Labor Supply Responses to Taxes and Transfers

3080 Economic Policy Analysis II
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GOALS OF THIS LECTURE

1) Cover empirical studies of labor supply responses to taxation going historically from earlier to more recent papers

2) Understand key methodologies such as non-linear budget sets and "bunching at kinks/notches" which are useful for a wide range of empirical work

3) Critically discuss papers' methodologies and results so as to practice our research skills

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, migration]

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

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

STATIC MODEL: SETUP (skip)

Baseline model (same as previous lecture): (i) static, (ii) linearized tax system, (iii) pure intensive margin choice, (iv) single hours choice, (v) no frictions

Utility $u(c, l)$ increases with consumption c, and decreases with hours worked l

Individual earns wage w per hour (net of taxes) and has R in non-labor income [e.g., linear tax system with tax rate τ and transfer G: $c = w^p(1 - \tau)l + G$]

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

LABOR SUPPLY BEHAVIOR (skip)

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: $\varepsilon^u = (w/l) \cdot \partial l^u/\partial w$ [% 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 $wl - c$ subject to constraint $u(c, l) \geq u$

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

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 couples]

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):

Small effects $\varepsilon^u = 0$, $\eta = -0.1$, $\varepsilon^c = 0.1$ with some variation across estimates

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 tastes 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't guarantee that we've controlled for all the factors correlated with w_i and tastes for work: **Omitted variable bias (OVB)** $\Rightarrow$ Tax changes provide more compelling identification

Natural Experiment Labor Supply Literature

First, what's *identification*?

Best identification method: exogenously change taxes/transfers with a **randomized experiment** (usually infeasible)

Literature exploits variation in taxes/transfers to estimate hours elasticities and participation elasticities

• Large literature in labor/public economics estimates effects of taxes and wages on hours worked and participation

• Let's discuss some estimates from older and more recent literature

Negative Income Tax (NIT) Experiments

▸ NIT experiment conducted in 1960s/70s in Denver, Seattle, and other cities (**randomized experiment**)

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

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

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

▸ 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

$c = z - T(z)$

NIT Treatment:
Transfer G
phased-out with
earnings z at tax
rate τ

slope=$1-\tau$

G

z

Control group: slope=1

$45°$

0

z^*

pre-tax income z

Negative Income Tax Experiment

$c = z - T(z)$

NIT Treatment
Negative
income and
substitution
effects on z

slope=1-τ

G

z

Control group: slope=1

45°

0

z*

pre-tax income z
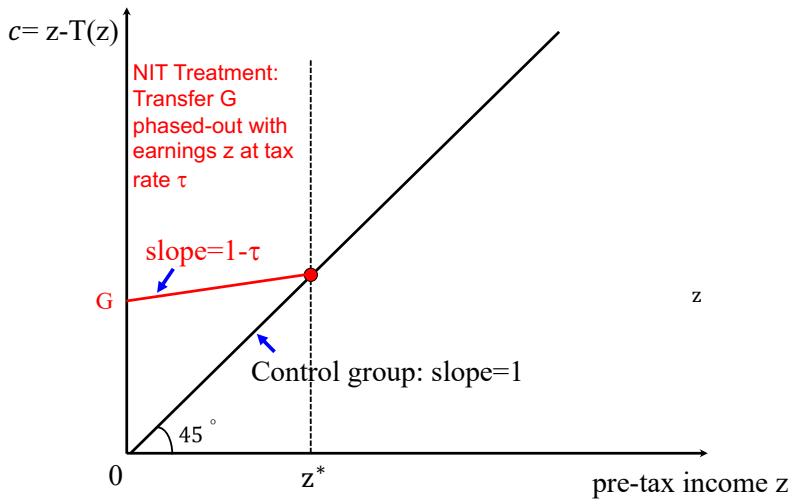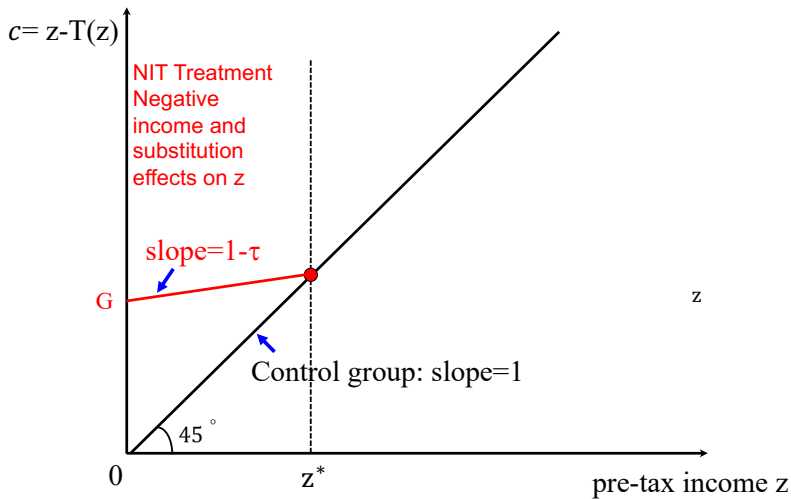
NIT Experiments: Findings

