# 230B: Public Economics
# Labor Supply Responses to Taxes and Transfers

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# MOTIVATION

1) Labor supply responses to taxation are of fundamental importance for income tax policy [efficiency costs and optimal tax formulas]

2) Labor supply responses along many dimensions:

(a) Intensive: hours of work on the job, intensity of work, occupational choice [including education]

(b) Extensive: whether to work or not [e.g., single parent who needs child care, retirement and migration decisions]

3) Reported earnings for tax purposes can also vary due to (a) tax avoidance [legal tax minimization], (b) tax evasion [illegal under-reporting]

4) Different responses in short-run and long-run: long-run response most important for policy but hardest to estimate

# STATIC MODEL: SETUP

Baseline model: (a) static, (b) linearized tax system, (c) pure intensive margin choice, (d) single hours choice, (e) no frictions

Let $c$ denote consumption and $l$ hours worked, utility $u(c, l)$ increases in $c$, and decreases in $l$

Individual earns wage $w$ per hour (net of taxes) and has $y$ in non-labor income

Key example: pre-tax wage rate $w^p$ and linear tax system with tax rate $\tau$ and demogrant $G \Rightarrow c = w^p(1-\tau)l + G$

Individual solves

$$\max_{c,l} u(c, l) \quad \text{subject to} \quad c = wl + y$$

# LABOR SUPPLY BEHAVIOR

FOC: $wu_c + u_l = 0$ defines uncompensated (Marshallian) labor supply function $l^u(w, y)$

Uncompensated elasticity of labor supply: $\varepsilon^u = (w/l)\partial l^u/\partial w$ [% change in hours when net wage $w \uparrow$ by 1%]

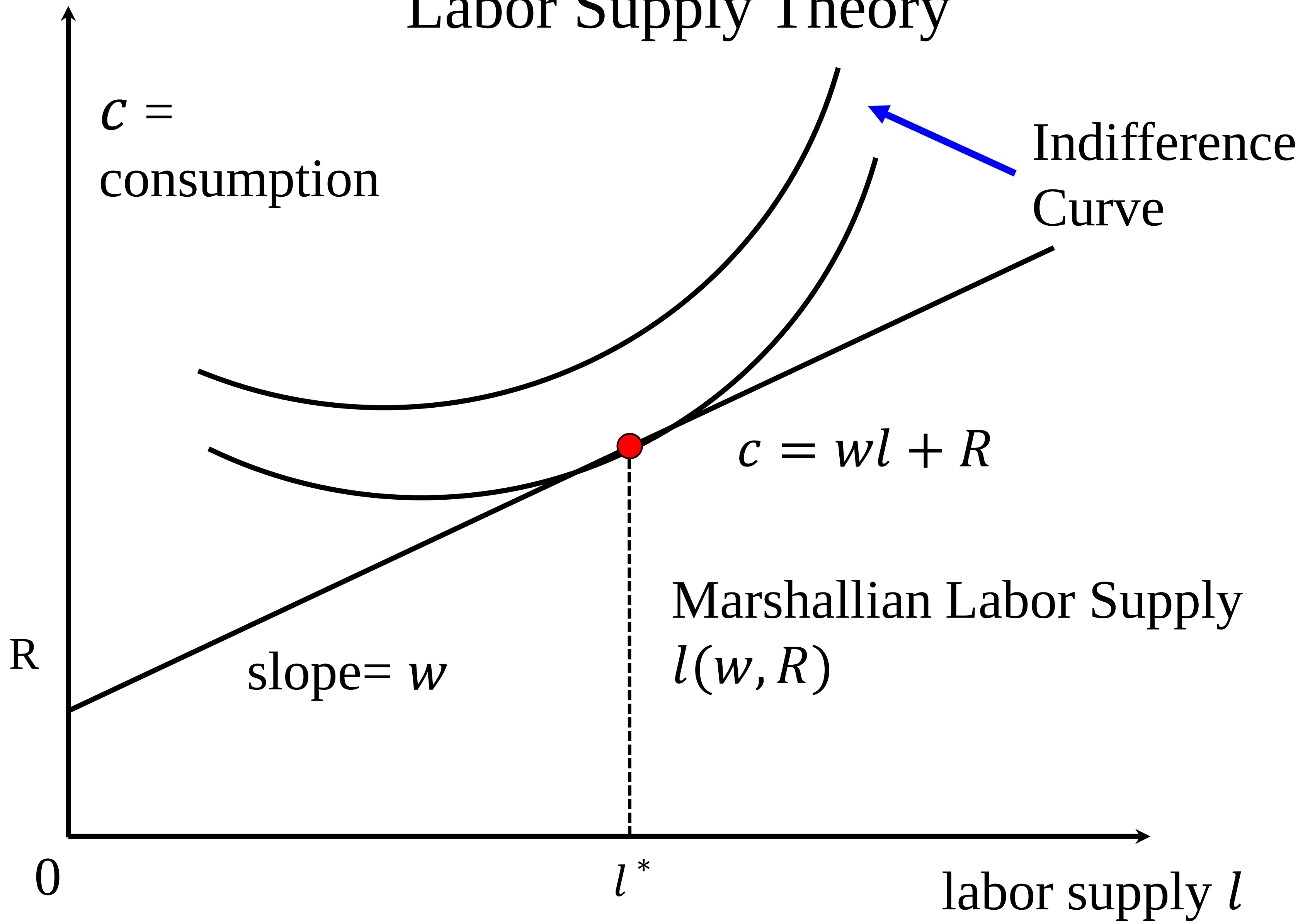
Income effect parameter: $\eta = w\partial l/\partial y \leq 0$: $ increase in earnings if person receives $1 extra in non-labor income

Compensated (Hicksian) labor supply function $l^c(w, u)$ which minimizes cost $c - wl$ st to constraint $u(c, l) \geq u$.

Compensated elasticity of labor supply: $\varepsilon^c = (w/l)\partial l^c/\partial w > 0$

Slutsky equation: $\partial l/\partial w = \partial l^c/\partial w + l\partial l/\partial y \Rightarrow \varepsilon^u = \varepsilon^c + \eta$

# Labor Supply Theory



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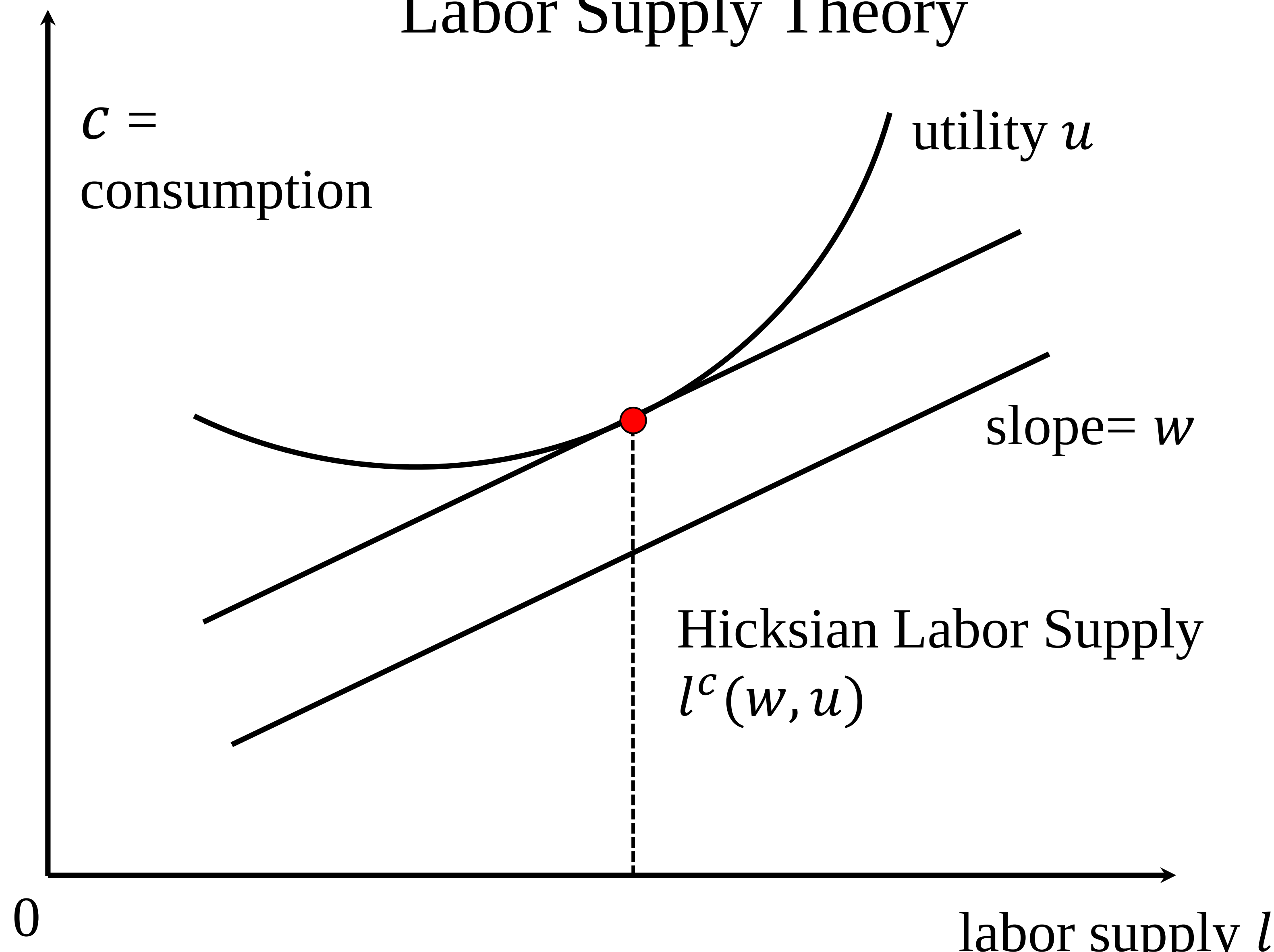
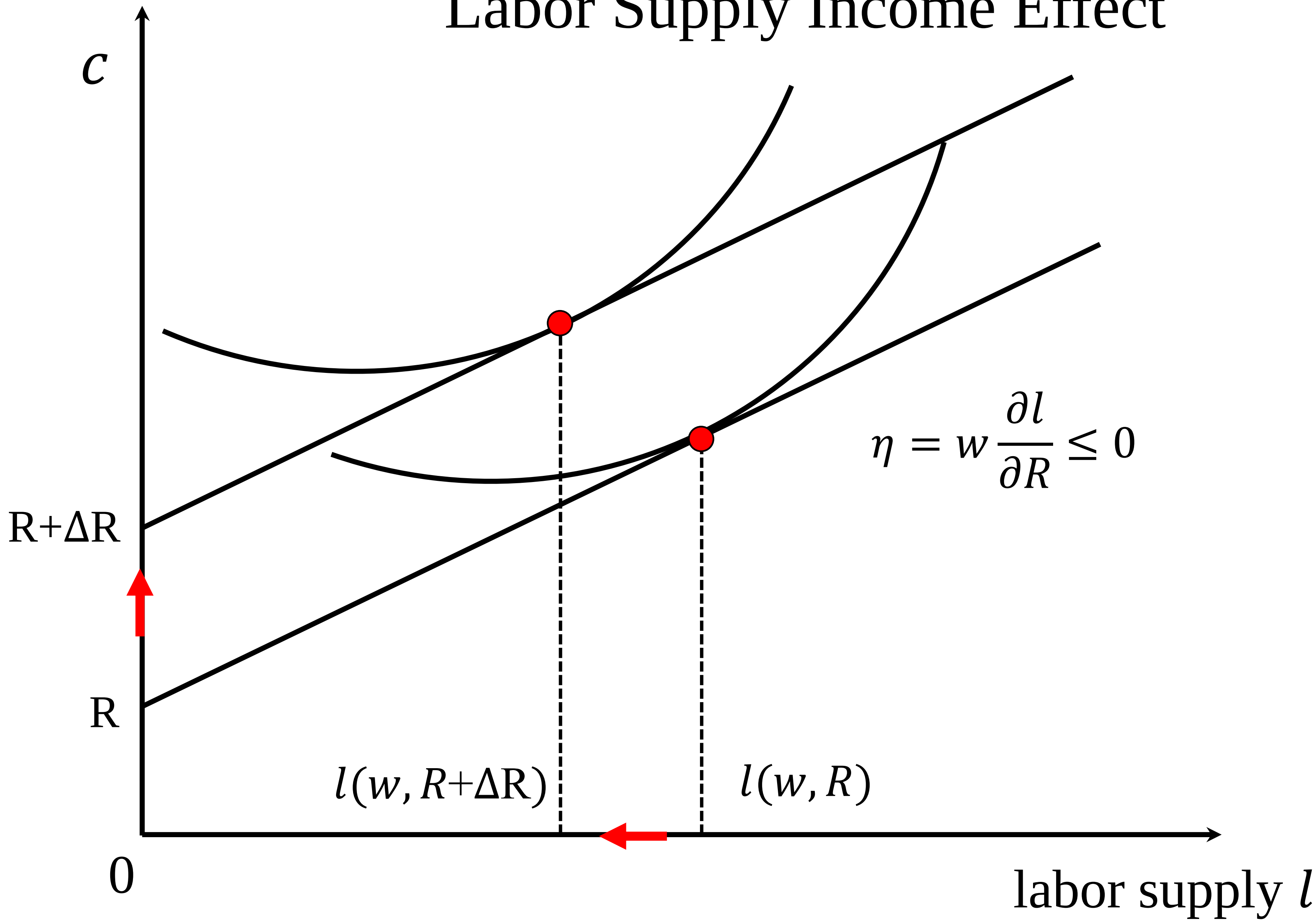
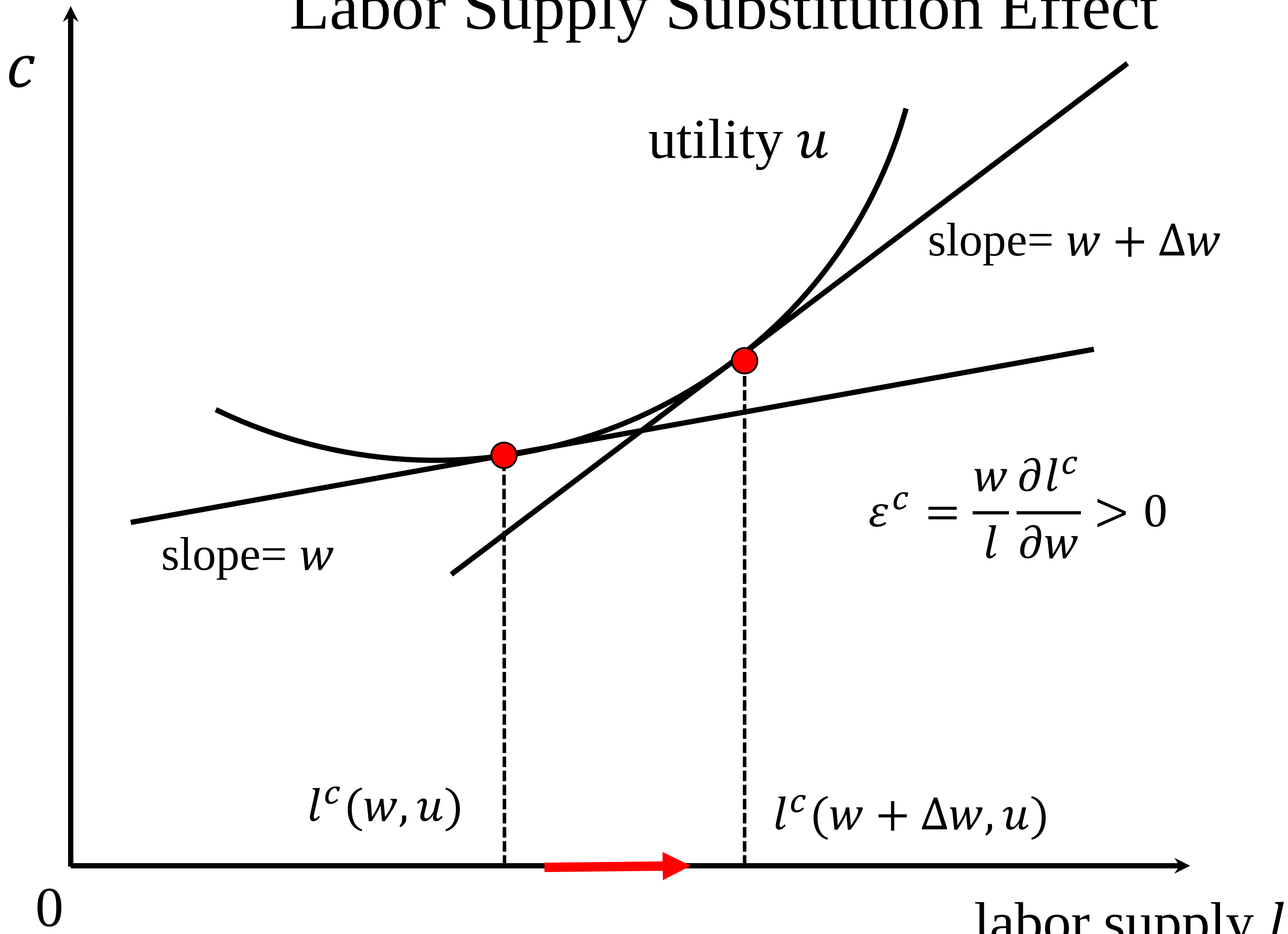


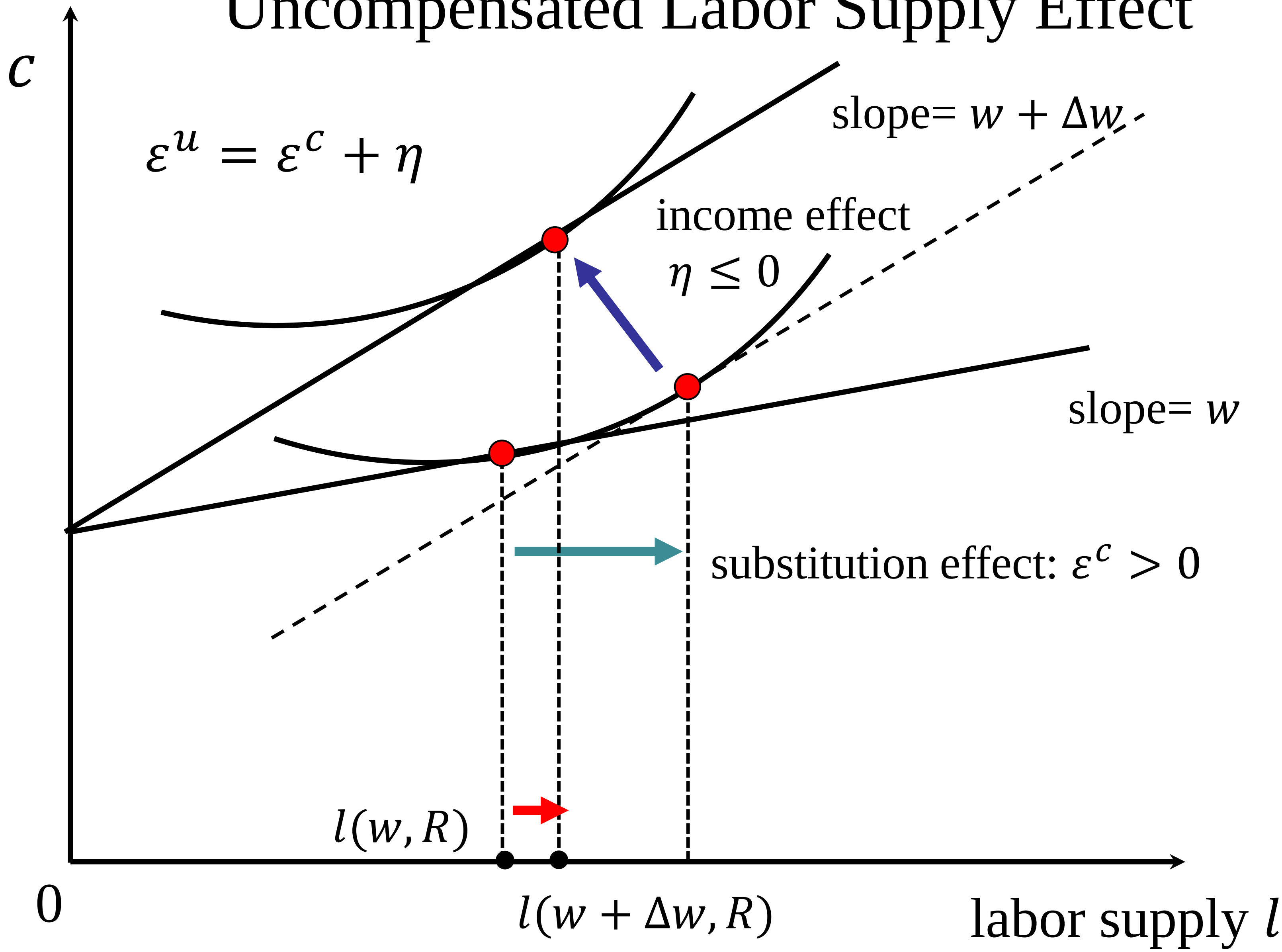
# Labor Supply Income Effect



# Labor Supply Substitution Effect



# Uncompensated Labor Supply Effect



# BASIC CROSS SECTION ESTIMATION

Data on hours or work, wage rates, non-labor income started becoming available in the 1960s when first micro surveys and computers appeared:

Simple OLS regression:

$$l_i = \alpha + \beta w_i + \gamma y_i + X_i \delta + \epsilon_i$$

$w_i$ is the net-of-tax wage rate

$y_i$ measures non-labor income [including spousal earnings for couples]

$X_i$ are demographic controls [age, experience, education, etc.]

$\beta$ measures uncompensated wage effects, and $\gamma$ income effects [can be converted to $\varepsilon^u$, $\eta$]

# BASIC CROSS SECTION RESULTS

**1. Male workers** [primary earners when married] (Pencavel, 1986 survey):

a) Small effects $\varepsilon^u = 0$, $\eta = -0.1$, $\varepsilon^c = 0.1$ with some variation across estimates (sometimes $\varepsilon^c < 0$).

**2. Female workers** [secondary earners when married] (Killingsworth and Heckman, 1986):

Much larger elasticities on average, with larger variations across studies. Elasticities go from zero to over one. Average around 0.5. Significant income effects as well

Female labor supply elasticities have declined overtime as women become more attached to labor market (Blau-Kahn JOLE'07)

## KEY ISSUE: $w$ correlated with tastes for work

$$l_i = \alpha + \beta w_i + \gamma y_i + \epsilon_i$$

Identification is based on cross-sectional variation in $w_i$: comparing hours of work of highly skilled individuals (high $w_i$) to hours of work of low skilled individuals (low $w_i$)

If highly skilled workers have more taste for work (independent of the wage effect), then $\epsilon_i$ is positively correlated with $w_i$ leading to an upward bias in OLS

Plausible scenario: hard workers acquire better education and hence have higher wages

Controlling for $X_i$ can help but can never be sure that we have controlled for all the factors correlated with $w_i$ and tastes for work: **Omitted variable bias**

$\Rightarrow$ Tax changes provide more compelling identification

## Negative Income Tax (NIT) Experiments

1) Best way to resolve identification problems: exogenously change taxes/transfers with a **randomized experiment**

2) NIT experiment conducted in 1960s/70s in Denver, Seattle, and other cities

3) First major social experiment in U.S. designed to test proposed transfer policy reform

4) Provided lump-sum welfare grants $G$ combined with a steep phaseout rate $\tau$ (50%-80%) [based on family earnings]

5) Analysis by Rees (1974), Munnell (1986) book, Ashenfelter and Plant JOLE'90, and others

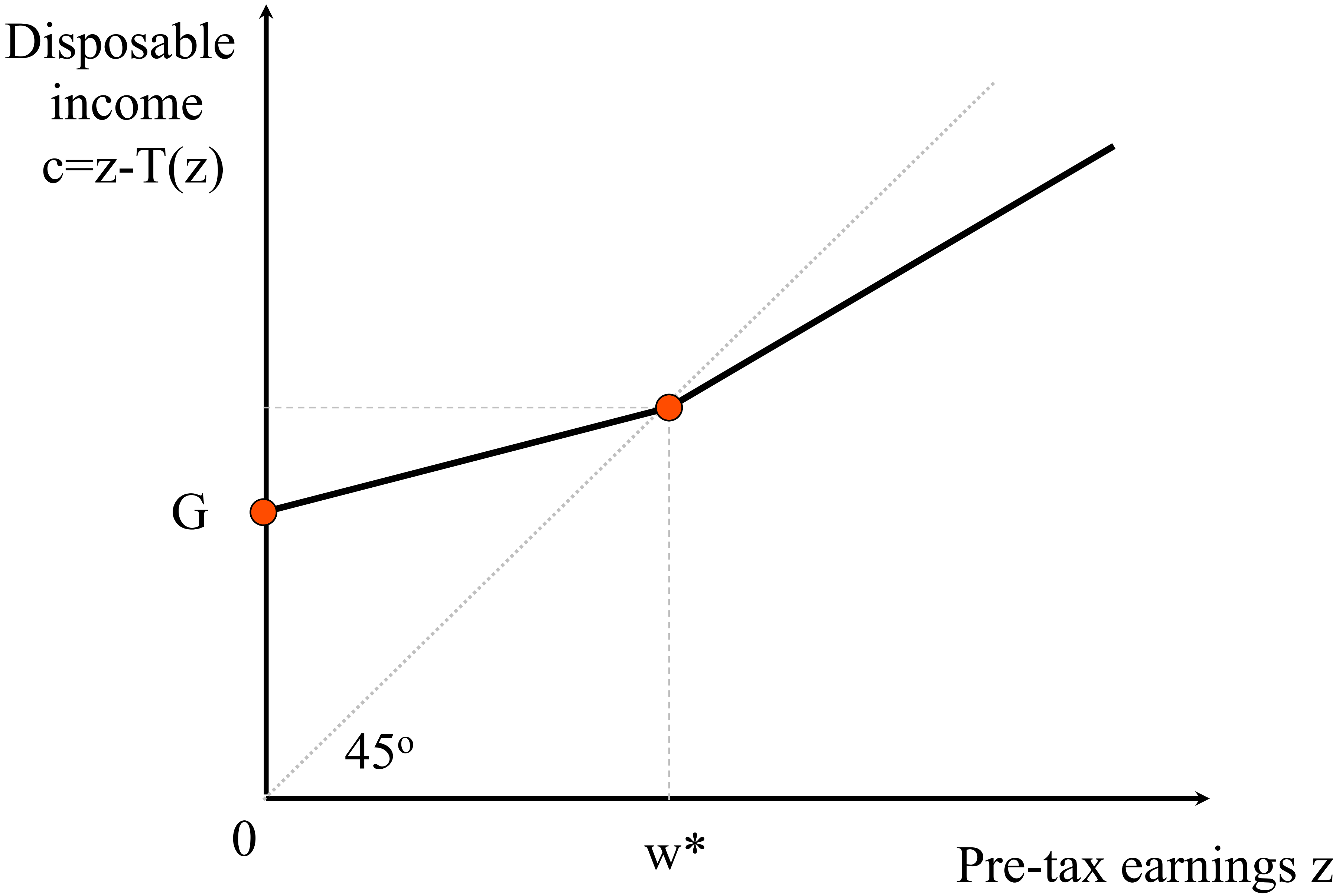
6) Several groups, with randomization within each; approx. N = 75 households in each group

**Table 1**
**Parameters of the 11 Negative Income Tax Programs**

| Program Number | $G$ (\$) | $\tau$ | Declining Tax Rate | Break-even Income (\$) |
|---|---|---|---|---|
| 1 | 3,800 | .5 | No | 7,600 |
| 2 | 3,800 | .7 | No | 5,429 |
| 3 | 3,800 | .7 | Yes | 7,367 |
| 4 | 3,800 | .8 | Yes | 5,802 |
| 5 | 4,800 | .5 | No | 9,600 |
| 6 | 4,800 | .7 | No | 6,857 |
| 7 | 4,800 | .7 | Yes | 12,000 |
| 8 | 4,800 | .8 | Yes | 8,000 |
| 9 | 5,600 | .5 | No | 11,200 |
| 10 | 5,600 | .7 | No | 8,000 |
| 11 | 5,600 | .8 | Yes | 10,360 |

Source: Ashenfelter and Plant (1990), p. 403

# Starting from a Means-Tested Program



## NIT Experiments: Findings

See Ashenfelter and Plant JHR' 90 for non-parametric evidence. More parametric evidence in earlier work. Key results:

1) Significant labor supply response but small overall

2) Implied earnings elasticity for males around 0.1

3) Implied earnings elasticity for women around 0.5

4) Academic literature not careful to decompose response along intensive and extensive margin

5) Response of women is concentrated along the extensive margin (can only be seen in official govt. report)

6) Earnings of treated women who were working before the experiment did not change much

## From true experiment to "natural experiments": income effects on lottery winners

True experiments are costly to implement and hence rare

Real economic world provides variation that can be exploited to estimate behavioral responses $\Rightarrow$ **Natural Experiments**

Natural experiments can come very close to true experiments:

Imbens, Rubin, Sacerdote AER '01 did a survey of lottery winners and non-winners matched to Social Security administrative data to estimate income effects

Lottery generates random assignment conditional on playing

Find significant but relatively small income effects: $\eta = w\partial l/\partial y$ between -0.05 and -0.10

Identification threat: differential response-rate among groups

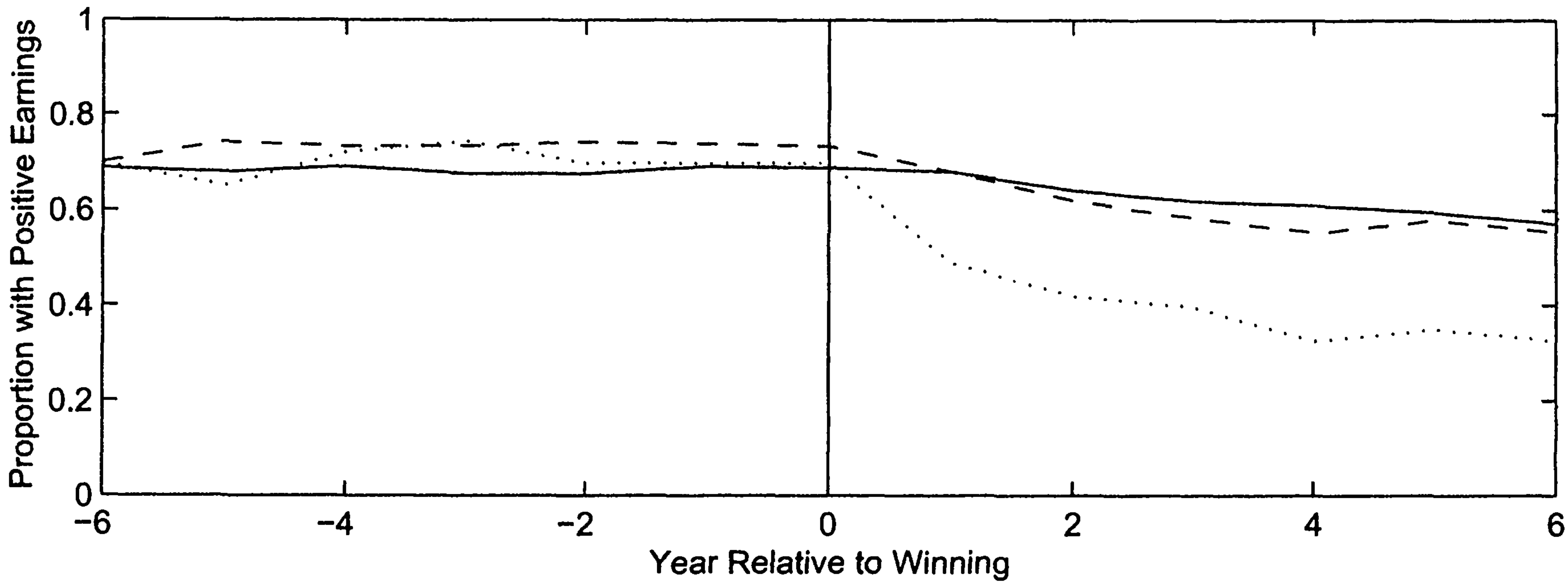



FIGURE 2. PROPORTION WITH POSITIVE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

*Note:* Solid line = nonwinners; dashed line = winners; dotted line = big winners.

Source: Imbens et al (2001), p. 784

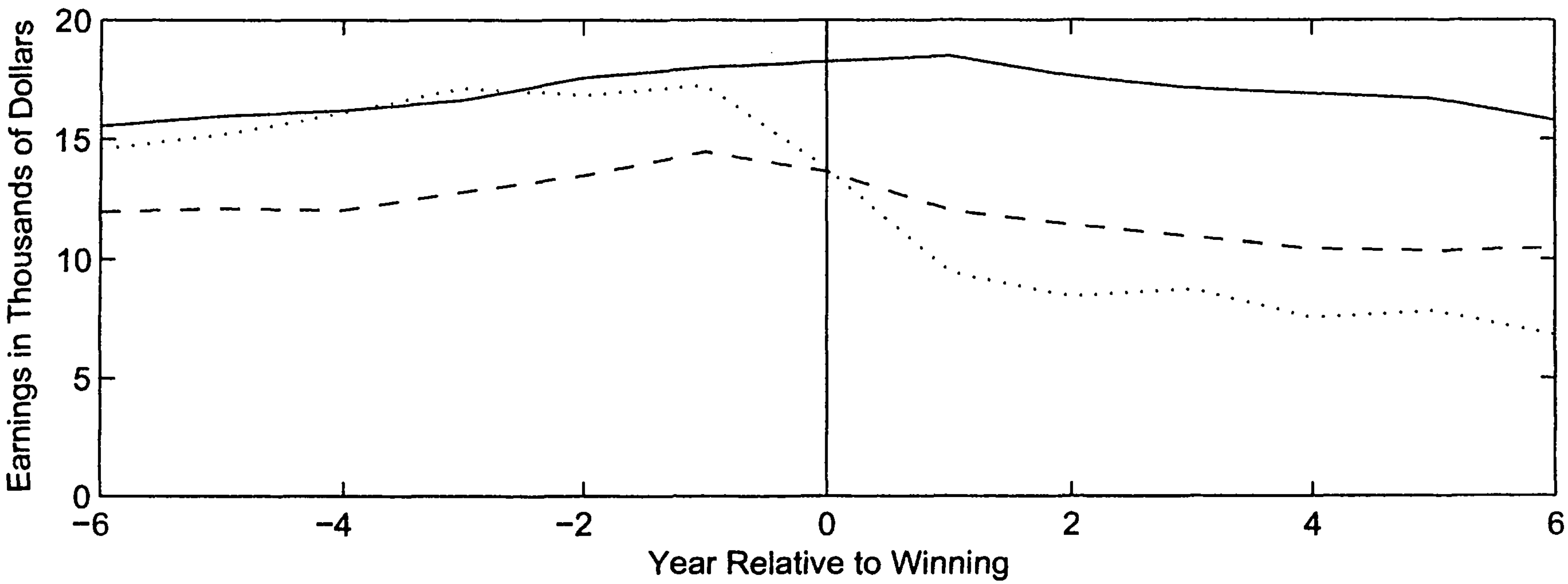



FIGURE 1. AVERAGE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

*Note:* Solid line = nonwinners; dashed line = winners; dotted line = big winners.

