

Unintended Consequences of the Earned Income Tax Credit: Maternal Labor Supply and Child Development

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Fertility Forum

May 13, 2022

- 1 Introduction
- 2 Background & Literature Review
- 3 Identification Strategy & Data
- 4 Child Outcomes
- 5 Mechanisms
- 6 Validity Test
- 7 Alternative Approach
- 8 Conclusion

Motivation

- Policymakers designing economic safety nets must balance multiple competing objectives:
 - Provide an adequate financial support to the households
 - Avoid disincentivizing work and accumulation of human capital

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 - Replacement of the Aid to Families with Dependent Children (AFDC) with Temporary Assistance to Needy Families (TANF)
 - EITC expansions

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 - Replacement of the Aid to Families with Dependent Children (AFDC) with Temporary Assistance to Needy Families (TANF)
 - EITC expansions
- However, motivating parents to work may reduce time spent with their children.
- The impact of the welfare programs on the children is ambiguous.
 - (+) increase family income; reduce "culture of dependency"
 - (-) reduce time with their parents; stressed by jobs

Research Questions

The Earned Income Tax Credit (EITC)

- Refundable tax credit to low-income households to encourage work; major part of pro-work reforms

Research question

How did the EITC affect development outcomes of single mothers' children, and what explains these results?

- Single mothers make up large portion of EITC recipients
 - 40% of overall EITC recipients; received 48% of EITC benefits
- Changes in labor supply and the impacts on children may be larger compared to two-parent households

Preview

This paper

- uses a difference-in-differences (DID) design around the time of the 1993 EITC expansion
 - finds that the EITC causes **reductions** in
 - combined math and reading scores(-**14%**), and
 - Motor Social Development (MSD) scores (-**68%**)
 - shows most important mechanism is reduced mother-child interactions due to increased labor supply of mothers

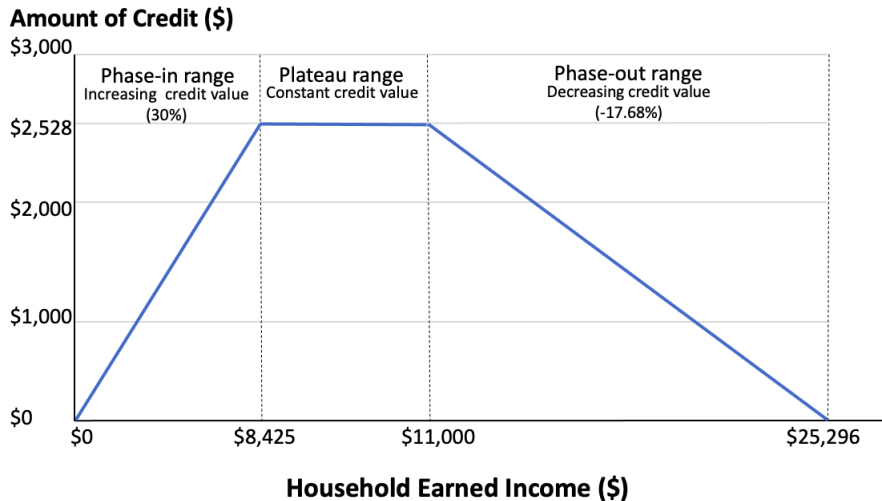
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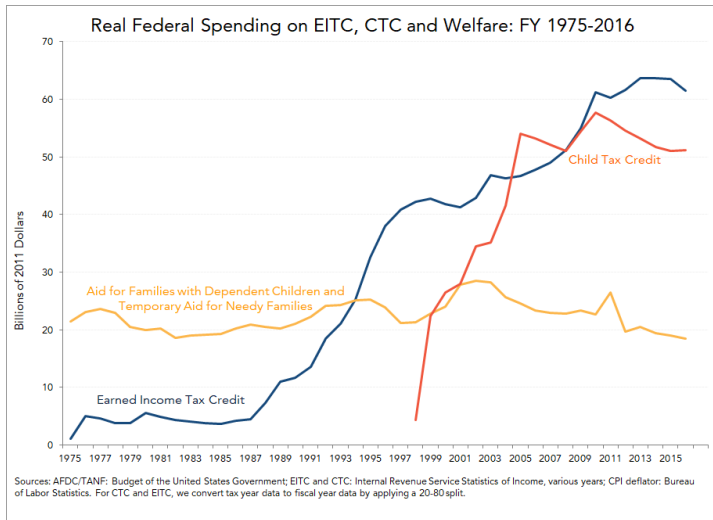
Background

