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., 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 (same as previous lecture):

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

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

Individual solves

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

LABOR SUPPLY BEHAVIOR

FOC: $w\partial u/\partial c + \partial u/\partial l = 0$ defines uncompensated (Marshallian) labor supply function $l^u(w, R)$

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

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

Compensated (Hicksian) labor supply function $l^c(w, u)$ which minimizes cost $wl - c$ 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: $\partial l/\partial w = \partial l^c/\partial w + l\partial l/\partial R \Rightarrow \varepsilon^u = \varepsilon^c + \eta$

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 (Ordinary Least Square) regression:

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

w_i is the net-of-tax wage rate

R_i measures non-labor income [including spousal earnings for married person]

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

β measures uncompensated wage effects, and γ measures income effects [can be converted to ε^u, η]

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.

Low wage men work about same hours as high wage men

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)

ISSUE WITH OLS REGRESSION: w_i correlated with taste for work ϵ_i

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

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 ϵ_i is positively correlated with w_i leading to an upward bias in OLS regression

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 identification method: exogenously increase the tax rate / non-labor income with a **randomized experiment**

2) NIT experiments 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) Lump-sum transfers G combined with a steep phaseout rate τ (50%-80%) [based on family earnings] for 3 or 5 years.

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

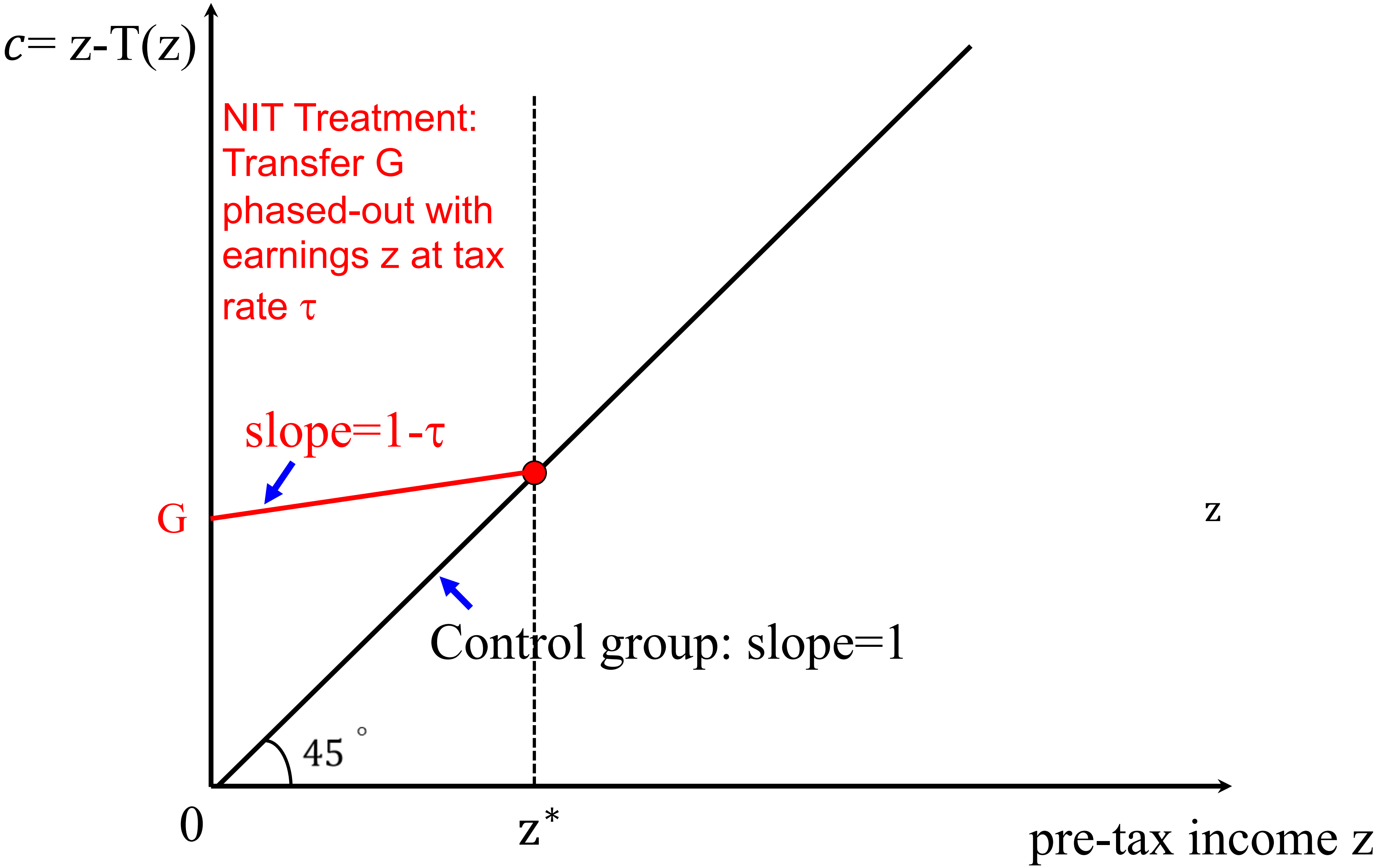
6) Several groups, with randomization within each; approx. N = 75 households in each group

Table 1
Parameters of the 11 Negative Income Tax Programs

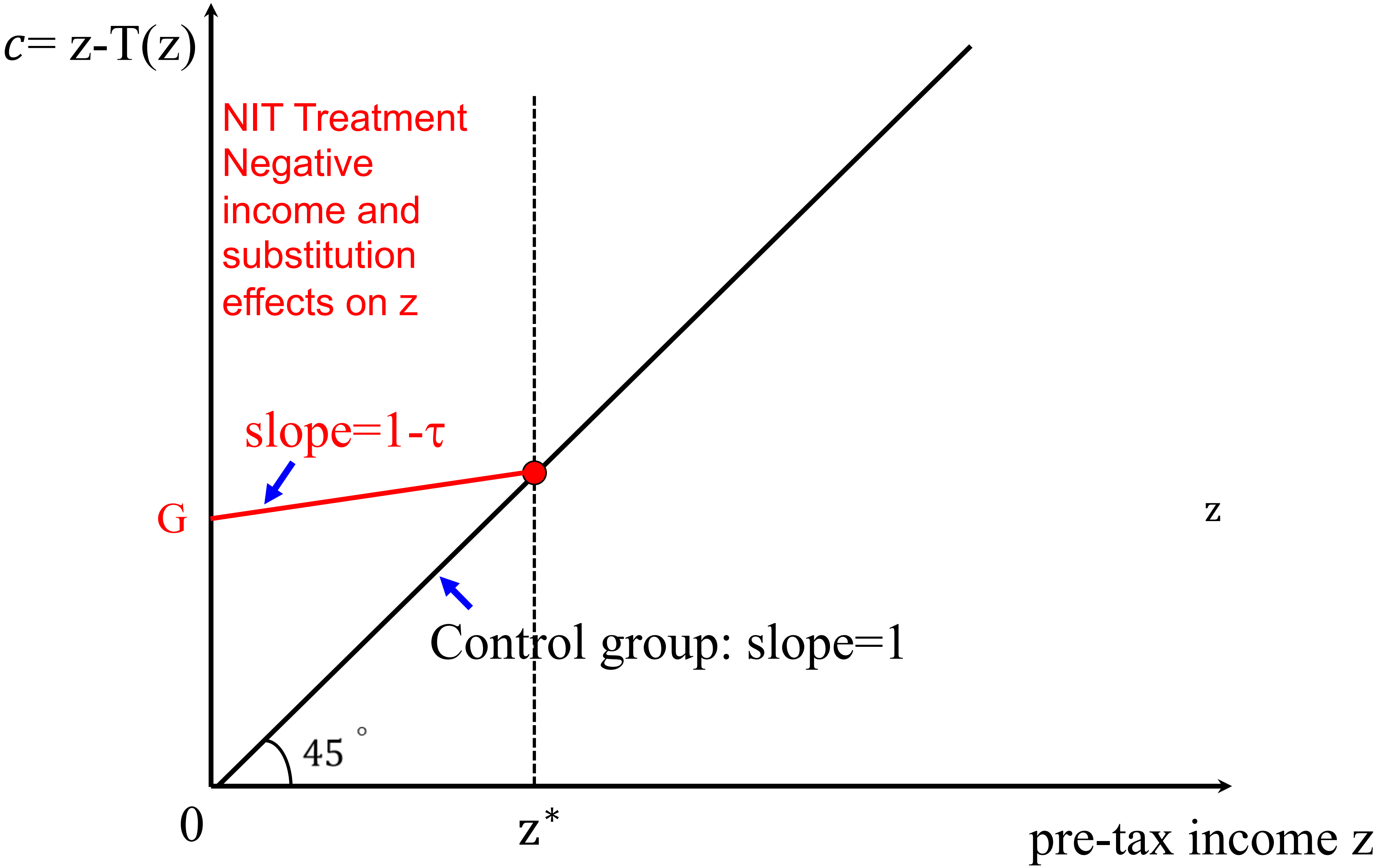
Program Number	G ($)	τ	Declining Tax Rate	Break-even Income ($)
1	3,800	.5	No	7,600
2	3,800	.7	No	5,429
3	3,800	.7	Yes	7,367
4	3,800	.8	Yes	5,802
5	4,800	.5	No	9,600
6	4,800	.7	No	6,857
7	4,800	.7	Yes	12,000
8	4,800	.8	Yes	8,000
9	5,600	.5	No	11,200
10	5,600	.7	No	8,000
11	5,600	.8	Yes	10,360

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

Negative Income Tax Experiment



Negative Income Tax Experiment



NIT Experiments: Findings

1) Significant labor supply response but small overall

2) Implied earnings elasticity for males around 0.1

3) Implied earnings elasticity for married women around 0.5

4) Response of married women is concentrated along the extensive margin (dropping out of work)

5) Earnings of treatment group bounce back after experiment ends

From true experiment to "natural experiments": Estimating income effects with lottery winnings

True experiments are costly to implement and hence rare

However, real economic world (nature) provides variation that can be exploited to estimate behavioral responses $\Rightarrow$ **Natural Experiments**

Natural experiments sometimes 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 small income effects: $\eta = w\partial l/\partial R$ between -0.05 and -0.10: \$1 in lottery reduces earnings by 5-10¢.

Identification threat: differential response-rate among groups

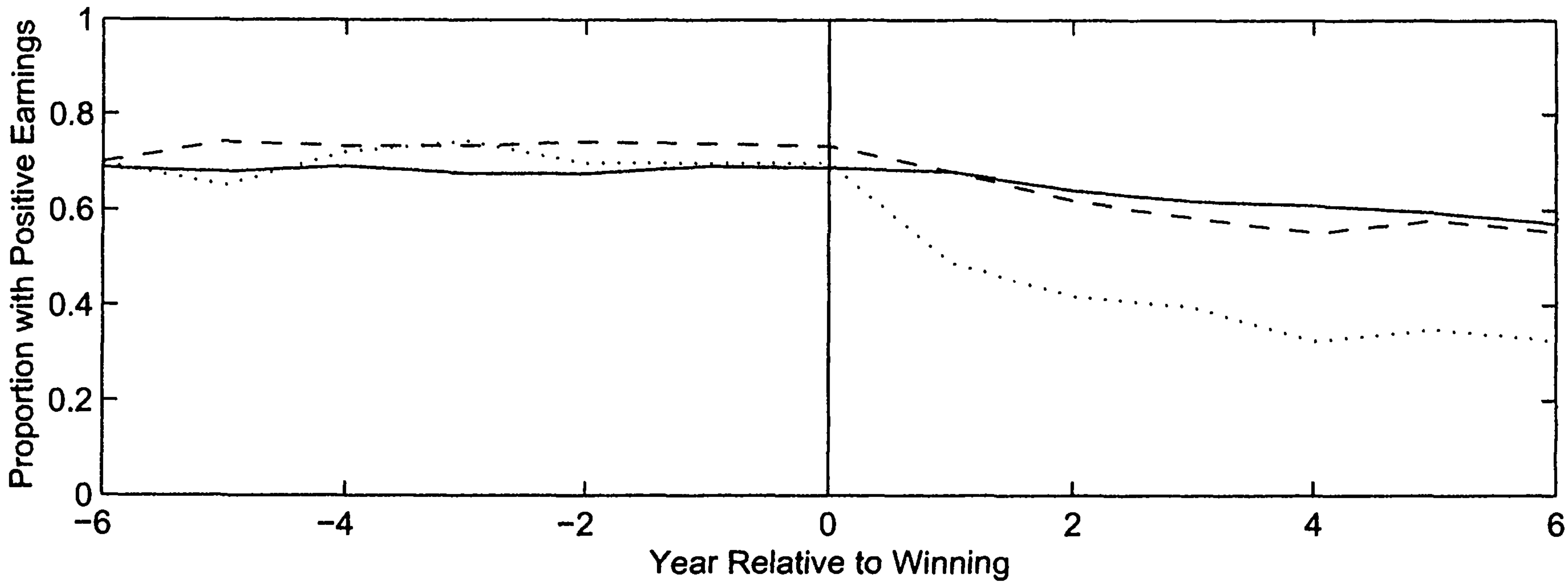


FIGURE 2. PROPORTION WITH POSITIVE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

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

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

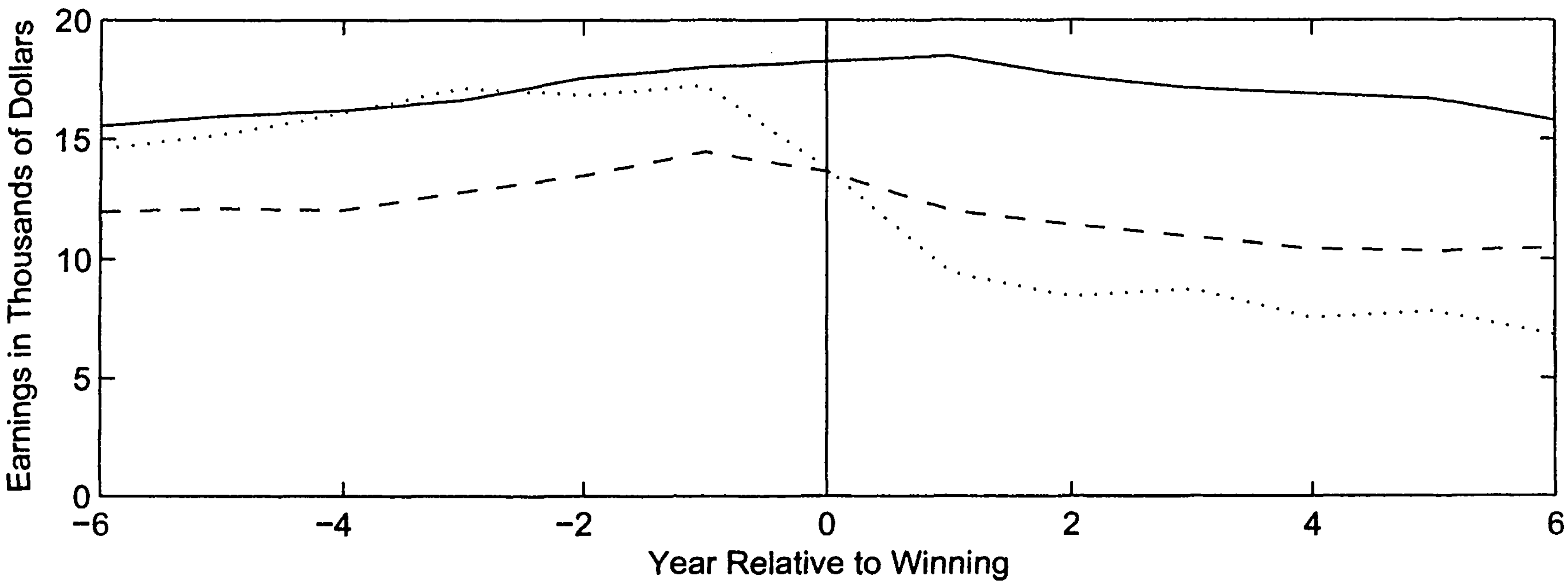


FIGURE 1. AVERAGE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

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

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

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: substitution labor supply effect

Tazhitdinova '22 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

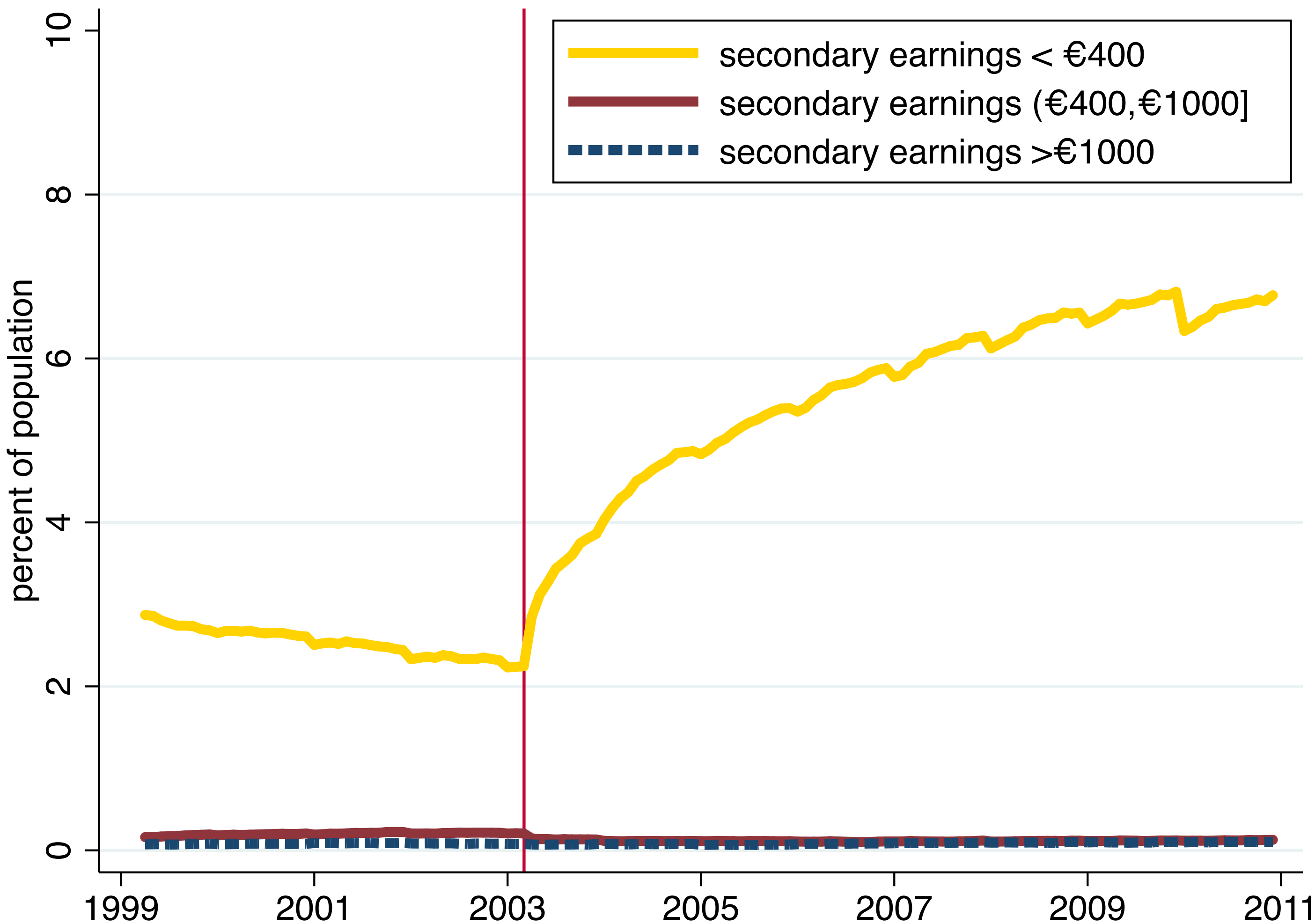
Finds no offsetting effect on primary earnings $\Rightarrow$ People did work more

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



Responses to Low-Income Transfer Programs

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

2) Complicated set of transfer programs in US

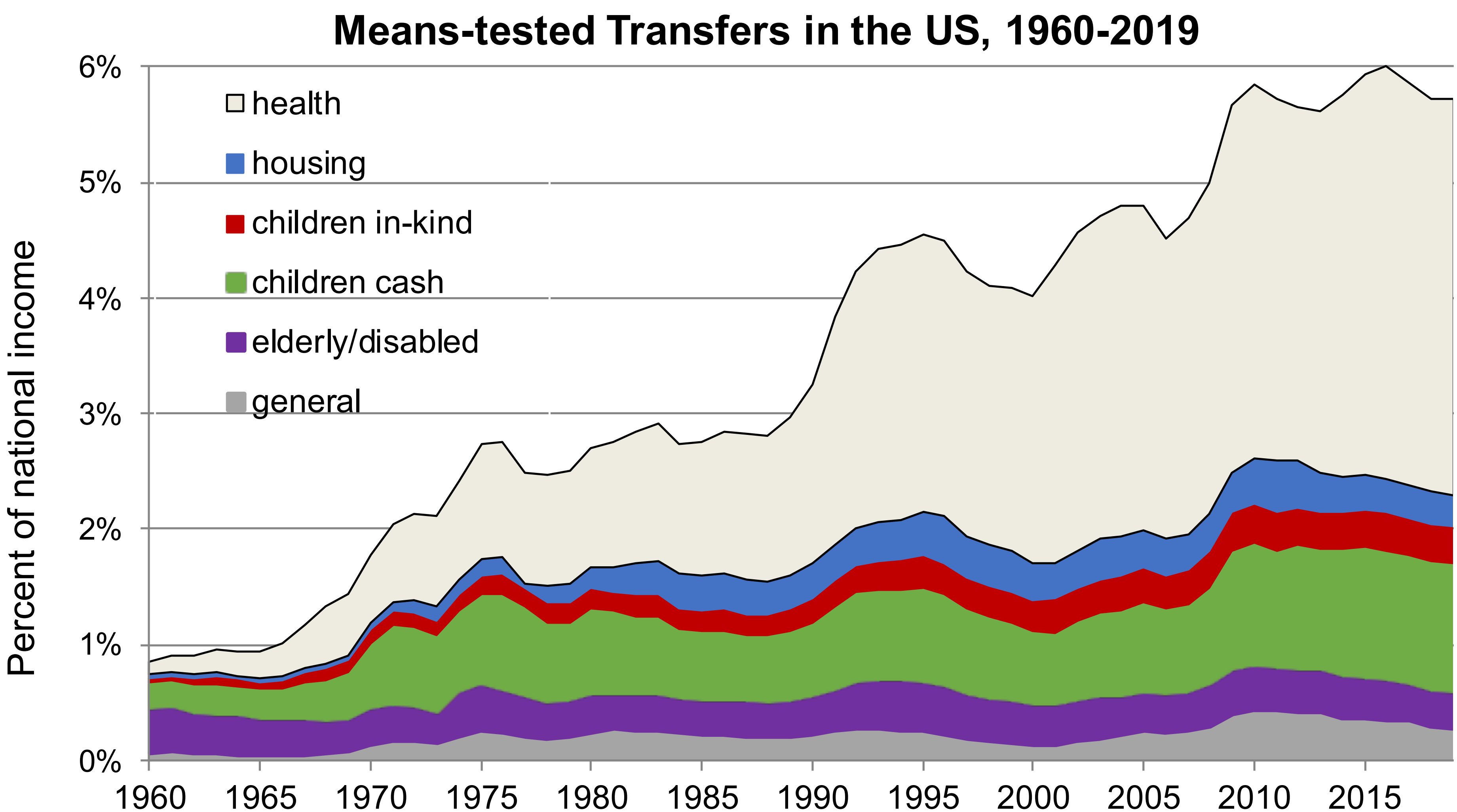
a) In-kind: food stamps (SNAP), Medicaid, public housing, job training, education subsidies

b) Cash: Temporary Aid to Need Families (TANF) and Earned Income Tax Credit for families with kids, Supplemental Security Income (SSI) for aged and disabled

US government (fed+state and local) spent 6% of national income in 2019 on income-tested programs

a) 60% is health care (Medicaid)

b) Cash goes almost only to families with kids



Source. National Accounts. Includes all individualized and means-tested transfers. General is untargetted (SNAP and general assistance for adults). Children cash includes refundable tax credits (EITC+CTC), TANF, and SNAP for children. Health is mostly Medicaid.

