Behavioral Responses To The 2015 CalEITC Introduction Pre-Analysis Plan

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Abstract

Do earned income tax credit wage subsidies increase employment on the extensive margin and incomes on the intensive margin? Such an important policy question remains a subject of debate in the academic economics literature surrounding one of the most popular types of anti-poverty programs in advanced economies, particularly the US. Using administrative tax data from the California Franchise Tax Board, we will analyze single mothers with various family sizes after the CalEITC introduced in 2015.

Keywords: Earned Income Tax Credit, Wage Subsidies, Welfare, Poverty, Taxes

JEL Codes: H24, I38

1   Introduction

Earned income tax credits (EITCs), defined broadly as refundable tax credits for eligible working individuals below certain income thresholds, are one of the most popular forms of transfer benefit programs in the US and around the world (Blundell and Hoynes (2004)). EITCs, functioning as wage subsidies, are generally designed with the goal of incentivizing work (Eissa and Hoynes (2006)). As a result of their scope, design and goals, EITCs have therefore presented fertile ground to test hypotheses about the labor market effects of wage subsidies and the effects of taxation on labor supply more generally.

The effects of wage subsidies like the earned income tax credit (EITC) on the labor supply decision is a contested topic in the economics literature, particularly in papers that examine the United States federal EITC, the largest means-tested cash transfer program in the country. A dominant view in the labor supply literature (Eissa and Liebman (1996), Meyer and Rosenbaum (2001), and Eissa and Hoynes (2006)) is that the EITC incentivizes work on the extensive margin (labor participation) more than on the intensive margin (hours of work or amount of earnings). There have also been several state and local EITC-like supplements and expansions. Cancian and Levinson (2005) examine Wisconsin's EITC expansion to families with three or more children, finding null effects on labor supply at the extensive margin. Miller, Katz, Azurdia, Isen, Schultz, and Aloisi (2018) find some positive effects on labor supply when analyzing the Paycheck Plus program in New York City, an EITC-like policy for low-income individuals without children. Recently this view has come into question with recent analysis finding that EITC expansions (both federal and state) have no effects on outcomes at the extensive labor margin (Kleven (2022)).

California offers an ideal setting to study a major EITC reform as it is the largest U.S. state by GDP, comparable to the economy of the 5th or 6th largest country in the world. The EITC makes up one of the most expensive parts of the US tax code in addition to being instrumental in the transformation of US anti-poverty programs from a system of primarily cash assistance to a means-tested wage subsidy scheme that began in 1972 at the federal level. The EITC has since been expanded at the federal level many times and various states have implemented their own EITC expansions. As of 2022, 30 states plus the District of Columbia have since enacted various state EITC expansions including California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Vermont, Virginia, Washington, and Wisconsin. While some have studied the CalEITC in the context of take-up (Linos et al 2022) and in the context of national studies of state EITCs (Kleven

(2022)), no study to our knowledge has studied CalEITC using administrative data to explore effects on the labor supply decision.

The CalEITC, introduced in 2015, offers useful variation both at the state level and across family sizes concentrated on a very narrow band of the lower end of the income distribution. Most past EITC expansions at the federal and state levels have been across a wide band of incomes.

We use the CalEITC as a source of identifying variation in an attempt to shine more light on the unresolved question of the effects of the EITC on the labor supply decision. One advantage to our paper is using millions of individual administrative tax filings that increase the sample size and precision of estimates. Like much of the EITC literature, we use a difference-in-difference approach (along with synthetic difference-in-differences) to compare the labor supply decision of parents with various numbers of children with those without children since the increase in the size of the EITC benefit skews towards parents with at least one child. We also perform several robustness checks across several specifications.

This paper proceeds as follows. In Section 2, we review related literature. In Section 3, we discuss the CalEITC institutional setting. In Section 4, we describe the data. In Section 5, we describe the empirical methodology. Sections 6 presents the results respectively. Section 7 concludes.

2 Literature Review

The EITC literature has focused mostly on the federal EITC reforms in the 1980s and 1990s and relied on difference-in-differences approaches using variation by the presence and number of children given that the generosity of the EITC increases with the number of children, especially from 0 children to 1 child (see Eissa and Liebman (1996), Meyer and Rosenbaum (2001), and Eissa and Hoynes (2006)).

