impacted. Young children are most commonly put in traditional childcare programs, which supports the theory of leisure and time decisions by mothers of young children.

Conversely, Ridao-Cano and McNown (2005) found a positive relationship between education and female labor participation. They separated the mothers in their study by age group; the young age group was 20-24, and the older group was 25-34. The

study found that the younger cohort is more responsive to the CDCTC in their labor market decisions and more likely to have a higher education. Understanding the different impacts and reactionary demographics of the CDCTC on female labor participation can guide policy makers toward addressing failures and improvements.

2 Childcare Welfare Programs

Various tax credits are available for working low-income families to supplement the costs of having children. Many of these programs are designed to provide funding as a function of a family's income and childcare expenses. These programs are known as progressive tax programs because they provide more relief to lower-income households. The Child and Dependent Care Tax Credit (CDCTC) is a federal and state tax credit primarily for middle-class families with children in childcare. This credit is limited to middle-class families rather than lower-class families because the federal CDCTC is not refundable. Scaled on income, families can claim a certain percentage of their dependent care expenses, as seen in Table 1. The federal eligible expense limit for one child has changed from $2000 in 1976 to $2400 in 1982 and up to $3000 in 2003.

There is also the federal Child Tax Credit (CTC). This tax credit is not limited to childcare expenses; it can be used in various ways to pay for household necessities for low-income families. This tax credit counts income earned after an initial $3,000 is made and has eligible income up to $150,000 for married filing jointly households. It includes a refundable element but is only partially refundable.

Table 1[1]: 2003 - Current Federal Expense Percentage, Scaled on Income

IF your adjusted gross income is: Over:		But not over:	THEN the percentage is:
$ 0	—	$15,000	35%
15,000	—	17,000	34%
17,000	—	19,000	33%
19,000	—	21,000	32%
21,000	—	23,000	31%
23,000	—	25,000	30%
25,000	—	27,000	29%
27,000	—	29,000	28%
29,000	—	31,000	27%
31,000	—	33,000	26%
33,000	—	35,000	25%
35,000	—	37,000	24%
37,000	—	39,000	23%
39,000	—	41,000	22%
41,000	—	43,000	21%
43,000	—	No limit	20%

A more notable credit is the Earned Income Tax Credit (EITC). While this credit offers cash benefits like the CTC, the EITC begins offering credit at $1 of earned income, and married filing jointly households with multiple children are eligible until their income reaches just under $45,000. This credit is also refundable, which allows it to help the lowest-income families. These different components allow each program to work together in providing more comprehensive support to families of all income ranges (Boughtwood et al., 2000).

In addition to the federal credits, some states have enacted their own tax credits that provide financial support to working families in various ways. These can be a percentage of the federal credit (EITC, CDCTC, and CTC) using a layered income scale or a lump sum per child (“CED and RegionTrack,” 2019). These tax credits use federal program outlines while implementing their own percentages available to families. This

[1] This table is from IRS Publication 503 and Internal Revenue Code (IRC) §21. It provides a percentage of the total eligible expense $3000 that is available to each income bracket. The total credit value is a function of the individual’s income, and the percentage of the eligible expenses. Most states use the federal income bracket as a baseline for the eligible credit they offer; however, there is variation as to when the states implement the policy and the states that choose different income brackets.

study focuses on childcare-specific tax programs to specify the relationship between childcare and female labor participation.

The programs also involve unique adjustments that benefit some while taking away from others. One such adjustment is a change in benefit reduction rate at income intervals. This change creates a benefit tail effect that represents the transition between fully receiving program benefits and advancing to income levels that do not qualify. Myck et al. (2013) discussed significant welfare compromises, including labor force participation incentives and welfare reduction policy. The authors argued that for the primary workers, a benefit taper incentivizes working yet disincentivizes potential secondary workers from joining the labor market. This dichotomy introduces a moral hazard argument: the benefit could reduce labor participation rates. While this finding is not corroborated with studies specifically focused on the CDCTC, it does bring up valid arguments about the tradeoffs associated with providing welfare benefits.

The impact of state-level childcare programs on female labor participation has yet to be fully understood. Research on the Child and Dependent Tax Credit focuses on federal credit provisions rather than state disparities. Contemporary papers analyze other forms of welfare policy that are not as varied between states, such as the EITC. This paper supplements missing data through its analysis of the state-level CDCTC. Uniquely, this paper specifies the impact of the CDCTC on different demographic groups, including levels of education and marital status. Additionally, it addresses how family size can affect the generosity level between states. This analysis uses a different approach than those taken by other researchers, which provides a new perspective and builds confidence in previous research.

3 Data

The first step for this project was to gather data on childcare tax policy and labor force statistics. There is no comprehensive source for the different childcare tax policies per state. I combined information collected by Tax Credits for Workers and Families, the Committee for Economic Development's State Tax Credits, the National Women's Law Center, and Haibin Jiang's data collection to find all the data needed. With these resources, I created a data set that included the tax code, year, generosity for each state, and refundability status. However, there are different credit-granting methods, such as a scaled income percentage of the federal tax credit or fixed amounts. To compare generosity, I multiplied the maximum percentage of the federal CDCTC, specific to each state, by the federal CDCTC value. This allowed me to compare the maximum credit value available in each state. For each state, I specified the maximum credit available to families with one child or two or more children.

After creating that dataset, I extracted a dataset from IPUMS that included CPS microdata such as household demographics (age, race, education level), income, and labor force participation found through reported whole year/half year working status, hours worked per week, or employed status. This data ranged from 1976 to 2019. I created a variable to represent eligible children in families (under 13) and attached it to the mothers of each household. This variable enabled me to identify eligible households for the tax program. Appending these datasets allowed me to create a master dataset that included each household report and generosity level for each state and year. Finally, I

adjusted the dollar amounts for all monetary variables using the 1990 adjustment variable in the CPS. To view realistic responses to childcare tax credit changes, I adjusted the tax credits available by dividing by 1000. This step meant that the regression results would indicate responses to a $1000 increase in the childcare tax credit.

4 Empirical Strategy

After combining data sets, I used Stata to estimate various linear regressions to determine the causal relationship between female labor participation and child credit generosity. The general regression equation is

Equation 1:

$$Y_{inst} = \beta_0 + \beta_1 rmaxcdctc_{nst} + \boldsymbol{\zeta}_{st} + \delta_n + \varepsilon_{inst}$$

Where Y_{inst} represents the labor force outcome for individual $_i$ with children $_n$ in state $_s$ at time $_t$. The beta term is a parameter that represents the effect of the generosity levels, dependent on the number of children $_n$ in state $_s$ at time $_t$. The $\boldsymbol{\zeta}_{st}$ and δ_n represent fixed effects for the state*year and number of children, respectively. Finally, the error term covers unexplained individual, state, and time variations. This paper uses several variables to analyze labor force participation. $\beta\hat{}_1$ is an estimated response of the outcome variables to childcare tax credit values. These outcome variables are mother's average weekly hours worked, mother's income, family income, and binary working measures. These variables address mothers working at all, working for more than 40 weeks of the year (whole year), or working for 40 weeks or less of the year (half a year). β_1 represents the strength of the relationship between the childcare tax credit and these

variables. For example, β_1 represents the change in hours for the outcome average weekly hours worked per $1000 increase in the CDCTC. A coefficient of 0.5 means that women will work 30 more minutes weekly in response to a $1000 increase in the total CDCTC. Additionally, it can represent dollar amounts for the income variables or a likelihood percentage for the binary working measures. Negative coefficients represent inverse relationships between the outcome variables and the CDCTC.