1996 US Welfare Reform (PRWORA)

1) Reform modified AFDC (Aid for Families with Dependent Children) cash welfare program to provide more incentives to work (renamed Temporary Aid to Needy Families, TANF)

a) Requiring recipients to go to job training or work

b) Limiting the duration of benefits (5 year max lifetime)

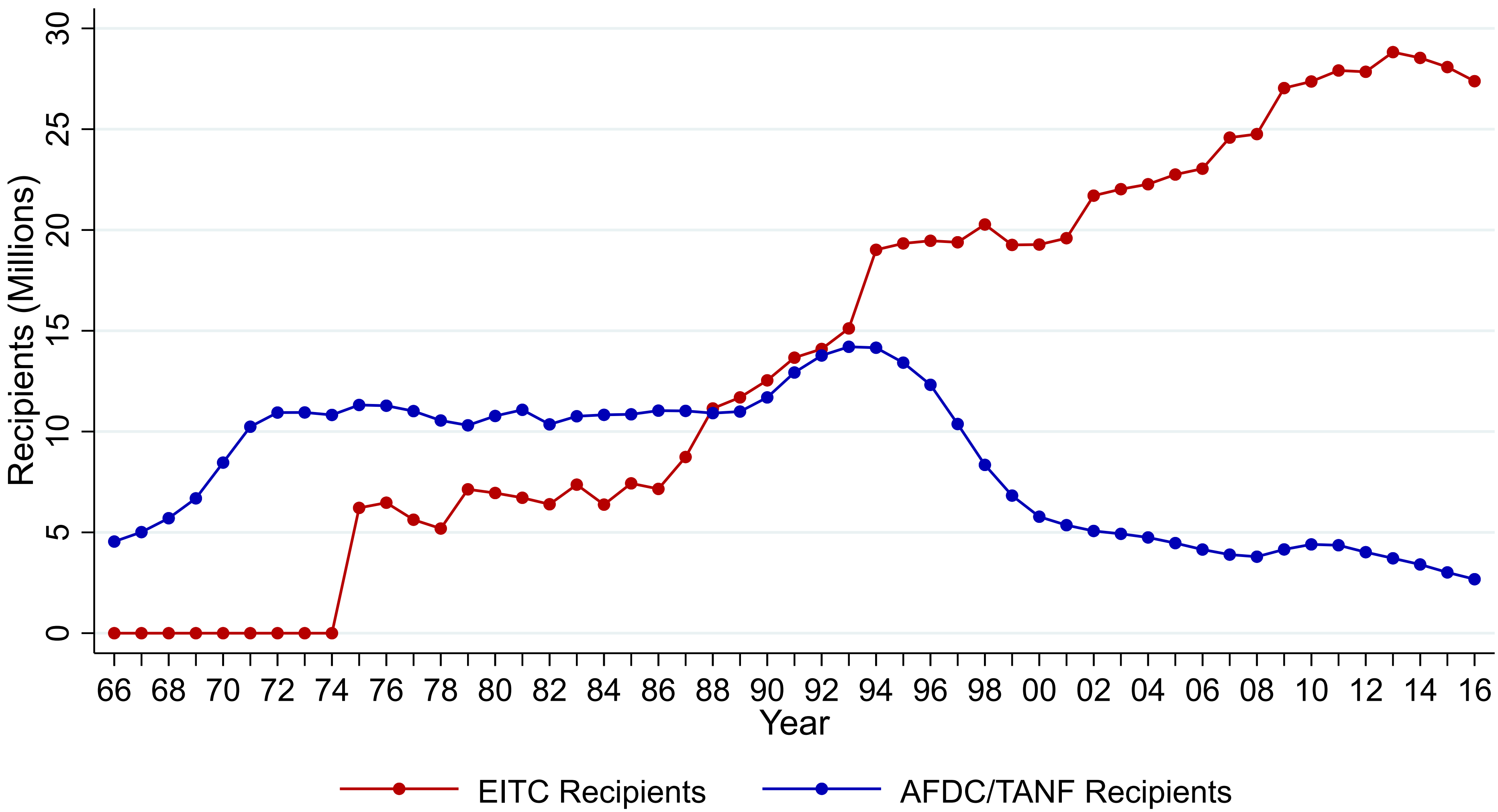
c) Reducing phase-out rate of benefits

2) States got welfare waivers from Federal government to experiment during 1992-1996 before Federal welfare reform

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

Did welfare reform and EITC increase labor supply?

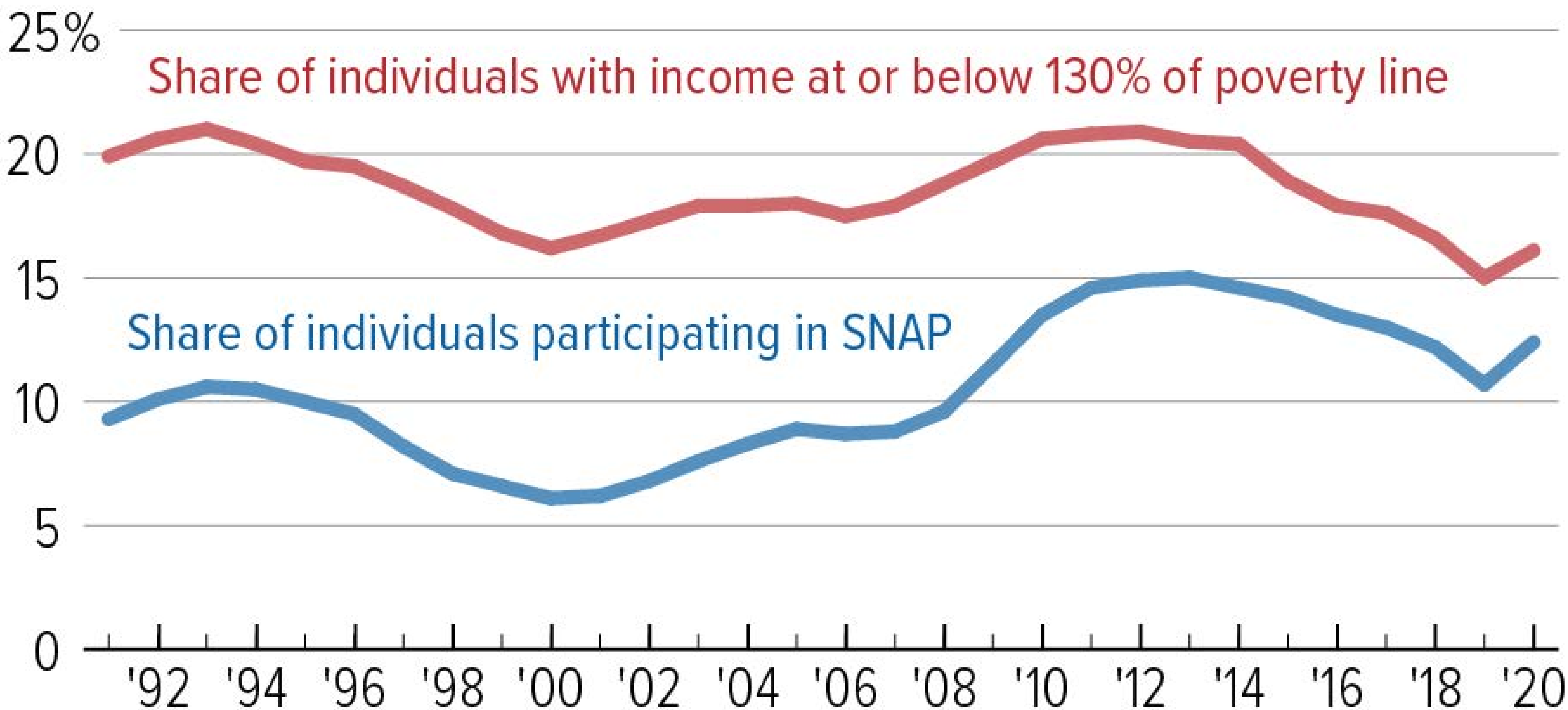
FIGURE 1: LONG-RUN EVOLUTION OF EITC AND CASH WELFARE



Source: Internal Revenue Service (EITC) and Department of Health and Human Services (AFDC/TANF).

Notes: The red series show the annual number of federal EITC recipients between 1966-2016. The blue series show the average monthly number of Aid to Families with Dependent Children (AFDC) recipients between 1966-1996, and the average monthly number of Temporary Assistance for Needy Families (TANF) recipients between 1997-2016.

SNAP Tracks Changes in Share of Population Near or Below the Poverty Line



Note: Poverty estimates are annual estimates. SNAP shares of resident population are calendar year averages.

Sources: U.S. Census Bureau, U.S. Department of Agriculture

Randomized welfare experiment: Canadian Self Sufficiency Project

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 '05 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)

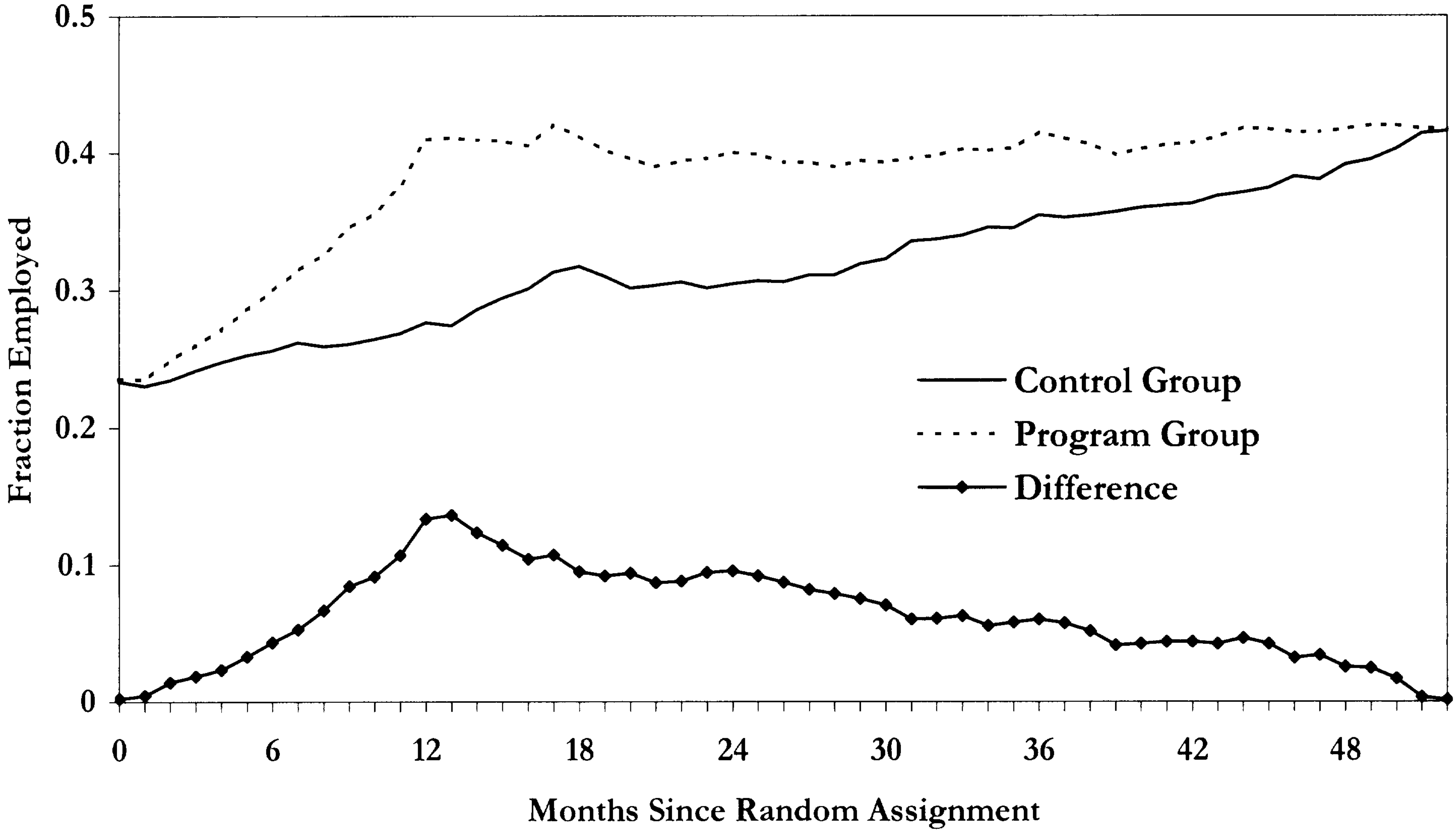


FIGURE 3.—Monthly employment rates.

Source: Card and Hyslop, 2005, p. 1734

Earned Income Tax Credit (EITC) program

1) EITC started small in the 1970s but was expanded in 1986-88, 1994-96, 2008-09: today, largest means-tested cash transfer program [$70bn in 2023, 23m families recipients]

2) Eligibility: families with kids and low earnings.

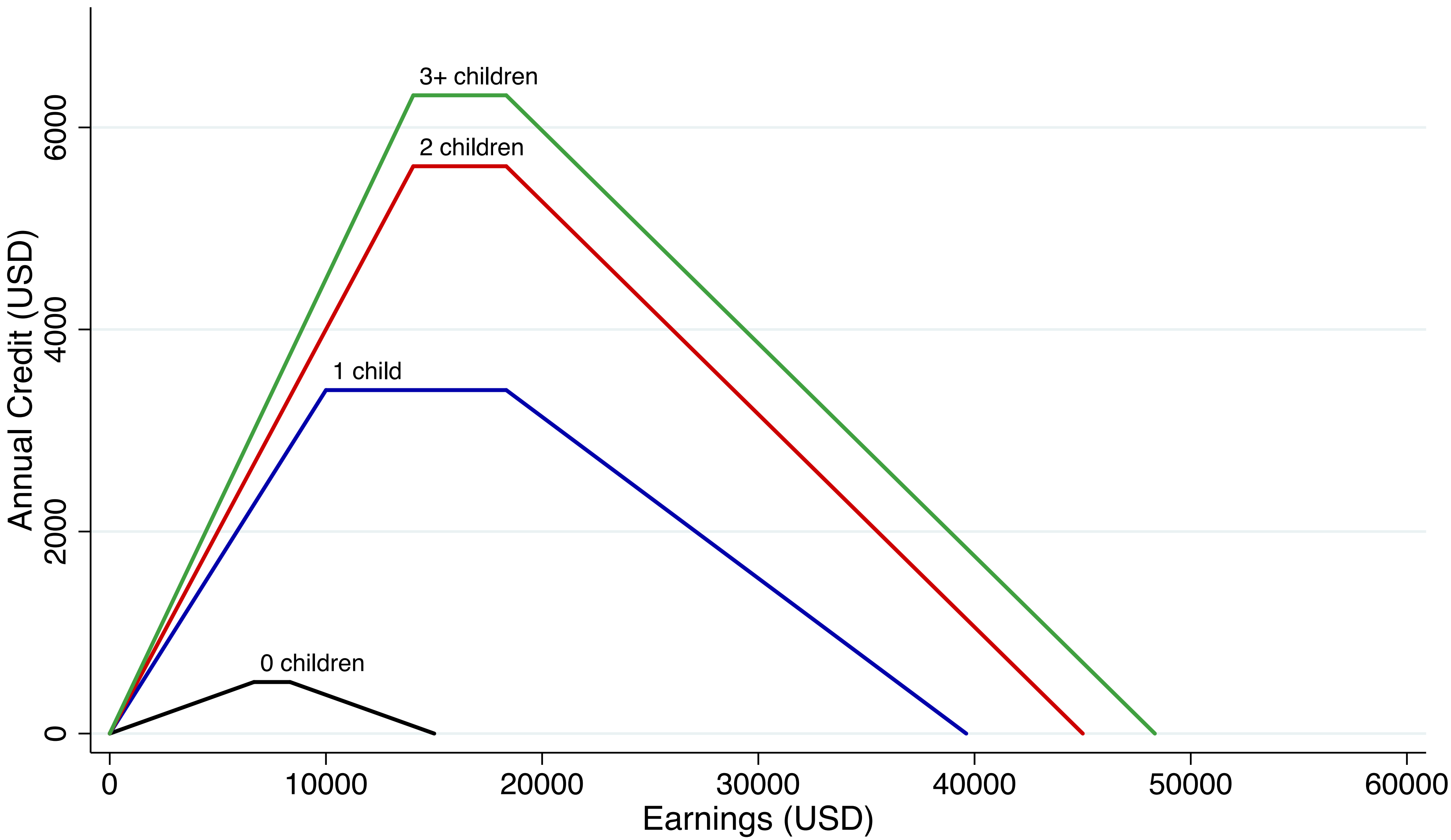
3) Refundable Tax credit: administered through income tax as annual tax refund received in Feb-April, year $t+1$ (for earnings in year t)

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

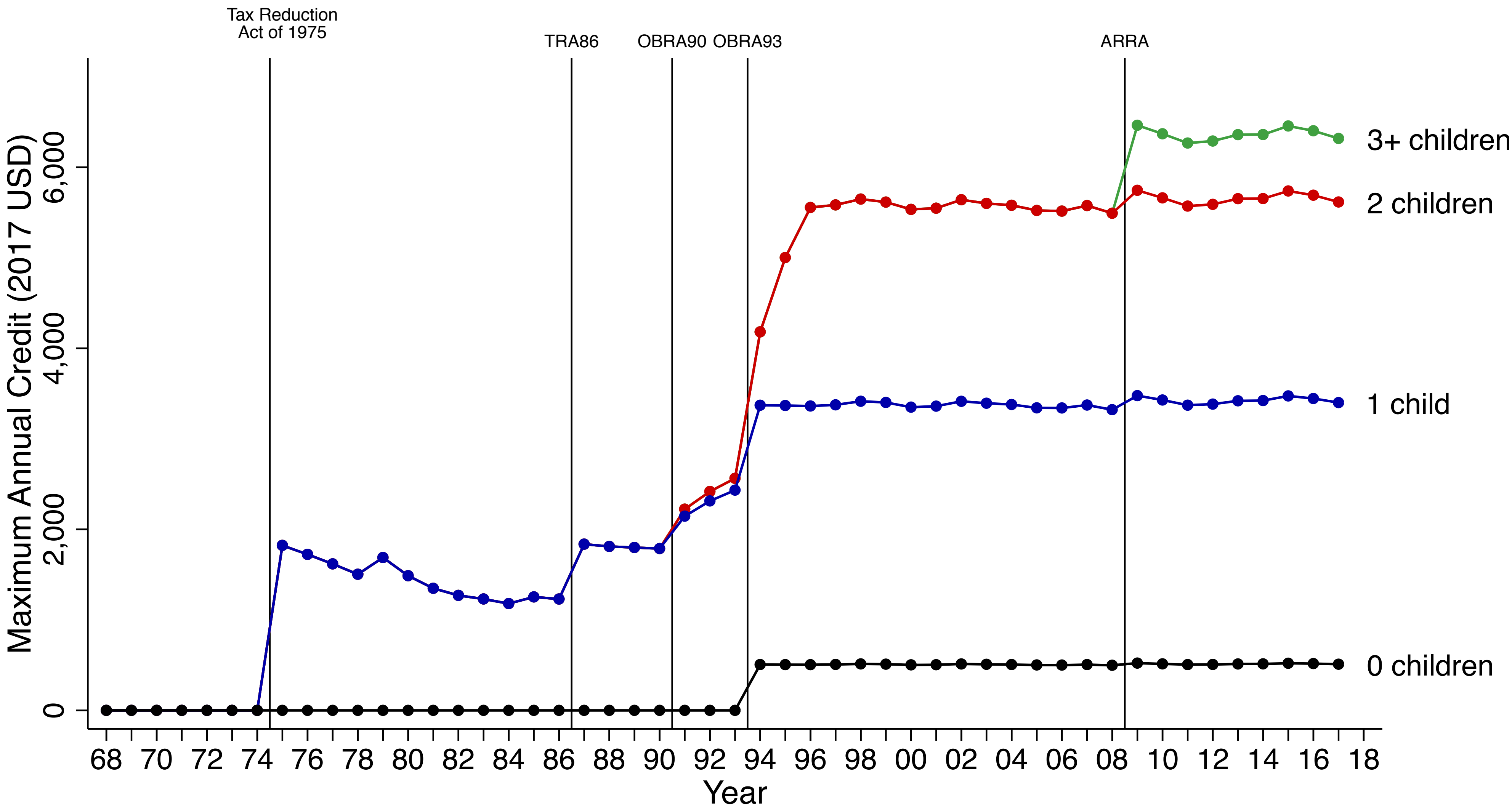
5) Theoretically, EITC should encourage labor force participation (extensive labor supply margin)

Kleven (2019) who looks at participation of single women (aged 20-50) with kids (treatment) vs without kids (control)

EITC Schedule in 2017



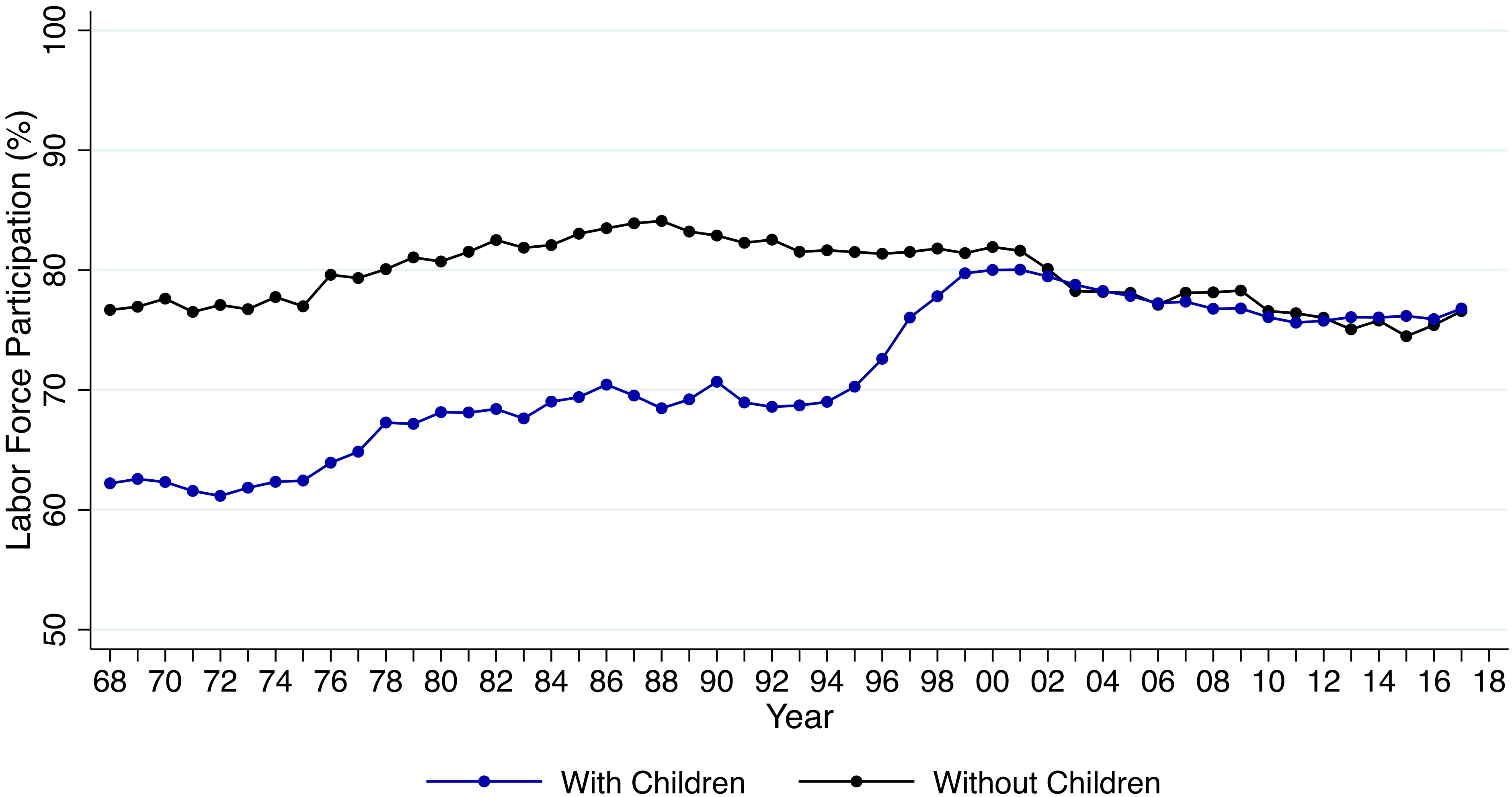
EITC Maximum Credit Over Time



Source: Kleven (2018)