Kleven (2022) analyzes every EITC reform at the federal and state level since the inception of the program in 1975 using CPS data finding that effects at the extensive margin were smaller than previously thought. In particular, when controlling for confounders like welfare reform and the macroeconomy, the significant results for the federal 1993 EITC reform, which has led much of the consensus, appears to disappear. Part of the confounding with welfare reform arises in fact that implicitly when analyzing variation in employment by family size one is also capturing variation by the age of the youngest child which is closely related to welfare AFDC receipts pre-1990s welfare reform.

Schanzenbach and Strain (2020) attempts to replicate an earlier version of Kleven (2022) with alternative specifications also using CPS data, finding some evidence of positive effects

of the EITC on extensive margin labor supply, although Kleven (2022) disputes these as outlier specifications.

Kleven (2022) is not the only paper to find little or no extensive margin effects from the EITC. Cancian and Levinson (2005) examine Wisconsin's EITC expansion to families with three or more children, finding no extensive margin effects on labor supply.

One issue with a simple analysis of EITC-eligible individuals (eg. single mothers) after an EITC reform is that not all EITC eligible individuals actually take up EITCs. Iselin, MacKay and Unrath (2022) find the corresponding take-up rate for the CalEITC among eligible SNAP-enrolled households was 54%. It also seems difficult to experimentally increase that take up through nudges (Linos, Rothstein et al (2022)). How does one measure the effects of a tax change like the EITC when agents for some reason (eg. inattentiveness, accountants) aren't income maximizing by actually taking the free money through the tax code? If we assume individuals with no knowledge of a tax policy's marginal incentives or those who knew about it but did not choose to take it behave as they would in the absence of the policy (the approach taken by Chetty, Friedman and Saez (2012), we should only analyze the labor supply effects of those who actually took the CalEITC vs those that did not (regardless of whether people knew about it or not). We take the approach of analyzing both those who are eligible as well as those who actually took up the CalEITC as treated individuals.

As Moffitt (2003) and Rothstein (2010) note, the EITC has many negative-income-tax like properties. Most notably, the phaseout of the program creates an increase in marginal tax rates. Much work has been done studying the impact of EITC on hours worked. In addition, while Eissa and Liebman (1996) and Meyer and Rosenbaum (2001) find that the EITC promotes employment among eligible unmarried women with children, Eissa and Hoynes (2004) find that the EITC reduces hours worked among married women using data from EITC expansions occurring between 1984 and 1996.

Several EITC reform proposals have been presented in recent years which consider the impact of marginal tax rates including those outlined in Hubbard (2016) and Hoynes and Rothstein (2016), which set the maximum credit for a single childless adult equal to the current level for a single adult with one child and keep the phase-in rate the same as for households with one child in addition to setting an income width for the plateau of $5,000 and a phaseout rate which equals that of the current one-child schedule.

Bierbrauer, Boyer and Hansen (2023) introduces a framework and set of tools that enables one to identify Pareto-improving tax reforms if they exist; in other words, determining if a tax system is so badly designed that all taxpayers can be made better off.

3   Institutional Details

Cash transfers (both unconditional and conditional) have long been a feature of public debate going back to as early as Moore (1516). Over various periods of time in American history, Paine (1797), Hayek (1960), Friedman (1962), and King (1967) all endorsed various forms of cash transfers as improvements on the existing U.S. welfare system.

In 1969, President Richard Nixon proposed a negative income tax ("Family Assistance Plan" as the centerpiece of his welfare reform proposal. Under Nixon's proposed FAP, a family of four would receive $1,600 (in 1969 dollars) annually from the federal government, or about $10,500 in 2016 dollars with income phaseouts. While FAP was passed in the House, it was met with resistance in the Senate. Ultimately the Senate voted down FAP and instead passed Supplemental Security Income (SSI) in 1972 (later implemented in 1974) which provides additional cash assistance to individuals residing in the United States who are either aged 65 or older, blind, or disabled. Later, as part of his 1972 Presidential campaign, George McGovern included a more generous negative income tax than Nixon's proposal, which would have provided $1,000 per person as a minimum annual income, or $4,000 for a family of four.

The 1970s welfare debate ultimately resulted in negative income tax proposals being set aside and replaced with the earned income tax credit (EITC) which was signed into law by President Gerald Ford in 1975. The EITC was later expanded federally in 1986, 1990, 1993, 2001, and 2009 and has quickly become the largest anti-poverty welfare program in the US. In addition, several states have introduced their own EITC supplements. As of 2022, 30 states in addition to the District of Columbia have since enacted various state EITC expansions including California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Vermont, Virginia, Washington, and Wisconsin.