Source: Imbens et al. (2001), p. 783

## Difference-in-Difference (DD) methodology

Two groups: Treatment group (T) which faces a change [lottery winners] and control group (C) which does not [non winners]

Compare the evolution of T group (before and after change) to the evolution of the C group (before and after change)

DD identifies the **treatment effect** if the **parallel trend assumption** holds:

Absent the change, $T$ and $C$ would have evolved in parallel

DD most convincing when groups are very similar to start with

Should always test DD using data from more periods and plot the two time series to check parallel trend assumption

## Labor supply and lotteries in Sweden

Cesarini et al. (2017) use Swedish population wide administrative data with more compelling setting: (1) bank accounts with random prizes (PLS), (2) monthly lottery subscription (Kombi), and (3) TV show participants (Triss)

**Key results:**

1) Effects on both extensive and intensive labor supply margin, time persistent

2) Significant but small income effects: $\eta = w\partial l/\partial y \simeq -0.1$

3) Effects on spouse but not as large as on winner

$\Rightarrow$ Rejects the **unitary** model of household labor supply: $\max u(c_1, c_2, l_1, l_2)$ st $c_1 + c_2 \leq w_1 l_1 + w_2 l_2 + R \Rightarrow$ only household $R$ matters

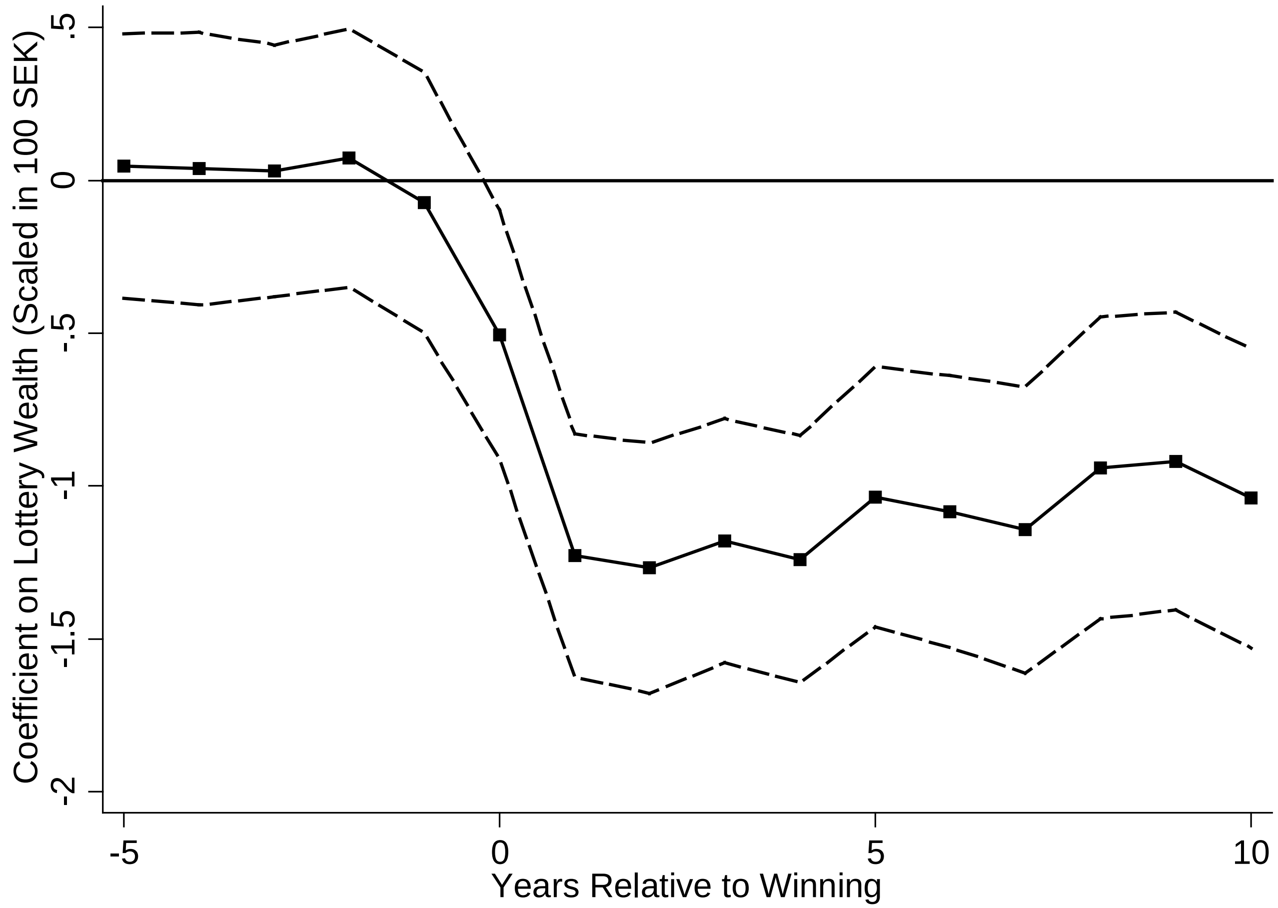
## Table 1. Distribution of Prizes

| | Pooled Sample | | Individual Lottery Samples | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLS | | Kombi | | Triss-Lumpsum | | Triss-Monthly | |
| | Count | Share | Count | Share | Count | Share | Count | Share | Count | Share |
| 0 to 1K SEK | 25,172 | 10.0% | 0 | 0.0% | 25,172 | 99.0% | 0 | 0.0% | 0 | 0.0% |
| 1K to 10K SEK | 204,626 | 81.3% | 204,626 | 92.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| 10K to 100K SEK | 16,429 | 6.5% | 15,520 | 7.0% | 0 | 0.0% | 909 | 27.8% | 0 | 0.0% |
| 100K to 500K SEK | 3,685 | 1.5% | 1,654 | 0.7% | 0 | 0.0% | 2,031 | 62.1% | 0 | 0.0% |
| 500K to 1M SEK | 355 | 0.1% | 195 | 0.1% | 0 | 0.0% | 160 | 4.9% | 0 | 0.0% |
| ≥1M SEK | 1,481 | 0.6% | 481 | 0.2% | 263 | 1.0% | 168 | 5.1% | 569 | 100.0% |
| TOTAL | 251,748 | | 222,476 | | 25,435 | | 3,268 | | 569 | |

Notes: This table reports the distribution of lottery prizes for the pooled sample and the four lottery subsamples.

Cesarini, Lindqvist, Notowidigdo, Östling NBER WP 2015

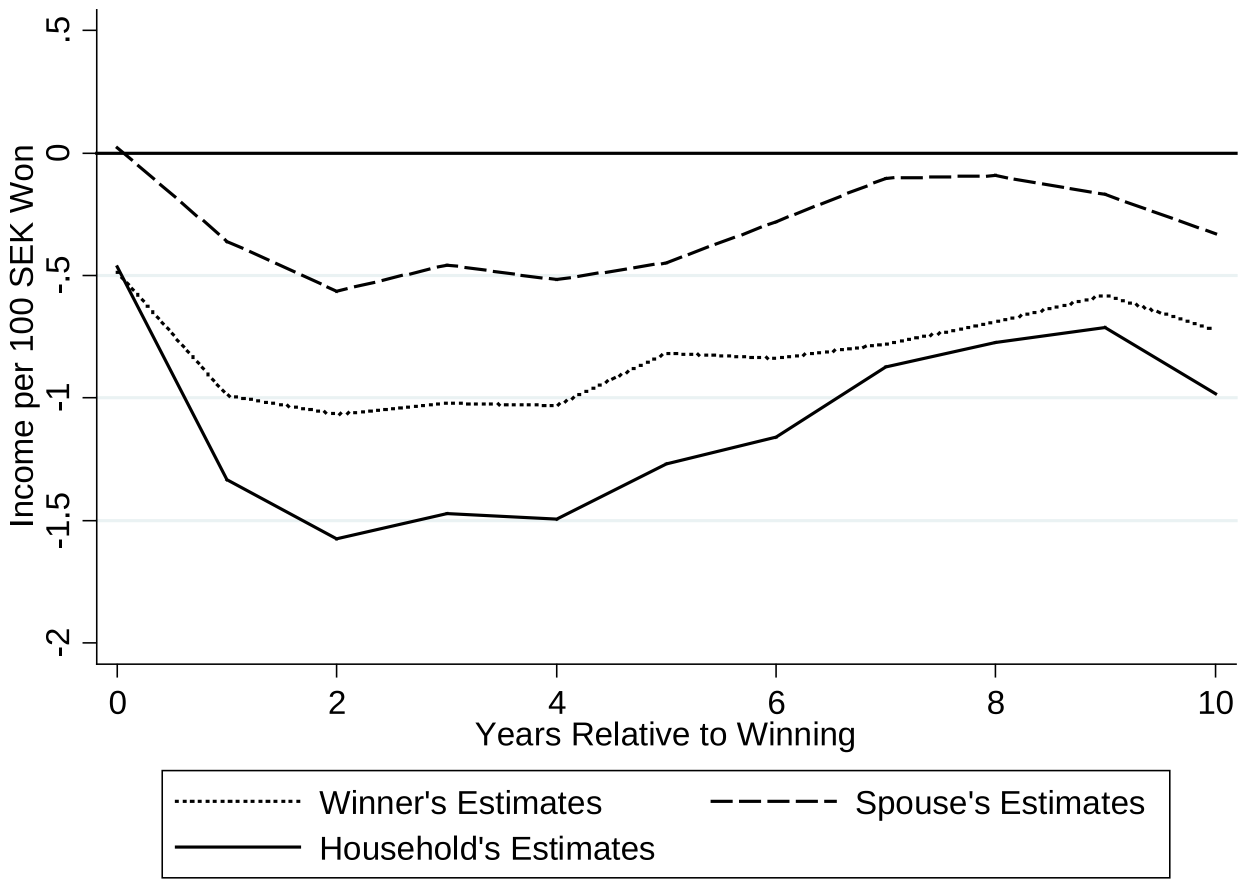
Figure 1: Effect of Wealth on Individual Gross Labor Earnings




Notes: This figure reports estimates obtained from equation (2) estimated in the pooled lottery sample with gross labor earnings as the dependent variable. A coefficient of 1.00 corresponds to an increase in annual labor earnings of 1 SEK for each 100 SEK won. Each year corresponds to a separate regression and the dashed lines show 95% confidence intervals.

Cesarini, Lindqvist, Notowidigdo, Östling NBER WP 2015

Figure 5: Effect of Wealth on Gross Labor Earnings of Winners and Spouses




Notes: This figure reports estimates obtained from equation (2) estimated separately for winners, their spouses, and the household. The dependent variable is gross labor earnings. Each year corresponds to a separate regression.

Cesarini, Lindqvist, Notowidigdo, Östling NBER WP 2015

## Labor Supply Substitution Effects: Tax Free Second Jobs in Germany

In 2003, Germany made secondary jobs (paying less than 400 Euros/month) tax free: amounts to a 20-60% subsidy on second job earnings (depending on family marginal tax rate) $\Rightarrow$ almost pure substitution labor supply effect

Tazhitdinova '20 uses social security admin monthly earnings data

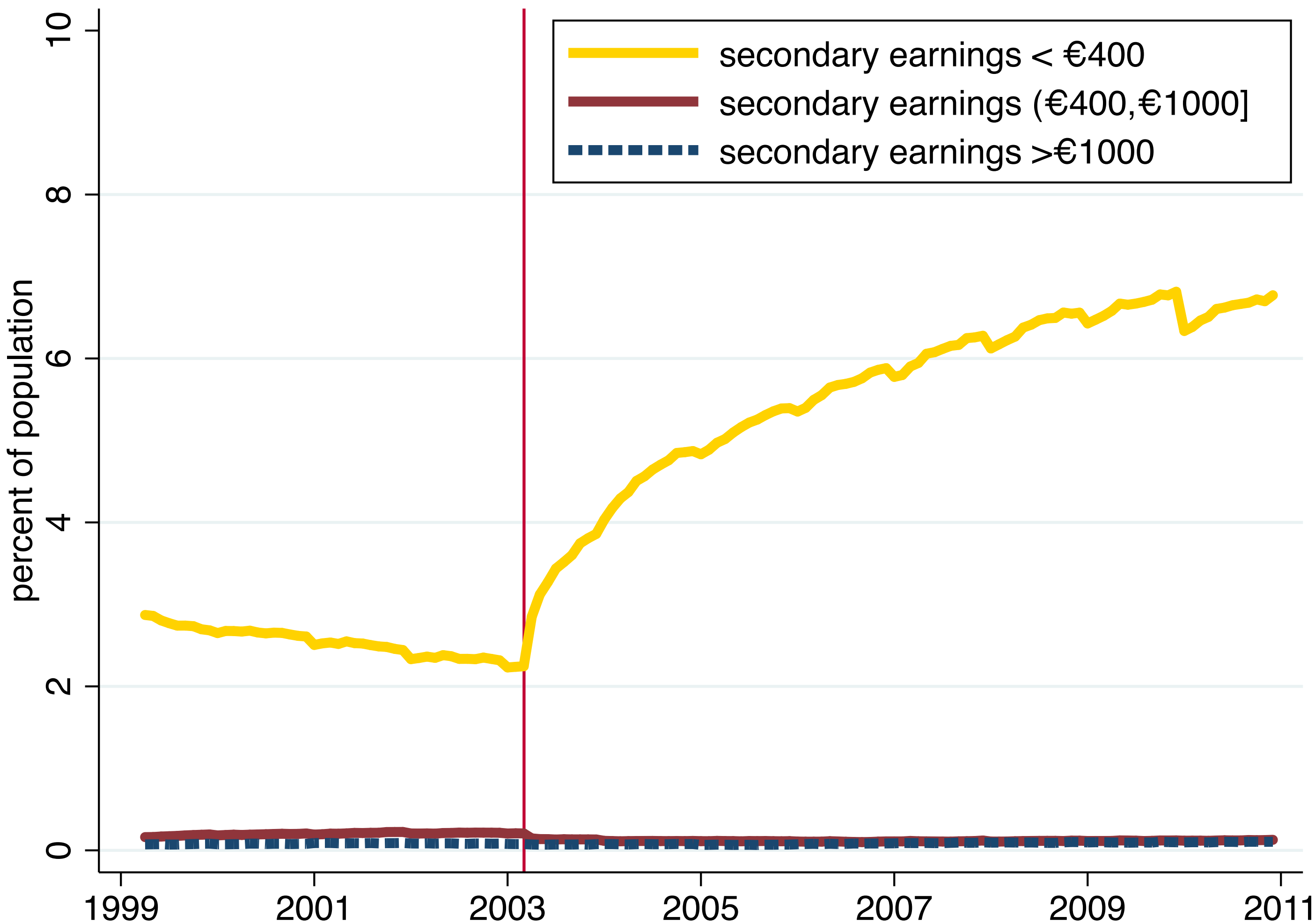
Fraction of population holding second jobs increased sharply (from 2.5% to 6-7%) with bigger response overtime

Finds no offsetting effect on primary earnings $\Rightarrow$ People did work more

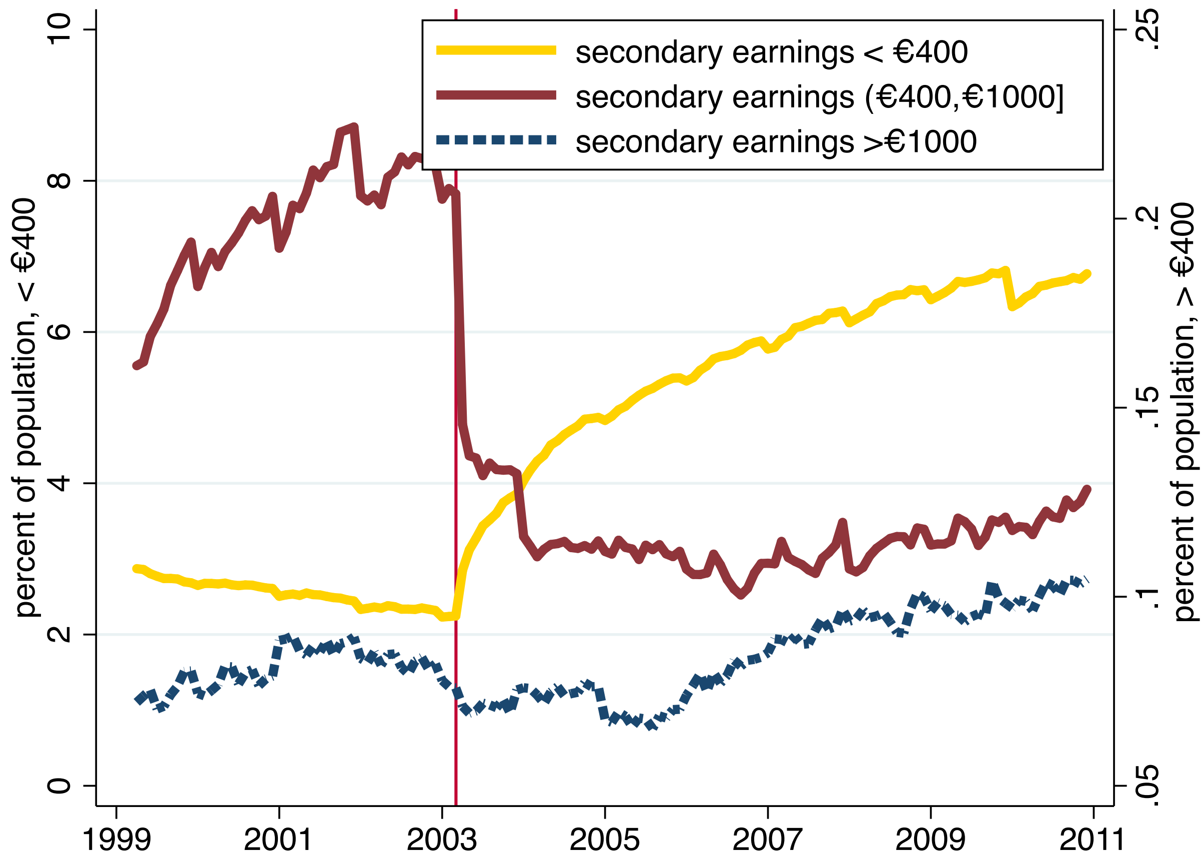
Looks like a big labor supply response but likely happened because employers willing to create lots of mini-jobs to accommodate supply

Figure 4: Secondary Job Holding Rates by Secondary Earnings Level
Source: Tazhitdinova (2019)

(a) same axis



(b) different axis




*Notes*: This figure shows the share of individuals with secondary jobs paying less than €400 per month, paying between €400 and €1000, or more than €1000 per month. The vertical red line identifies the 2003 tax reform. *Source*: Sample of Integrated Labour Market Biographies (SIAB) 1975 - 2010, Nuremberg 2013.

## Married Women Elasticities: Blau and Kahn '07

1) Identify elasticities from 1980-00 using grouping instrument

a) Define cells (year$\times$age$\times$education) and compute mean wages

b) Instrument for actual wage with mean wage in cell

2) Identify purely from group-level variation, which is less contaminated by individual endogenous choice

3) Results: (a) total hours elasticity for **married women** (including intensive + extensive margin) shrank from 0.4 in 1980 to 0.2 in early 2000s, (b) effect of husband earnings $\downarrow$ overtime

4) Interpretation: elasticities shrink as women become more attached to the labor force

## Summary of Static Labor Supply Literature (SKIP)

1) Small elasticities for prime-age males

Probably institutional restrictions, need for at least one income, etc. prevent a short-run response

2) Larger responses for workers who are less attached to labor force: Married women, low income earners, retirees

3) Responses driven primarily by extensive margin

a) Extensive margin (participation) elasticity around 0.2-0.5

b) Intensive margin (hours) elasticity smaller

## Responses to Low-Income Transfer Programs

1) Particular interest in treatment of low incomes in a progressive tax system: are they responsive to incentives?

2) Complicated set of transfer programs in US

a) In-kind: food stamps, Medicaid, public housing, job training, education subsidies

b) Cash: TANF, EITC, SSI

3) See Gruber undergrad textbook for details on institutions

## 1996 US Welfare Reform

1) Reform modified AFDC cash welfare program to provide more incentives to work (renamed TANF)

a) Requiring recipients to go to job training or work

b) Limiting the duration for which families able to receive welfare

c) Reducing phase-out rate of benefits

2) Fed govt provided incentives for states to experiment with reforms in 1992-1995 (state waivers). Some did randomize experiments.

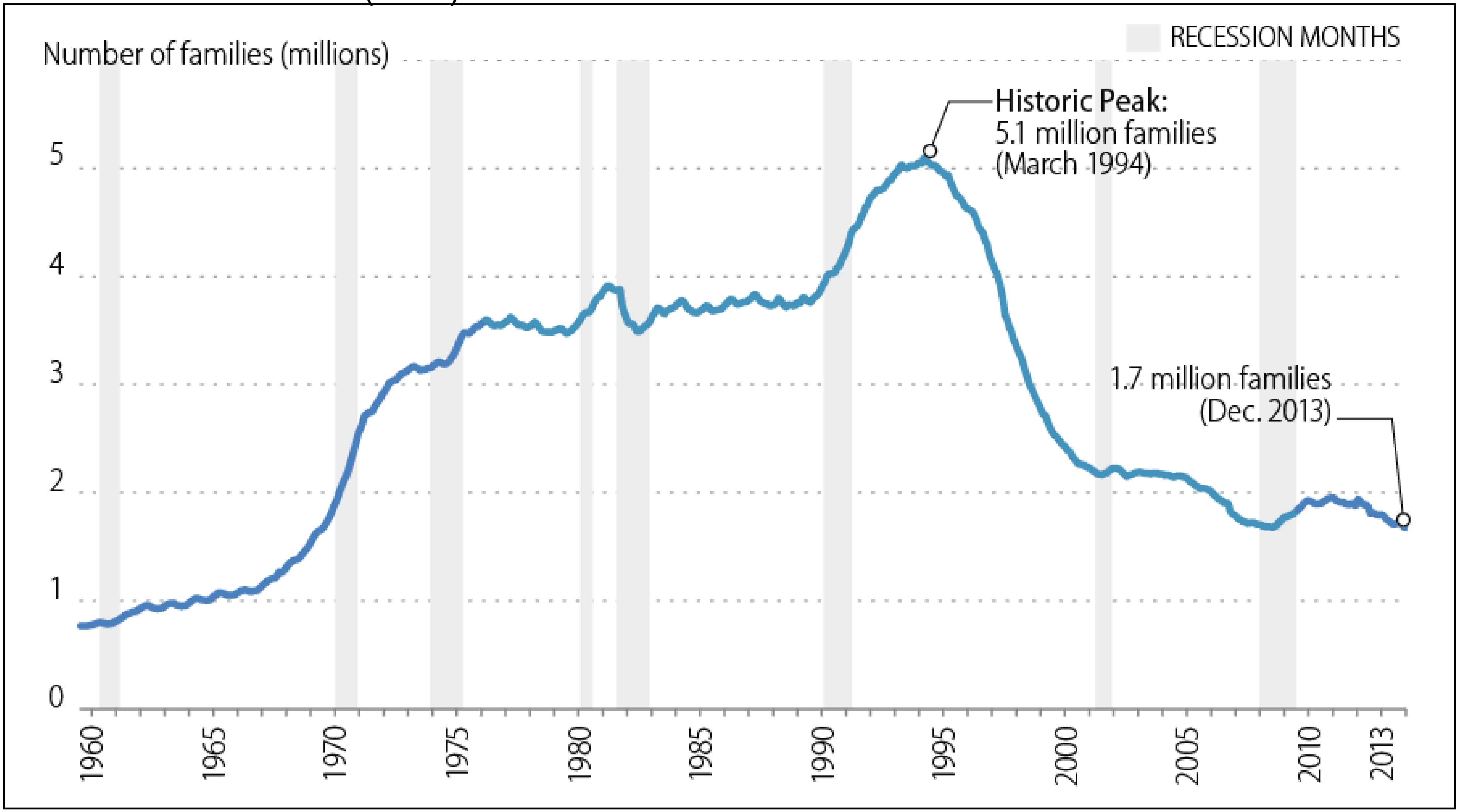
4) EITC also expanded during this period: general shift from welfare to "workfare"

Did welfare reform and EITC increase labor supply?

**Figure 1. Number of Families Receiving AFDC/TANF Cash Assistance, 1959-2013**

(Families in millions)

Source: Falk (2016)




**Source:** Congressional Research Service (CRS), based on data from the U.S. Department of Health and Human Services (HHS).

**Notes:** Shaded areas represent recessionary periods. Families receiving TANF cash assistance since October 1, 1999, include families receiving cash assistance from separate state programs (SSPs) with expenditures countable toward the TANF maintenance of effort requirement (MOE).

## Randomized welfare experiment: SSP Welfare Demonstration in Canada

Canadian Self Sufficiency Project (SSP): randomized experiment that gave welfare recipients an earnings subsidy for 36 months in 1990s (but need to start working by month 12 to get it)

3 year temporary participation tax rate cut from average rate of 74.3% to 16.7% [get to keep 83 cents for each $ earned instead of 26 cents]

Card and Hyslop (EMA 2005) provide classic analysis. Two results:

1) Strong effect on employment rate during experiment (peaks at 14 points)

2) Effect quickly vanishes when the subsidy stops after 36 months (entirely gone by month 52)

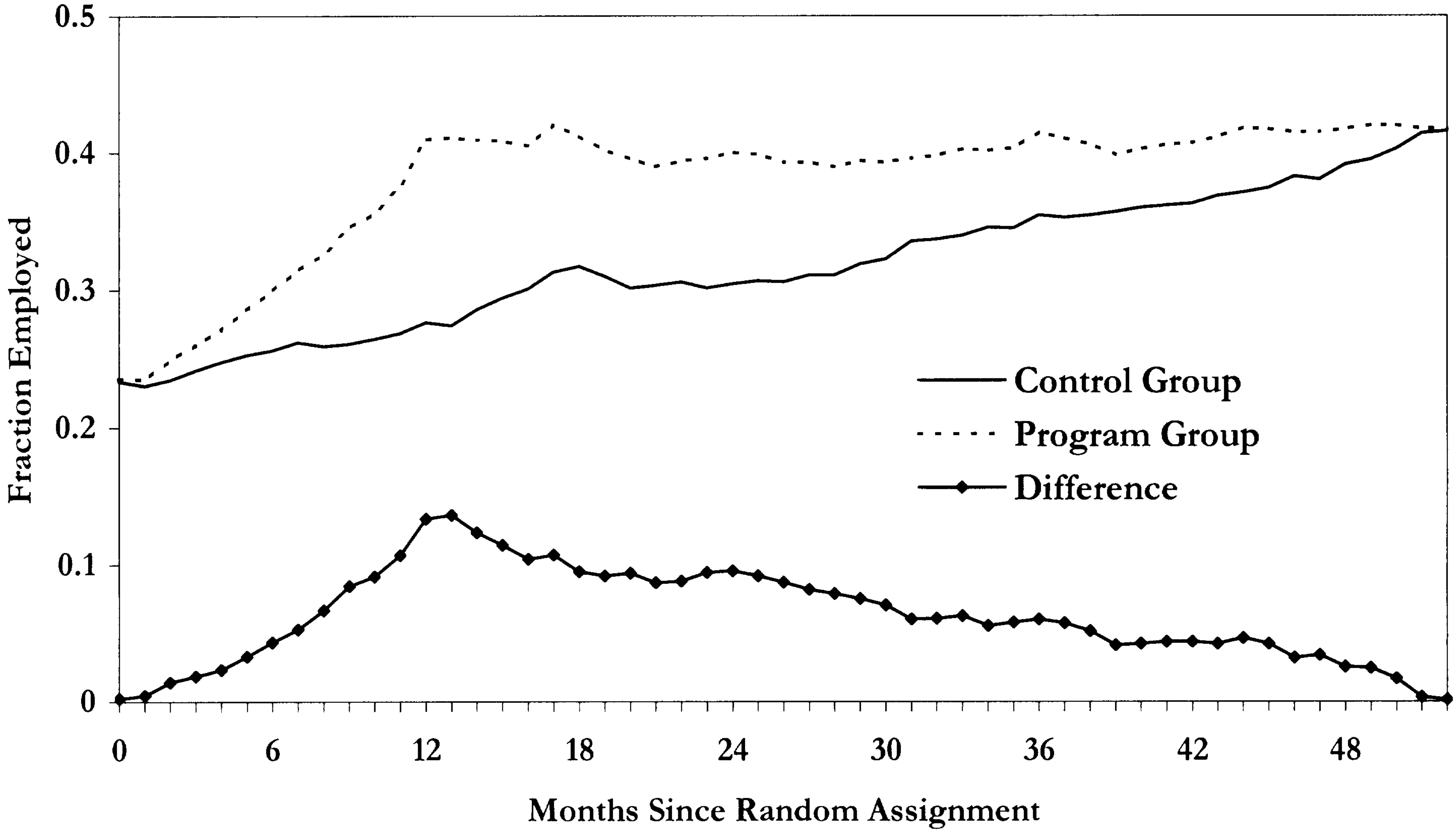



FIGURE 3.—Monthly employment rates.

Source: Card and Hyslop, 2005, p. 1734

## Earned Income Tax Credit (EITC) program

Kleven (2019) provides comprehensive EITC re-analysis using women aged 20-50 and CPS data

1) EITC started small in the 1970s but was expanded in 1986-88, 1994-96, 2008-09: today, largest means-tested cash transfer program [$75bn in 2019, 30m families recipients]

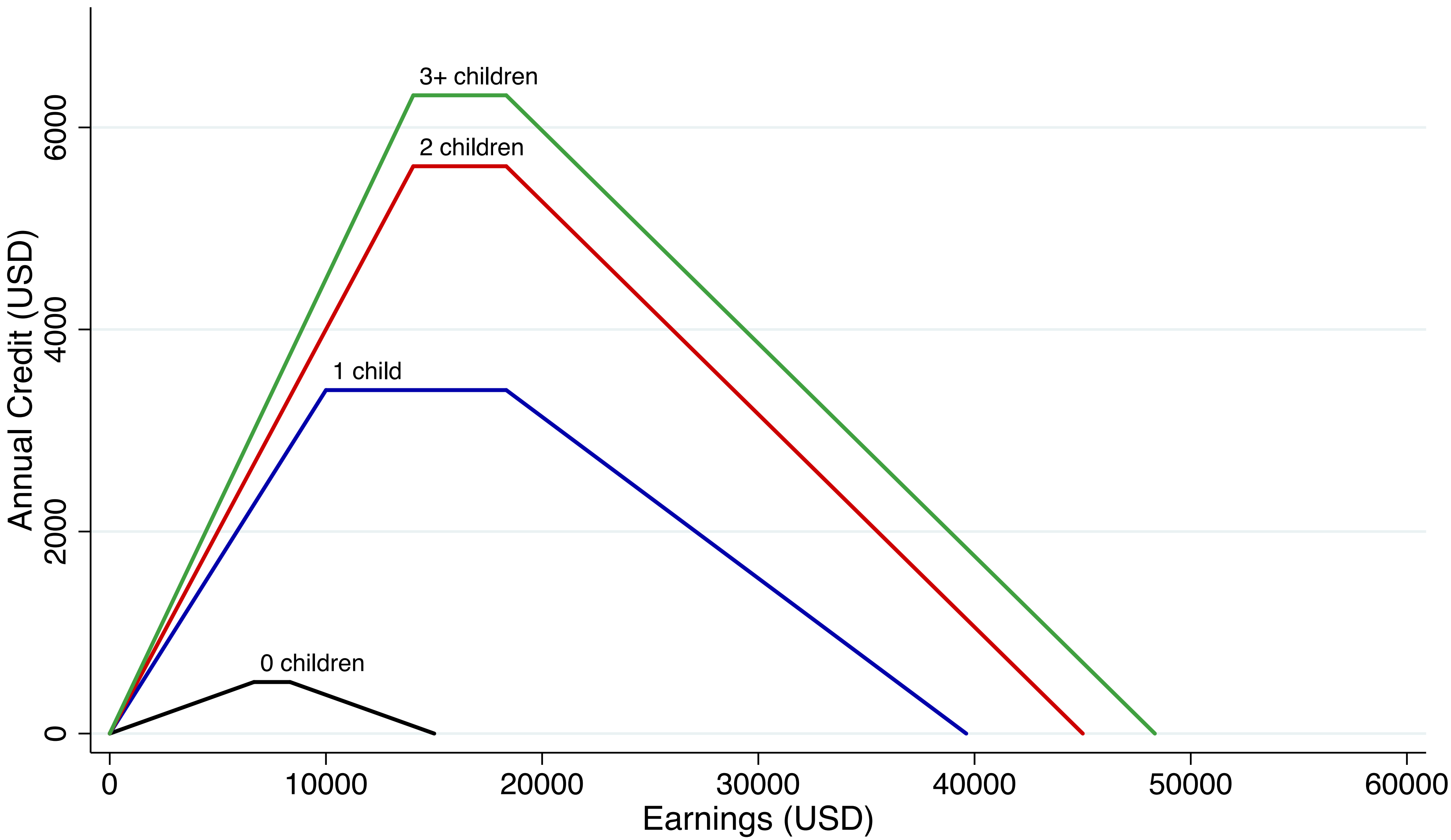
2) Eligibility: families with kids and low earnings.

