The EITC and the Extensive Margin: A Reappraisal

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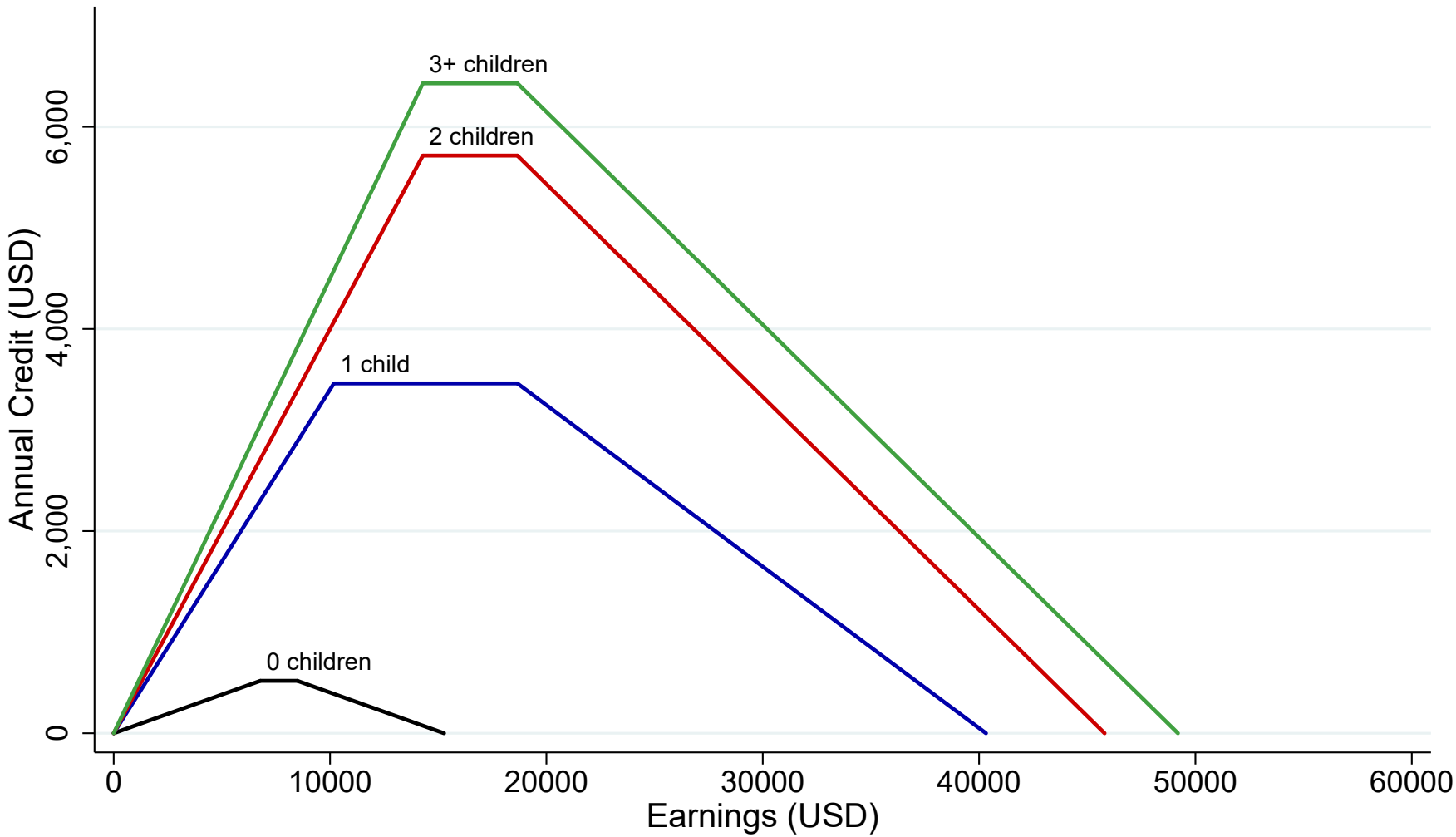
The Extensive Margin of Labor Supply

- A consensus that extensive margin responses can be sizable, at least for some groups
- Where does this consensus originate from?
  - Early labor supply literature (Heckman 1993)
  - Macro business cycle literature (Hansen 1985; Rogerson 1988)
  - Labor supply literature studying EITC reform (Eissa & Liebman 1996; Meyer & Rosenbaum 2001)
- A meta study by Chetty et al. (2013) puts the extensive margin elasticity at 0.25

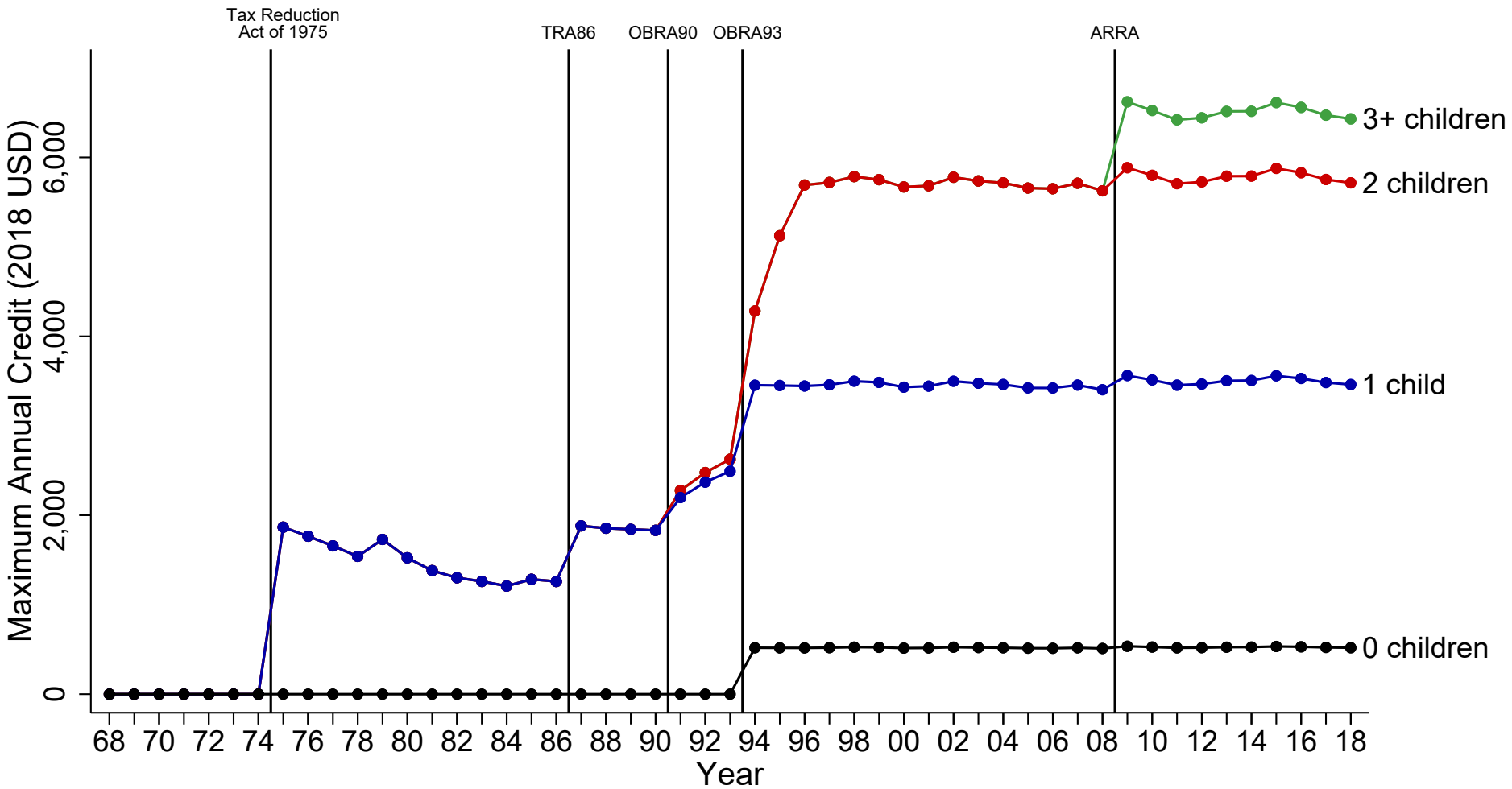
The Earned Income Tax Credit (EITC)

- A means-tested transfer conditional on positive earnings and children
- The largest cash support program in the US
- A large literature studies the labor supply effects of the EITC, particularly on single mothers
  - Most of this work exploits the federal EITC expansions in the 1980s and 1990s
- Most researchers seem to agree that the EITC expansions led to sizable extensive margin responses

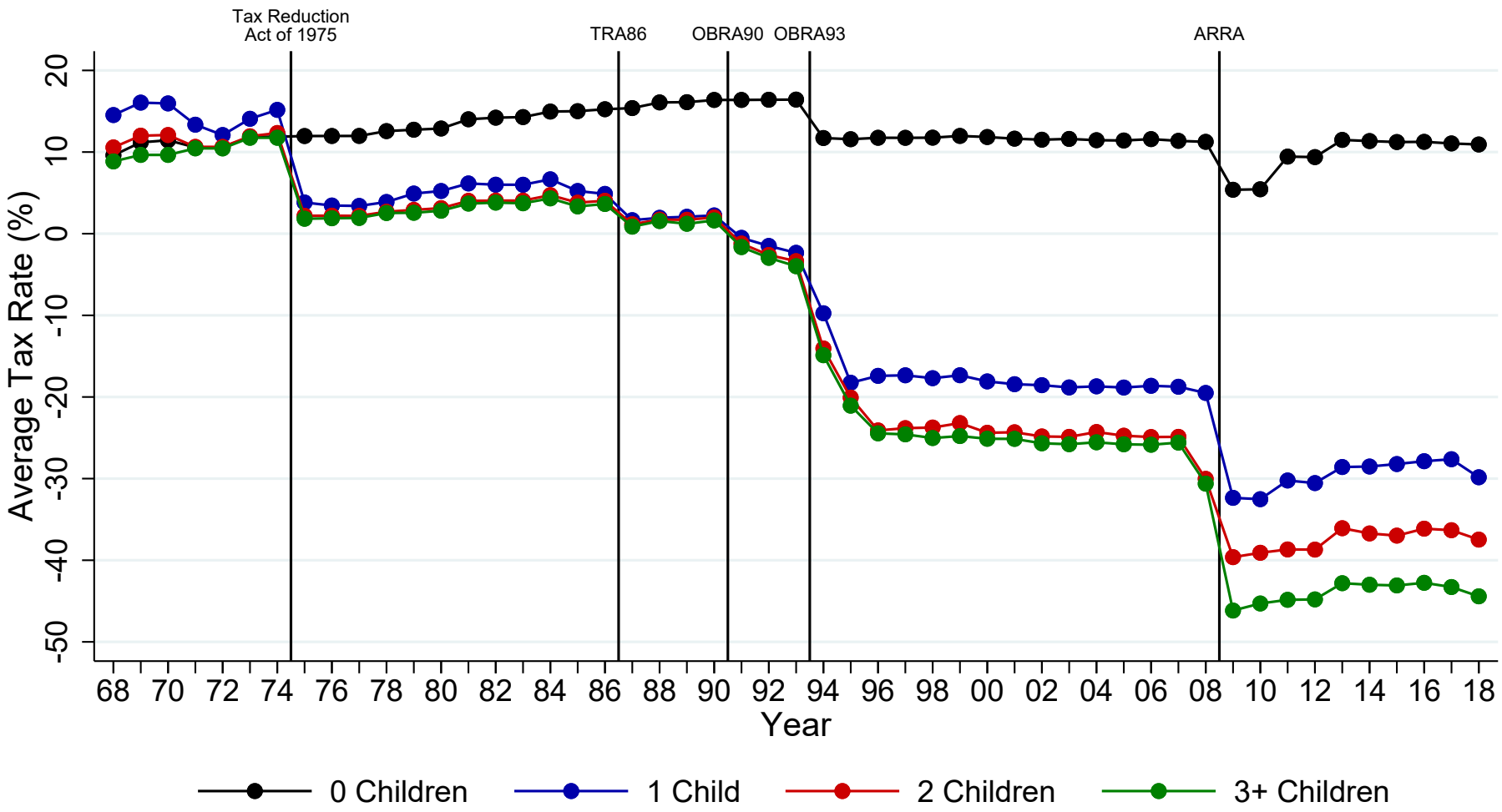
EITC Schedule in 2018



EITC Maximum Credit Over Time



Average Tax Rates on Single Women Over Time



Contribution

- I reappraise the impact of the EITC on extensive margin labor supply for single mothers
- What's new?
  - Long-run perspective
  - Analysis of all state and federal reforms
  - Event study approach applied to all reforms
  - New analysis of confounders
  - Analysis of model uncertainty

Data and Descriptives

Data

- Current Population Survey (CPS)
  - Basic monthly files and March supplements
  - 50-year period (1968-2018)
- Measures of extensive margin labor supply:
  1. Weekly Employment (Baseline)
  2. Weekly Participation
  3. Annual Employment
  4. Annual Participation
- Analysis Samples:
  1. All Single Women (Baseline)
  2. Low-Educated Single Women
  3. Single Women With Low Predicted Earnings Earnings Prediction

Descriptive Statistics

Single Mothers

	All	Low Education	Low Predicted Earnings*
Weekly Employment Rate	0.68	0.60	0.53
Annual Employment Rate	0.73	0.66	0.63
Earnings	22,186	15,313	10,923
Age	34.37	33.26	25.51
Fraction Black	0.26	0.27	0.34
Number of Children	1.79	1.89	2.12
Age of Youngest Child	7.51	7.11	3.11
High School & Below	0.55	1.00	0.79
Observations	1,787,348	979,702	447,099

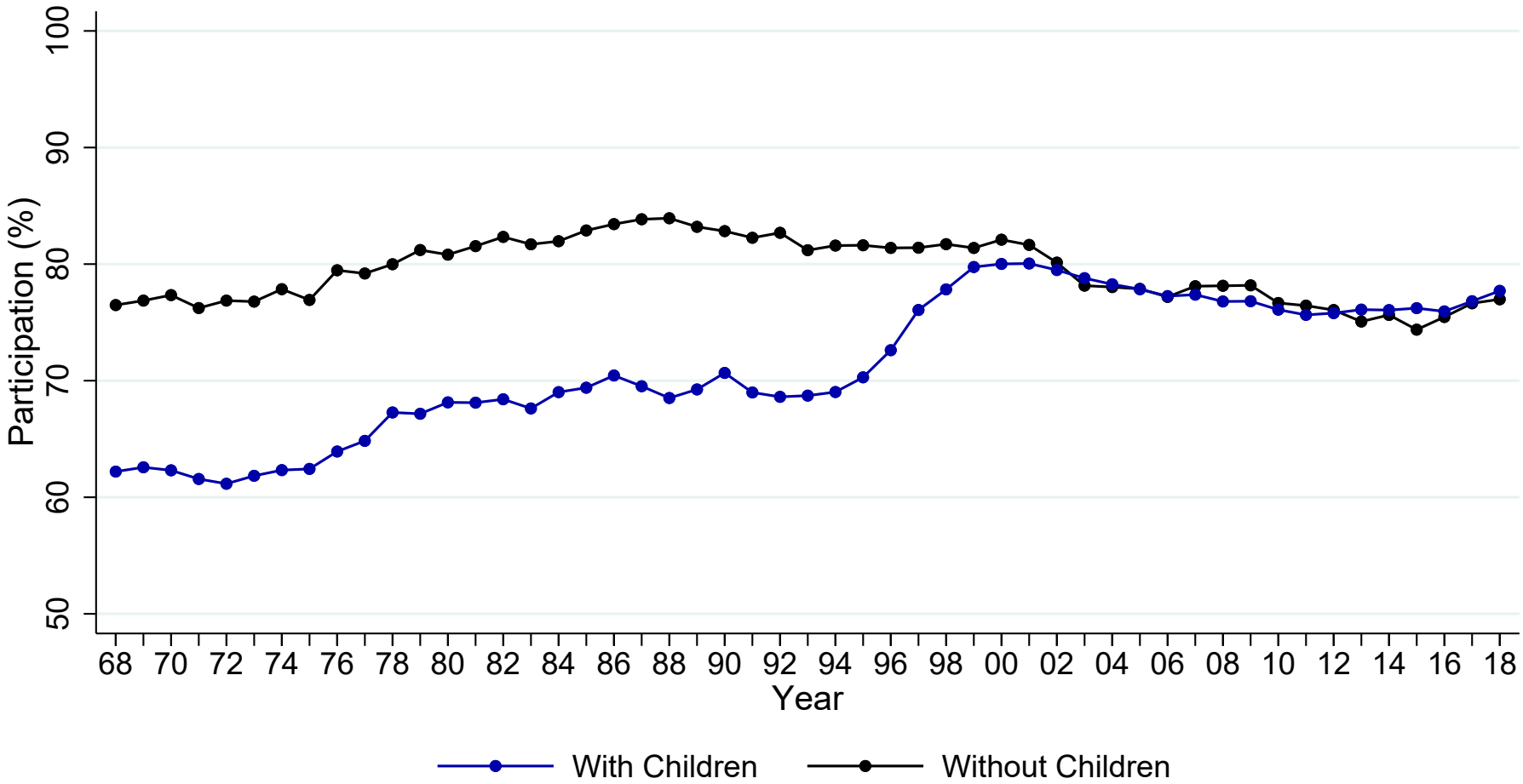
$*$ Bottom Quartile of Predicted Earnings

Earnings Distribution

The EITC and the Extensive Margin: The Long View

Labor Force Participation of Single Women

With and Without Children



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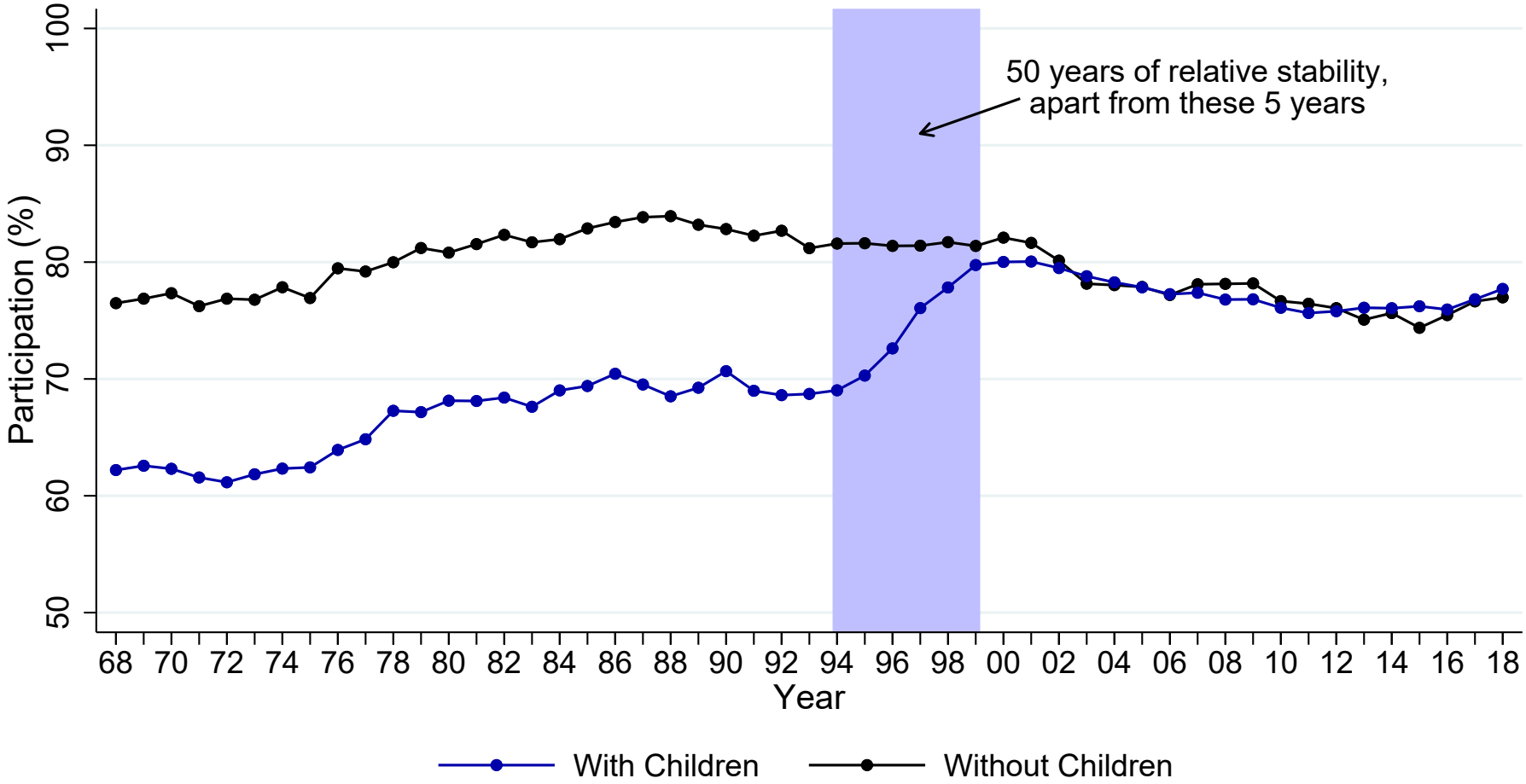

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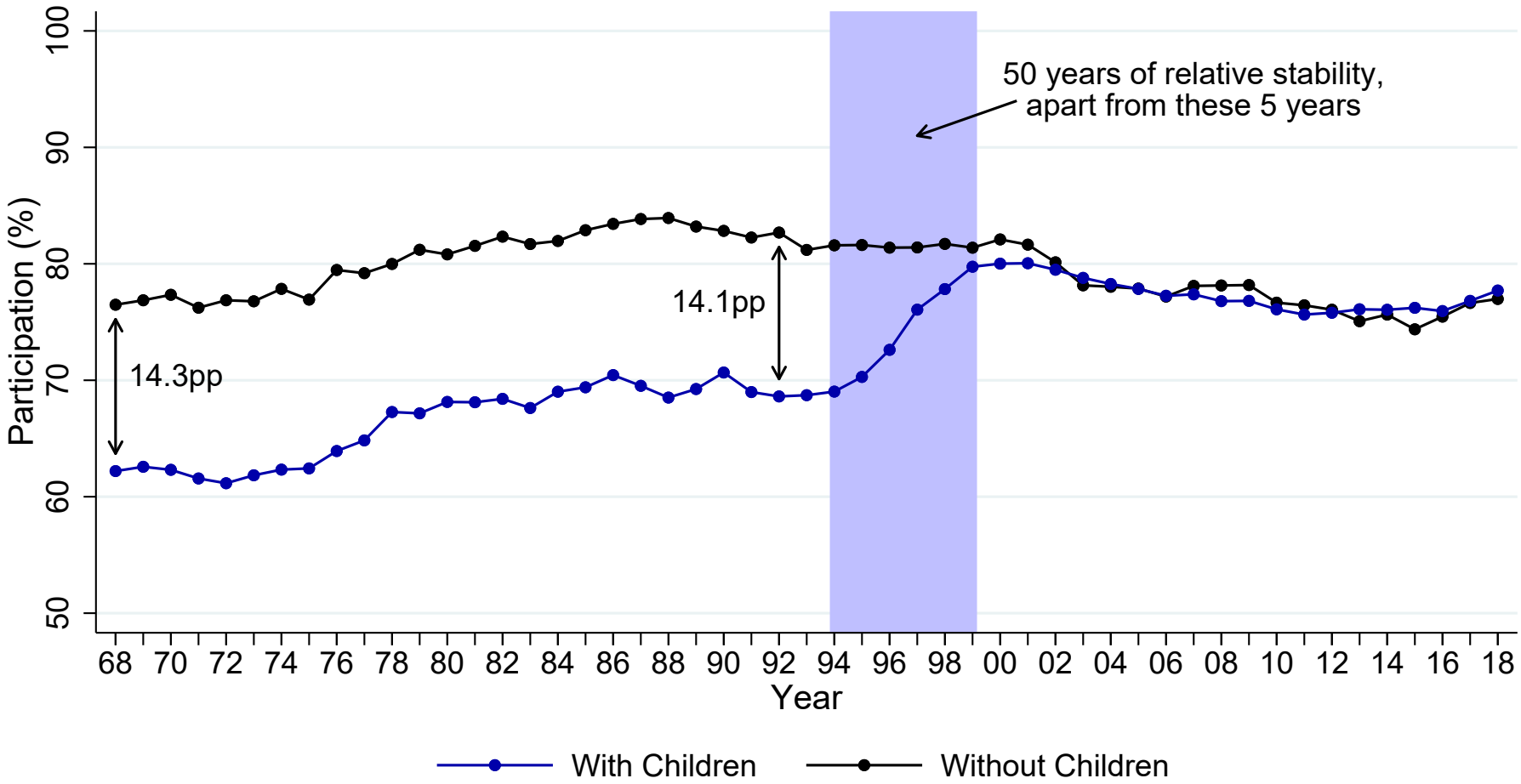
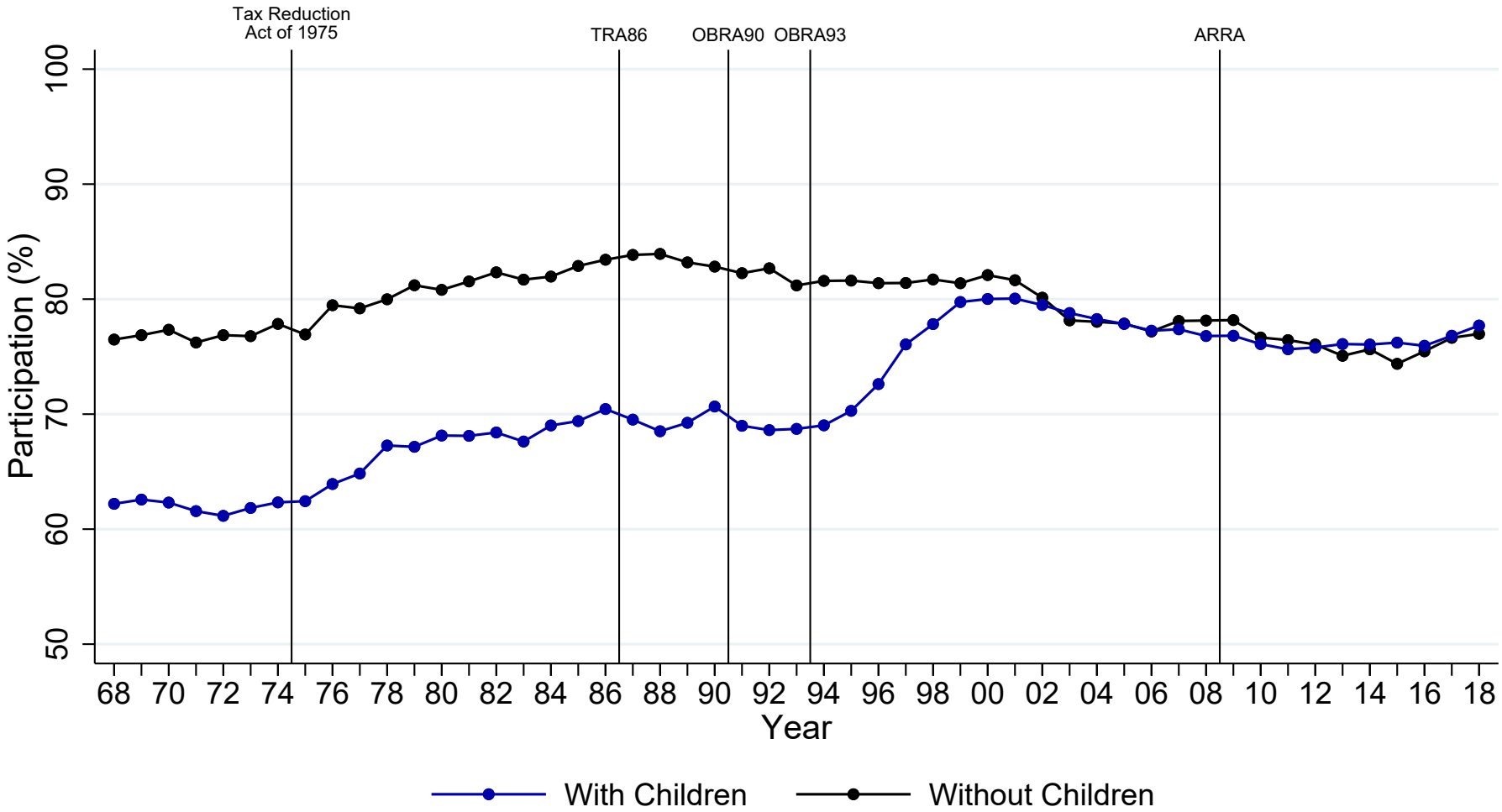


Different Outcomes (All) Different Outcomes (Low Ed) Different Outcomes (Low Pred Earnings)

Labor Force Participation of Single Women

With and Without Children



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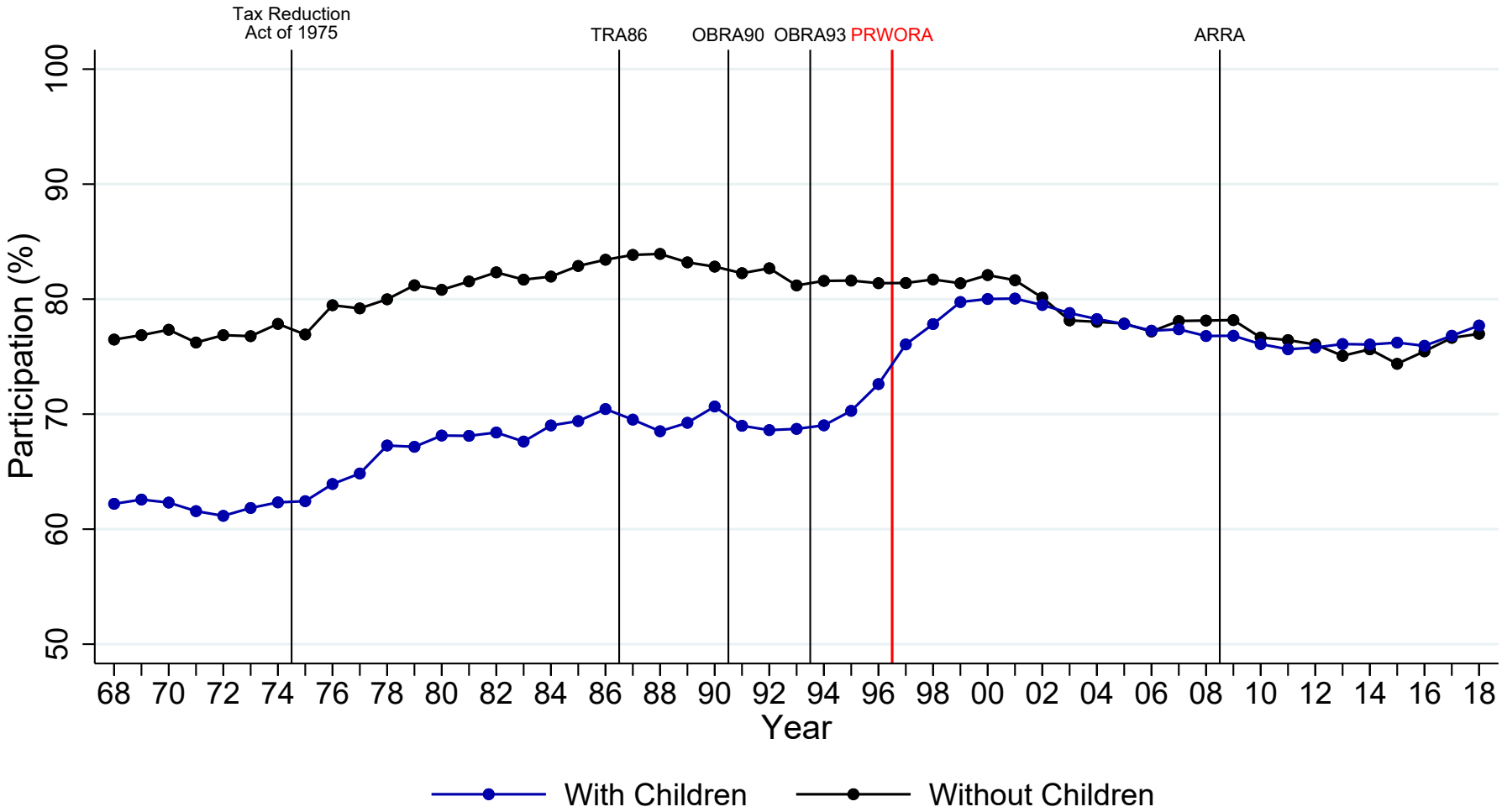

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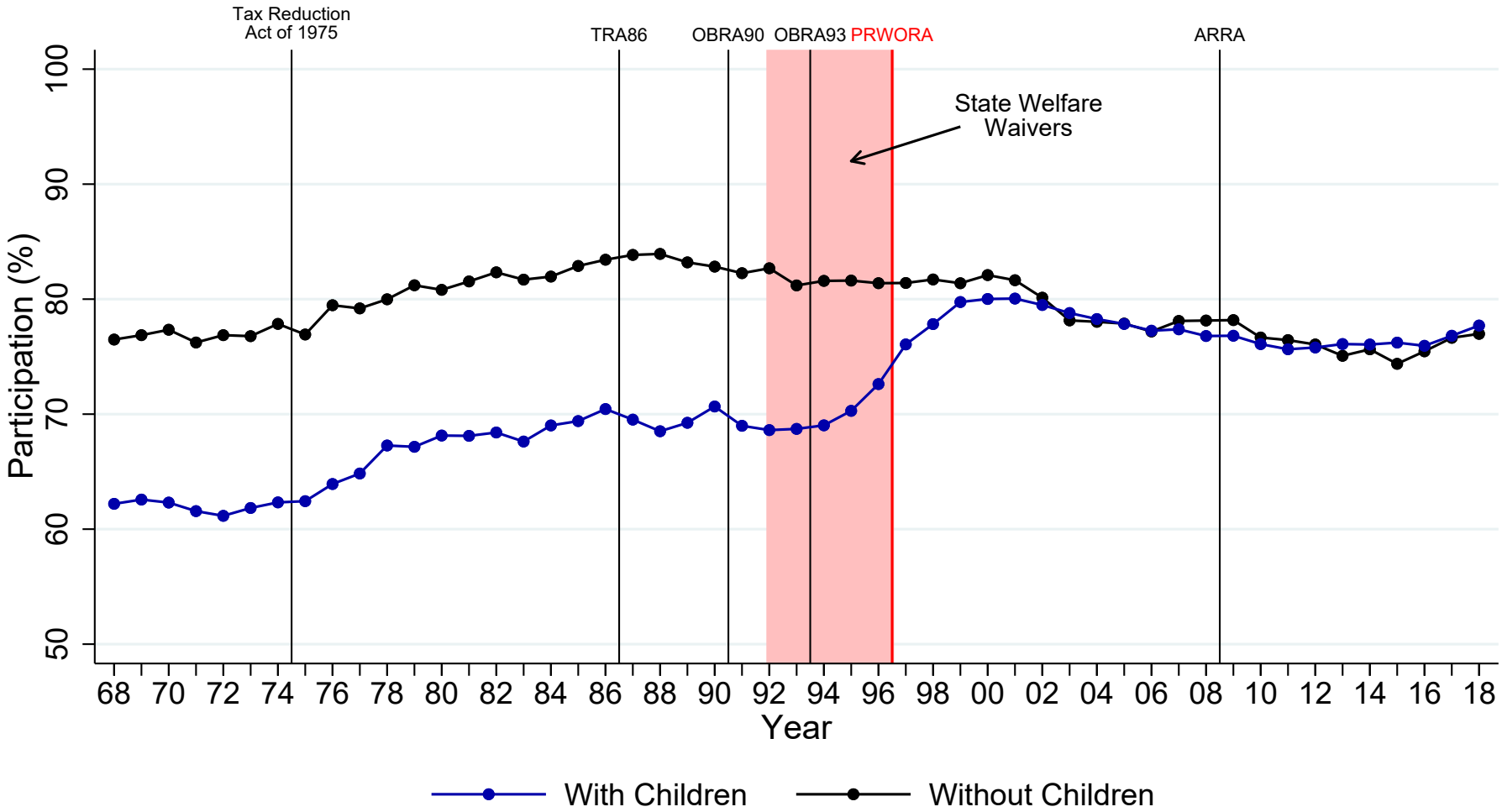