The Earned Income Tax Credit (EITC)

- a refundable tax credit given to low-income families with dependent children
- designed to encourage work
- started as a Negative Income Tax (NIT) in 1975
- distributed \$63 billion to 25 million low-income families (IRS, 2019)
- United Kingdom (2003), France (2000), Korea (2008)

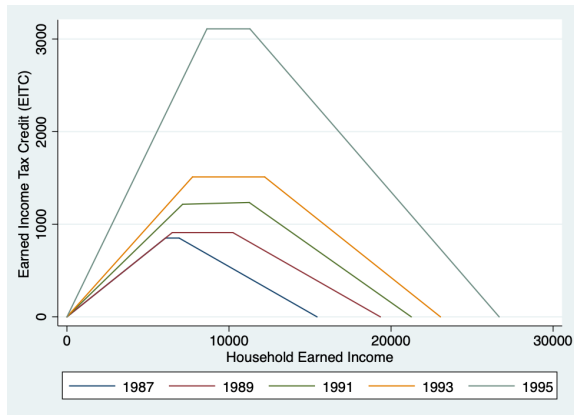
Figure: Amount of the EITC for families with two children, 1994





Earned Income Tax Credit (EITC)

Figure: The EITC Expansions for Families with Two Children



Literature Review

EITC and Labor Supply

- Single mothers were most responsive
- Married mothers/fathers did not change their labor supply

[Eissa and Liebman (1996), Eissa and Hoynes (2006), Meyer and Rosenbaum (2001)]

EITC and Child Development

- Income effect: increase in birth weights, test scores, college enrollment and adult earnings

[Chetty, Friedman and Rockoff (2011), Dahl and Lochner (2012), Bastian and Michelmore (2018)]

- Time effect: few explored

[Agostinelli and Sorrenti (2018)]

Literature Review

EITC and Child Development (cont'd)

- Contribution of this paper
 - examines the least explored channel of the EITC, time spent with their parents
 - focuses on low-income single mothers
 - gives implications about policy design such as about phase-in rates or supplemental child care

Literature Review

Maternal Labor Supply and Child Development

- Results are mixed and remain an empirical question.
 - Children's age when mothers start work, working conditions of mothers or quality of child care matter
[James-Burdumy (2005), Felfe and Hsin (2012), Bernal and Keane (2011)]
- Contribution of my paper:
 - Quasi-experimental approach; exploit exogenous variation from the policy change
 - Focused on the EITC recipients

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Identification Strategy: DID

- **Identification strategy**

To compare child outcomes of single mothers *before and after* the EITC expansion in 1993

- Treatment Group:
Children of *single* mothers with low-education and with low expected earnings
- Control Group:
Children of *married* mothers with low-education and with low expected earnings

- **Two groups are**

- Similar: likely EITC recipients, and low-income
- Different: mothers' labor supply incentives ▶ 1993 Expansion
 - 58% of single mothers were in the phase-in range, and faced a large reduction in tax rates
 - 15% of married mothers were in the phase-in range