3) Refundable Tax credit: administered as annual tax refund received in Feb-April, year $t+1$ (for earnings in year $t$)

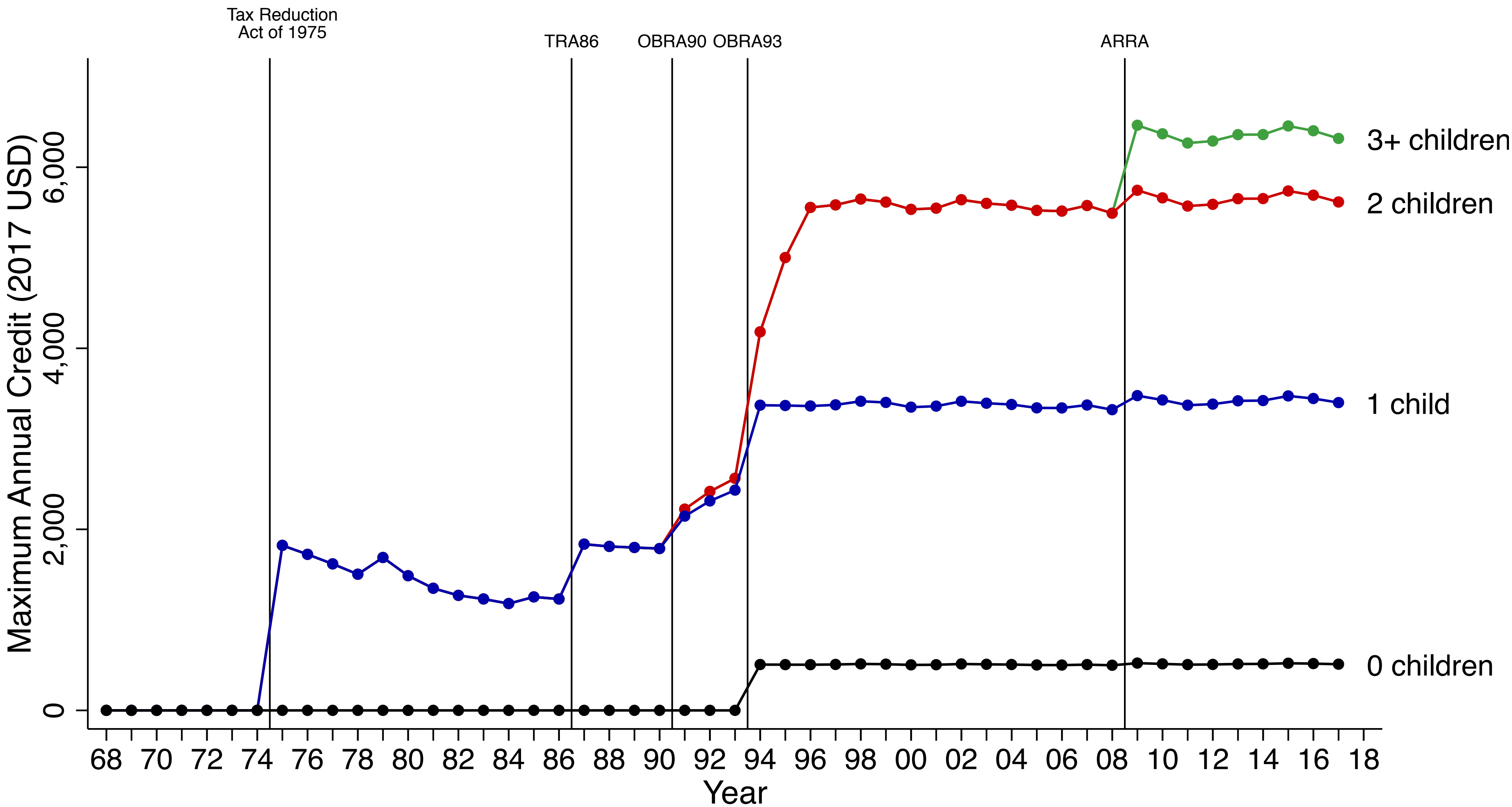
4) EITC has flat pyramid structure with phase-in (negative MTR), plateau, (0 MTR), and phase-out (positive MTR)

5) States have added EITC components to their income taxes [in general a percentage of the Fed EITC, great source of natural experiments, understudied bc CPS too small]

# EITC Schedule in 2017



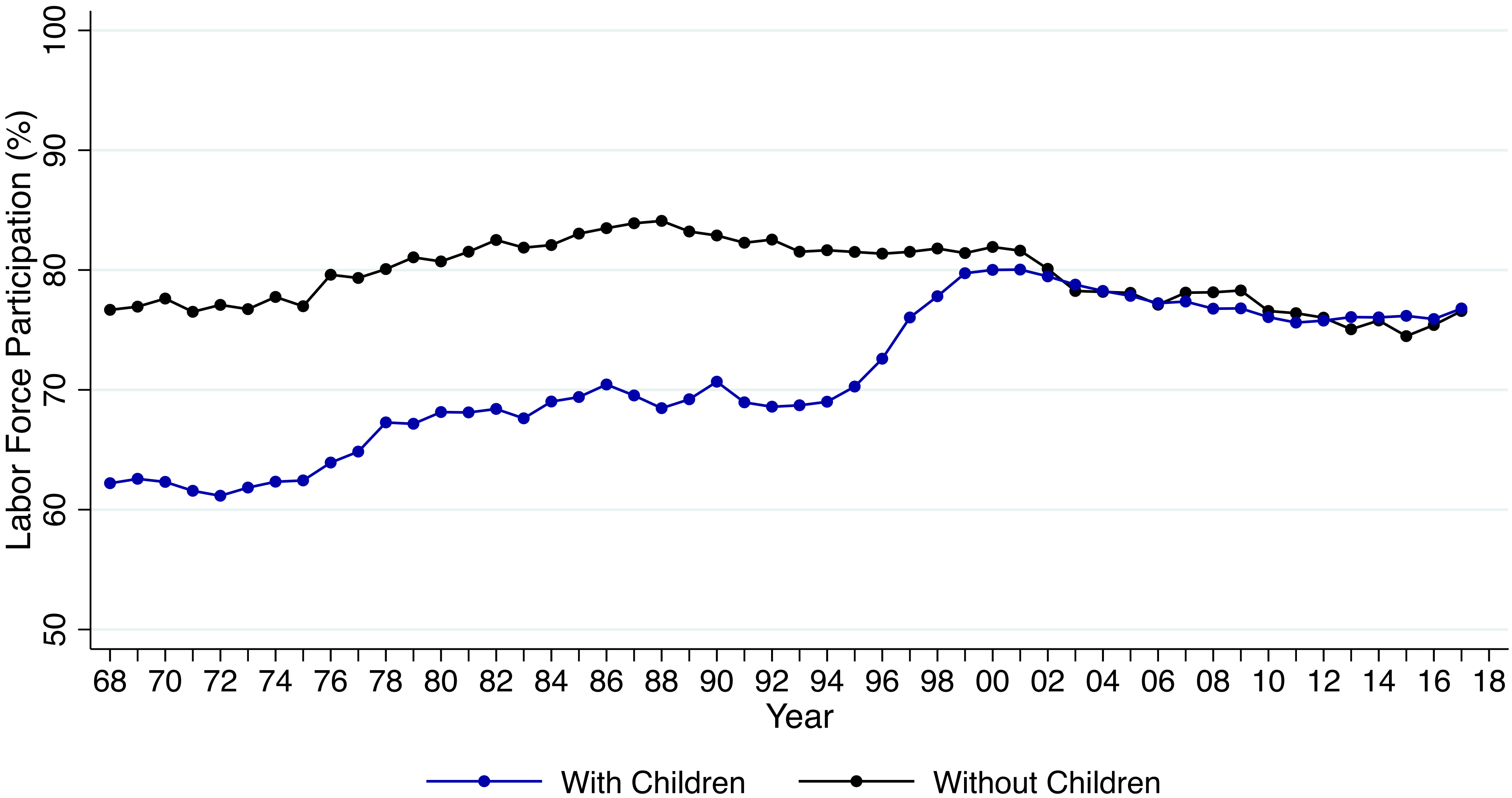
# EITC Maximum Credit Over Time




Source: Kleven (2018)

# Labor Force Participation of Single Women

## With and Without Children




Source: Kleven (2018)

Annual Employment Low Education

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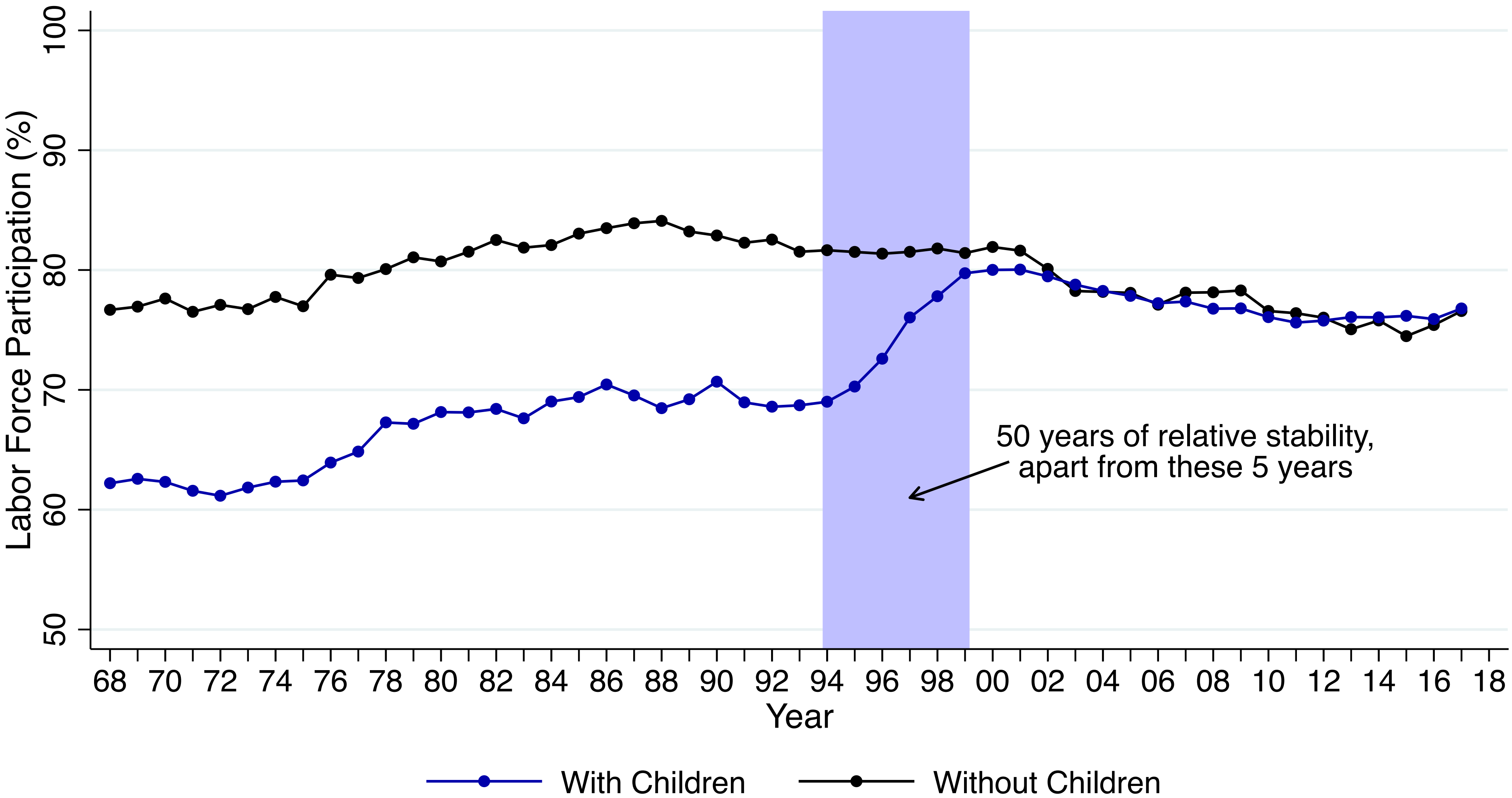


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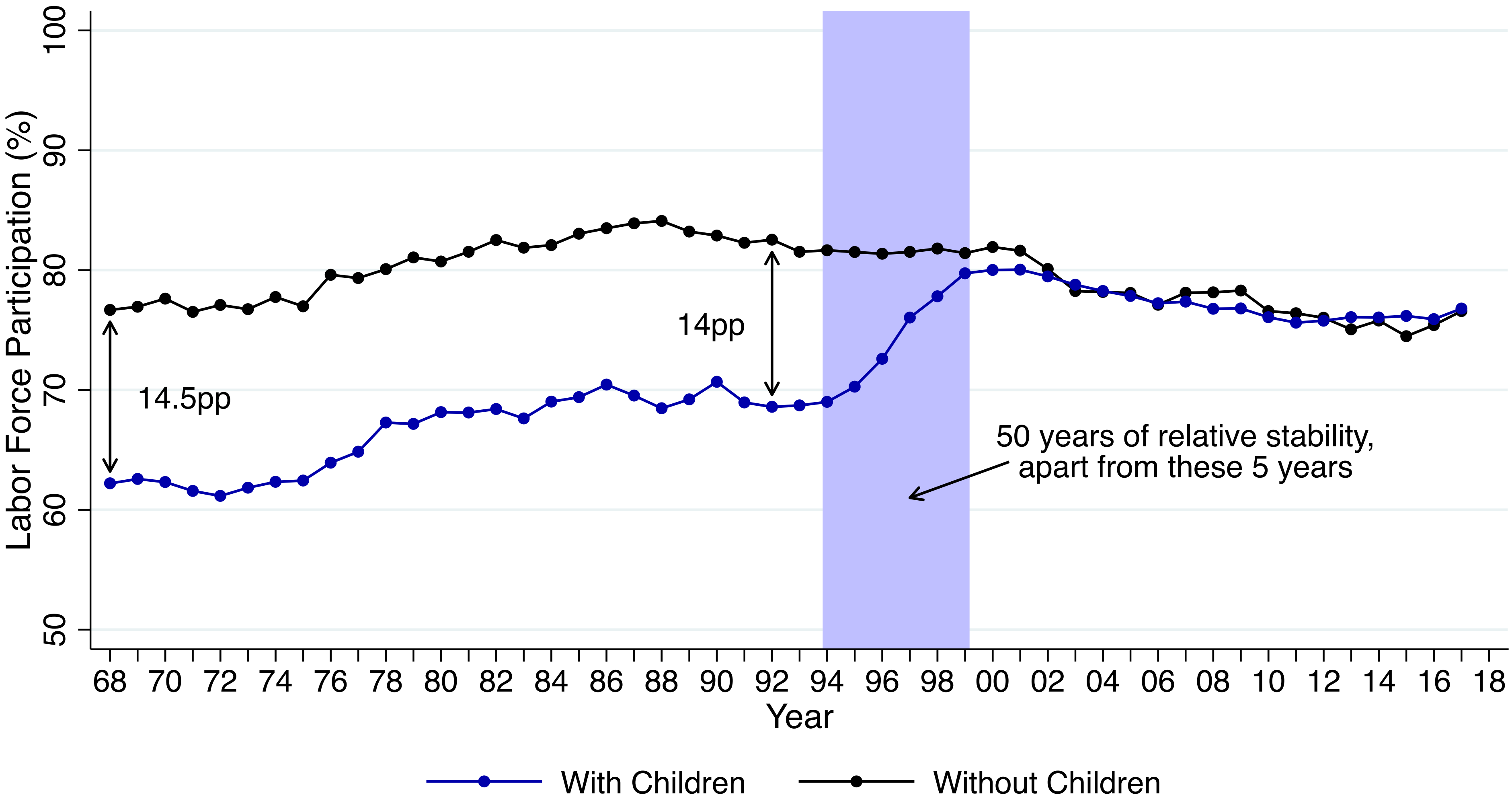


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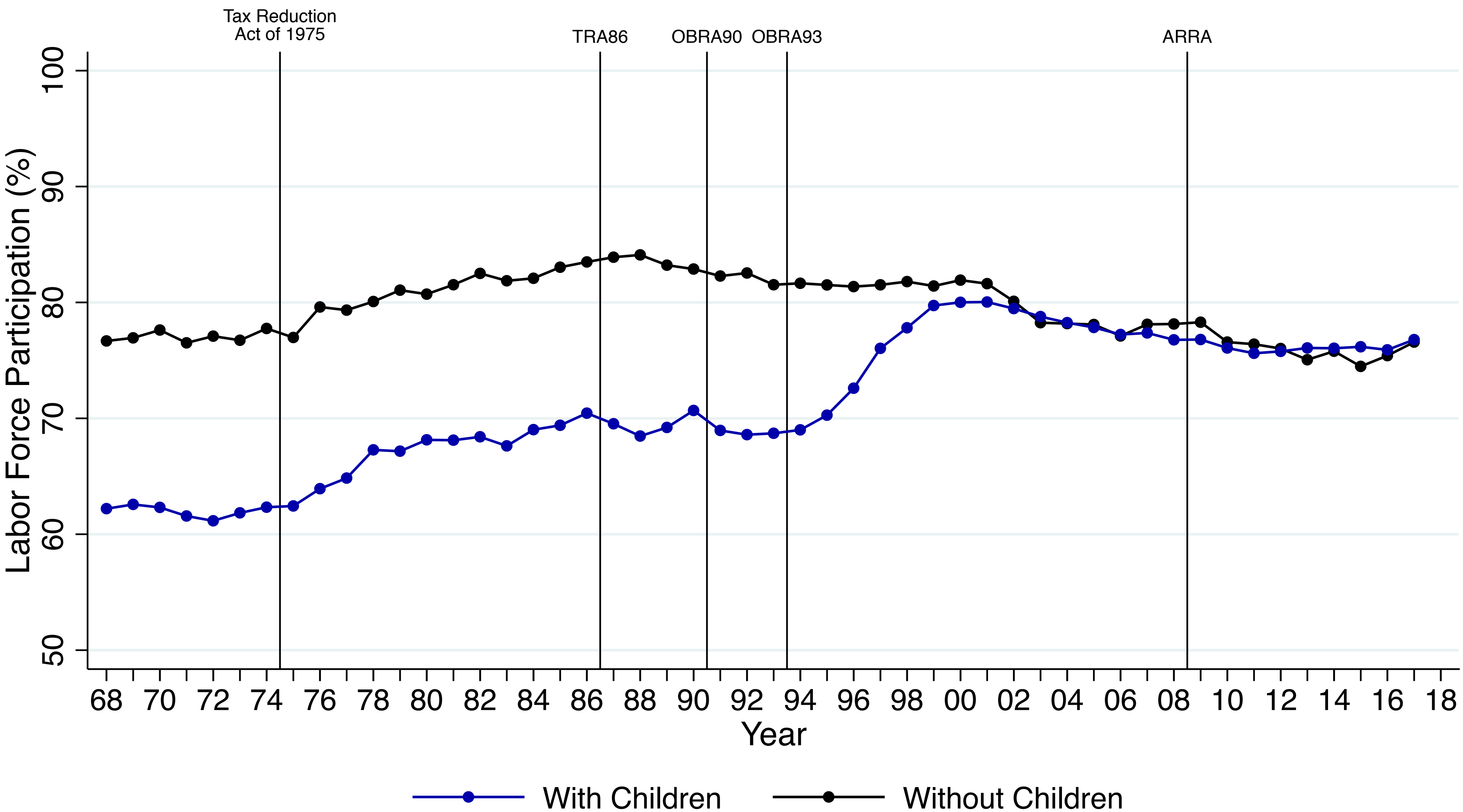


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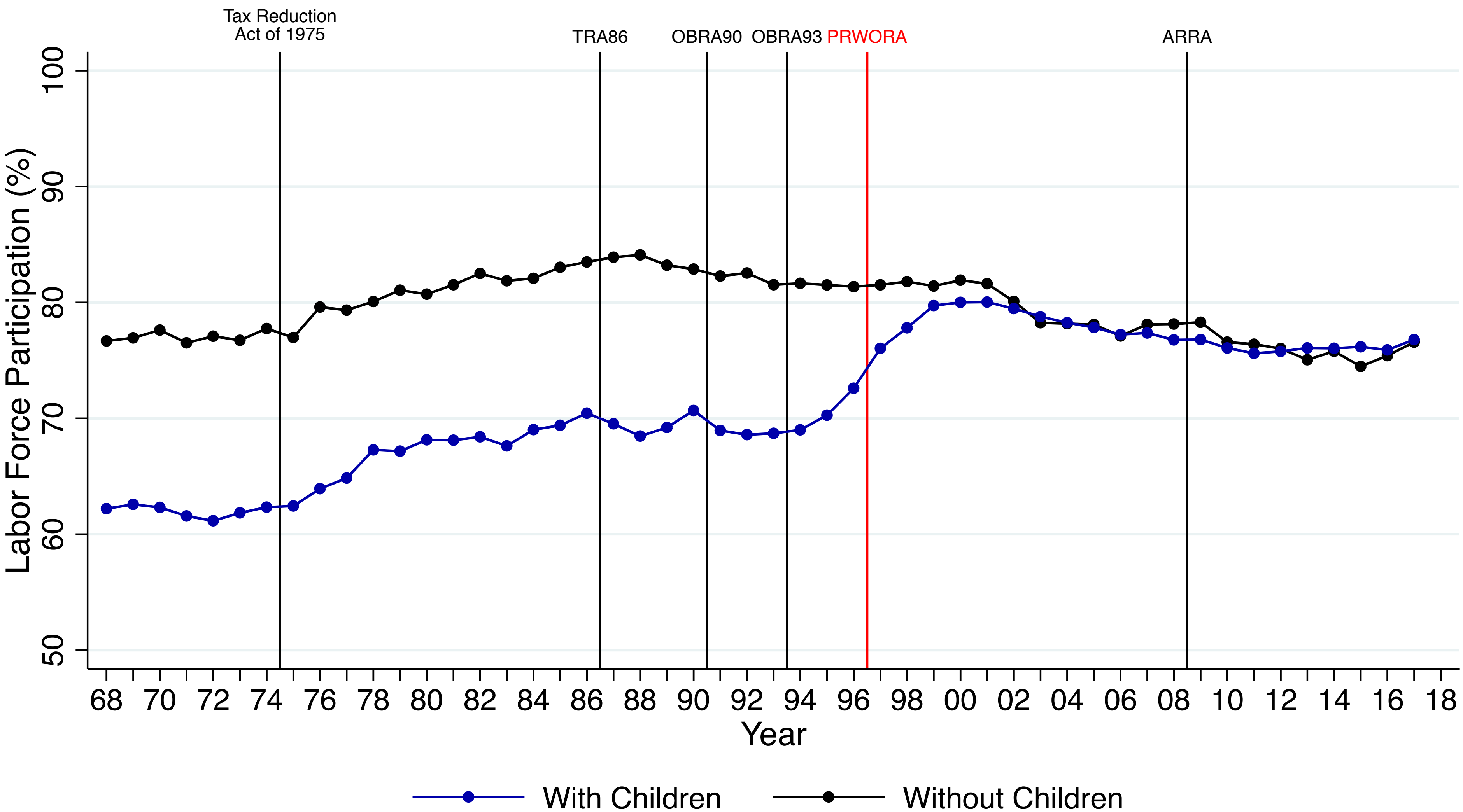


Annual Employment

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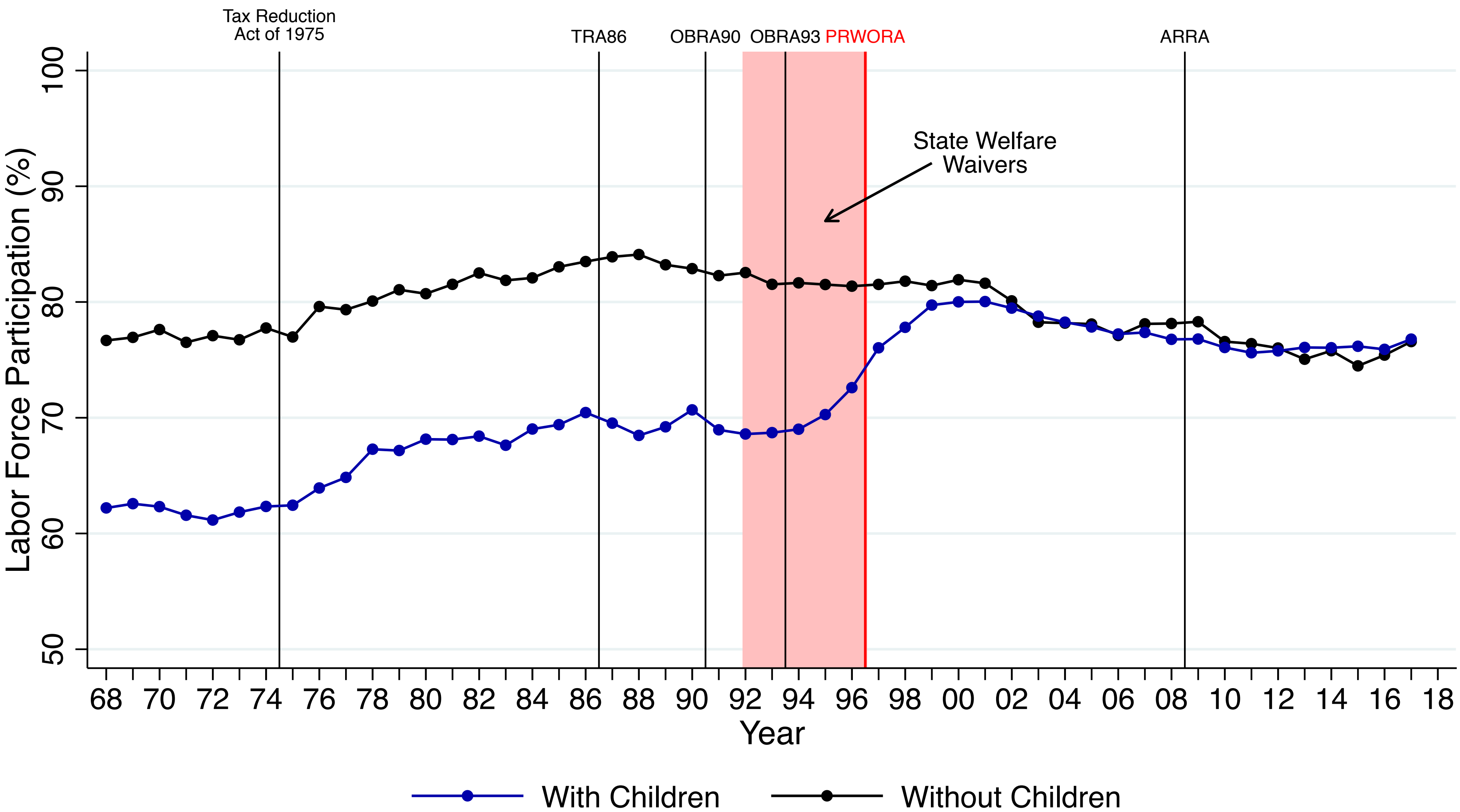


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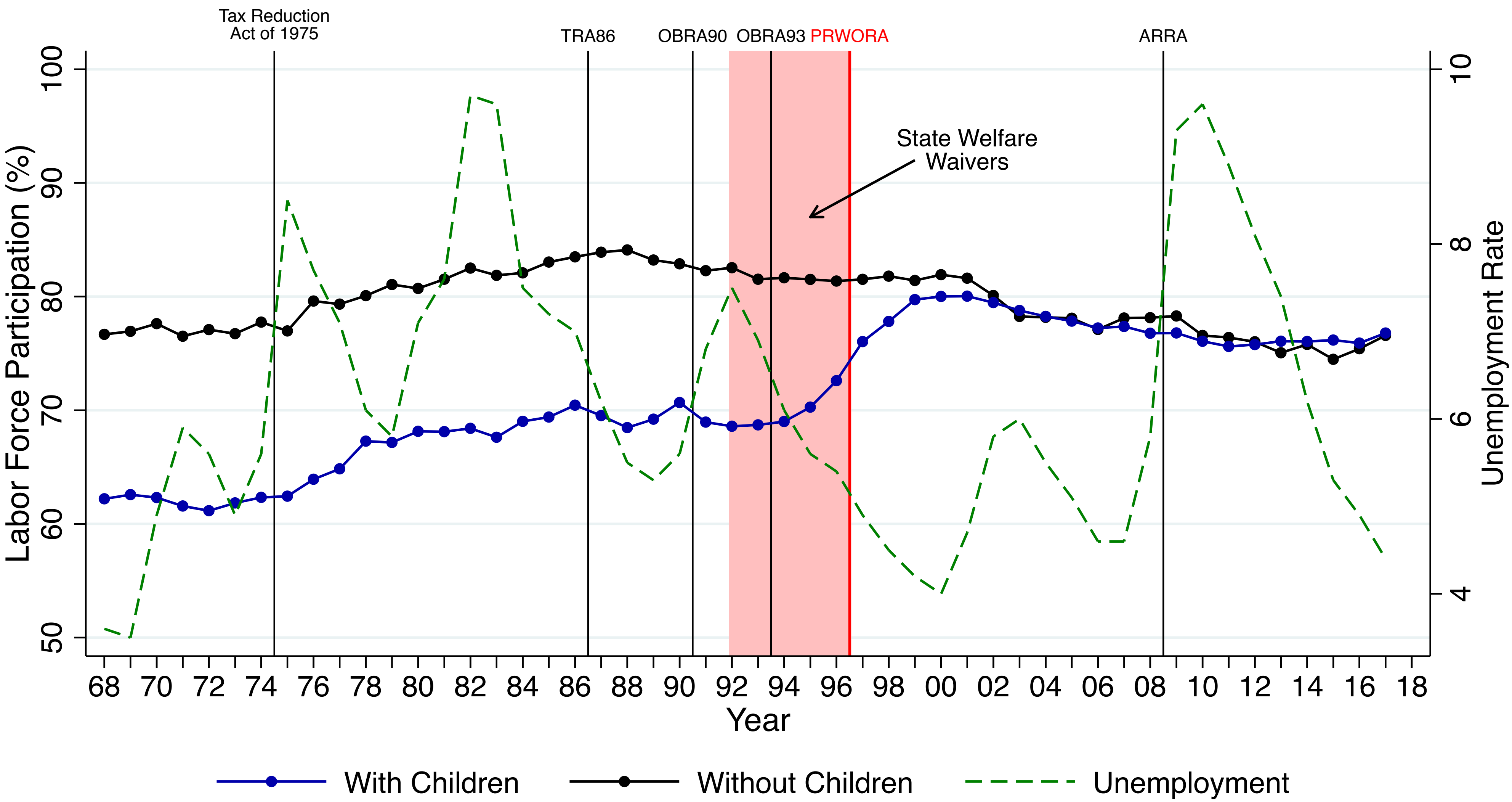


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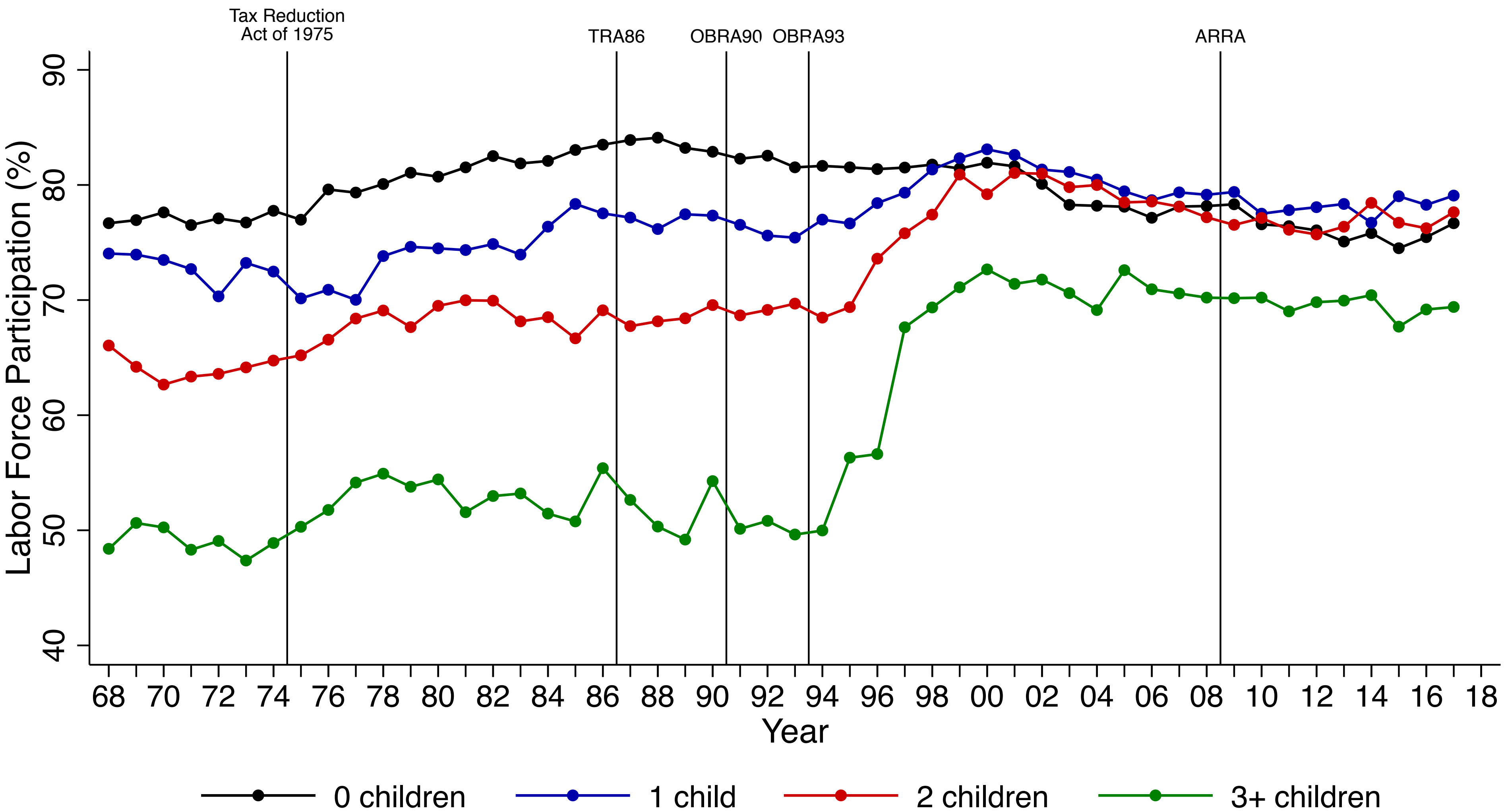
Source: Kleven (2018)

# Labor Force Participation of Single Women

## By Number of Children




Annual Employment
Low Education

Source: Kleven (2018)

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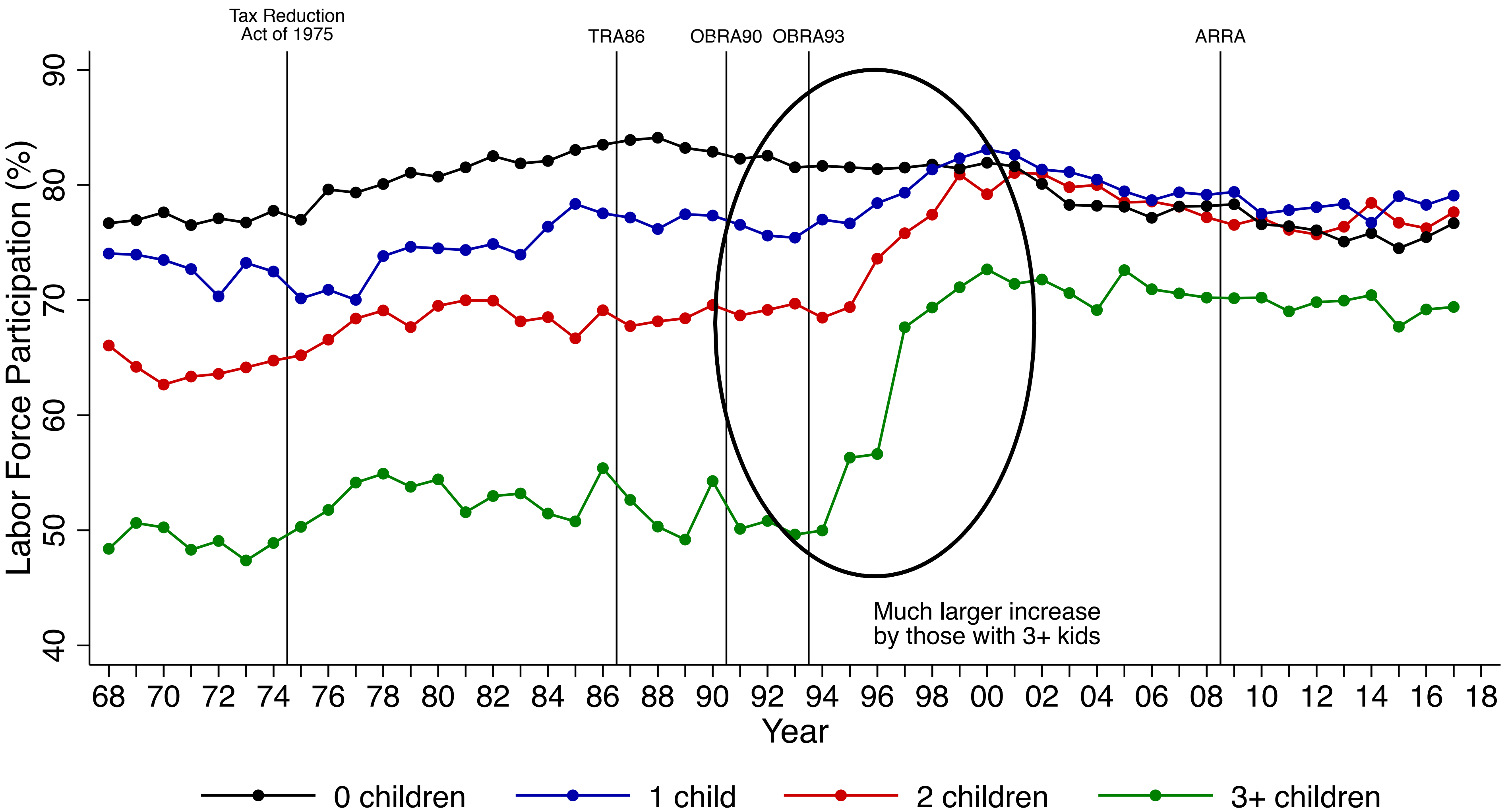


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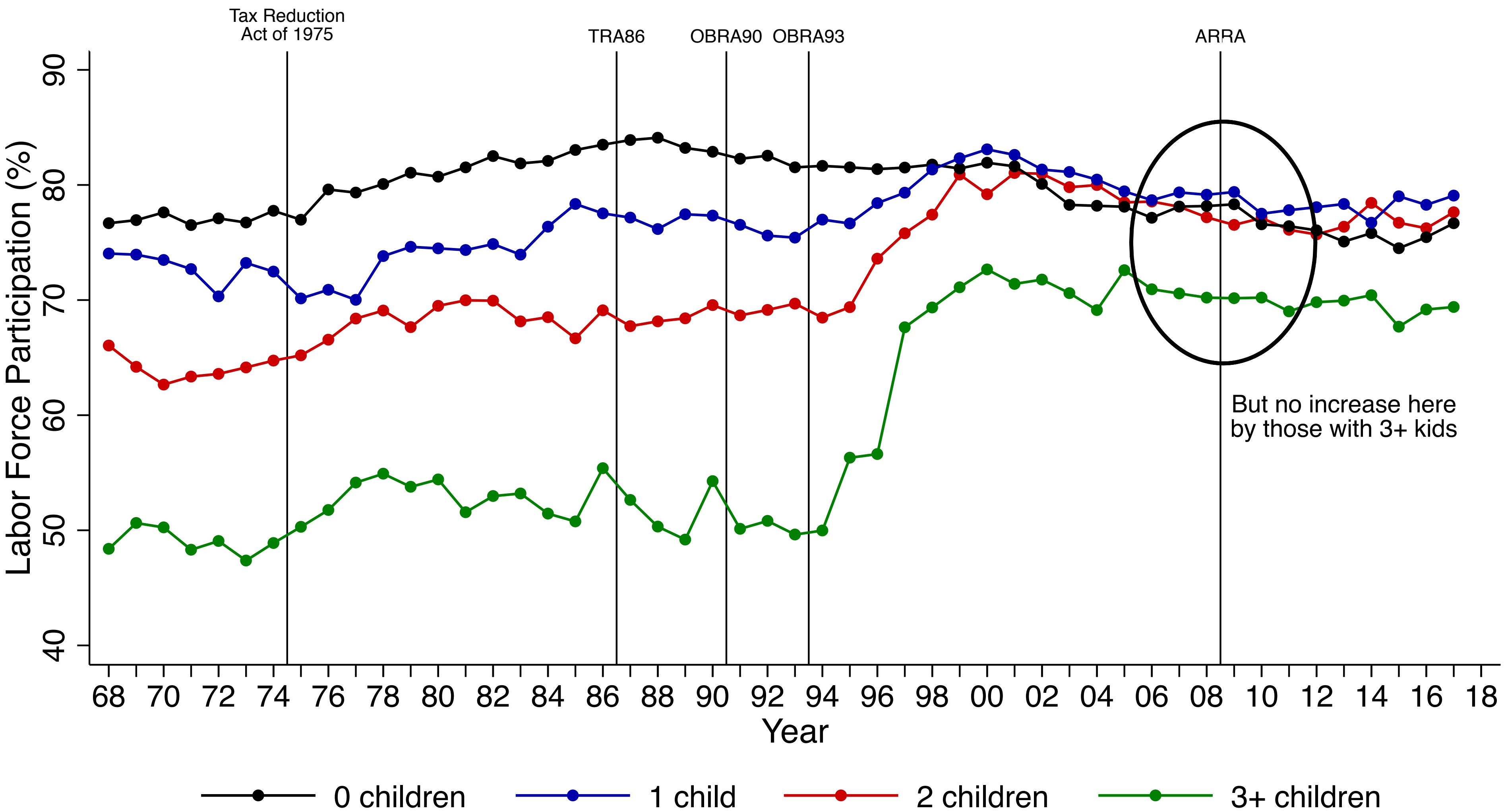