For this specification to estimate the causal effect of the CDCTC on female labor force participation, the identifying assumption is that the changes in average labor force decisions of women in states with higher childcare tax credits would be the same as the changes in average levels for women in states with lower childcare tax credits. The study looks at the changes rather than the labor force participation levels across states in order to account for original state differences. This assumption means that the difference in labor force participation change is only driven by the different credit values across states. It also assumes that the unobservable characteristics through time, state, and individual are comparable for each group. This assumption might not hold. States that offer different credit values tend to follow political party preferences, which imply different social and working cultures. Additionally, significant purchasing power differences across states play into the effectiveness of childcare tax credits. This implies that mothers across states consider additional factors than credit value when determining labor force participation. For this reason, I will also consider event study specifications that compare mothers with one child and mothers with multiple children in the same state over time.

Using a repeated cross-sectional analysis of time, state, and generosity level, I compared the female labor participation trends as generosity levels change. I included

state*year fixed effects to control for regional effects and trends over time. In my baseline estimates, I do not control for race, age, and education level, but I use subsample analysis to look at heterogeneity by these factors. To do this, I use *if* statements to condition the data and estimate Equation 1 for different demographic groups. I performed multiple regressions for each explanatory variable, conditioning on separate variables. Each response variable regression included controls for college graduates, high school graduates, and less than high school education, whether they were Black or Hispanic, and if they were married. I also included a control for the refundability status of the credit dependent on the state. This enabled me to compare the outcome results between all states and those specifically targeting low-income households. These specifications are necessary because demographic groups have specific labor force trends. Understanding how the childcare tax credit affects each group can play a role in policies that reduce inequalities for racial and ethnic minority groups. When applicable, I controlled for the working status of the mother to separate extensive margin and intensive margin effects. This variable reported whether or not they said they were working in general (as opposed to being unemployed).

5 Results

The first set of regressions, reported in Table 2, focuses on the impact of tax credit values on various measures of female labor participation. Hours needed for childcare are taken out of potential working hours. This allows me to create a relationship between the hourly cost of childcare and the hourly benefit of working. Childcare is needed during the

day, and those hours are the most viable for working. Using childcare tax credits as the explanatory variable, the initial regressions result in significant, positive relationships with family income, mother's income, mother's average weekly hours worked, and working status of the mother. These did not include any conditional statements; however, they did include the aforementioned fixed effects. The work intensity did not result in significant relationships with childcare tax credits. The results suggest that family income increases by $2747.6 for every $1000 increase in childcare tax credits, and the mother's income increases by $901.5. This implies that there are more significant returns from childcare tax credits to a family than just in a mother's income.

Additionally, it implies almost a 3:1 monetary return to the credits. One explanation is that families who already pay for childcare services can increase their discretionary income from childcare tax credits. This is because they are not introducing any new childcare costs (contrary to those who enroll in childcare due to a lowered cost from tax credits) and can work more or more effectively as a result.

In order to look at both family income and mother's income, I assume that the income of a married woman's spouse is exogenous (Jiang, 2019). This means that women make labor and income decisions regardless of their partner's choices. However, this is a tenuous claim. While the number of dual-income households is growing, ranging from 52-58% from 1998-2017, many married couples have one sole breadwinner (Sullivan, 2020). Some proportion of those couples may have one worker out of necessity, while others may choose that out of preference. Additionally, the asymmetric response sizes to the CDCTC for mothers' income and family income suggest that households shift their labor supply as a unit rather than individually. A mother may not want to enter the

workforce, even with more time flexibility, because their partner is meeting financial needs.

Table 2[2]: Baseline Regressions on Maximum Credit Value

	Total Family Income	Mother's Income	Weekly Mother's Hours Worked	Worked Full Year	Worked Half Year	Working Status
Maximum Credit Value	2747.6**	901.5***	0.5327***	0.000766	-0.000766	0.0127*
	(1015.8)	(158.6)	(0.122)	(0.00331)	(0.00331)	(0.00523)
_cons	52527.4***	14559.7***	35.09***	0.829***	0.171***	0.584***
	(206.1)	(32.18)	(0.02678)	(0.000672)	(0.000672)	(0.00106)
N	908667	908667	638713	908667	908667	908667

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The previous analysis focused on average outcomes for all women. Notably, conditioning the regressions on working resulted in a positive, significant relationship for all response variables except those working for less than half of the year, from column eight in Table 7. While working half of the year and part-time work are not interchangeable, they both represent workers who do not work full-time and year-round. I assume that the behavior of these workers is similar because of a flexible schedule for work. It is important to note the reverse causality when conditioning on working, as the results cannot be determined causal. However, the work intensity variables can address this by including all levels of working. There was a significant, negative relationship between the childcare tax credit and working less than half of the year. This is surprising because part-time workers and those who do not work full-time, year-round are the most flexible in adjusting hours to extrinsic incentives. The results imply that for every $1000 increase in the childcare tax credit, women who work half of the year decrease their

[2] This table provides original regression results for the different outcome variables listed in each column for the explanatory variable maximum credit value. The regressions do not include any conditional statements; however, they do include state, number of children, and year fixed effects.

weekly hours worked by 1.3 percentage points. This is less than one minute in an hour weekly, leading to a negligible change.

An assumption is that half-year workers have more control over the number of hours worked. Therefore, they could increase their hours worked if childcare was more affordable. However, the cost of childcare may be a preventative factor in a positive response. Although the tax credit decreases childcare costs, the price of quality childcare may need to be lowered to be a viable childcare solution for low-income families. Another factor in this negative value could be caused by mothers who switch from working half of a year to working for an entire year. This distinction change may create a misleading coefficient for those working half of a year because the size of participants working for half of a year decreases, despite the increase in total hours worked by all women.

I separated education into three categories for the regression: graduated university, graduated high school, and did not graduate high school. This measures different responses to childcare tax credits for significant education milestones, as shown in Table 3. Interestingly, mother's weekly hours worked responds in a U-shaped relationship to the three levels of education, all at significant or moderately significant values. University graduates have a coefficient of 0.907, and those who have not completed high school have a coefficient of 0.716 for hours worked. Women who have completed high school but not university have the lowest coefficient, at 0.599. These coefficients show the hourly percentage increase of hours worked in response to a $1000 increase in childcare tax credits. This means that mothers with university degrees would work an hour more each week per $1000 increase in the tax credit. One explanation for

this U-shaped relationship is that women who graduate high school but do not graduate from a university may have left school due to marriage or children. Therefore, they are less likely to work overall because they have never been in the labor force. Women who graduate from a university may be more inclined to work and have higher-paying positions that allow them flexibility. Mothers who do not graduate high school may be in low-income households and must work to provide for their children and families.