Labor Force Participation of Single Women

With and Without Children

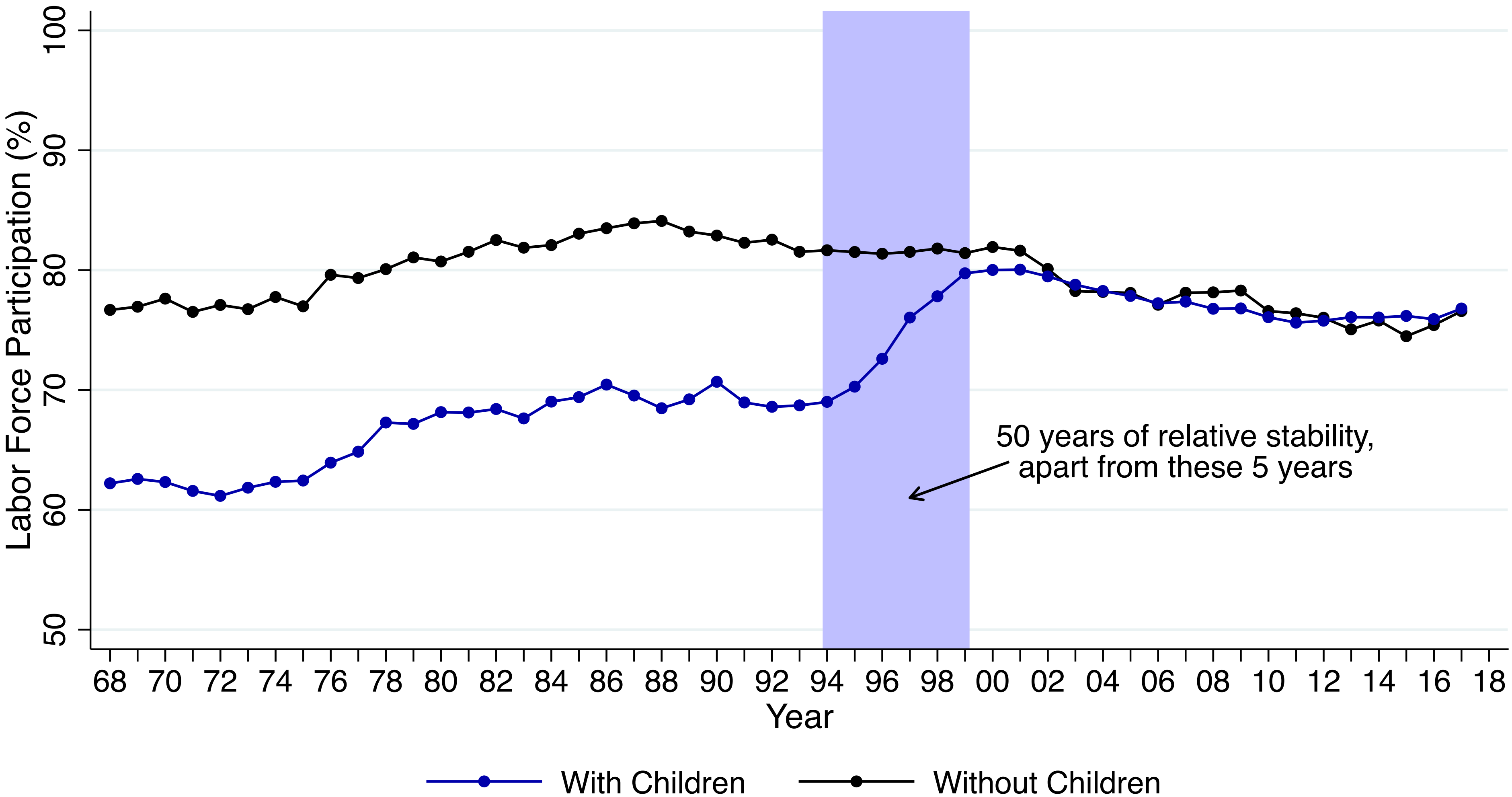


Source: Kleven (2018)

Annual Employment Low Education

Labor Force Participation of Single Women

With and Without Children



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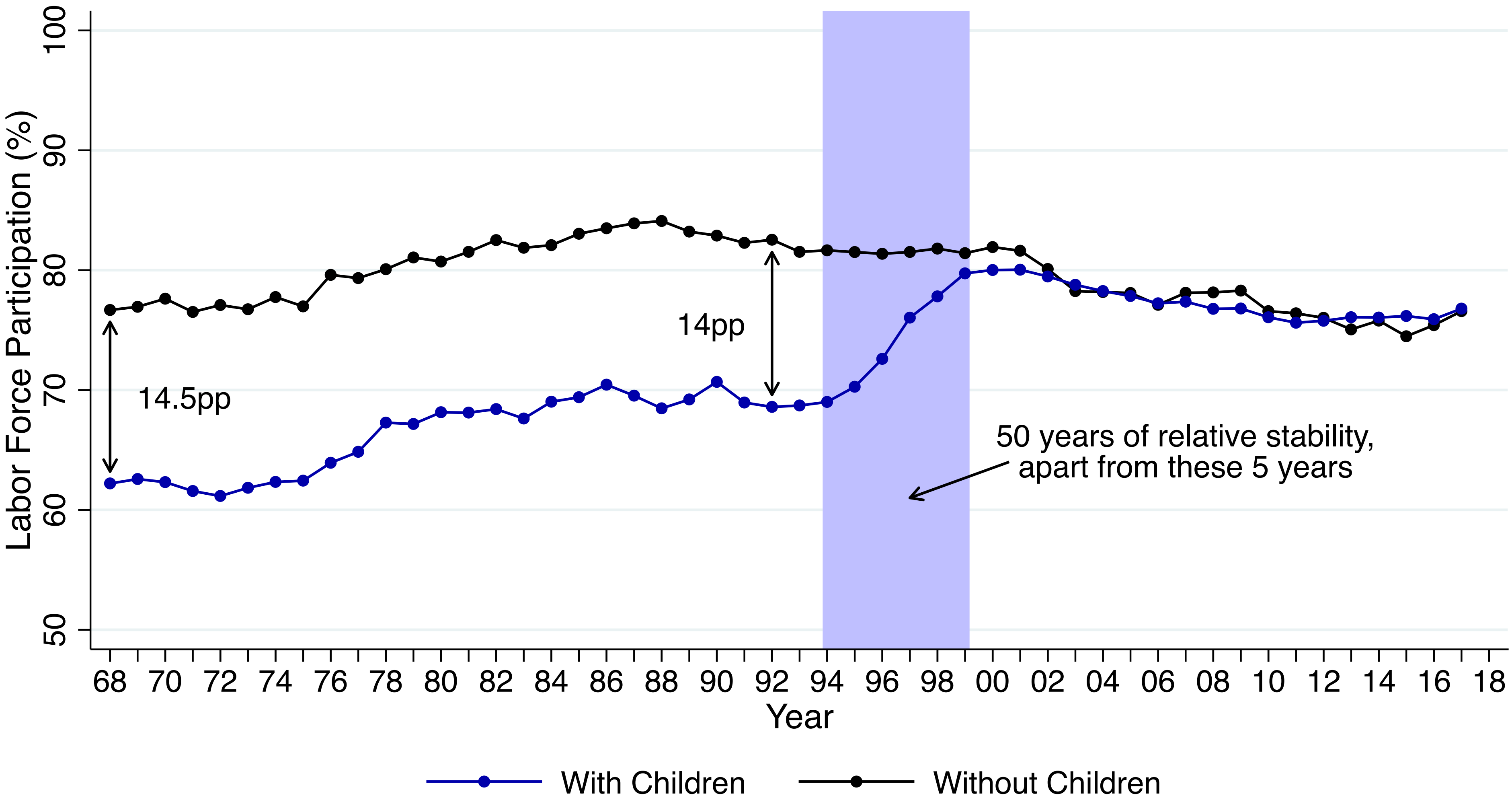

Annual Employment | Low Education

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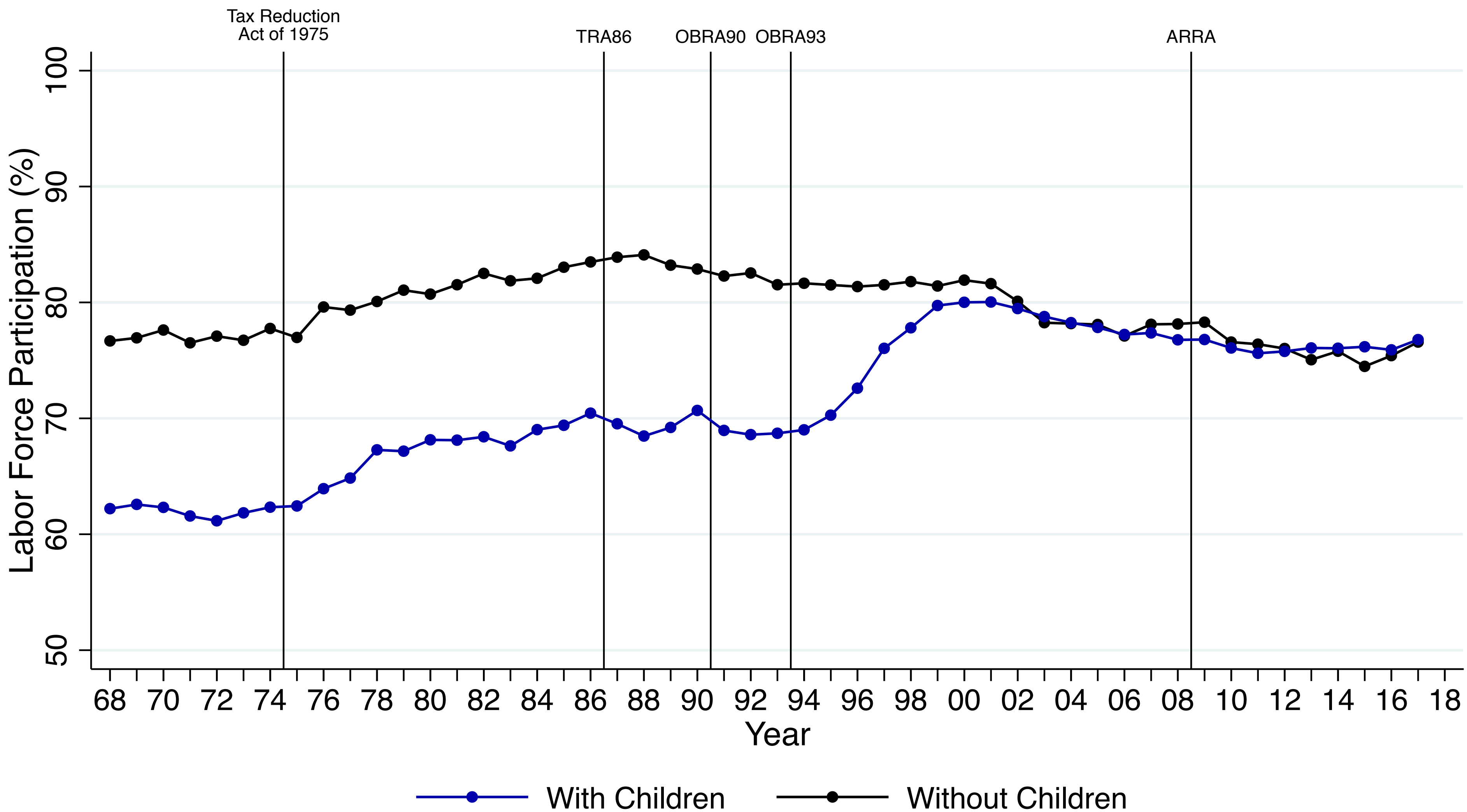

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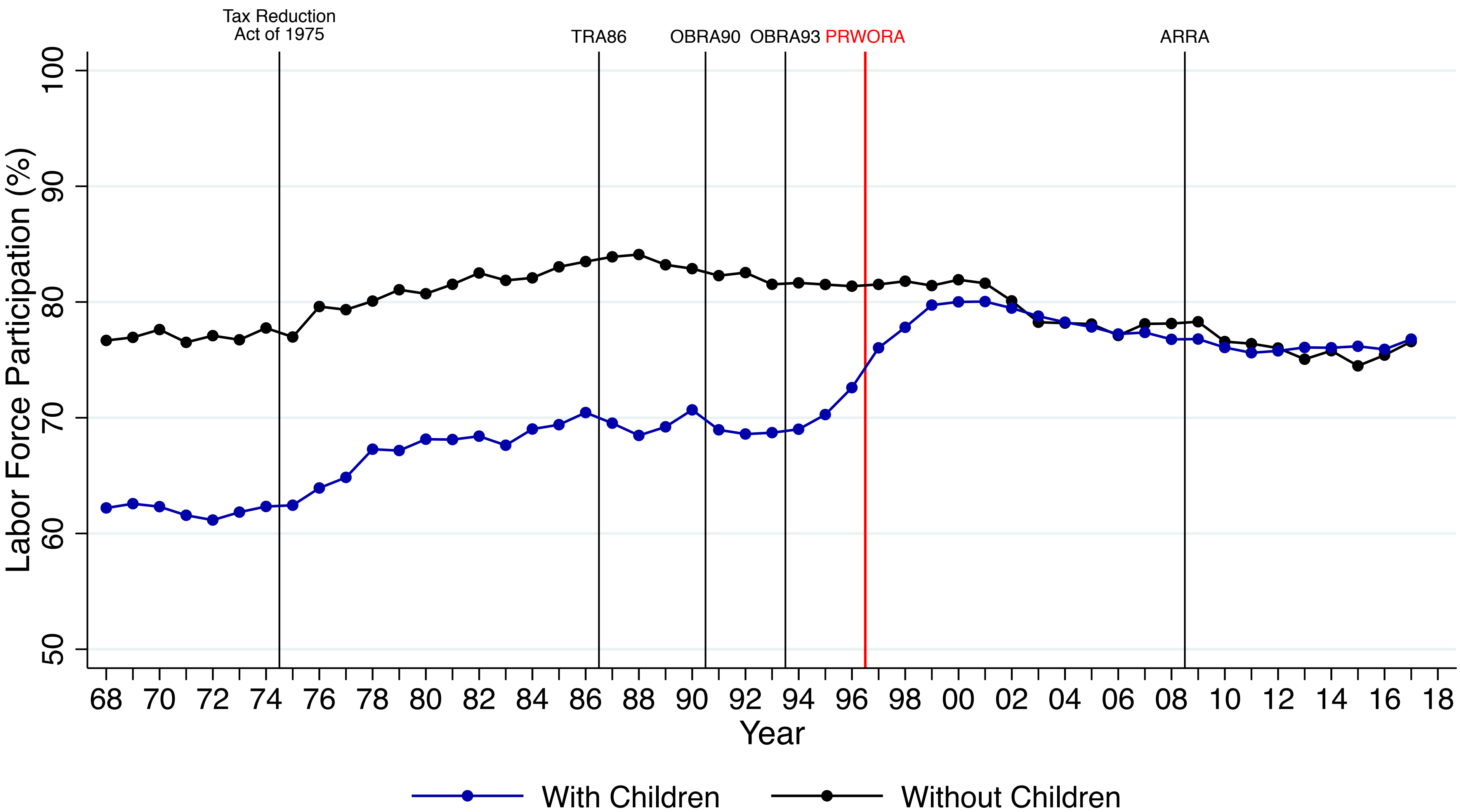

Annual Employment | Low Education

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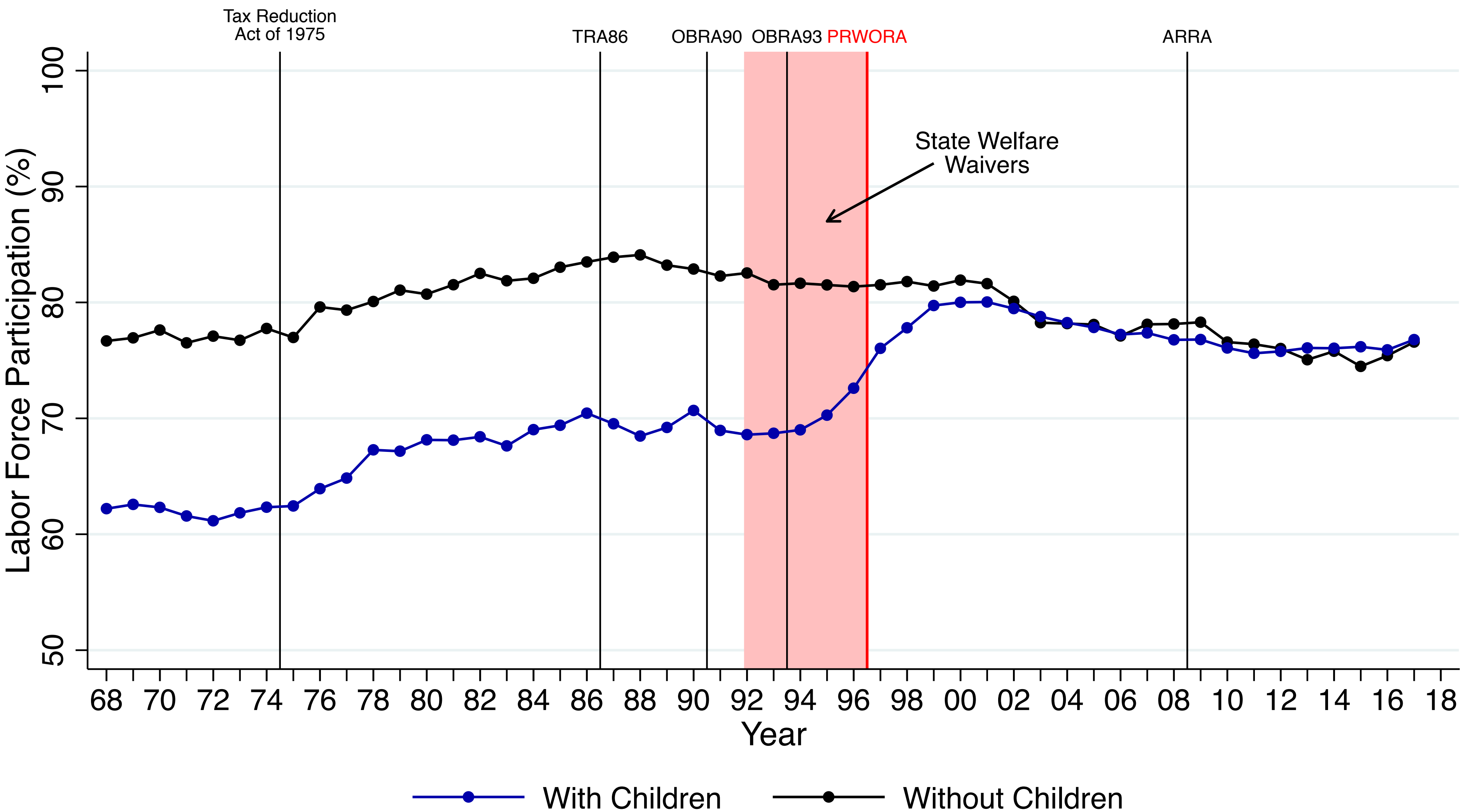


Annual Employment
Low Education

Source: Kleven (2018)

Welfare Reform and EITC Expansion: Labor supply

Kleven (2019) looks at participation of single women (aged 20-50) with kids (treatment) vs without kids (control)

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

Unlikely that the EITC can explain it fully 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

A combination of EITC reform, welfare reform, and changing social norms lead to this shift

Theoretical Behavioral Responses to the EITC

Extensive margin: EITC makes work more attractive (vs. non-work) $\Rightarrow$ positive effect on Labor Force Participation

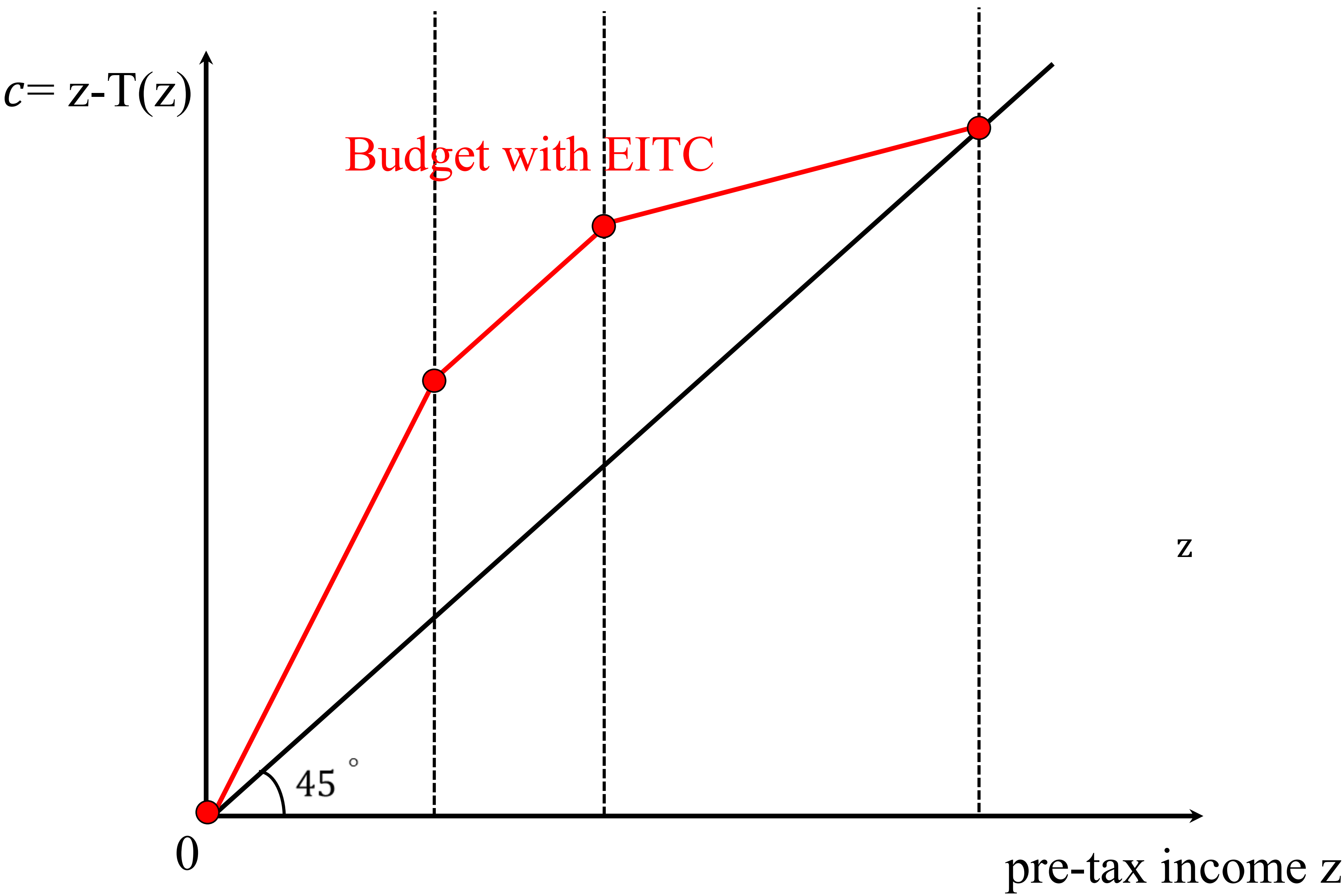
Intensive margin: earnings conditional on working;

1) Phase in: (a) Substitution effect: work more due to 40% increase in net wage, (b) Income effect: work less $\Rightarrow$ Net effect: ambiguous; probably work more

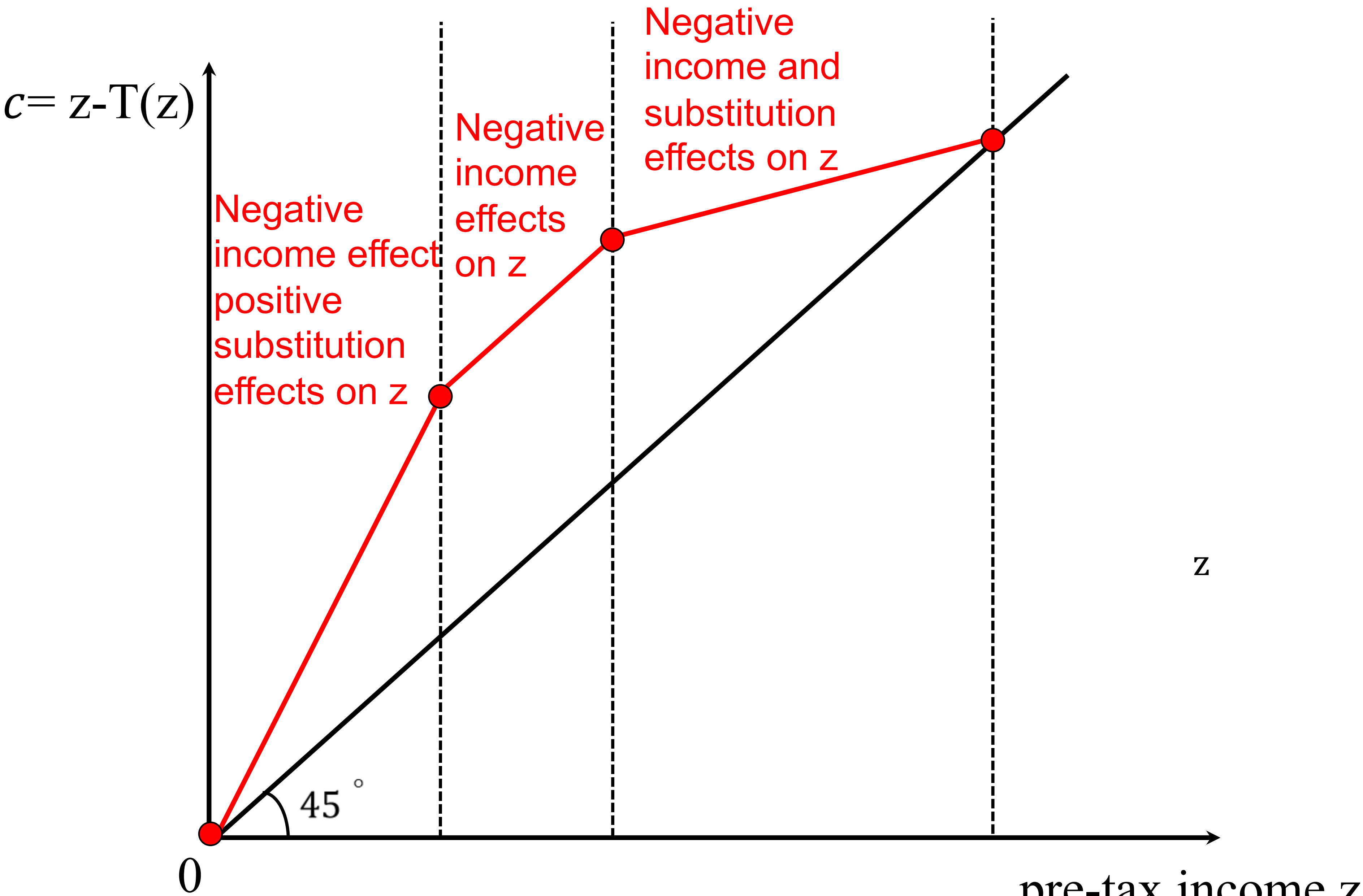
2) Plateau: Pure income effect (no change in net wage) $\Rightarrow$ Net effect: work less