Annual Employment

Low Education

Source: Kleven (2018)

## Welfare Reform and EITC Expansion: Labor supply

Incredible increase in labor force participation of single mothers during the 1990s when welfare reform and EITC expansion happened

Unlikely that the EITC can explain it because other EITC changes haven't generated such large effects

Sociological evidence shows that welfare reform "scared" single mothers into working

Single moms in the US were suddenly expected to work

Kleven (2019): Maybe a unique combination of EITC reform, welfare reform, economic upturn, and changing social norms lead to this shift

## Bunching at Kinks (Saez AEJ-EP'10)

Key prediction of standard labor supply model: individuals should bunch at (convex) kink points of the budget set

1) The only non-parametric source of identification for intensive elasticity in a single cross-section of earnings is amount of bunching at kinks creating by tax/transfer system

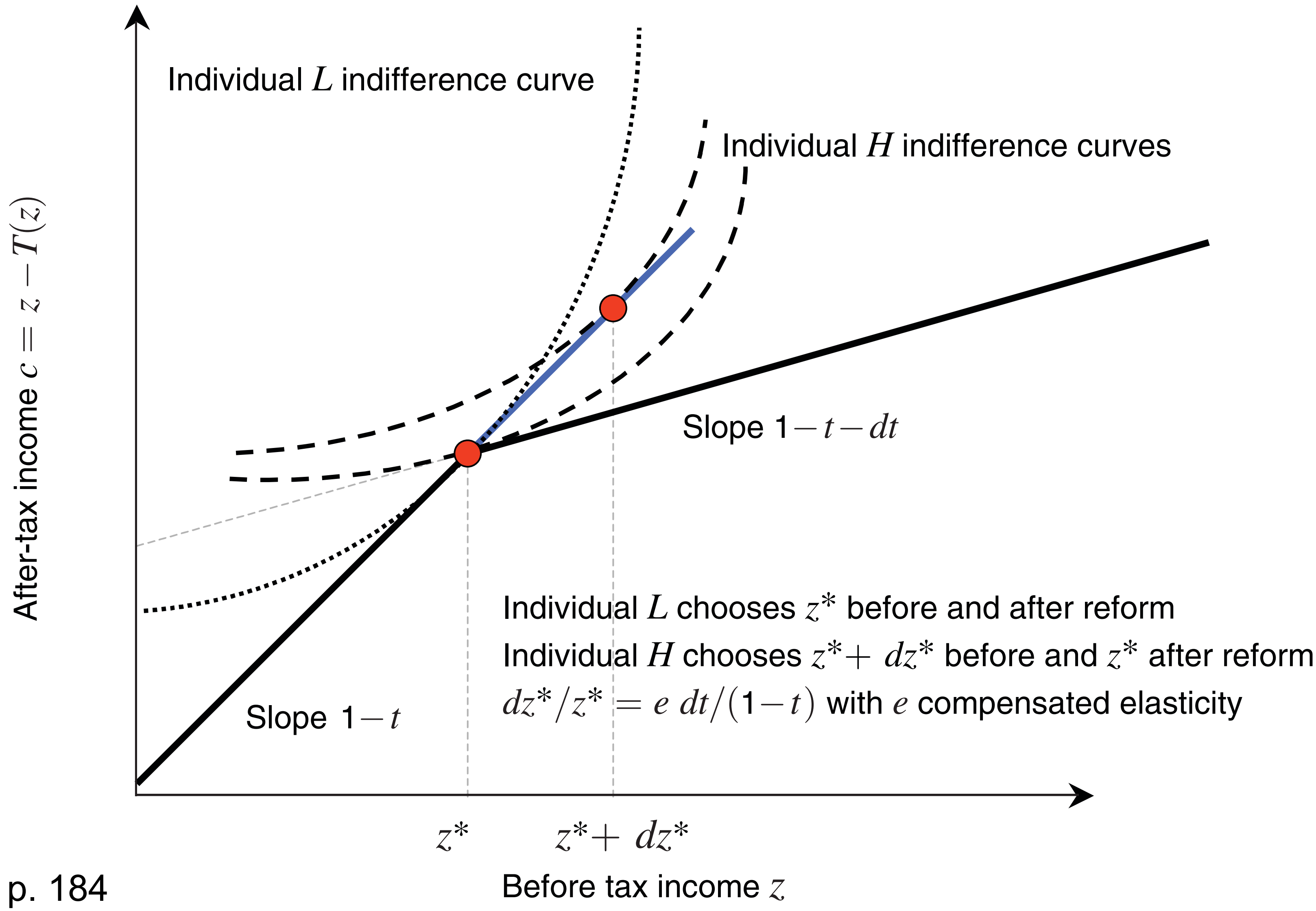
2) Saez '10 develops method of using bunching at kinks to estimate the compensated income elasticity

Formula for elasticity: $\varepsilon^c = \frac{dz/z^*}{dt/(1-t)}$ = excess mass at kink / change in NTR

$\Rightarrow$ Amount of bunching proportional to compensated elasticity

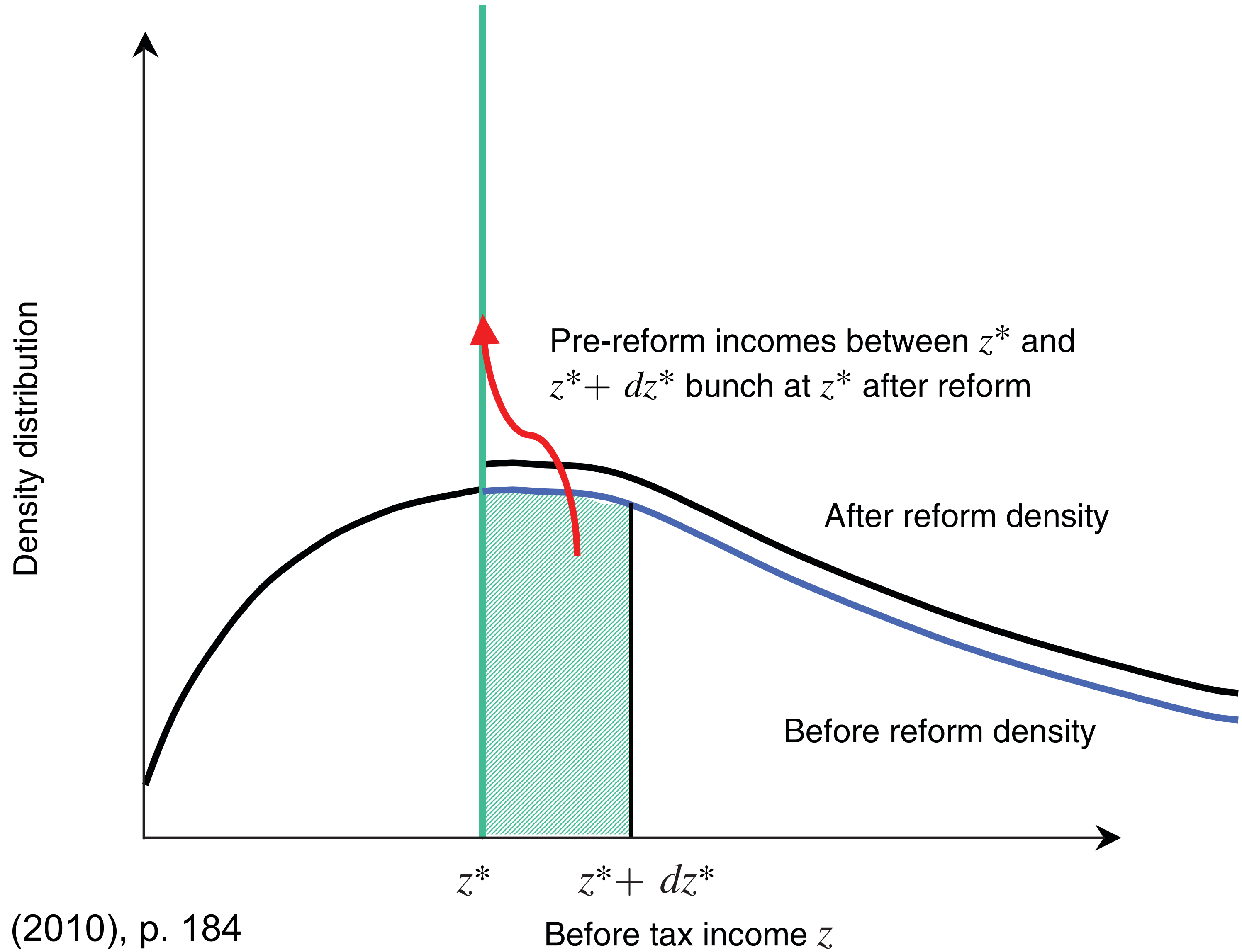
Blomquist et al. JPE'21: Bunching method requires making assumptions on counterfactual density (but testable using tax changes see Londono-Avila '18 below)

Panel A. Indifference curves and bunching




Source: Saez (2010), p. 184

Panel B. Density distributions and bunching




Source: Saez (2010), p. 184

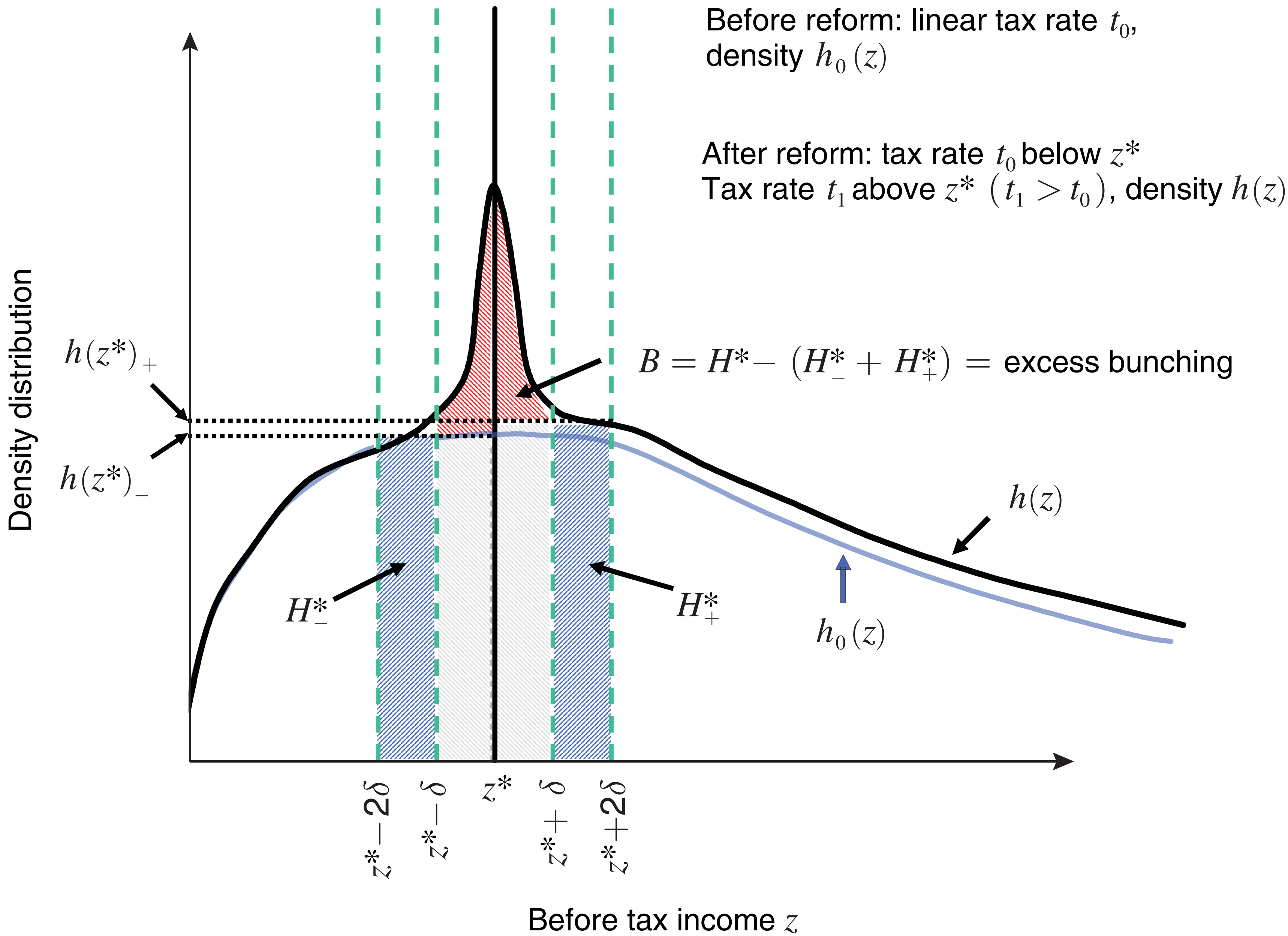



Figure 2. Estimating Excess Bunching Using Empirical Densities

## Bunching at Kinks (Saez AEJ-EP'10)

1) Uses individual tax return micro data (IRS public use files) from 1960 to 2004

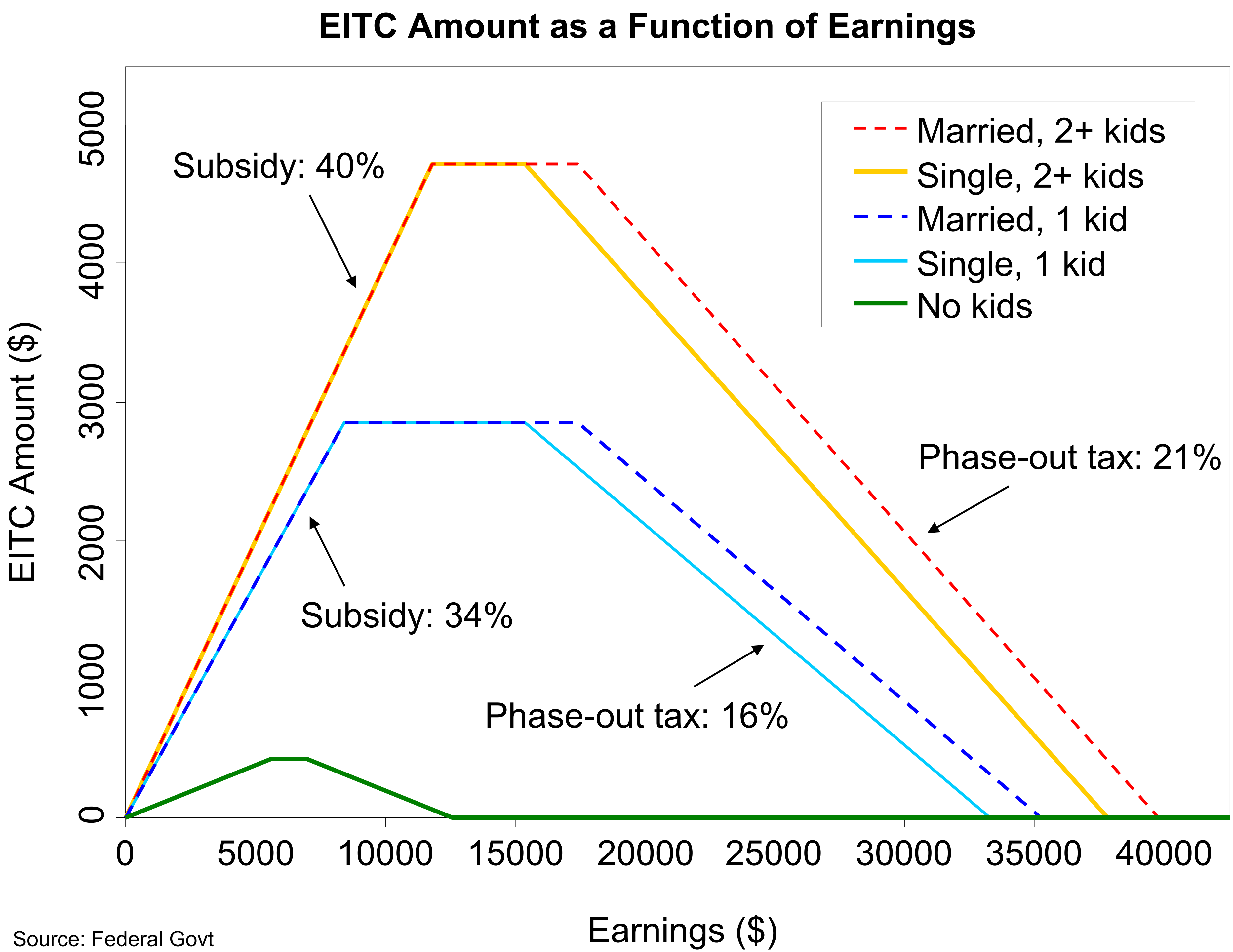
2) Advantage of dataset over survey data: very little measurement error

3) Finds bunching around:

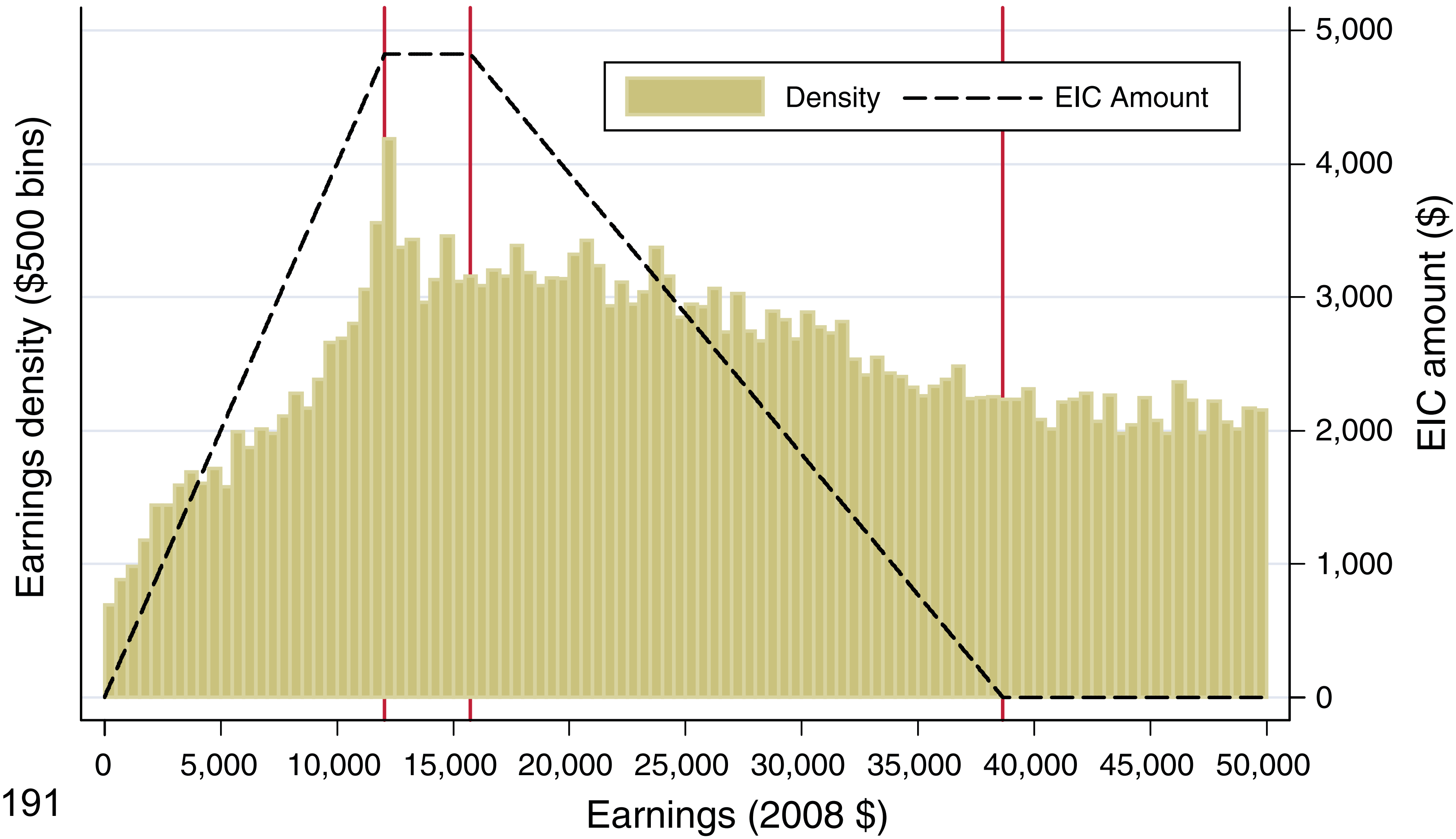
a) First kink point of the Earned Income Tax Credit (EITC), especially for self-employed

b) At threshold of the first tax bracket where tax liability starts, especially in the 1960s when this point was very stable

4) However, no bunching observed around all other kink points

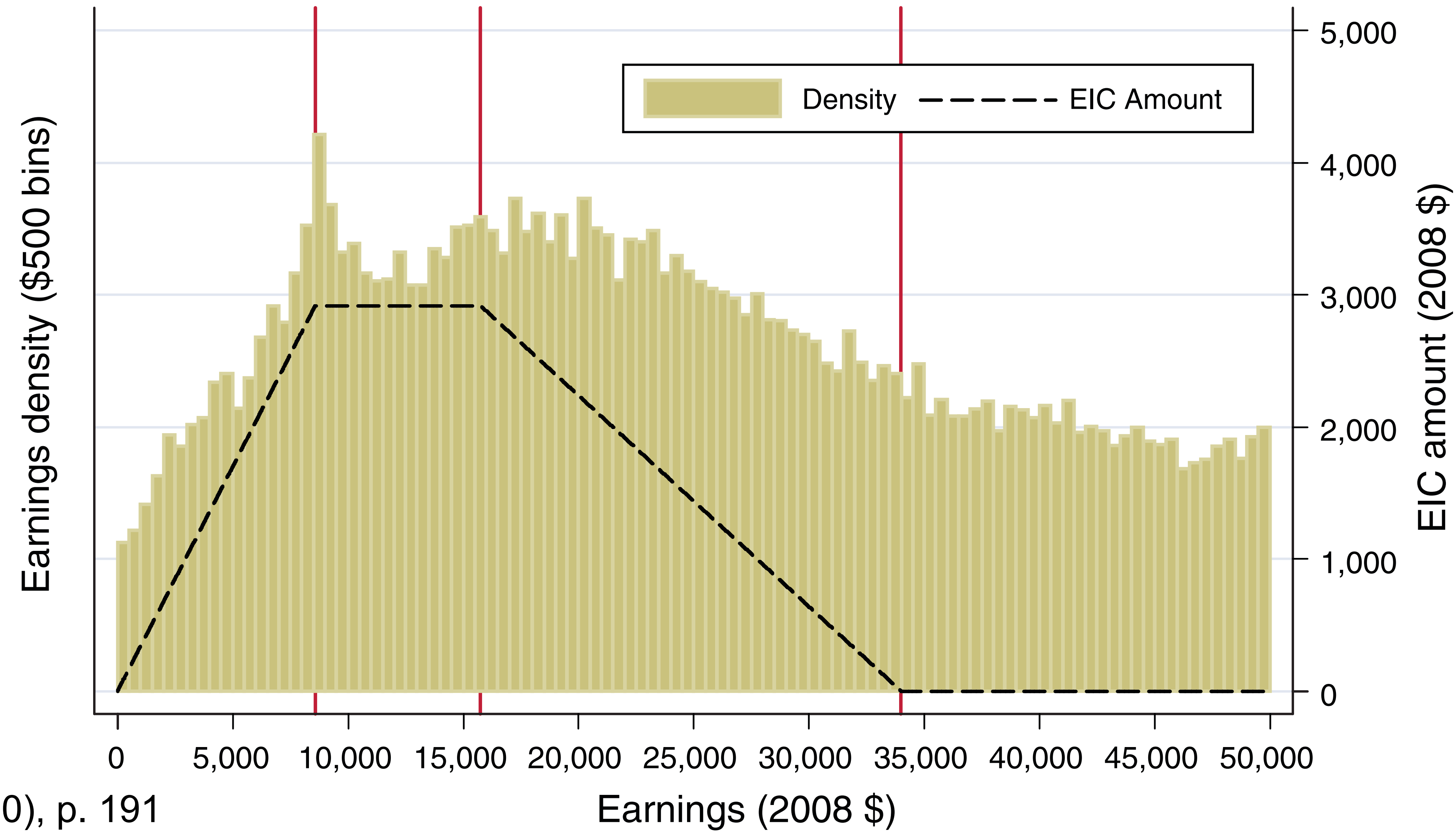

EITC Amount as a Function of Earnings
Married, 2+ kids
Single, 2+ kids
Married, 1 kid
Single, 1 kid
No kids
Subsidy: 40%
Subsidy: 34%
Phase-out tax: 21%
Phase-out tax: 16%
EITC Amount ($)
0
1000
2000
3000
4000
5000
Earnings ($)
0
5000
10000
15000
20000
25000
30000
35000
40000
Source: Federal Govt

B. Two children or more




10), p. 191

Panel A. One child




ez (2010), p. 191

Panel A. One child


10), p. 192

Panel B. Two or more children


10), p. 192

## Why not more bunching at kinks?

1) True intensive elasticity of response may be small

2) Randomness in income generation process: Saez (1999) shows that year-to-year income variation too small to erase bunching if elasticity is large

3) Frictions: Adjustment costs and institutional constraints (Chetty, Friedman, Olsen, and Pistaferri QJE'11)

4) Information and salience

## EITC Behavioral Studies

Evidence of response along extensive margin but little evidence of response along intensive margin (except for self-employed) $\Rightarrow$ Possibly due to lack of understanding of the program

Qualitative surveys show that:

Low income families know about EITC and understand that they get a tax refund if they work

However very few families know whether tax refund $\uparrow$ or $\downarrow$ with earnings

Such confusion might be good for the government as the EITC induces work along participation margin without discouraging work along intensive margin (Liebman-Zeckhauser '04, Rees-Jones and Taubinsky '16)

## Chetty, Friedman, Saez AER'13 EITC heterogeneity

Use US population wide tax return data since 1996 (through IRS special contract)

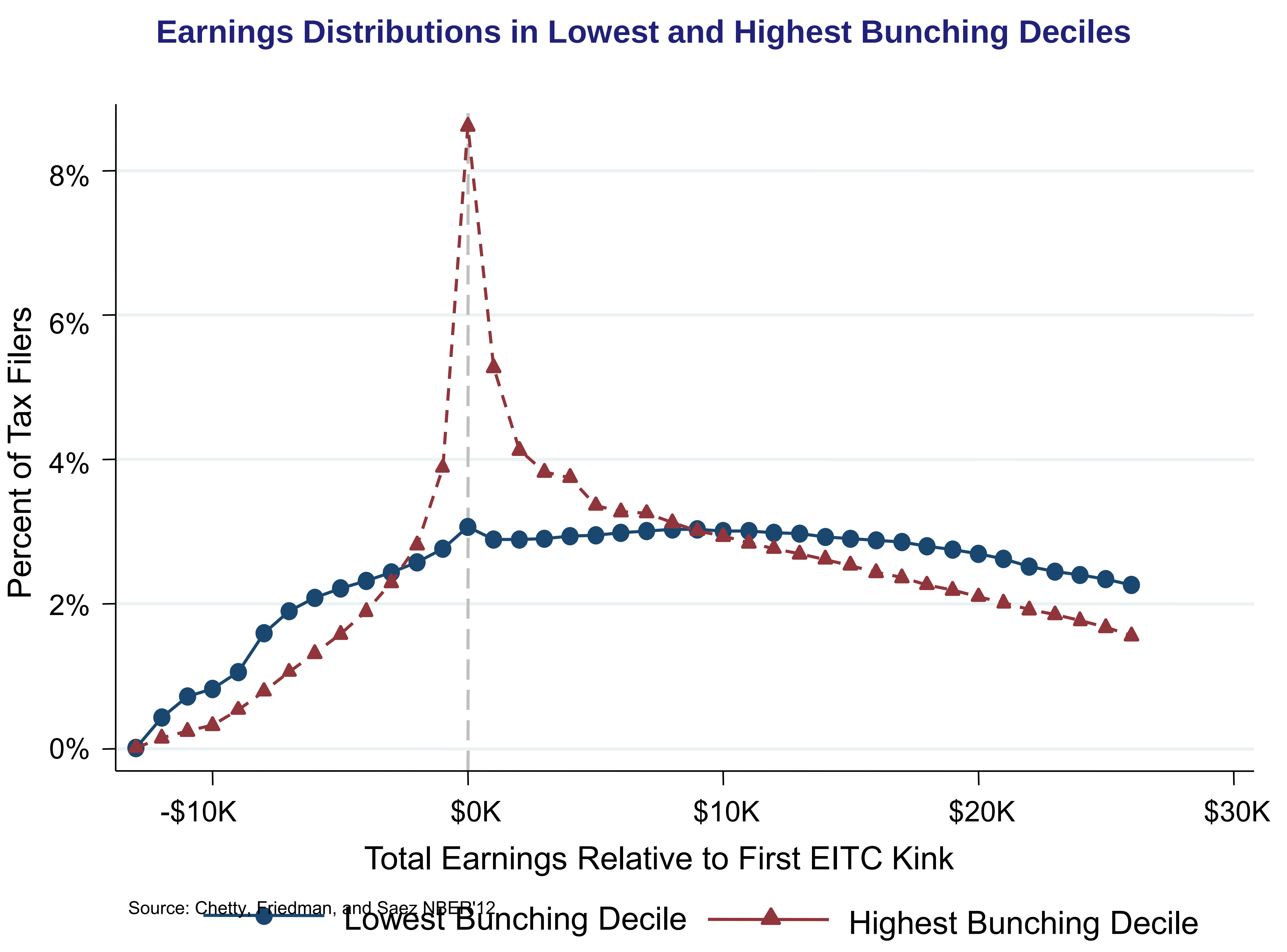
1) Substantial heterogeneity in fraction of EITC recipients bunching (using self-employment) across **geographical areas**

$\Rightarrow$ Information on EITC varies across areas and grows overtime

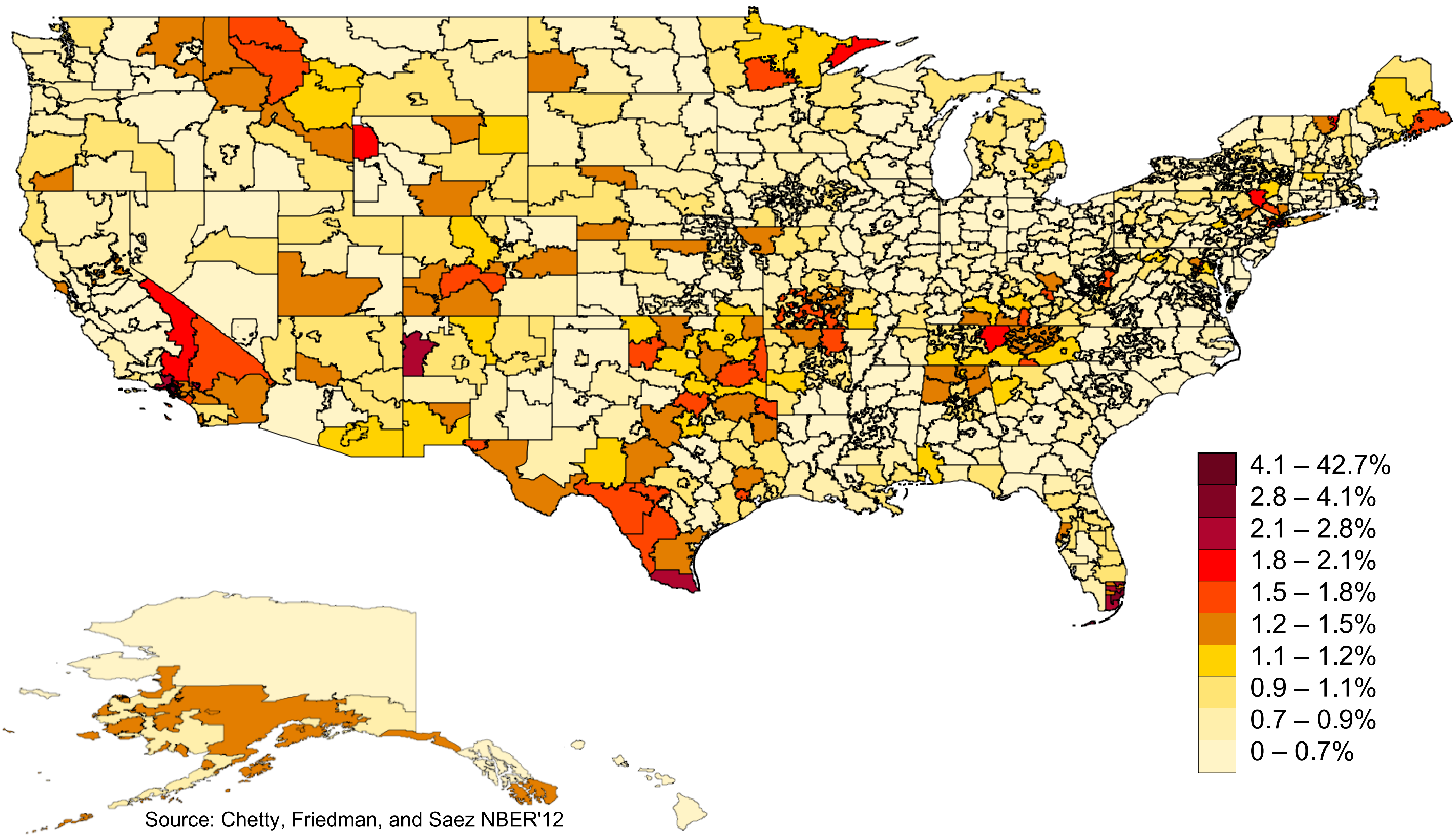
2) Places with high self-employment EITC bunching display **wage earnings** distribution more concentrated around plateau

3) Omitted variable test: use birth of first child to test causal eff'EITC on wage earnings