For Hispanic mothers, moderately significant ($0.001 < \rho < 0.05$) results show negative relationships between childcare tax credits, women's income, and working status, as found in Table 3. This follows the results of Averett et al., which explain that Hispanic women are less likely to use formal childcare services. This means that cash transfers rather than in-kind benefits may result in larger benefits for Hispanic households. This study finds that Hispanic women's income decreases by $500 for every $1000 increase in childcare tax credits. However, when conditioning on both Hispanic mothers and working, the relationship is positive, while not significant. Regardless of the reason behind this unexpected relationship, this data shows that state CDCTCs do not effectively reach Hispanic households in a way that positively impacts their labor force outcomes.

According to the results in Table 3, married mothers' weekly hours worked are increased by 30 minutes for every $1000 credit increase. The credit does not provide statistically significant changes for married mothers to benefit from entering the labor force. It can be assumed that for married mothers, the prospect of childcare tax credits does not provide enough incentive to enter the labor force. However, those already

working may increase their hours worked if childcare is more affordable. The results for married mothers working year-round and less than half of the year are insignificant.

Black mothers show a moderately significant relationship between working status and the childcare tax credit. This had a positive coefficient of 0.0197. This means that for every $1000 increase in the childcare tax credit, a Black mother is about 2% more likely to start working. While this value is small, it does show that for some minority groups, childcare tax credits can make entering the labor force more accessible to mothers.

Table 3[3]: Regressions with Conditions

	Original	Graduated College	Graduated High School	Less Than High School	Black	Hispanic	Married	Working
Outcome:	Weekly Mother's Hours Worked							
Maximum Credit Value	0.533*** (0.122)	0.907*** (0.156)	0.599*** (0.150)	0.716* (0.327)	0.313 (0.279)	0.0873 (0.125)	0.504*** (0.122)	0.568*** (0.114)
cons	35.09*** (0.0268)	35.76*** (0.0413)	35.05*** (0.0349)	34.22*** (0.0433)	37.15*** (0.0542)	36.19*** (0.0325)	34.41*** (0.0271)	35.84*** (0.0254)
N	638713	177398	310765	150543	72205	92632	462405	521234
Outcome:	Mother's Income							
Maximum Credit Value	901.5*** (158.6)	2608.5*** (387.9)	260.2 (175.3)	569.7 (284.5)	329.3 (214.0)	-500.0* (205.8)	991.8*** (192.7)	1703.4*** (273.9)
_cons	14559.7*** (32.18)	26699.4*** (89.03)	12976.3*** (37.42)	6613.2*** (46.29)	14084.5*** (36.86)	10534.5*** (47.83)	15025.3*** (40.15)	22242.7*** (55.70)
N	908667	223799	421606	263260	100992	155263	666869	539093
Outcome:	Working Status							
Maximum Credit Value	0.0127* (0.00523)	0.0170** (0.00489)	0.0130 (0.00736)	0.00589 (0.0127)	0.0197* (0.00866)	-0.0184** (0.00651)	0.00765 (0.00422)	
_cons	0.584*** (0.00106)	0.689*** (0.00112)	0.618*** (0.00157)	0.438*** (0.00207)	0.587*** (0.00149)	0.506*** (0.00151)	0.578*** (0.000879)	
N	908667	223799	421606	263260	100992	155263	666869	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Refundability status also varies between states. Although the federal CDCTC is not refundable, some states have chosen to offer a refundable credit that can enable more low-income families to access the credit. Refundable credits mean that families do not have to be tax liable to access the credit value, meaning they can maximize their credit despite income restrictions. To analyze the impact of a refundability status in states, I

[3] This table shows the outcome variables along column one, while the subsequent columns show the response to each conditional statement. The regressions all include the state, number of children, and year fixed effects. Each regression has one conditional statement in order to maintain the sample size. The explanatory variable for all the regressions is the maximum credit value.

create an interaction between the binary refundable variable and the maximum childcare tax credit, found in Equation 2. The refundable variable equals one for individuals in states that offer a refundable credit, and zero for those in states that do not.

Equation 2:

$$Y_{inst} = \beta_0 + \beta_1 rmaxcdctc_{nst} + \beta_2 rmaxcdctc*refundability + \boldsymbol{\zeta}_{st} + \delta_n + \varepsilon_{inst}$$

The interaction variable following β_2 equals the childcare credit value if the state credit is refundable, and zero if not. This means that β_2 represents the impact that a refundable credit has on the outcome variable. I included the same fixed effects as the original regression and include conditions for various education levels. Focusing on low-income groups for the impact of refundability is endogenous; to combat this, I used education as a proxy to see the impact of refundability on different income groups. I assumed that women with lower levels of education live in lower-income households, while women with higher levels of education live in higher-income households.

Table 4 looks at the impact of refundability on mothers' incomes. Interestingly, this shows that refundable credits have a negative effect on the outcome. The most significant impact is for women who have graduated college. However, women with college degrees are likely in higher income brackets, as college education can lead to higher-income jobs. This means that the refundability status of the childcare tax credit does not impact these mothers. While the refundable interaction coefficient is still negative for women who have only graduated high school or who have not graduated high school, the coefficient is no longer significant nor as large as it was for college-educated women. The sum of both β_1 and β_2 is slightly less than the coefficient under mother's income and the less than high school condition in Table 7, meaning that there is

a slight net negative impact of refundability. However, due to the lack of significance, this relationship cannot be determined causal.

Table 4[4]: Impact of Refundability and Credit Value on Mother's Income

Outcome: Mother's Income	Original	Graduated College	Graduated High School	Less Than High School
Maximum Credit Value	1291.7***	3626.7***	443.2	587.2
	(230.9)	(551.1)	(278.0)	(437.3)
Maximum Credit Value* Refundability	-561.5	-1387.8**	-267.2	-26.71
	(281.3)	(466.1)	(321.5)	(530.5)
cons	14544.1***	26651.8***	12969.0***	6612.6***
	(29.69)	(78.91)	(37.11)	(46.95)
N	908667	223799	421606	263260

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This unique relationship with the mother's income led me to examine the relationship between refundable credits and family income, as seen in Table 5. This regression did not yield any statistically significant results; however, the coefficients for the original regression on family income, the graduated college condition, and the graduated high school condition were positive. Similar to mother's income, the refundable interaction coefficient for women with less than a high school education was negative. This could be due to a correlation between states that offer fewer childcare tax credits and states that have lower-income populations. Additionally, the sum of both β_1 and β_2 is slightly less than the coefficient under family income, and the less than high school condition in Table 7. This shows a negative relationship between refundability status and credit value but is not significant, similar to the previous outcome.

[4] The refundable interaction variable is the maximum childcare credit value * refundability status, a binary variable. This table shows the impact of the explanatory variable maximum credit value on mother's income in the first row, and the impact of the refundable interaction on mother's income in the second row. The first column is without conditional statements, while the following three columns include conditional statements on the level of education as a proxy for income level.