Data

- **NLSY '79 + NLSY '79 Child and Young Adult (Matched data)**
 - **NLSY '79** : National representative sample of 12,686 young men and women who were 14-22 years old when they were first surveyed in 1979; information on mothers' characteristics, labor supply, marital status and incomes
 - 25-39 years old; 959 mothers
 - **NLSY '79 Child and Young Adult**: Child-specific information of all children born to NLSY '79 female respondents; information on child characteristics, household composition, and child outcomes
 - 0-18 years old; 2,627 children
- Panel data from the U.S Bureau of Labor Statistics

Data

- **EITC expansion in 1993:**

- The biggest expansion during the 1990s
- Many previous studies found large labor supply impacts.
[Meyer and Rosenbaum (2001), Kleven (2019)]

- **Years:**

- 1990, 1992, 1994 and 1996
 - Another EITC expansion due to TRA 1986 [Eissa and Liebman (1996)]
 - After 1996, there was a major change in policy for single mothers

Data

Child Outcome Variables

- PIAT (Peabody Individual Achievement Test) Math + Reading Score
 - administered to children older than 5
 - Math: recognizing numerals, advanced concepts
 - Reading: matching letters, naming names, and reading single words aloud.
- MSD (Motor Social Development)
 - administered to children from birth through 3 years
 - measures motor, social, and cognitive (readiness) development
 - mothers answer age-appropriate items
- given in raw, percentile and standard scores; normalized standard scores

Data

Mechanism

- **Maternal Labor Supply**

- Annual Labor Hours
- Employment
- Number of jobs

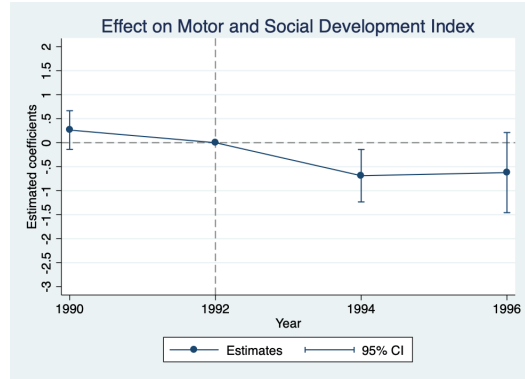
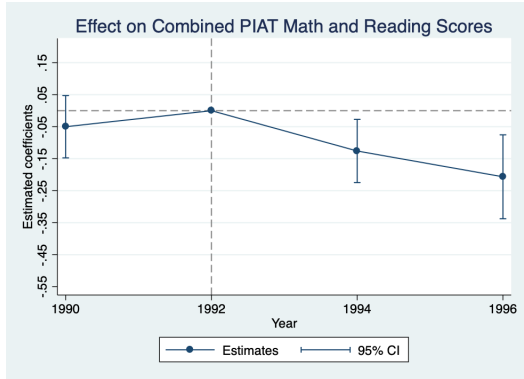
- **Income Sources**

- Mother's wages and salaries
- Government payment
- Imputed EITC

- **HOME-SF Score**

- Cognitive Stimulation
- Emotional Support

Common Trend Assumptions



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Child Outcomes

Empirical Model (DID with fixed effect)

$$Y_{it} = \alpha + \beta \text{Single}_i \times \text{Expansion1993}_t + X'_{it}\delta_1 + Z_i + \lambda_t + \varepsilon_{it}$$

- Y_{it} : a child outcome of child i at time t
- $\text{Expansion1993} = 1$ if $t > 1993$ and 0 otherwise
- $\text{Single} = 1$ if mother is widowed, divorced or never married in 1992
- X_{it} controls for child, mother and family characteristics including nonwage income
- Child fixed effect (Z_i) and Time effect (λ_t) ▶ Control
- $\beta < 0$ implies that net effect of the EITC expansion was negative

Results for Academic Achievement

Table: DID Regression Results of Children's Cognitive Achievements

Dependent variables:	PIAT Math+Reading (1)	PIAT Math (2)	PIAT Reading (3)
Expansion in 1993 \times Single	-0.1361*** (0.0470)	-0.1016* (0.0528)	-0.1436** (0.0566)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	1,829	1,832	1,849
Observations	3,753	3,773	3,812
R-squared	0.0201	0.0200	0.0154