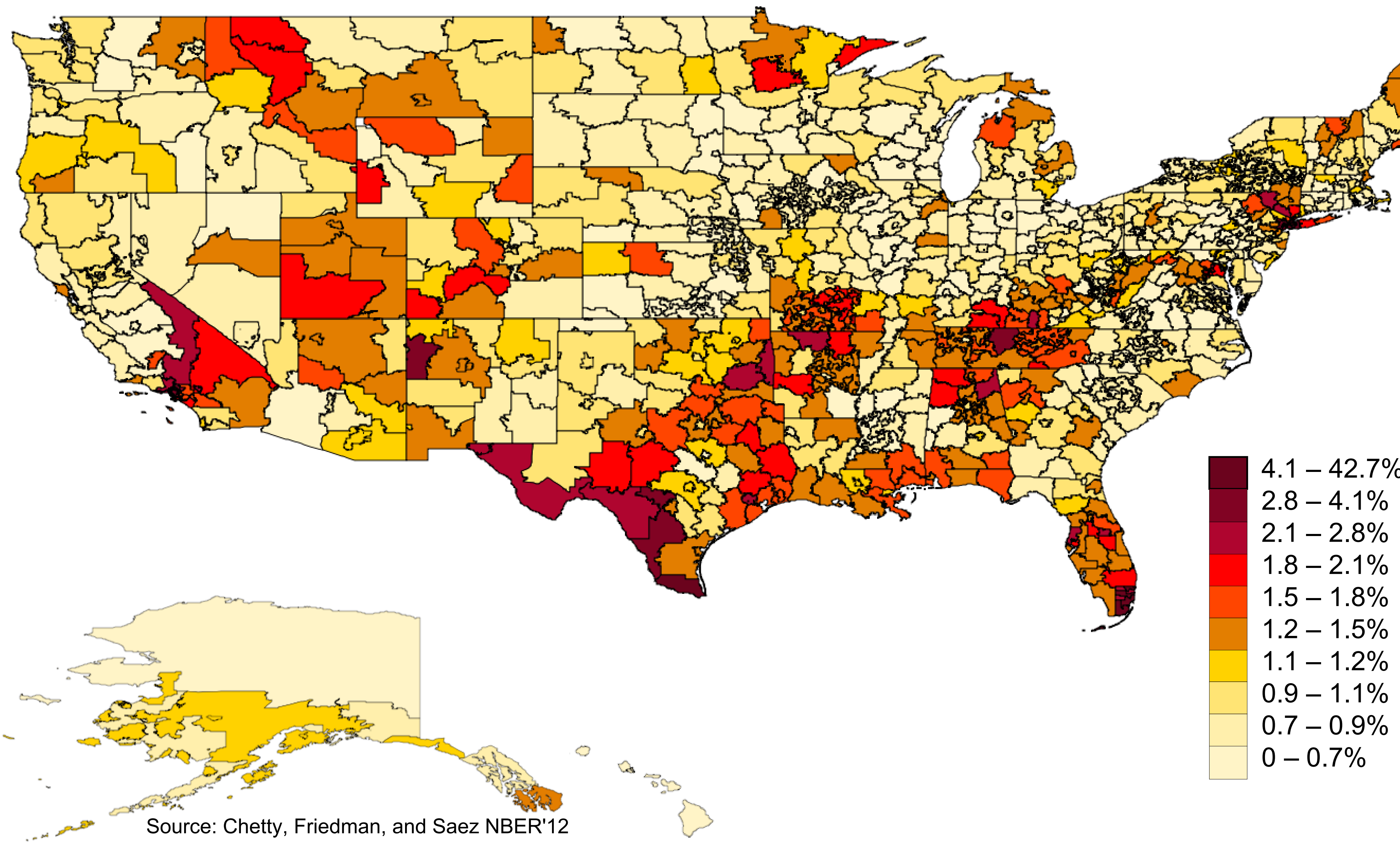
$\Rightarrow$ Evidence of wage earnings response to EITC along intensive margin


Earnings Distributions in Lowest and Highest Bunching Deciles
Percent of Tax Filers
0%
2%
4%
6%
8%
-$10K
$0K
$10K
$20K
$30K
Total Earnings Relative to First EITC Kink
Source: Chetty, Friedman, and Saez NBER'12
Lowest Bunching Decile
Highest Bunching Decile

# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 1996

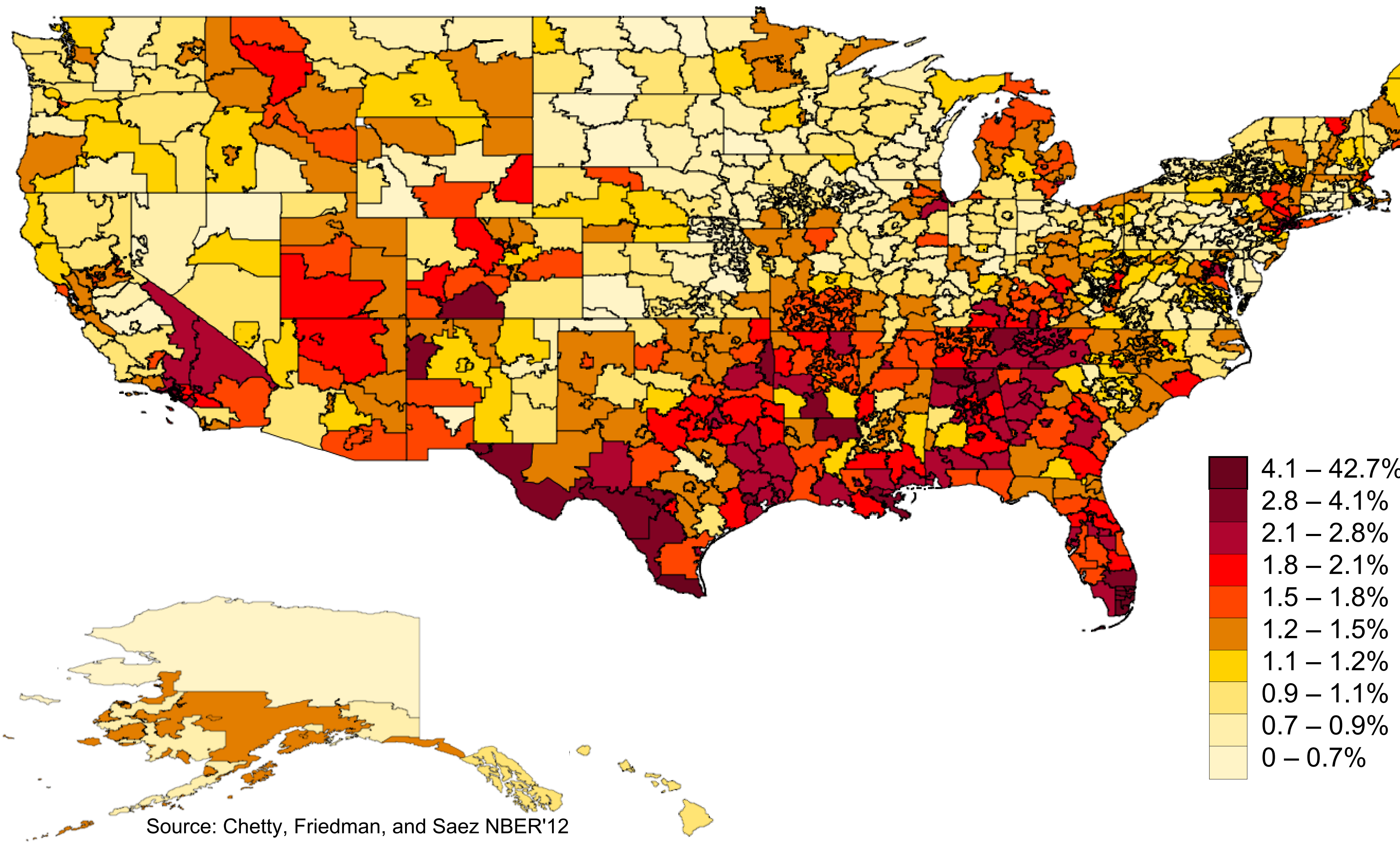


# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 1999



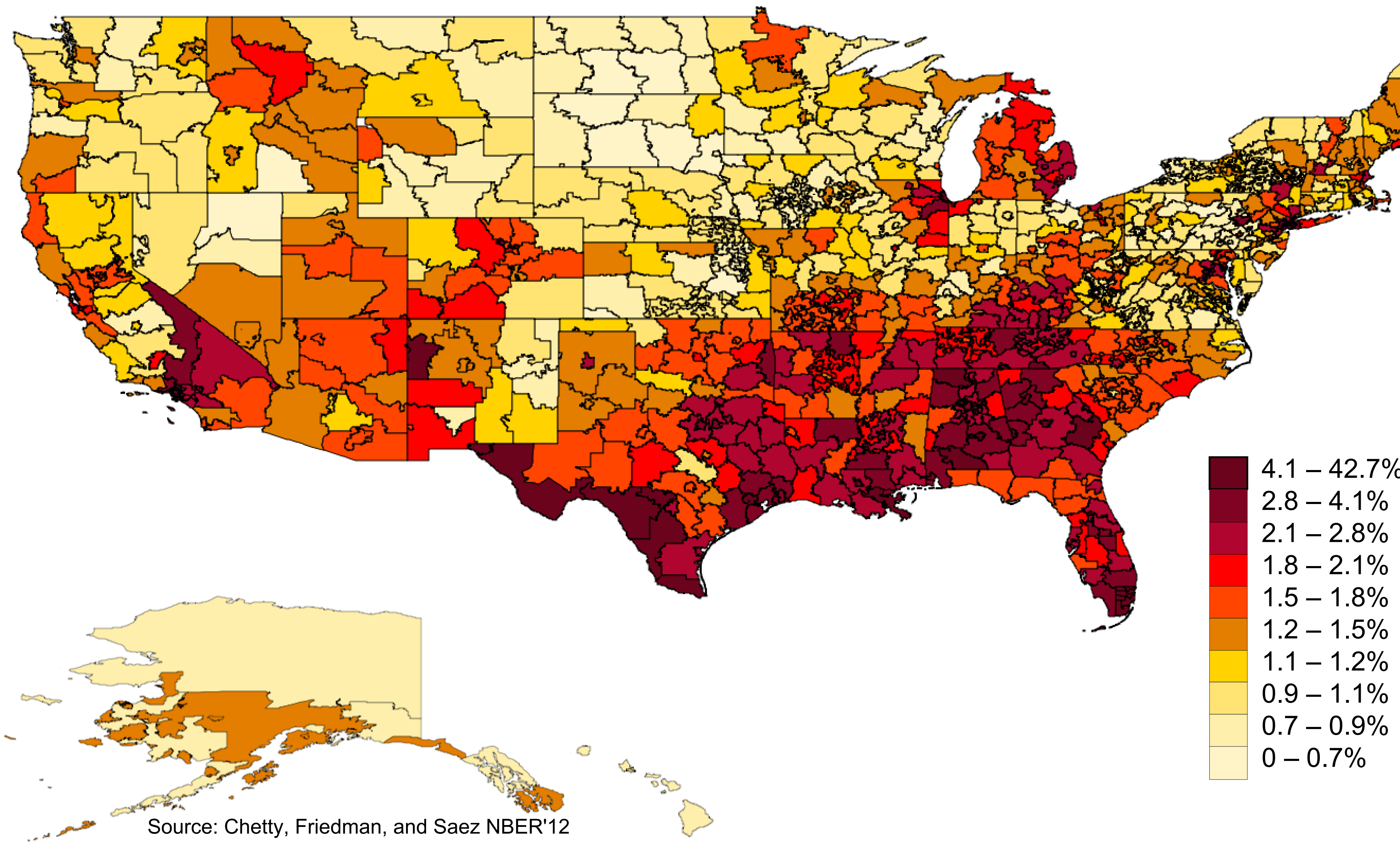

Source: Chetty, Friedman, and Saez NBER'12

# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2002

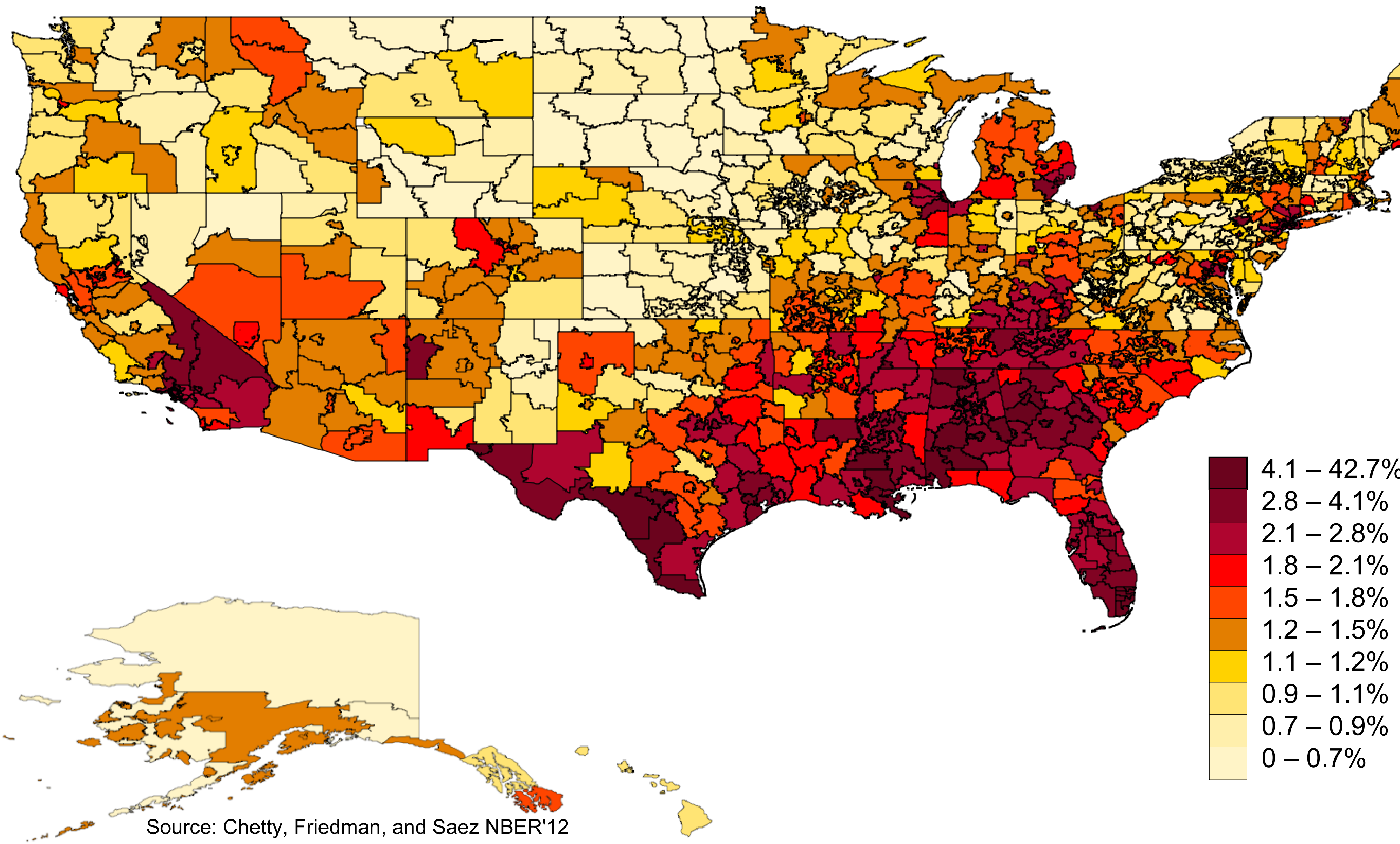



Source: Chetty, Friedman, and Saez NBER'12

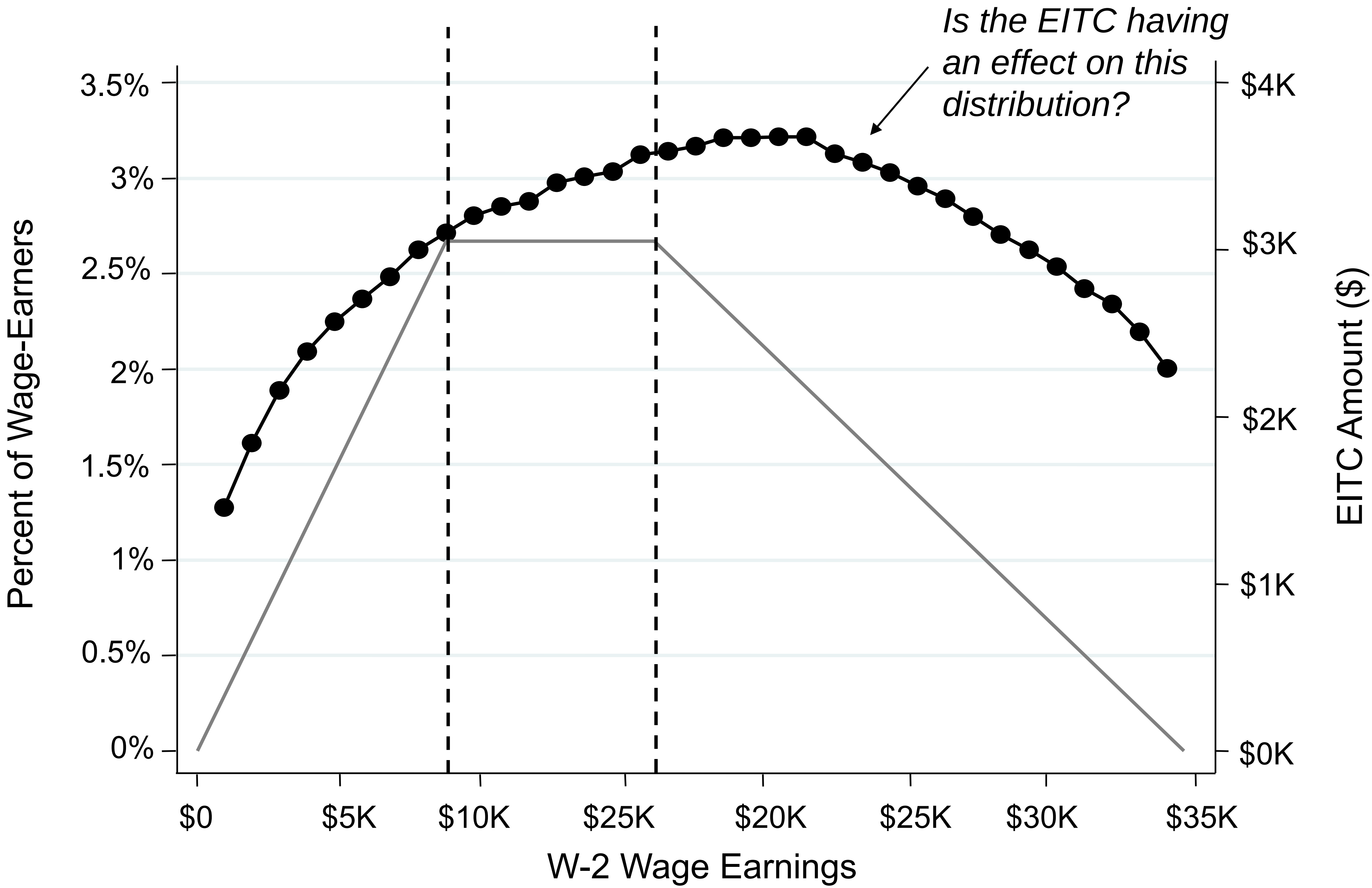
# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2005



# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2008

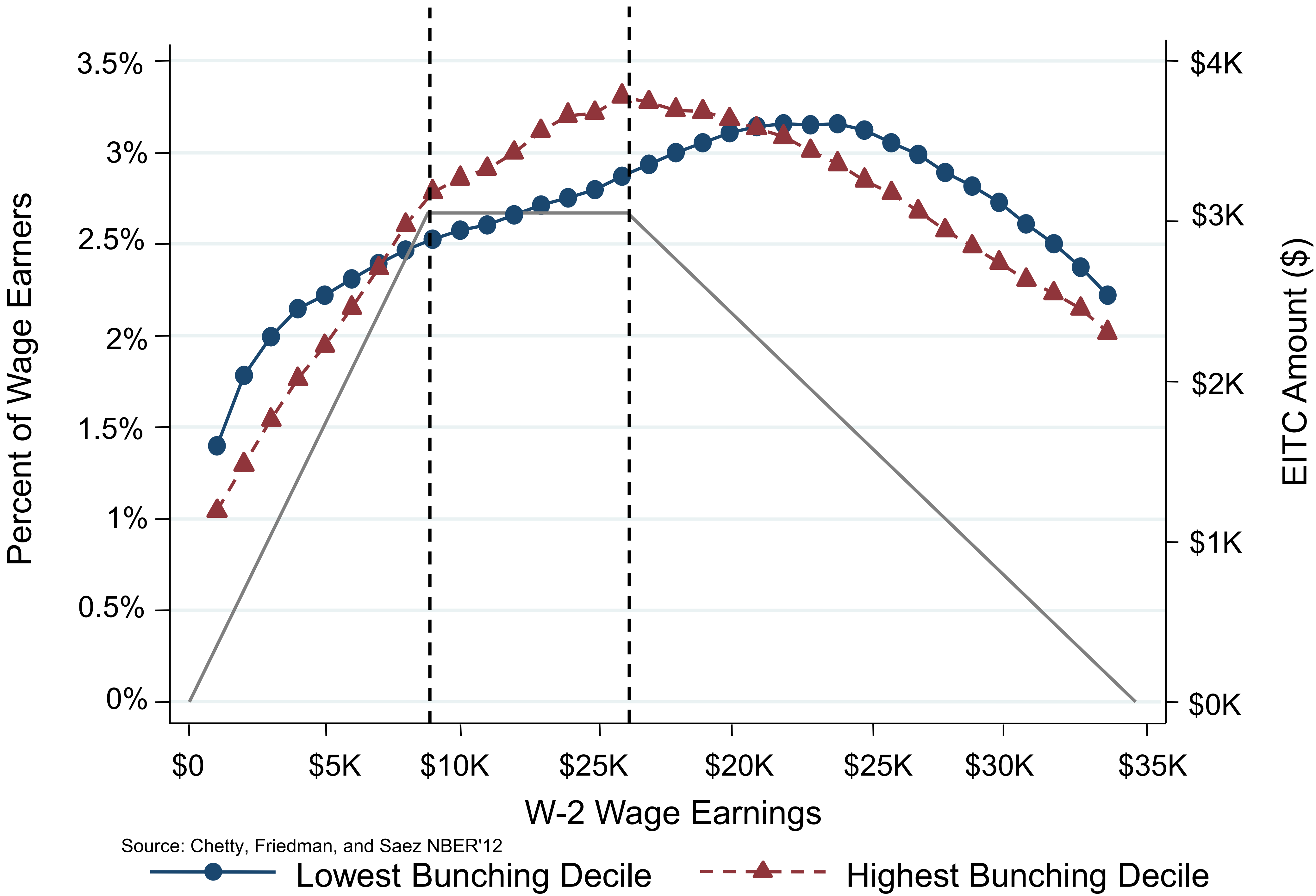


## Income Distribution For Single Wage Earners with One Child

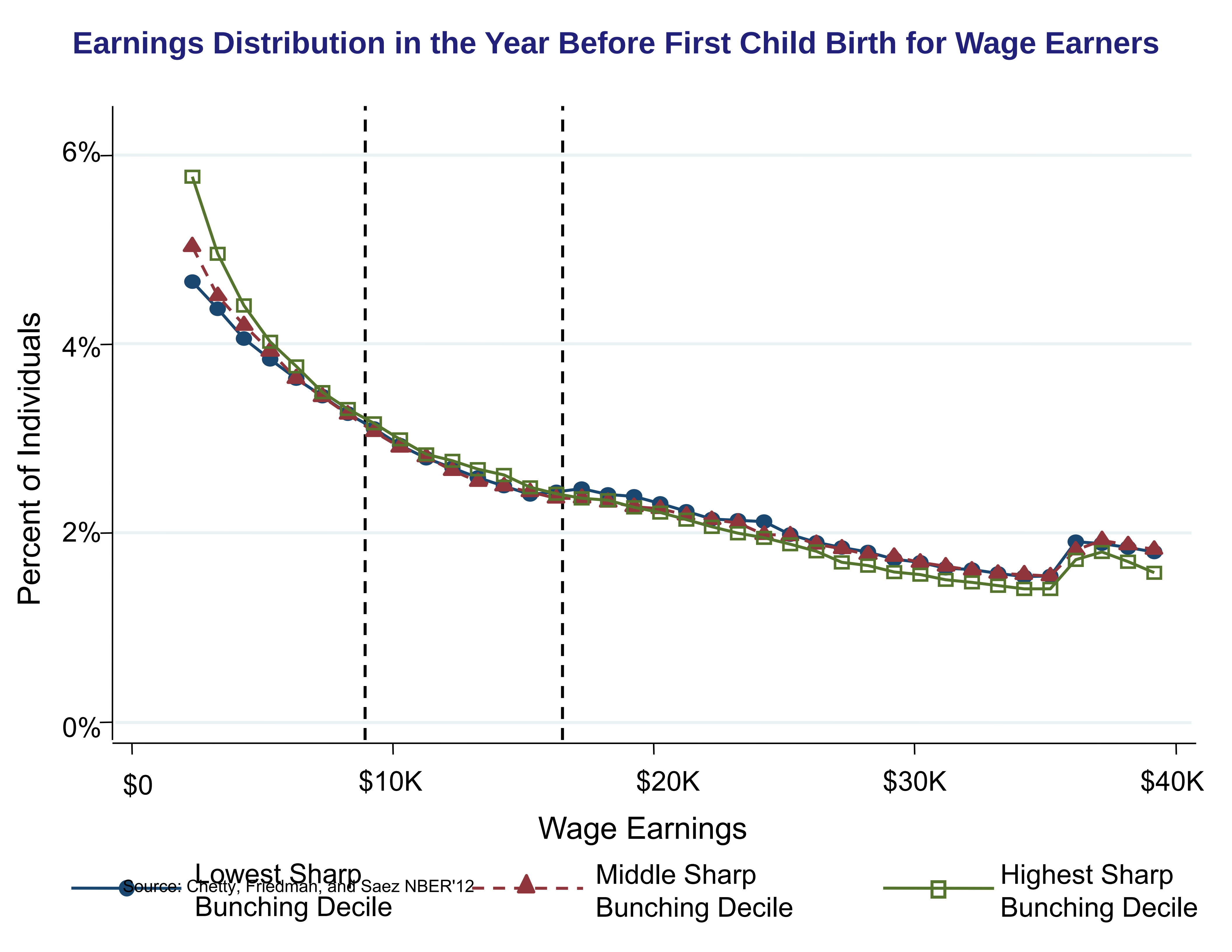



Source: Chetty, Friedman, and Saez NBER'12

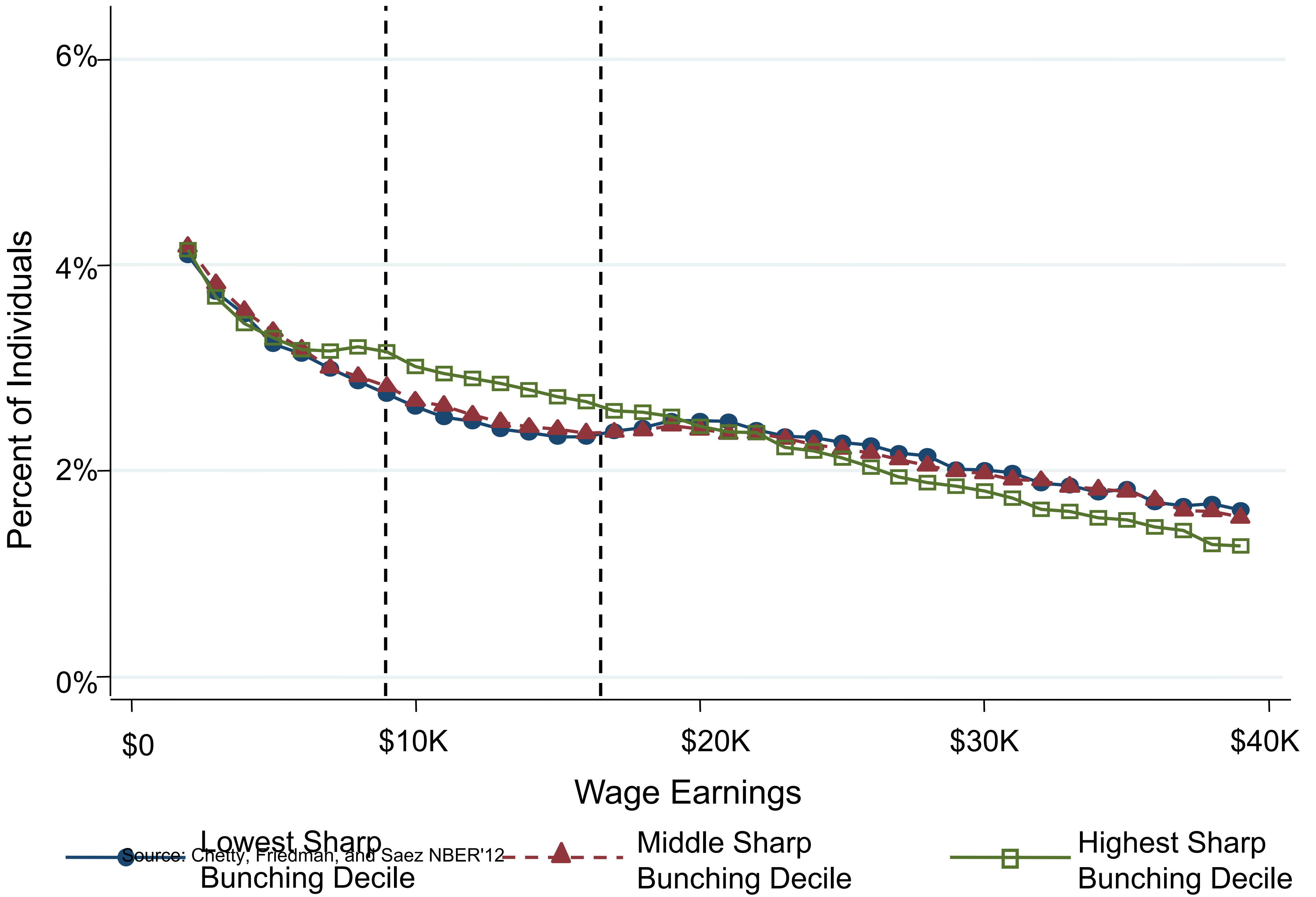
## Income Distribution For Single Wage Earners with One Child
## High vs. Low Bunching Areas




Source: Chetty, Friedman, and Saez NBER'12


Earnings Distribution in the Year Before First Child Birth for Wage Earners
Percent of Individuals
6%
4%
2%
0%
$0
$10K
$20K
$30K
$40K
Wage Earnings
Lowest Sharp Bunching Decile
Middle Sharp Bunching Decile
Highest Sharp Bunching Decile
Source: Chetty, Friedman, and Saez NBER'12

## Earnings Distribution in the Year of First Child Birth for Wage Earners




Source: Chetty, Friedman, and Saez NBER'12

# IMPLICATIONS OF ROLE OF INFORMATION

**Empirical work:**

Information should be a key explanatory variable in estimation of behavioral responses to govt programs

When doing empirical project, always ask the question: did people affected understand incentives?

Cannot identify structural parameters of preferences without modeling information and salience

**Normative analysis:**

Information is a powerful and inexpensive policy tool to affect behavior

Should be incorporated into optimal policy design problems

## Value of Administrative data

Key advantages of admin data (in most advanced countries such as Scandinavia):

1) Size (often full population available)

2) Longitudinal structure (can follow individual across years)

3) Ability to match wide variety of data (tax records, earnings records, family records, health records, education records)

US is lagging behind in terms of admin data access [hard to match across agencies]

Private sector also generates valuable **big data** (Google, Credit Bureaus, personnel/health data from large companies)

## Bunching at Notches: Kleven and Waseem '13

Taxes and transfers sometimes also generate **notches** (=discontinuities) in the budget set

Such discontinuities should create bunching (and gaps) in the resulting distributions

Kleven and Waseem QJE'13 pioneered tax notch analysis in the case of the Pakistani income tax where **average** tax rate jumps

$\Rightarrow$ Bunching below the notch and gap in density just above the notch

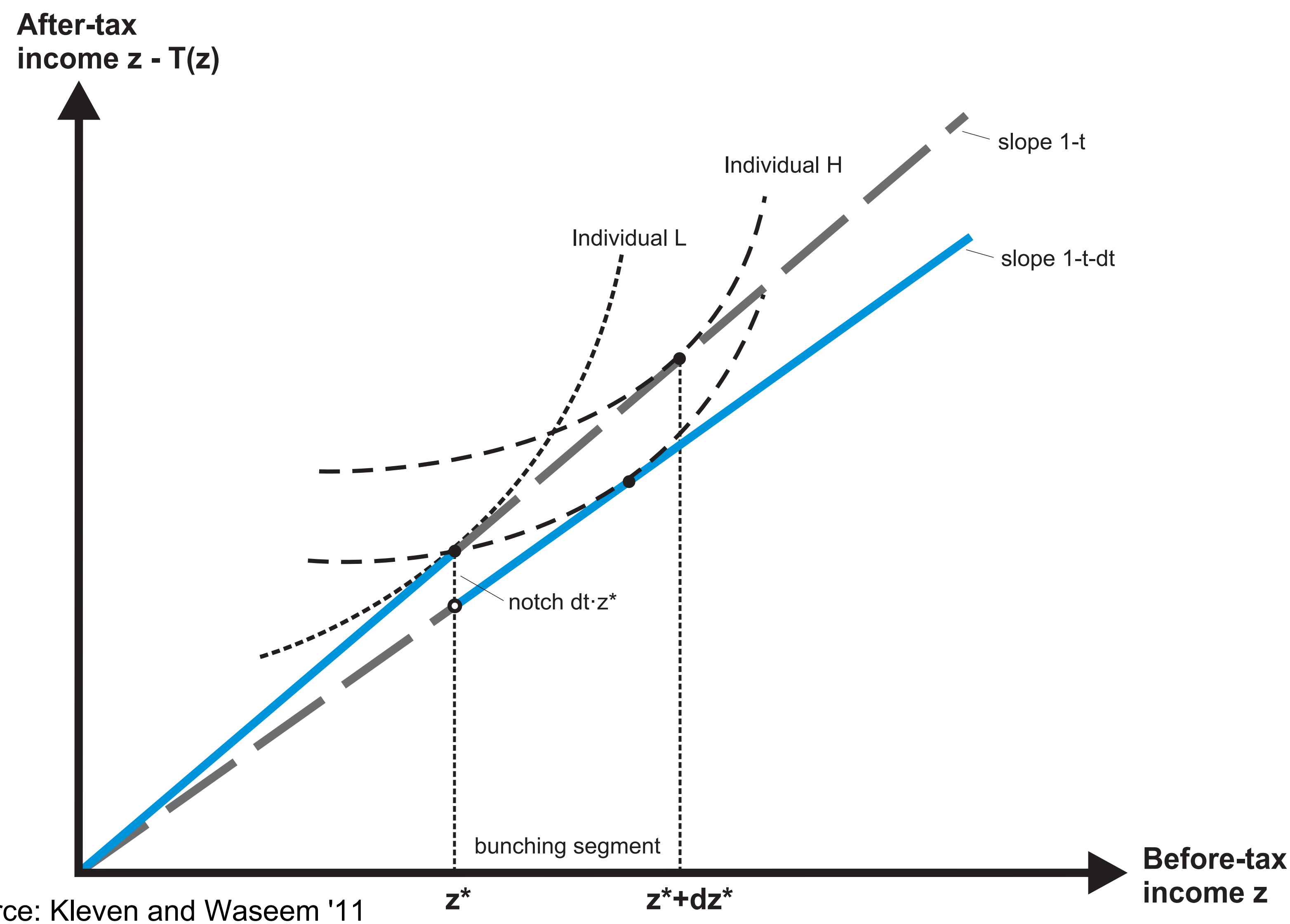
Recently Londono-Velez and Avila (2018) use notch analysis to study wealth tax in Columbia

They show clean prior-year counterfactual overcoming the Blomquist et al. '21 critique