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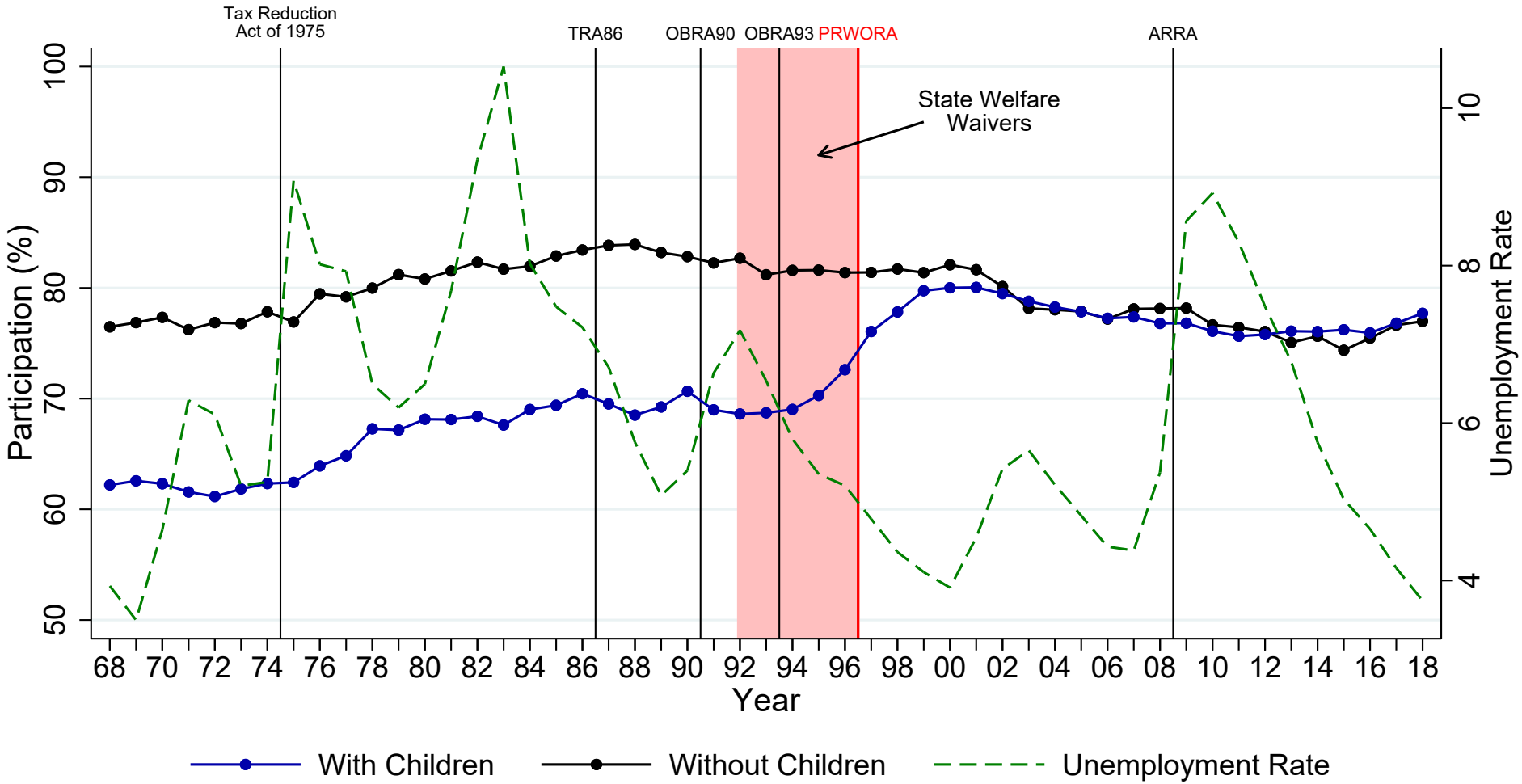
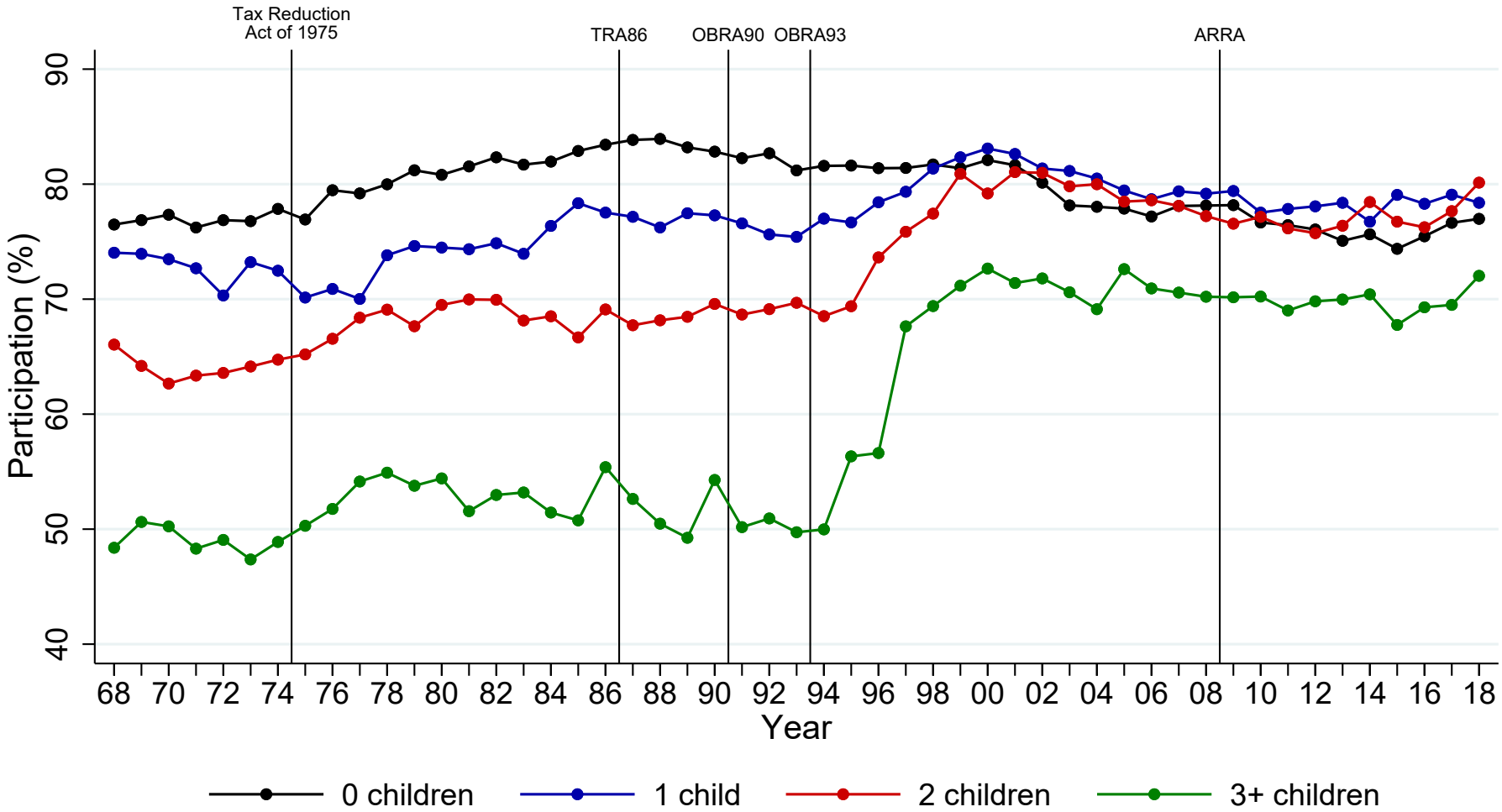


Labor Force Participation of Single Women

By Number of Children



Different Outcomes (All) | Different Outcomes (Low Ed) | Different Outcomes (Low Pred Earnings)

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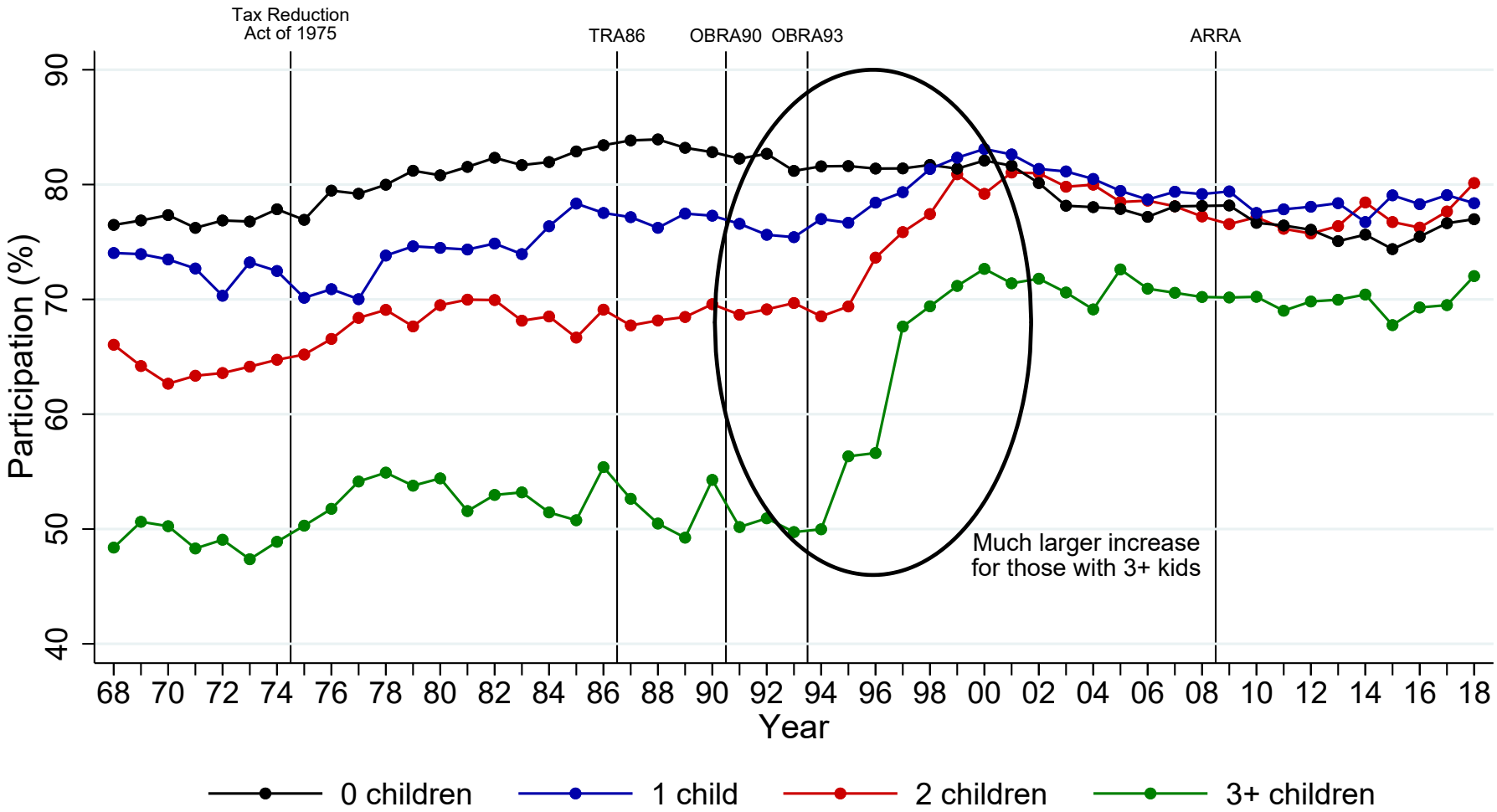

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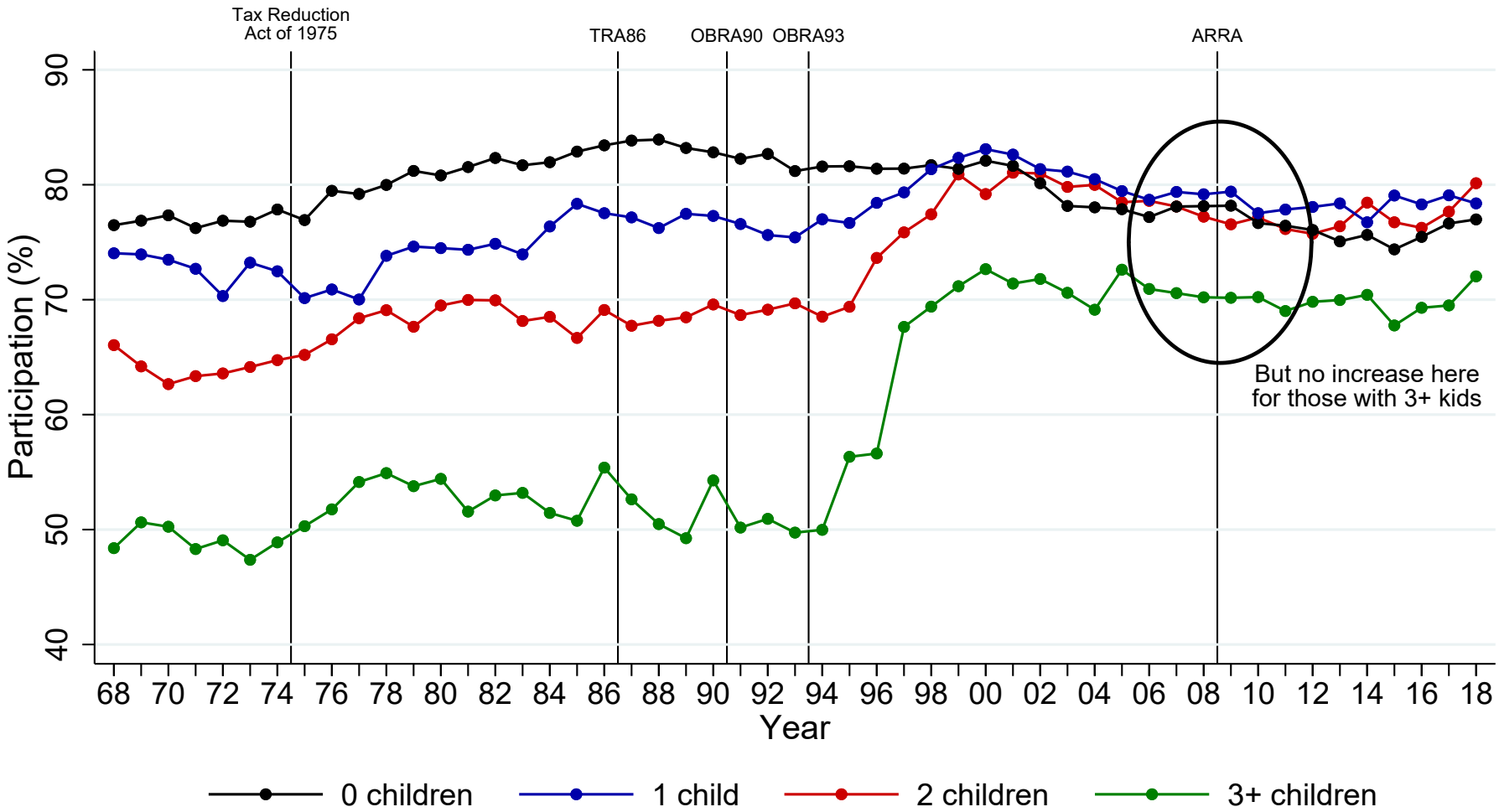

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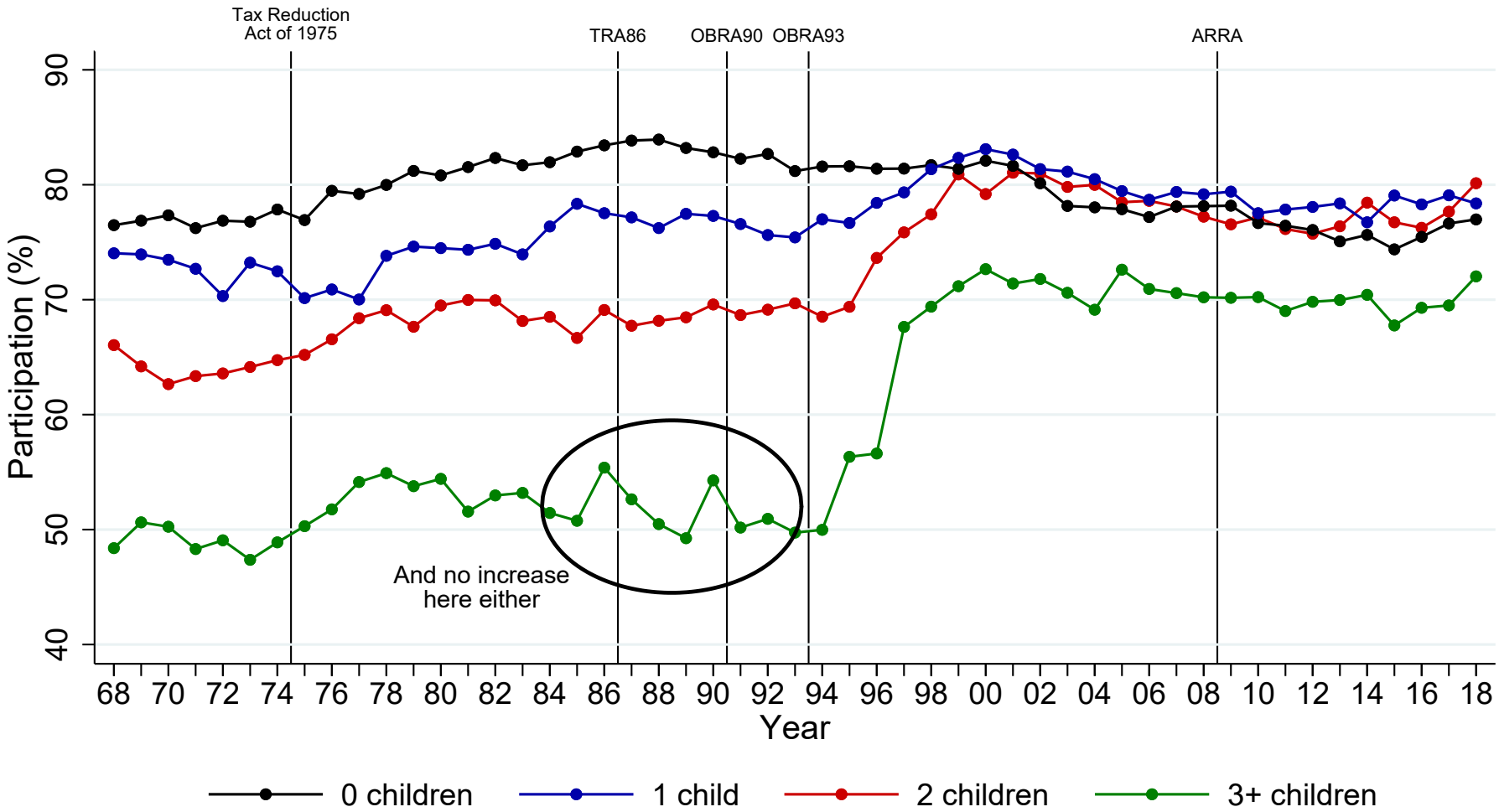


Questions and Puzzles

The extensive margin increases for single mothers in 1994-99 are massive and follows the 1993 reform, BUT:

- Why are there no clear effects of any other reform?
- How do we reconcile the puzzling patterns across family sizes?
- How do we separate EITC effects from confounders?
  - The business cycle
  - State and national welfare reform
  - Changes in social norms and stigma

Event Studies of Federal EITC Reforms

Event Study Specification

DiD comparing single women with and without children:

$$P_{imt} = \sum_j \alpha_j \cdot Year_{j=t} + \beta \cdot Kids_i + \sum_{j \neq -1} \gamma_j \cdot Year_{j=t} \cdot Kids_i + \boldsymbol{X_i}\boldsymbol{\phi} + \eta \cdot U_{st} + \theta \cdot U_{st} \cdot Kids_i + \nu_{imt},$$

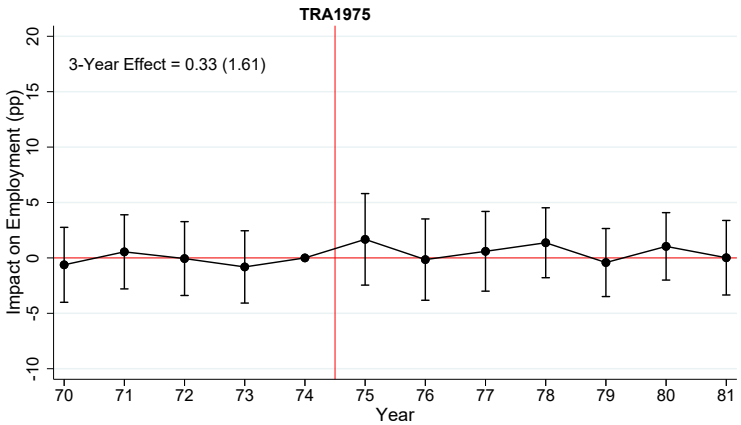
Where

- P_{imt} is an indicator for an individual i working in month m of year t
- $\boldsymbol{X_i}$ is a vector of demographic controls
- U_{st} is the demeaned unemployment rate for state s in year t
- I use linked March and monthly CPS files after 1989, March files alone before 1989

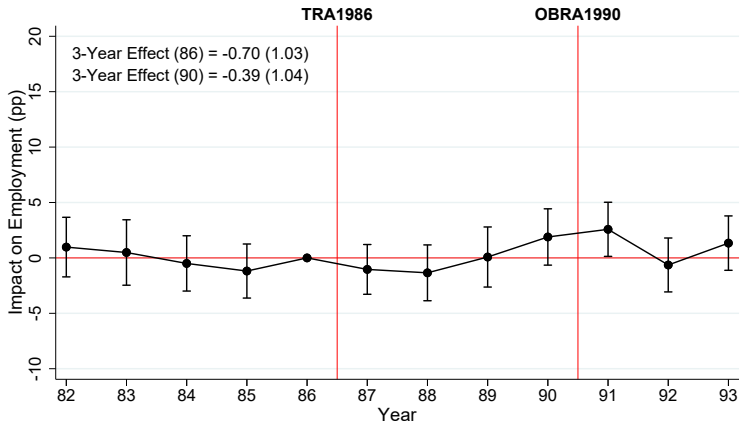
Event Studies of Individual Reforms

Weekly Employment, All Single Women, With Controls

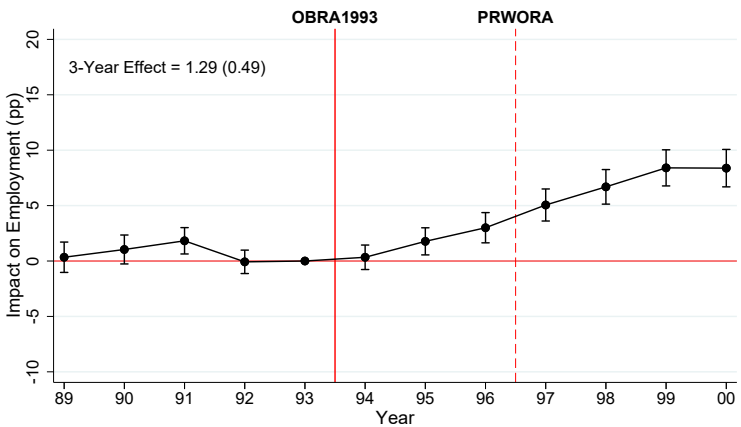
1975 Reform



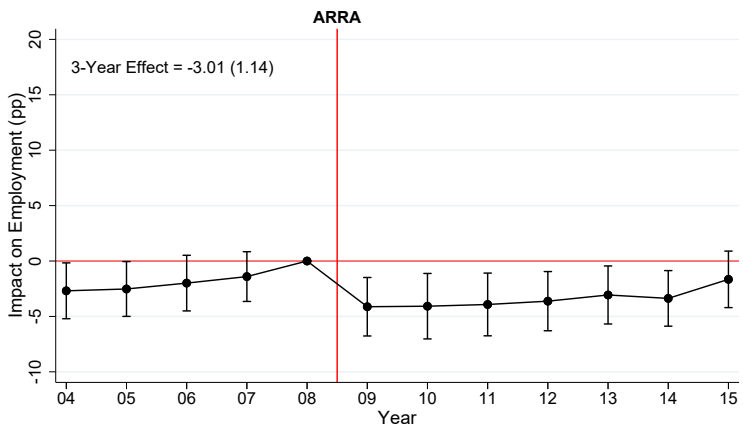
1986 and 1990 Reforms



1993 Reform



2009 Reform

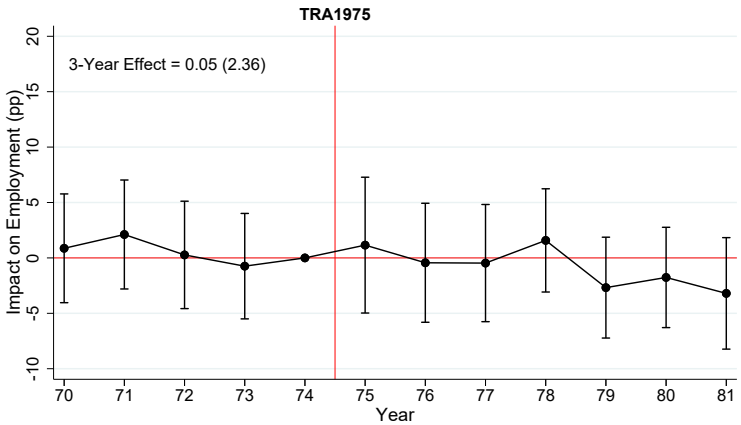


Weekly Employment (No Controls) | Annual Employment (With Controls) | Annual Employment (No Controls)

Event Studies of Individual Reforms

Weekly Employment, Bottom Half of Predicted Earnings, With Controls

1975 Reform



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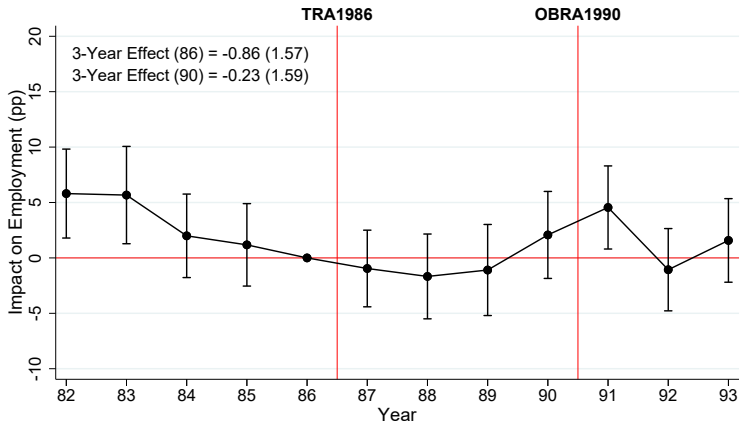
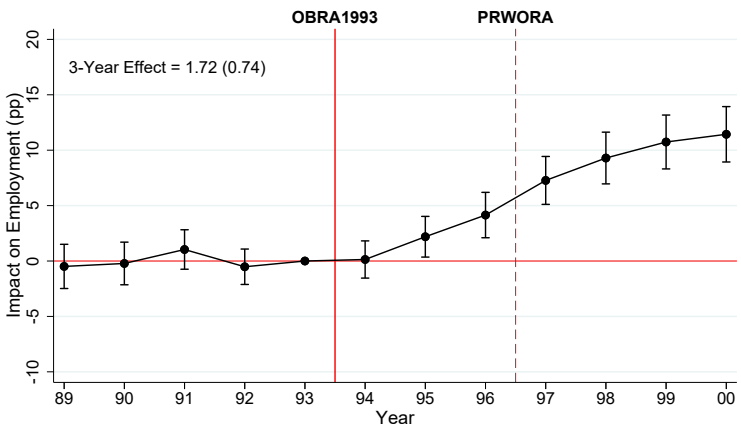


1993 Reform



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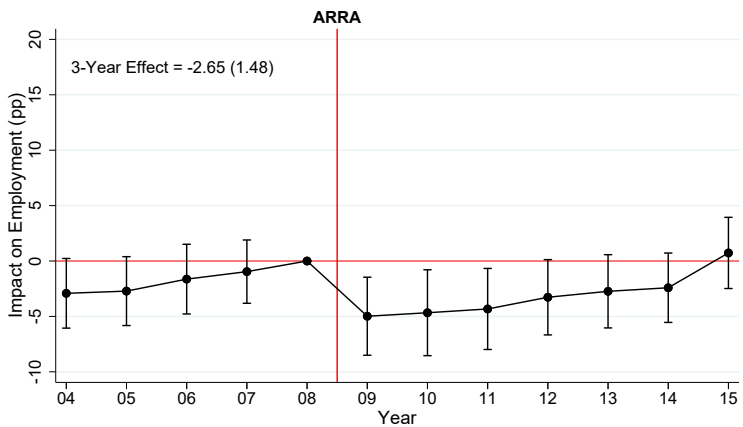
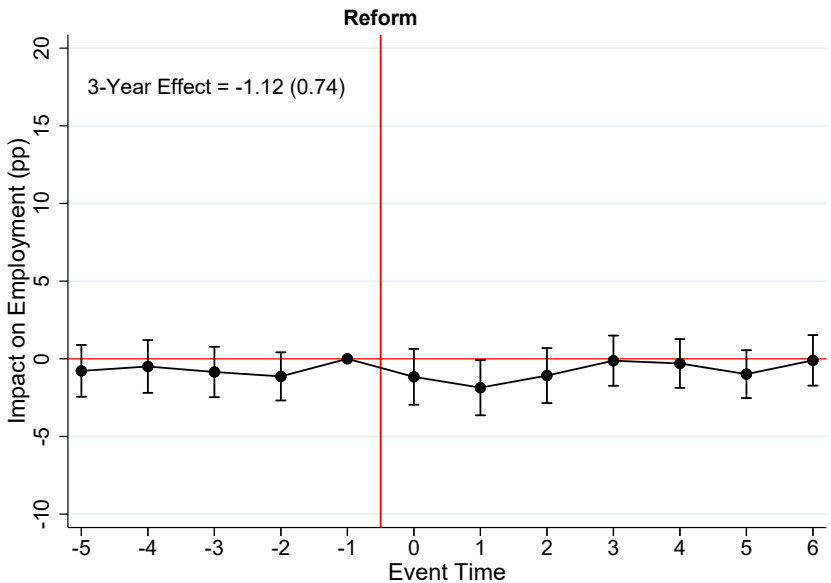


Weekly Employment (No Controls) | Annual Employment (With Controls) | Annual Employment (No Controls)

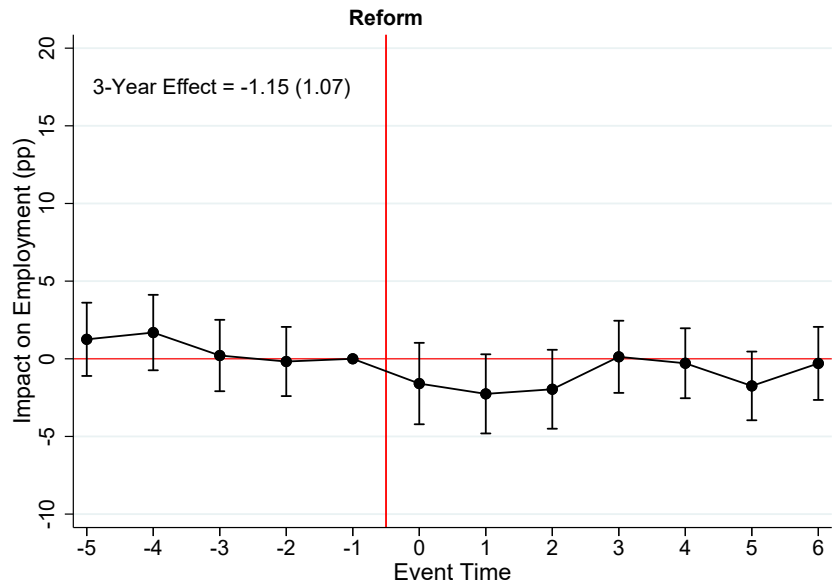
Stacked Event Studies (Without 1993)

Weekly Employment, With Controls

All Single Women



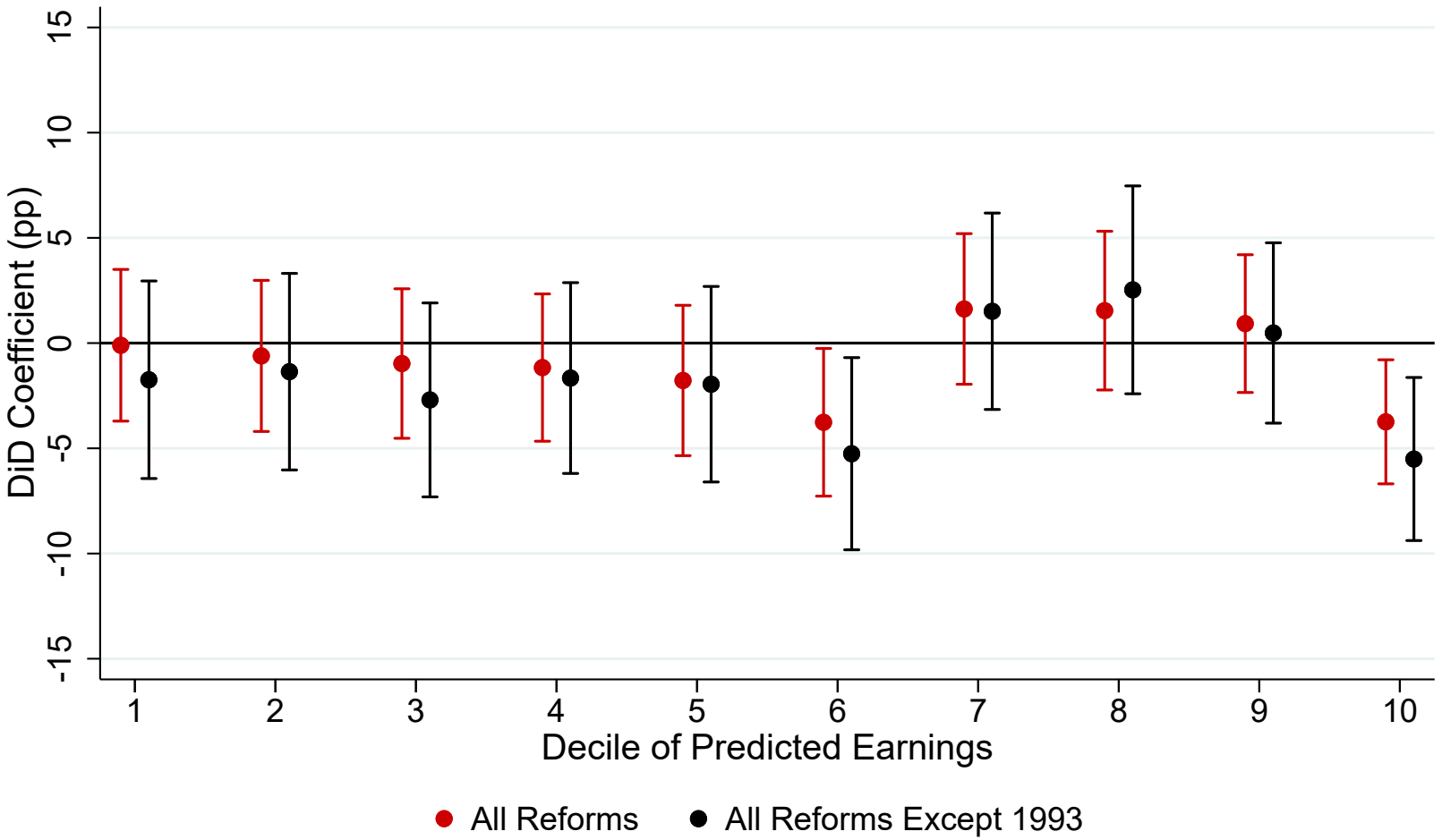
Bottom Half of Predicted Earnings



Weekly Employment (No Controls) Annual Employment (With Controls) Annual Employment (No Controls)