Table 5[5]: Impact of Refundability and Credit Value on Family Income

Outcome: Total Family Income	Original	College	Graduated High School	Less Than High School
Maximum Credit Value	2110.7 (1219.2)	1439.4 (1535.0)	-689.9 (771.2)	883.9 (1623.3)
Maximum Credit Value* Refundability	916.5 (1668.5)	3067.2 (2203.7)	1020.3 (801.8)	-164.1 (1527.8)
cons	52553.0*** (183.2)	90065.9*** (320.2)	45559.6*** (90.57)	32765.4*** (159.7)
N	908667	223799	421606	263260

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Finally, I analyzed the relationship between refundability and working status. Table 6 shows that this yielded no statistically significant values, and all values are between -2% - 1%. This negligible amount shows that there is not a significant relationship between refundability status, and whether women begin working. This means that the credit refundability status lacks the incentive to influence potential low-income workers to enter the workforce.

There are several reasons behind this negligible relationship. It could involve personal cost-benefit decisions that consider the time needed to enter the workforce and other obligations that favor not working. Additionally, a lack of information about tax credits may play a role. Tax credits are notoriously difficult to access and not intuitive. People who do not work and who have never worked as adults may be less familiar with the different tax credit options available to them. Overall, the refundability study did not

[5] The refundable interaction variable is the maximum childcare credit value * refundability status, a binary variable. This table shows the impact of the explanatory variable maximum credit value on family income in the first row, and the impact of the refundable interaction on family income in the second row. The first column is without conditional statements, while the following three columns include conditional statements on the level of education as a proxy for income level.

result in conclusive evidence that refundability status is able to uniquely affect low-income families' income or labor supply.

Table 6[6]: Impact of Refundability and Credit Value on Working Status

Outcome: Working Status	Original	Graduated College	Graduated High School	Less Than High School
Maximum Credit Value	0.0134**	0.0208*	0.00710	0.0165
	(0.00435)	(0.00841)	(0.00461)	(0.0157)
Maximum Credit Value* Refundability	-0.00106	-0.00521	0.00865	-0.0161
	(0.00655)	(0.00954)	(0.0102)	(0.0126)
cons	0.584***	0.689***	0.618***	0.437***
	(0.000950)	(0.00112)	(0.00138)	(0.00197)
N	908667	223799	421606	263260

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

After focusing on the direct relationships between childcare credit and labor outcomes, I created an event study of the surrounding five years before and after policy implementation, found in Figure 3. The general event study equation is

Equation 3:

$$Y_{inst} = \beta_0 + \beta_1 * EventYear_{nst} + \boldsymbol{\zeta}_{st} + \delta_n + \varepsilon_{inst}$$

This used a binary marker to indicate when the policy was implemented. I focused on the five years before and after each policy was implemented to see the changes in the mother's hours worked and probability of entering the labor force. Because the implementation year varies between states, the study overlays the surrounding years for each state. The relationship between β_1 and the $EventYear_{nst}$ allows

[6] The refundable interaction variable is the maximum childcare credit value * refundability status, a binary variable. This table shows the impact of the explanatory variable maximum credit value on working status in the first row, and the impact of the refundable interaction on working status in the second row. The first column is without conditional statements, while the following three columns include conditional statements on the level of education as a proxy for income level.

me to isolate the years in the event study to see the response in the outcome variable. This regression contains state*year and number of children fixed effects and the same error term as Equation 1. For each outcome, I conditioned on the education levels, race, marital status, and working status when applicable, as mentioned previously.

For the outcome mother's weekly hours worked, some graphs showed pre-trends in either direction. However, the graphs with slight trends introduce new dimensions to labor force participation behavior. With no additional conditions, weekly hours worked had a slight positive pre-trend while maintaining negative probabilities. However, there is no discernible trend post-policy. Despite the lack of a trend, the post-policy probabilities of hours worked are, on average, higher than the pre-policy values. This is similar for mothers with less than a high school education, university graduates, Hispanic households, and those already working. This implies that there is some positive effect of childcare tax credits, although small, for these demographics of working mothers. Conversely, on average, Black mothers have lower, negative probabilities of hours worked after the policy implementation. Married mothers appear to have no average probability difference in weekly hours worked before and after the policy implementation.

The binary outcome of working had less discernable pre-trends. The notable exception was for Black households. This probability began at a high, positive probability and fell as the years approached the policy implementation. After the policy, there are no discernable trends. However, the probabilities are, on average, lower than before. In the initial regression without conditions, Hispanic households and those who graduated high

school all have higher average percentage responses post-policy for the working binary. In contrast, all other outcomes have similar probabilities pre and post-policy.

An additional discrepancy in outcome response may be the size of the family. Not all states have equal credit value proportional to the number of children in the family. Some states provide funding for more than one child at a lower provision per child than families with one child, while others provide proportional or greater credit values. To assess families' responses to multiple children, I conducted an additional time-trend analysis of hours worked and the working binary, shown in Figure 4. I conditioned these regressions on whether or not the difference between the credit for one child and the credit for multiple children was greater than or smaller than the average difference.

This study showed increasing, negative probabilities for weekly hours worked as pre-trends for states with smaller than average differences, with no identifiable post-trends. However, the post-policy probabilities were higher than the pre-policy values. The working outcome for minor credit differences showed no pre-trends, but the post-policy probabilities were higher on average. The post-policy probabilities for small package differences imply that any childcare support for families with multiple children positively impacts female labor participation.

The baseline regressions and the event study yield different intensities of results. While the regressions looked at all data over each year and state, the event study only focused on data from five years before and after the policy was implemented. Due to the smaller range of dates, this study resulted in more minor responses to the policy implementation. Unlike the first study, this does not include long-term changes and trends. However, this contrasting relationship with the initial regressions is important to

caveat the significance of the results from the initial study. The event study corroborates a positive relationship between the childcare tax credit and labor force outcomes in most places; however, it does provide a more modest estimate of the effect size.

6 Conclusion

Throughout the 20th and 21st centuries, large-scale social movements have promoted more equal workplaces and have contributed to rising female labor participation rates. The Civil Rights Act, signed in 1964, prevents workplace discrimination based on sex, race, and religion (A&E…, 2019). Sexual harassment in the workplace was first addressed in 1977, and the Pregnancy Discrimination Act was passed in 1978 (Women in the Workforce…, 2022). Racial minority participation in the labor force has also increased, spurred by the Civil Rights Movement ending in the late 1960s (Toossi, 2002). Additionally, economic conditions have resulted in different labor force patterns. Following World War 2, the U.S. economy strengthened and grew, leading to more labor force opportunities. However, the Great Inflation, from 1965 to 1982 (Bryan, 2013), and the Great Recession, from 2007 to 2009 (Weinberg, 2013), increased unemployment rates for men and women. These historical events and policies play a significant role in the different labor force trends and can explain labor force variations over time. It is important for contemporary policy to understand the trends behind women's labor force participation as it has the power to promote equity and diversity in the workplace.