# FIGURE 1

Effect of Notch on Taxpayer Behavior

## Panel A: Bunching at the Notch

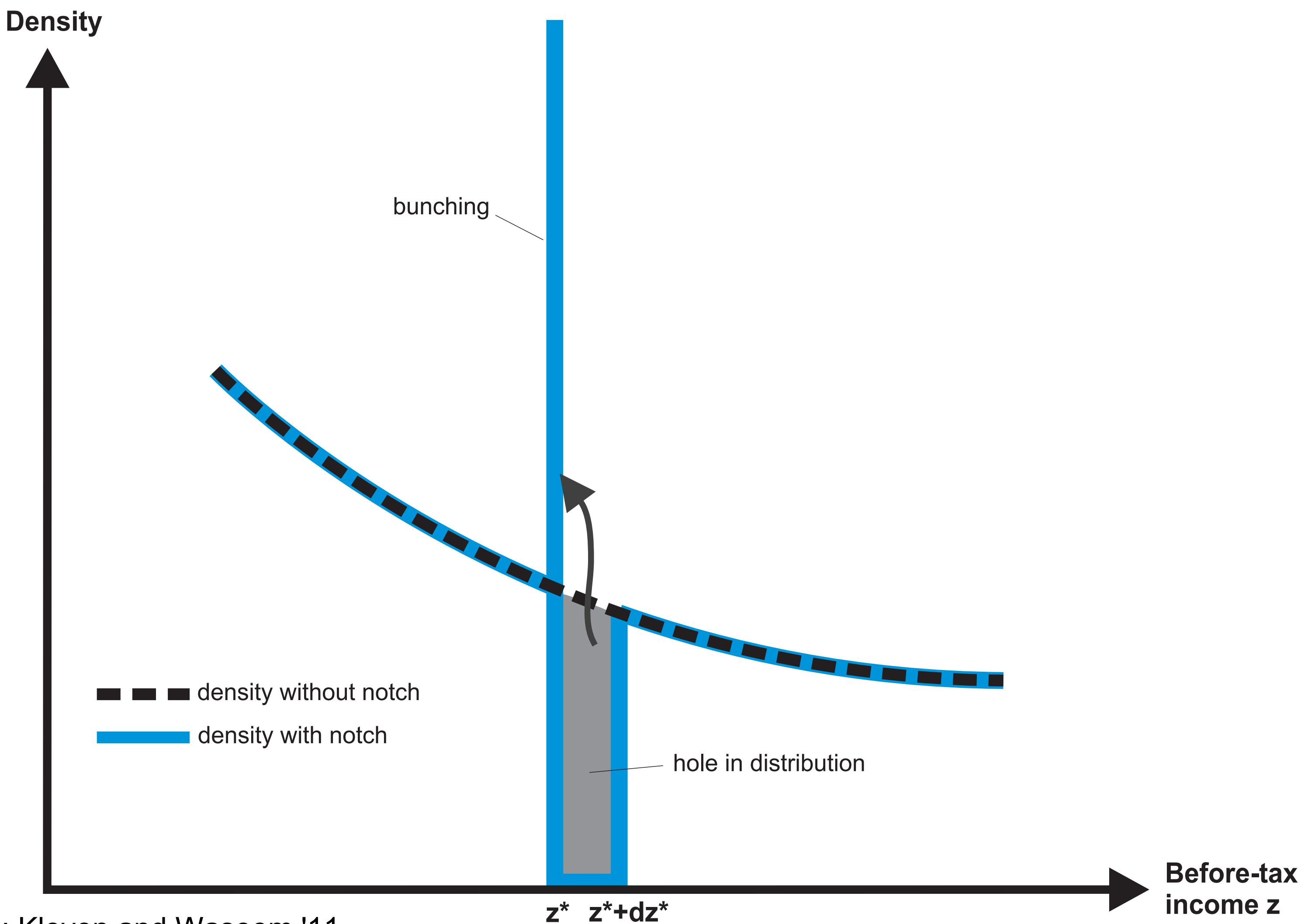



Source: Kleven and Waseem '11

## FIGURE 2

Effect of Notch on Density Distribution

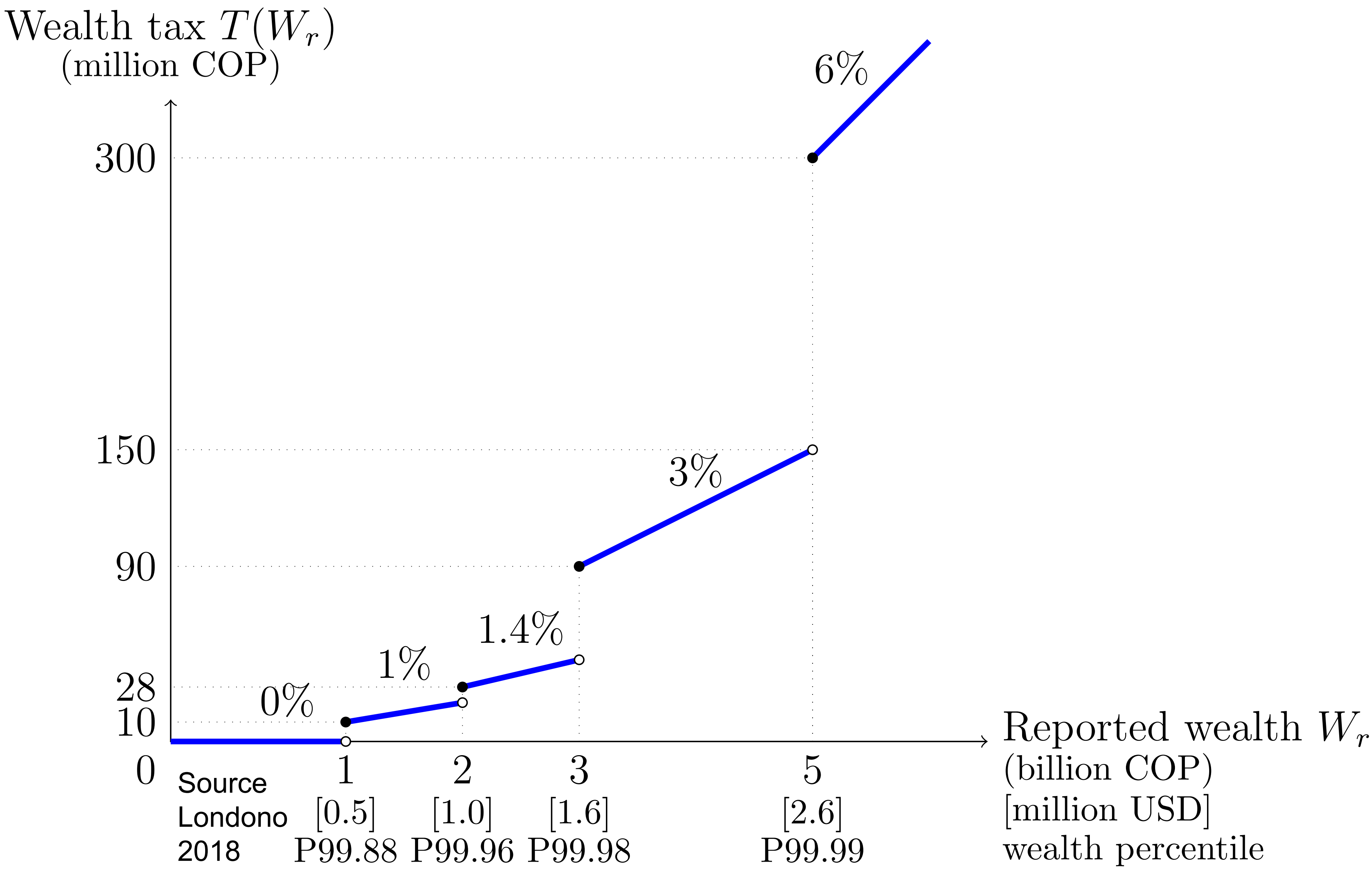
### Panel A: Theoretical Density Distributions




Source: Kleven and Waseem '11

Figure 1: The Personal Wealth Tax Schedule in Colombia

(a) Wealth Tax Liability as a Function of Reported Net Wealth (FY 2010)



(b) Evolution of Statutory Annual Wealth Tax Rates by Bracket Cutoff

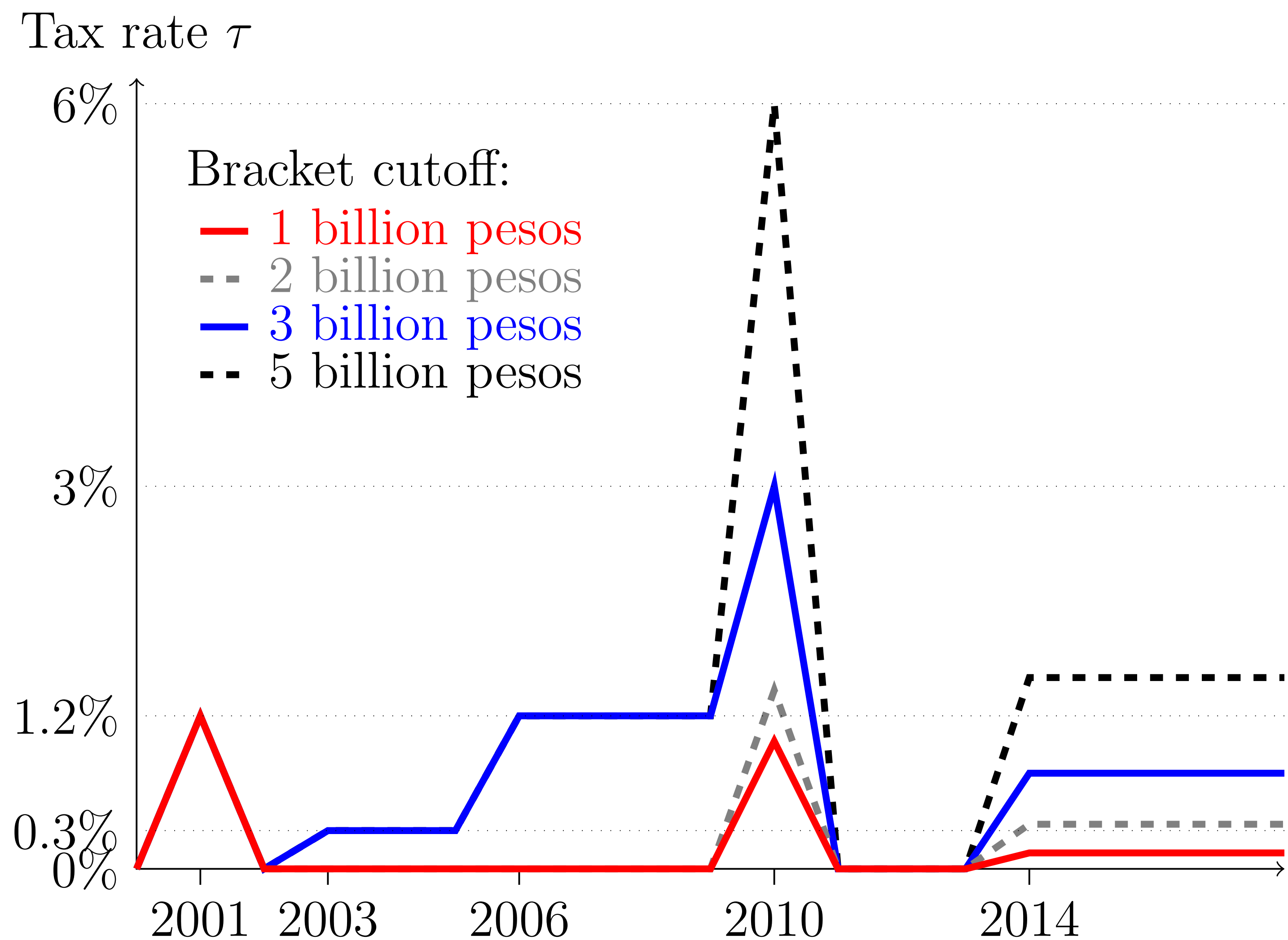
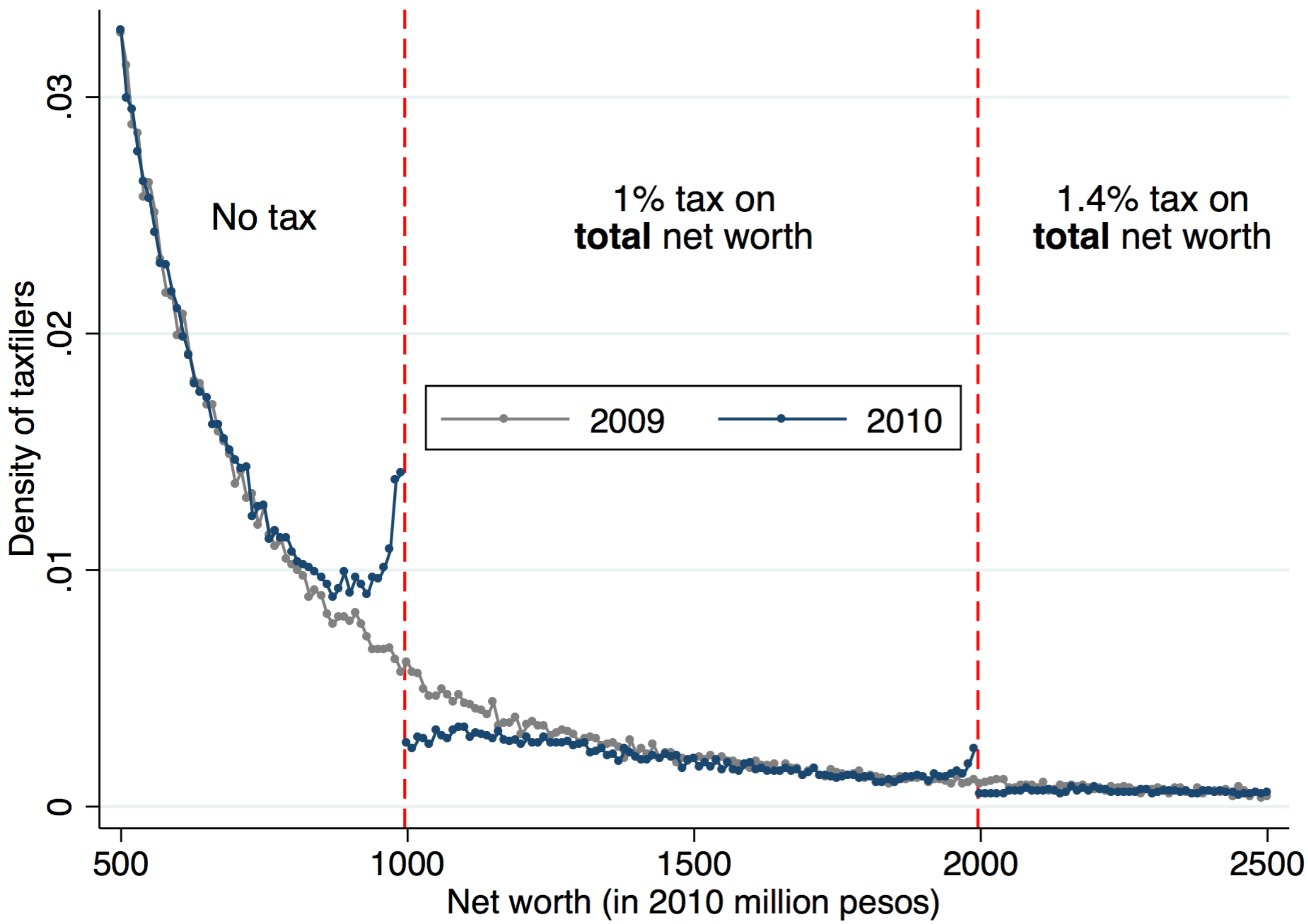


Figure 2: Distribution of Reported Net Worth in 2009 (Before Reform) and 2010 (After Reform)




*Notes:* This figure overlays the distribution of tax filers by reported net wealth before and after a reform introduced two wealth tax notches at 1 and 2 billion pesos (red vertical lines), as depicted in Figure 1. These notches imply that wealth tax liability jumps discontinuously, as illustrated in Figure 1. The figure shows that the distribution of individuals is smooth in the absence of wealth tax notches (2009). The two notches result in the immediate emergence of excess mass below the notch points, and corresponding missing mass just above them (2010). This

## Bunching at notches: elasticity estimation

With optimization frictions (lack of information, costs of adjustment), a fraction of individuals fail to respond to notch

Kleven-Waseem use empirical density in the theoretical gap area to measure the fraction of unresponsive individuals

This allows them to back up the frictionless elasticity (i.e. the elasticity among responsive individuals)

The frictionless elasticity is much higher than the reduced form elasticity but remains still relatively modest

## Many Recent Bunching Studies

Bunching method applied to many settings with nonlinear budgets with convex kink points or notches (Kleven '16 survey):

- Individual tax (Bastani-Selin '14 Sweden, Mortenson-Whitten '16 US)
- Payroll tax (Tazhidinova '15 on UK)
- Corporate tax (Devereux-Liu-Loretz '14, Bachas-Soto '17)
- Wealth tax (Seim '17, Jakobsen et al. '17, Londono-Velez and Avila '18)
- Health spending (Einav-Finkelstein-Schrimpf '13 on Medicare Part D)
- Retirement savings (401(k) matches)
- Retirement age (Brown '13 on California Teachers)
- Housing transactions (Best and Kleven, 2017)

General findings:

(1) clear bunching when information is salient and outcome easily manipulable. Bunching comes most often from avoidance/evasion rather than real behavior.

(2) bunching is almost always small relative to conventional elasticity estimates

## Responses to Corporate Tax Notches: Bachas-Soto '18

Bachas and Soto '18 exploit the notched Costa Rica corporate tax system to estimate compellingly the effects of the corporate tax rate on reported profits

Corporate tax applies to profits = revenue minus costs

But tax rate depends on size of revenue with 3 rates: 10%, 20%, 30%

1) Firms bunch at the notches to benefit from the lower rates

2) Most importantly: clear evidence that profit rates (profits/revenue) is strongly affected by the corporate tax rate

Source: Bachas and Soto (2018)

# Figure 1: Costa Rica's Corporate Tax Schedule

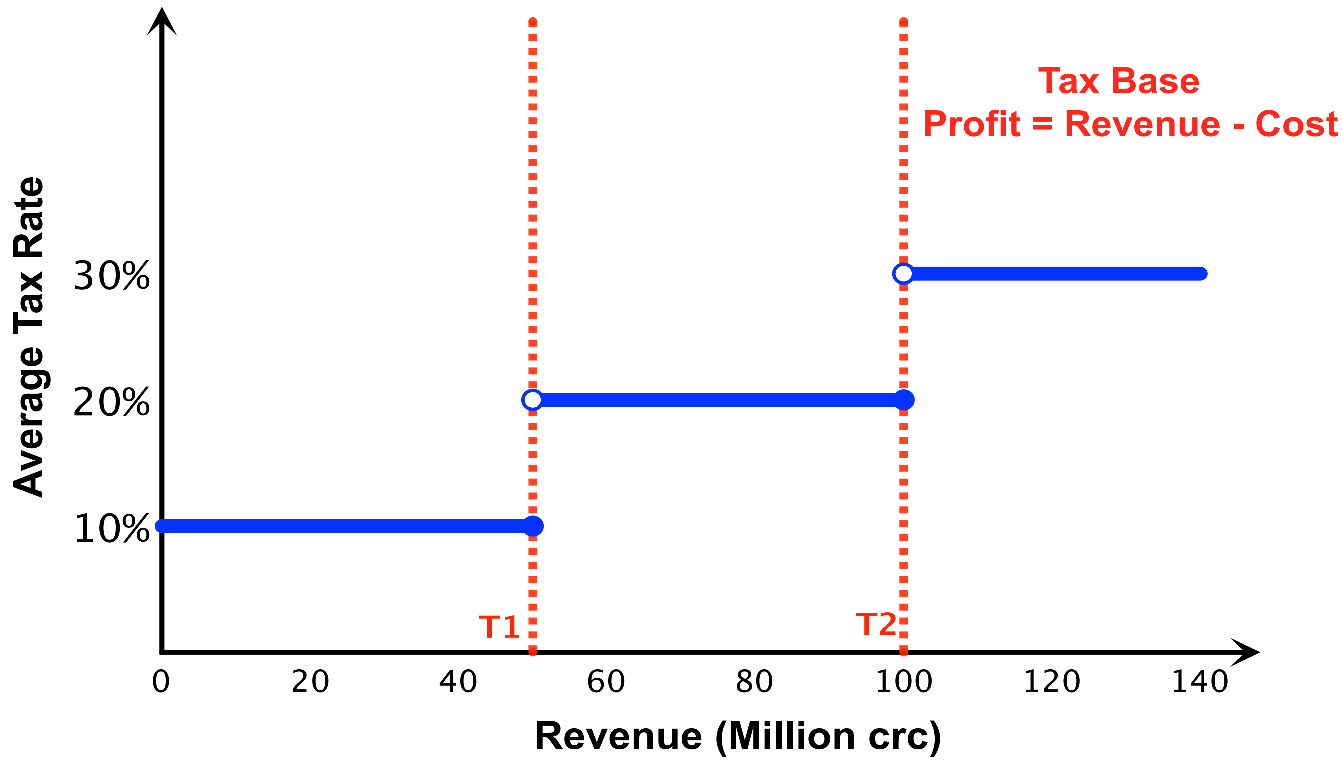
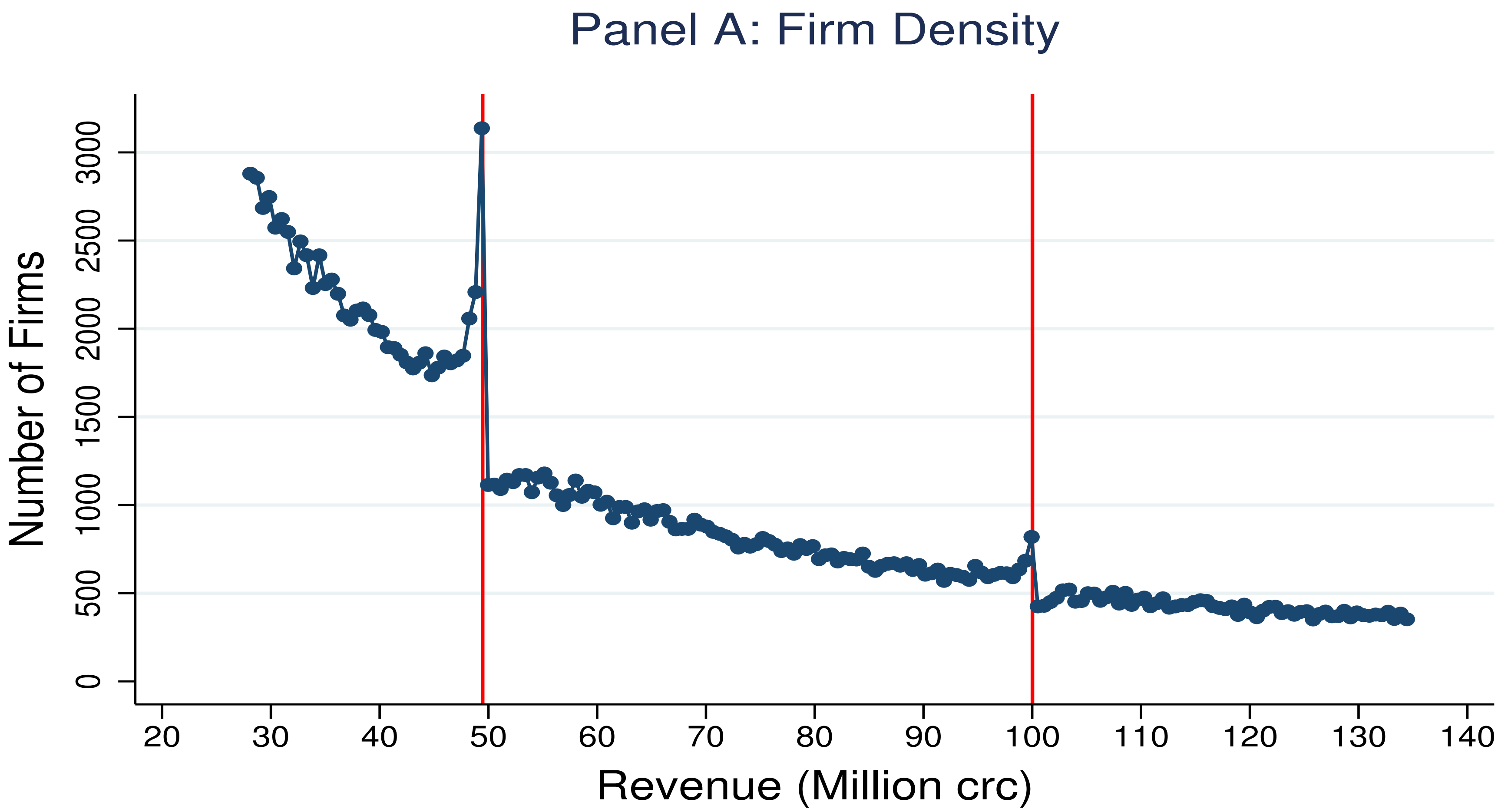
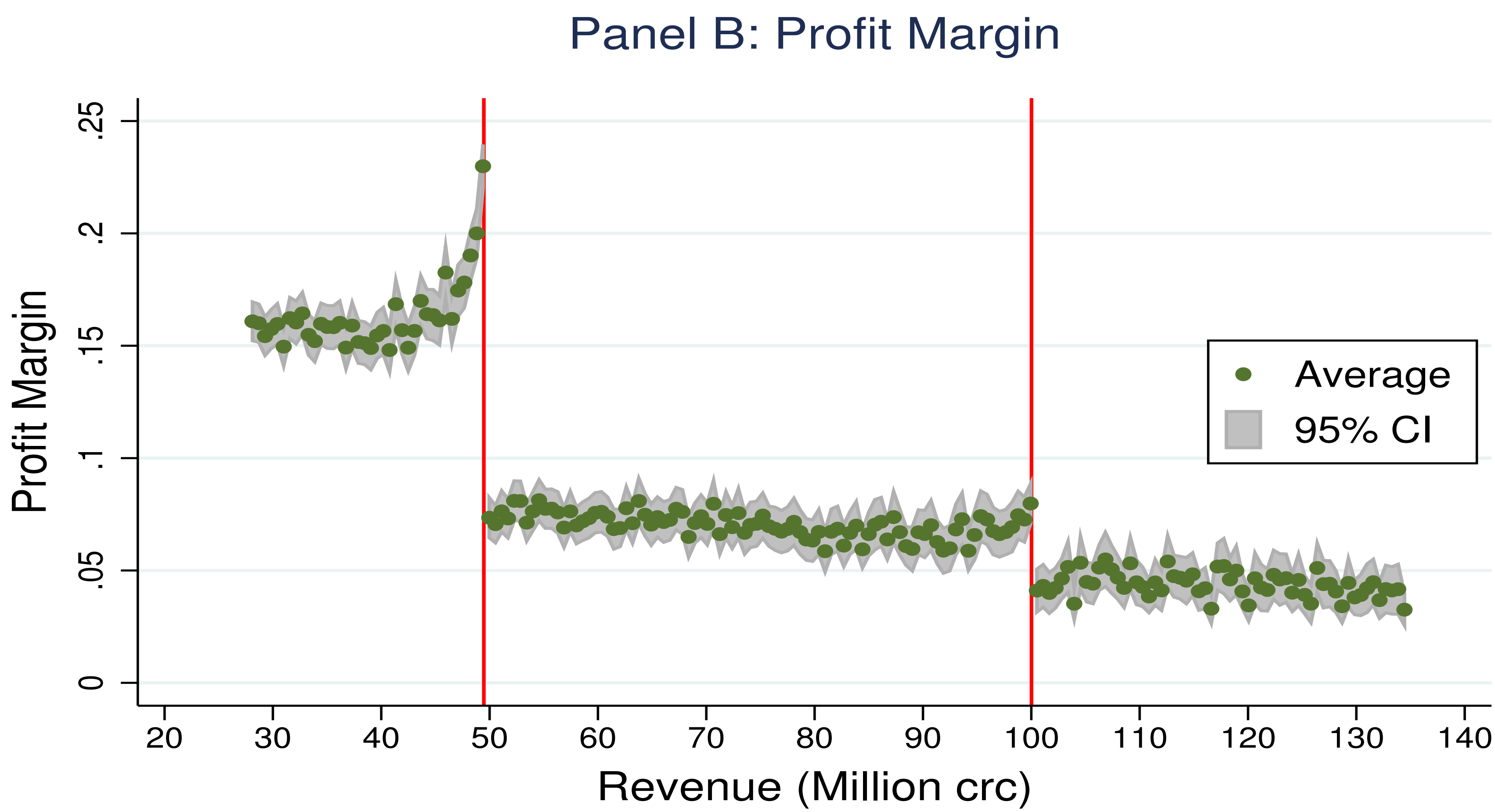



Figure 1 shows the design of the corporate income tax in Costa Rica, as discussed in section 2.1. Firms face increasing *average* tax rates on their profits (revenue minus cost) as a function of their revenue. When revenue exceeds the first threshold, the average tax rate jumps from 10% to 20% and from 20% to 30% past the second threshold. Thresholds are adjusted yearly for inflation.

# Figure 3: Firm Density and Average Profit Margin






Source: Administrative data from the Ministry of Finance 2008-2014.
Figure 3 presents the key patterns of the corporate tax data, discussed in Section 3.1. The figure pulls together data from years 2008 to 2014. Panel A shows the density of firms by revenue. Panel B displays the average profit margin by revenue. Profit margin is defined as profits over revenue. The size of the revenue bins is 575,000 CRC.

## Intertemporal Labor Supply: High Frequency

Frisch elasticity $e^F$: changing wages in a single period and keeping marginal utility of income $\lambda$ constant

Compensated static elasticity $e^C$: changing wages in all periods but keeping utility constant

Uncompensated static elasticity $e^U$: changing wages in all periods with no compensation

$$\text{Theoretically: } e^F > e^C > e^U$$

Frisch elasticity is of central interest for calibration of macro business cycle models:

Real business cycle model requires huge elasticity to generate realistic employment fluctuations

## Intertemporal substitution: Tax Holiday in Iceland

In 1987, Iceland transitioned from paying taxes on previous year's income to current income

To avoid double taxation during transition, no tax charged over 1987 incomes

Average tax rate of 14.5% in 1986, 0% in 1987, 8% in 1988

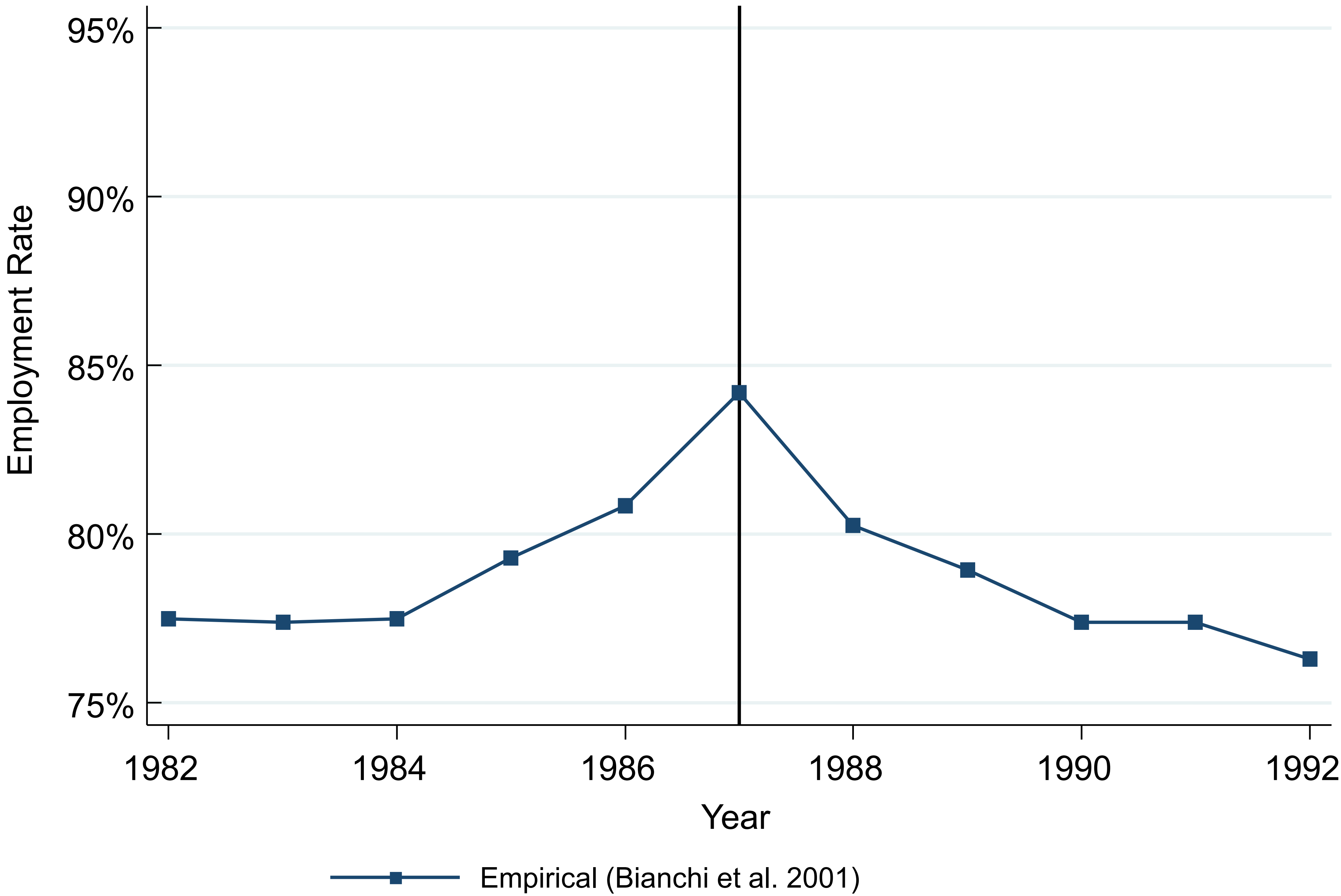
Reform announced in late 1986 $\Rightarrow$ unanticipated temporary tax change

Temporary change in incentives $\Rightarrow$ ideal quasi-experiment to intertemporal substitution elasticity (work hard in 1987, take a break in 1986 or 1988)

Bianchi et al. AER'01 look at employment effects [hard to know what counterfactual is]

Siggurdsson (2019) compares high (big tax cut) vs. low earners (small tax cut) and finds larger response among high earners [but possible that high earners are more elastic to start with]

Figure 1a: 1987 Tax Holiday in Iceland



## Tax Holiday in Swiss Cantons

Martinez, Saez, Siegenthaler ’21 study tax holidays in Swiss cantons also created by a transition to pay-as-you earn

Key advantage: different cantons transitioned at different times (creating staggered tax holidays across cantons)

Key findings:

(a) precise zero effect on extensive margin

(b) some effects on intensive margin for high wage earners and self-employed (possibly avoidance rather than real)

Why smaller effects in Switzerland than Iceland? Iceland sold tax holiday as opportunity to work more (Switzerland did not)

# 1990s Income Tax Reform in Switzerland

Transition from retrospective taxation to annual pay-as-you-earn

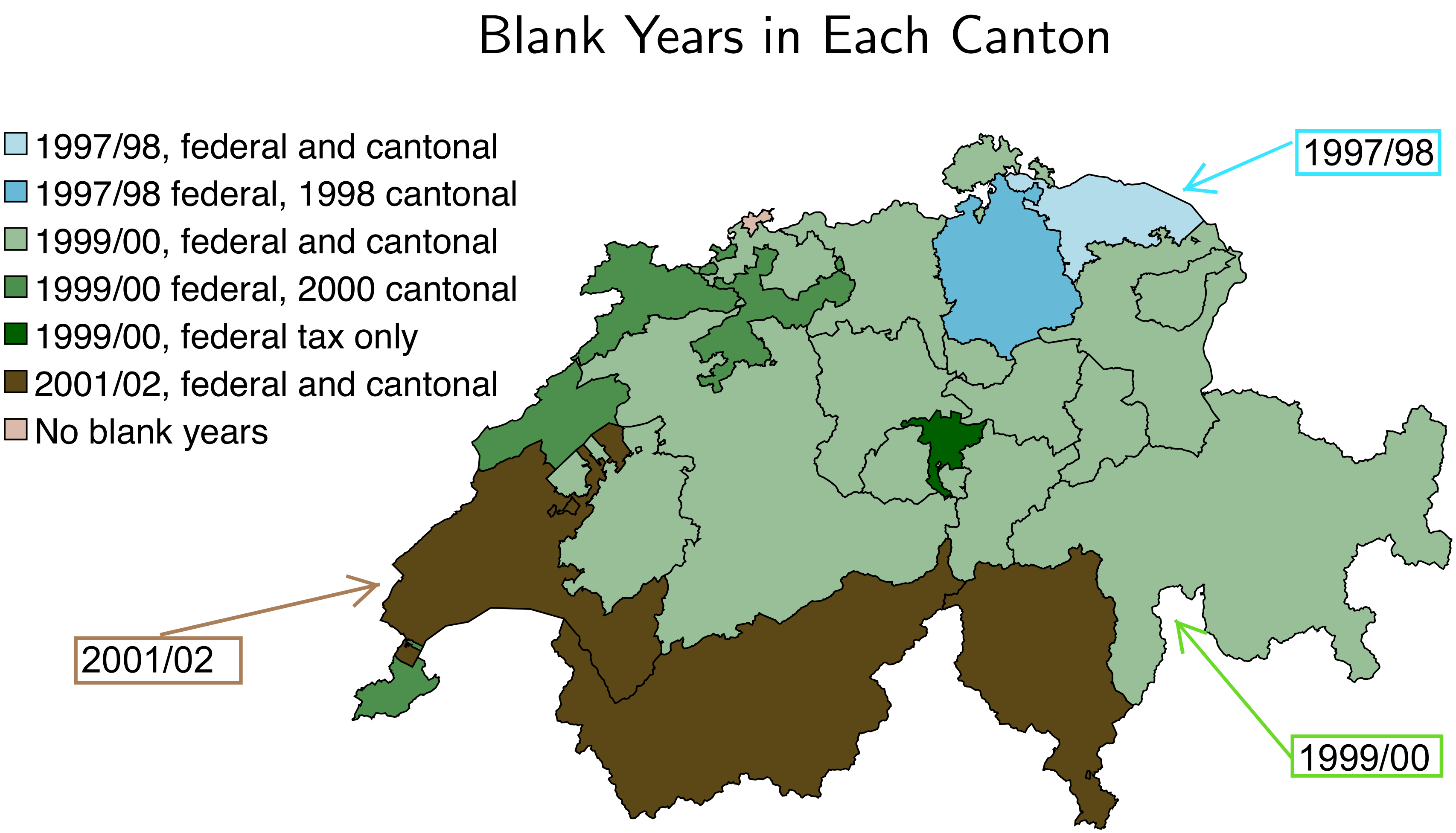
- Reasons: modernizing, simplifying and harmonizing
- Side effect: incomes earned during the two years prior to the change remained untaxed (blank years, tax holiday)

untaxed incomes!