Three-Year Effects by Decile of Predicted Earnings

Weekly Employment



Annual Employment

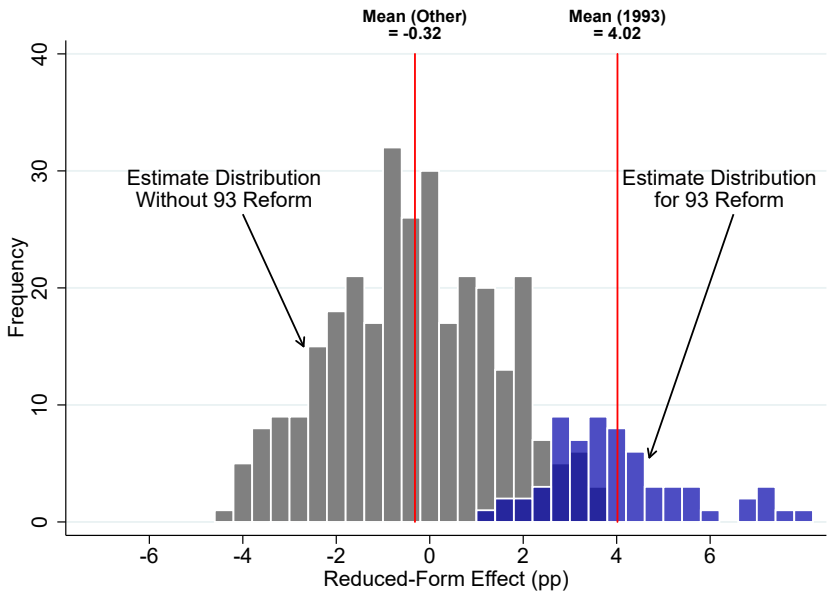
Model Uncertainty

Effects of Federal Reforms Across All Specifications

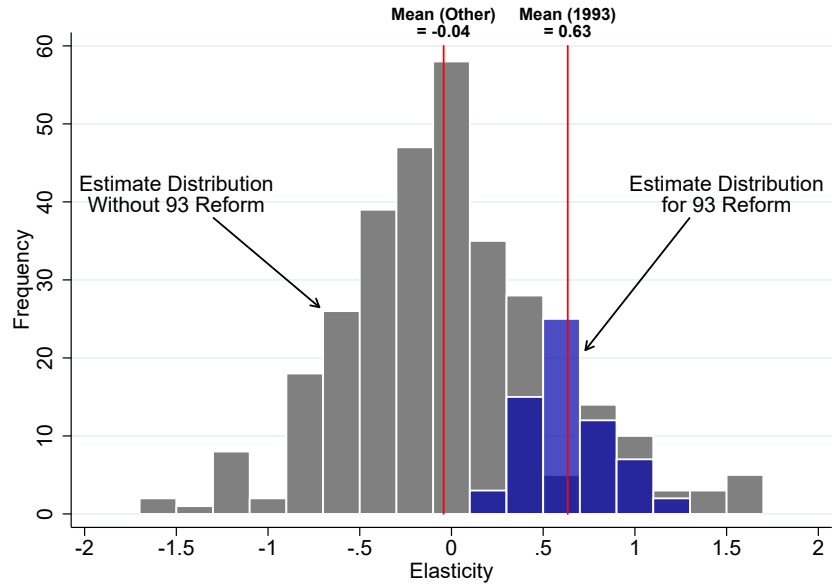
- **Reform experiments:**
  - 1975, 1986, 1990, 1993, and 2009 reforms
  - All reforms stacked, all reforms stacked apart from 1993
- **Sample, outcome, and controls:**
  - Samples: All single women, low-educated, bottom half of predicted earnings, bottom quartile of predicted earnings
  - Outcomes: Weekly employment, annual employment, weekly participation, annual participation
  - Controls: No controls, basic demographic controls, rich demographic controls, rich demographic & unemployment controls
- In total there are **432 estimates**

Effects of Federal Reforms Across All Specifications

Distribution of Reduced-Form Effects

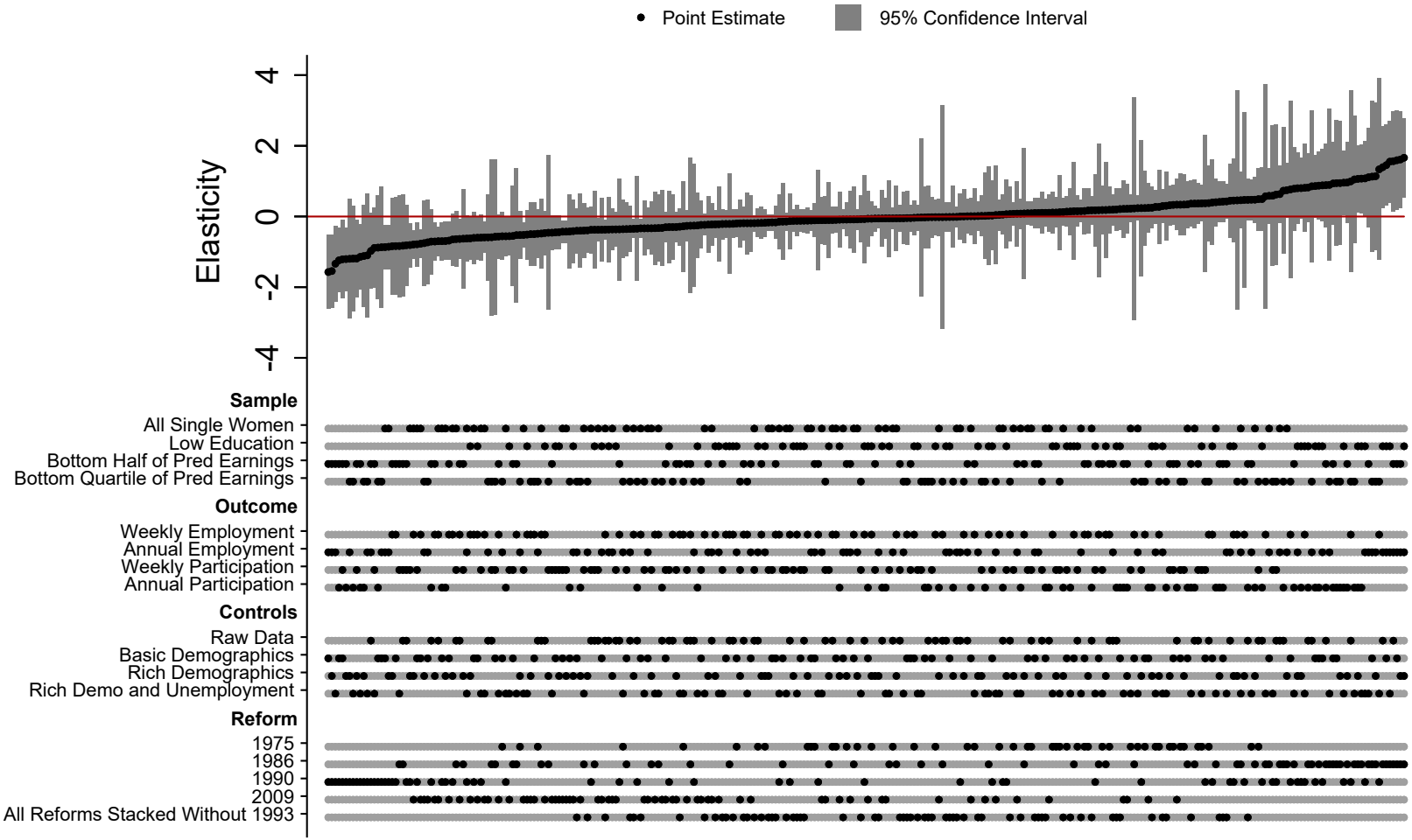


Distribution of Elasticities

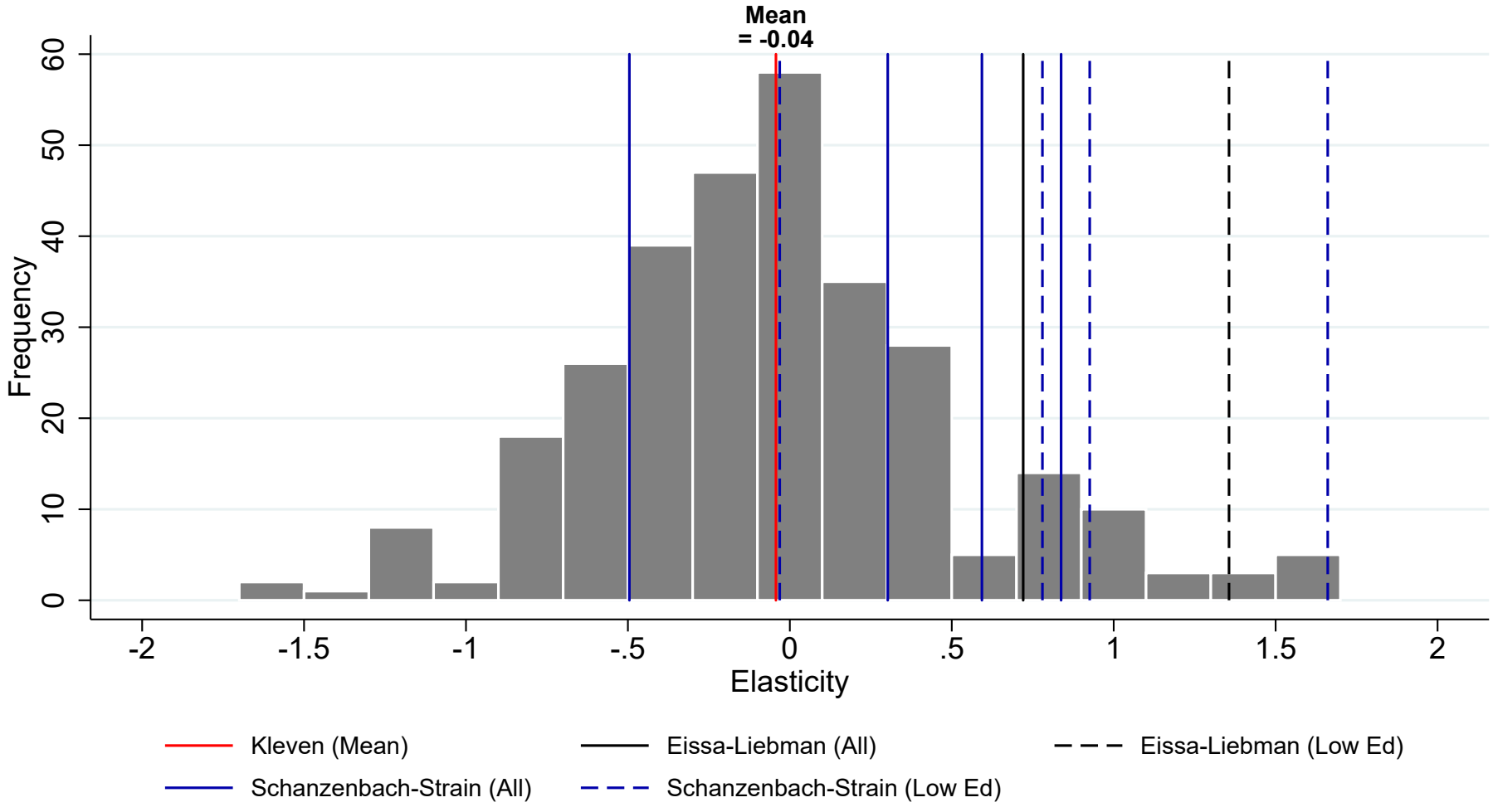


Elasticity Calculations

Specification Curve



Elasticities Across All Specifications vs Prior Estimates



Event Studies of State EITC Reforms

Synthetic Control Approach

- 30 states have implemented EITC supplements Maps
- For each state with an EITC supplement, a synthetic control state is created from those without a supplement
- Use state EITC introductions:
  - All Reforms
    - Drop states with very small sample sizes, states where other tax changes offset the EITC, and state reforms that are too recent
  - Ten largest reforms
- Match on pre-reform variables:
  - Match on outcomes in event years -5,...,-1

Event Study Specifications

Difference-in-Differences comparing states with and without EITC reforms, conditional on having children:

$$P_{st} = \sum_j \alpha_j \cdot Event_{j=t} + \beta \cdot Treat_s + \sum \gamma_j \cdot Event_{j=t} \cdot Treat_s + \nu_{st}$$

Triple-Differences comparing states with and without EITC reforms and single women with and without children:

$$\begin{aligned} P_{kst} = & \sum_j \alpha_j \cdot Event_{j=t} + \beta \cdot Kids_k + \gamma \cdot Treat_s + \delta \cdot Kids_k \cdot Treat_s \\ & + \sum_{j \neq -1} \zeta_j \cdot Event_{j=t} \cdot Kids_k + \sum_{j \neq -1} \eta_j \cdot Event_{j=t} \cdot Treat_s \\ & + \sum_{j \neq -1} \theta_j \cdot Event_{j=t} \cdot Kids_k \cdot Treat_s + \nu_{kst} \end{aligned}$$

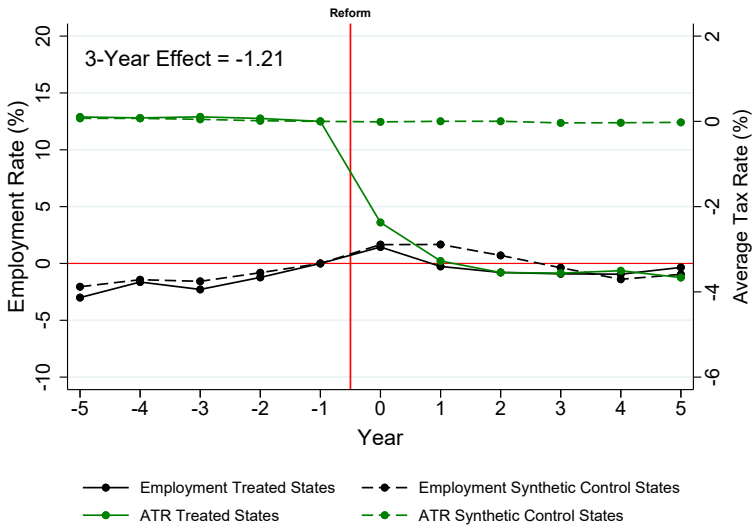
where $Event_{j=t}$ are event time indicators and $Treat_s$ is an indicator for being a treatment state

Stacked Event Studies: All Reforms

Weekly Employment, All Single Women

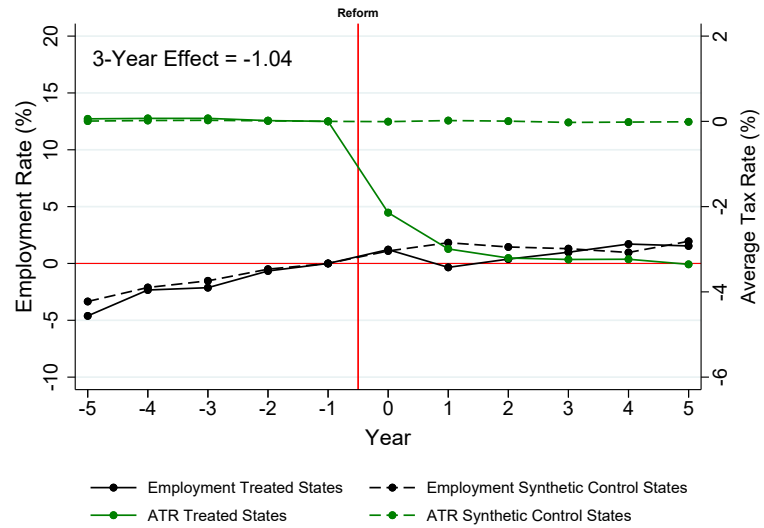
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



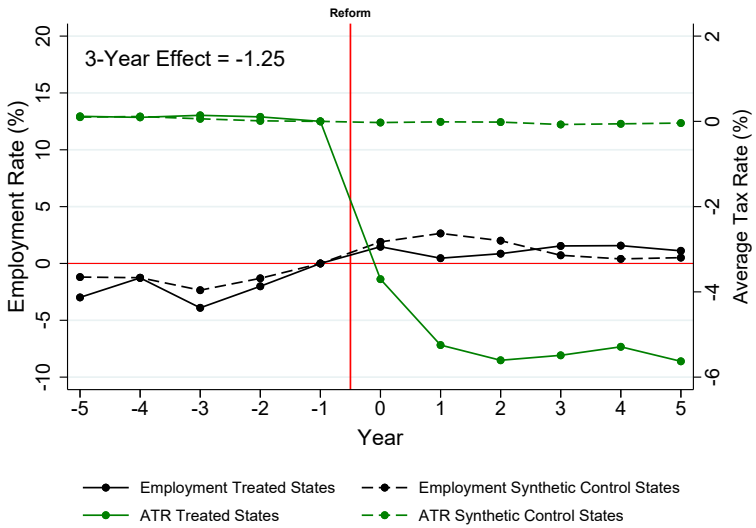
Low Pred Earnings | Annual Employment (All) | Annual Employment (Low Pred Earnings)

Stacked Event Studies: Ten Largest Reforms

Weekly Employment, All Single Women

Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

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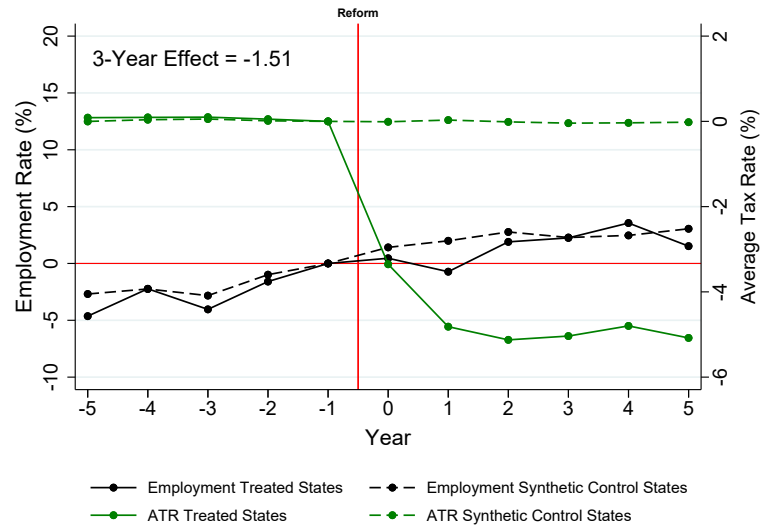


Low Pred Earnings | Annual Employment (All) | Annual Employment (Low Pred Earnings)

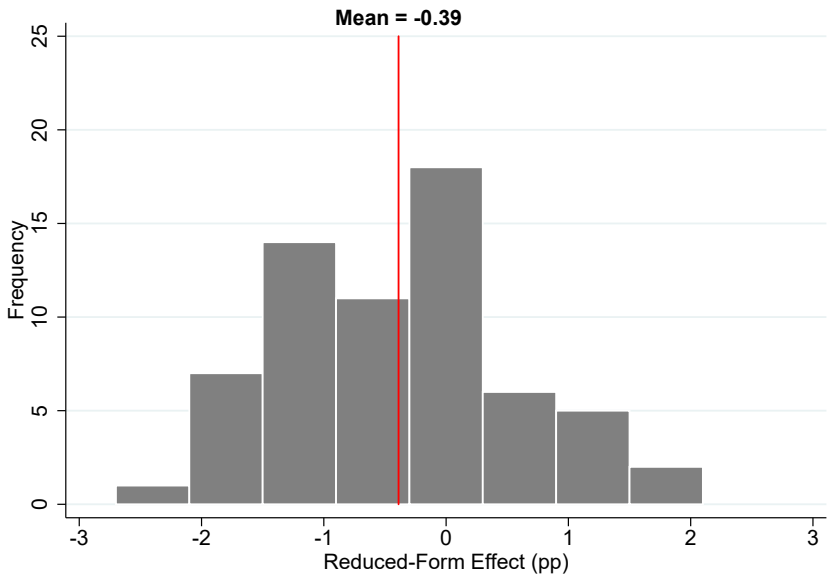
Model Uncertainty

Effects of State Reforms Across All Specifications

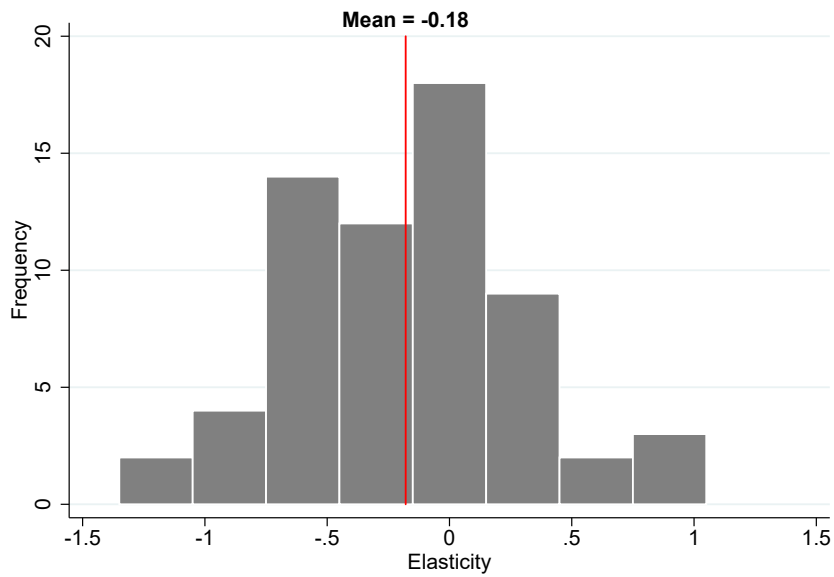
- **Reform experiments:**
  - All state reforms stacked, ten largest state reforms stacked
- **Sample, outcome, and specification:**
  - Samples: All single women, low-educated, bottom half of predicted earnings, bottom quartile of predicted earnings
  - Outcomes: Weekly employment, annual employment, weekly participation, annual participation
  - Specification: Difference-in-differences and triple-differences
- In total there are **64 estimates**

Effects of State Reforms Across All Specifications

Distribution of Reduced-Form Effects



Distribution of Elasticities



Dissecting the 1990s

Dissecting the 1990s
Simulated Responses

Simulated Responses

- Static model with constant extensive margin elasticity ε
- Employment effect in year t, ΔP_t, equals

$$\Delta P_t \quad = \quad \varepsilon \cdot \frac{\Delta(1-\tau_t)}{1-\tau_{93}} \cdot P_{93}$$

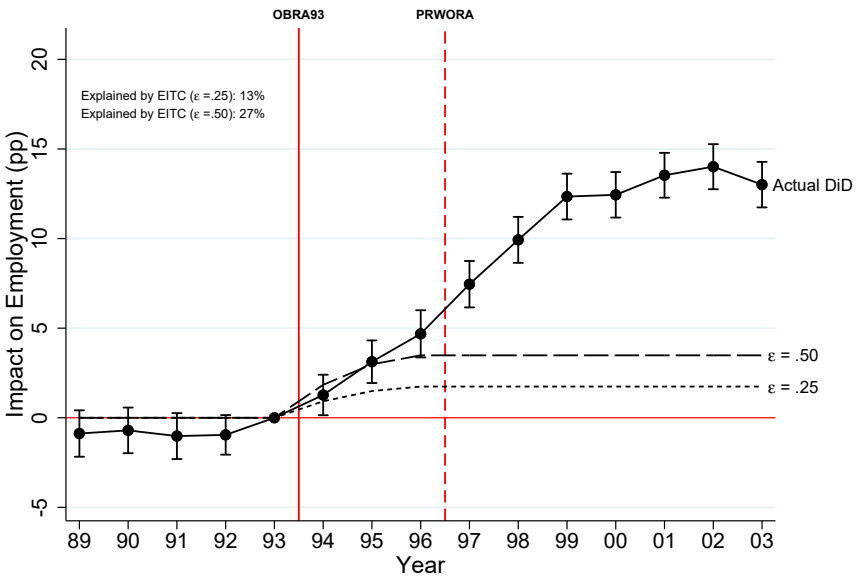
Where

- $\Delta(1-\tau_t)$ is the reform-induced change in the average net-of-tax rate in year t relative to the pre-reform year, 1993
- τ_{93} and P_{93} are baseline levels in the pre-reform year

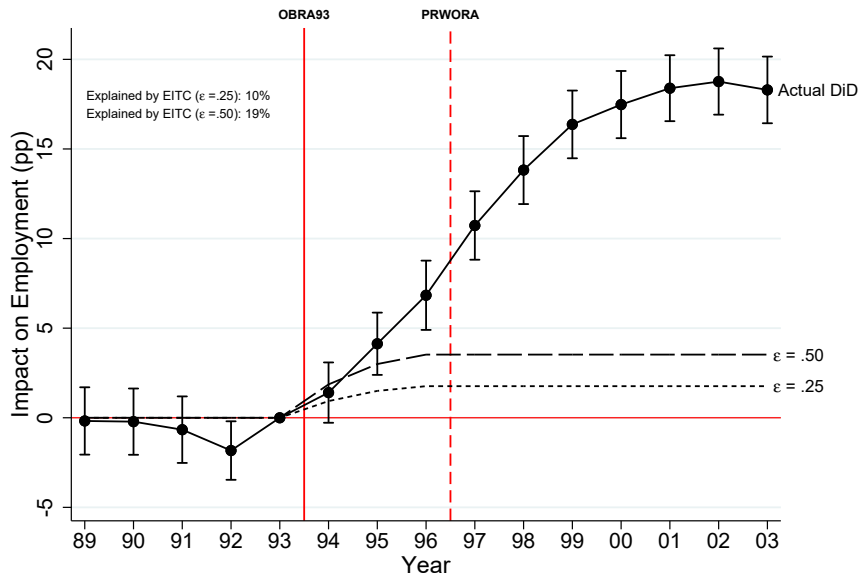
Actual DiD vs Simulated Responses

Weekly Employment

All Single Women



Bottom Half of Predicted Earnings



By Number of Children (All) By Number of Children (Low Pred Earnings)

Lessons: Simulated Responses

- Even under sizable elasticities, the EITC explains a minor part of the extensive margin increases in the 1990s
- At an extensive margin elasticity of 0.25 (0.5):
  - The EITC explains 13% (27%) across all single mothers, and 10% (19%) for single mothers with low predicted earnings
- For any reasonable elasticity, the extensive margin increases following the 1993 tax reform are driven mostly by confounding non-tax factors

Dissecting the 1990s:
Was Welfare Reform Big Enough?

Was Welfare Reform Big Enough?

Define **employment+welfare rate**:

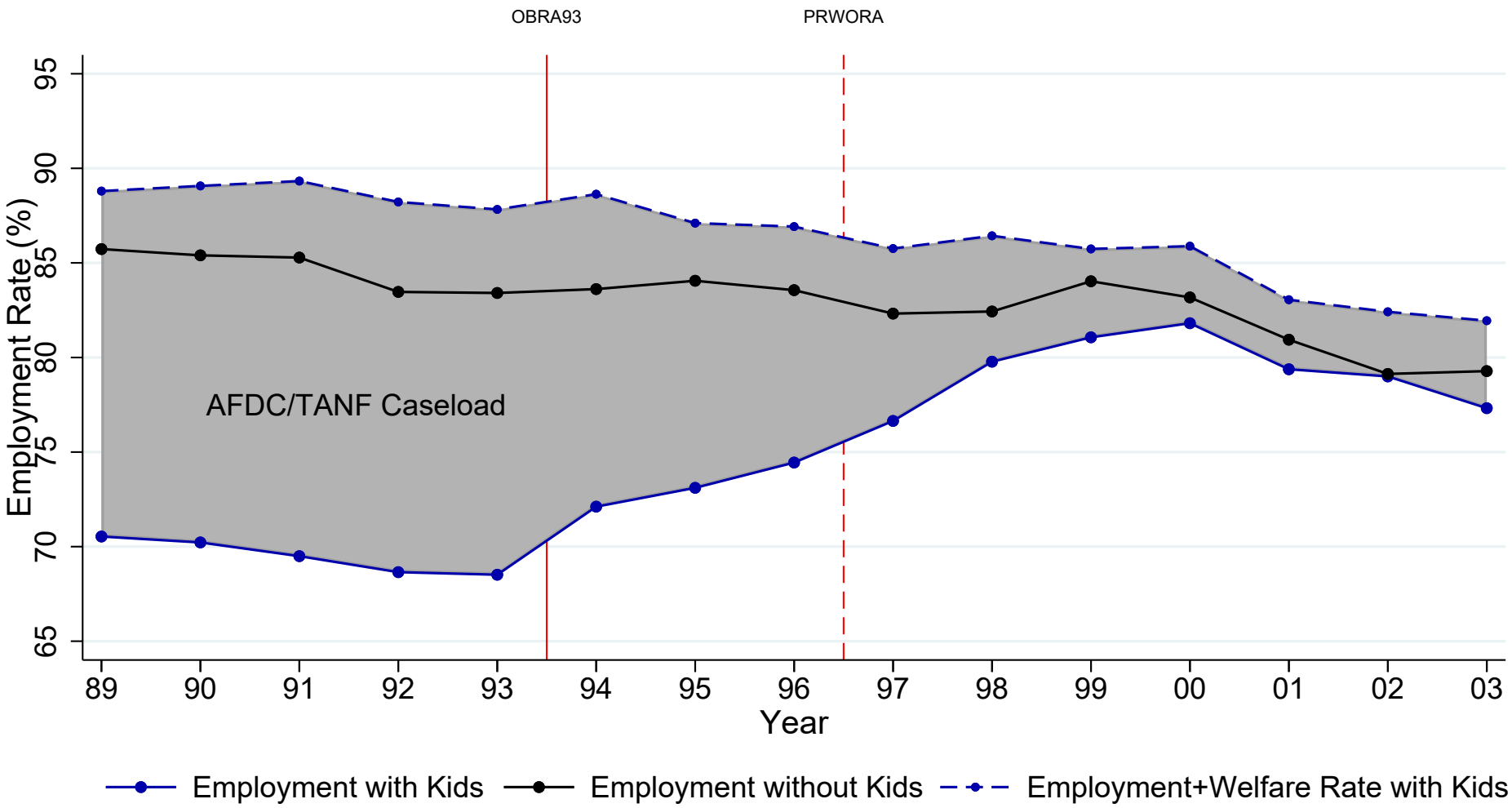
- Fraction of single mothers who are employed and/or on AFDC/TANF

EITC and welfare reform affect this outcome differently:

- Welfare reform pushes people from welfare into work or into searching for work $\rightarrow$ employment+welfare rate should stay constant or decrease
- EITC reform attracts people from all non-working states $\rightarrow$ employment+welfare rate should increase

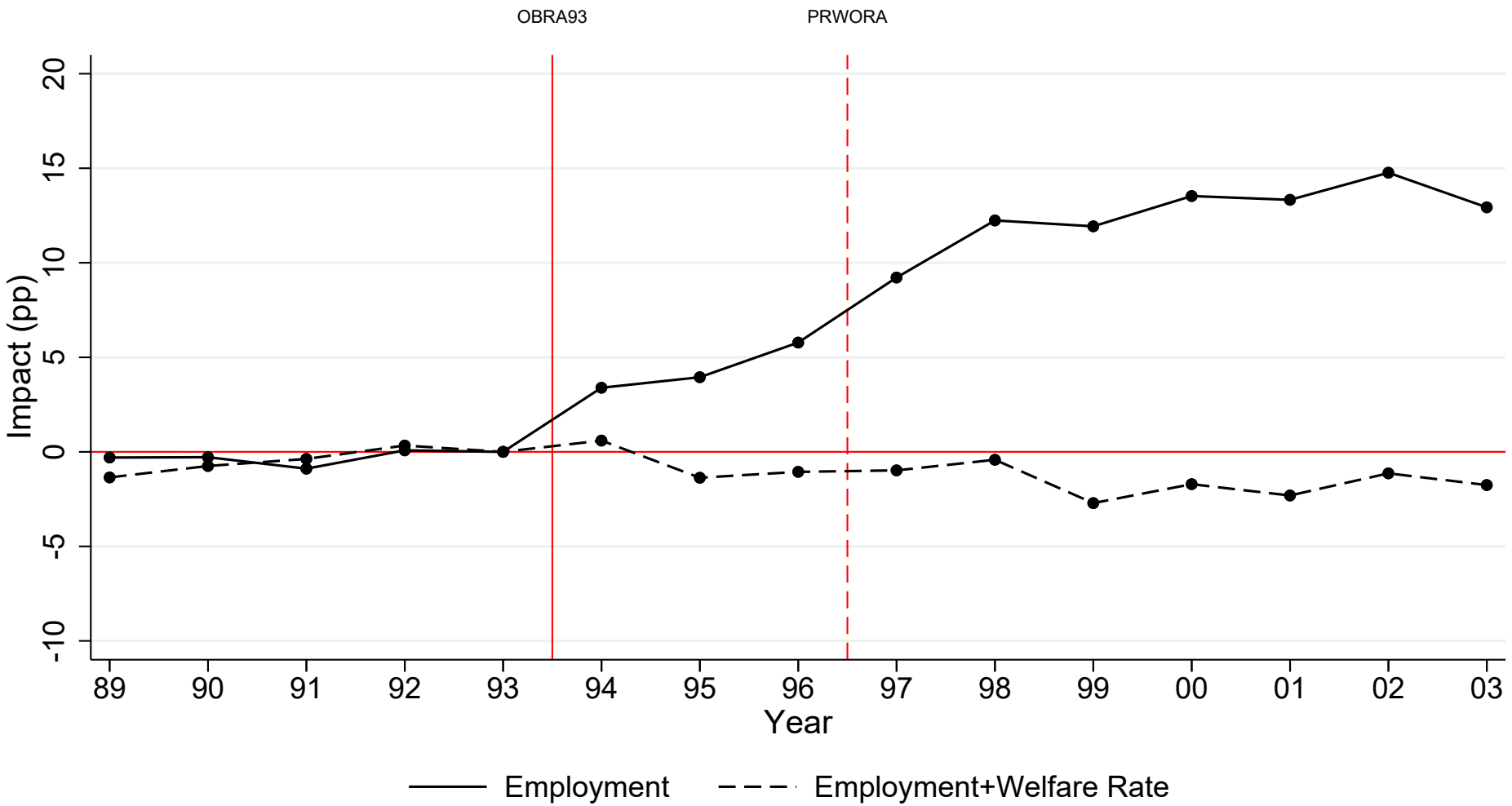
Adding AFDC/TANF Caseloads for Single Women