The introduction of CalEITC is a unique natural experiment in that it is very different from the other state EITCs. Where most other states provide a fixed percentage of the federal credit, the California EITC provides nothing to the higher-income federal EITC recipients, concentrating its payments on the families with the very lowest incomes. In the first year of the CalEITC's existence, the maximum CalEITC credit is $214 for families without children, $1,428 for families with one child, $2,358 for families with two children, and $2,653 for families with three or more children. No family with children with earnings above $13,870 can qualify for the CalEITC. Similarly no family without children with earnings above $6,580 can qualify for the CalEITC. Since then, thresholds have been increased over

time such what phaseout has ended at \$30,000 since 2019.

As Montialoux and Rothstein (2015) point out, the CalEITC only goes to about one fifth of Californians who get the federal credit; largely families with very low earnings. Families without any earned income are also ineligible as with the federal EITC.

4 Data

4.1 California Franchise Tax Board Individual Administrative Tax Filings

This paper uses the universe of individual administrative tax record data for the calendar years 2000 to 2020 obtained from the California Franchise Tax Board (FTB).

From these returns, we have population-level coverage of certain variables measured from the California Form 540. Variables for which we have full coverage include Taxable Income and California AGI, Federal AGI, Capital Gains (we observe the sum of long term and short term capital gains), Interest, and Dividends. We also have data on an individual's EITC amount from specific line-items in the tax filings data.

Three filing statuses account for the near-universe of filings: single, married joint-filers, and head of household.

"Total Income," which is then adjusted to AGI through subtractions. AGI then becomes taxable income by removing deductions. State and federal quantities differ due to state and federal specific adjustments. For example, state and local taxes could at the time still be itemized in deductions from federal AGI.

EITC amounts are determined based upon on AGI. For 2020, to receive any federal EITC, earned income and adjusted gross income (AGI) must each be less than: \$51,464 (\$57,414 married filing jointly) with three or more qualifying children. \$47,915 (\$53,865 married filing jointly) with two qualifying children. \$42,158 (\$48,108 married filing jointly) with one qualifying child.

The FTB designates one spouse the "primary taxpayer" and the other a "redundant spouse," and the data include identical records for each party reflecting household quantities. All of our analysis is conducted at the level of a primary taxpayer which is our unit of observation.

All dollar amounts are inflation-adjusted to 2020 dollars using inflation factors from the FTB.

Table 1 will contain summary statistics for the full sample, 2000-2020.

This data is a rich dataset that can be used to analyze the effects on incomes across the

income distribution (eg. comparing treated CalEITC eligible individuals across family sizes (eg. childless parents are often a popular control group in EITC studies). Other studies have used such California data to study the behavioral response to taxation including Rauh and Shyu (2022) which studies the response to California top marginal income tax rate changes and Rauh (2022) which studyies net migration in response to various types of tax changes.

Most of the EITC literature has examined outcome variables on both the extensive margin (employment) and the intensive margin (incomes, hours worked by working individuals).

First, we study the extensive margin response to the CalEITC. We define a new tax filer as an individual who had not previously filed a state tax return in California or with the IRS at the federal level the prior year. Second, we study the intensive margin response to the CalEITC, with a particular focus around income changes around the income ranges where the CalEITC is relevant when first passed in 2015.

4.2 Survey Data

To study additional variables in exploring the labor response to the CalEITC, we further make use of data from the American Community Survey (ACS), Quarterly Census of Employment and Wages (QCEW), and Current Population Survey (CPS). Kleven (2022) uses the CPS to study the effects of the CalEITC using state difference-in-differences. We extend this analysis to comparing families with any number of children to families with no children. Additionally, the ACS and QCEW allow for greater sample size versus the CPS.

In particular, we use variables like whether one is in the labor force and whether one is employed to analyze changes at the extensive margin and variables like hours worked and individual income to analyze changes at the intensive margin.

The CPS allows for four different ways of measuring extensive margin labor supply: weekly employment, annual employment, weekly labor force participation, and annual labor force participation. QCEW only includes employment and wages.

The key difference between employment and labor force participation is that labor force participation includes unemployed people who are actively looking for work or are experiencing a temporarily layoff.