3) Phase out: (a) Substitution effect: work less, (b) Income effect: also work less $\Rightarrow$ Net effect: work less

EITC and intensive labor supply



EITC and intensive labor supply



EITC and Intensive Labor Supply Response: Bunching at Kinks

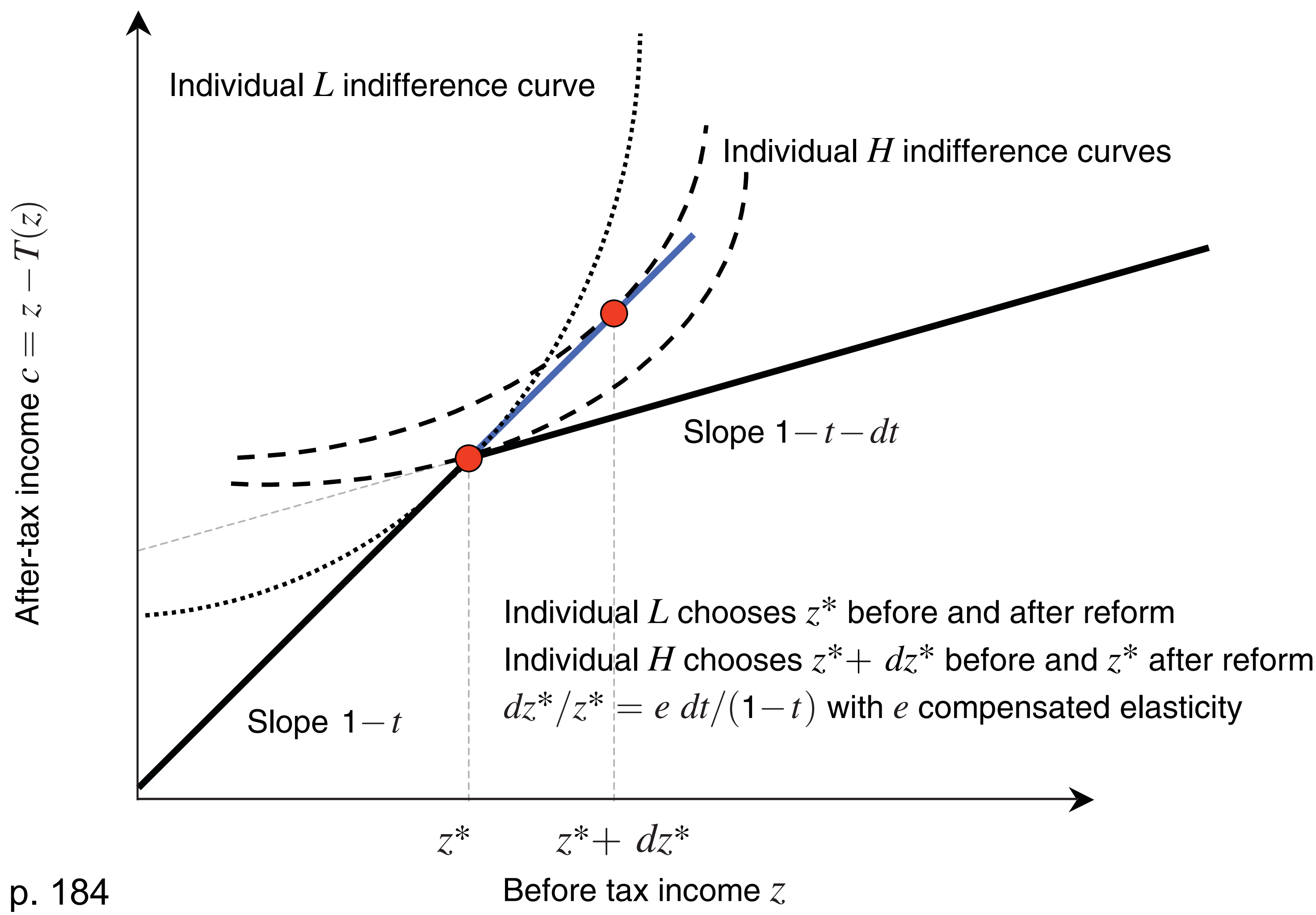
1) Basic labor supply theory predicts that we should observe bunching of individuals at the EITC kink points:

Some individuals find it worthwhile to work more when subsidy rate is 40% (2 kids) but not when subsidy rate falls to 0% $\Rightarrow$ Utility maximizing labor supply is to be exactly at the kink

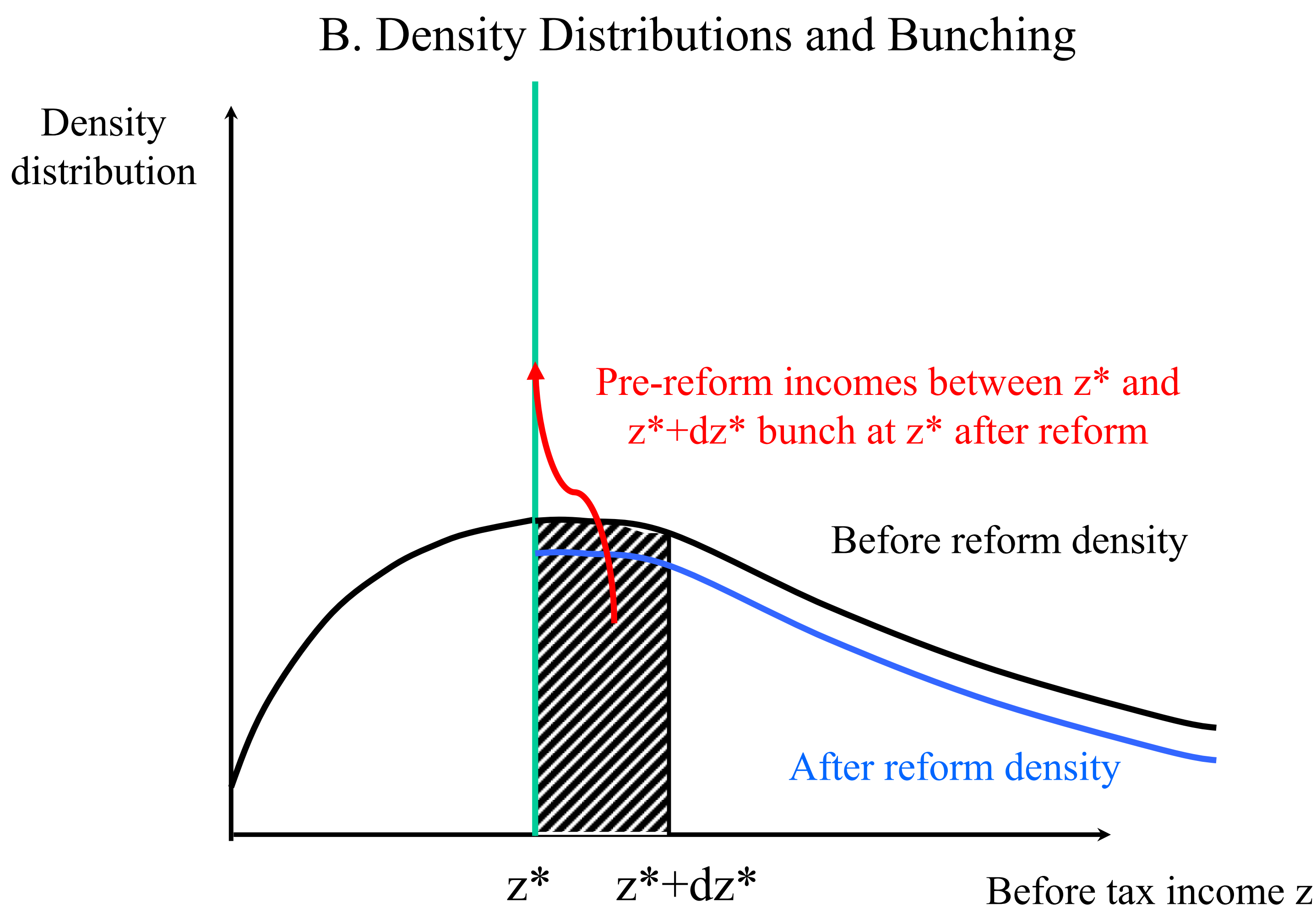
2) Amount of bunching is proportional to compensated elasticity: if labor supply is inelastic, then kinks in the budget set are irrelevant and do not create bunching

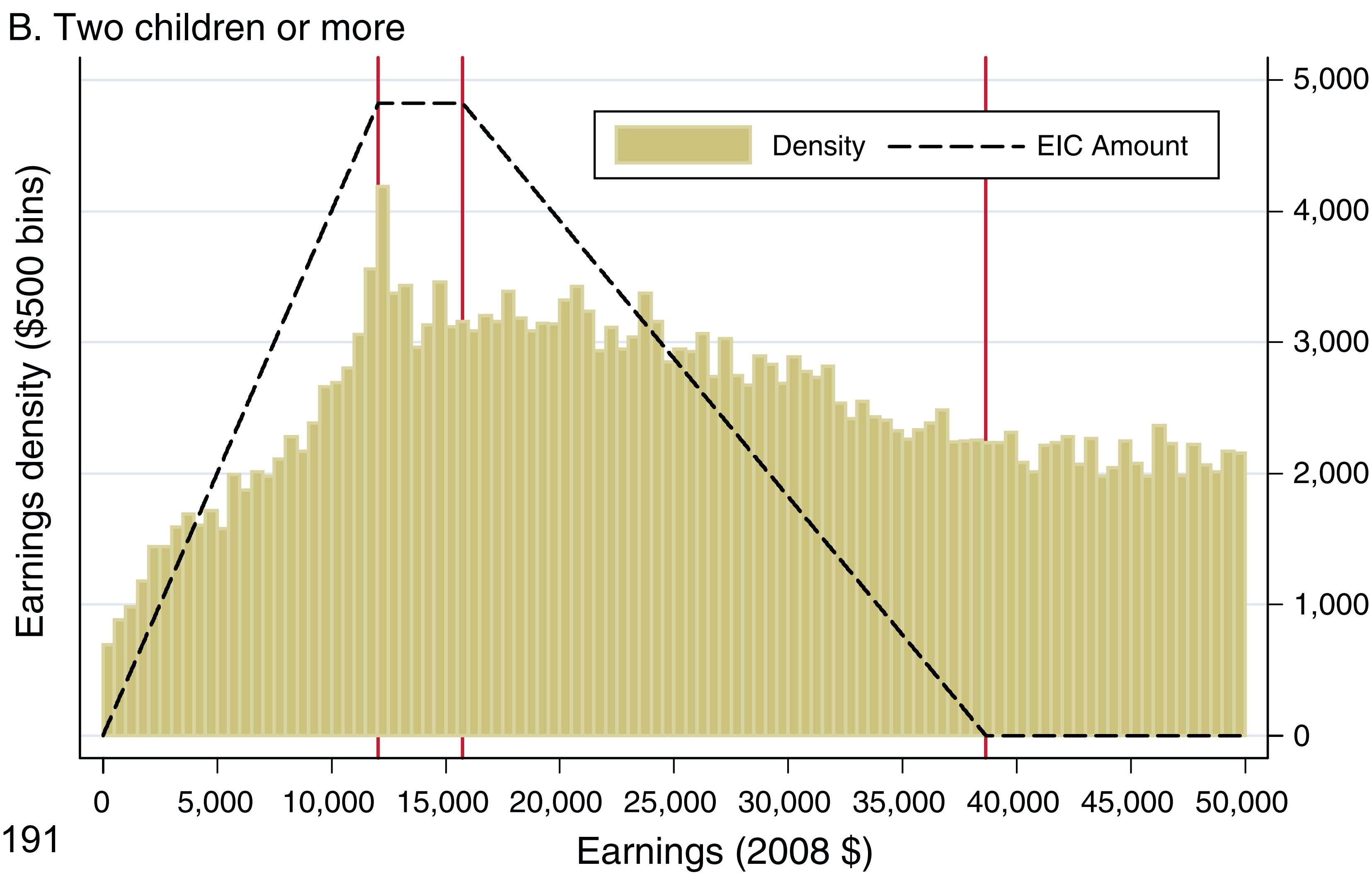
Saez AEJ'10 finds bunching around 1st kink point of EITC but only for the self-employed $\Rightarrow$ likely due to cheating to maximize tax refund (and not labor supply)

Panel A. Indifference curves and bunching



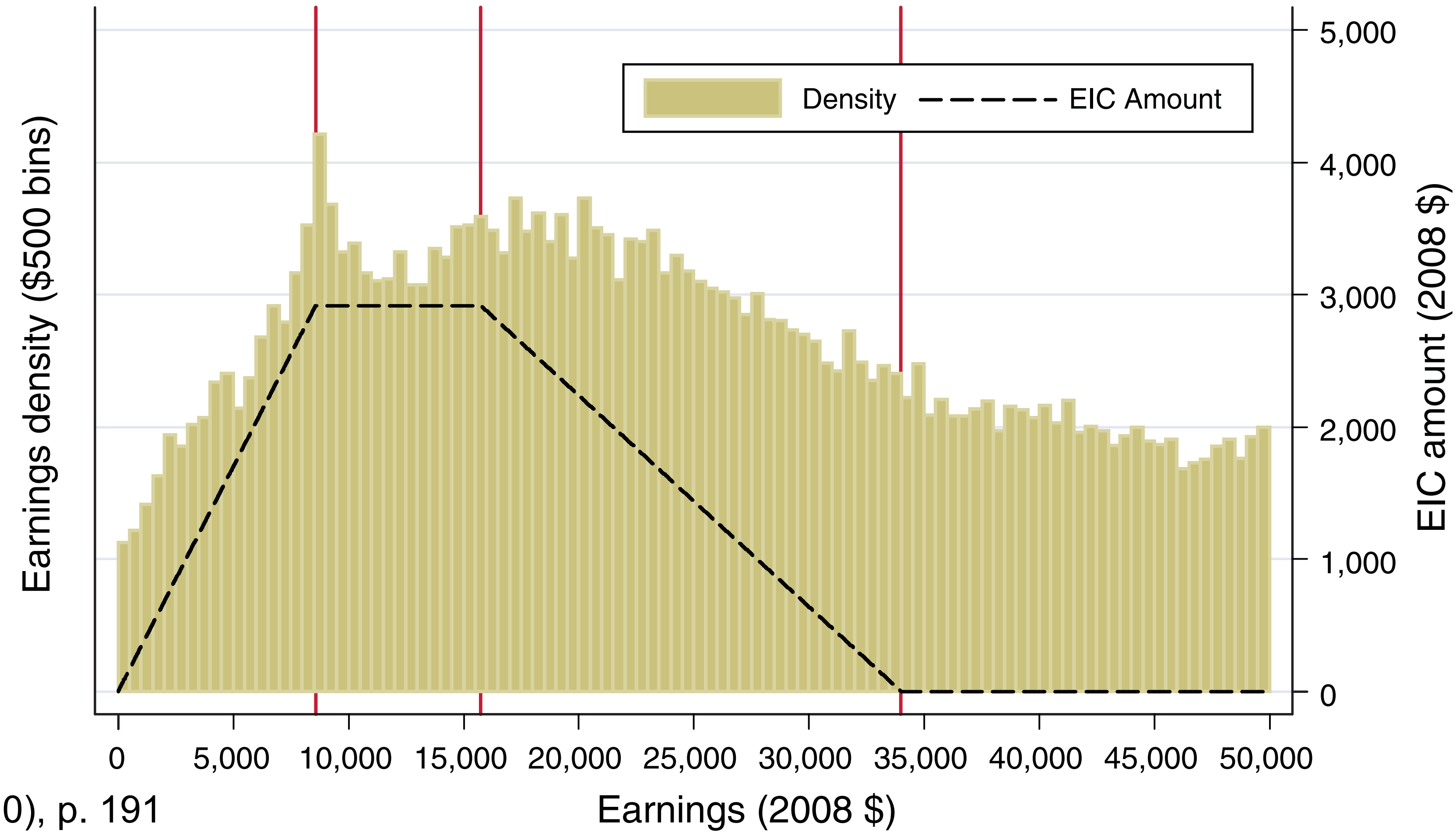
Source: Saez (2010), p. 184


B. Density Distributions and Bunching
Density
distribution
Pre-reform incomes between z* and
z*+dz* bunch at z* after reform
Before reform density
After reform density
z*
z*+dz*
Before tax income z


B. Two children or more
Density
EIC Amount
Earnings density ($500 bins)
EIC amount ($)
5,000
4,000
3,000
2,000
1,000
0
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
Earnings (2008 $)

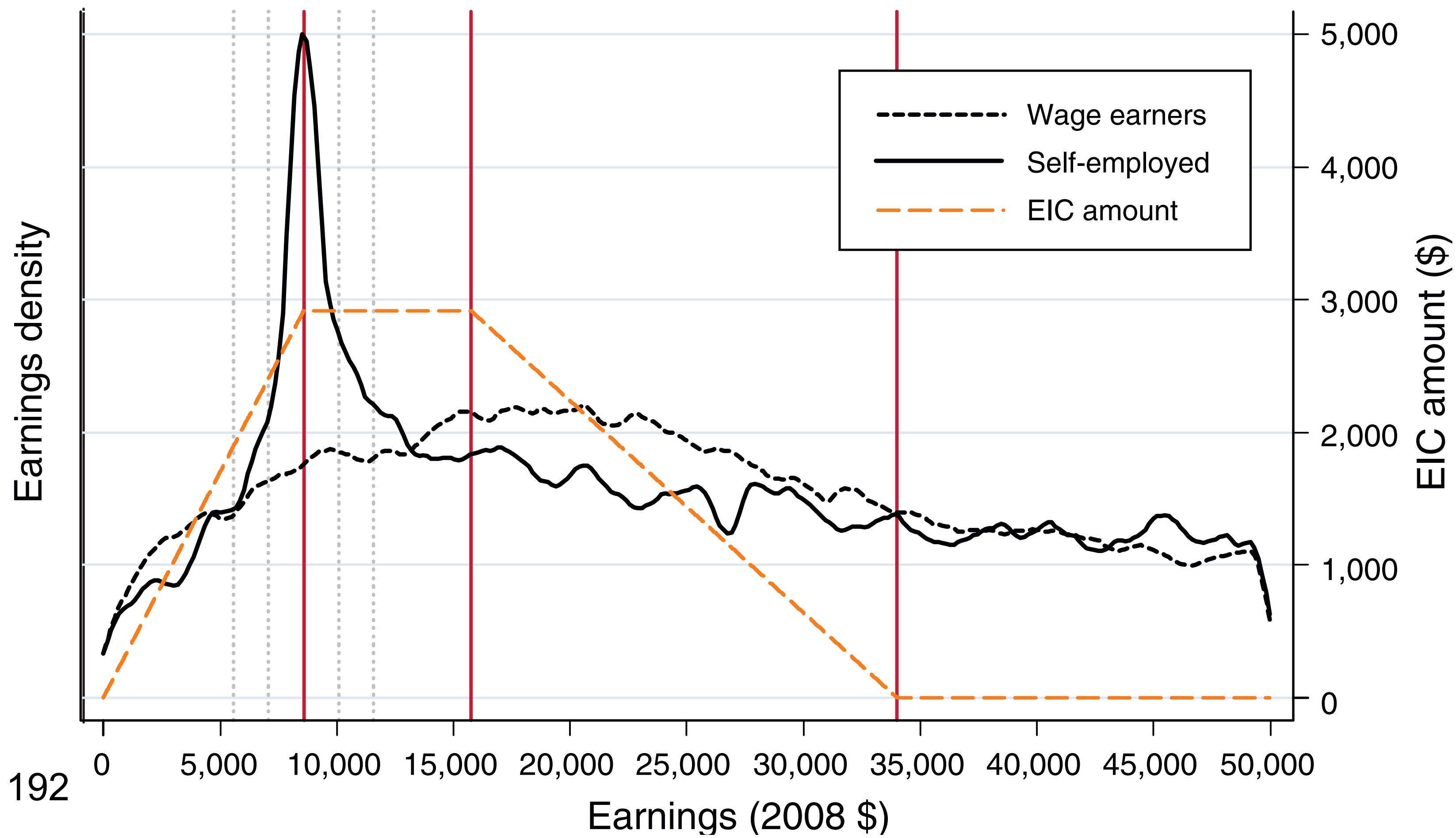
(2010), p. 191

Panel A. One child



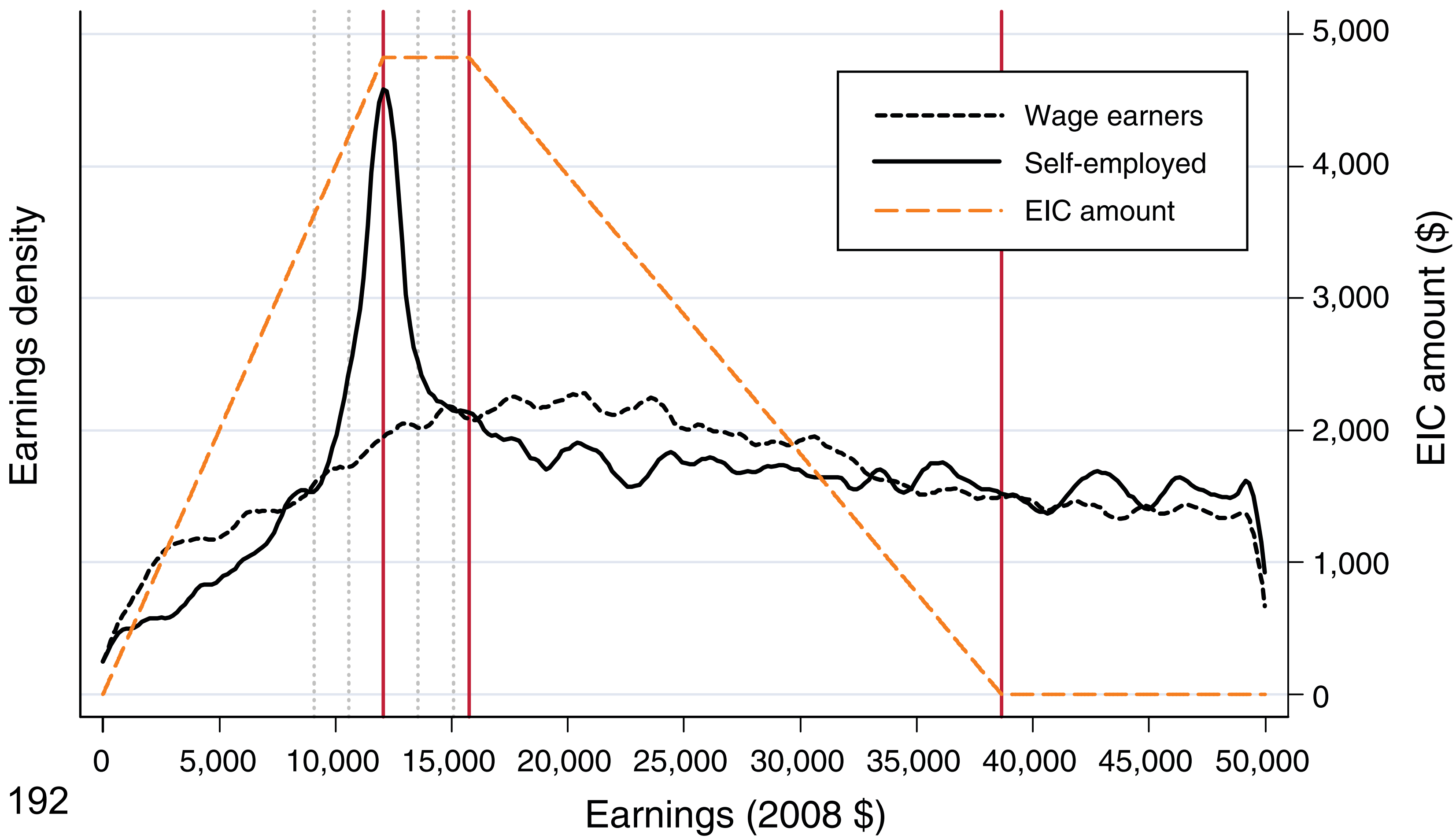
rce: Saez (2010), p. 191

Panel A. One child



ez (2010), p. 192

Panel B. Two or more children



ez (2010), p. 192

EITC Empirical Studies

Some 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 increases or decreases with earnings