With and Without Children



Event Study of Employment+Welfare Rate

With vs Without Children



By Number of Children

Lessons: Employment+Welfare Rate

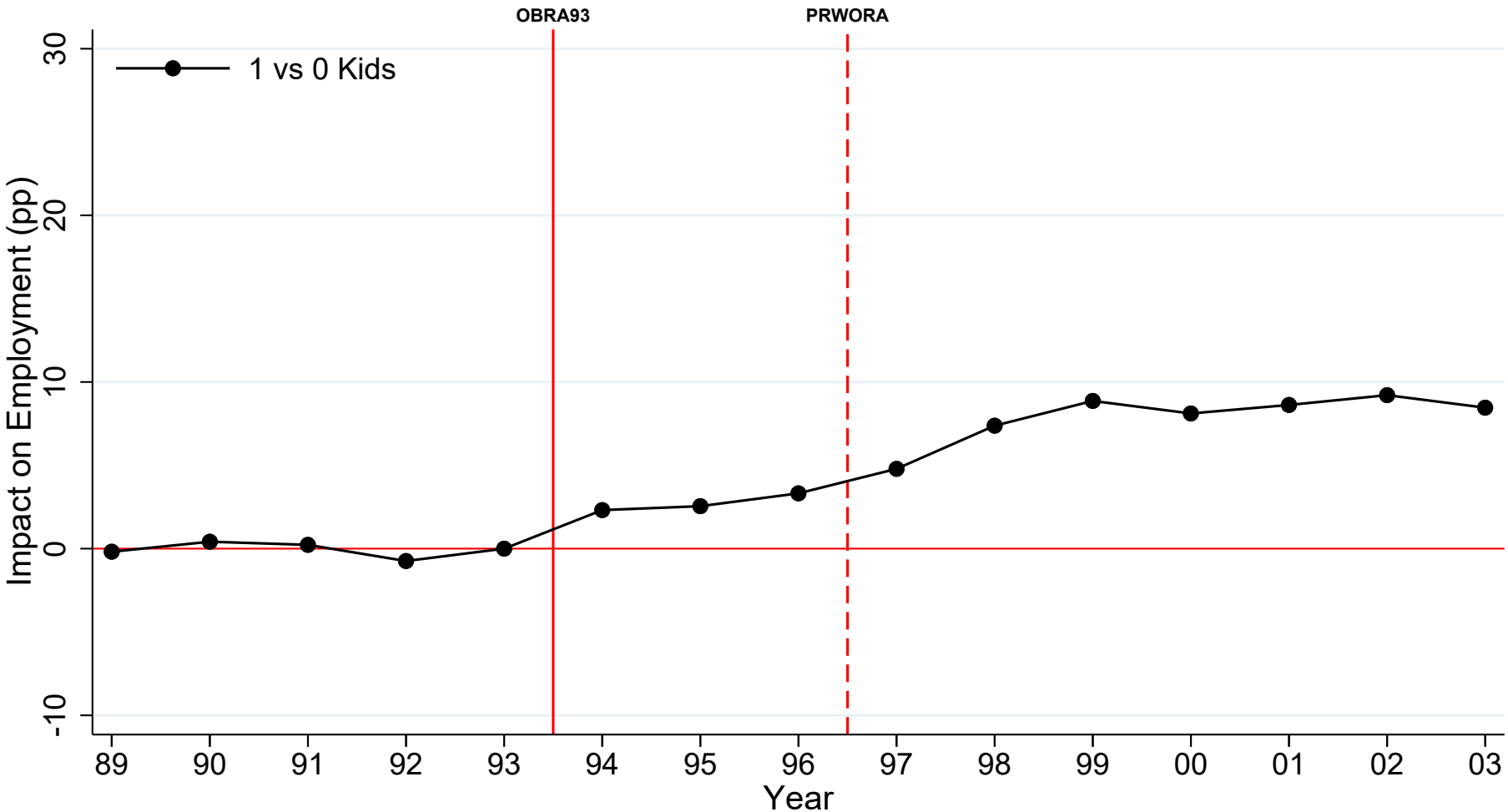
- The year-to-year extensive margin increases correspond to the year-to-year AFDC/TANF caseload reductions
  - Employment+welfare rate does not respond
  - This holds in every subsample

- What do we learn from this?
  - AFDC/TANF changes were large enough to explain what happened in the 1990s
  - If the EITC had any effect, it attracted women only from AFDC/TANF and not from any other non-work state
  - Such asymmetry of EITC effects is puzzling, but expected in the case of AFDC/TANF effects

Dissecting the 1990s:
Event Studies by Number of Children

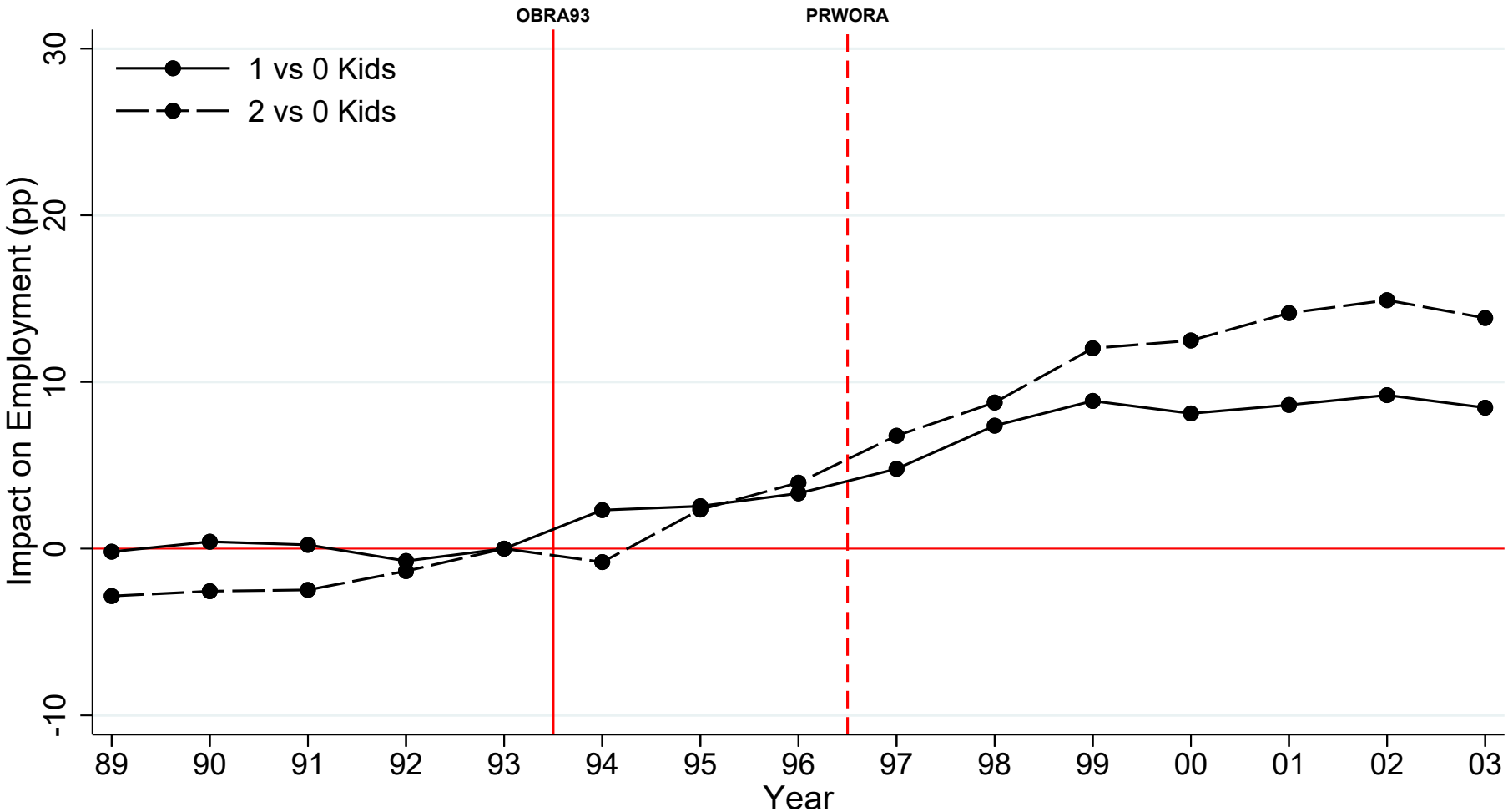
DiD by Number of Children

Weekly Employment, All Single Women



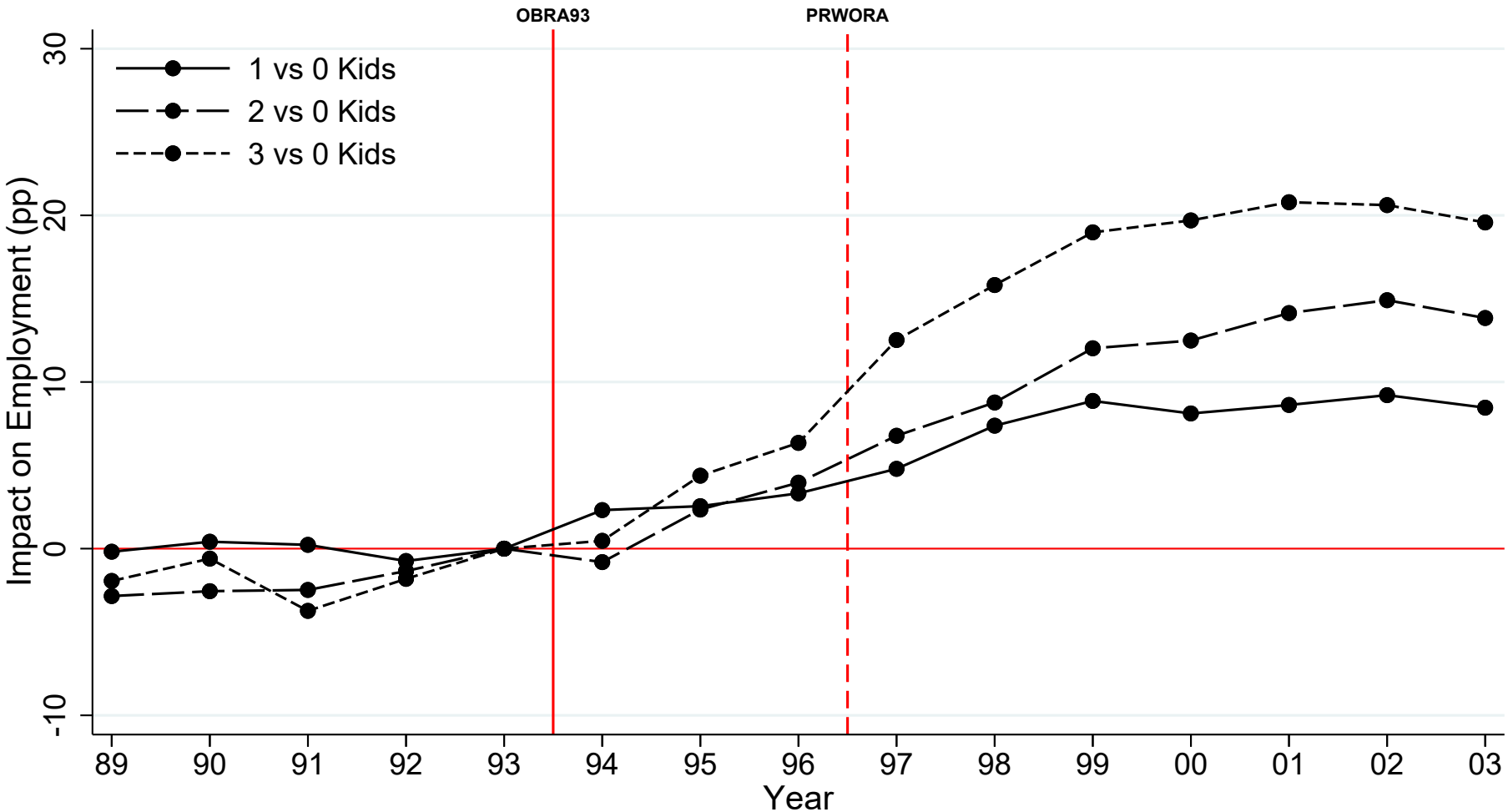
DiD by Number of Children

Weekly Employment, All Single Women



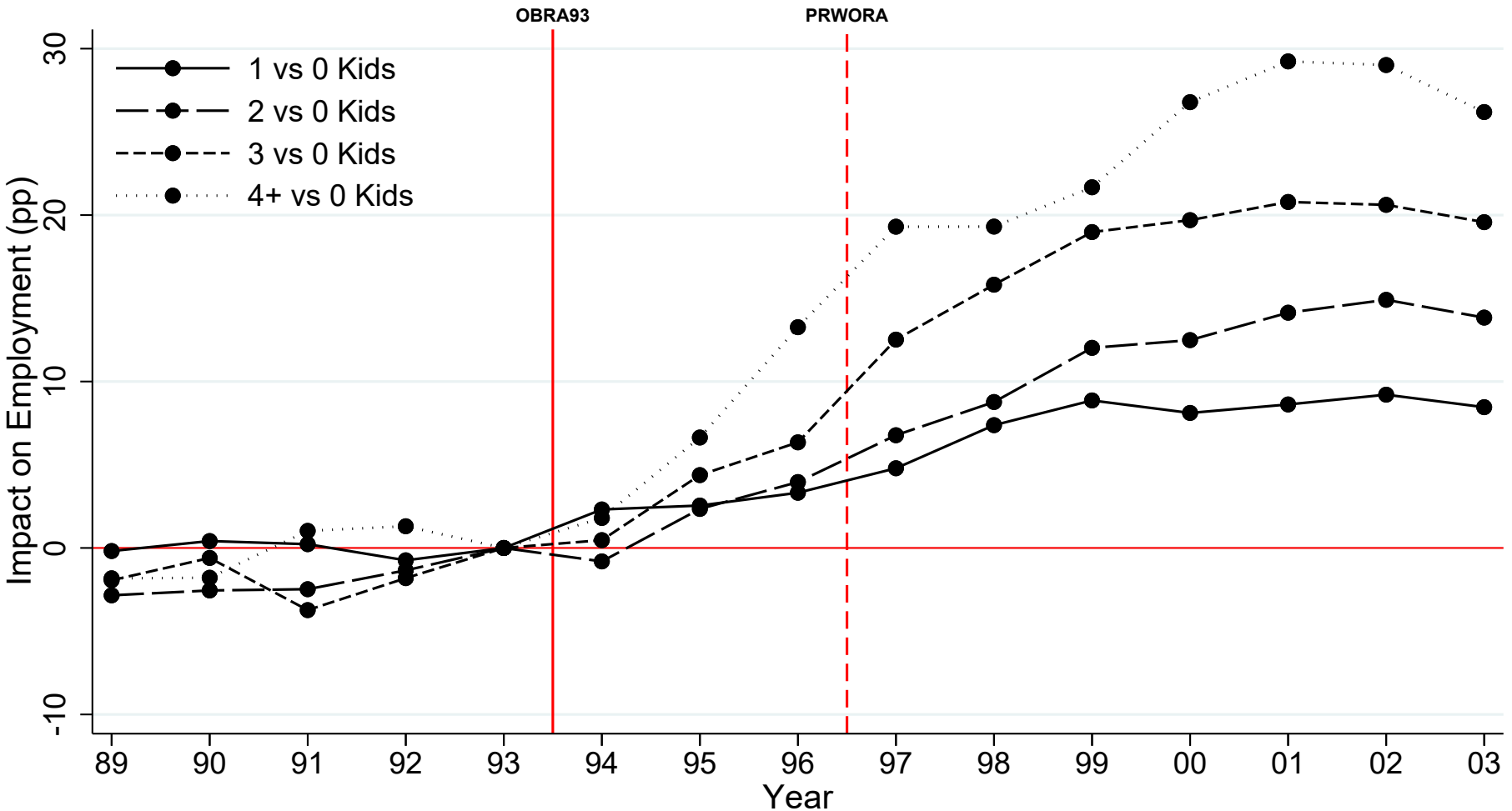
DiD by Number of Children

Weekly Employment, All Single Women



DiD by Number of Children

Weekly Employment, All Single Women



Demographic Controls Annual Employment

Lessons: Effects by Number of Children

- A fanning-out by number of children
  - Extensive margin effects are strictly increasing in the number of children
  - The spread is relatively small between 1 and 2 children (where the EITC split is large), and very large between the other family sizes (where the EITC difference is small/zero)
- Consistent with welfare reform, but not EITC reform

Welfare Caseloads

Dissecting the 1990s:
Heterogeneity by
Welfare Treatment Intensity

DiD Event Study by Welfare Treatment Intensity

Specification:

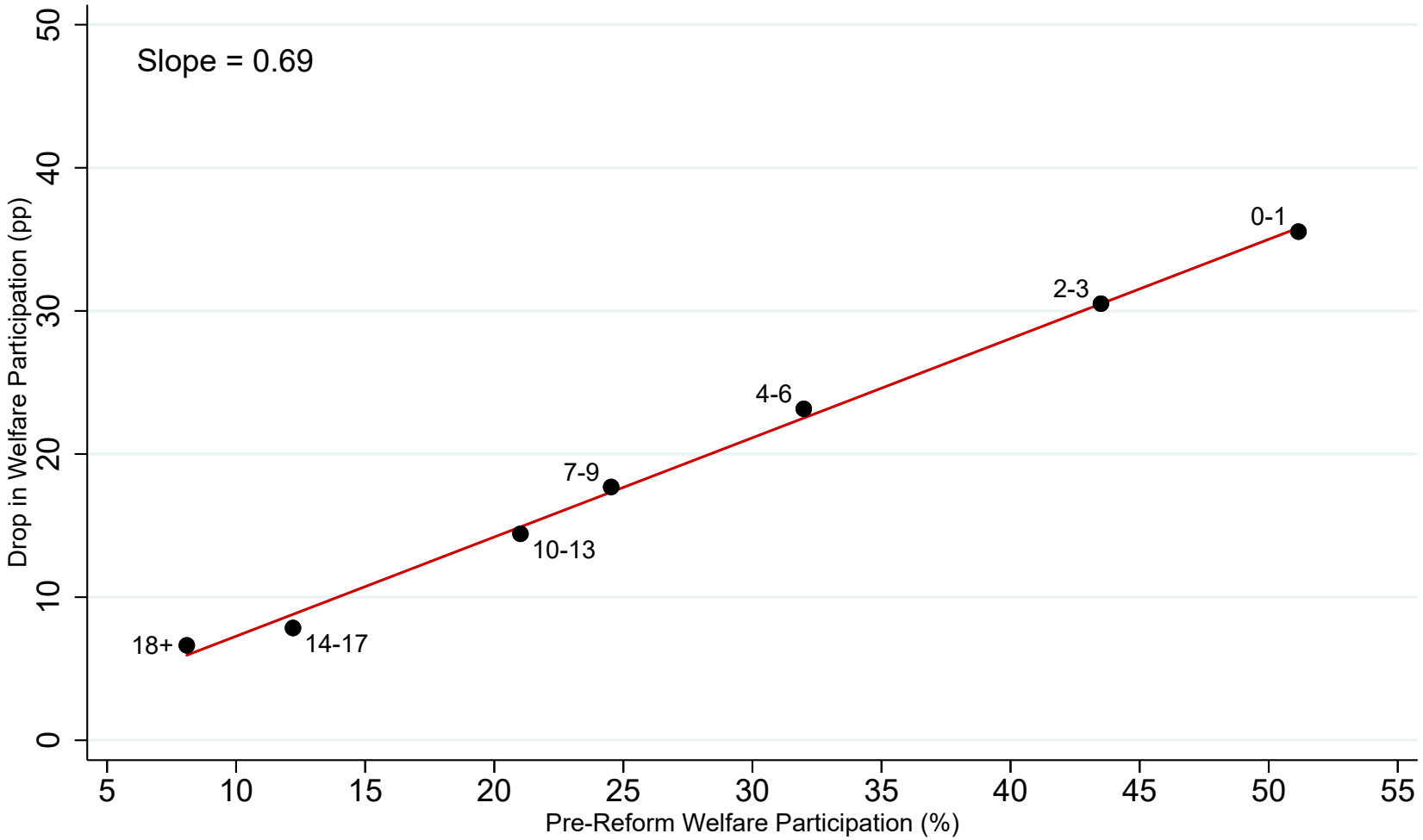
$$P_{imt} = \alpha \cdot Post_t + \sum_j \beta_j \cdot Welfare_{j=c} + \sum_j \gamma_j \cdot Post_t \cdot Welfare_{j=c}$$
$$+\eta \cdot U_{st} + \theta \cdot U_{st} \cdot Kids_i + \lambda_s + \boldsymbol{X_i}\boldsymbol{\phi} + \nu_{imt}$$

Where $Welfare_{j=c}$ is an indicator for welfare treatment category c:

- Age of youngest child
- Predicted AFDC probability based on demographics (dummies for age of woman, number of children, age of youngest child, race, state)

By Age of Youngest Child

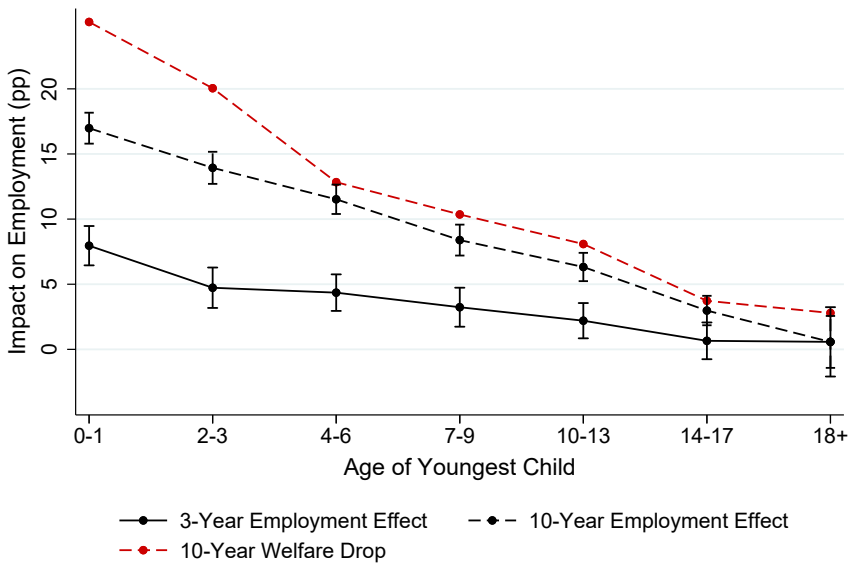
Pre-Reform AFDC Participation Predicts Post-Reform Drop in Participation



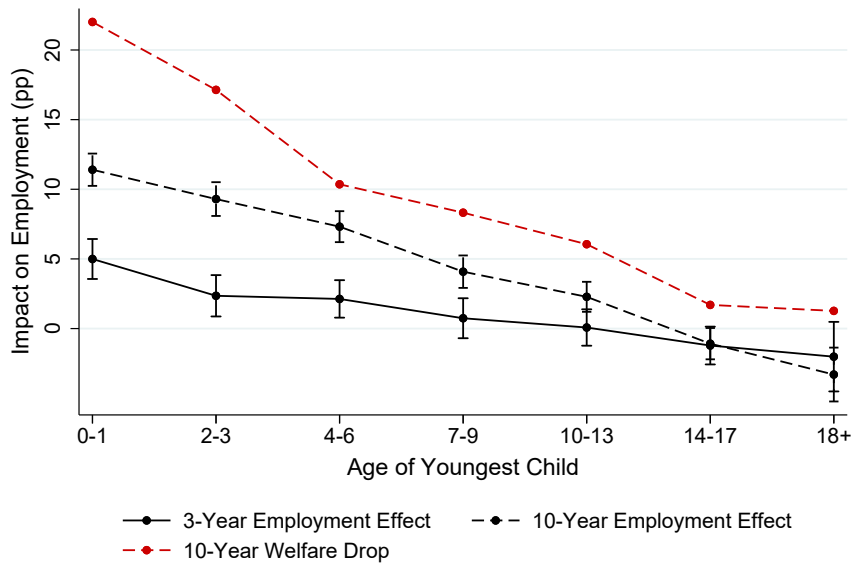
Effects of the EITC by Age of Youngest Child

Weekly Employment, All Single Women

Raw Data



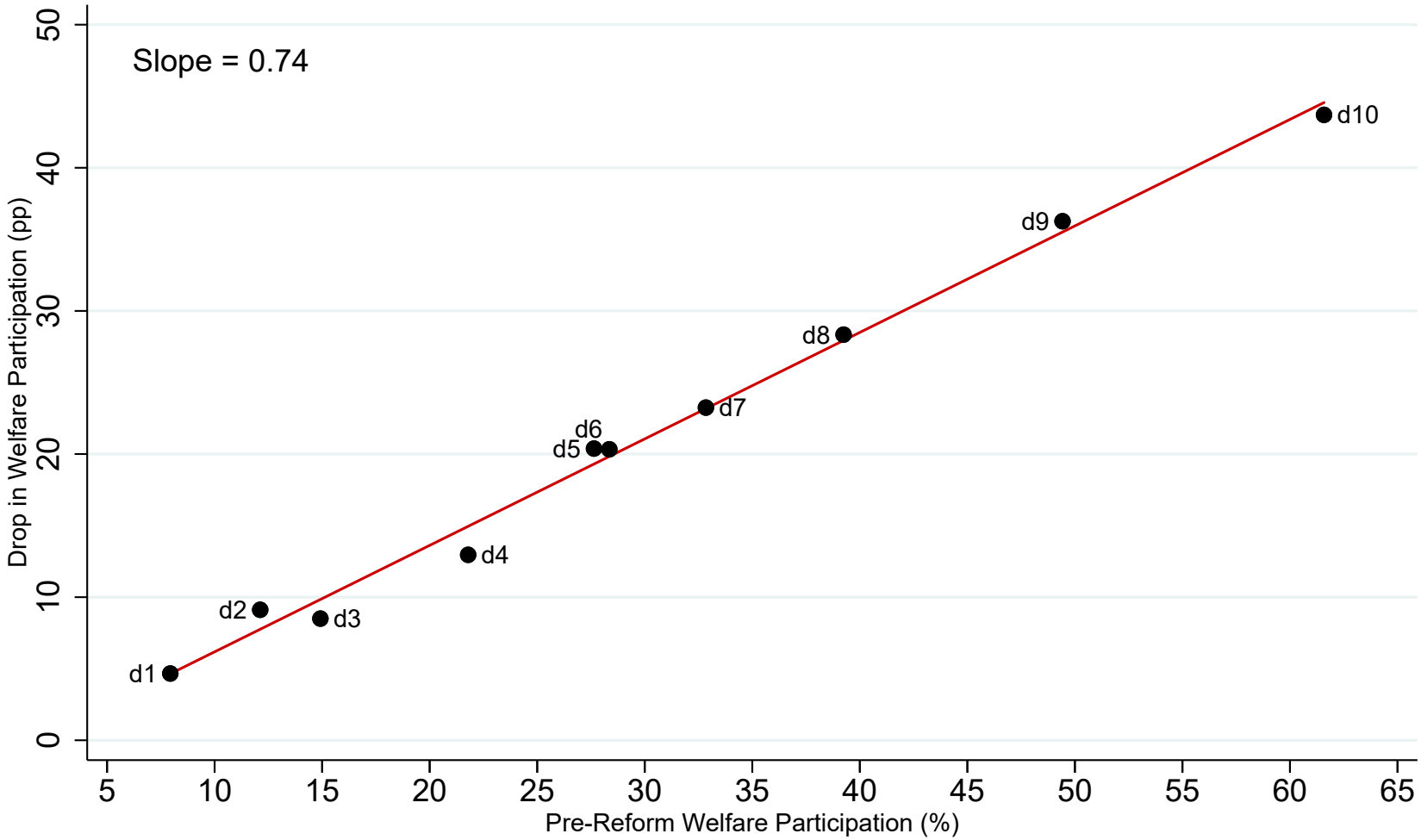
With Controls



Annual Employment

By Probability of AFDC Participation

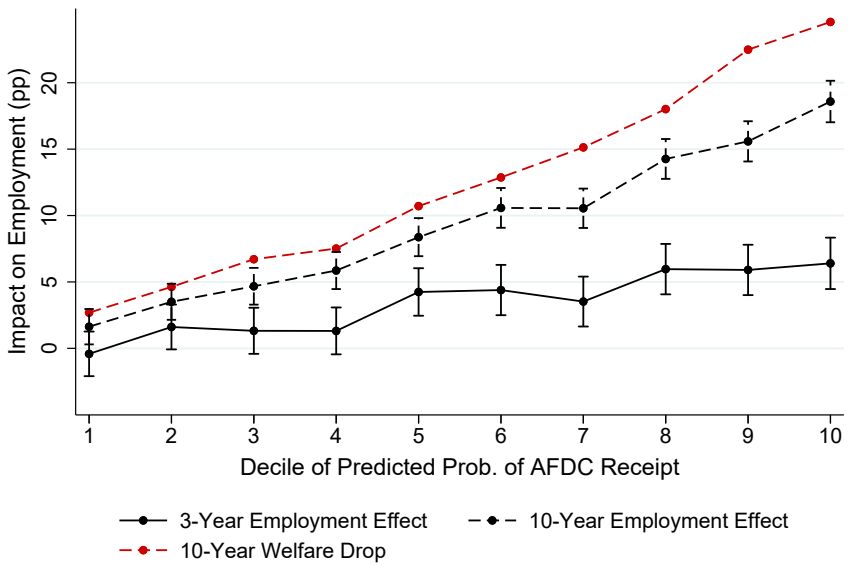
Pre-Reform AFDC Participation Predicts Post-Reform Drop in Participation



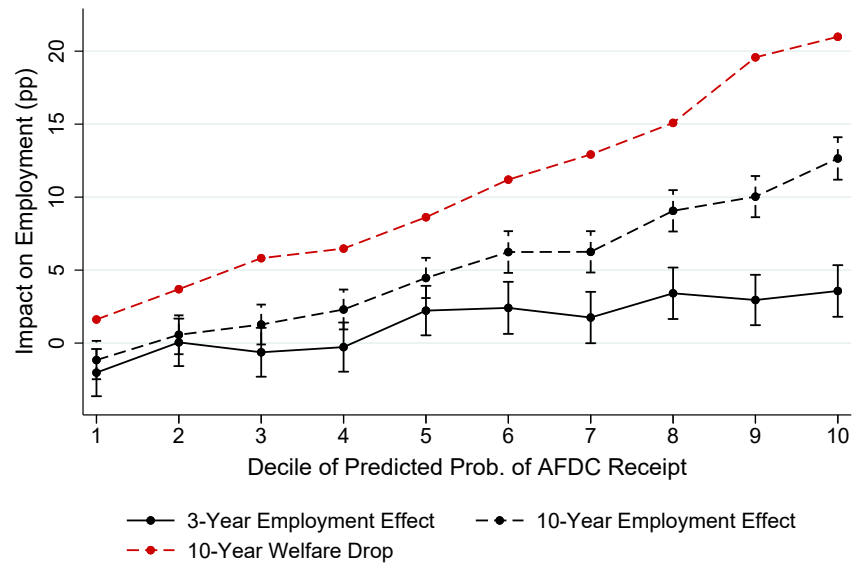
Effects of the EITC by Prob. of AFDC Participation

Weekly Employment, All Single Women

Raw Data



With Controls



Annual Employment

Lessons: Effects by Welfare Treatment Intensity

- Extensive margin effects align closely with welfare treatment
- **Age of youngest child:**
  - Age of youngest child is a strong predictor of welfare treatment
  - No 3-year effects for single mothers whose youngest child is older than six
- **Probability of AFDC participation:**
  - Pre-reform AFDC probability is a strong predictor of welfare treatment
  - No 3-year effects in the bottom four deciles of AFDC probability

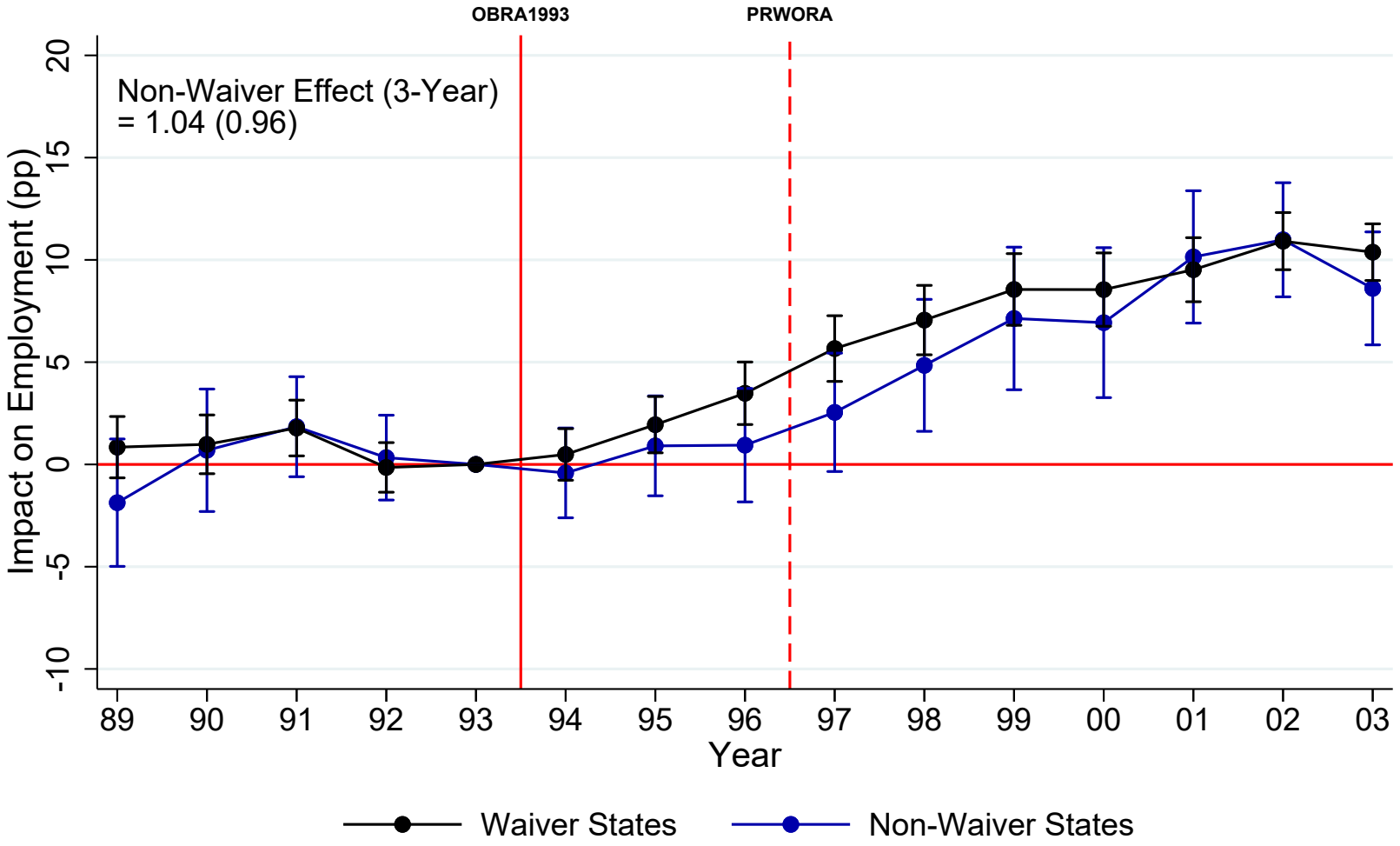
Dissecting the 1990s:
Welfare Waivers

Waiver vs Non-Waiver States

- Waiver types: time limits, work requirements, family caps, JOBS exemptions, JOBS sanctions, and earnings disregards
- 38 states approved statewide welfare waiver legislation between 1992-96
- States without statewide waiver legislation:
  - Alabama, Alaska, District of Columbia, Kansas, Kentucky, Louisiana, Nevada, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, and Wyoming
- Run DiD event studies separately for waiver and non-waiver states