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Academic Achievement - Additional Controls

Table: DID Regression Results of Children's Cognitive Achievements

Dependent variables:	PIAT Math+Reading (1)	PIAT Math (2)	PIAT Reading (3)
Expansion in 1993 \times Single	-0.1317*** (0.0481)	-0.1140** (0.0544)	-0.1176** (0.0575)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Additional	Additional	Additional
Number of children	1,795	1,814	1,800
Observations	3,612	3,667	3,632
R-squared	0.0256	0.0203	0.0275

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Academic Achievement - By Age

Table: DID Regression Results of Children's Cognitive Achievements

Dependent variables: Samples:	PIAT Math+Reading		
	All	5-12 years (1)	Older than 12 years old (2)
Expansion in 1993 \times Single	-0.1361*** (0.0470)	-0.1429*** (0.0502)	-0.0662 (0.1200)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	1,829	1,353	477
Observations	3,753	2,981	773
R-squared	0.0201	0.023	0.0284

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Academic Achievement - By Ethnicity

Table: DID Regression Results of Children's Cognitive Achievements

Dependent variables: Samples:	PIAT Math+Reading		
	All	Non-White (1)	White (2)
Expansion in 1993 \times Single	-0.1361*** (0.0470)	-0.1356** (0.0550)	0.0306 (0.1028)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	1,829	1,349	480
Observations	3,753	2,716	1,037
R-squared	0.0256	0.0280	0.0395

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Academic Achievement - By AFQT

Table: DID Regression Results of Children's Cognitive Achievements

Dependent variables: Samples:	PIAT Math+Reading		
	All (1)	Low AFQT (2)	High AFQT (3)
Expansion in 1993 \times Single	-0.1361*** (0.0470)	-0.1182** (0.0561)	-0.0935 (0.0885)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	1,829	1,284	545
Observations	3,753	2,546	1,207
R-squared	0.0201	0.0330	0.0504

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Non-cognitive Achievement

Table: DID Regression Results of Children's Non-cognitive Achievements

Dependent Variable:	Motor Social Development	
	(1)	(2)
Expansion in 1993 \times Single in 1992	-0.6821** (0.2780)	-0.7064** (0.2927)
Child fixed effect	Yes	Yes
Years and SMSAs dummies	Yes	Yes
Controls	Yes	Additional
Number of children	798	770
Observations	1081	1021
R-Squared	0.0767	0.1764

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level.

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Non-cognitive Achievement - By Ethnicity

Table: DID Regression Results of Children's Non-cognitive Achievement

Dependent variables: Samples:	Motor Social Development		
	All	Non-White (1)	White (2)
Expansion in 1993 \times Single	-0.6820** (0.2780)	-0.6898* (0.3928)	-0.4828 (0.6053)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	798	489	309
Observations	1,081	646	435
R-squared	0.0767	0.1129	0.1371

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Results for Non-cognitive Achievement - By AFQT

Table: DID Regression Results of Children's Non-cognitive Achievement

Dependent variables: Samples:	Motor Social Development		
	All (1)	Low AFQT (2)	High AFQT (3)
Expansion in 1993 \times Single	-0.6820** (0.2780)	-0.8609*** (0.3123)	0.5765 (0.8593)
Child fixed effect	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	798	487	311
Observations	1,081	648	433
R-squared	0.0767	0.1366	0.0980

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

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Mechanisms

Where did the impacts come from?