The positive relationship between the Child and Dependent Care Tax Credit and female labor participation is highly supported through theory and empirical evidence.

This study adds to the existing body of evidence through mothers' positive employed hours and income responses. Additionally, it shows that both women with college educations and women without high school degrees have positive labor responses to the availability of a childcare tax credit. The study examines the impact of a refundable credit but does not find conclusive evidence in favor of it. Overall, the study shows that childcare credits make it more affordable for mothers to work outside the home and increase the financial incentives for single mothers to work.

Inflation has risen significantly from 1976 to 2019, reducing the purchasing power of each dollar made. This can be seen in the rising cost of childcare and the cost of living. In order to combat these trends, it is important to adjust tax credits for current inflation to maintain the strength of its benefits to families. The results of this study suggest that states will see higher levels of female labor participation and higher economic returns with larger childcare tax credit values.

Examining specified areas of interest can help researchers understand the most significantly impacted demographics. These include race, age, education, marital status, and employment attachment. Future avenues of research include the long-term effects on children in households who received the benefits and their educational attainment and labor force attachment. This can provide a rationale for expanding childcare credit programs and promote longer-term legislative action. Additionally, future studies can examine how credit refundability affects different demographic groups and how accessible childcare tax credit information is to people who are not in the workforce.

While the CDCTC is not new, proposed changes to the system are highly relevant in political debate and policy proposals. Learning more about the long-term effects of

welfare policies targeted toward children may aid in sustainability arguments and lead to the discovery of long-term benefits that outweigh immediate tax revenue costs. Existing research suggests that policy makers should continue to support the childcare tax credit as a policy tool to increase female labor participation and further investigate additional benefits.

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Table 1: IRS Publication 503 and Internal Revenue Code (IRC) §21.

Appendix 1

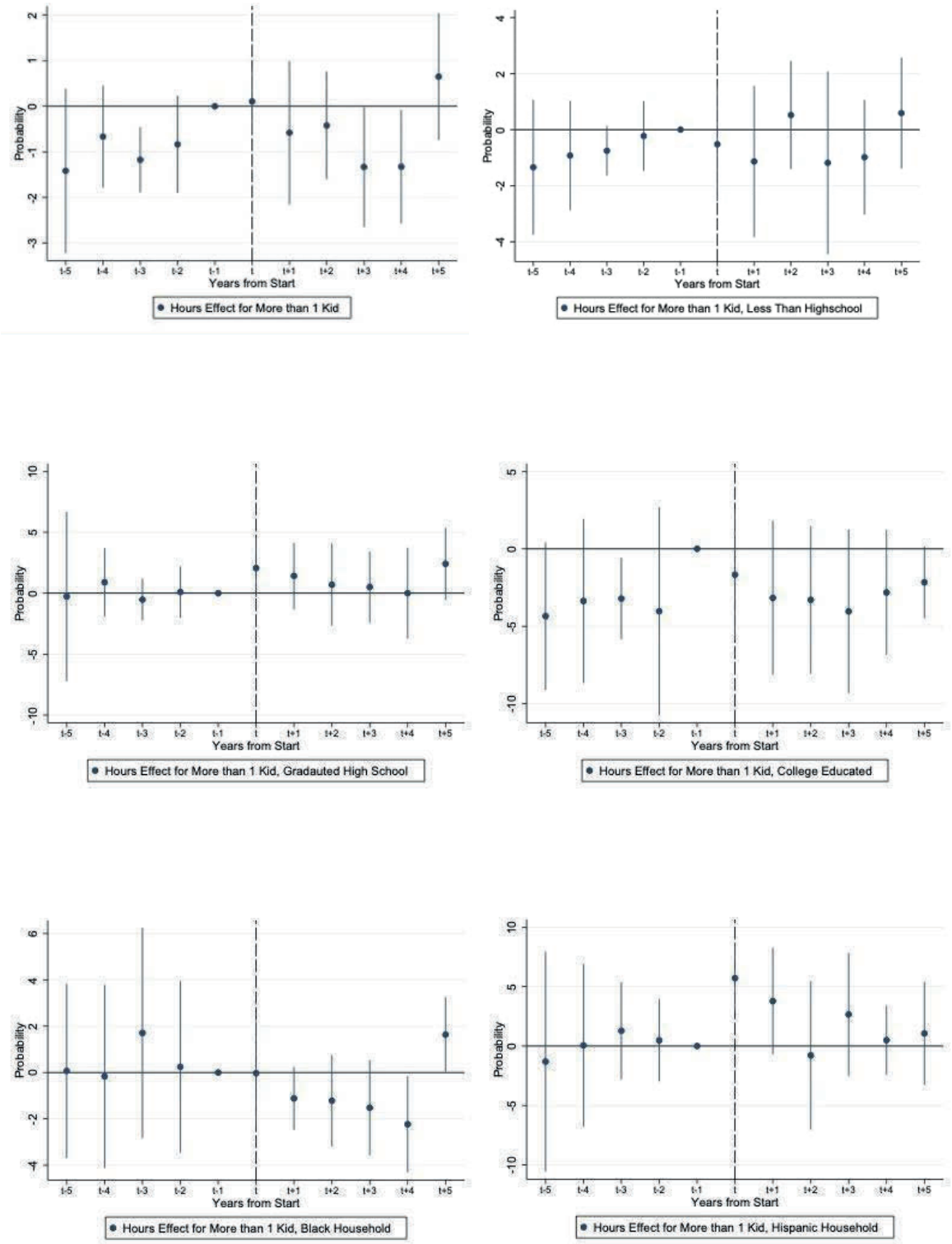
Table 7[7]: Full Table of Outcomes and Conditional Statements