Such confusion might be good for the government as the EITC induces work along participation margin without discouraging work along intensive margin

Chetty, Friedman, Saez AER'13 EITC information

Use US population wide tax return data since 1996

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

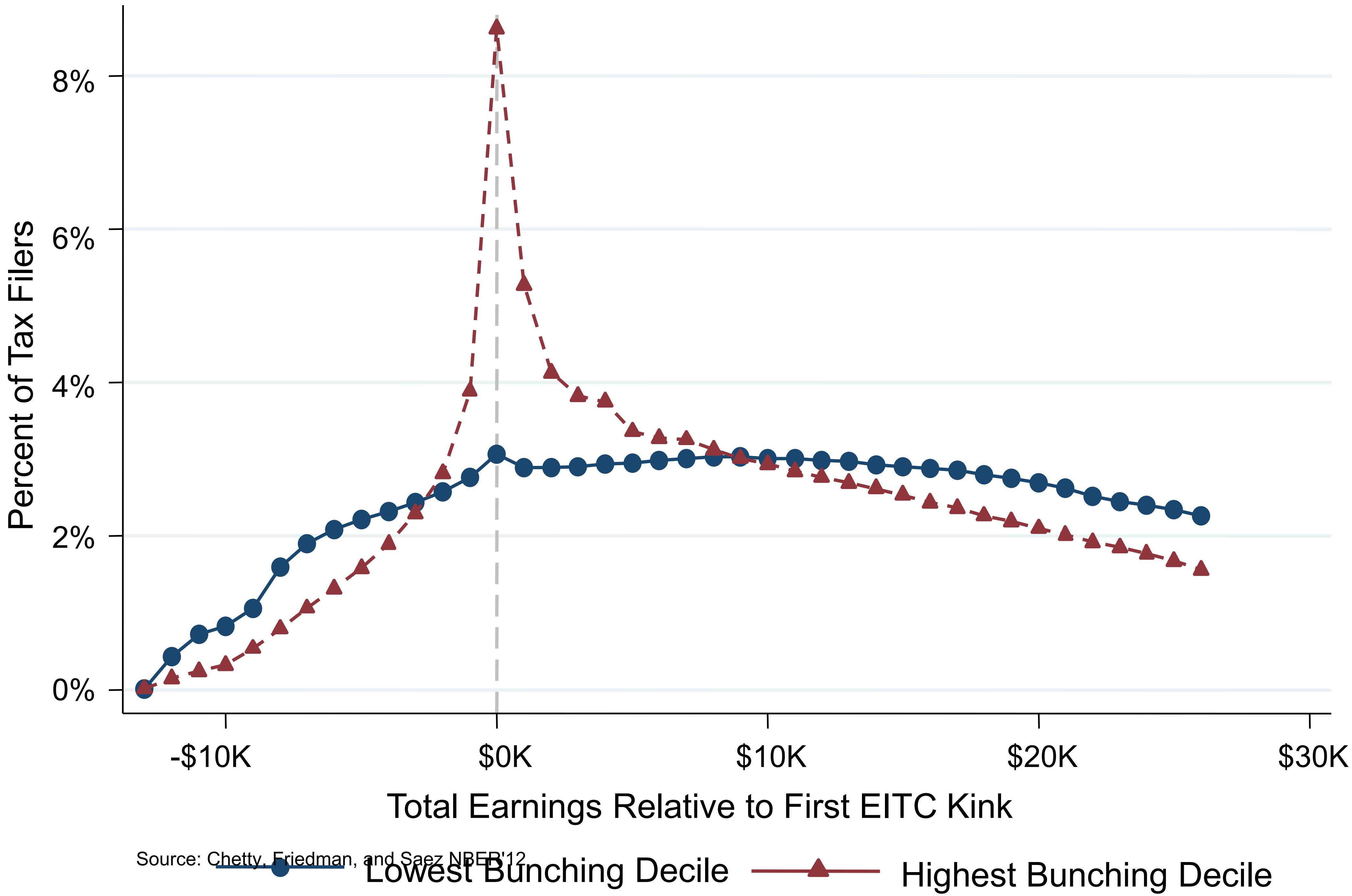
$\Rightarrow$ Information about EITC varies across areas

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

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

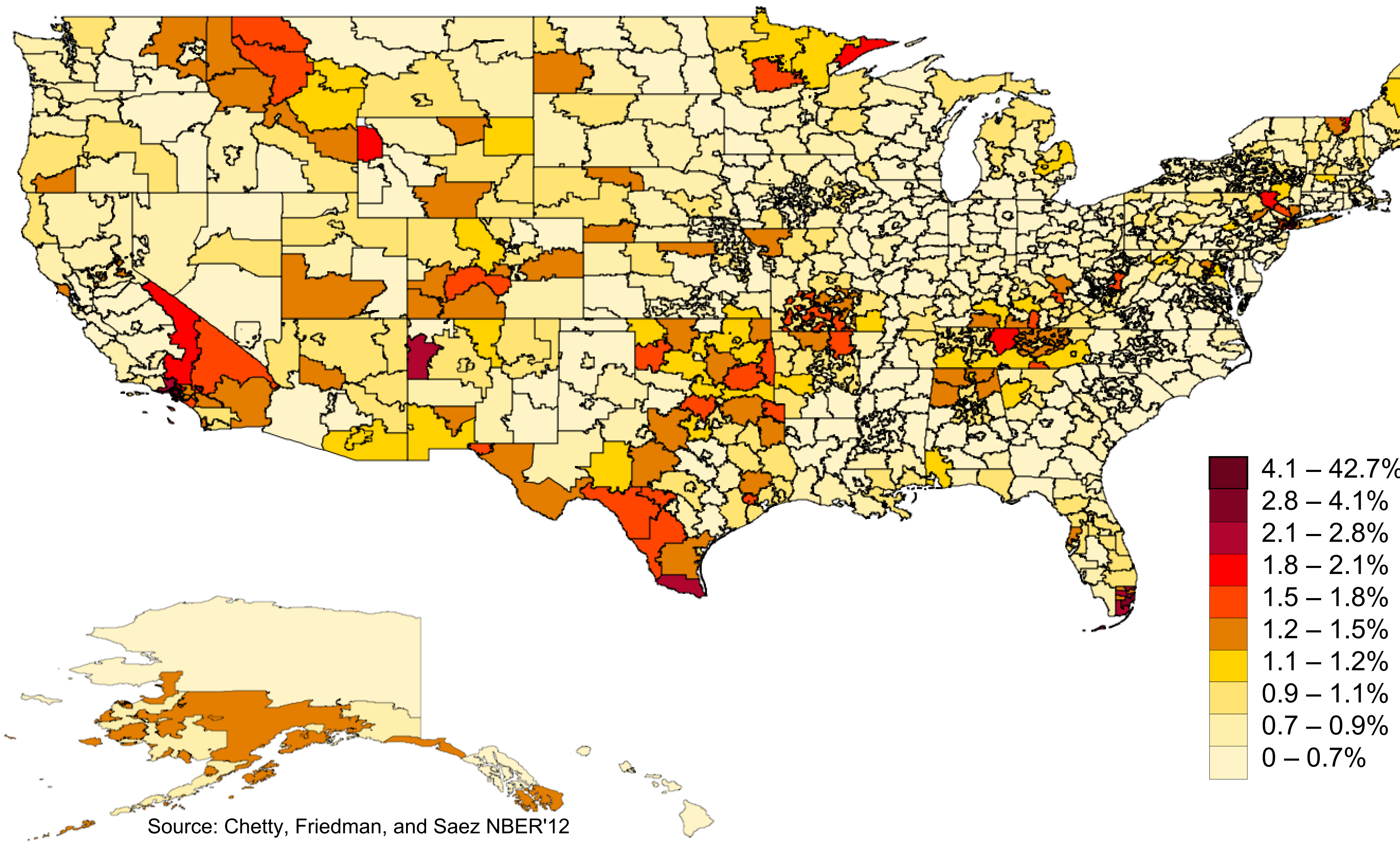
3) Omitted variable test: use birth of first child to test causal effect of EITC on wage earnings

Earnings Distributions in Lowest and Highest Bunching Deciles



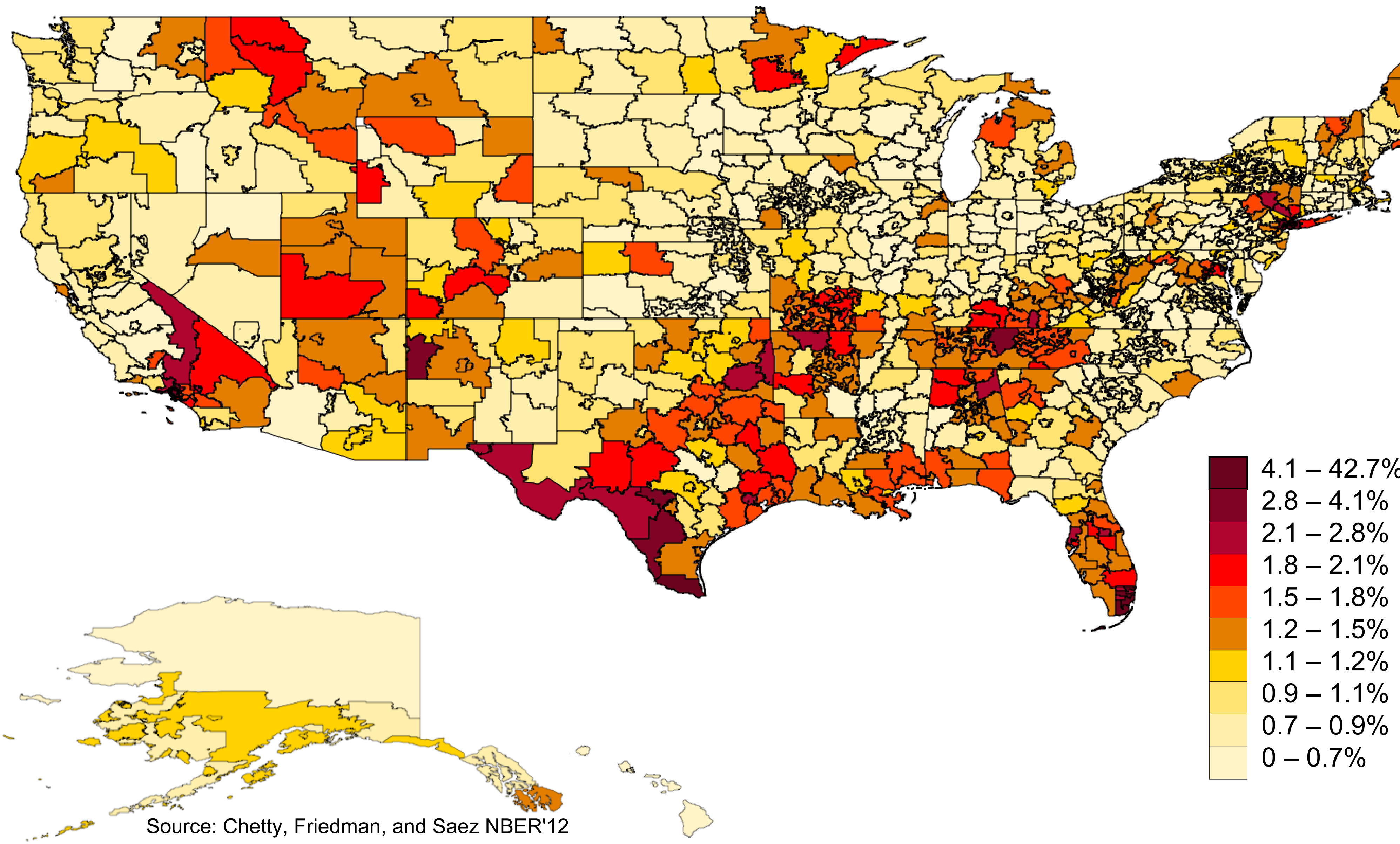
Source: Chetty, Friedman, and Saez NBER'12

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

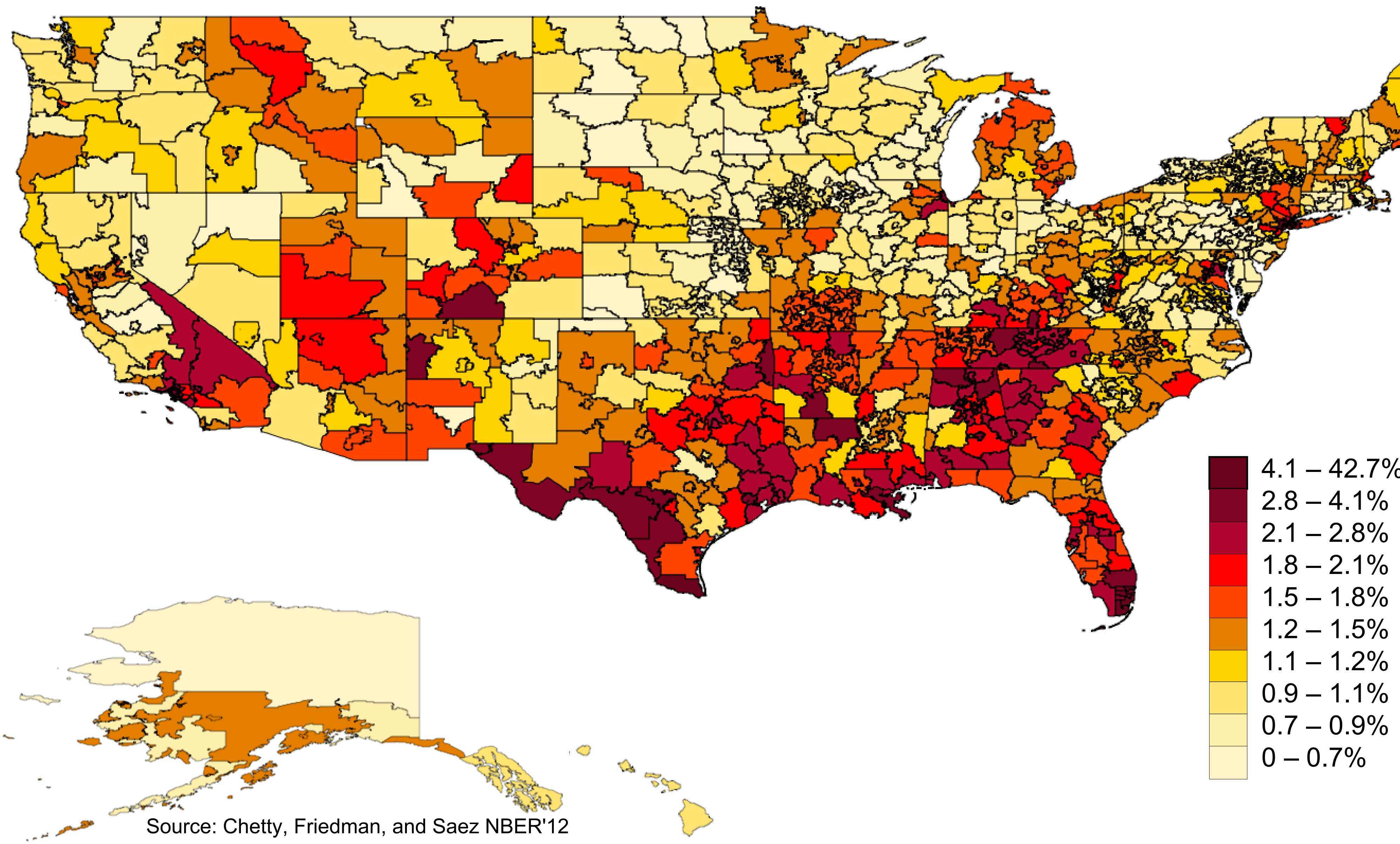


Source: Chetty, Friedman, and Saez NBER'12

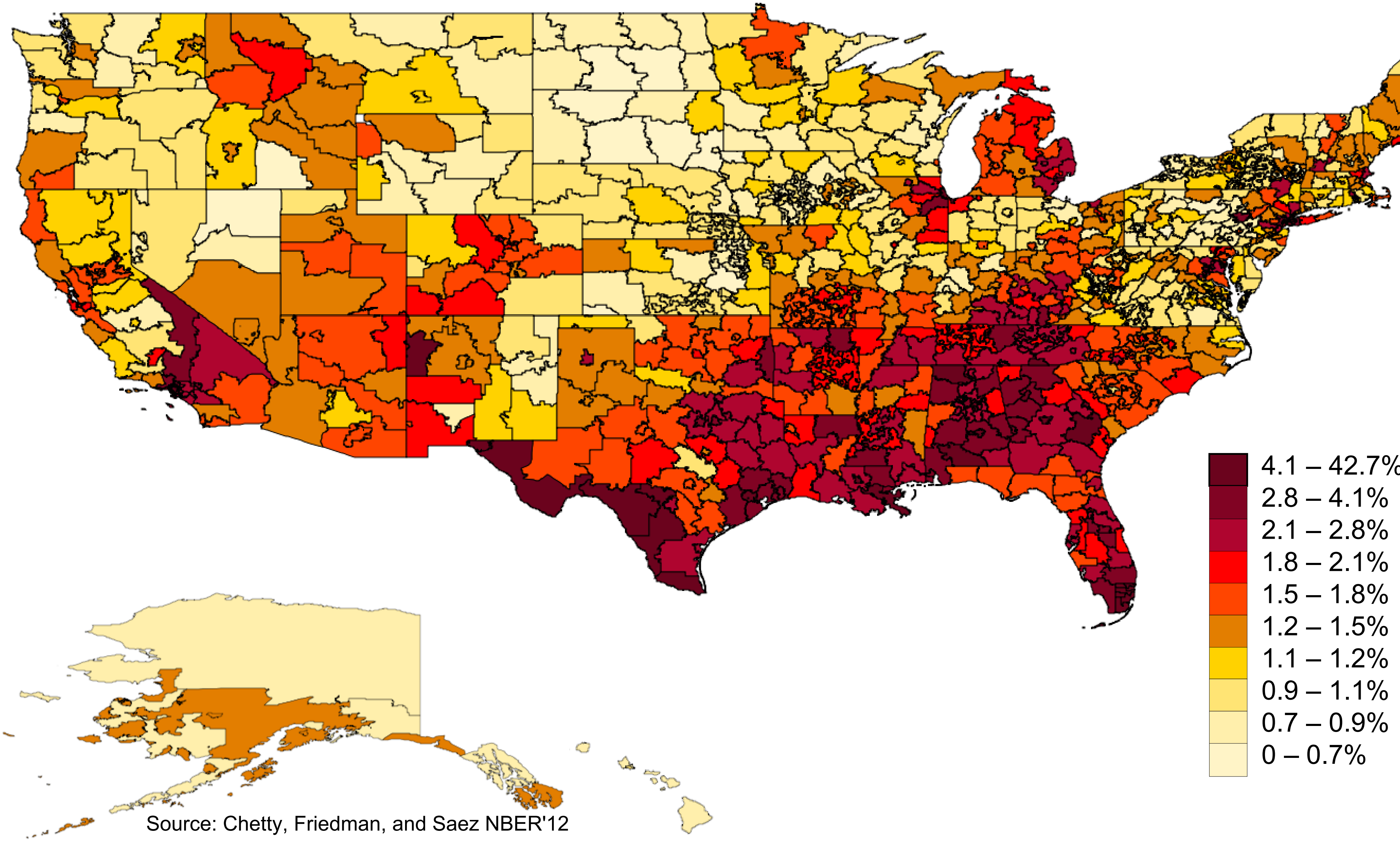
Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 1999



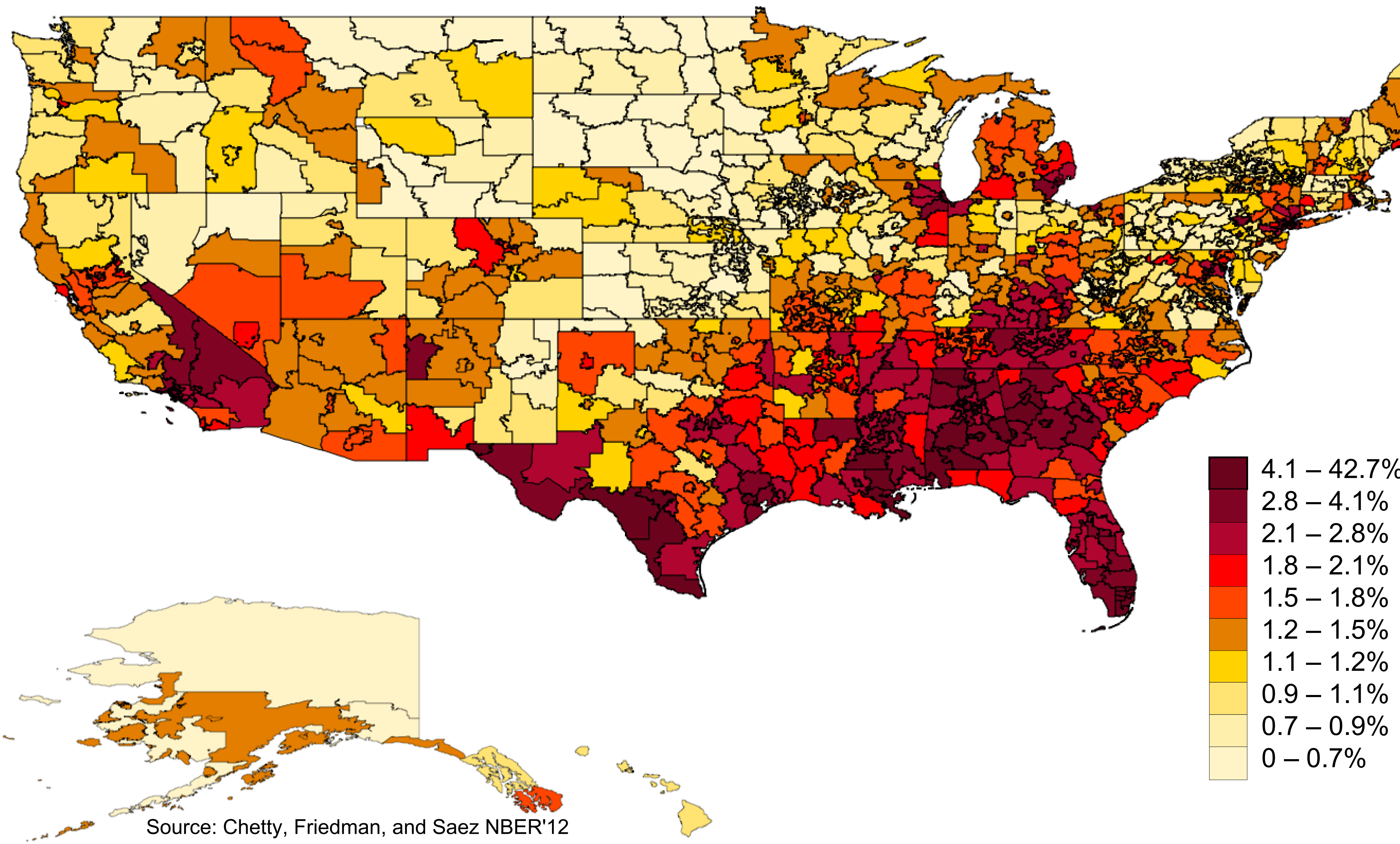
Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2002