- Maternal labor supply
- Other income source
- Investment in children
- Others

Table: Changes in the Mother's Labor Supply

Samples:	All Mothers		Working Mothers	
Dependent Variables:	Positive Working Hours (1)	Had a Job (2)	Annual Working Hours (3)	Working As Full Time (4)
Expansion in 1993 \times Single	0.0496* (0.0265)	0.0513** (0.0261)	-25.2120 (60.5966)	0.0137 (0.0371)
Mother fixed effect	Yes	Yes	Yes	Yes
Year and Region dummies	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Number of mothers	959	959	803	803
Observations	3,268	3,268	2,495	2,495
R-squared	0.0070	0.0087	0.0108	0.0159

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the mother level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: Changes in Income Sources

Dependent variables:	Sum of the other income sources	Mother's Wages and Salaries (1)	Government Payment (2)	Imputed EITC (3)
Expansion in 1993 \times Single	-497.1784 (623.4318)	144.9330 (556.5022)	-504.9465*** (110.3567)	351.7840*** (68.3750)
Mother fixed effect	Yes	Yes	Yes	Yes
Year and Region dummies	Yes	Yes	Yes	Yes
Number of mothers	947	959	959	947
Observations	2,489	3,268	3,268	2,489
R-squared	0.0397	0.0214	0.0386	0.1586

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the mother level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Mechanisms

Where did the impacts come from?

- Maternal labor supply
- Other income source
- Investment in children
 - HOME-SF Score
- Others

Data

- **HOME-SF Score:**

- measures the quality of a child's home environment
- predictors of child development [▶ Correlations](#)
 - **Cognitive Stimulation:** number of toys, books, cleanness of the house, mother-child interactions
 - **Emotional Support:** home discipline, emotional bond

Table: Changes in Investments in Children

Dependent Variables:	HOME-SF Score	Cognitive Stimulation (1)	Emotional Support (2)
Expansion in 1993 \times Single	-14.1150 (8.8504)	-29.0268*** (9.5484)	-1.9803 (10.2542)
Child fixed effects	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Number of children	2,301	2,267	2,176
Observation	5,222	5,037	4,647
R-squared	0.0176	0.0119	0.0205

1. HOME-SF: The Home Observation Measurement of the Environment-Short Form (HOME-SF).
2. HOME -SF is the primary measure of the quality of a child's home environment included in the NLSY79 child survey
3. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level
4. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: Changes in Cognitive Stimulation - Goods Inputs (detailed)

Dependent variables: Samples:	Have More Than Ten Books	Have More Than Twenty Books	Have Musical Instrument for Child	
	6-9 years	10-14 years old	6-9 years	10-14 years old
	(1)	(2)	(3)	(4)
Expansion in 1993 \times Single	-0.0356 (0.0636)	0.0868 (0.0660)	0.0252 (0.0754)	-0.0372 (0.0696)
Child fixed effect	Yes	Yes	Yes	Yes
Year and region dummies	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Number of children	1,197	1,230	1,195	1,227
Observations	1,700	1,929	1,701	1,925
R-squared	0.0346	0.0349	0.0230	0.0173

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: Changes in Cognitive Stimulation - Time Inputs (detailed)

Dependent variables: Samples:	Discuss TV Programs with Child 6-9 years (1)	Take Child to Musical/Theatrical Performance Older than 10 years old (2)
Expansion in 1993 \times Single	-0.1596** (0.0716)	-0.1272* (0.0673)
Child fixed effect	Yes	Yes
Year and region dummies	Yes	Yes
Controls	Yes	Yes
Number of children	1,188	1,227
Observations	1,684	1,934
R-squared	0.0257	0.1753

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Mechanisms

Where did the impacts come from?

- Maternal labor supply
- Other income source
- Investment in children
- Others

Table: Changes in the School Behavior

Dependent Variables:	Skip Schools (1)	Damage Property (2)	Misbehave (3)
Expansion in 1993 \times Single	-0.0243 (0.0332)	0.0115 (0.0326)	0.0390 (0.0344)
Child fixed effect	Yes	Yes	Yes
Year and Region dummies	Yes	Yes	Yes
Number of Children	1,329	1,329	1,329
Observations	3,753	3,753	3,753
R-squared	0.4958	0.3969	0.2719

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: Changes in Residence with Grandparents in the Household