We tend to focus on employment data as the key outcome variable from the survey data since most of the existing literature has focused on annual employment although we plot labor force participation data as well following Kleven (2022). Further, we use it at the highest frequency to improve statistical power.

In terms of the intensive margin, all surveys include some form of wage/income data. CPS and ACS both include numbers of hours worked per week.

We also use a variety of other household-related variables to analyze heterogeneity across the family like whether effects are greater for single women, single men, married women, and married men. We also are able to use variables that would be otherwise unavailable like an individual's level of education as additional controls.

5 Empirical Strategy

5.1 Difference-In-Differences Approach

Many analyses of state EITC reforms (Kleven (2022)) use difference-in-differences specifications comparing single mothers in states with and without EITC reform or use triple-differences specifications comparing single women with and without children in states with and without EITC reform.

In our case of analyzing the CalEITC expansion in 2015, since we only have meaningful data on tax filers within California, we run a simple difference-in-difference analysis for the extensive and intensive margin comparing families with children of various sizes versus families without children. This is essentially the same specification used by many studies that analyze federal EITC reforms (Eissa and Liebman (1996), Meyer and Rosenbaum (2001), and Eissa and Hoynes (2006)). One advantage our study has is that we have universal administrative income data for California.

In certain specifications on the extensive margin, we also limit observations to analyzing participation at lower incomes since the CalEITC expansion is targeted toward lower income individuals which is locally where we may expect to observe significant effects.

$$Income_i = \alpha + \beta_1 Post_i + \beta_2 Treated_i + \beta_3 Post_i * Treated_i + \epsilon_i$$

where $Post_i$=1 after 2015, the year the CalEITC was introduced and $Treated_i$=1 if the individual belongs to the treated group (eg. California tax filers with one or more children who was eligible or received a substantially larger EITC expansion) and 0 otherwise if not (eg. California tax filers with no children who received a much smaller increase in their EITC benefit throught the 2015 CalEITC supplement).

We also apply this difference-in-difference approach to the ACS/QCEW survey data. In this case, we use income and family size to infer CalEITC eligibility in which case we assign $Treated_i$=1.

5.2 Synthetic Control Methods

For the sake of robustness, we next implement the synthetic difference-in-differences (SDID) approach of Arkhangelsky et al. (2021). Synthetic differences-in-differences ("SDID") is a synthesis of ideas underlying the synthetic controls and difference-in-differences methods for causal program evaluation. The main advantage of the method over standard difference-in-differences is that it reweights control observations to weaken the parallel trends assumption. While we find that broadly parallel trends are observed between the treatment group and various sub-samples of the control group that can be selected through propensity score matching techniques, SDID is preferable to these ad hoc techniques in that it retains the logic of ad hoc techniques that aim to make the parallel trends assumption plausible but does not require the use of arbitrary sample restrictions. Instead, SDID generates unit weights that align pre-exposure trends in the outcome of unexposed units with those for the exposed units, and it generates time weights so that the average post-treatment outcome for each of the control units differs by a constant from the weighted average of the pre-treatment outcomes for the same control units.

In an elastic nets model, these kinds of estimators minimize the distance between the treated outcome and an affine combination of the untreated outcome for the pre-treatment period, regularized the intercept μ is not regularized. by the elastic-net (en) penalty:

$$(\hat{\mu}^{en}, \hat{\omega}^{en}) = \underset{\mu,\omega}{} \ Y_{i,pre} - \mu - Y_{C,pre} \cdot \omega_2^2 + \lambda \cdot (\alpha\omega_1 + (1-\alpha)\omega_2)$$

The parameter $\lambda \geq 0$ reflects the amount of regularization, and $\alpha \in [0,1]$ reflects the type. The case $\alpha = 1$ corresponds to a LASSO penalty function, which captures a preference for parsimony via a small number of nonzero weights. The case $\alpha = 0$ corresponds to a Ridge penalty function, which captures a preference for smaller weights.