Waiver vs Non-Waiver States

Weekly Employment, All Single Women



Different Outcomes/Samples

Lessons: Welfare Waivers

- Employment effects between 1994-96 (after EITC reform, but before federal welfare reform) can be explained by welfare waivers and business cycles
  - Controlling for business cycles, non-waiver states did not see any statistically significant employment increase for single mothers between 1994-96
- After the implementation of PRWORA in 1997, non-waiver states begin to catch up to waiver states and converge to the same long-run effect
  - The series for non-waiver states look like an event study for PRWORA

Conclusions

Conclusions

- The consensus view on the EITC and the extensive margin is fragile

- What happened with single mothers in America in the 1990s?
  - A historic shift in the labor market equilibrium
  - Not the EITC, but welfare reform aided by a strong economy
  - Fits with behavioral ideas:
    - EITC knowledge is limited
    - Welfare reform was salient:
      Big debate, instant treatment, ordeals, enforcement
    - Welfare culture/norms? Language Trends TNR Cover

Appendix

Predicted Earnings Regression

Earnings regression:

$$Y_i = \alpha_a + \beta_n + \gamma_y + \delta_e + \zeta_r + \lambda_s + \nu_i$$

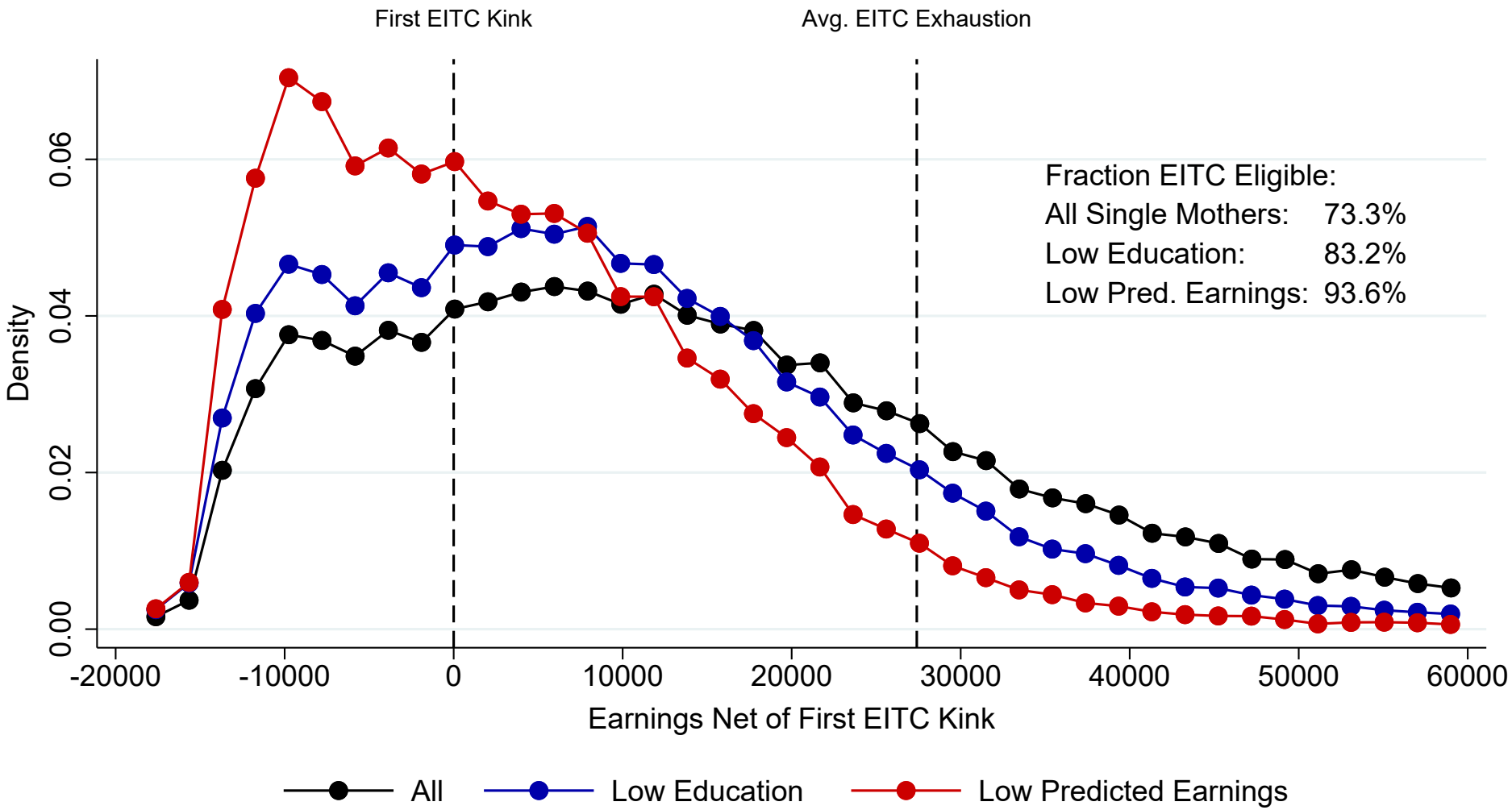
Where the RHS includes fixed effects for age of the woman a, number of children n, age of youngest child y, education e, race r, and state s

- Run regression on the sample of working single women
- Predict earnings for workers and non-workers
- Select different quantiles of predicted earnings within each year

Back

Earnings Distribution

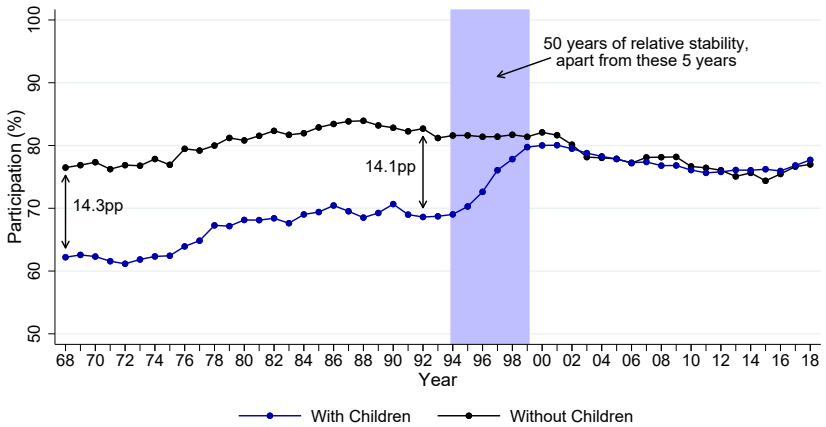
Single Mothers



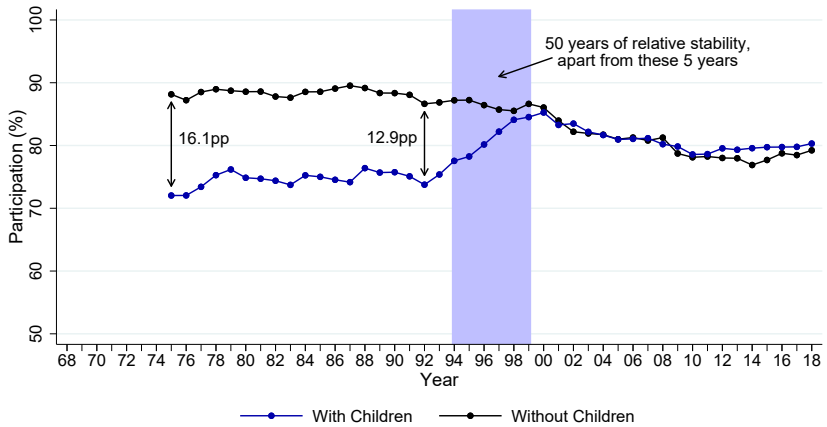
Labor Force Participation of Single Women

With and Without Children, **All Single Women**

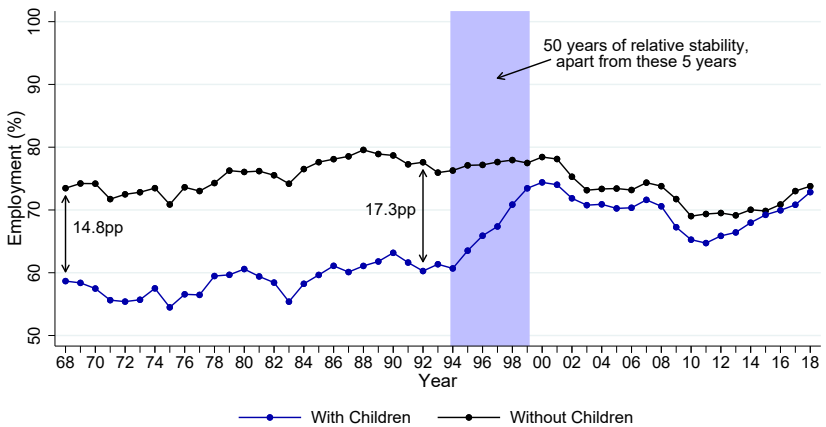
Weekly Participation



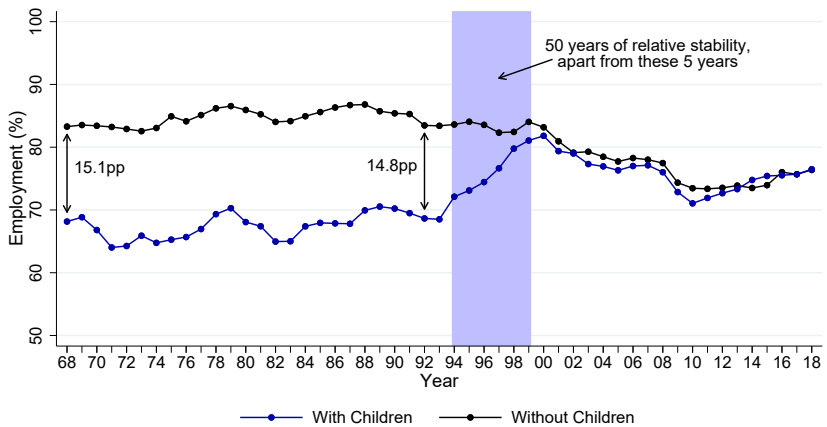
Annual Participation



Weekly Employment



Annual Employment



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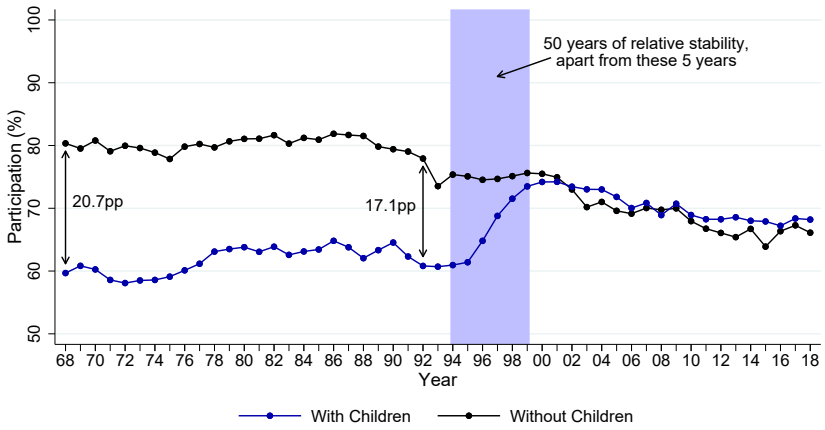
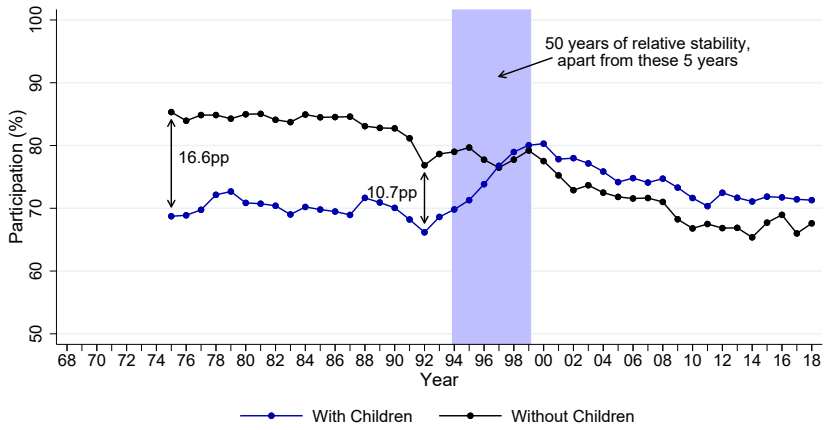
Labor Force Participation of Single Women

With and Without Children, **Low-Educated Single Women**

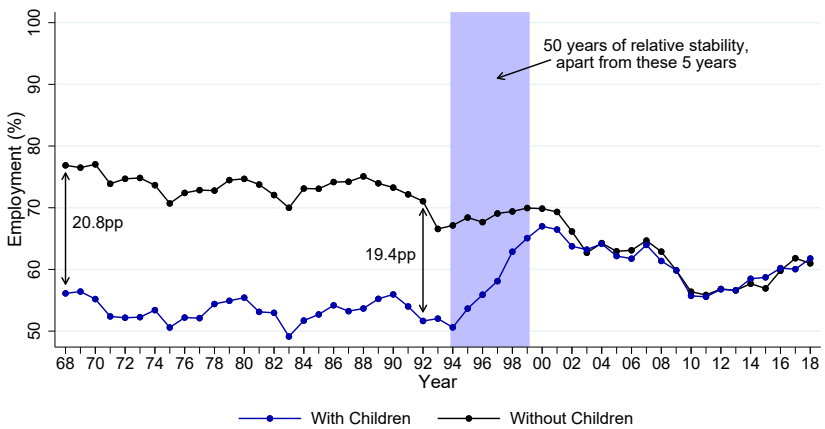
Weekly Participation



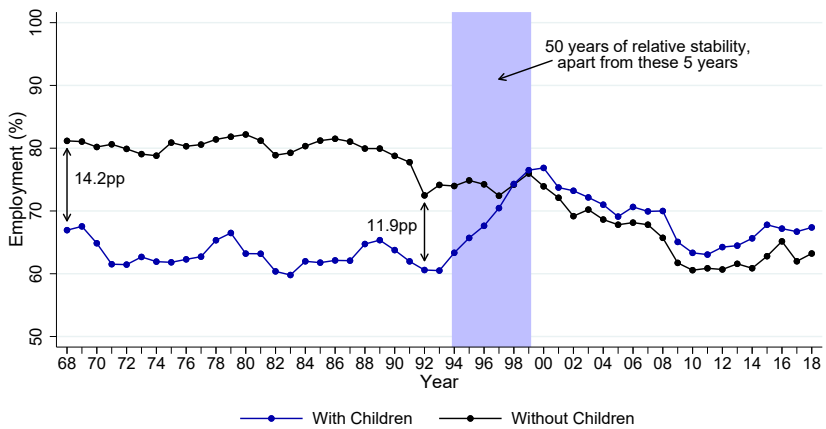
Annual Participation



Weekly Employment



Annual Employment



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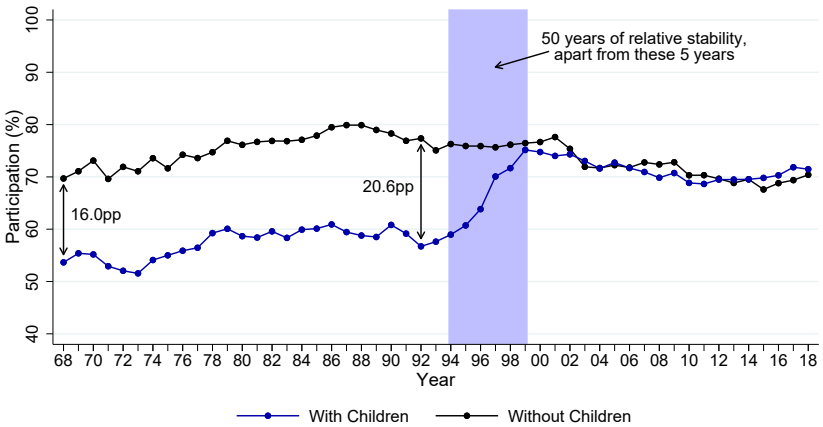
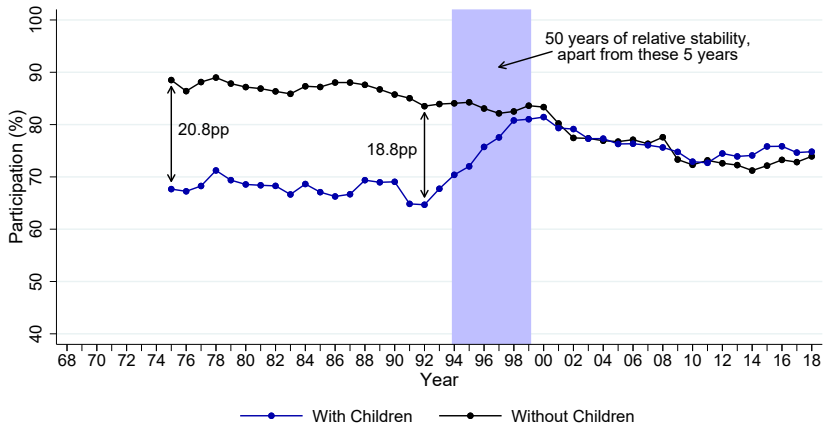
Labor Force Participation of Single Women

With and Without Children, **Bottom Half of Predicted Earnings**

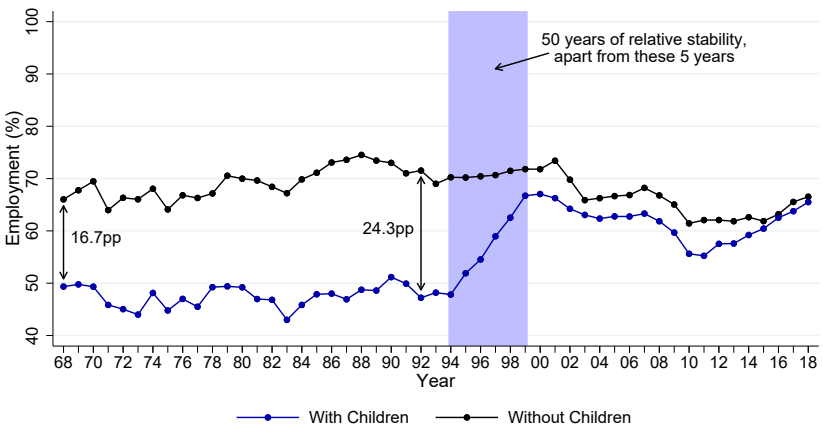
Weekly Participation



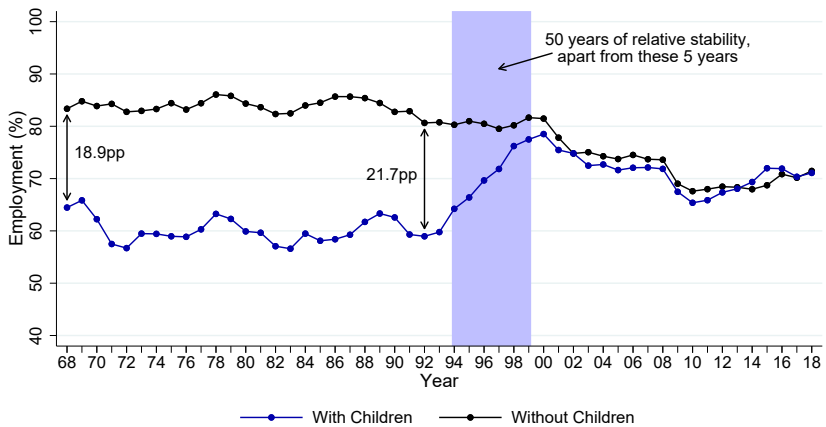
Annual Participation



Weekly Employment



Annual Employment



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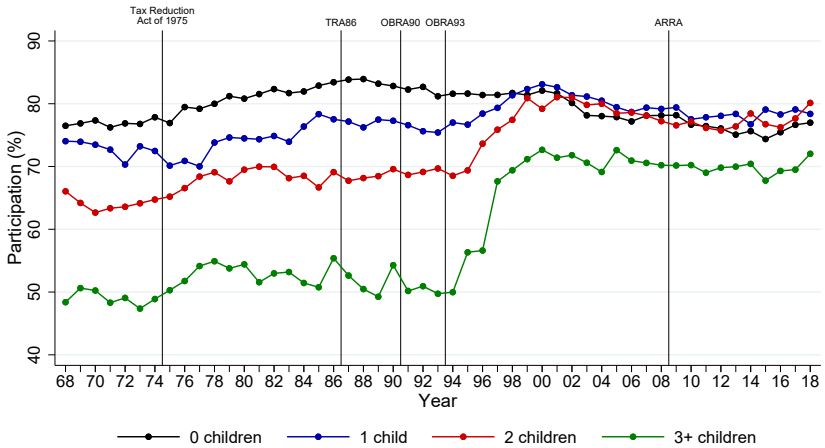
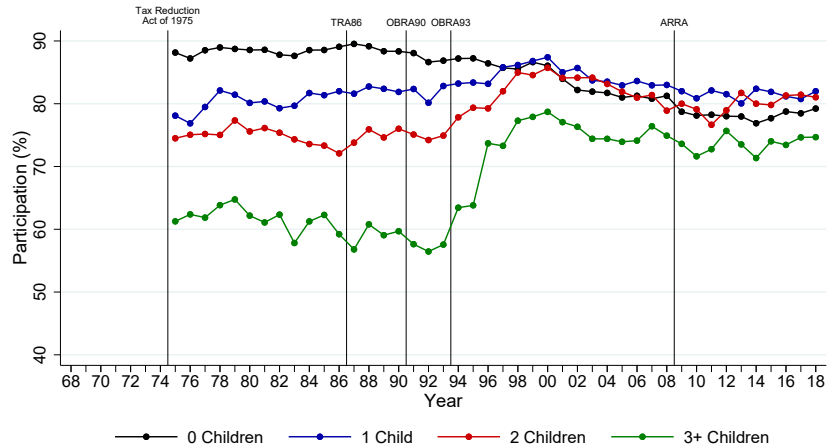
Labor Force Participation of Single Women

By Number of Children, **All Single Women**

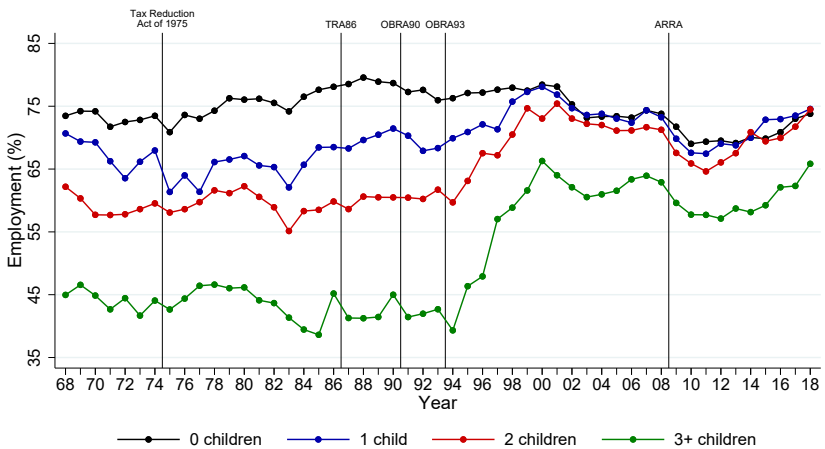
Weekly Participation



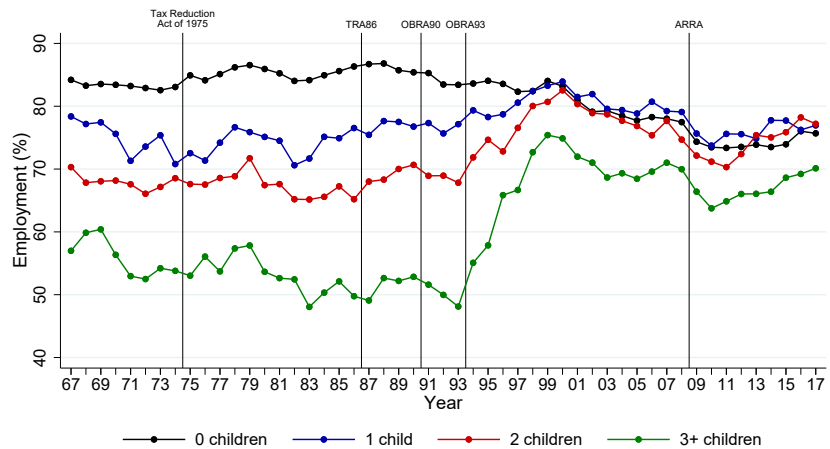
Annual Participation



Weekly Employment



Annual Employment



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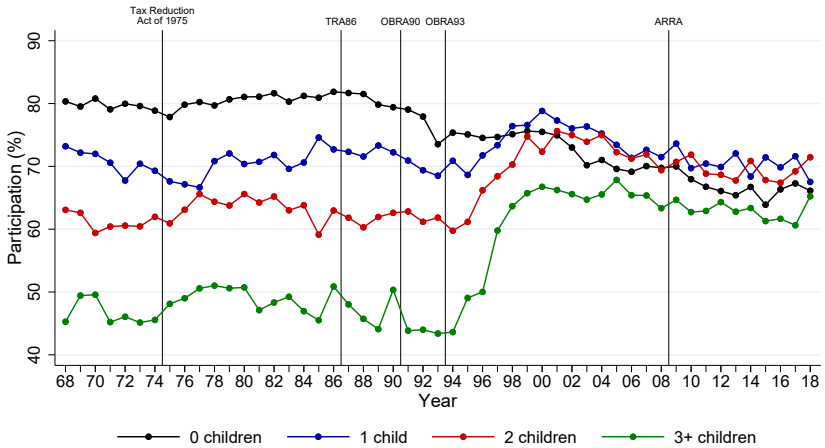
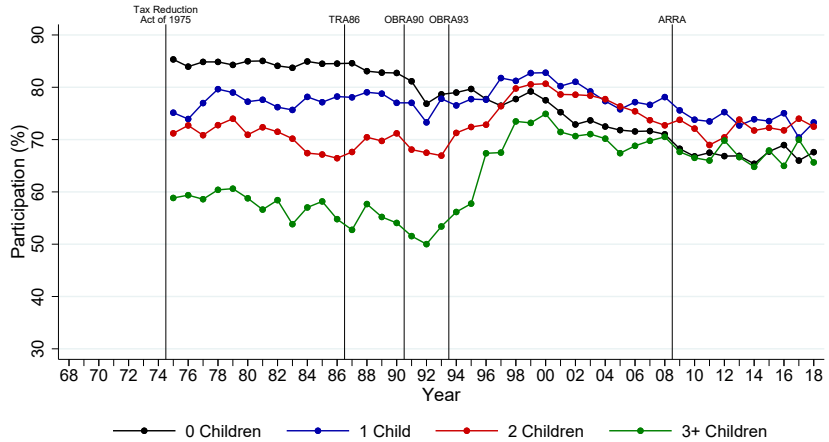
Labor Force Participation of Single Women

By Number of Children, **Low-Educated Single Women**

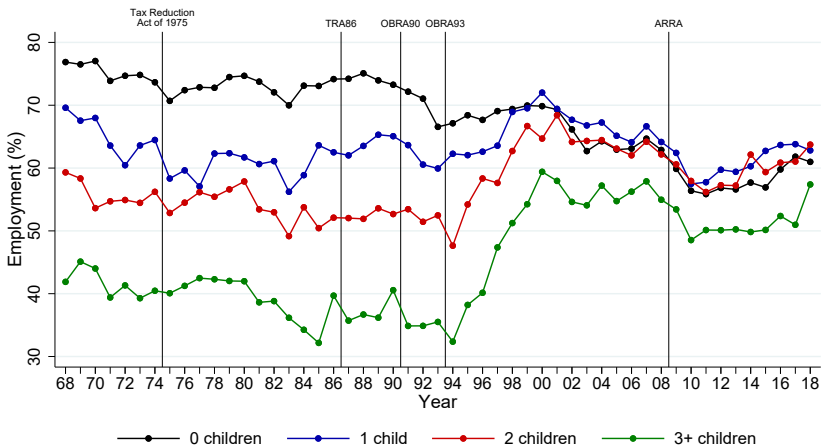
Weekly Participation



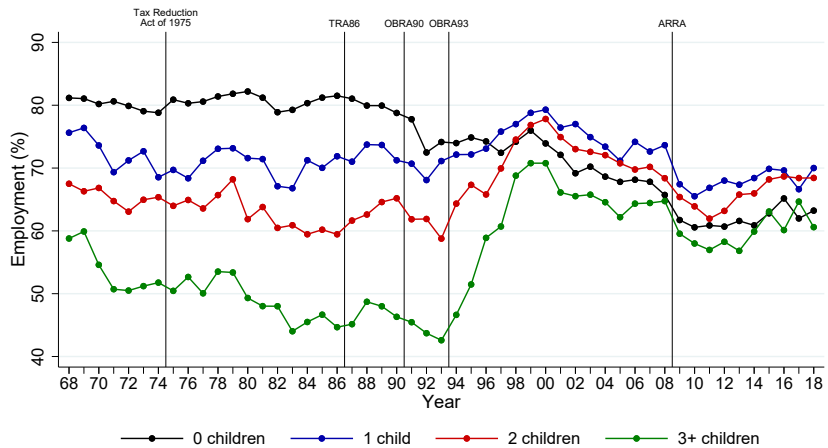
Annual Participation



Weekly Employment



Annual Employment



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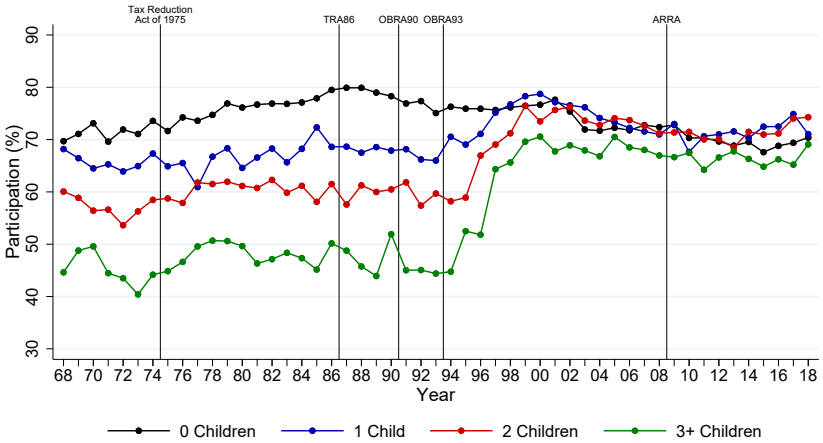
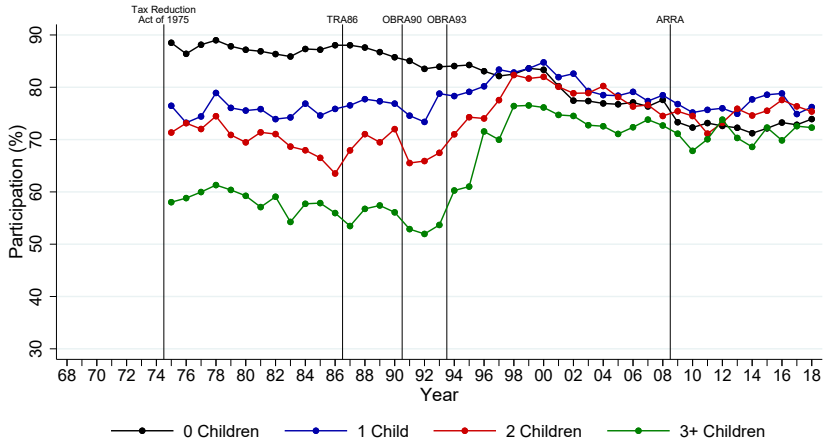
Labor Force Participation of Single Women