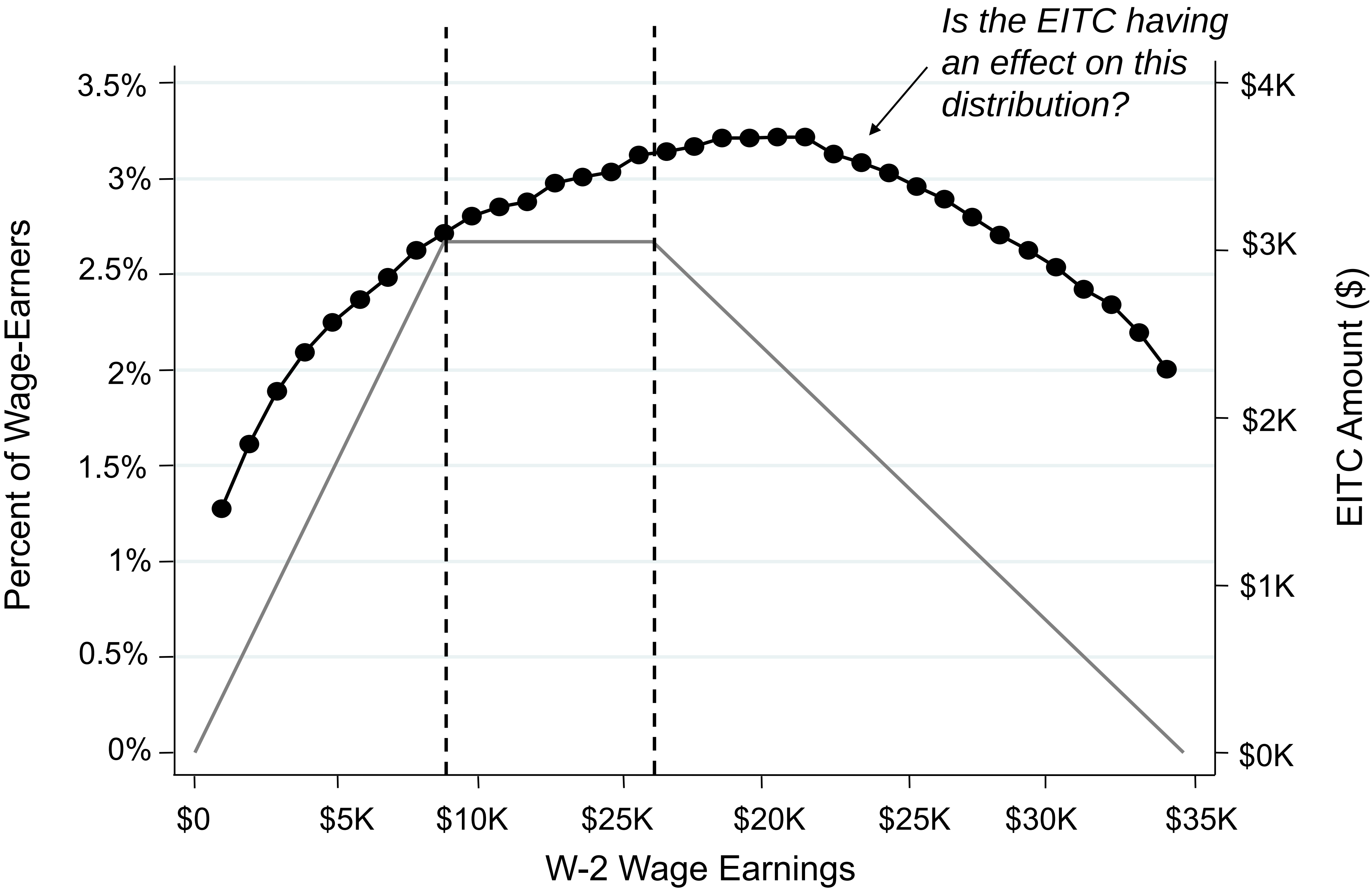
Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2005



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

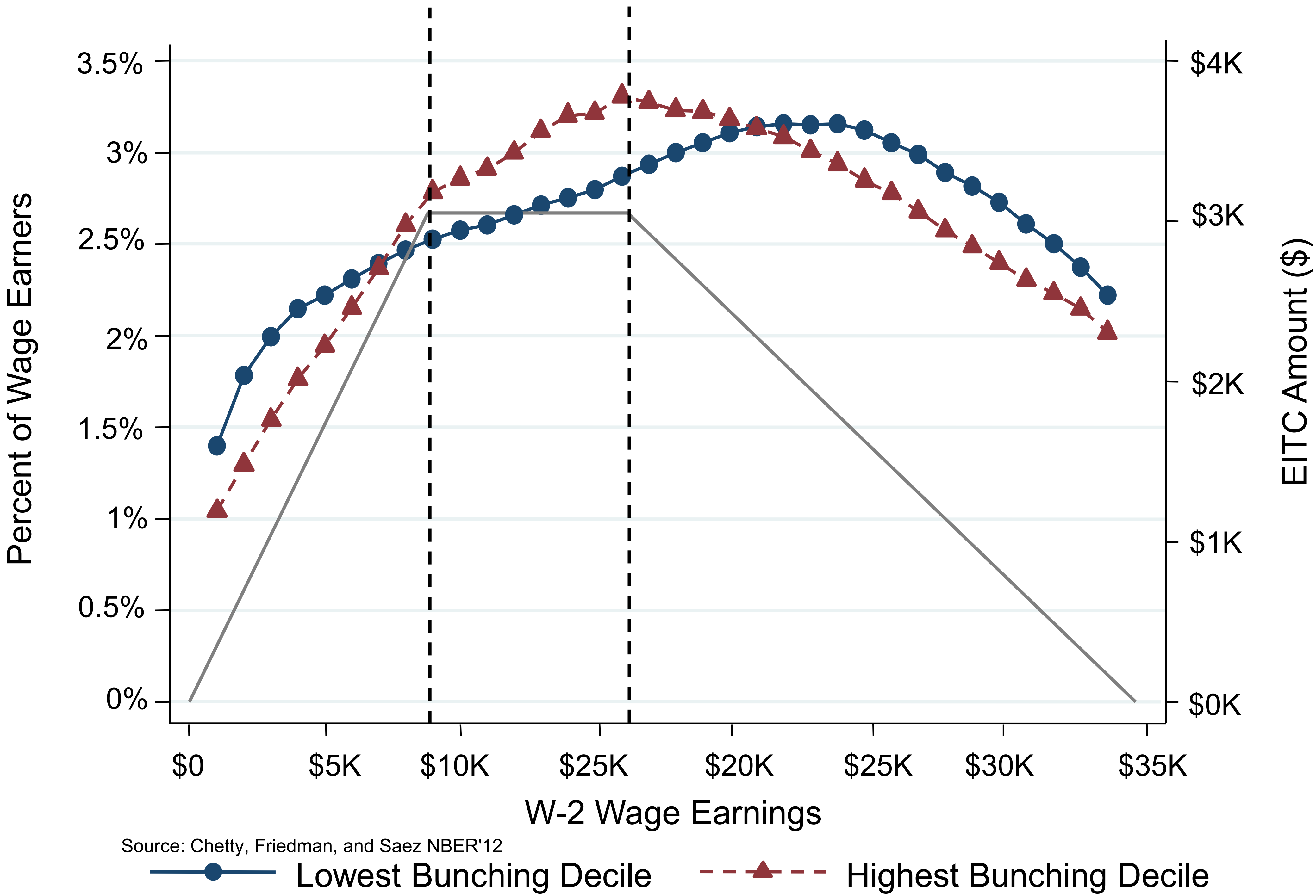


Income Distribution For Single Wage Earners with One Child



Source: Chetty, Friedman, and Saez NBER'12

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



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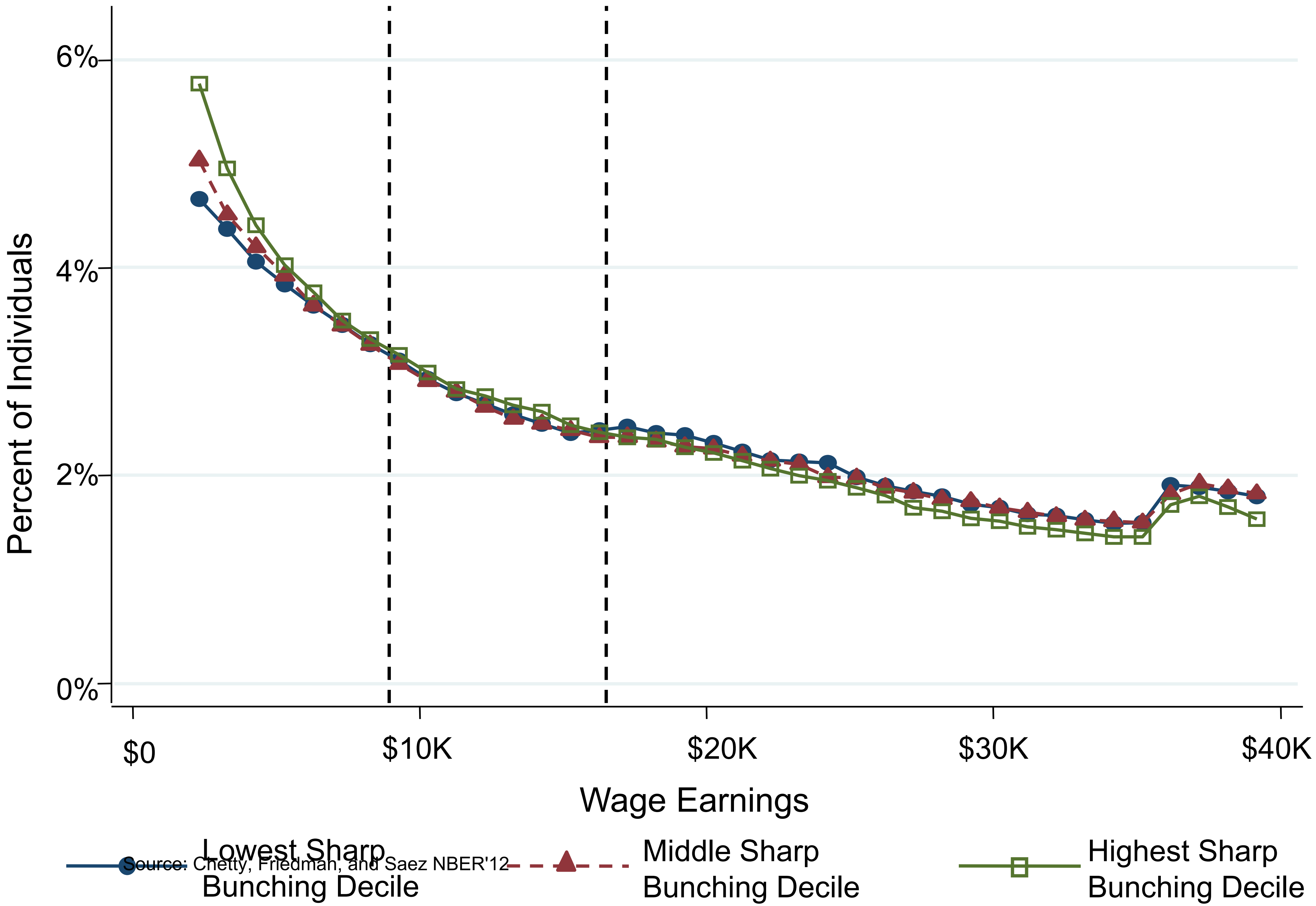
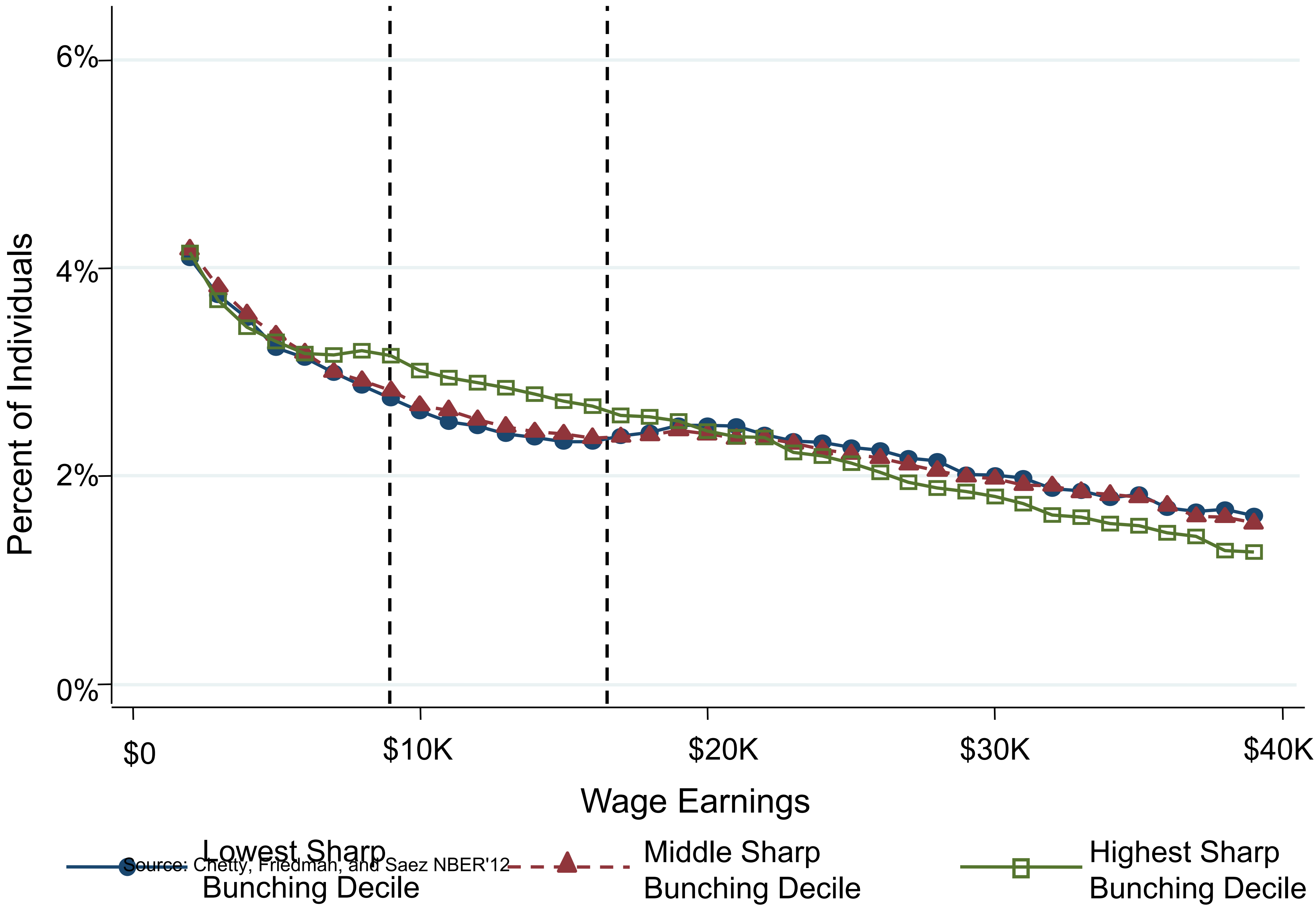
Earnings Distribution in the Year Before First Child Birth for Wage Earners



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



Source: Chetty, Friedman, and Saez NBER'12

Long-term effects of Redistribution: Evidence from the Israeli Kibbutz

Abramitzky (2018) book based on series of academic papers

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

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

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

Long-term effects of Redistribution: Evidence from the Israeli Kibbutz

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

They use a DD strategy: pre-post reform and comparing reform Kibbutz to non-reform Kibbutz. They find that

1) Students are 3 percentage points more likely to graduate

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

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

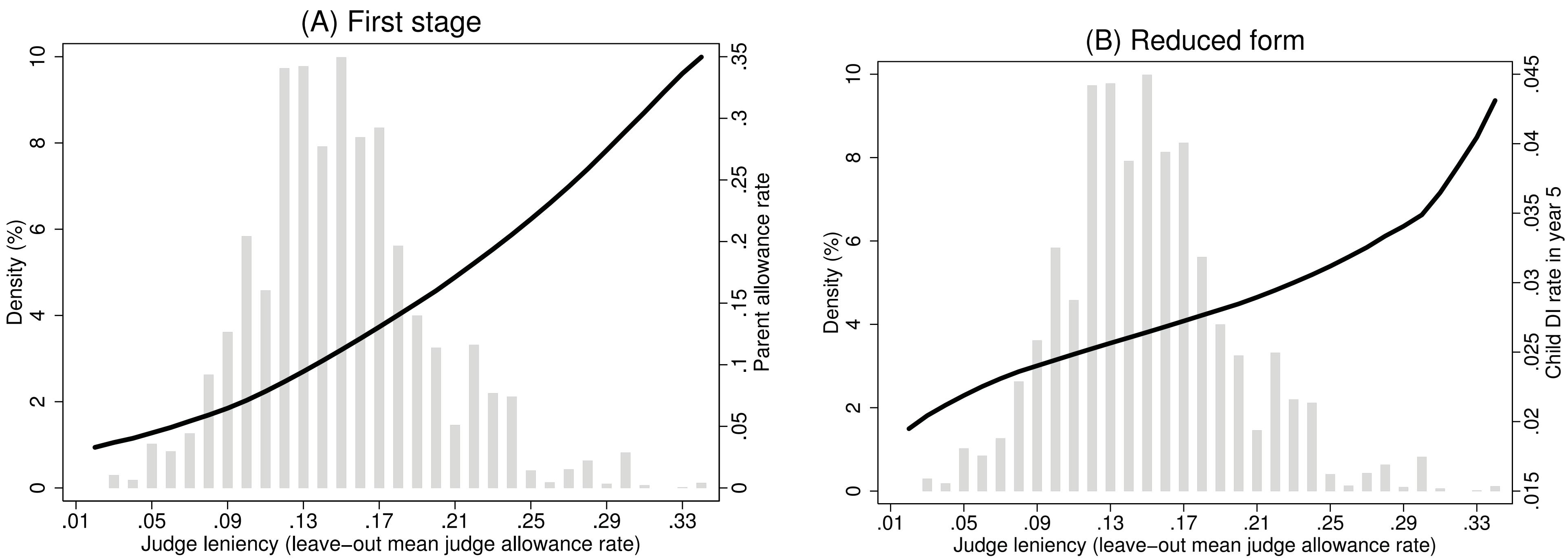
Dahl, Kostol, Mogstad QJE'14 analyze causal effect of parental use of Disability Insurance (DI) on children use (as adults) of DI in Norway

Identification uses random assignment of judges to denied DI applicants who appeal [some judges severe, others 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)

Long-term benefits for children of support programs

Traditional economic view: equity vs. efficiency tradeoff

But support programs can also have positive efficiency long-term impacts on children later on (birth weight, health, education, earnings) as shown in series of papers by H. Hoynes

Example: Hoynes, Schanzenbach, Almond AER'16 studies effect of Food Stamp Program rollout across US counties in the 1960s-1970s on health (based on age of children at rollout)

Find large positive impact of food stamps on health for being exposed to food stamps in early childhood (-.4 std dev. of having metabolic syndrome precursor to diabetes)

$\Rightarrow$ Social state support should also be seen as investment

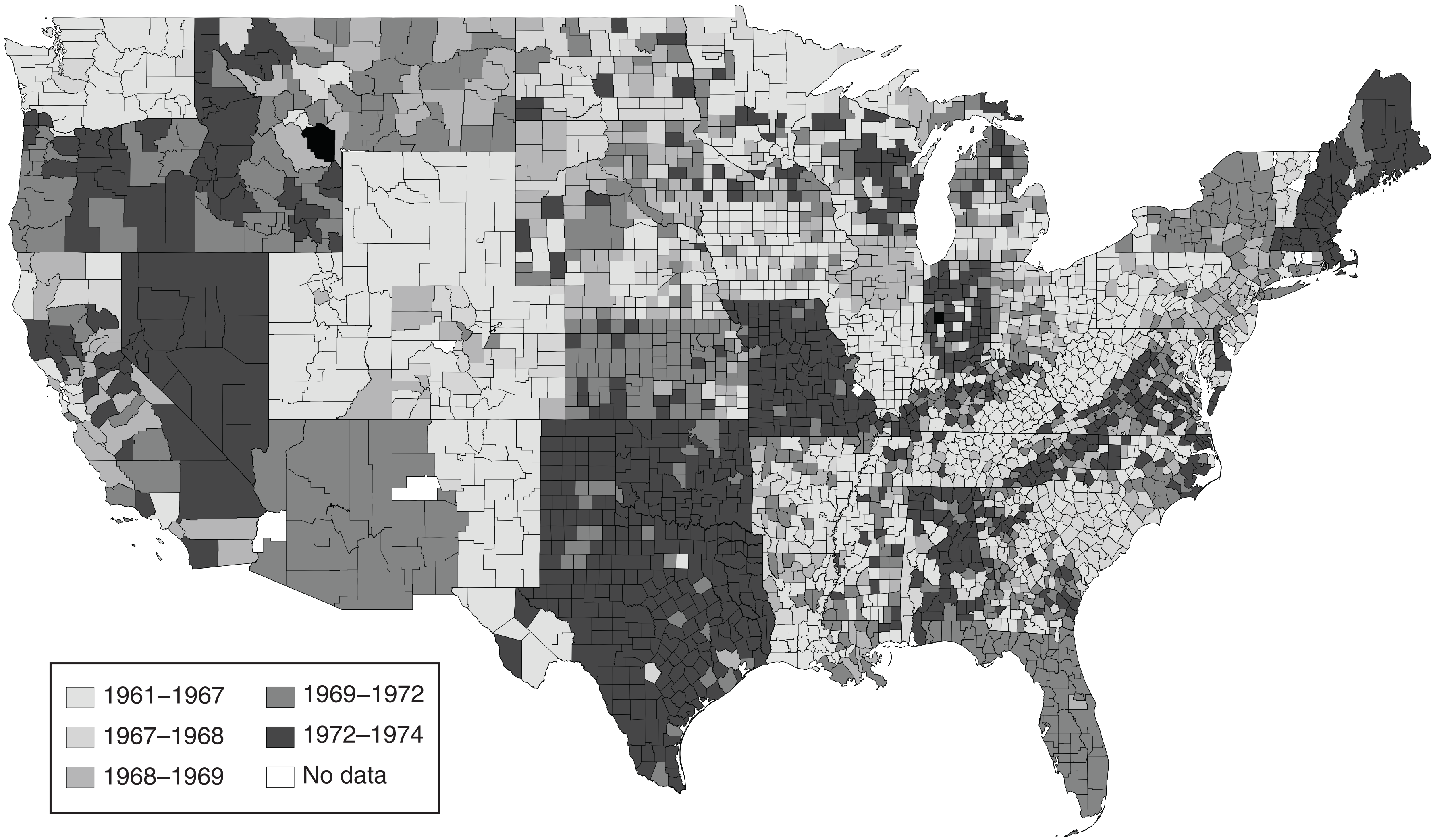


Figure 2. Food Stamp Program Start Date, by County, 1961–1974

Notes: Authors' tabulations of food stamp administrative data (US Department of Agriculture, various years). The shading corresponds to the county FSP start date, where darker shading indicates later county implementation.

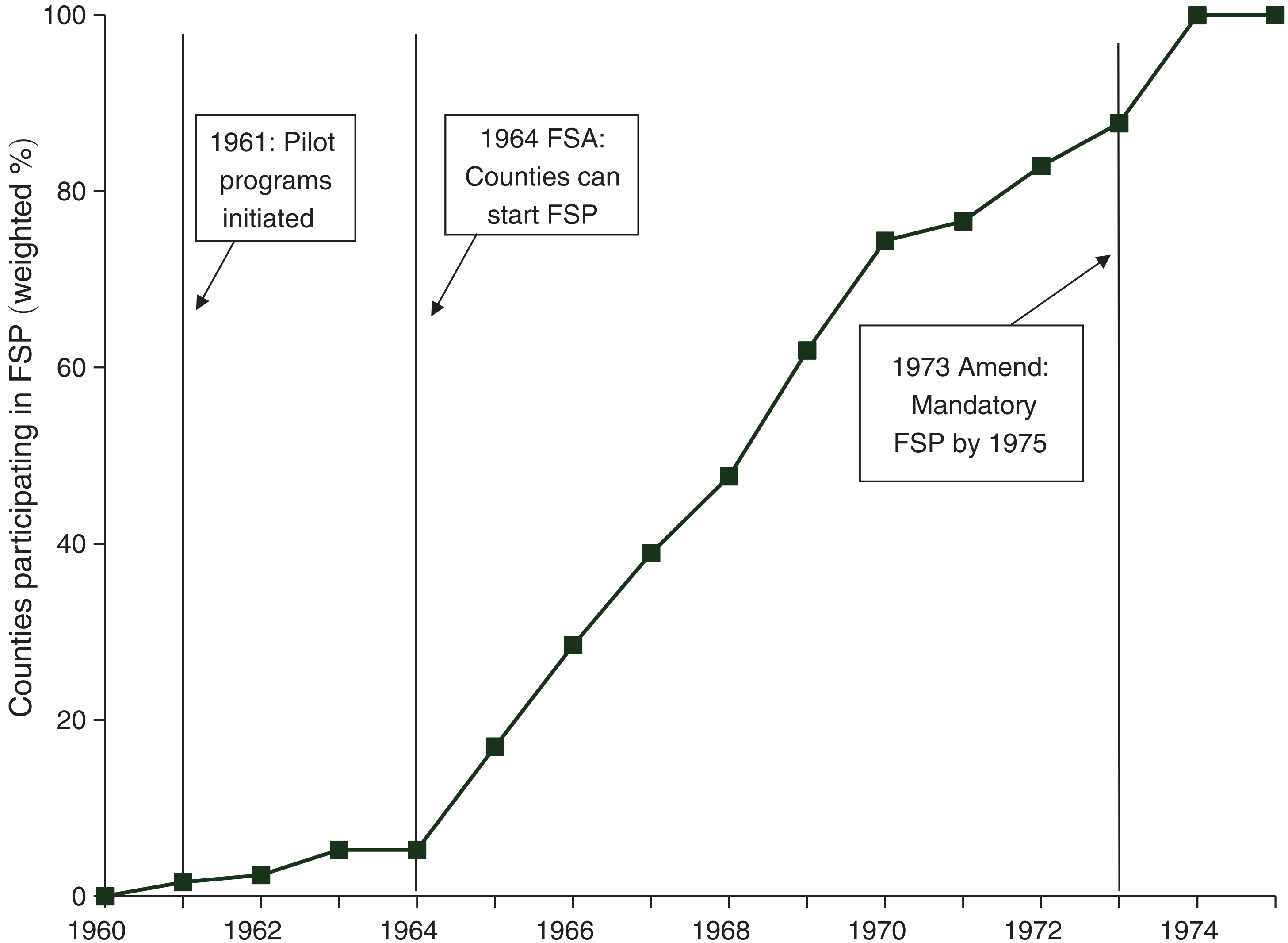


FIGURE 1. WEIGHTED PERCENT OF COUNTIES WITH FOOD STAMP PROGRAM, 1960–1975

Source: Authors' tabulations of food stamp administrative data (US Department of Agriculture, various years). Counties are weighted by their 1960 population.