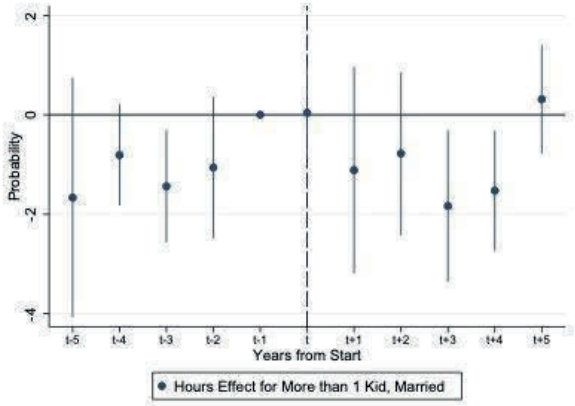
	Original	Graduated College	Graduated High School	Less Than High School	Black	Hispanic	Married	Working
Outcome:	Weekly Mother's Hours Worked							
Maximum Credit Value	0.533*** (0.122)	0.907*** (0.156)	0.599*** (0.150)	0.716* (0.327)	0.313 (0.279)	0.0873 (0.125)	0.504*** (0.122)	0.568*** (0.114)
cons	35.09*** (0.0268)	35.76*** (0.0413)	35.05*** (0.0349)	34.22*** (0.0433)	37.15*** (0.0542)	36.19*** (0.0325)	34.41*** (0.0271)	35.84*** (0.0254)
N	638713	177398	310765	150543	72205	92632	462405	521234
Outcome:	Total Family Income							
Maximum Credit Value	2747.6** (1015.8)	3689.7* (1815.9)	8.871 (371.3)	776.2 (864.9)	1144.4 (615.1)	-63.52 (734.8)	1995.9 (1103.1)	3866.3*** (767.7)
_cons	52527.4*** (206.1)	89960.6*** (416.8)	45531.8*** (79.23)	32768.9*** (140.7)	32095.5*** (105.9)	35999.4*** (170.8)	65240.7*** (229.8)	58814.9*** (156.1)
N	908667	223799	421606	263260	100992	155263	666869	539093
Outcome:	Mother's Income							
Maximum Credit Value	901.5*** (158.6)	2608.5*** (387.9)	260.2 (175.3)	569.7 (284.5)	329.3 (214.0)	-500.0* (205.8)	991.8*** (192.7)	1703.4*** (273.9)
_cons	14559.7*** (32.18)	26699.4*** (89.03)	12976.3*** (37.42)	6613.2*** (46.29)	14084.5*** (36.86)	10534.5*** (47.83)	15025.3*** (40.15)	22242.7*** (55.70)
N	908667	223799	421606	263260	100992	155263	666869	539093
Outcome:	Worked Half Year							
Maximum Credit Value	-0.000766 (0.00331)	0.00698 (0.00374)	-0.00539 (0.00568)	-0.00702 (0.00606)	-0.00764 (0.00547)	0.0000210 (0.00586)	0.00650 (0.00359)	-0.0131*** (0.00279)
_cons	0.171*** (0.000672)	0.135*** (0.000858)	0.167*** (0.00121)	0.212*** (0.000985)	0.175*** (0.000941)	0.148*** (0.00136)	0.167*** (0.000748)	0.156*** (0.000567)
N	908667	223799	421606	263260	100992	155263	666869	539093
Outcome:	Worked Whole Year							
Maximum Credit Value	0.000766 (0.00331)	-0.00698 (0.00374)	0.00539 (0.00568)	0.00702 (0.00606)	0.00764 (0.00547)	-0.0000210 (0.00586)	-0.00650 (0.00359)	0.0131*** (0.00279)
_cons	0.829*** (0.000672)	0.865*** (0.000858)	0.833*** (0.00121)	0.788*** (0.000985)	0.825*** (0.000941)	0.852*** (0.00136)	0.833*** (0.000748)	0.844*** (0.000567)
N	908667	223799	421606	263260	100992	155263	666869	539093
Outcome:	Working Status							
Maximum Credit Value	0.0127* (0.00523)	0.0170** (0.00489)	0.0130 (0.00736)	0.00589 (0.0127)	0.0197* (0.00866)	-0.0184** (0.00651)	0.00765 (0.00422)	
_cons	0.584*** (0.00106)	0.689*** (0.00112)	0.618*** (0.00157)	0.438*** (0.00207)	0.587*** (0.00149)	0.506*** (0.00151)	0.578*** (0.000879)	
N	908667	223799	421606	263260	100992	155263	666869	

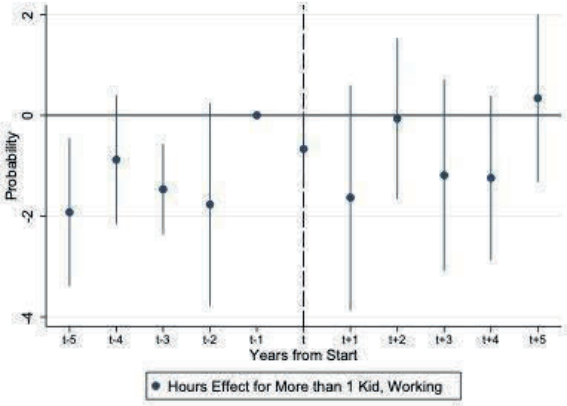
Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

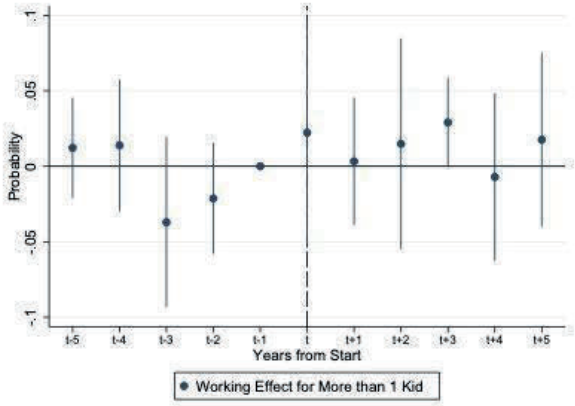
[7] This table shows the outcome variables along column one, with the conditional statements along the subsequent columns. Column two titled "Original" represents the regressions without conditional statements. Each regression includes state*year, state, number of children, and year fixed effects.

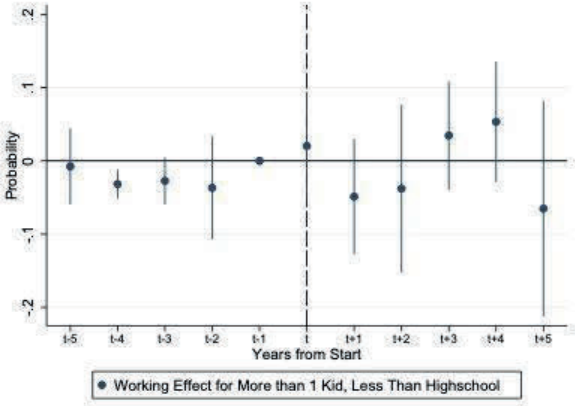
Figure 3: Event Study, Hours and Working Effects