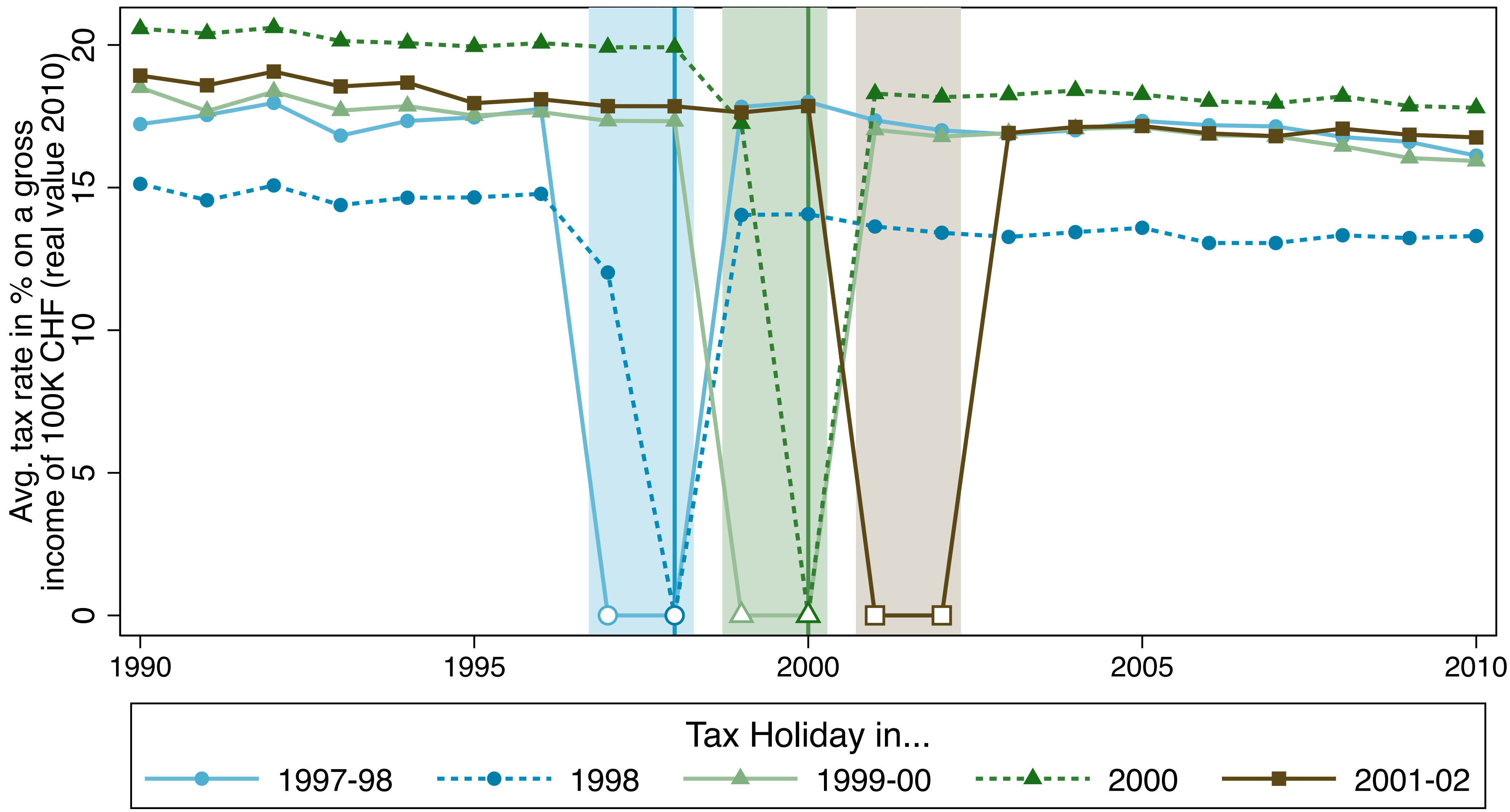
| Year X | 1993 1994 | 1995 1996 | 1997 1998 | 1999 | 2000 |
|---|---|---|---|---|---|
| Tax base for assessment period X | Incomes realized in 1991 + 1992 | Incomes realized in 1993 + 1994 | Incomes realized in 1995 + 1996 | Income realized in 1999 | Income realized in 2000 |
| Payment of tax liability owed for year X | During 1993 and 1994 | During 1995 and 1996 | During 1997 and 1998 | Provisional installments 1999, final assessment in 2000 | Provisional installments 2000 final assessment in 2001 |

- Cantons chose different years to change: 1999, 2001, and 2003

# Timing of the Reform

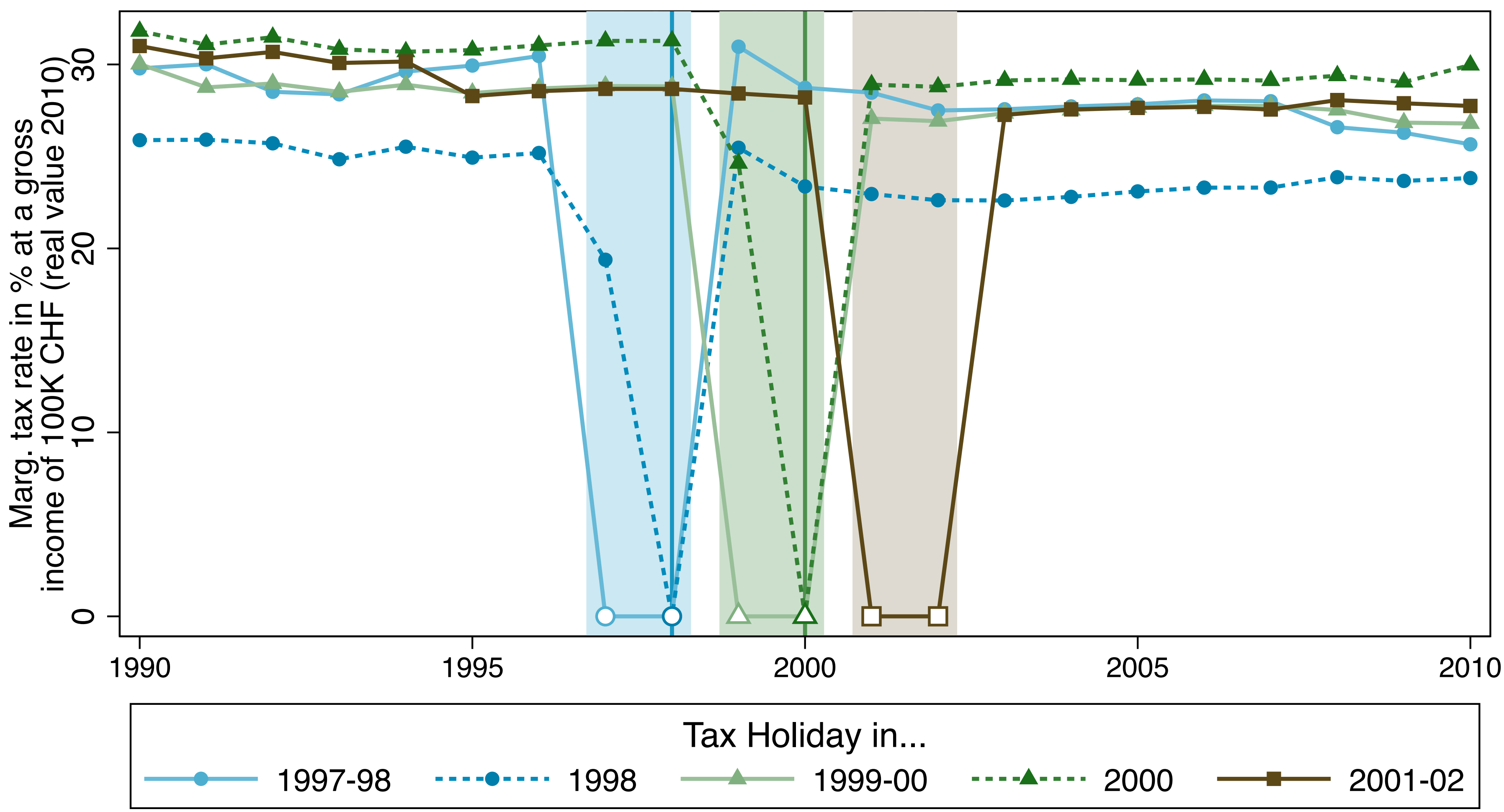


# Average Income Tax Rates over Time



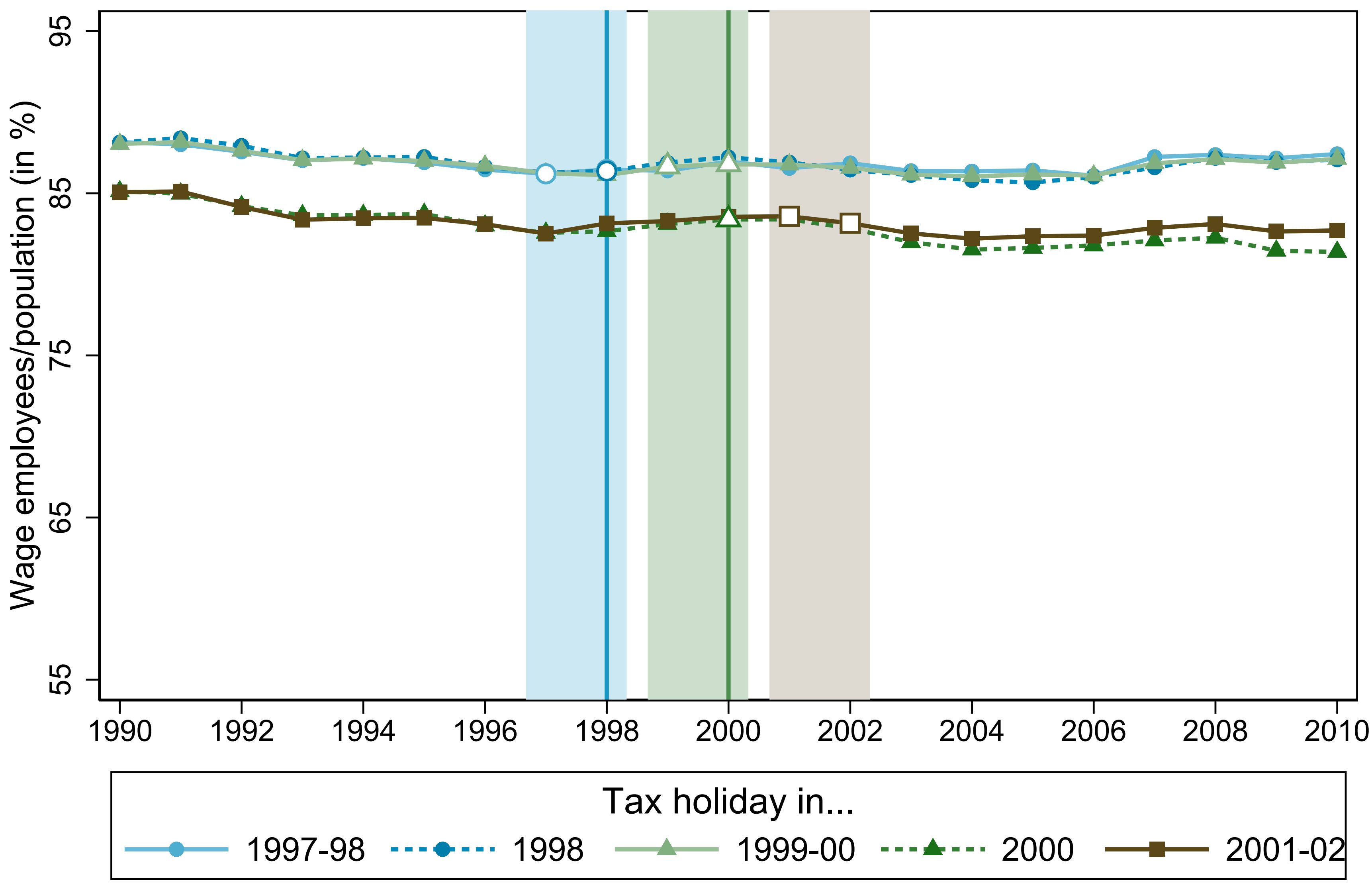

Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

# Marginal Income Tax Rates over Time



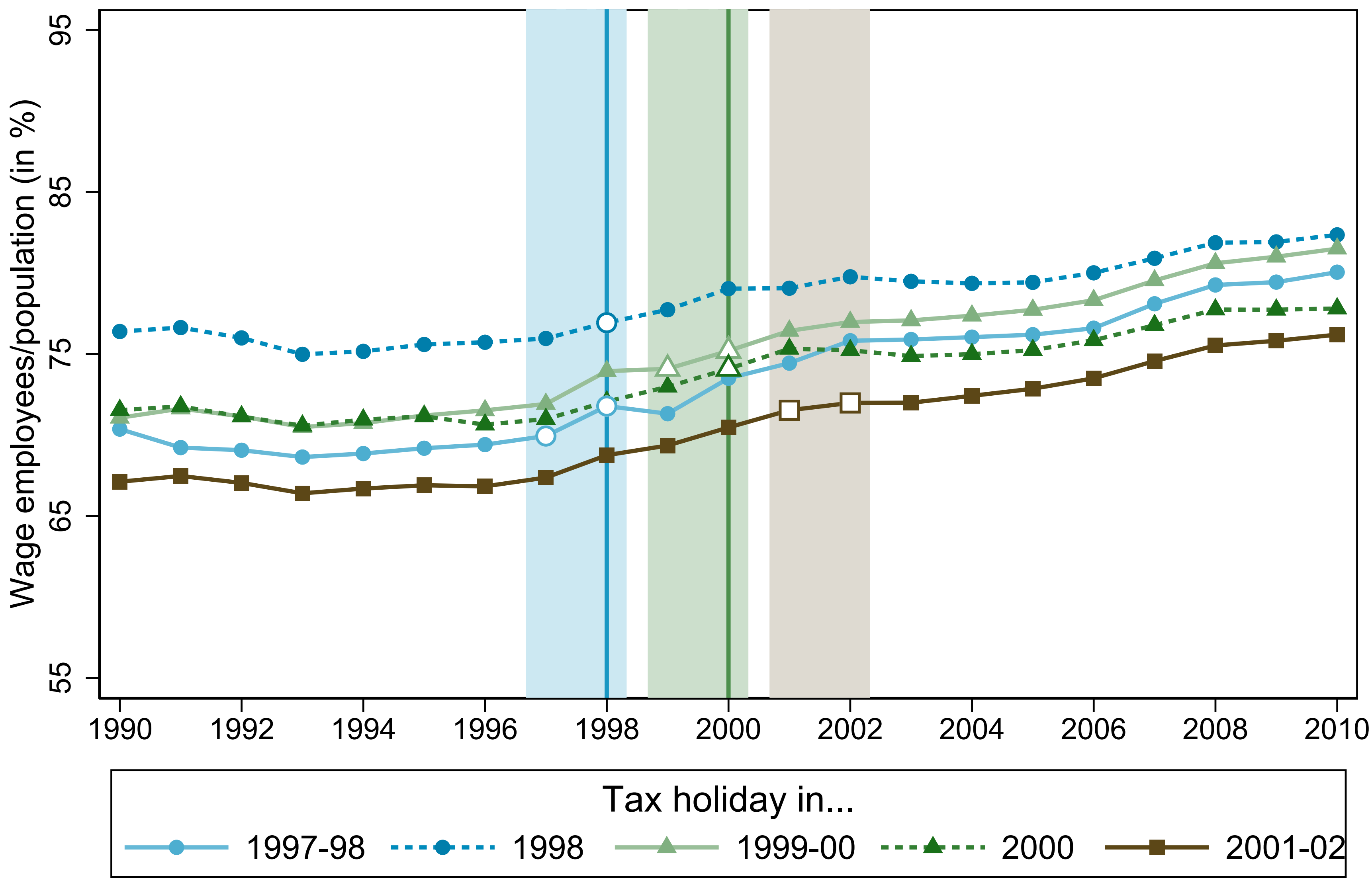

Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

# Employment Rate: Men (age 20-60)



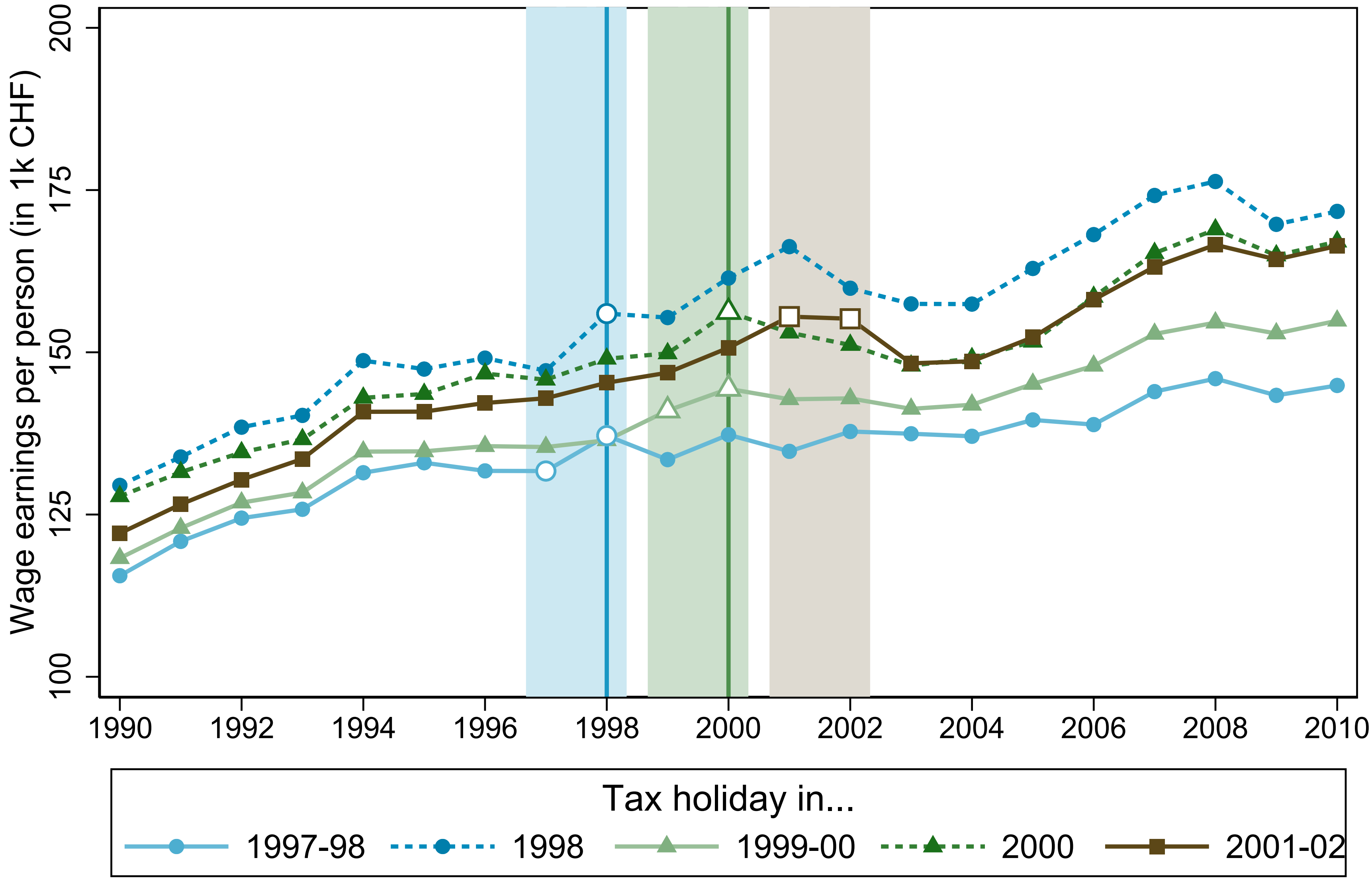

Data source: AHV-STATPOP

# Employment Rate: Women (age 20-60)



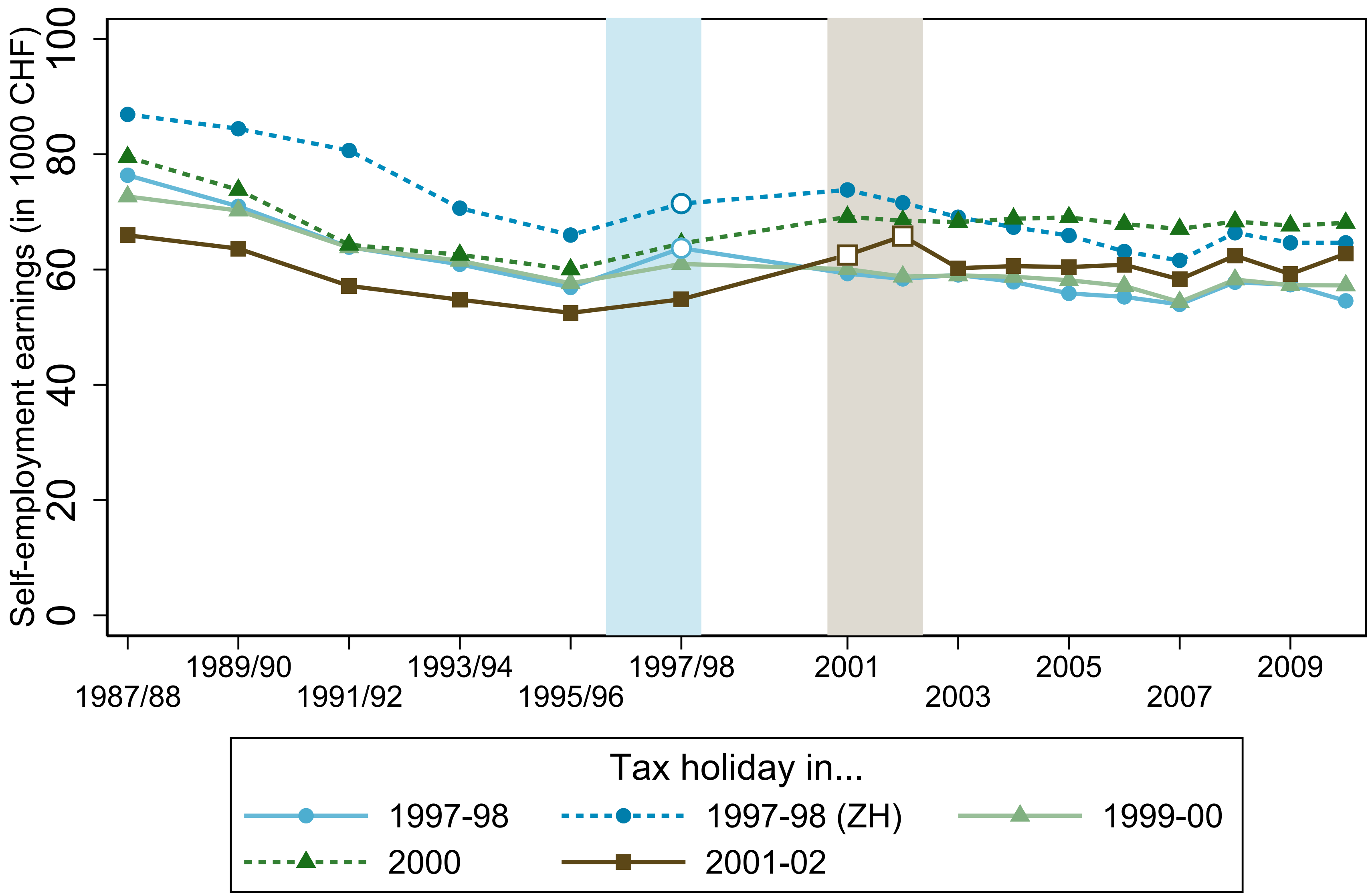

unemployment rate

# Average Wage Earnings: High-income Employees




*High income*: avg. real wage earnings in 1994-1996 $> 100k$ CHF/year

# Mean Self-employment Earnings (excluding zeros)




Data source: AHV-STATPOP

# SOCIAL DETERMINANTS OF LABOR SUPPLY

Concern that taxes funding social state could discourage work

**Standard econon view:** labor supply $l(w, R)$ coming out of $\max u(\underset{+}{c}, \underset{-}{l})$ st $c = wl + R$ is highly incomplete

**Social determinants of labor supply:**

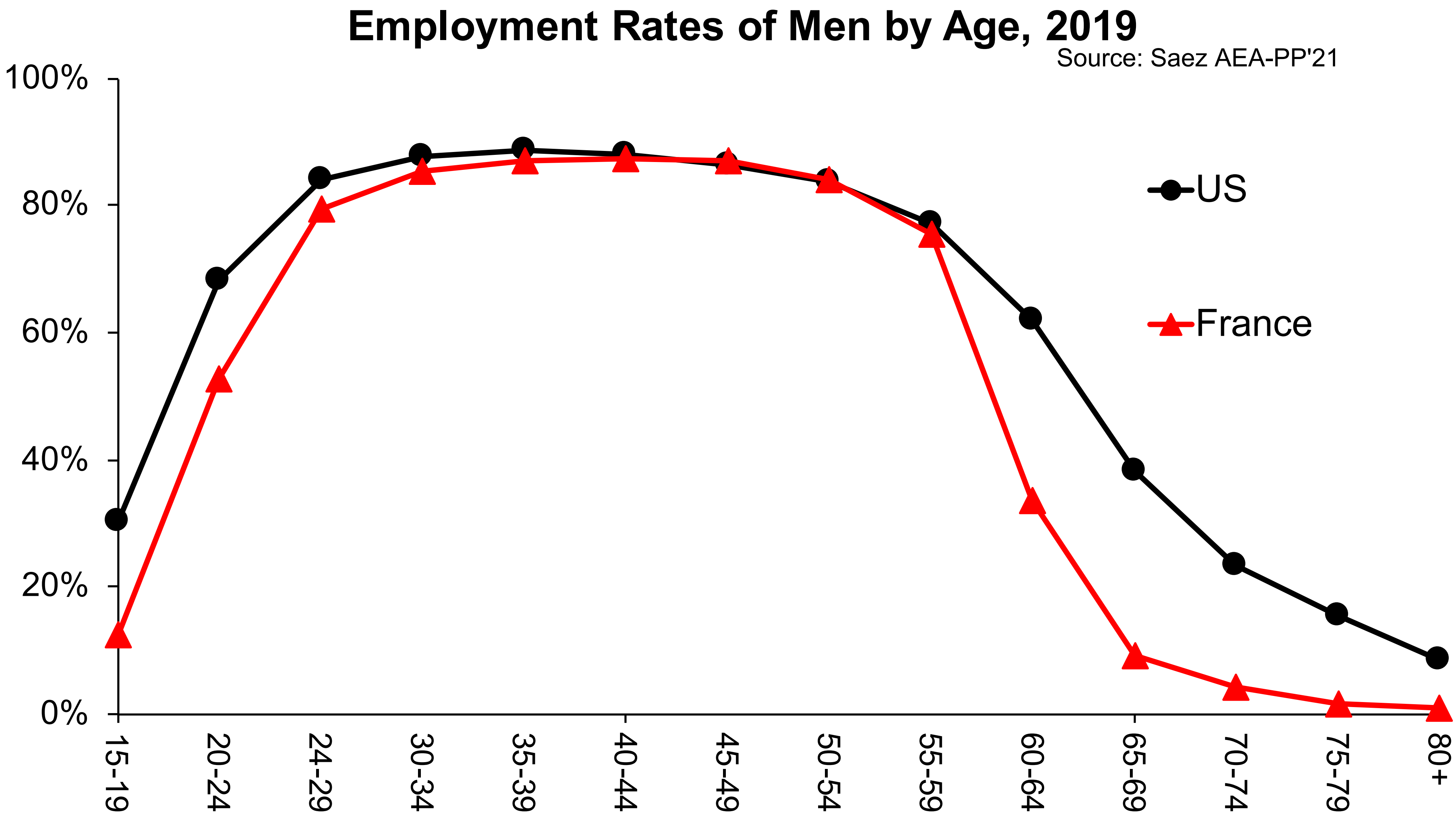
a) Youth labor is regulated by labor laws/education

b) Old age labor regulated by retirement programs

c) Female market labor driven by norms + child care policy

d) Hours of work regulated by overtime + vacation mandates

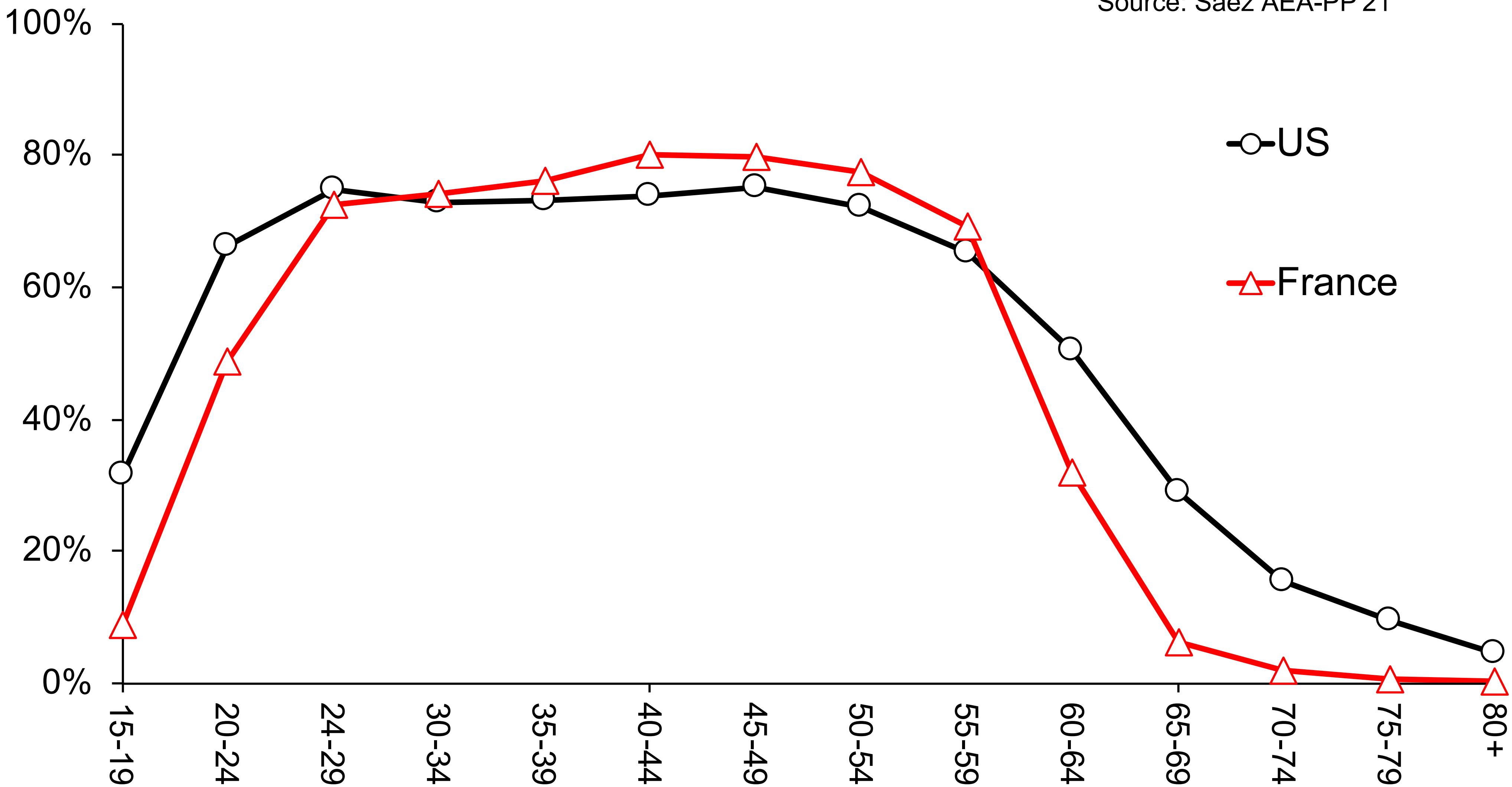
Social labor supply with disutility for youth, old, overtime labor