Source: Hoynes, Schanzenbach, and Almond AER'16

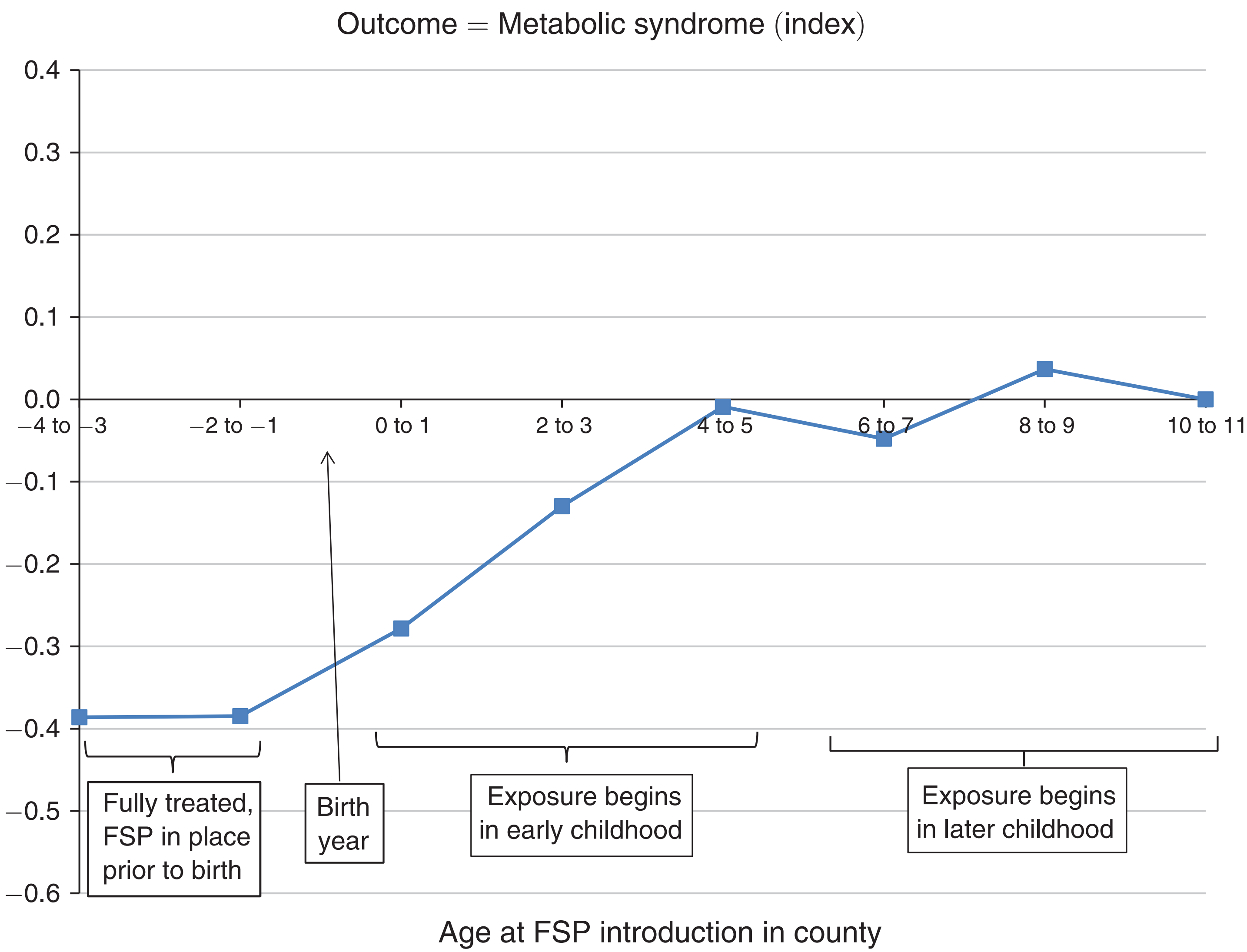


Figure 3. Event Study Estimates of the Impact of FSP Exposure on Metabolic Syndrome Index (*High Participation Sample*)

Notes: The figure plots coefficients from an event-study analysis. Event time is defined as age when FSP is implemented in the birth county. The models are estimated for the sample of individuals born into families where the head has less than a high school education. Age 10–11 is the omitted year so estimates are relative to that point. See the text for a description of the model.

Crime Reduction Benefits of Welfare Benefits

US has very high incarceration rate .50% of population down from .75% in 2008 peak (but still 5 times more than Europe)

Costs \$50K/year per inmate $\Rightarrow$ Expensive and punitive

Deshpande and Mueller QJE'22 use welfare reform which made it harder for disabled children to keep SSI (supplemental security income for low income aged+disabled) past age 18
$\Rightarrow$ Can use Regression Discontinuity Design (RDD)

Finds increase in offenses by 20% and incarceration by 60% over next 2 decades [Deshpande AER'16 showed positive but small effect on regular work]

Incarceration effect persists even after 1st stage effect on SSI recipiency has vanished

Extra incarceration costs almost as big as SSI benefits saved

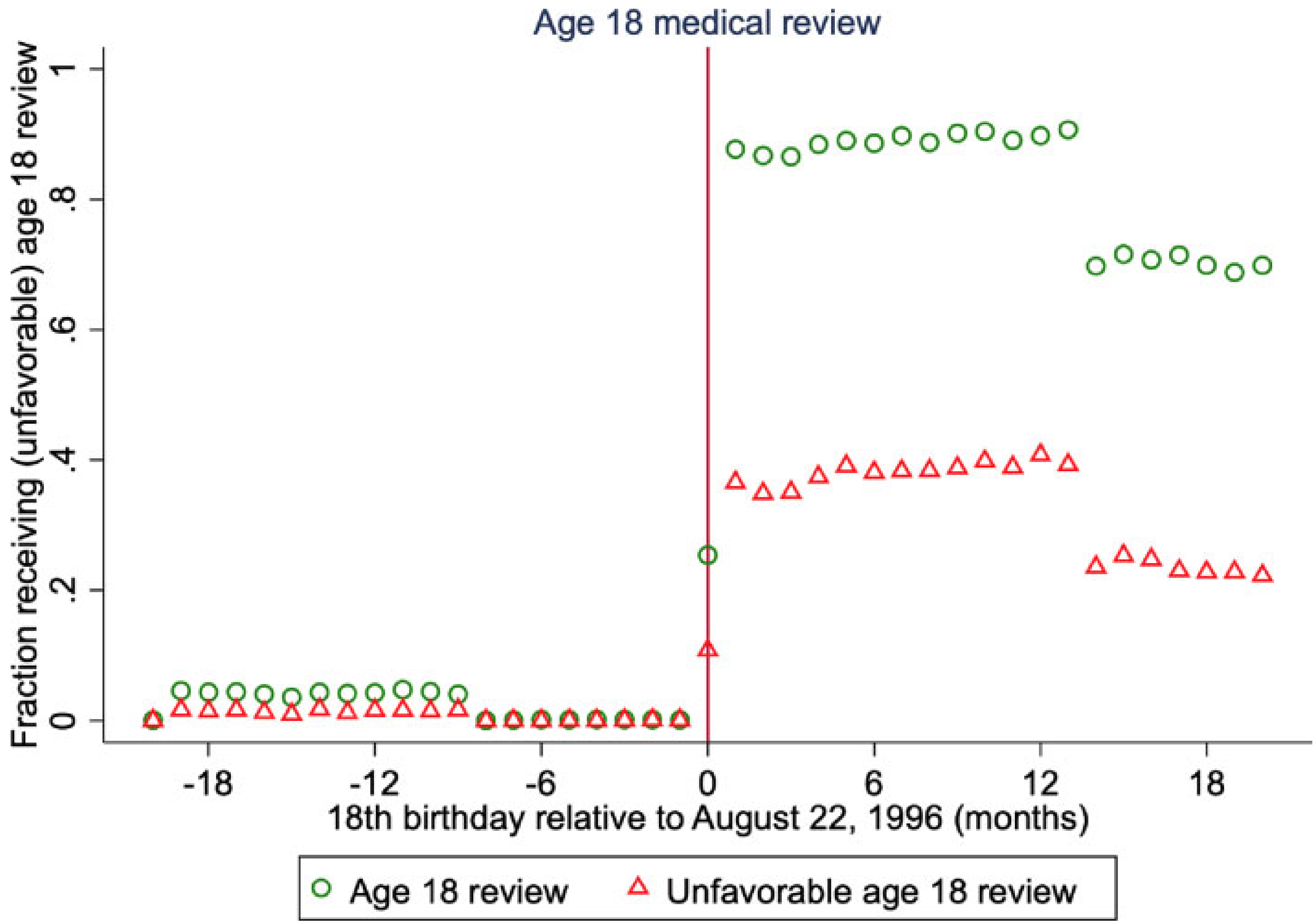


FIGURE II

First Stage: Likelihood of Age 18 Medical Review across Cutoff

Figure plots the likelihood of receiving an age 18 medical review and the likelihood of receiving an unfavorable age 18 review (i.e., being removed from SSI at age 18). The sample is SSI children with an 18th birthday within 18 months of the August 22, 1996, cutoff who reside in a county with CJARS coverage. Table I reports point estimates and standard errors.

Source: Deshpande and Mueller-Smith QJE 2023

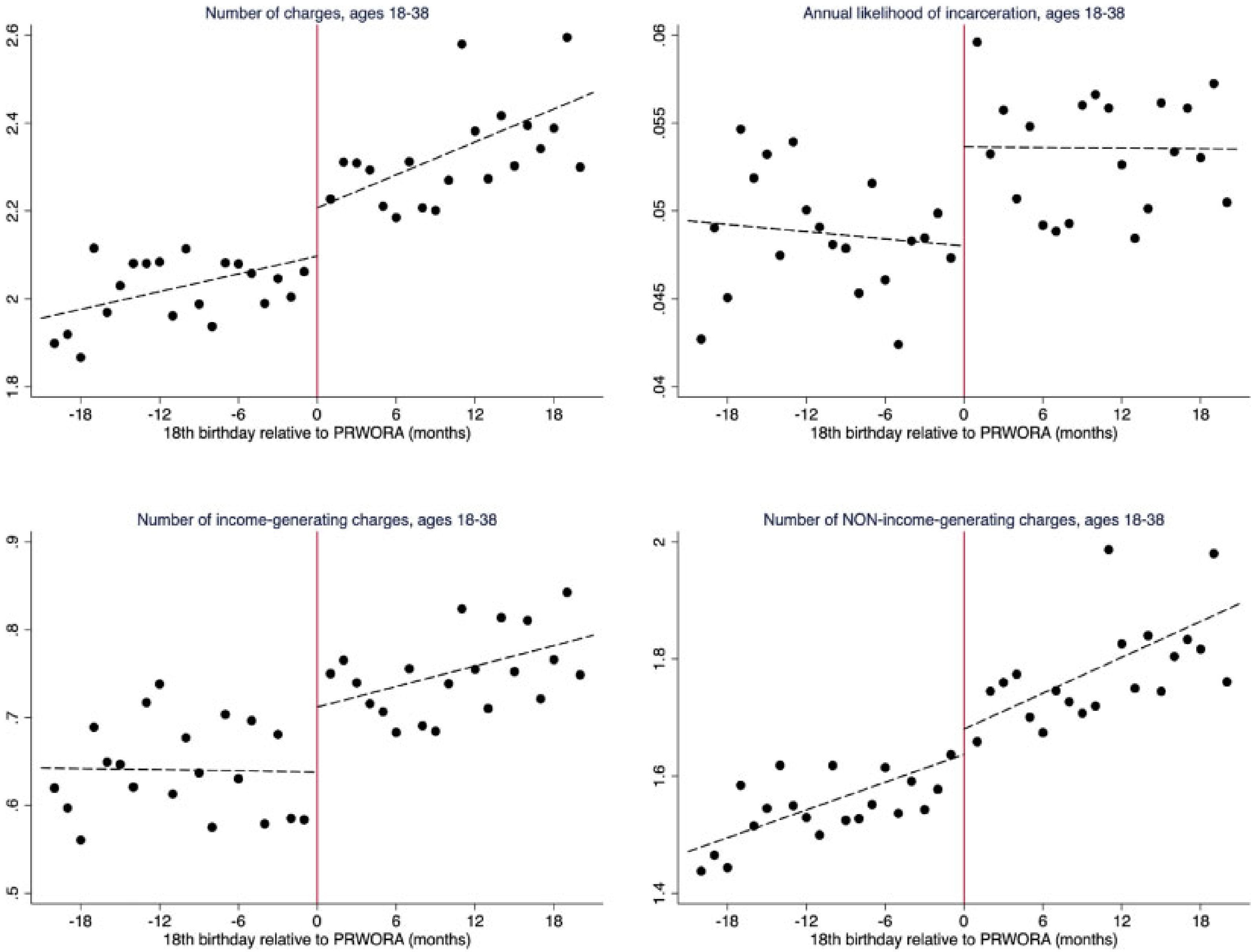


FIGURE III

Reduced Form: Criminal Justice Outcomes across Cutoff

Social Determinants of Labor Supply (Saez '21)

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:

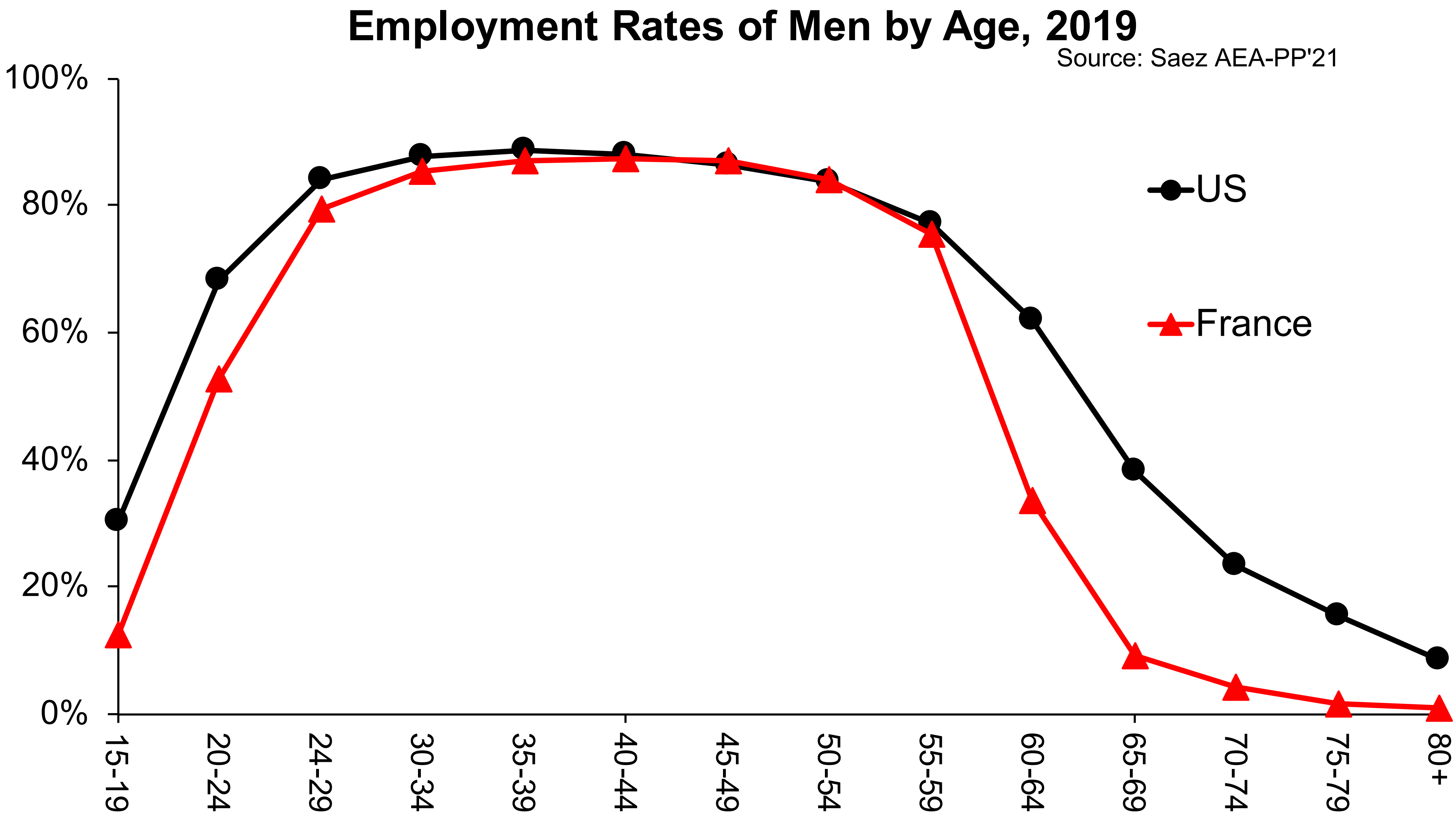
a) Youth labor is regulated by labor laws/education

b) Old age labor regulated by retirement programs

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

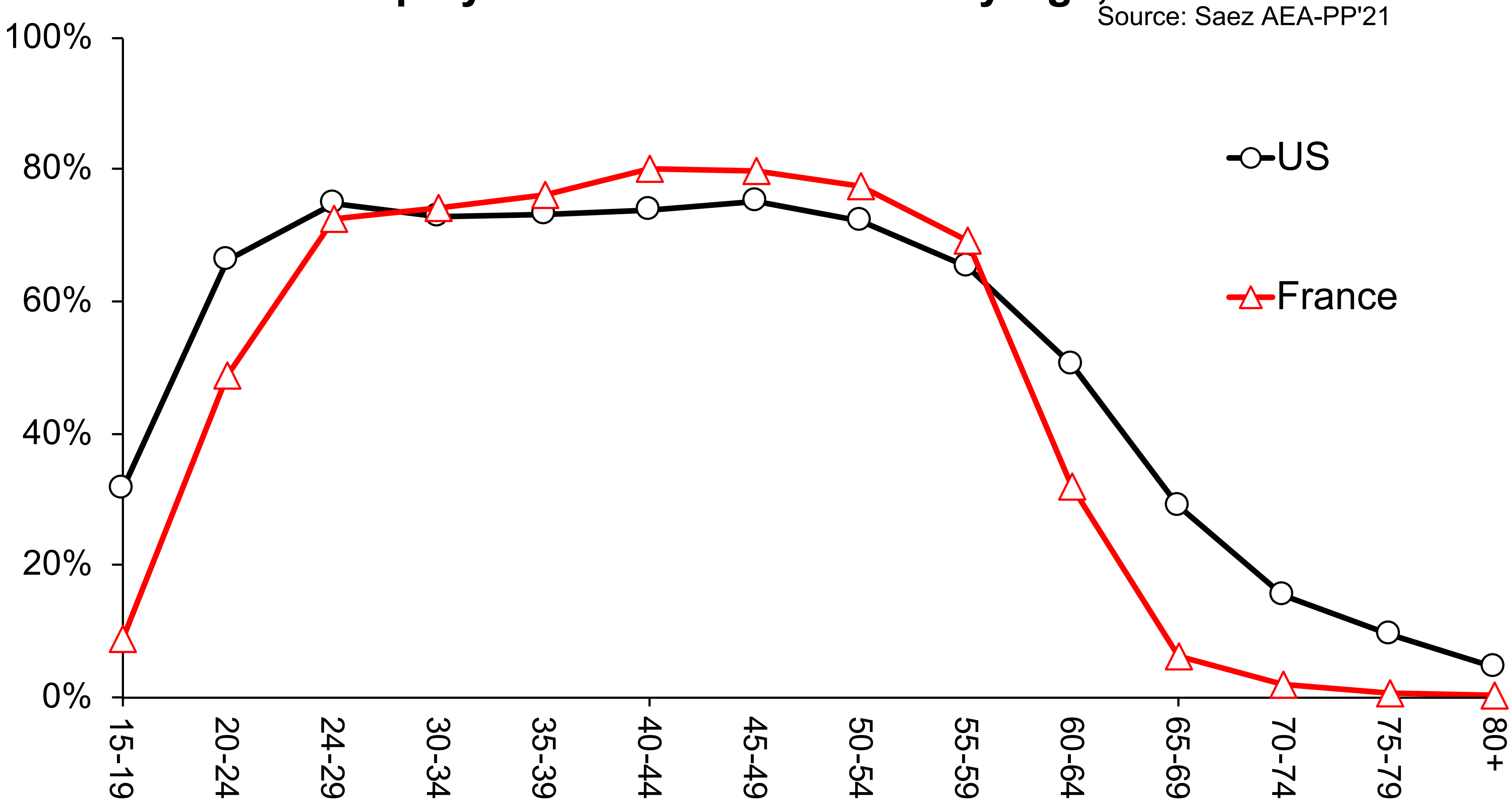
d) Hours of work regulated by overtime + vacation mandates

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

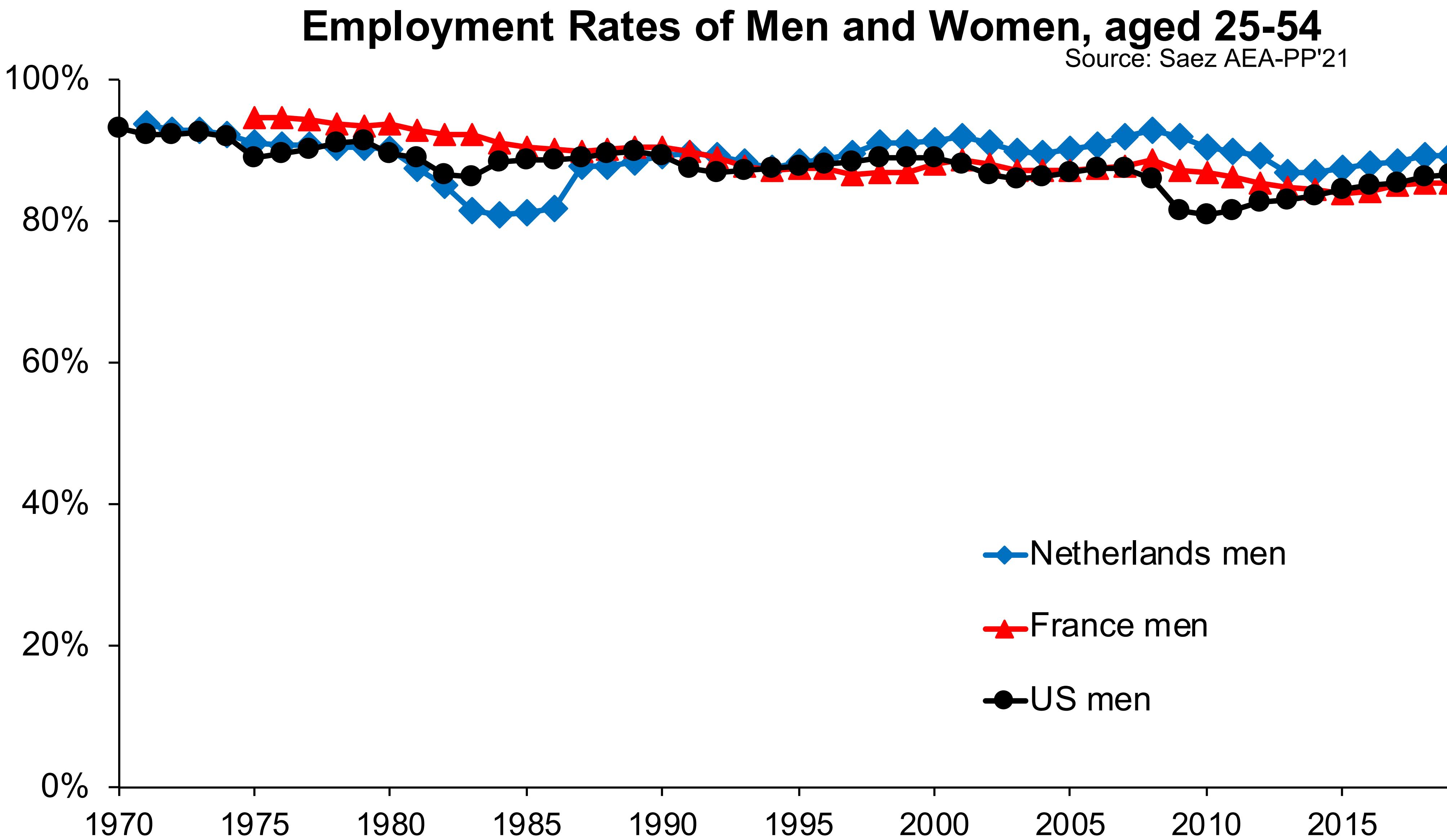


Source: OECD database online. Employment to population ratios.