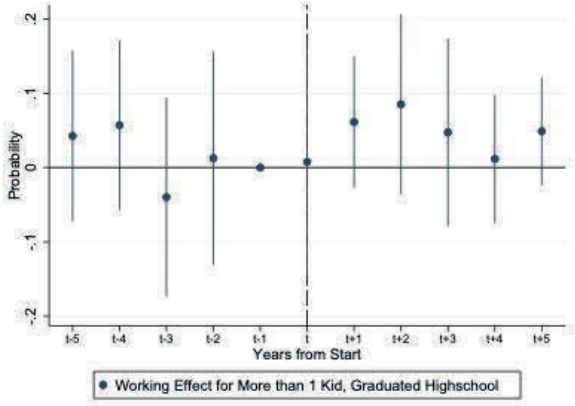


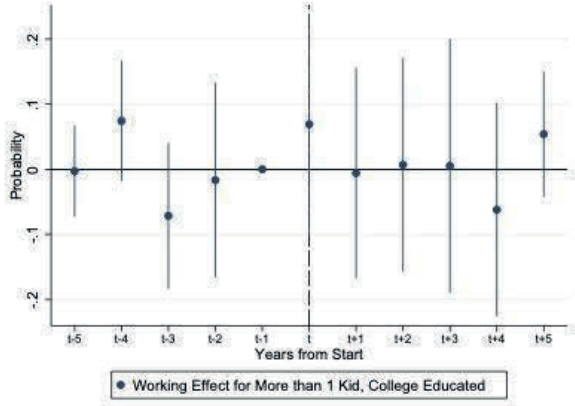

Probability
Years from Start
Hours Effect for More than 1 Kid, Married

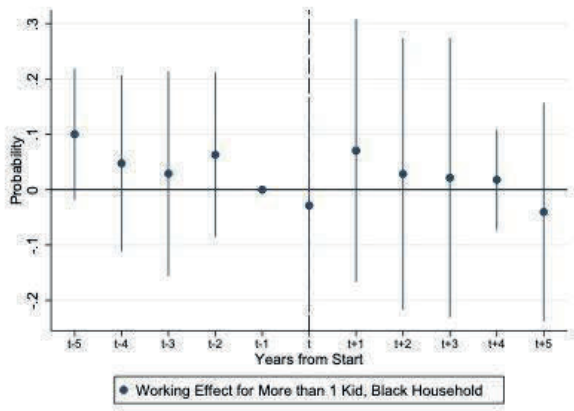

Probability
Years from Start
Hours Effect for More than 1 Kid, Working

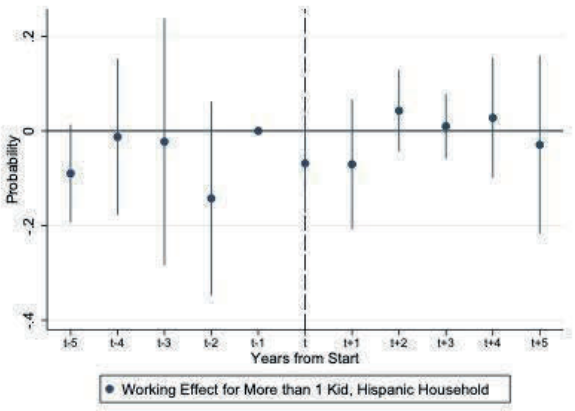

Probability
Years from Start
Working Effect for More than 1 Kid


Probability
Years from Start
Working Effect for More than 1 Kid, Less Than Highschool


Probability
Years from Start
Working Effect for More than 1 Kid, Graduated Highschool


Probability
Years from Start
Working Effect for More than 1 Kid, College Educated


Probability
.3
.2
.1
0
-.1
-.2
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
Years from Start
Working Effect for More than 1 Kid, Black Household


Probability
.2
0
-.2
-.4
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
Years from Start
Working Effect for More than 1 Kid, Hispanic Household