Dependent variables:	Grandmother (1)	Grandfather (2)
Expansion in 1993 \times Single	-0.0060 (0.0154)	0.0050 (0.0067)
Child fixed effect	Yes	Yes
Year and region dummies	Yes	Yes
Controls	Yes	Yes
Number of children	1,829	1,829
Observations	3,573	3,753
R-squared	0.0500	0.0138

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: Changes in Time with Father or Father-like Figure

Dependent variables: Sample:	Spend time with Father or Father-like Figure	
	6-9 years (1)	10-14 years old (2)
Expansion in 1993 \times Single	0.0375 (0.0674)	0.0210 (0.0677)
Child fixed effect	Yes	Yes
Year and region dummies	Yes	Yes
Controls	Yes	Yes
Number of children	1,095	876
Observations	1,528	1,281
R-squared	0.0346	0.0500

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

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Robustness Check

- Placebo test ▶ Robustness 1
 - Mothers with high household incomes are not typically the recipients of the EITC; Test the same thing by looking at mothers with high earnings; no similar impacts
- Comparison with Alternative Treatment and Control Groups ▶ Alternative Groups
 - Alternative groups have smaller reductions in the test scores and smaller increases in mothers' labor supply
- Effect of welfare reforms in the 1990s (State AFDC Waivers) ▶ Robustness 2
 - Controlling for state dummies and state dummies interacted with year dummies; did not change the results

Robustness Check

- Did the EITC affected children through changes in marital status?
 - The expansion in 1993 did not cause any significant changes in marital status. ▶ Marital Status
 - Using mothers with constant marital status sample; increased the estimates. ▶ Robustness 3
- Unmarried single mothers for the treatment group; increased the estimates ▶ Robustness 4
- Effect of presence of grandparents ▶ Robustness 5

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Motivation

- A limitation of the previous DID approach?
 - DID cannot show a direct link between mothers' labor supply and child development
 - DID cannot incorporate multiple expansions
- Instrumental approach can compensate for the weakness
- Plus, it allow to compare sizes of the estimates

Instrumental Variable (IV)

Maximum Credit Rates

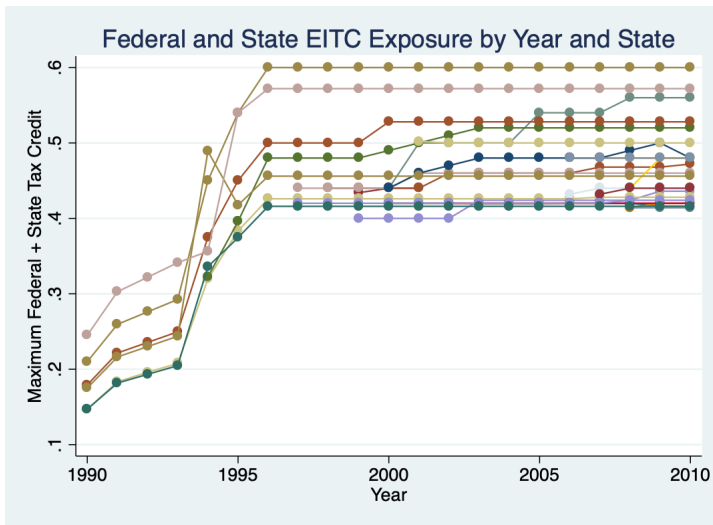
- Federal EITC Expansions
- State EITC Expansions
 - in a proportion to the federal EITC
 - Both adoptions and expansions account for the changes.

$$maxEITC_{ist} = Rfederal_t \times (1 + Rstate_{ist}) \times 100 \quad (1)$$

, where $maxEITC_{ist}$ denotes the maximum credit rate in percent, which is determined by $Rfederal_t$, a maximum federal credit rate, and $Rstate_{ist}$, a state EITC rate.