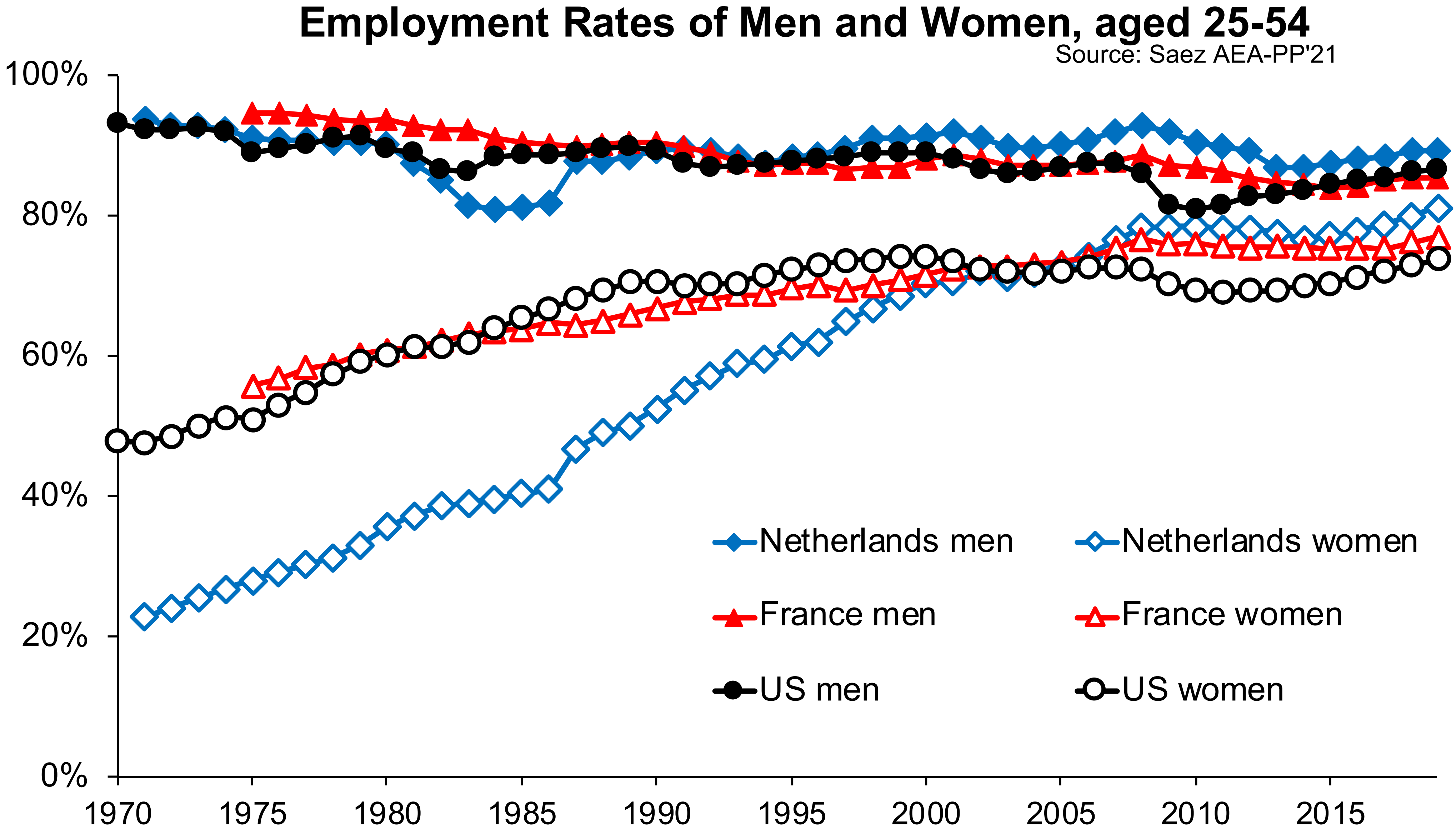

**Source**: OECD database online. Employment to population ratios.

# Employment Rates of Women by Age, 2019

Source: Saez AEA-PP'21



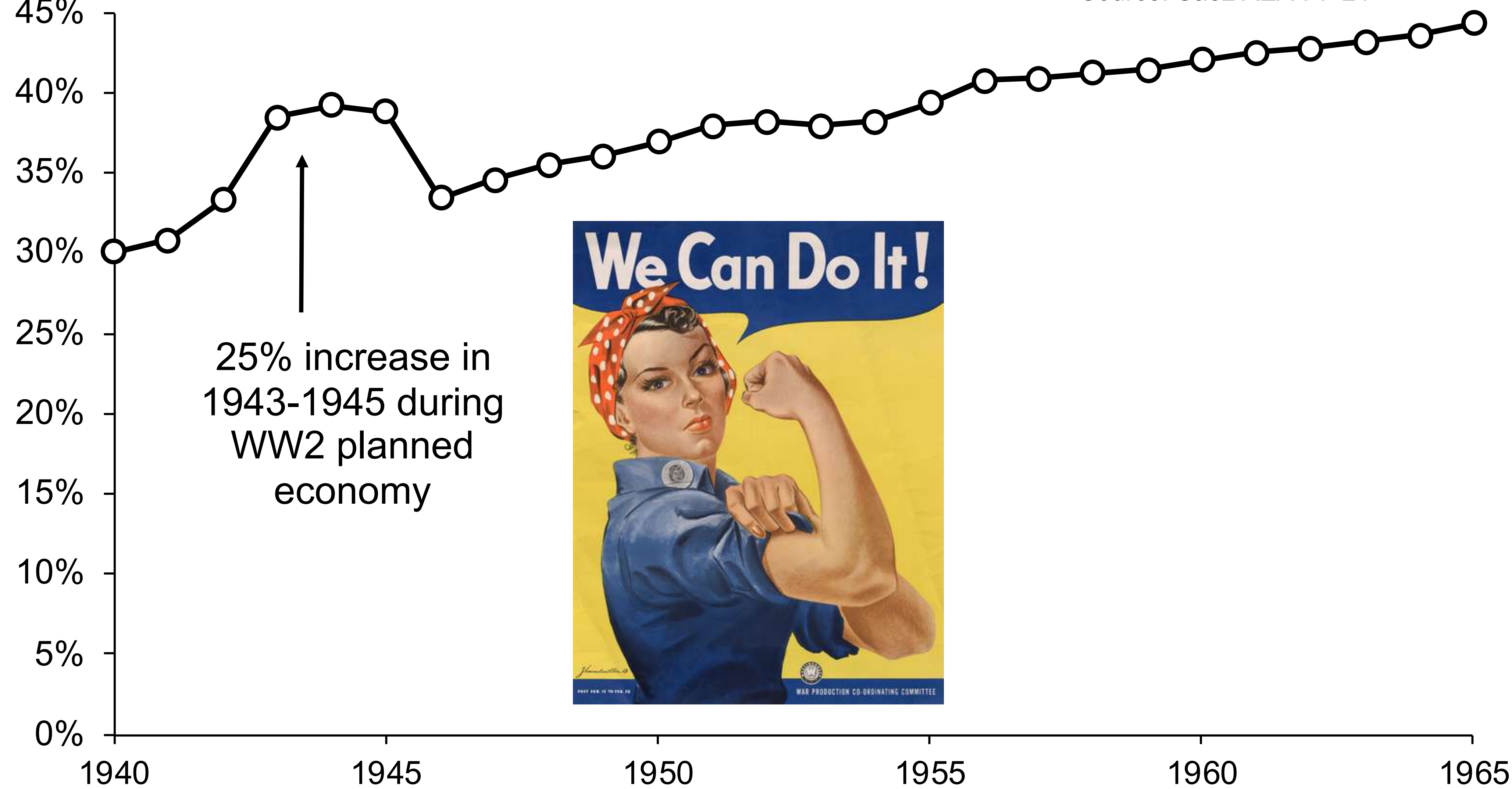

**Source**: OECD database online. Employment to population ratios.




**Source**: OECD database online.

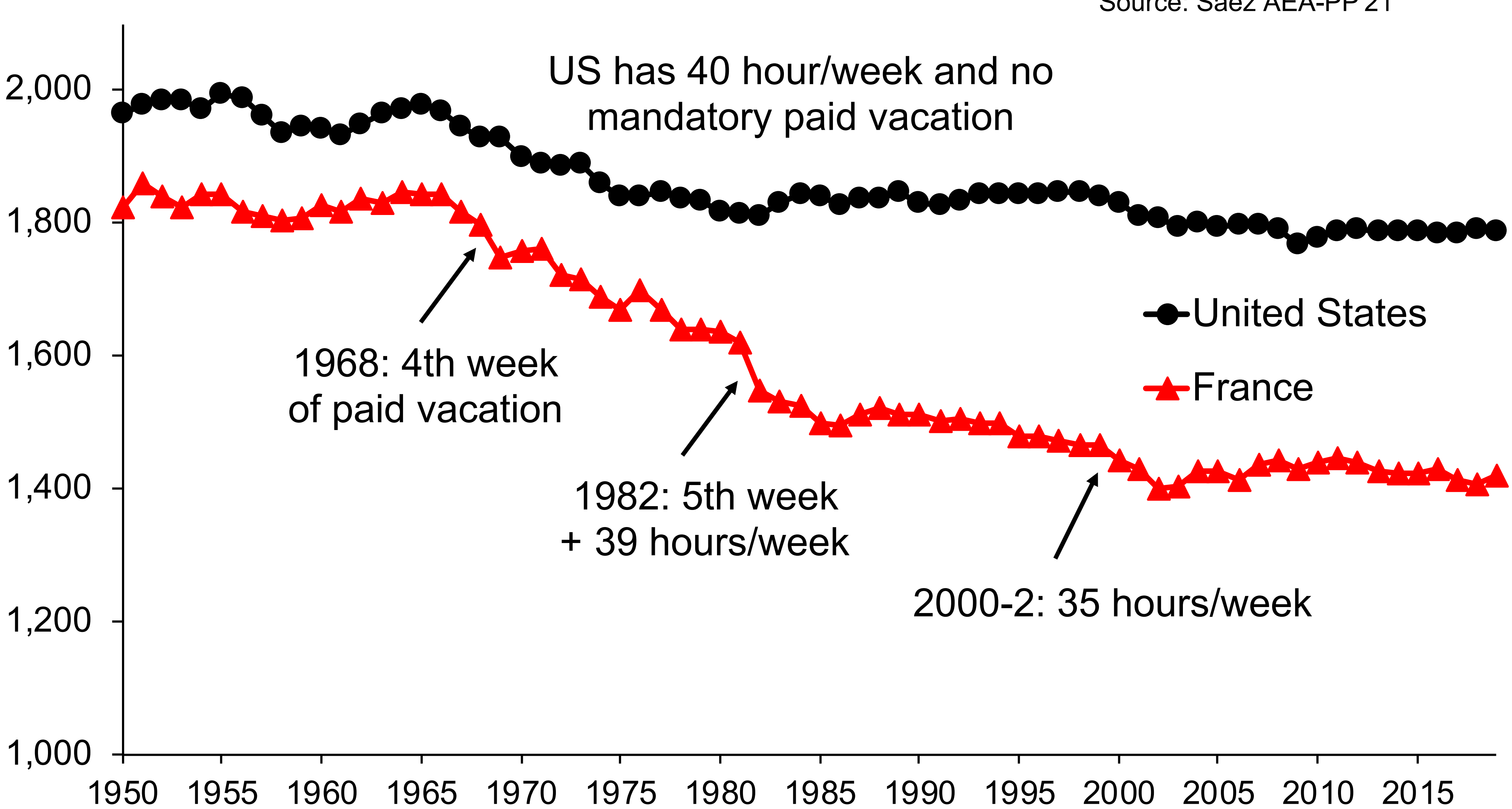
## US female labor force participation, age 16-64

Source: Saez AEA-PP'21

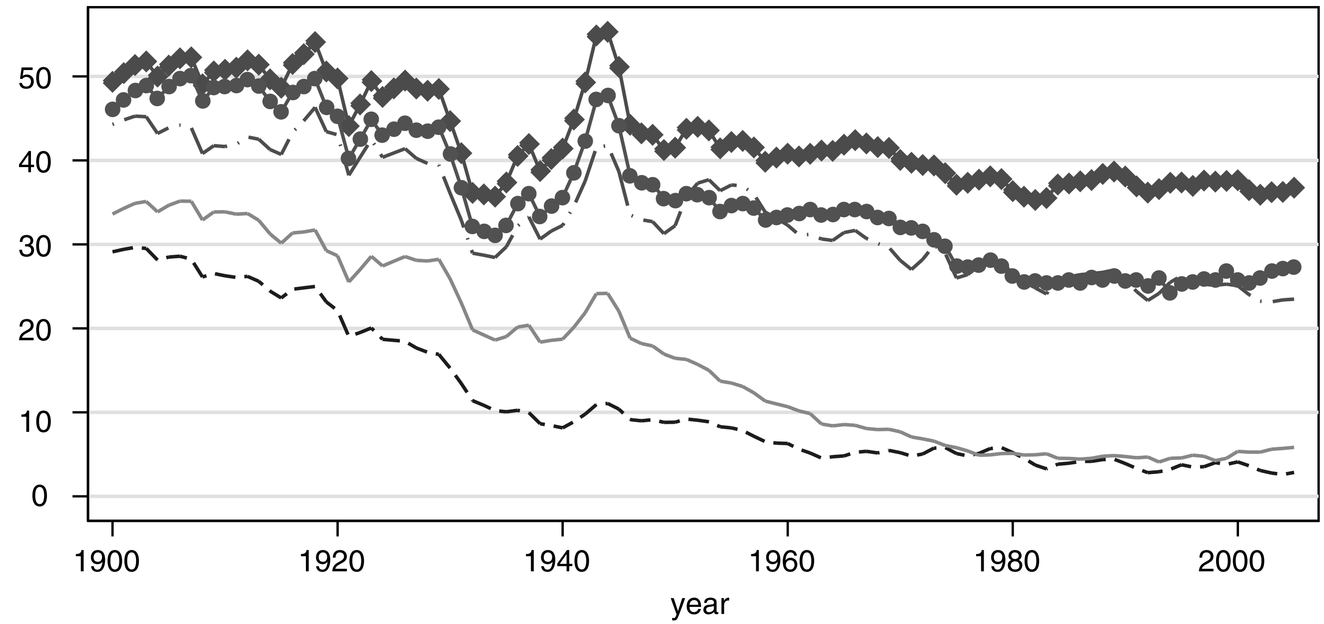



**Source**: Historical Statistics of the United States (Current Population Reports).

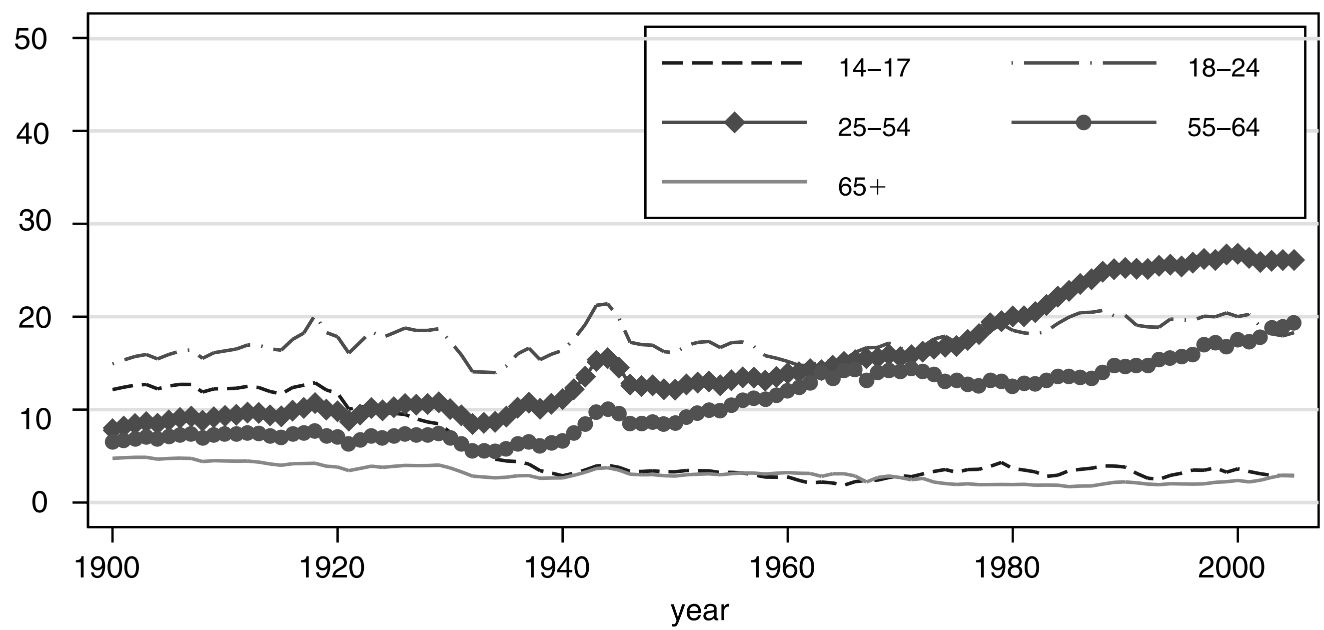
# Average Annual Hours of Work of Employees




**Source**: OECD database online. Includes all ages, genders, and part-time, full-time, overtime.




B. Males




Ramey and Francis AEJ'09

C. Females

Figure 2. Average Weekly Hours Worked per Person, by Age Group

## Long-term effects: Evidence from the Israeli Kibbutz

Abramitzky '18 book based on series of academic papers

Kibbutz are egalitarian and socialist communities in Israel, thrived for almost a century within a more capitalist society

1) Social sanctions on shirkers effective in small communities with limited privacy

2) Deal with brain drain exit using communal property as bond

3) Deal with adverse selection in entry with screening and trial period

4) Perfect sharing in Kibbutz has negative effects on high school students performance but effect is small in magnitude (concentrated among kids with low education parents)

## Long-term effects: Evidence from the Israeli Kibbutz

Abramitzky-Lavy ECMA'14 show that high school students study harder once their kibbutz shifts away from equal sharing

Uses a DD strategy: pre-post reform and comparing reform Kibbutz to non-reform Kibbutz. Finds that

1) Students are 3% points more likely to graduate

2) Students are 6% points more likely to achieve a matriculation certificate that meets university entrance requirements

3) Students get an average of 3.6 more points in their exams

Effect is driven by students whose parents have low schooling; larger for males; stronger in kibbutz that reformed to greater degree

## Culture of Welfare across Generations

Conservative concern that welfare promotes a culture of dependency: kids growing up in welfare supported families are more likely to use welfare

Correlation in welfare use across generations is obviously not necessarily causal

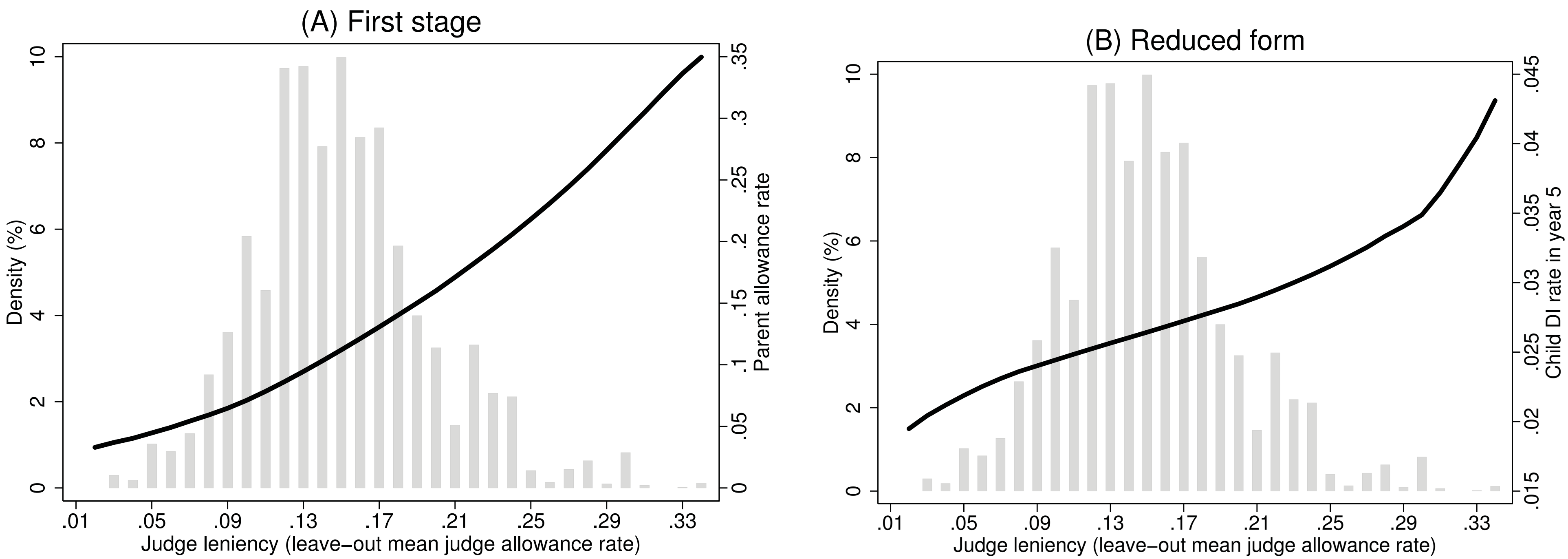
Dahl, Kostol, Mogstad QJE'2014 analyze causal effect of parental use of Disability Insurance (DI) on children use (as adults) of DI in Norway

Identification uses random assignment of judges to denied DI applicants who appeal [some judges are severe, some lenient]

Find evidence of causality: parents on DI increases odds of kids on DI over next 5 years by 6 percentage points

Mechanism seems to be learning about DI availability rather than reduced stigma from using DI [because no effect on other welfare programs use]

**Figure 3: Effect of Judge Leniency on Parents (First Stage) and Children (Reduced Form).**




*Notes:* Baseline sample, consisting of parents who appeal an initially denied DI claim during the period 1989-2005 (see Section 3 for further details). There are 14,893 individual observations and 79 different judges. Panel (A): Solid line is a local linear regression of parental DI allowance on judge leniency. Panel (B): Solid line is a local linear regression of child DI receipt on their parent's judge leniency measure. All regressions include fully interacted year and department dummies. The histogram of judge leniency is shown in the background of both figures (top and bottom 0.5% excluded from the graph).

Source: Dahl, Kostol, Mogstad (2013)

# REFERENCES

Abramitzky, Ran *The Mystery of the Kibbutz: How Socialism Succeeded*, Princeton: Princeton University Press, 2018 (web)

Abramitzky, Ran and Victor Lavy, 2014 "How Responsive is Investment in Schooling to Changes in Redistributive Policies and in Returns?", Econometrica, 82(4), 1241-1272 (web)

Alesina, A., E. Glaeser, and B. Sacerdote "Work and Leisure in the U.S. and Europe: Why So Different?", NBER Macroeconomics Annual 2005. (web)

Ashenfelter, O. and M. Plant "Non-Parametric Estimates of the Labor Supply Effects of Negative Income Tax Programs", Journal of Labor Economics, Vol. 8, 1990, 396-415. (web)

Bachas, Pierre and Mauricio Soto. "Not(ch) Your Average Tax System: Corporate Taxation Under Weak Enforcement," World Bank Policy Research Working Paper 8524, 2018. (web)

Bastani, Spencer and Hakan Selin, "Bunching and non-bunching at kink points of the Swedish tax schedule," Journal of Public Economics, 109, 2014, 36-49. (web)

Bertrand, M., E. Duflo and S. Mullainhatan “How Much Should we Trust Differences-in-Differences Estimates?”, Quarterly Journal of Economics, Vol. 119, 2004, 249-275. (web)

Best, Michael and Henrik Kleven “Housing Market Responses to Transaction Taxes: Evidence from Notches and Stimulus in the UK,” Review of Economic Studies 2017 forthcoming (web)

Bianchi, M., B. R. Gudmundsson, and G. Zoega. 2001. “Iceland’s Natural Experiment in Supply-Side Economics,” American Economic Review, 91(5), 1564-79. (web)

Bitler, M. J. Gelbach and H. Hoynes “What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments”, American Economic Review, Vol. 96, 2006, 988-1012. (web)

Bitler, M. and H. Hoynes “The State of the Safety Net in the Post-Welfare Reform Era” Brookings Papers on Economic Activity Fall 2010, 71-127 (web)

Blau, F. and L. Kahn “Changes in the Labor Supply Behavior of Married Women: 1980-2000”, Journal of Labor Economics, Vol. 25, 2007, 393-438. (web)

Blomquist, S. “Restrictions in labor supply estimation: Is the MaCurdy critique correct?”, Economics Letters, Vol. 47, 1995, 229-235 (web)

Blomquist, Soren,Whitney Newey, Anil Kumar, Che-Yuan Liang "On Bunching and Identification of the Taxable Income Elasticity", Journal of Political Economy 2021 (web)

Blundell, Richard, Antoine Bozio, and Guy Laroque. 2013. "Extensive and Intensive Margins of Labour Supply: Work and Working Hours in the US, UK and France," Fiscal Studies, 34(1), 1-29 (web)

Blundell, R., A. Duncan and C. Meghir "Estimating Labor Supply Responses Using Tax Reforms", Econometrica, Vol. 66, 1998, 827-862. (web)

Blundell, R. and T. MaCurdy "Labor supply: a review of alternative approaches", in the Handbook of Labor Economics, Vol. 3A, O. Ashenfelter and D. Card, eds. Amsterdam: Elsevier Science 1999. (web)

Brown, K. "The Link between Pensions and Retirement Timing: Lessons from California Teachers", Journal of Public Economics, 98, 2013, 1–14. 2007 (web)

Camerer, C., L. Babcock, G. Loewenstein and R. Thaler "Labor Supply of New York City Cabdrivers: One Day at a Time", Quarterly Journal of Economics, Vol. 112, 1997, 407-441. (web)

Card, David, Raj Chetty, Martin Feldstein, and Emmanuel Saez "Expanding Access to Administrative Data for Research in the United States,"

White Paper for NSF 10-069 call for papers on "Future Research in the Social, Behavioral, and Economic Sciences" September 2010. (web)

Card, D.,R. Chetty, and A. Weber, "Cash-on-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market", Quarterly Journal of Economics, Vol. 122, 2007, 1511-1560. (web)

Card, David, and Dean R. Hyslop. 2005. "Estimating the Effects of a Time-Limited Earnings Subsidy for Welfare-Leavers" Econometrica, 73(6), 1723-70. (web)

Cesarini, David, Erik Lindqvist, Matthew J. Notowidigdo, Robert Ostling. 2017 "The Effect of Wealth on Individual and Household Labor Supply: Evidence from Swedish Lotteries", American Economic Review (web)

Chetty, R. "A New Method of Estimating Risk Aversion", The American Economic Review, Vol. 96, 2006, 1821-1834. (web)

Chetty, Raj. 2012. "Bounds on Elasticities with Optimization Frictions: A Synthesis of Micro and Macro Evidence on Labor Supply," Econometrica 80(3), 969–1018. (web)

Chetty, R., Adam Guren, Day Manoli, and Andrea Weber. 2013 "Does Indivisible Labor Explain the Difference between Micro and Macro Elasticities? A Meta-Analysis of Extensive Margin Elasticities", NBER Macroeconomics Annual, University of Chicago Press, 27(1), 1–56. (web)

Chetty, R., J. Friedman, T. Olsen and L. Pistaferri “Adjustment Costs, Firms Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records”, Quarterly Journal of Economics, 126(2), 2011, 749-804. (web)

**Chetty, R., J. Friedman and E. Saez “Using Differences in Knowledge Across Neighborhoods to Uncover the Impacts of the EITC on Earnings”, American Economic Review, 2013, 103(7), 2683-2721 (web)**

Chetty, R. and E. Saez “Teaching the Tax Code: Earnings Responses to an Experiment with Recipients”, American Economic Journal: Applied Economics 5(1), 2013, 1-31. (web)

Crawford, V. and J. Meng “New York City Cabdrivers’ Labor Supply Revisited: Reference-Dependence Preferences with Rational-Expectations Targets for Hours and Income”, University of California at San Diego, Economics Working Paper Series: 2008-03, 2008. (web)

**Dahl, Gordon B., Andreas Ravndal Kostol, Magne Mogstad “Family Welfare Cultures” Quarterly Journal of Economics, 129(4), 2014, 1711-52 (web)**

Davis, J. and M. Henrekson, “Tax Effects on Work Activity, Industry Mix and Shadow Economy Size: Evidence from Rich Country Comparisons”, in R. Gomez-Salvador, A. Lamo, B. Petrongolo, M. Ward and E. Wasmer

eds., Labour Supply and Incentives to Work in Europe, 2005, 44-104. (web)

Devereux, Michael P, Li Liu and Simon Loretz. 2014. "The Elasticity of Corporate Taxable Income: New Evidence from UK Tax Records." American Economic Journal: Economic Policy, 6(2): 19-53. (web)

Einav, Liran, Amy Finkelstein, Paul Schrimpf "The Data Revolution and Economic Analysis', NBER Working Paper 19035, 2013. (web)

Einav, Liran and Jonathan Levin "The Data Revolution and Economic Analysis", NBER Working Paper No. 19035, 2013 (web)

Eissa, N. and H. Hoynes "Taxes and the labor market participation of married couples: the earned income tax credit", Journal of Public Economics, Vol. 88, 2004, 1931-1958. (web)

Eissa, N. and J. Liebman "Labor Supply Response to the Earned Income Tax Credit", Quarterly Journal of Economics, Vol. 111, 1996, 605-637. (web)

Farber, H. "Is Tomorrow Another Day? The Labor Supply of New York City Cab Drivers", Journal of Political Economy, Vol. 113, 2005, 46-82. (web)

Farber, H. “Reference-Dependent Preferences and Labor Supply: The Case of New York City Taxi Drivers”, The American Economic Review, Vol. 98, 2008, 1069-1082. (web)

Fehr, E. and L. Goette “Do Workers Work More if Wages Are High? Evidence from a Randomized Field Experiment”, American Economic Review, Vol. 97, 2007, 298-317. (web)

Friedberg, L. “The Labor Supply Effects of the Social Security Earnings Test”, Review of Economics and Statistics, Vo. 82, 2000, 48-63. (web)

Greenberg, D. and H. Hasley, “Systematic Misreporting and Effects of Income Maintenance Experiments on Work Effort: Evidence from the Seattle-Denver Experiment”, Journal of Labor Economics, Vol. 1, 1983, 380-407. (web)

Hausman, J. “Stochastic Problems in the Simulation of Labor Supply”, NBER Working Paper No. 0788, 1981. (web)

Hausman, J. “Taxes and Labor Supply”, in A. Auerbach and M. Feldstein, eds, Handbook of Public Finance, Vol I, North Holland 1987. (web)

Heckman, J. “What Has Been Learned About Labor Supply in the Past Twenty Years?”, American Economic Review, Vol. 83, 1993, 116-121. (web)

Heckman, J. and M. Killingsworth "Female Labor Supply: A Survey" Handbook of Labor Economics, Vol. I, Chapter 2, 1986. (web)

**Imbens, G.W., D.B. Rubin and B.I. Sacerdote "Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery", American Economic Review, Vol. 91, 2001, 778-794. (web)**

Jakobsen, Kristian, Katrine Jakobsen, Henrik Kleven and Gabriel Zucman. 2018. Wealth Accumulation and Wealth Taxation: Theory and Evidence from Denmark NBER working paper No. 24371, forthcoming Quarterly Journal of Economics (web)

Jones, Damon "Information, Inertia and Public Benefit Participation: Experimental Evidence from the Advance EITC and 401(k) Savings", AEJ: Applied Economics, Vol. 2, 2010, 147-163. (web)

Keane, Michael "Labor Supply and Taxes: A Survey?", Journal of Economic Literature, Vol. 49(4), 2011, 961-1075. (web)

Kleven, Henrik "How Can Scandinavians Tax So Much?", Journal of Economic Perspectives 28(4), 77-98, 2014 (web)

**Kleven, Henrik 2019. "The EITC and the Extensive Margin: A Reappraisal", NBER working paper No. 26405. (web)**

**Kleven, Henrik "Bunching", Annual Review of Economics, 8, 2016, 435-464. (web)**

Kleven, Henrik, Camille Landais, Johanna Posch, Andreas Steinhauer, and Josef Zweimuller. 2019 "Child penalties across countries: Evidence and explanations." AEA Papers and Proceedings, 109, 122-26. (web)

Kleven, Henrik and Mazhar Waseem, 2013 "Using notches to uncover optimization frictions and structural elasticities: Theory and evidence from Pakistan", Quarterly Journal of Economics 2013, 669-723. (web)

Kline, Patrick and Melissa Tartari, 2016. "Bounding the Labor Supply Responses to a Randomized Welfare Experiment: A Revealed Preference Approach," American Economic Review, 106(4), 972-1014. (web)

Kopczuk, Wojciech and David J. Munroe, 2015 "Mansion Tax: The Effect of Transfer Taxes on the Residential Real Estate Market", American Economic Journal: Economic Policy, 7(2), 214-57 (web)

Liebman, J. and R. Zeckhauser "Schmeduling", Harvard University working paper, October 2004. (web)

Londono-Velez, Juliana and Javier Avila. "Can Wealth Taxation Work in Developing Countries? Quasi-Experimental Evidence from Colombia", UC Berkeley working paper, 2018. (web)

MaCurdy, T. “An Empirical Model of Labor Supply in a Life-Cycle Setting”, Journal of Political Economy, Vol. 89, 1981, 1059-1085. (web)

MaCurdy, T. “A Simple Scheme for Estimating an Intertemporal Model of Labor Supply and Consumption in the Presence of Taxes and Uncertainty”, International Economic Review, Vol. 24, 1983, 265-289. (web)

MaCurdy, T., D. Green and H. Paarsch “Assessing Empirical Approaches for Analyzing Taxes and Labor Supply” Journal of Human Resources, Vol. 25, 1990, 415-490. (web)

**Martinez, Isabel, Emmanuel Saez, and Michael Siegenthaler. 2021. “Intertemporal Labor Supply Substitution? Evidence from the Swiss Income Tax Holidays,” American Economic Review 111(2), 506-546. (web)**

Meyer, B. and D. Rosenbaum “Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers”, Quarterly Journal of Economics, Vol. 116, August 2001, 1063-1114. (web)

Moffitt, R. “Welfare Programs and Labor Supply”, in A. Auerbach and M. Feldstein, Handbook of Public Economics, Volume 4, Chapter 34, Amsterdam: North Holland, 2003. (web)

Mortenson, Jacob A. and Andrew Whitten. 2016. “Bunching to Maximize Tax Credits: Evidence from Kinks in the U.S. Tax Schedule”, OTA-JCT working paper (web)

Mroz, T. "The Sensitivity of An Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions", Econometrica, Vol. 55, 1987, 765-799. (web)

Munnell, A., Lessons from the income maintenance experiments : proceedings of a conference held at Melvin Village, New Hampshire, September 1986. Boston: Federal Reserve Bank of Boston, 1986. (web)

Nichols, Austin and Jesse Rothstein 2015. "The Earned Income Tax Credit", forthcoming in Volume on US Transfer Programs edited by R. Moffitt (web)

Oettinger, G. "An Empirical Analysis of the Daily Labor Supply of Stadium Vendors", Journal of Political Economy, Vol. 107, 1999, 360-392. (web)

Ohanian, L., A. Raffo, and R. Rogerson "Long-Term Changes in Labor Supply and Taxes: Evidence from OECD Countries, 1956-2004", Journal of Monetary Economics, Vol. 55, 2008, 1353-1362. (web)

Pencavel, J. "Labor Supply of Men: A Survey", Handbook of Labor Economics, vol. 1, chapter 1, 1986. (web)

Pencavel, J. "A Cohort Analysis of the Association between Work Hours and Wages among Men", The Journal of Human Resources, Vol. 37, 2002, 251-274. (web)

Prescott, E. "Why Do Americans Work So Much More Than Europeans?", NBER Working Paper No. 10316, 2004, published in FRB Minneapolis - Quarterly Review, 2004, 28(1), 2-14. (web)

Prescott, E. "Nobel Lecture: The Transformation of Macroeconomic Policy and Research", Journal of Political Economy, 114, 2006, 203-235. (web)

Ramey, Valerie A. and Neville Francis, 2009. "A Century of Work and Leisure," American Economic Journal: Macroeconomics, 1(2), 189-224. (web)

Rees, A. "An Overview of the Labor-Supply Results", The Journal of Human Resources, Vol. 9, 1974, 158-180. (web)

Rees-Jones, Alex and Dmitry Taubinsky. 2016 "Measuring "Schmeduling" ", NBER Working Paper No. 22884.(web)

Rogerson, R. and J. Wallenius "Micro and Macro Elasticities in a Life Cycle Model with Taxes", Journal of Economic Theory, Vol. 144, 2009, 2277-2292. (web)

Rothstein, J. 'Is the EITC as Good as an NIT? Conditional Cash Transfers and Tax Incidence." American Economic Journal: Economic Policy 2 (1), February 2010, 177-208. (web)

Saez, E. "Do Taxpayers Bunch at Kink Points?", NBER Working Paper No. 7366, 1999. (web)

**Saez, E. "Do Taxpayers Bunch at Kink Points?", AEJ: Economic Policy, Vol. 2, 2010, 180-212. (web)**

**Saez, Emmanuel "Public Economics and Inequality: Uncovering Our Social Nature", AEA Papers and Proceedings, 121, 2021 (web)**

Saez, E., J. Slemrod, and S. Giertz "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review", Journal of Economic Literature 50(1), 2012, 3-50. (web)

Seim, David. 2017. "Behavioral Responses to an Annual Wealth Tax: Evidence from Sweden", American Economic Journal: Economic Policy, 9(4), 395-421. (web)

Sigurdsson, Josef. 2019. "Labor Supply Responses and Adjustment Frictions: A Tax-Free Year in Iceland", Working Paper, September 2019. (web)

Steinhauer, Andreas. 2018 "Working Moms, Childlessness, and Female Identity", CEPR Discussion Paper No. 12929.(web)

Tazhitdinova, Alisa. 2020 "Increasing Hours Worked: Moonlighting Responses to a Large Tax Reform", NBER Working Paper No. 27726, forthcoming AEJ: Economic Policy. (web)

Tortarolo, Dario, Guillermo Cruces, and Victoria Castillo. 2019 "It takes two to tango: labor responses to an income tax holiday in Argentina", UC Berkeley working paper (web)