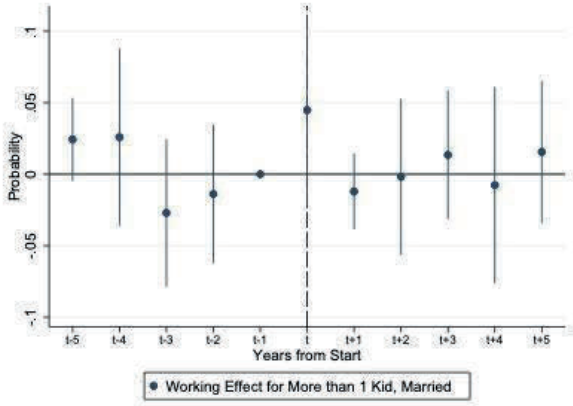
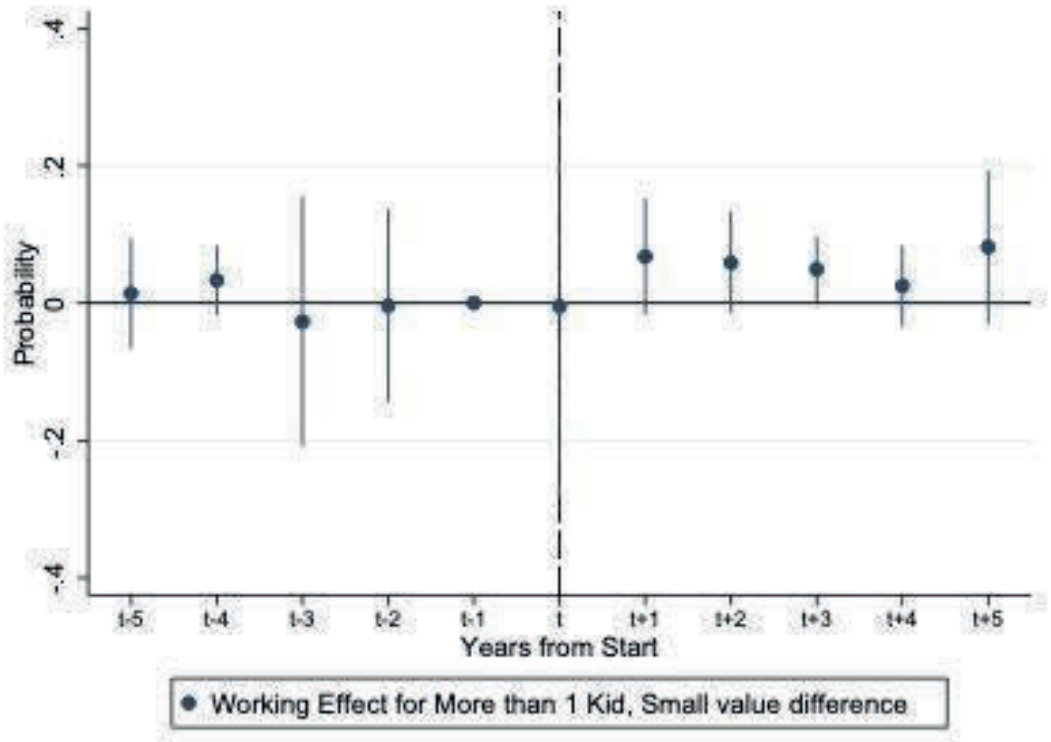
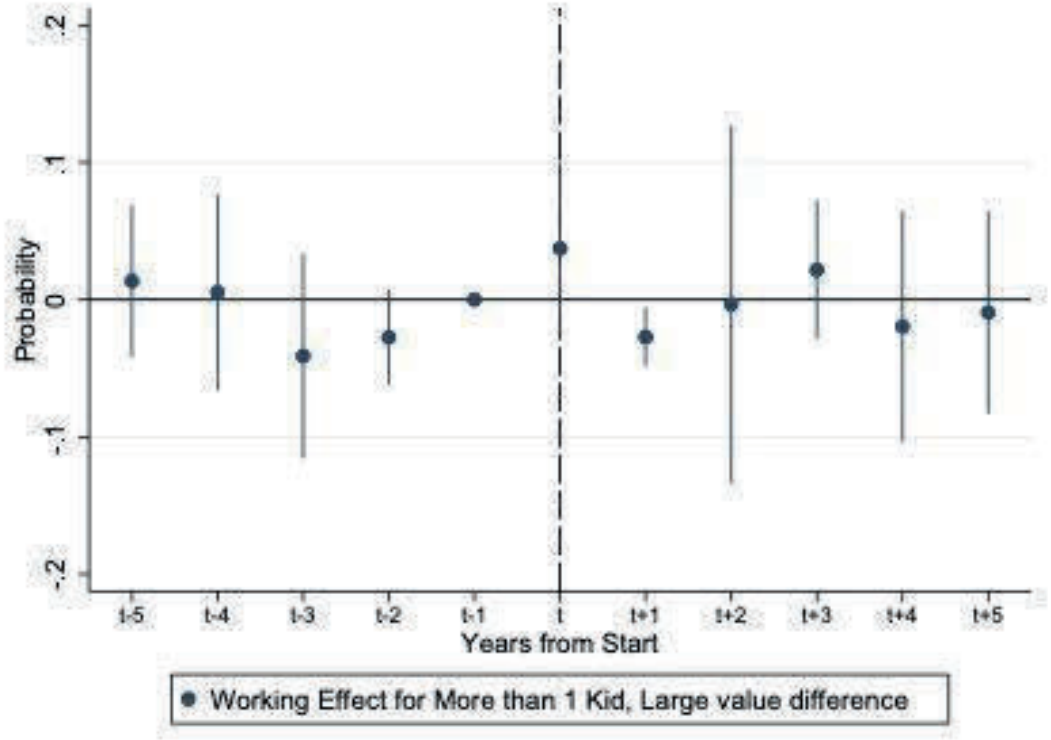
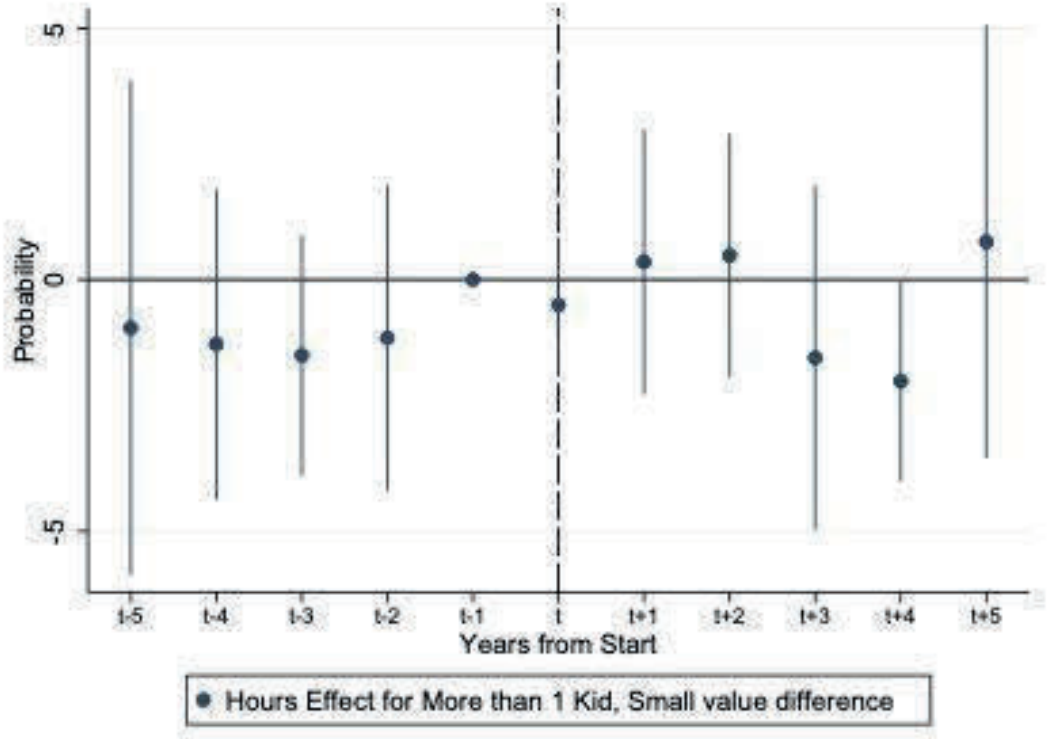
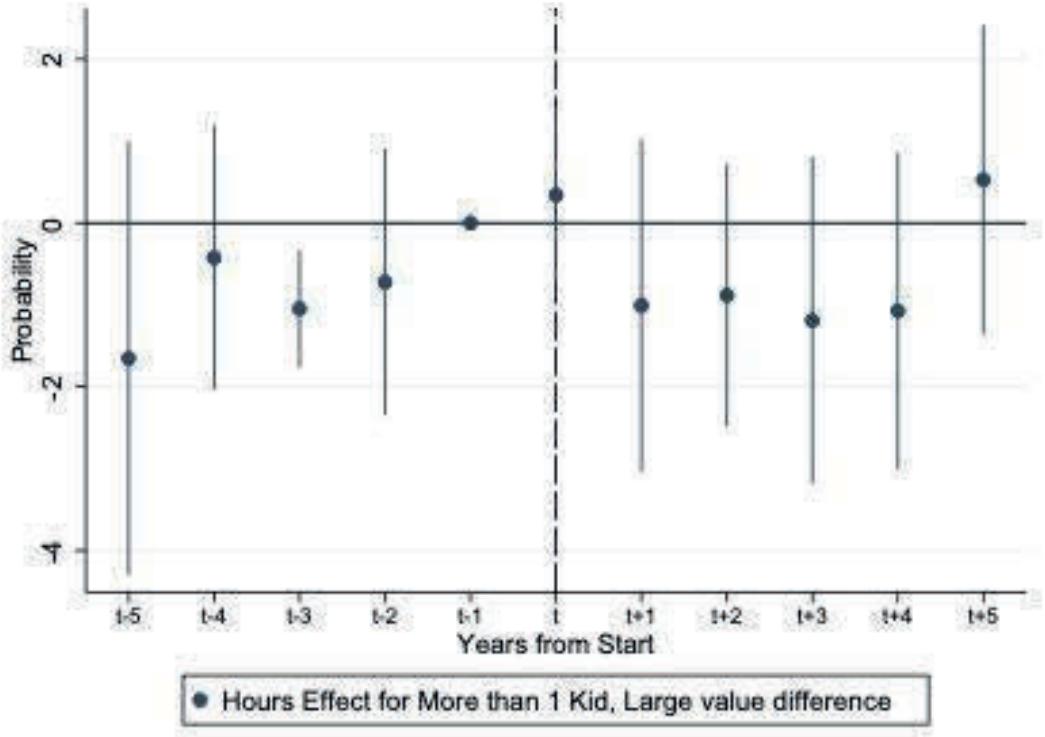

Probability
.1
.05
0
-.05
-.1
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
Years from Start
Working Effect for More than 1 Kid, Married

Figure 4: Event Study, Heterogeneity Plots






5
0
-5
Probability
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
Years from Start
Hours Effect for More than 1 Kid, Small value difference


2
0
-2
-4
Probability
t-5
t-4
t-3
t-2
t-1
t
t+1
t+2
t+3
t+4
t+5
Years from Start
Hours Effect for More than 1 Kid, Large value difference