By Number of Children, **Bottom Half of Predicted Earnings**

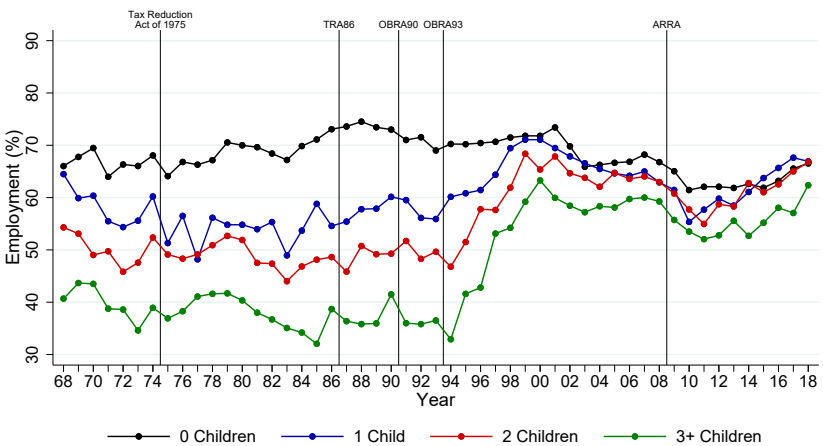
Weekly Participation



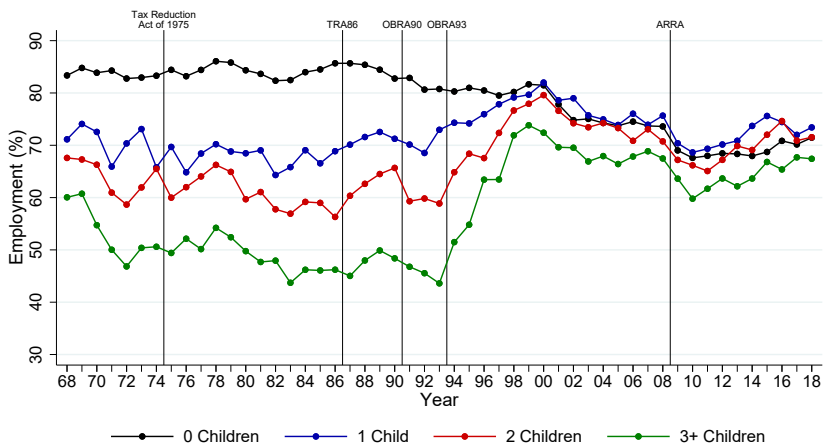
Annual Participation



Weekly Employment



Annual Employment



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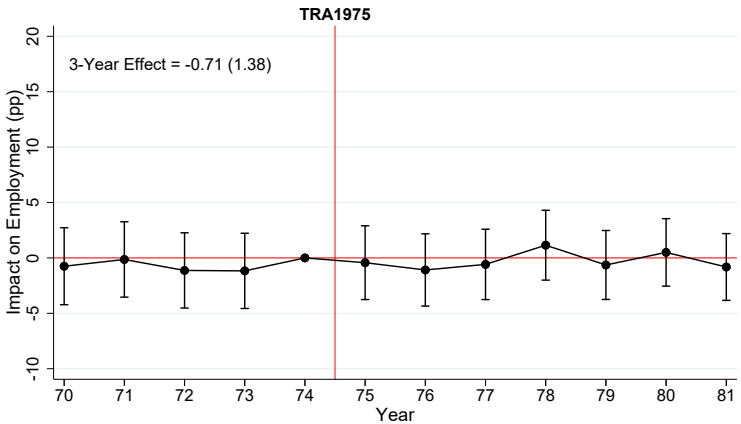
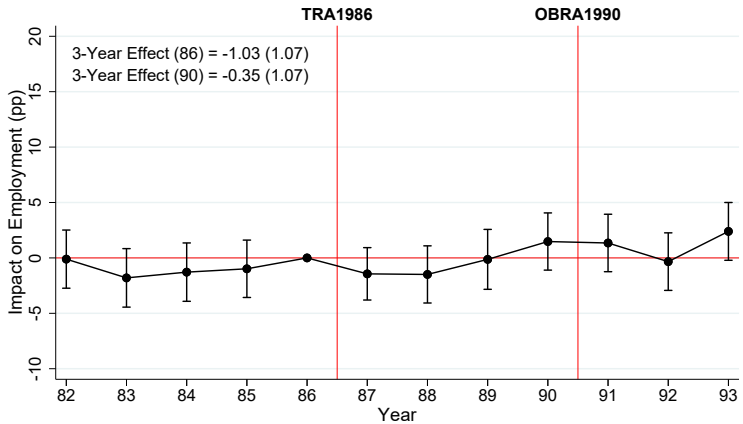
Event Studies of Individual Reforms

Weekly Employment, All Single Women, Without Controls

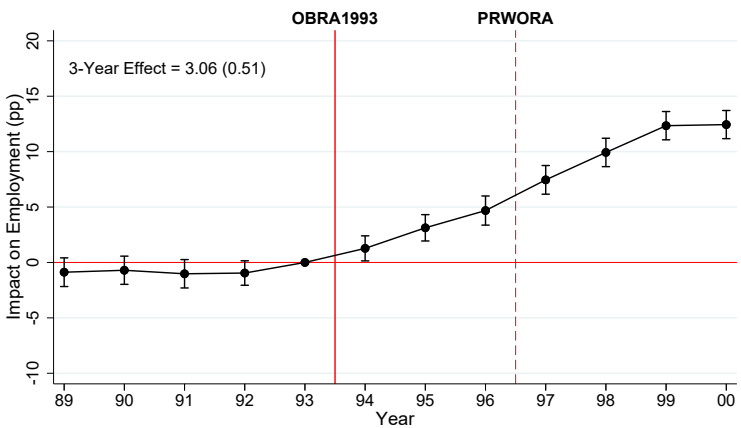
1975 Reform



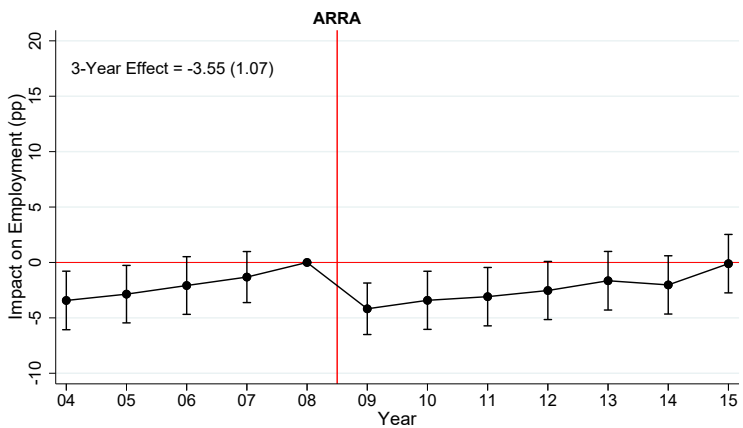
1986 and 1990 Reforms



1993 Reform



2009 Reform

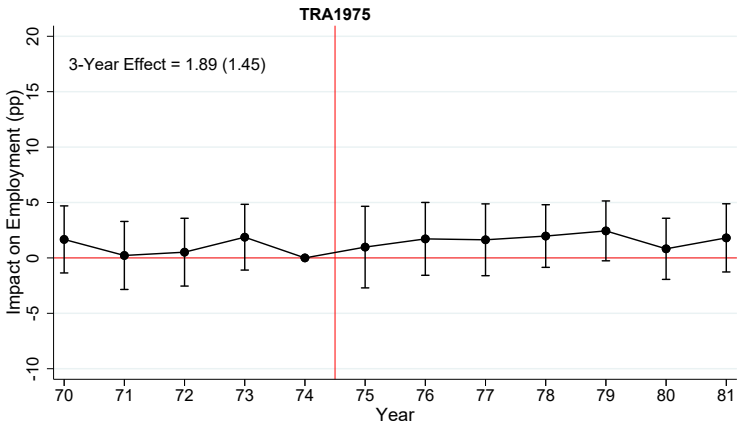


Weekly Employment (With Controls)

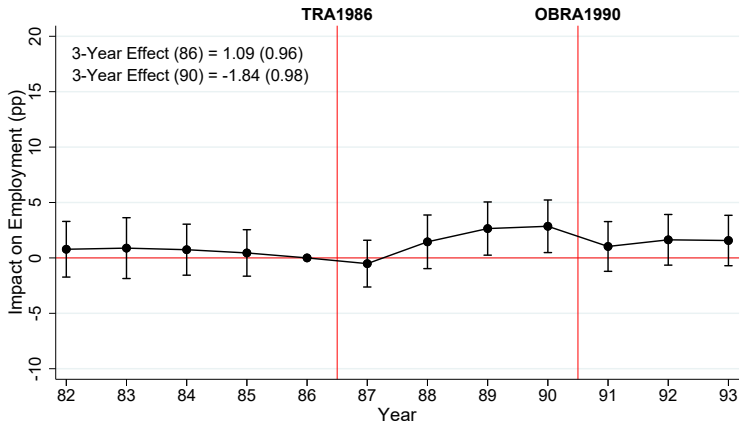
Event Studies of Individual Reforms

Annual Employment, All Single Women, With Controls

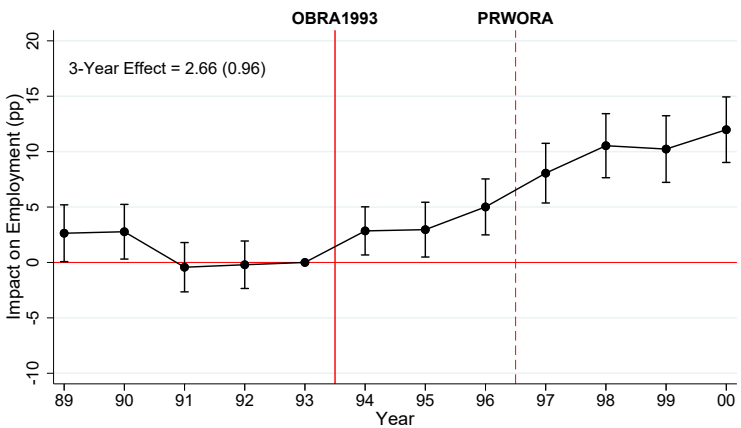
1975 Reform



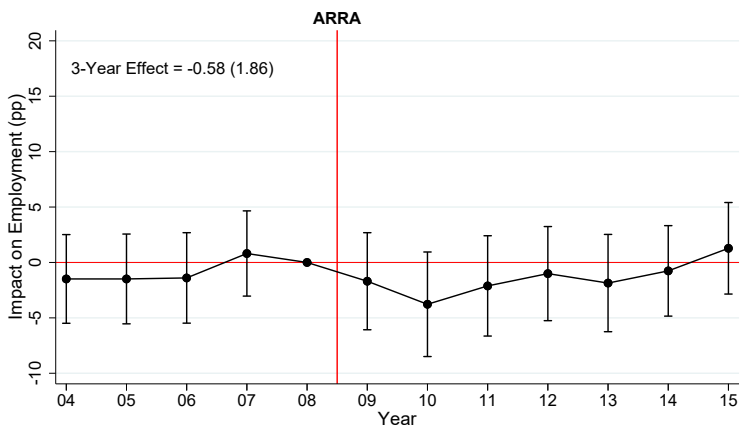
1986 and 1990 Reforms



1993 Reform



2009 Reform

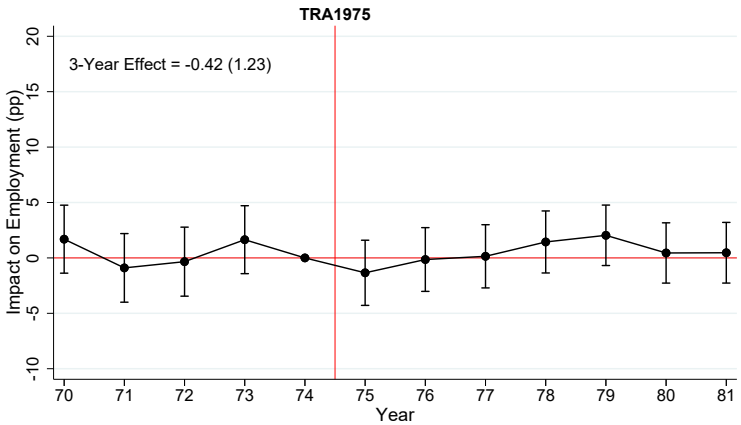


Weekly Employment (With Controls)

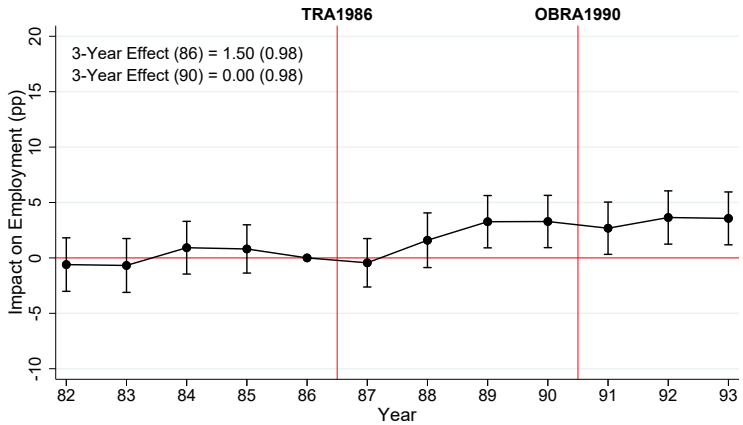
Event Studies of Individual Reforms

Annual Employment, All Single Women, Without Controls

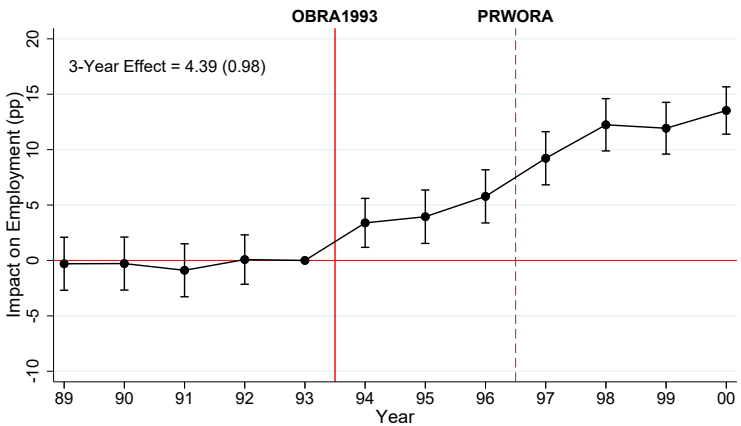
1975 Reform



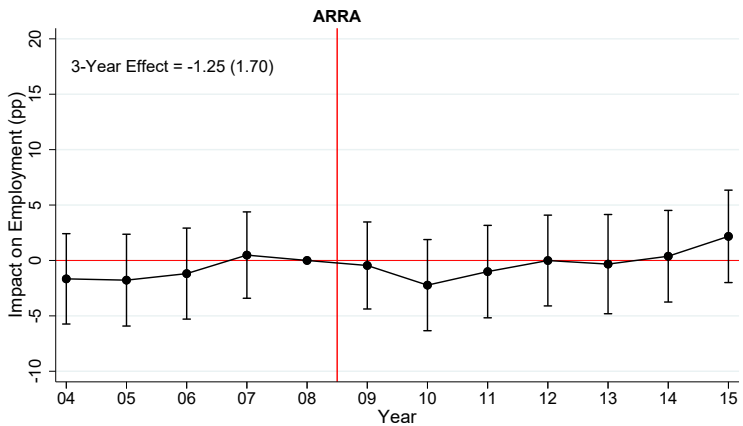
1986 and 1990 Reforms



1993 Reform



2009 Reform

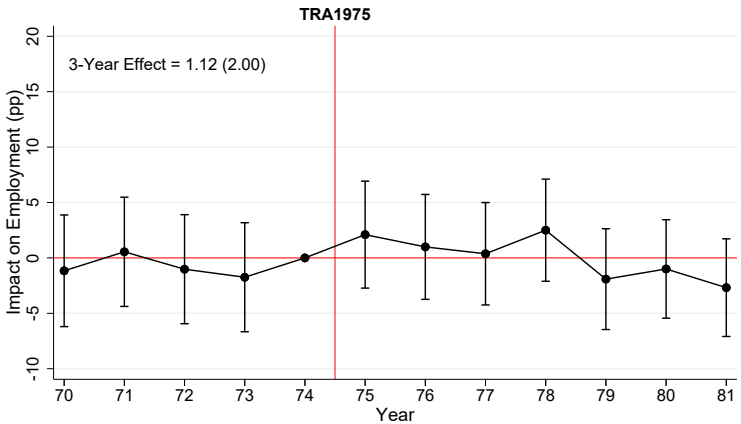


Weekly Employment (With Controls)

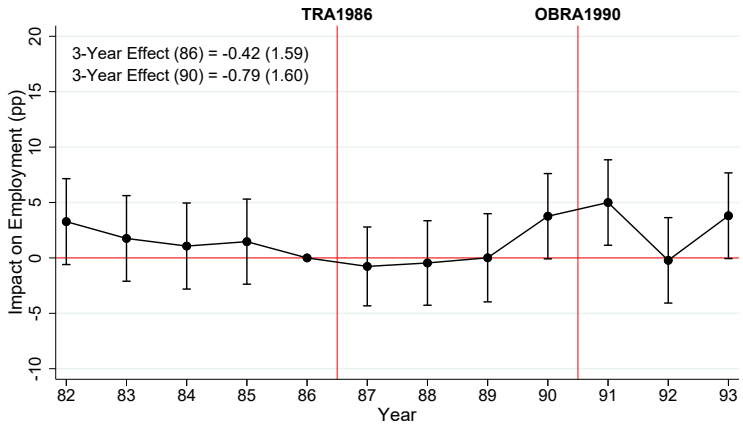
Event Studies of Individual Reforms

Weekly Employment, Bottom Half of Predicted Earnings, Without Controls

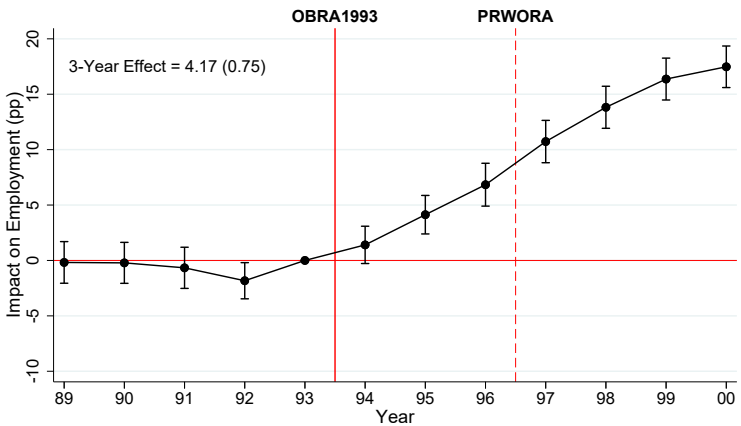
1975 Reform



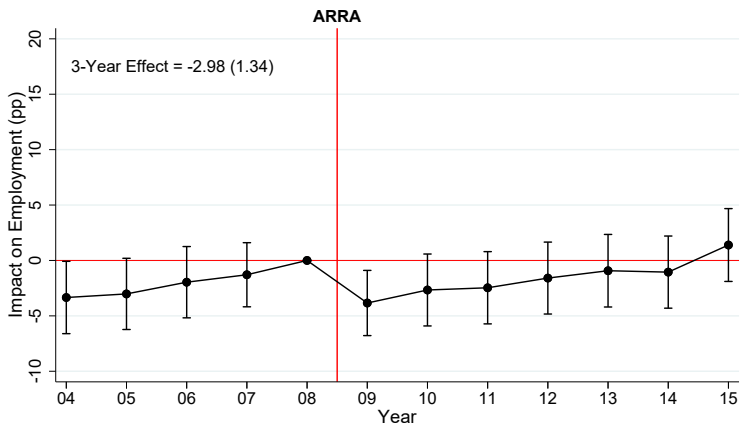
1986 and 1990 Reforms



1993 Reform



2009 Reform

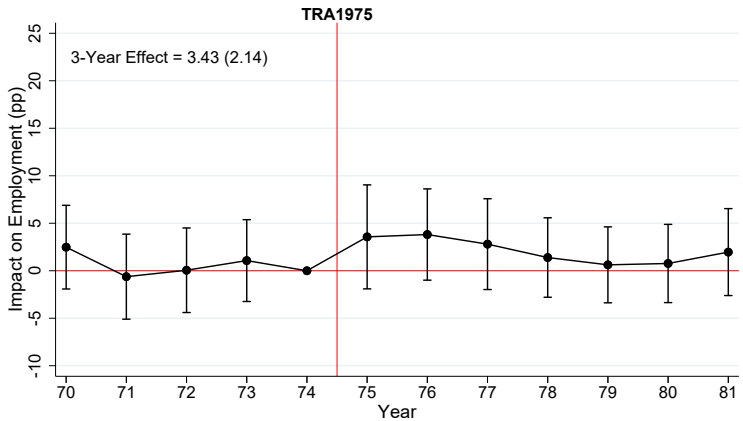


Weekly Employment (With Controls)

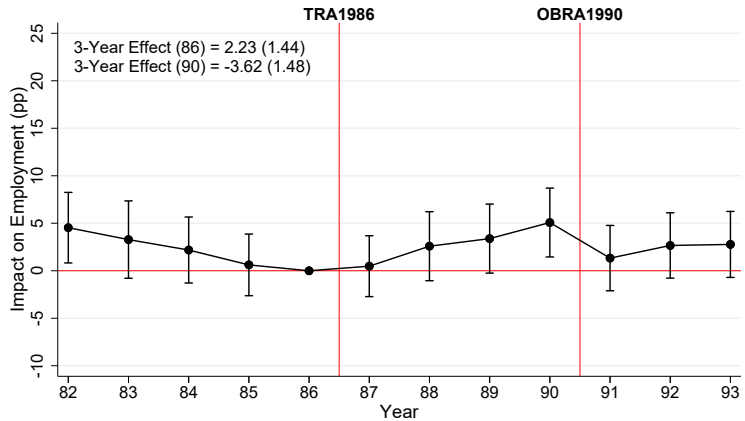
Event Studies of Individual Reforms

Annual Employment, Bottom Half of Predicted Earnings, With Controls

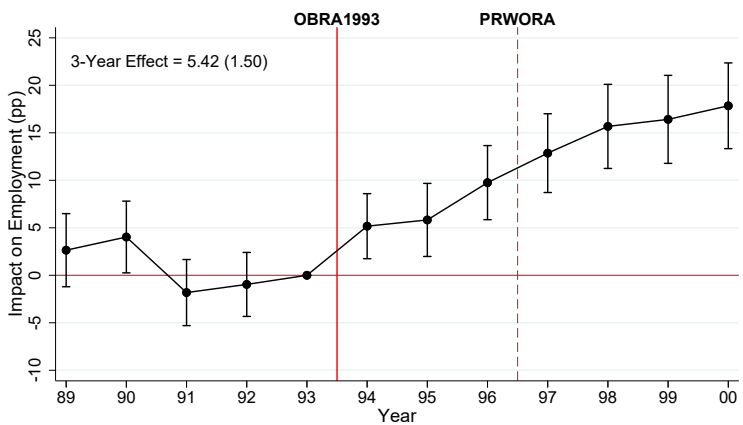
1975 Reform



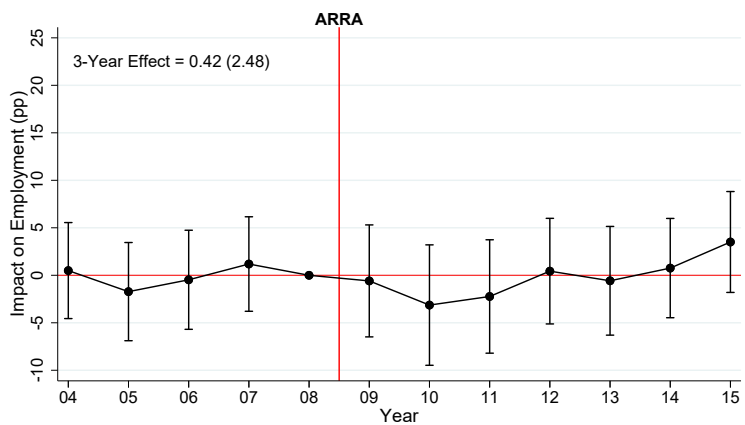
1986 and 1990 Reforms



1993 Reform



2009 Reform

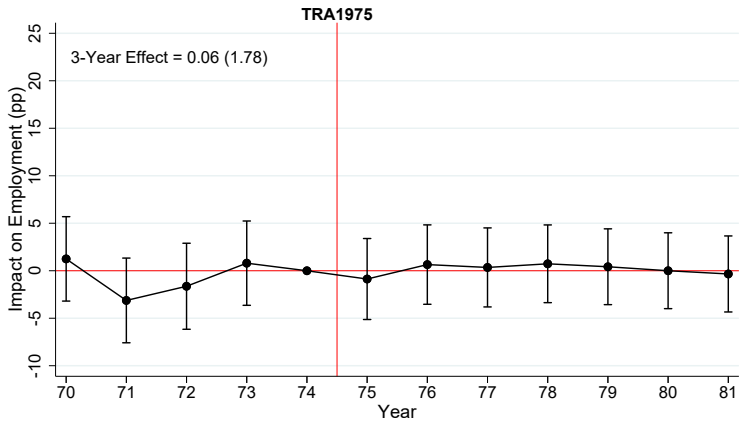


Weekly Employment (With Controls)

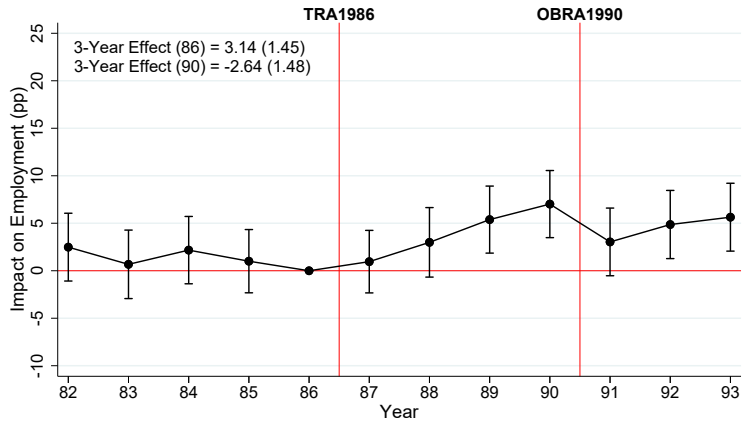
Event Studies of Individual Reforms

Annual Employment, Bottom Half of Predicted Earnings, Without Controls

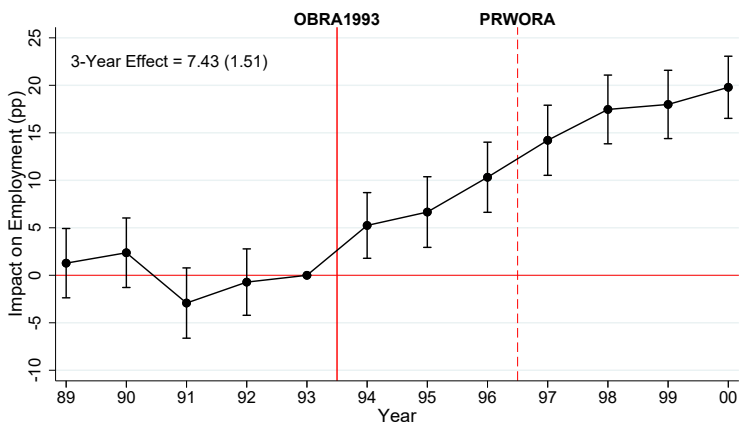
1975 Reform



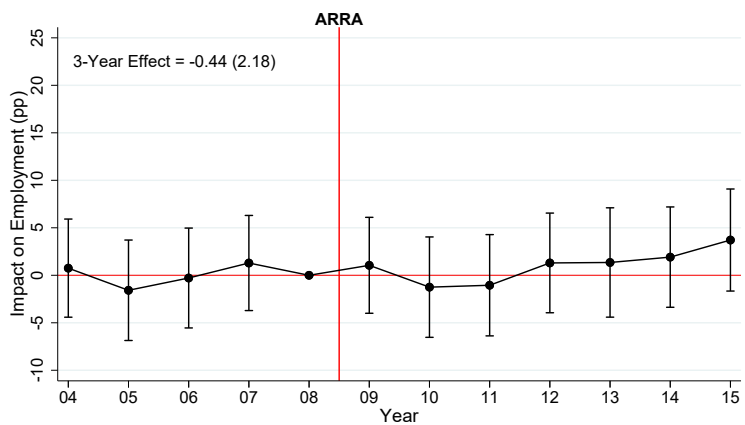
1986 and 1990 Reforms



1993 Reform



2009 Reform

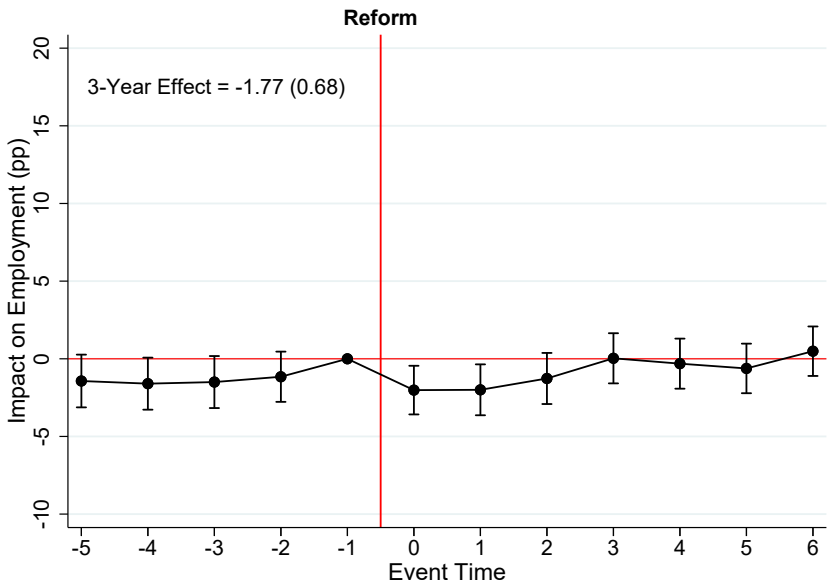


Weekly Employment (With Controls)

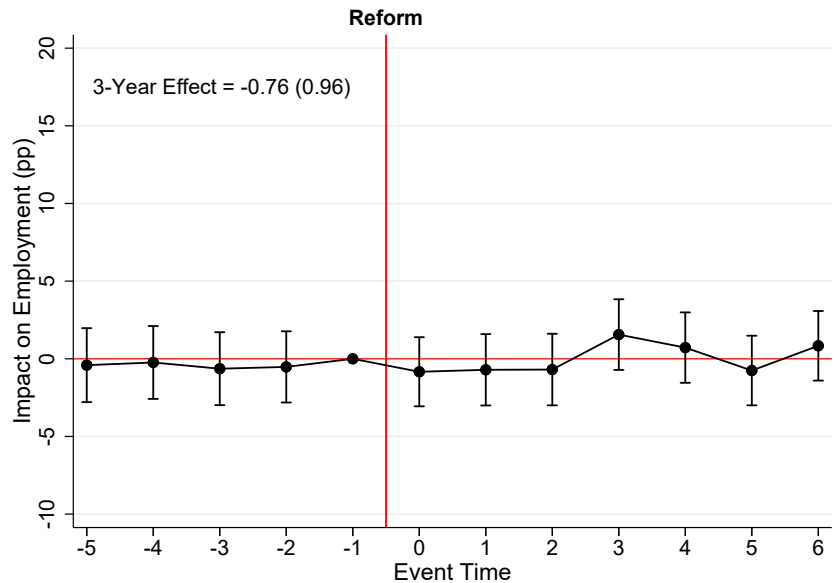
Stacked Event Studies (Without 1993)

Weekly Employment, Without Controls

All Single Women



Bottom Half of Predicted Earnings

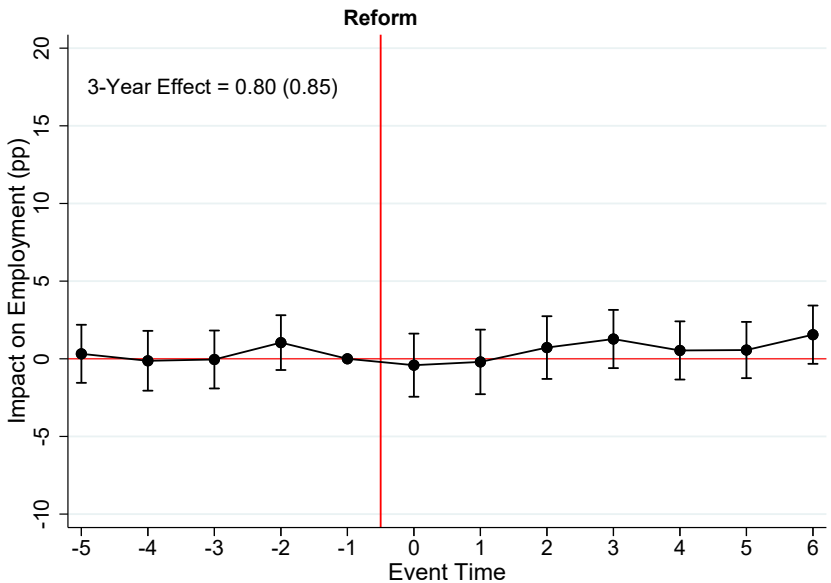


Weekly Employment (With Controls)

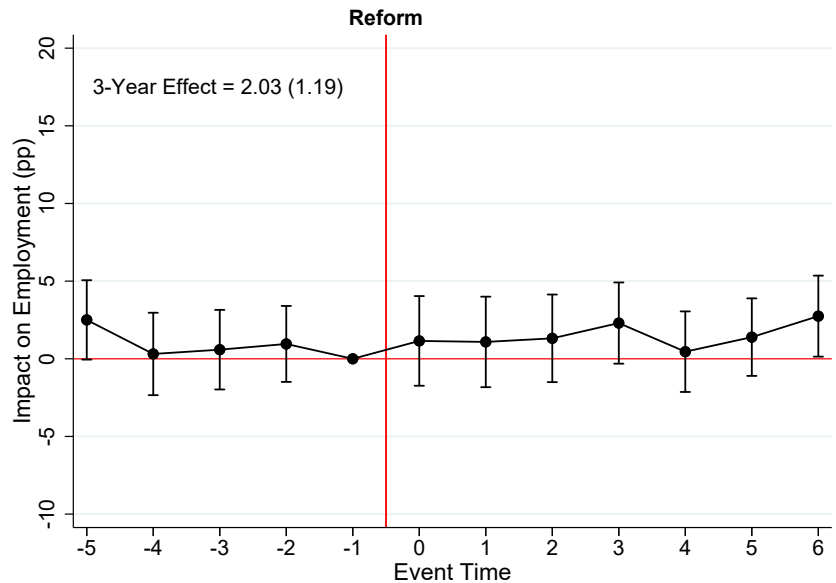
Stacked Event Studies (Without 1993)

Annual Employment, With Controls

All Single Women



Bottom Half of Predicted Earnings

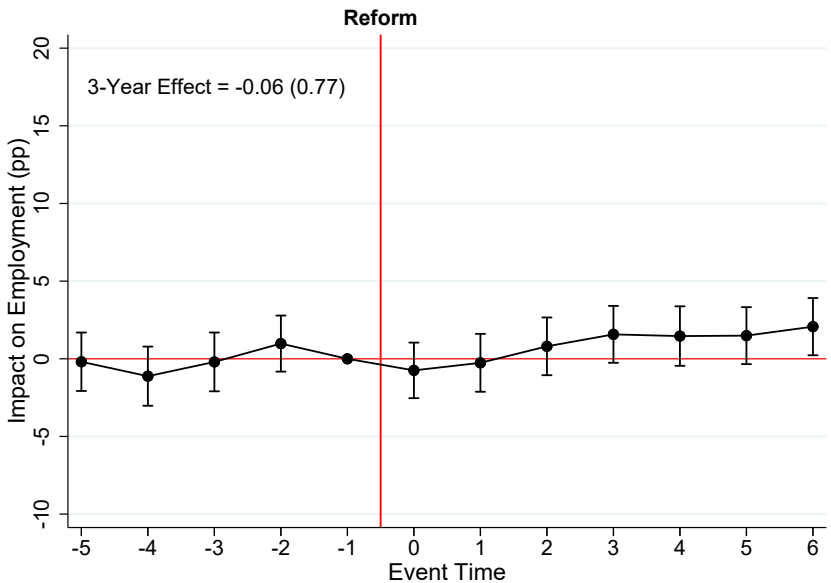


Weekly Employment (With Controls)