- For instance, mothers with two children in California in 2015, faced $74\%(= 0.4 \times (1 + 0.85))$ of $maxEITC_{ist}$, where $Rfederal_t$ was 40% and $Rstate_t$ was 85%

Instrumental Variable



Empirical Specification

- Empirical Specification

- First Stage:

$$MLS_{ist} = \alpha_1 + \beta_1 maxEITCrate_{ist} + X'_{it}\gamma_1 + \tau_i + \phi_s + year_t + \varepsilon_{ist}$$

- Second State:

$$y_{ist} = \alpha_2 + \beta_2 \hat{MLS}_{ist} + X'_{it}\gamma_2 + \tau_i + \phi_s + year_t + \varepsilon_{ist}$$

,where MLS_{ist} is a measure of labor supply of mothers and y_{ist} is a child development.

Table: IV Estimates with PIAT Reading Test

Dependent variable: Sample:	PIAT Reading Test		
	All	Low Education (1)	High Education (2)
Labor Force Participation	-20.5979** (9.9352)	-25.8627** (13.5850)	-8.0529 (13.9455)
Kleibergen-Paap rk LM statistic	12.664	7.135	6.017
Kleibergen-Paap rk Wald F-statistic	12.42	7.124	6.426
Number of children	4,532	2,961	1,547
Observations	11,938	7,680	4,050

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table: IV Estimates with PIAT Reading Test

Dependent variable: Sample:	PIAT Reading Test	
	Single (1)	Married (2)
Labor Force Participation	-17.5105** (8.7803)	-40.9299 (37.9625)
Kleibergen-Paap rk LM statistic	12.014	1.878
Kleibergen-Paap rk Wald F-statistic	12.160	1.833
Number of children	1,279	3,092
Observations	3,148	7,970

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Alternative Estimation 2

● Alternative Approach

- use variation in the regions within the EITC benefit schedule
- children in the phase-in range v.s. children in the other ranges
- large reduction in the test scores of the single mothers' children in the phase-in range

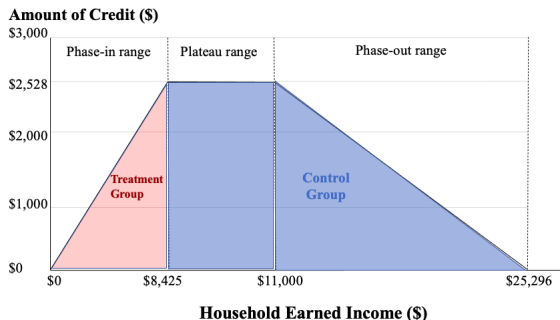


Table: Impacts on Children of Single Mothers in the Phase-in Range

Dependent Variables: Methods:	PIAT Math +Reading	
	Sharp DID (1)	Fuzzy DID (2)
Expansion in 1993 \times Phase-in Range	-0.3033** (0.1286)	-1.9056*** (0.3050)
Kleibergen-Paap rk Wald F statistic	-	59.856
Number of children	761	174
Observations	1,457	447

1. Standard errors (in parentheses) are robust for heteroskedasticity and clustered at the child level

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

- 1 Introduction
- 2 Background & Literature Review
- 3 Identification Strategy & Data
- 4 Child Outcomes
- 5 Mechanisms
- 6 Validity Test
- 7 Alternative Approach
- 8 Conclusion**

Conclusion

- Summary
 - This paper examines the impact of the 1993 EITC expansion on children of single mothers using difference-in-differences approach
- Finding
 - I found reductions in the combined PIAT math and reading scores (-14%), and Motor Social Development (MSD) scores (-68%)
 - The negative impacts are concentrated among younger (5-12 years) and more disadvantaged (Non-white and Low AFQT scores) groups
 - Analysis on mechanisms shows that there are increased maternal labor supply (5%), which accompany reduced mother-child interactions
- Implication
 - These results suggest that for the EITC to be an effective poverty reduction tool, it may need to be paired with other interventions such as child care

Thank You