Estimated weights from the above are then used in a weighted two-way fixed effects difference-in-differences regression intended to obtain the Average Treatment Effect on the Treated ("ATT"). The ATT for individual i is the gap (i.e., difference) between the observed and counterfactual outcome:

$$\hat{\eta}_{i,t} = Y_{i,t} - \hat{Y}_{i,t}(0).$$

Our primary dependent variable of interest is an individual's likelihood of filing a tax return and log taxable income. Thus, we use this variable to generate SDID weights. In this procedure, 2000-2015 is the pre-period and 2016-2020 is the post-period, where the treatment

begins in 2016. As in the recent synthetic controls literature, SDID uses L2 regularization (also known as "ridge regression") to estimate its entity weights. This procedure introduces dispersion into the weights by shrinking the OLS coefficients (when well-defined) uniformly toward zero in a ratio sense. Regularization stabilizes estimated weights by controlling their variance; to see this note that least-squares with L2 regularization is equivalent to adding a constant positive term to the diagonal of the variance-covariance matrix used to calculate the OLS estimator.

To conduct inference with SDIDs, we use Jackknife standard errors.

We also recognize the potential for there to be confounding factors influencing the number of children a household has which may be related to the labor supply decision. To examine these possibilities we conduct extensive placebo tests, by estimating a synthetic control group for all of the untreated individuals as well as treated individuals. The goal is to see whether we consistently find average out-of-sample placebo effects to be close to zero.

6 Results

First, we will test for evidence of substantially different pre-trends between our treatment and control populations.

Figure 1 will plot the average employment rates for California households with different family sizes over time from survey data (2000-2022).

Figure 2 will plot the number of tax returns filed by California households with different family sizes over time across income bands (2000-2020).

Figure 3 will plot the median income for California households across families over time using both tax return and survey data (2000-2020).

Figure 4 will plot the distributions of log income for California households across family sizes in 2015 versus 2016 from California tax filings.

Table 2 will present the results from our extensive margin results from California tax return data.

Table 3 will present the results from our intensive margin results from California tax return data.

Table 4 will present the results from our extensive margin results from survey data.

Table 5 will present the results from our intensive margin results from survey data.

Figure 5 will present results from our placebo tests.

7   Conclusion

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Table 1: Summary Statistics

	Mean	SD	p1	p10	p50	p90	p99
Wage							
Federal AGI							
California AGI							
Taxable Income							
Dependents							
Married							
Cal AGI/Fed AGI Ratio							
EITC Eligible							
EITC Amount Actually Received							
EITC Amount Eligible For							

Notes: The table shows summary statistics for all observations pooled over the time period 2000-2020. The level of observation is the household, as reflected in the primary taxpayer observation which aggregates spousal income. California AGI differs from Federal AGI in two ways: (a) it includes only California source income; and (b) California and Federal law differ slightly in their definitions of AGI.

Figure 1: Average Employment Rates For California Households Across Family Sizess (2000-2022)

Figure 2: Number of Tax Returns Filed By California Households With Different Family Sizes Over Time Across Income Bands (2000-2020)

Figure 3: Median Income For California Households With Different Family Sizes From Tax
Filings and Survey Data (2000-2020)

Figure 4: The Distributions of Log Income For California Households With Children And Those Without Children in 2015 versus 2016

Figure 5: Placebo Tests for ATTs

Table 2: 2015 CalEITC Extensive Margin Tax Filings Difference-In-Difference Results

Filed Tax Return

	More Than 1 Child	2 or More Children	3 or More Children
Treated			
Post			
*Treated * Post*			
Income			
Constant			
F-test			
N			

Notes: $^{*} p < 0.1$; $^{**} p < 0.05$; $^{***} p < 0.01$

Table 3: 2015 CalEITC Intensive Margin Tax Filings Difference-In-Difference Results

Income

	More Than 1 Child	2 or More Children	3 or More Children
Treated			
Post			
*Treated * Post*			
Constant			
F-test			
N			

Notes: $^{*} p < 0.1$; $^{**} p < 0.05$; $^{***} p < 0.01$

Table 4: 2015 CalEITC Extensive Margin Survey Data Difference-In-Difference Results

Employment Rate

	More Than 1 Child	2 or More Children	3 or More Children
Treated			
Post			
*Treated * Post*			
Income			
College			
SomeCollege			
HighSchool			
Constant			
F-test			
N			

Notes: $^{*} p < 0.1$; $^{**} p < 0.05$; $^{***} p < 0.01$

Table 5: 2015 CalEITC Intensive Margin Survey Data Difference-In-Difference Results

Income

	More Than 1 Child	2 or More Children	3 or More Children
Treated			
Post			
*Treated * Post*			
College			
SomeCollege			
HighSchool			
Constant			
F-test			
N			

Notes: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$