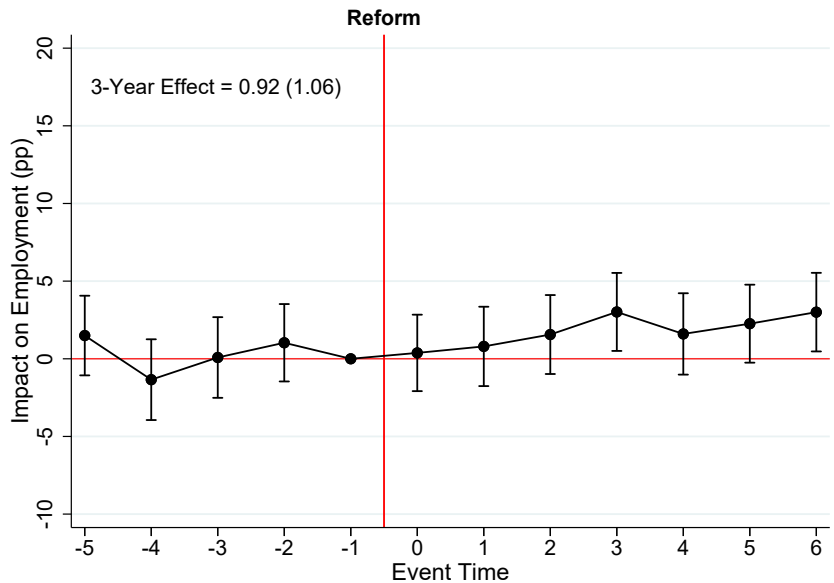
Stacked Event Studies (Without 1993)

Annual Employment, Without Controls

All Single Women



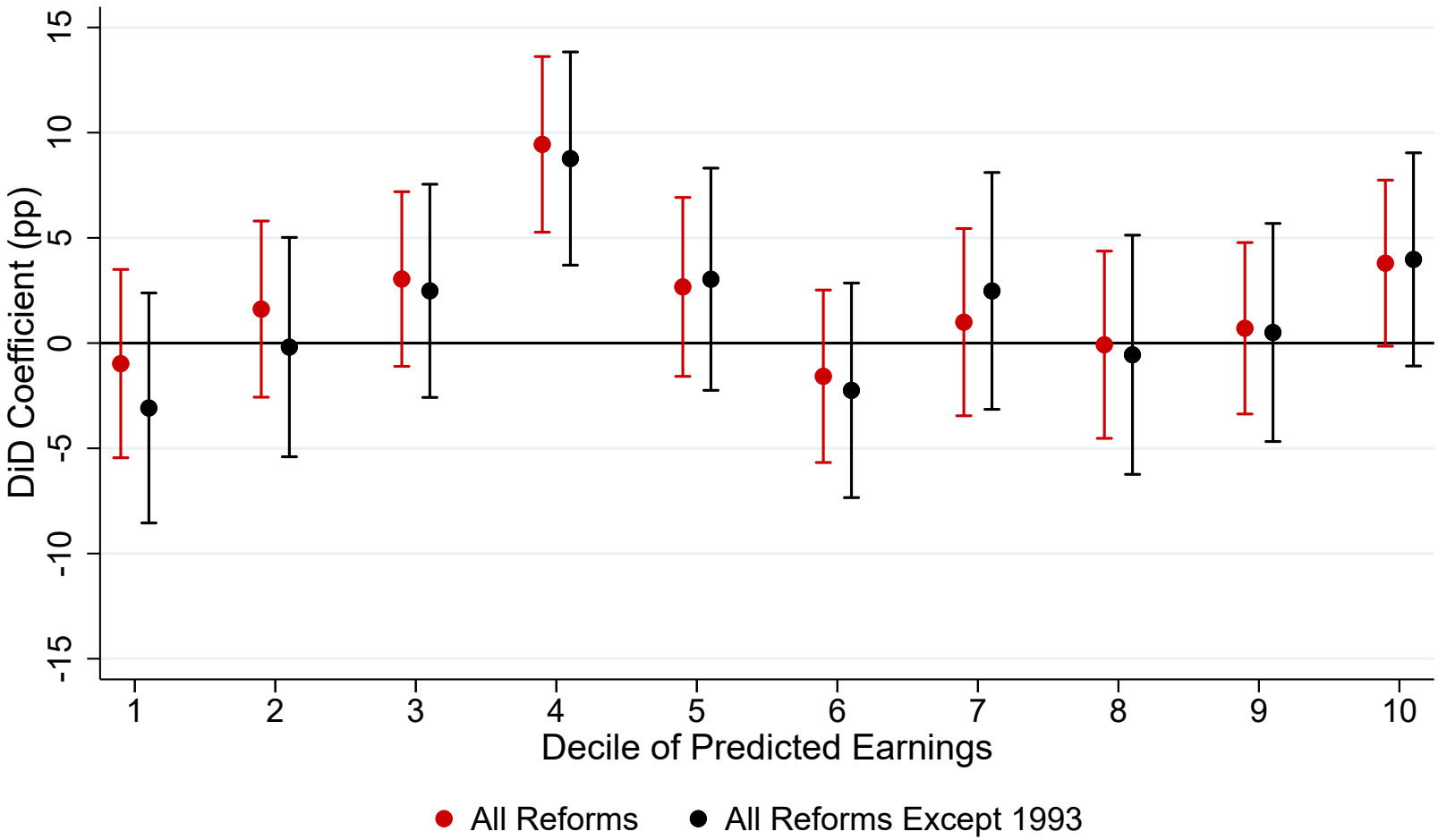
Bottom Half of Predicted Earnings



Weekly Employment (With Controls)

Three-Year Effects by Decile of Predicted Earnings

Annual Employment



Weekly Employment

Elasticity Calculation

- Extensive Margin Elasticity:

$$\varepsilon \equiv \frac{\Delta P/P}{\Delta(1-\tau)/(1-\tau)}$$

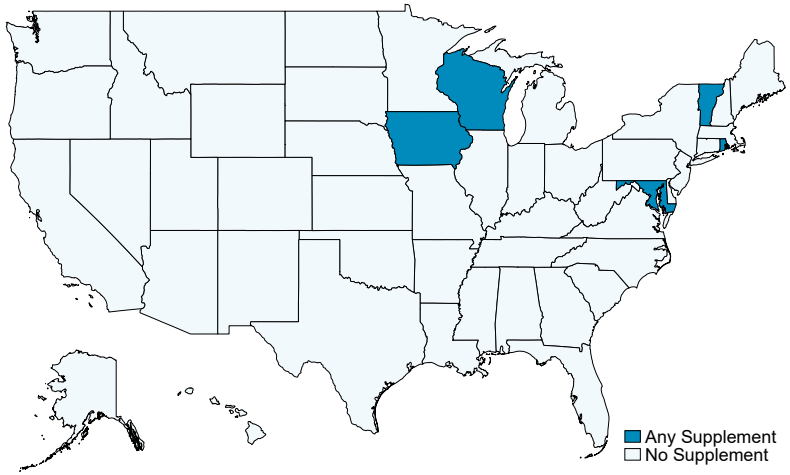
Where

- $\Delta P/P$ is the percent effect of the tax reform on employment/participation
- $\Delta(1-\tau)/(1-\tau)$ is the percent effect of the tax reform on the average net-of-tax rate
  - τ includes federal taxes, state taxes, and federal insurance contributions (FICA), but not the welfare system
  - τ is calculated based on setting earnings conditional on working equal to the first kink of the federal EITC for each family size

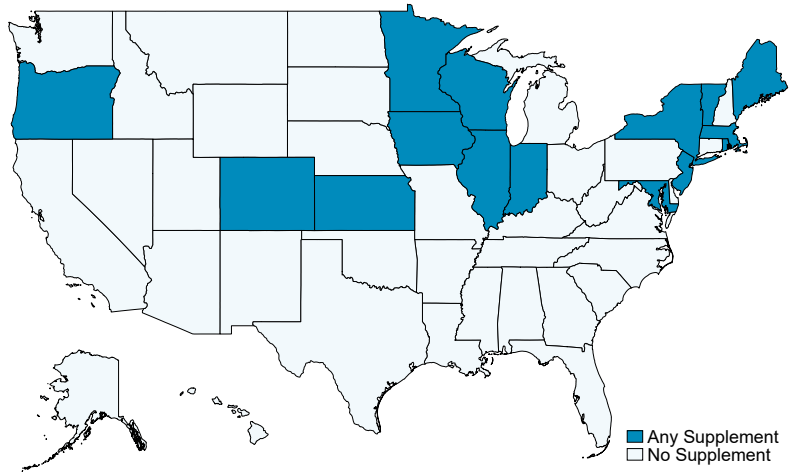
Back

States with EITC Supplements Over Time

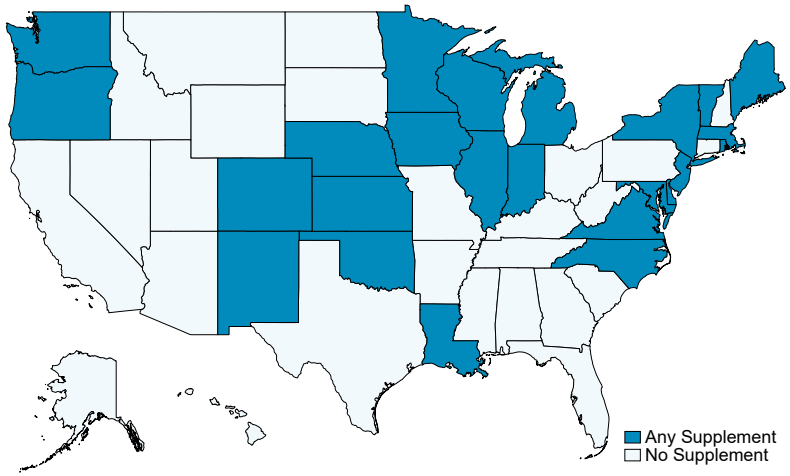
1990



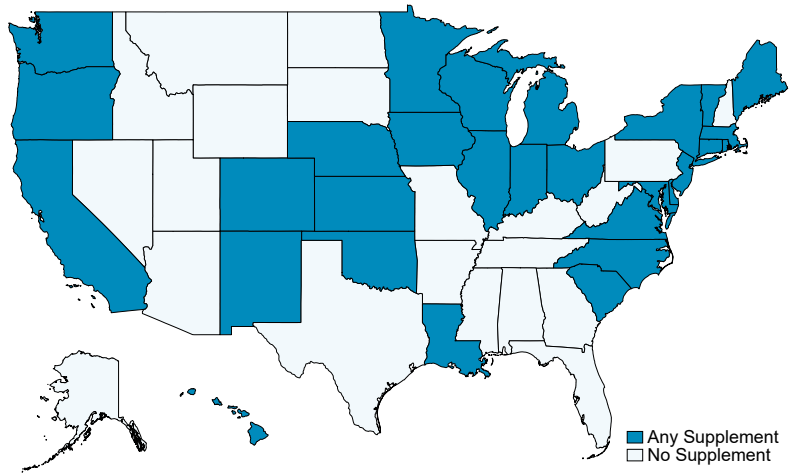
2000



2010



2018

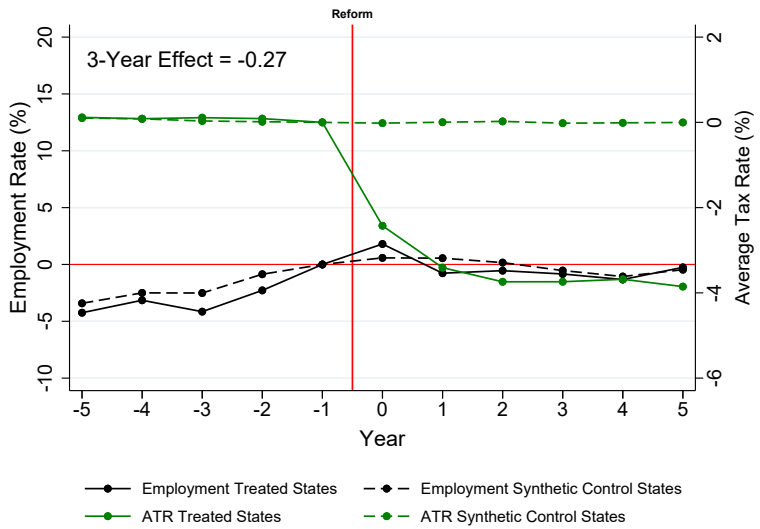


Stacked Event Studies: All Reforms

Weekly Employment, Bottom Half of Predicted Earnings

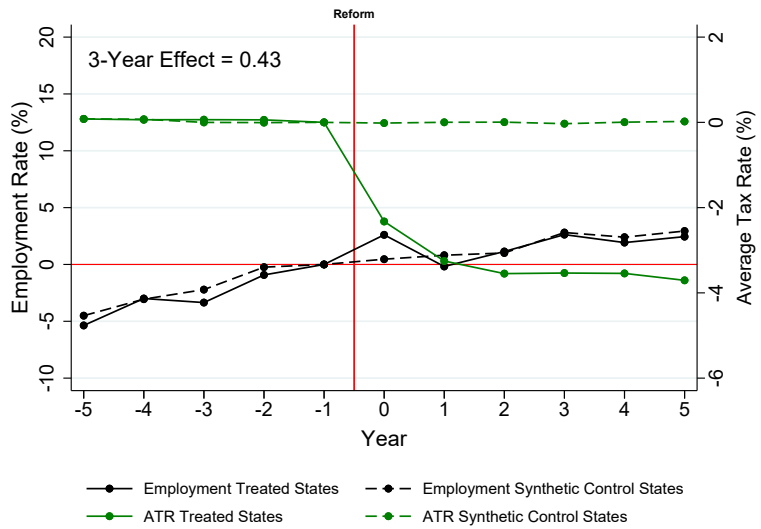
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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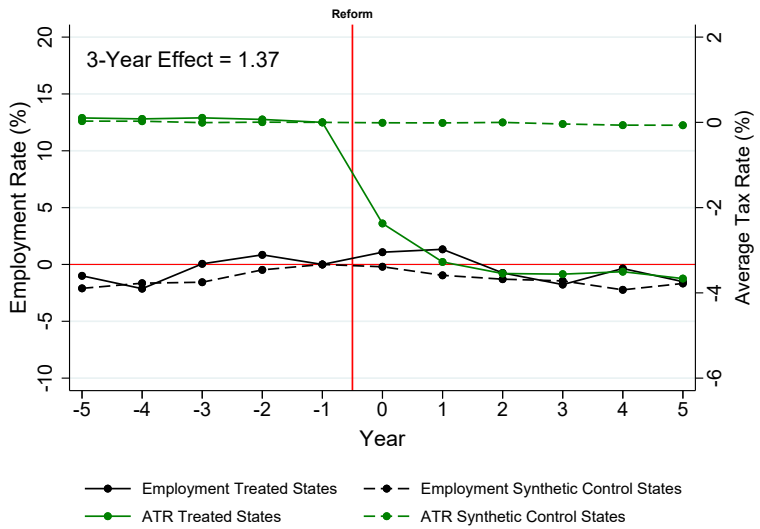
Stacked Event Studies: All Reforms

Annual Employment, All Single Women

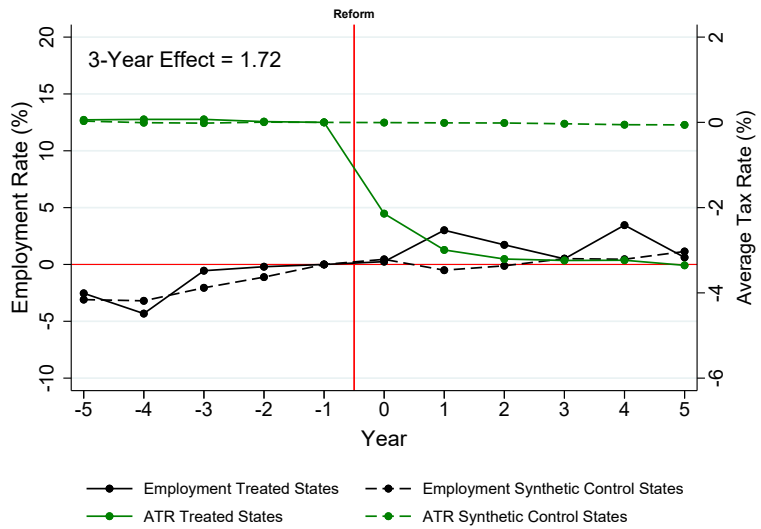
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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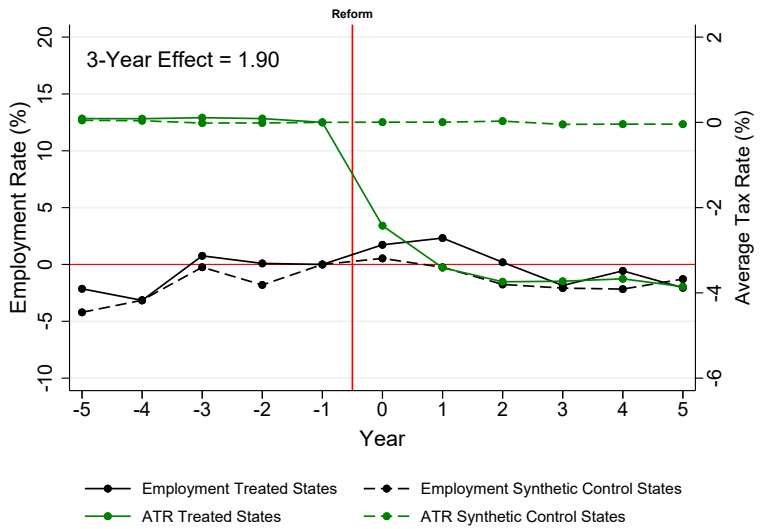
Stacked Event Studies: All Reforms

Annual Employment, Bottom Half of Predicted Earnings

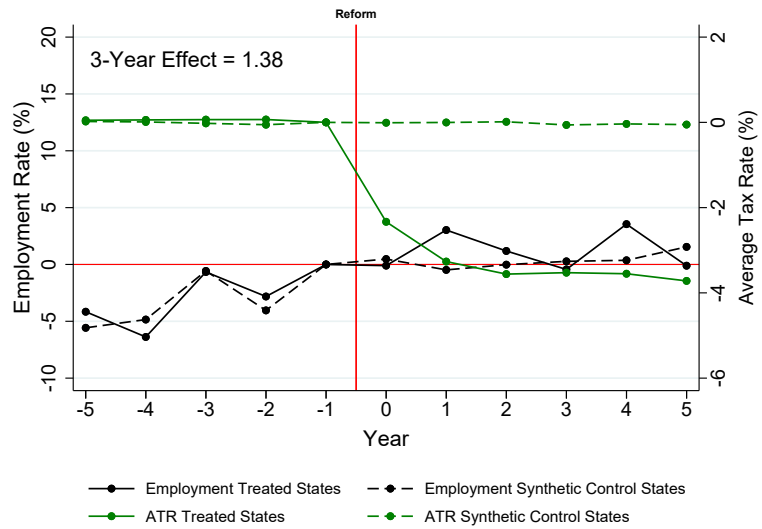
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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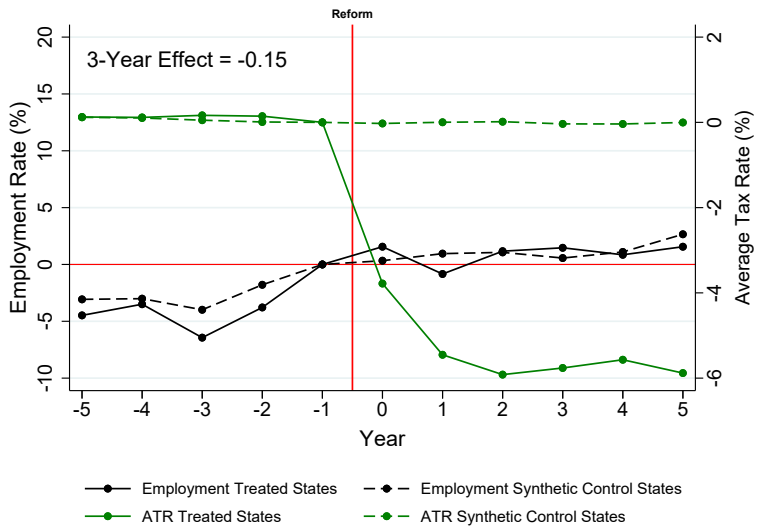
Stacked Event Studies: Ten Largest Reforms

Weekly Employment, Bottom Half of Predicted Earnings

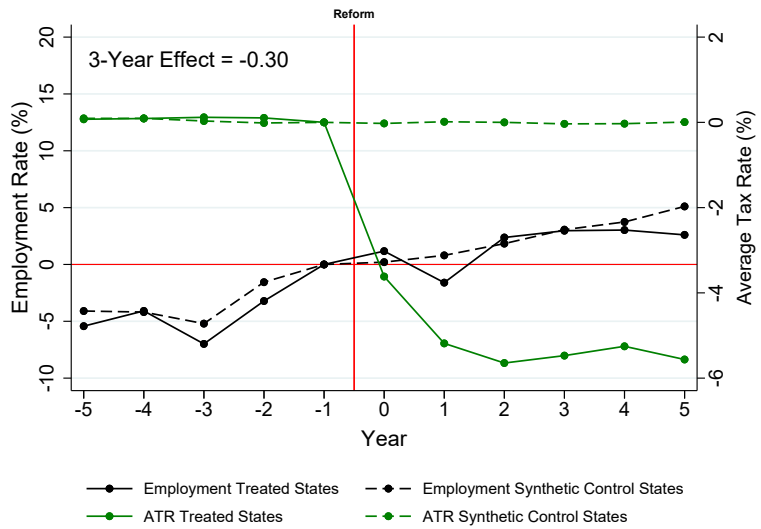
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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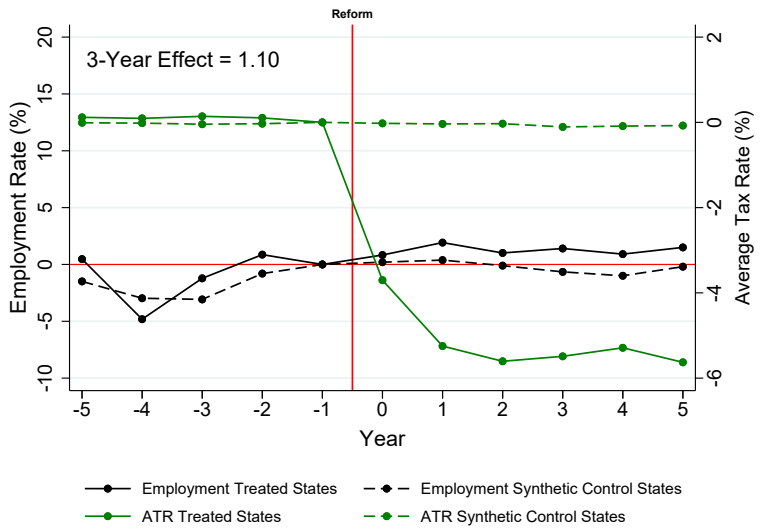
Stacked Event Studies: Ten Largest Reforms

Annual Employment, All Single Women

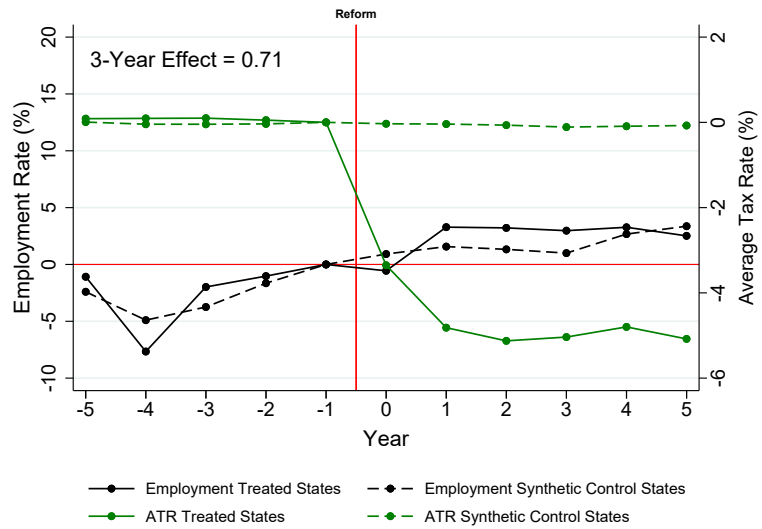
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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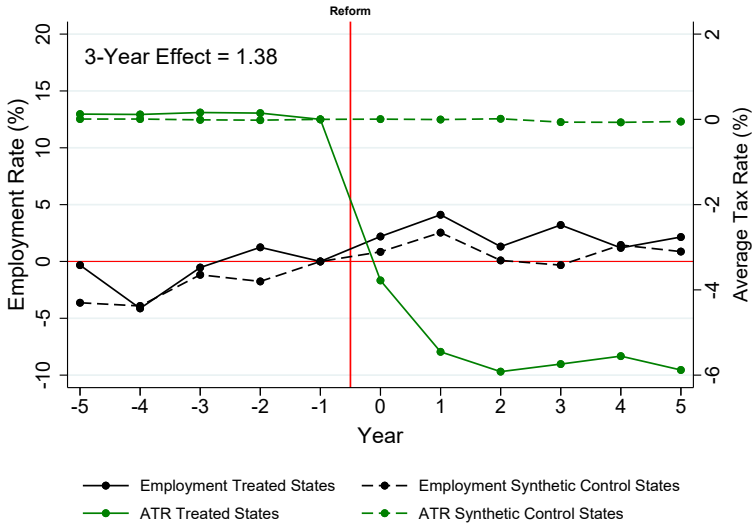
Stacked Event Studies: Ten Largest State Reforms

Annual Employment, Bottom Half of Predicted Earnings

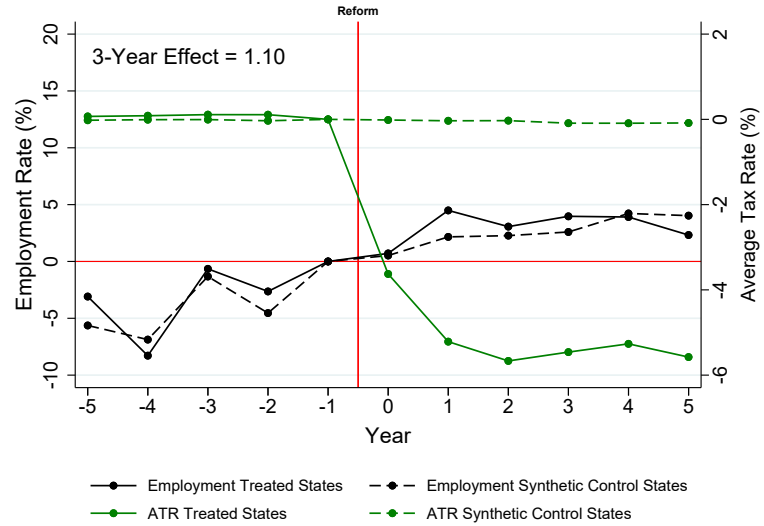
Difference-in-Differences:

Treated vs Control States (With Kids)



Triple-Differences:

Treated vs Control States (With vs Without Kids)



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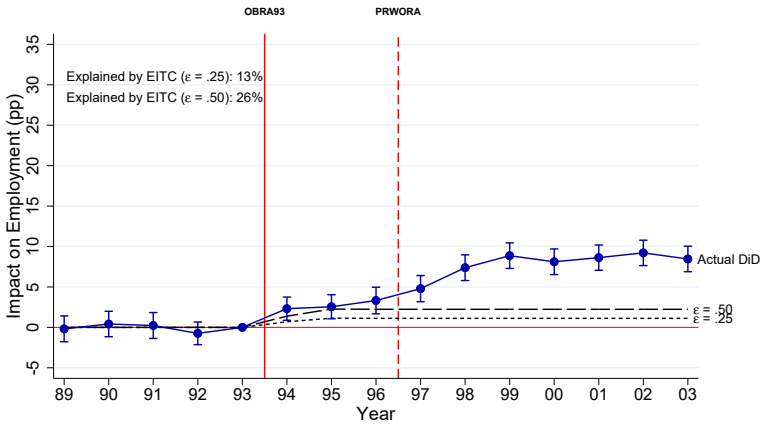
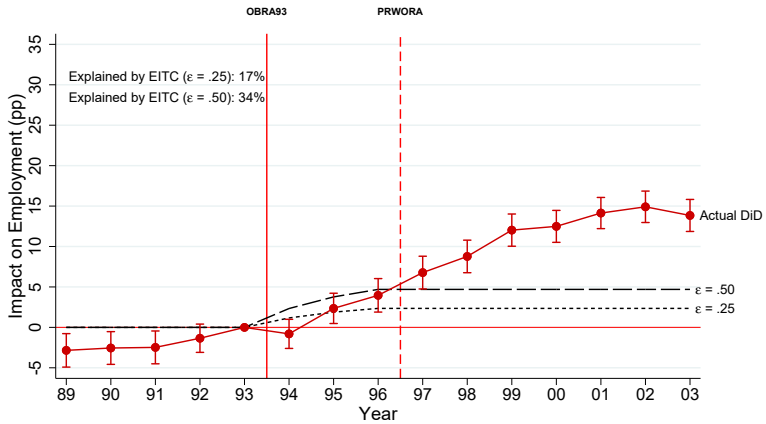
Actual DiD vs Simulated Responses by Family Size

Weekly Employment, All Single Women

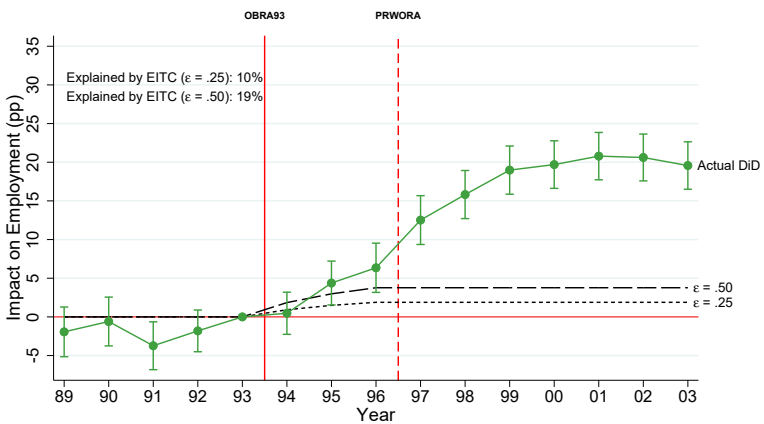
1 vs 0 Children



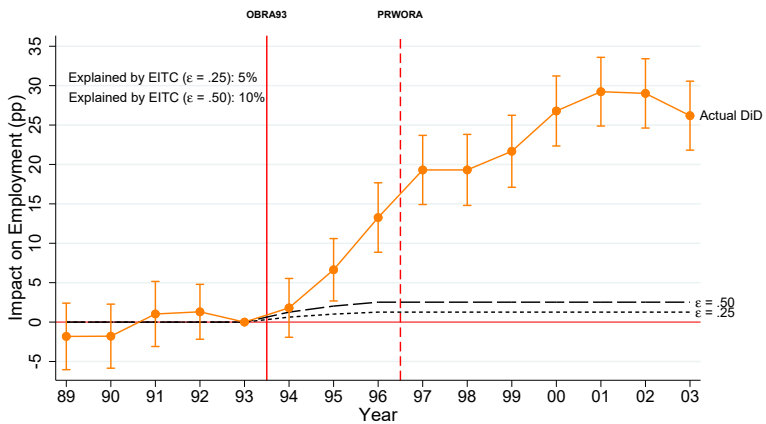
2 vs 0 Children



3 vs 0 Children



4+ vs 0 Children



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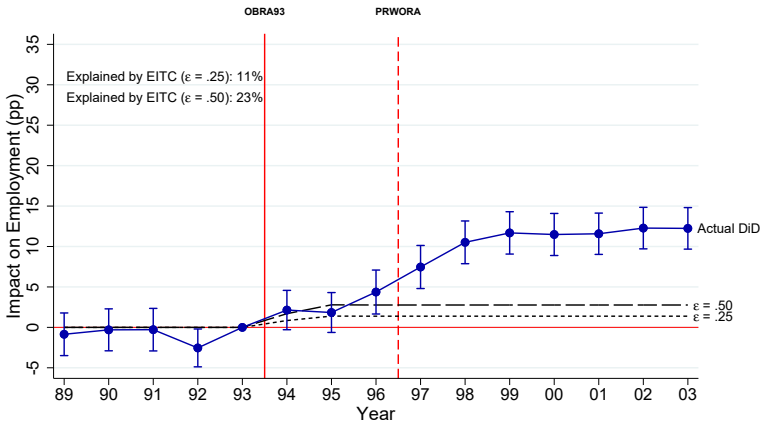
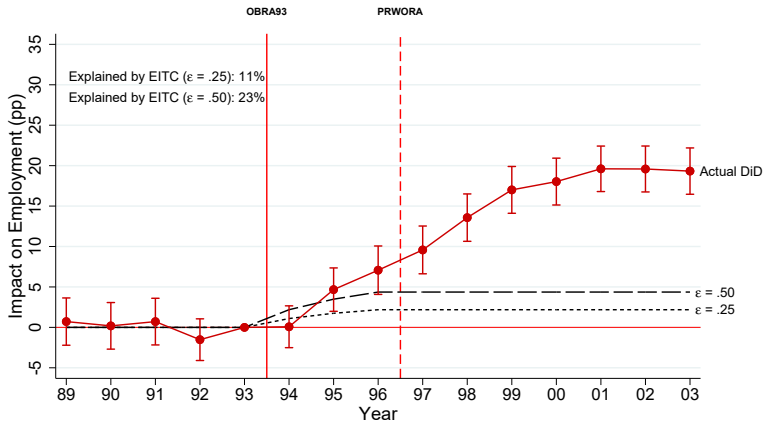
Actual DiD vs Simulated Responses by Family Size