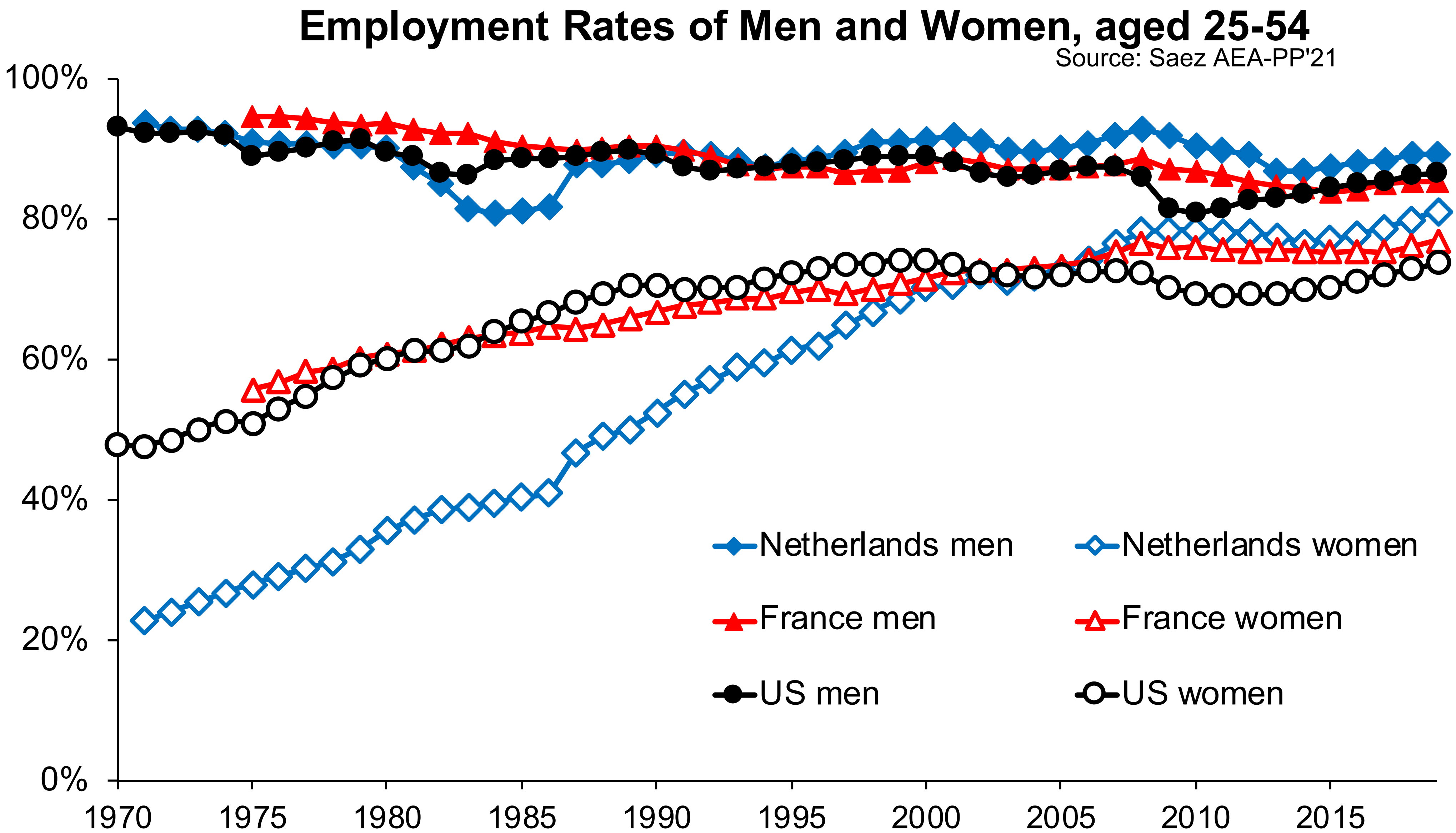
Employment Rates of Women by Age, 2019



Source: OECD database online. Employment to population ratios.



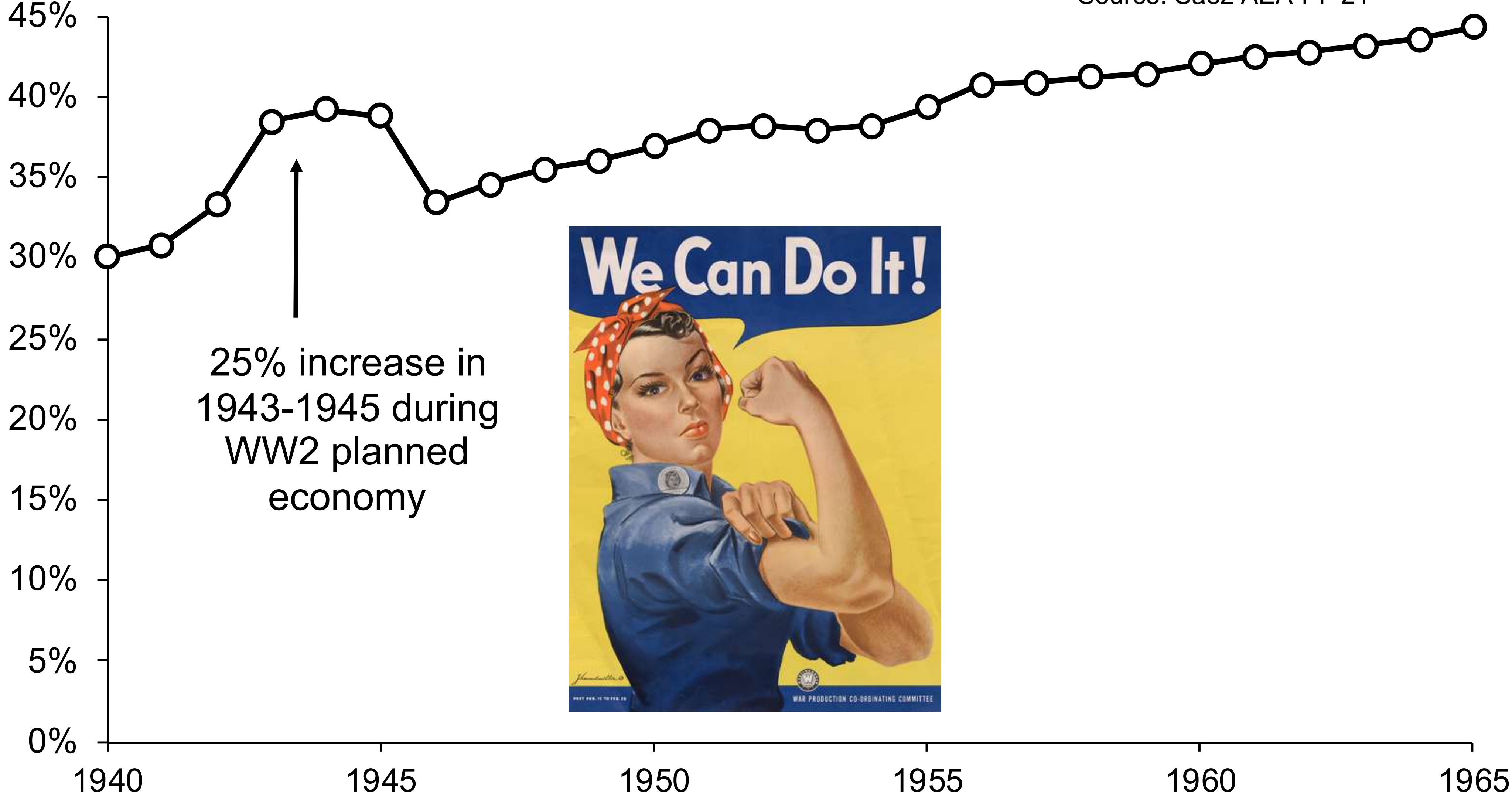
Source: OECD database online.



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).

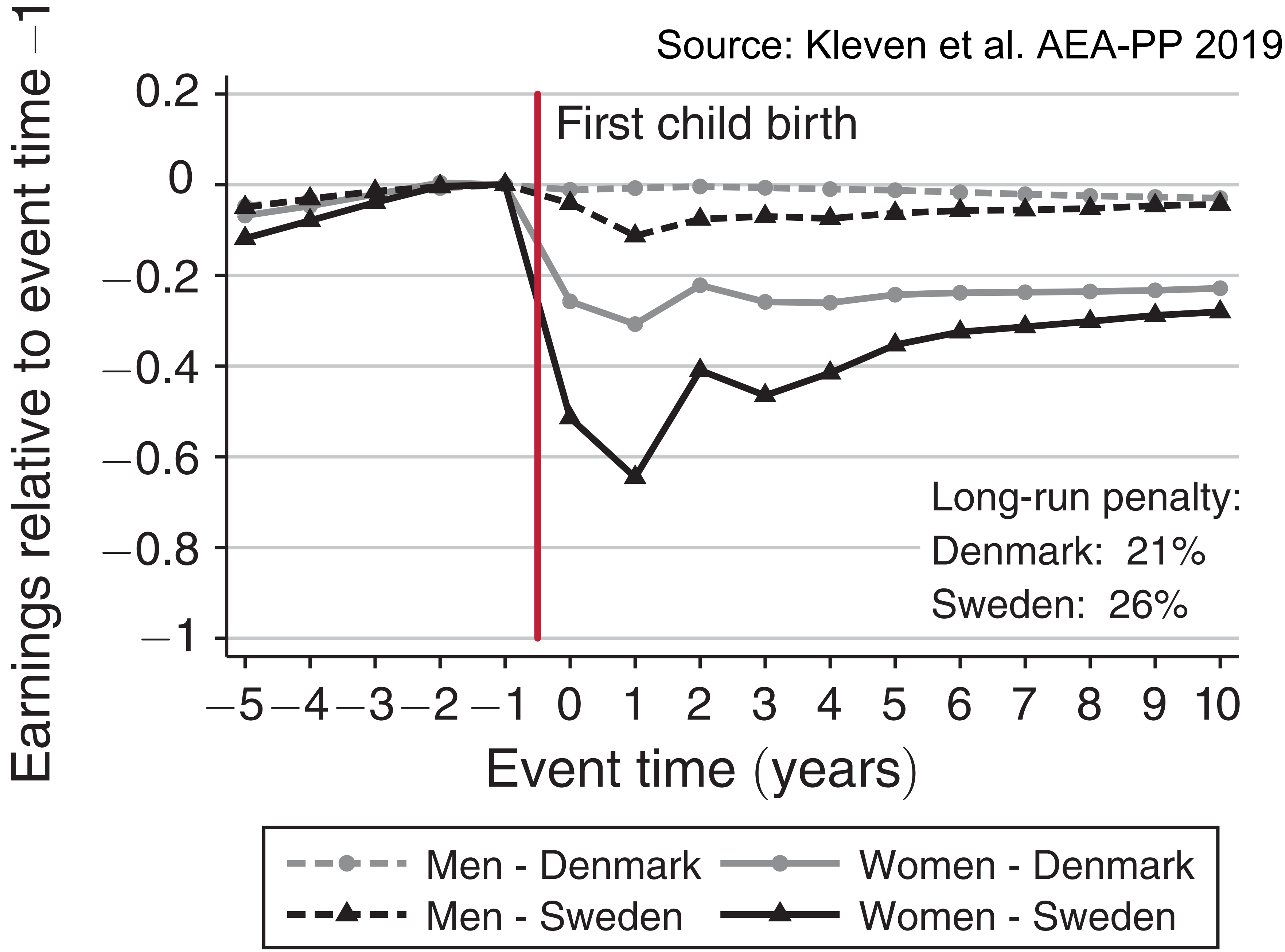


FIGURE 1. CHILD PENALTIES IN EARNINGS IN SCANDINAVIAN COUNTRIES

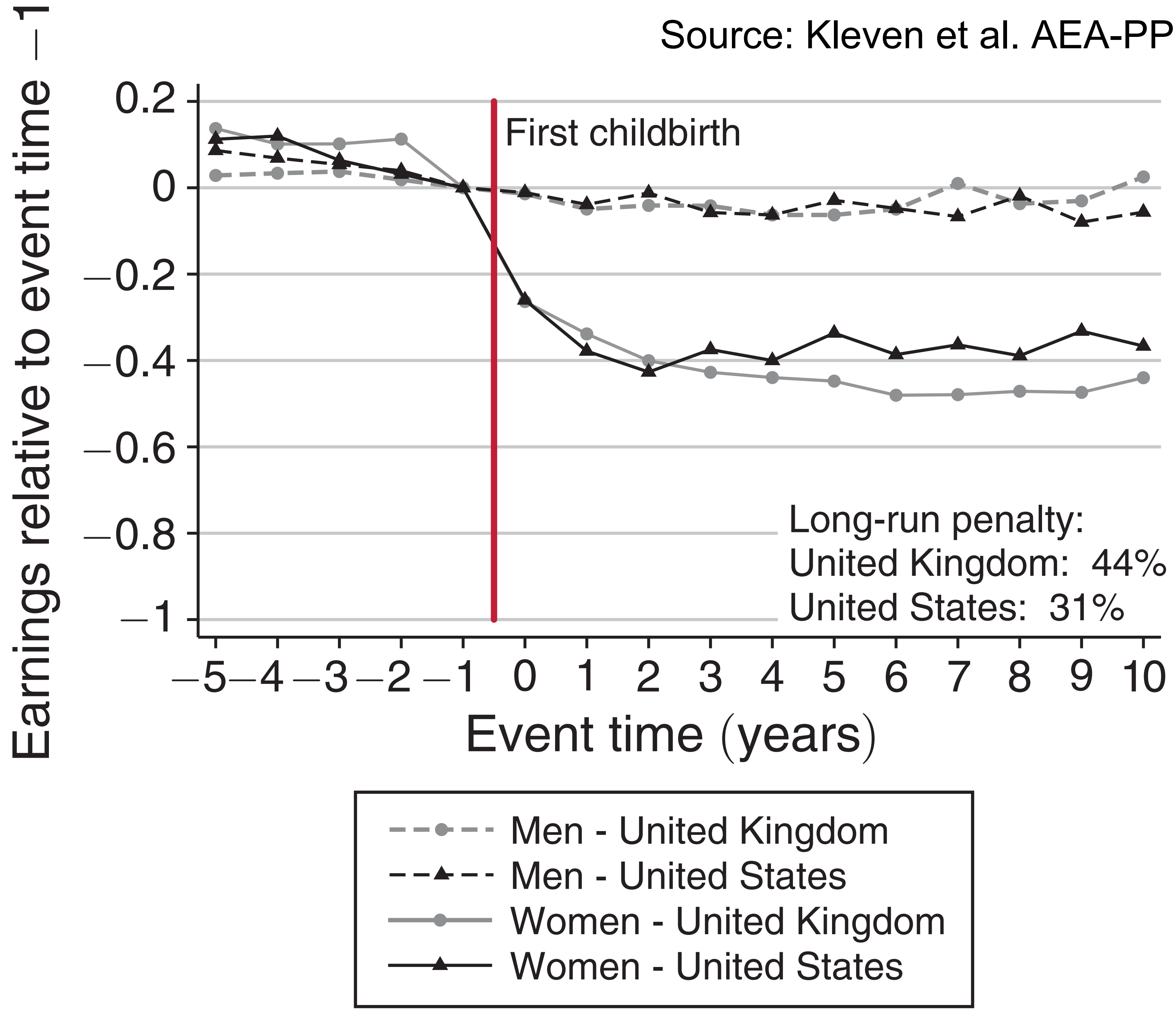


Figure 2. Child Penalties in Earnings in English-Speaking Countries

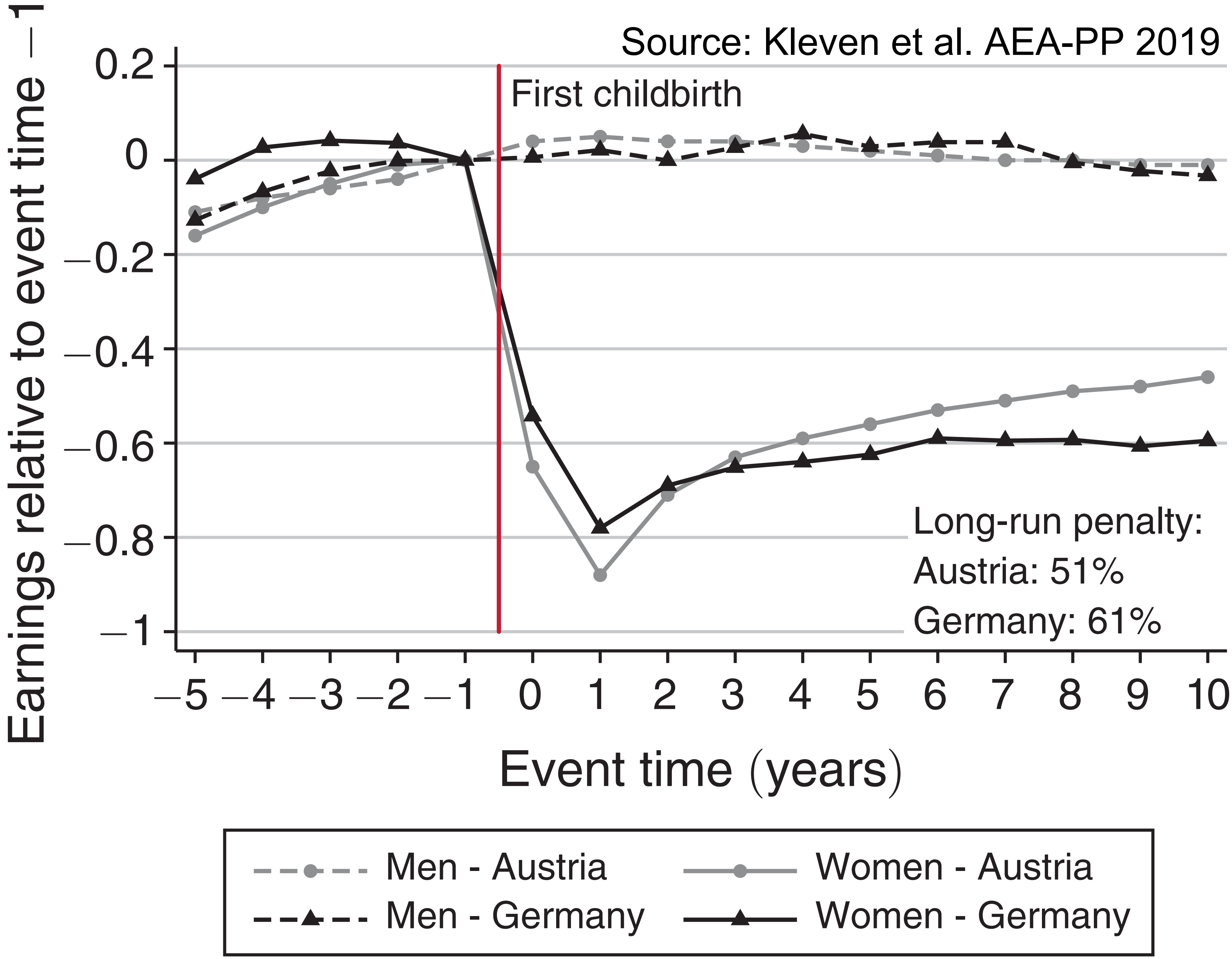
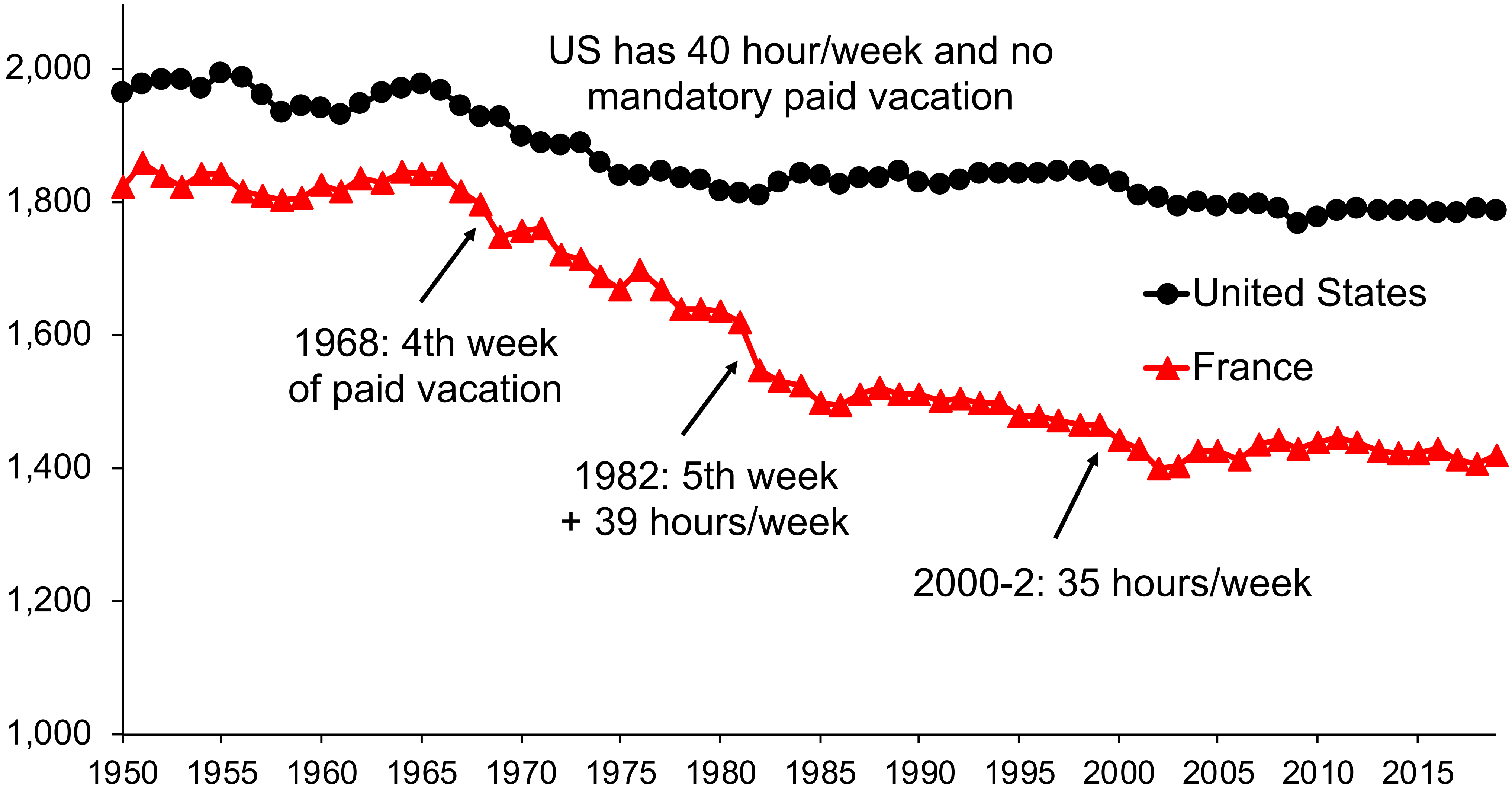


FIGURE 3. CHILD PENALTIES IN EARNINGS IN GERMAN-SPEAKING COUNTRIES

Average Annual Hours of Work of Employees

Source: Saez AEA-PP'21



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

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