Weekly Employment, Bottom Half of Predicted Earnings

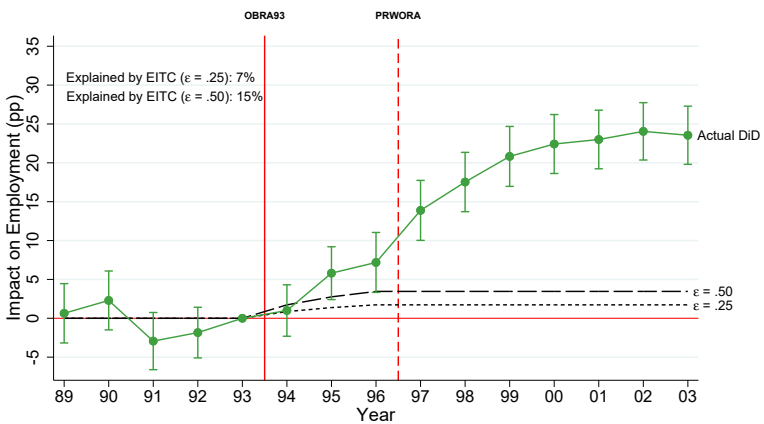
1 vs 0 Children



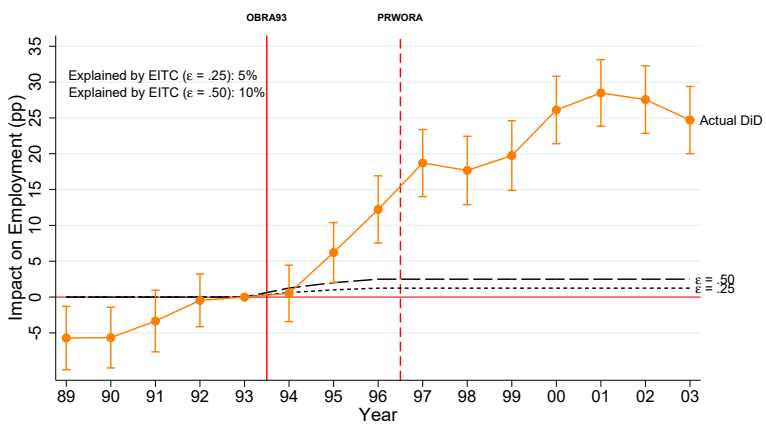
2 vs 0 Children



3 vs 0 Children



4+ vs 0 Children



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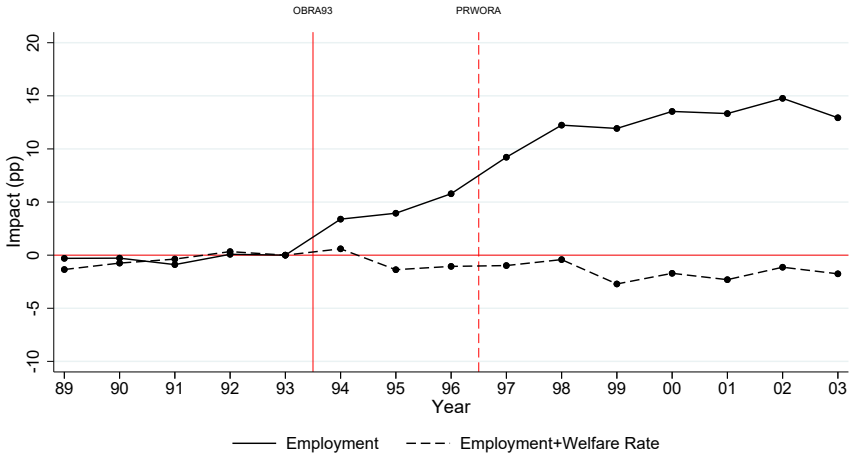
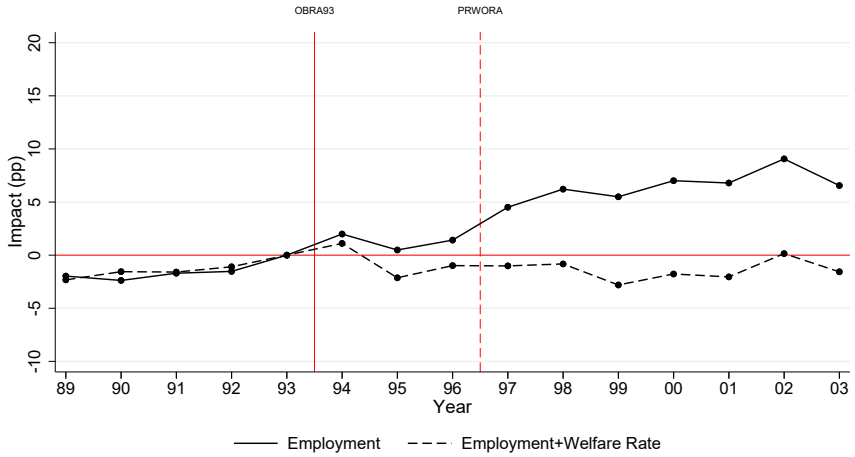
Event Study of Employment+Welfare Rate

By Number of Children

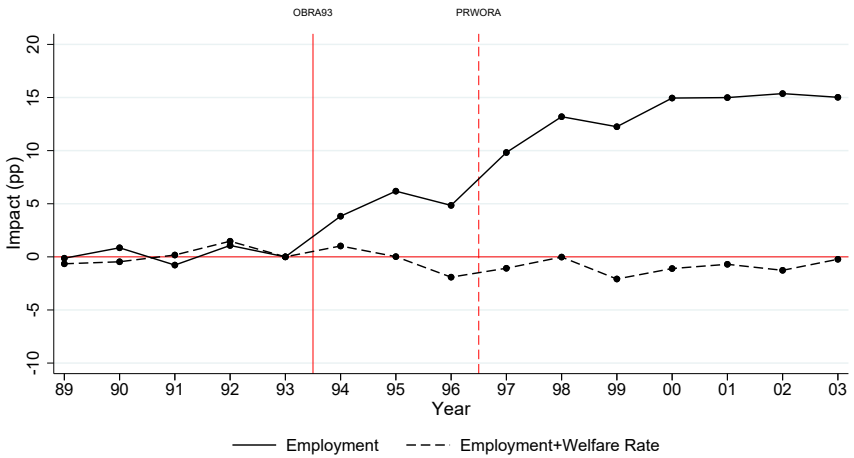
With vs Without Children



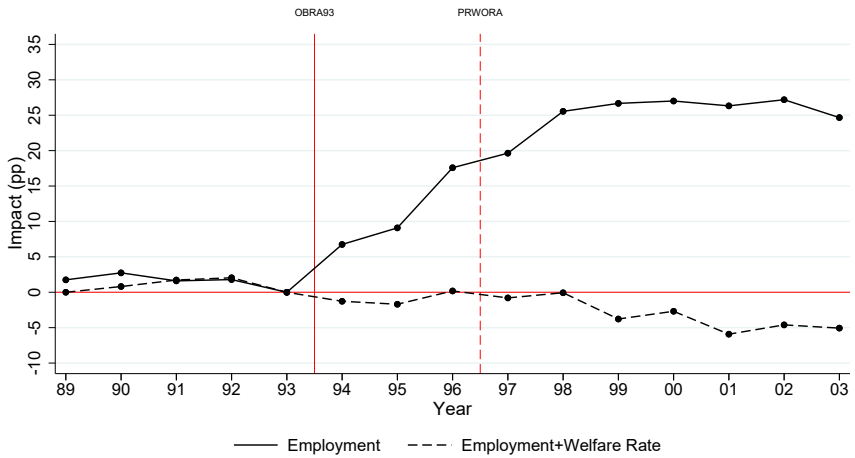
1 vs 0 Children



2 vs 0 Children



3+ vs 0 Children



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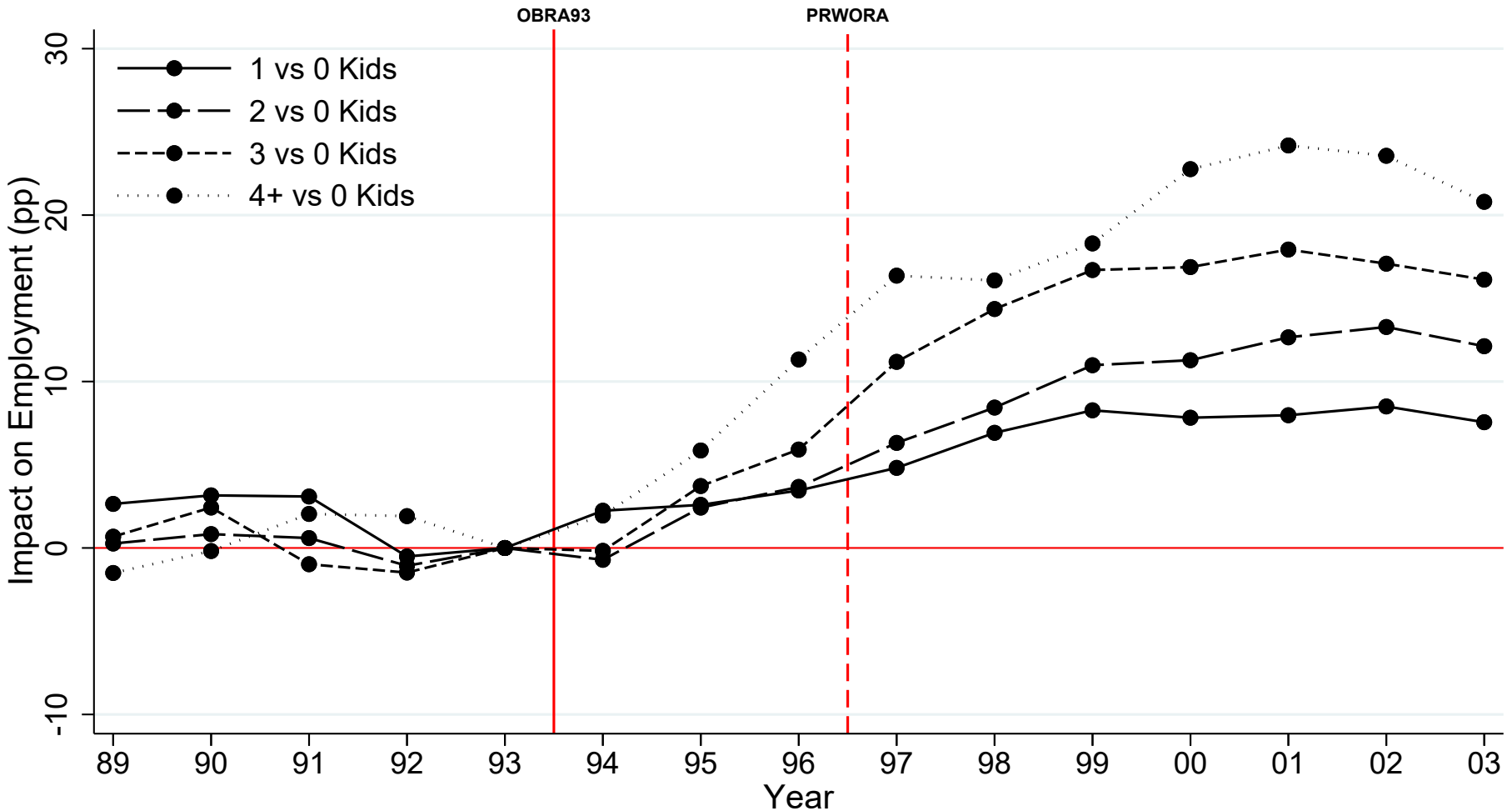
DiD By Number of Children

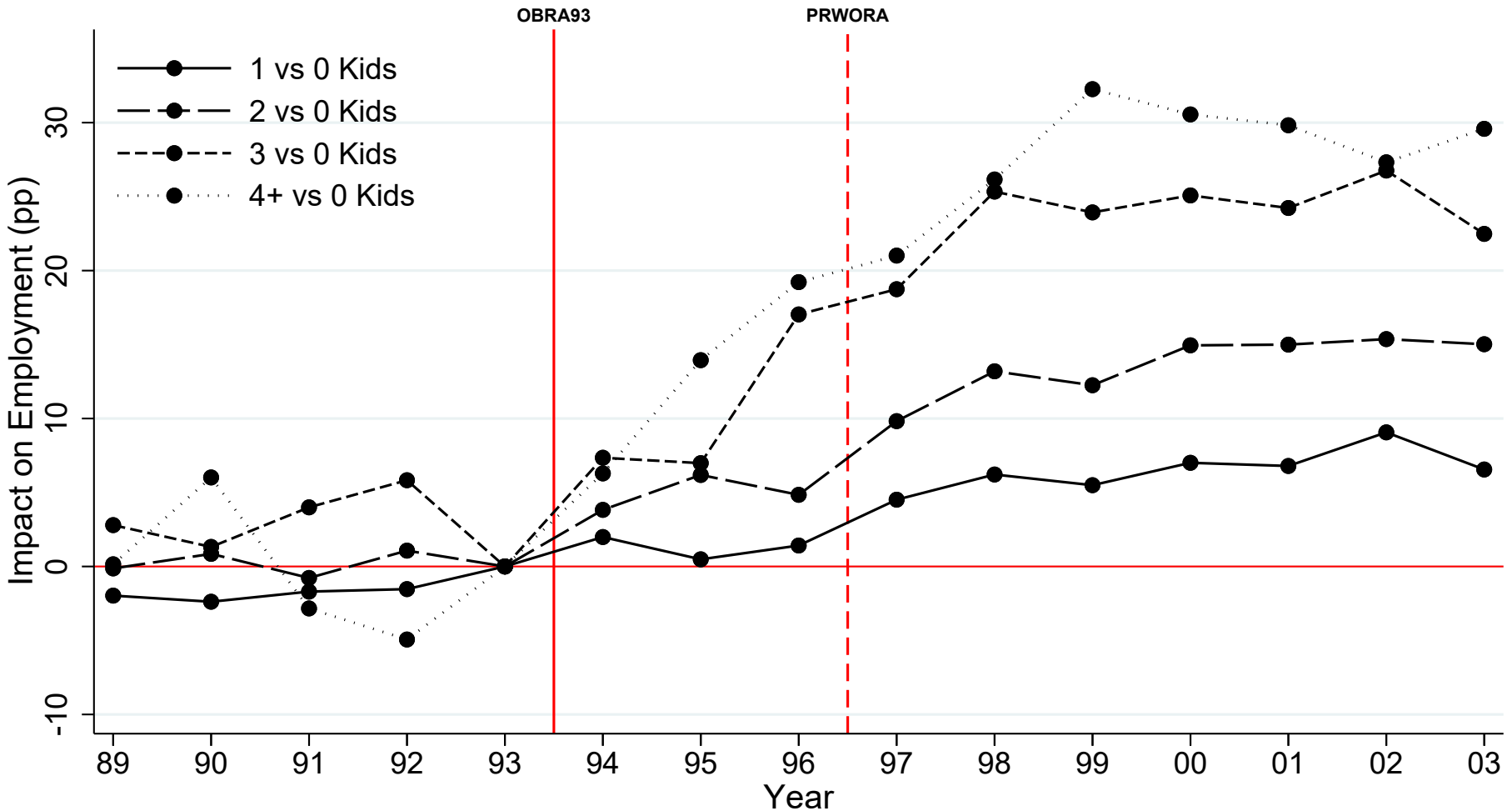
Weekly Employment, All Single Women, With Demographic Controls



No Controls

DiD By Number of Children

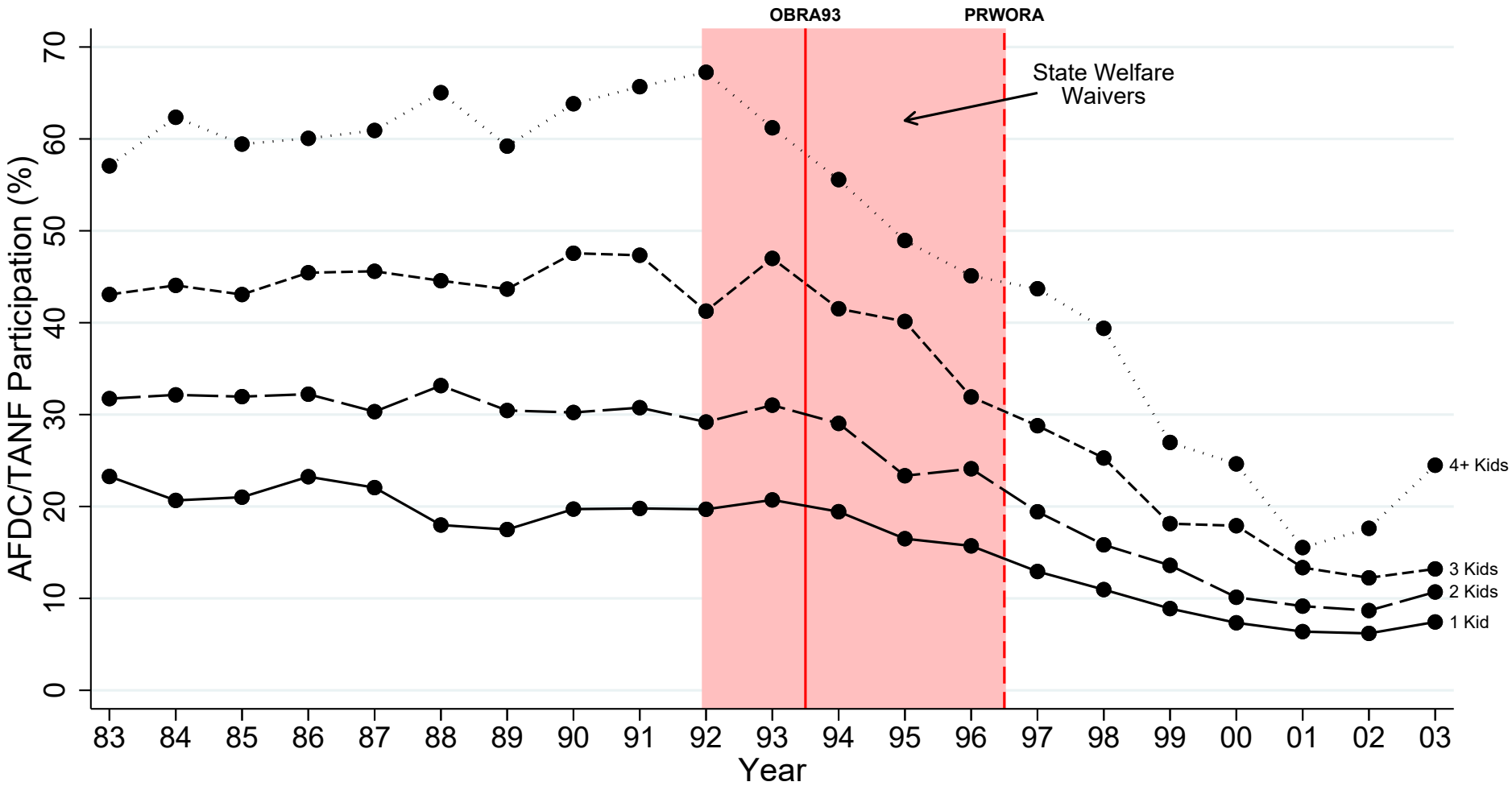
Annual Employment, All Single Women



Weekly Employment

AFDC/TANF Participation of Single Women

By Number of Children



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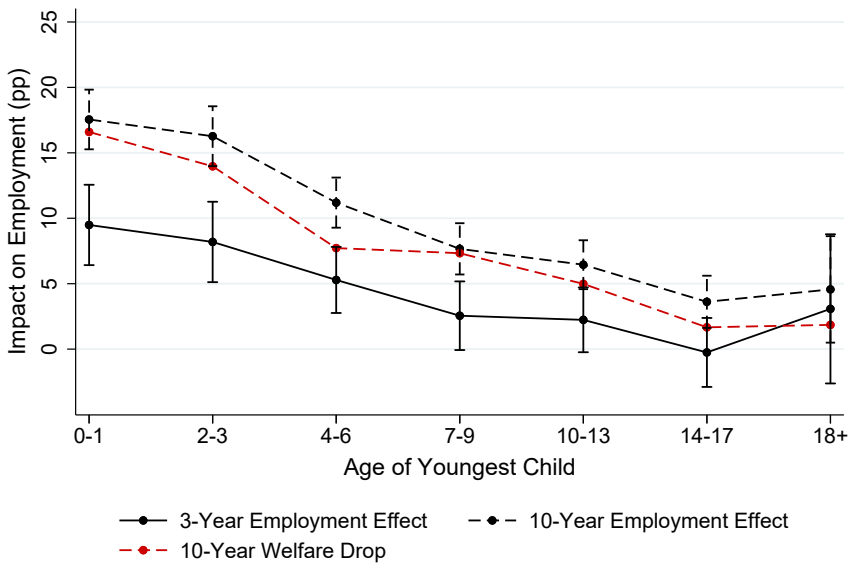
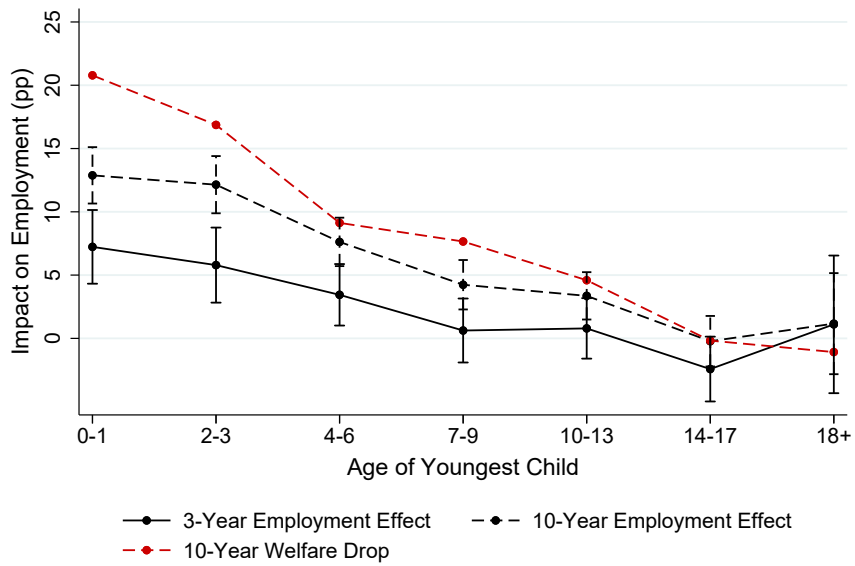
Effects of the EITC by Age of Youngest Child

Annual Employment, All Single Women

Raw Data



With Controls

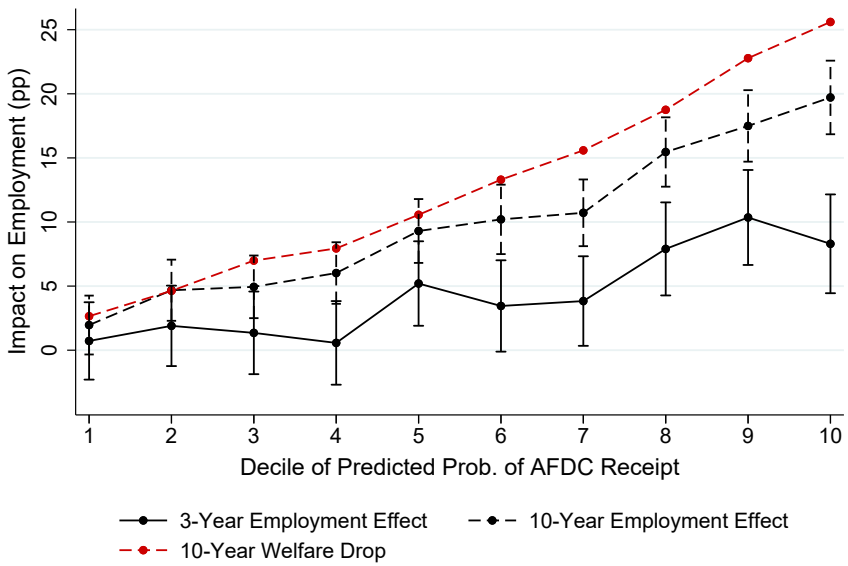


Weekly Employment

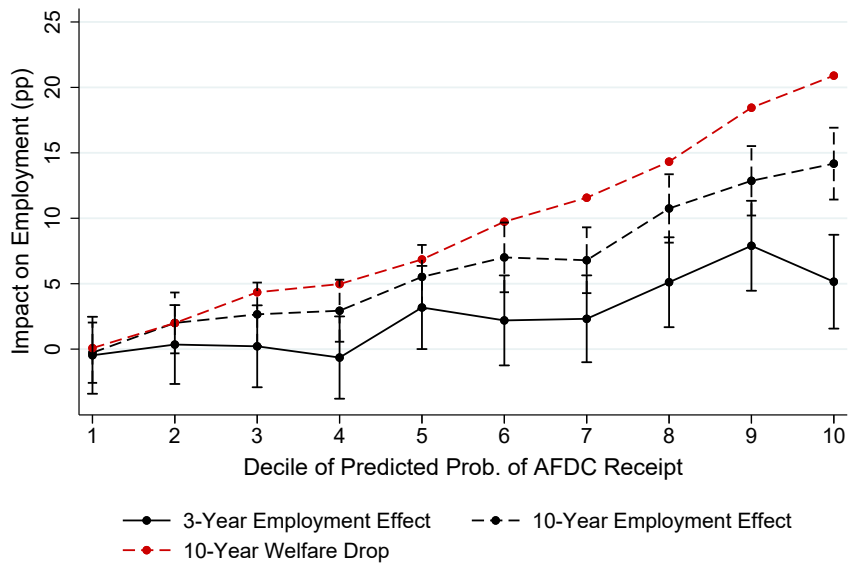
Effects of the EITC by Prob. of AFDC Participation

Annual Employment, All Single Women

Raw Data



With Controls

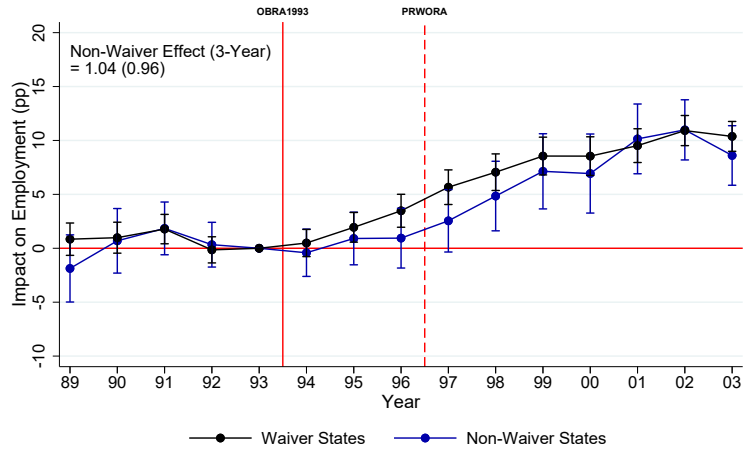


Weekly Employment

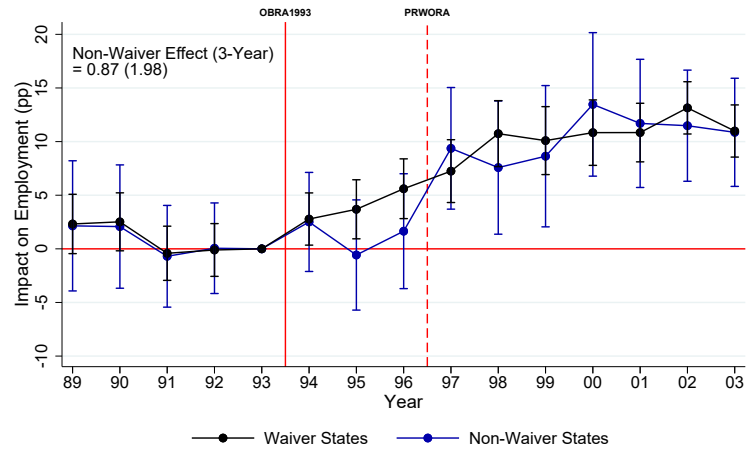
Waiver vs Non-Waiver States

Varying the Outcome and Sample

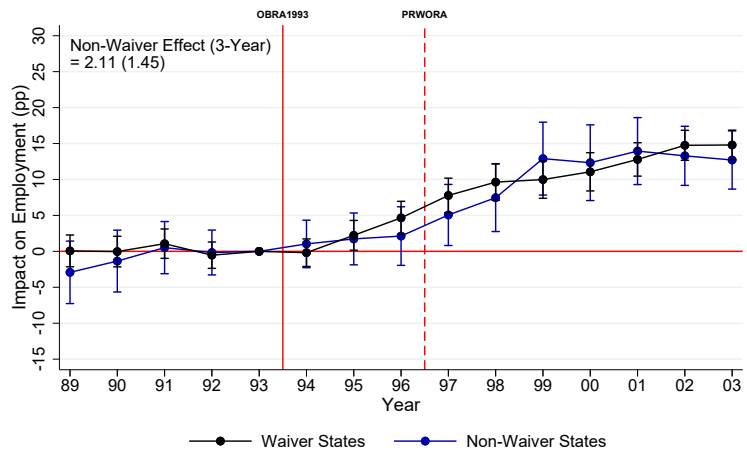
Weekly Employment, All



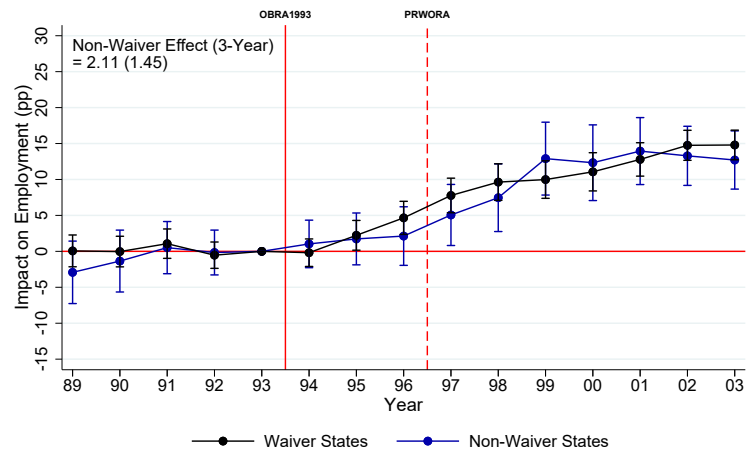
Annual Employment, All



Weekly Employment, Low Pred Earnings



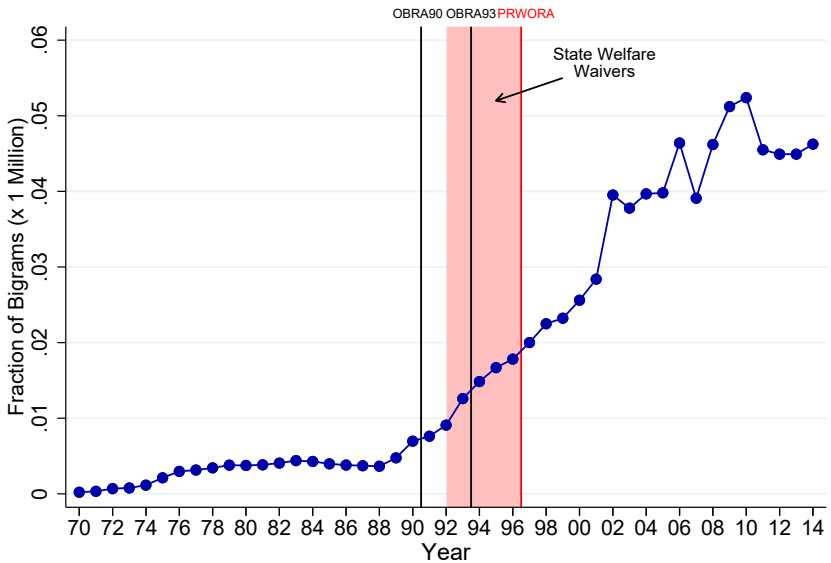
Annual Employment, Low Pred Earnings



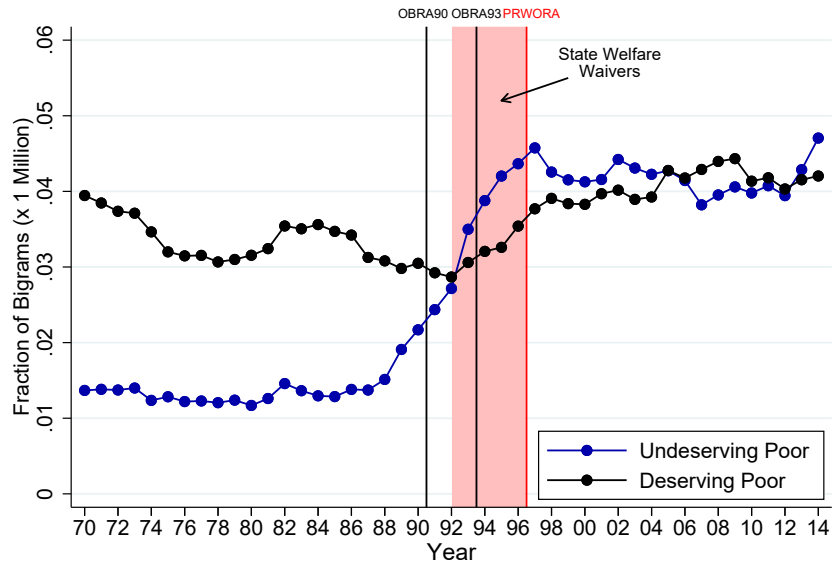
Baseline

Use of Loaded Language

Welfare Queen



Deserving vs Undeserving Poor



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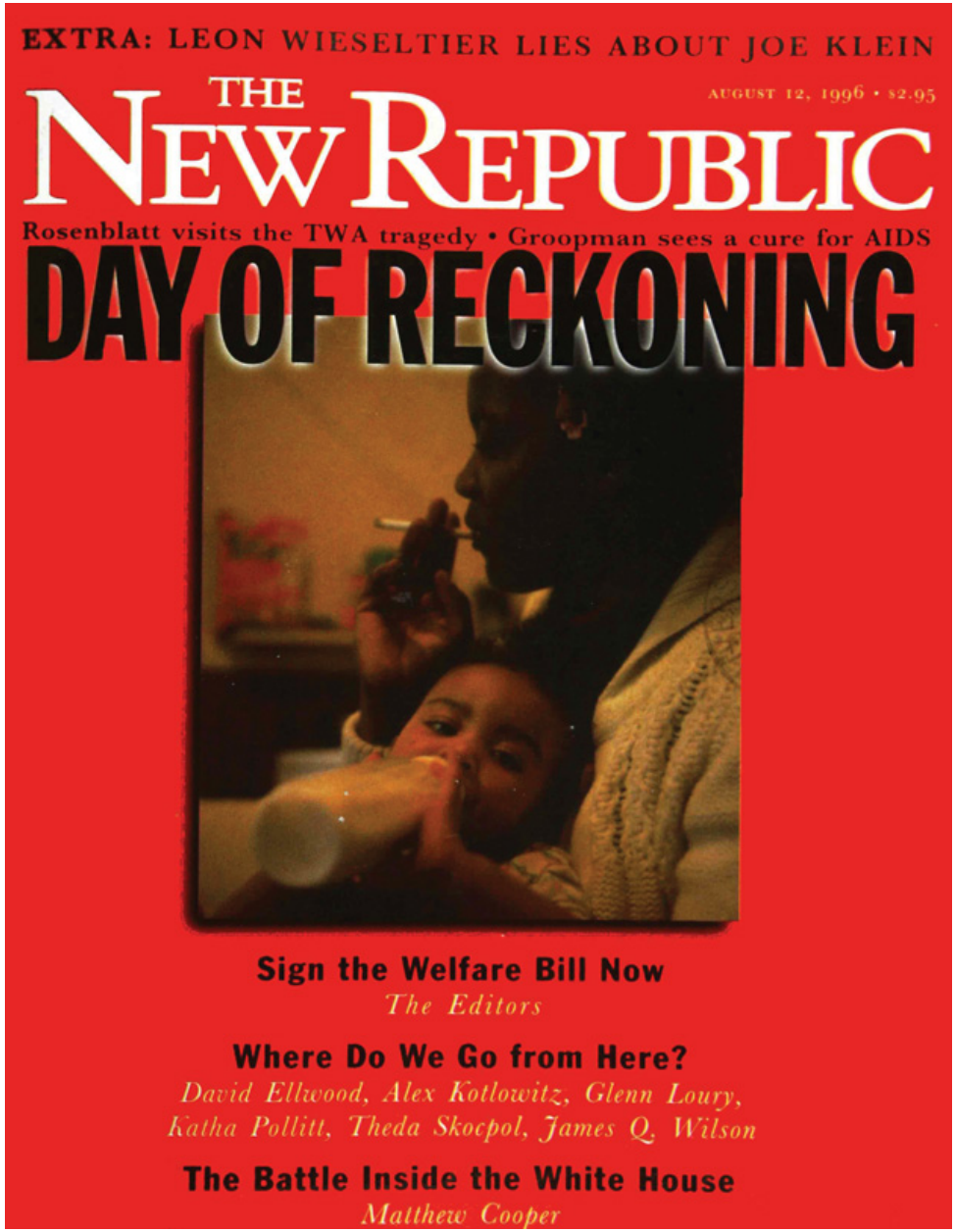
A Picture Is Worth A Thousand Words



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