1) Statistically 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

5) Earnings of treated married 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

However, real economic world (nature) provides variation that can be exploited to estimate behavioral responses ⇒ "**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 in Massachusetts matched to Social Security administrative data to estimate income effects

- Lottery generates random assignment conditional on playing

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

- Identification threat: differential response-rate among groups
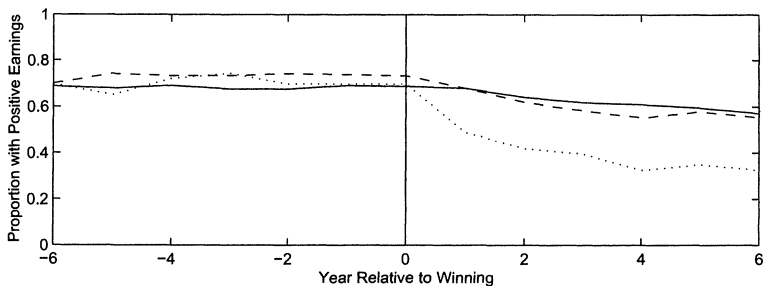
FIGURE 2. PROPORTION WITH POSITIVE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

Note: Solid line = nonwinners; dashed line = winners; dotted line = big winners.
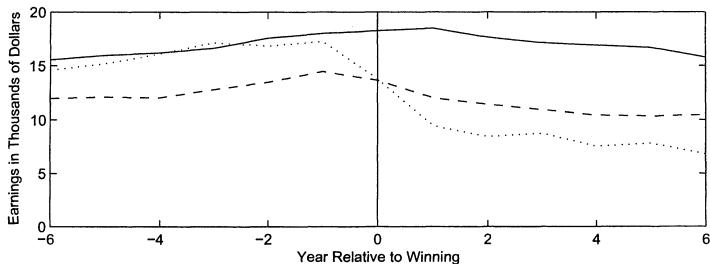
FIGURE 1. AVERAGE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

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

Digression: Diff-in-Diff (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. AER'17 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: $\eta = w\partial l/\partial R \approx -0.1$
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 non-labor income R matters

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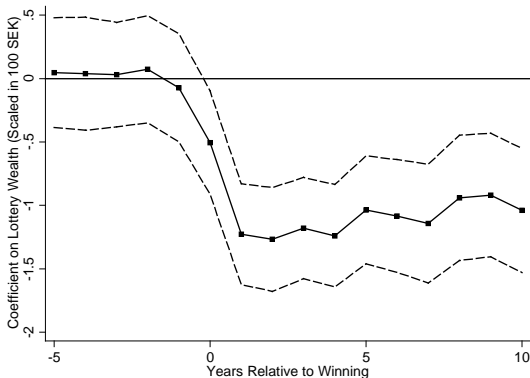
Notes: This figure reports estimates obtained from equation (2) estimated in the pooled lottery sample with gross labor earnings as the dependent variable. A coefficient of 1.00 corresponds to an increase in annual labor earnings of 1 SEK for each 100 SEK won. Each year corresponds to a separate regression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

Cesarini, Lindqvist, Notowidigdo, Östling NBER WP 2015

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 AEJ-EP'22 uses social security admin monthly earnings data + a difference-in-differences (DiD) approach

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

Finds no offsetting effect on primary earnings ⇒ 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)
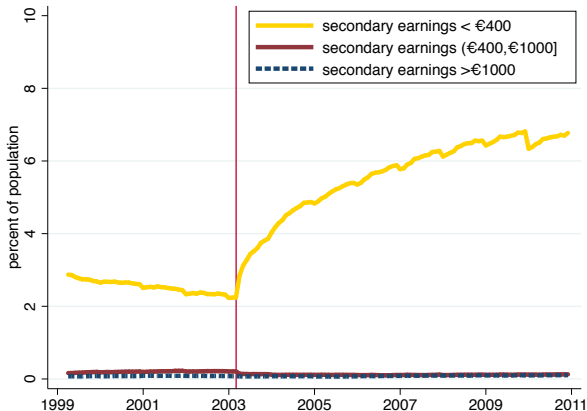
Responses to Low-Income Transfer Programs

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 the UK

   a) In-kind: NHS low-income scheme, public housing, free childcare hours, free school meals, public education

   b) Cash: Income Support, DLA, CTC, WTC, UC

UK govt spent £227.3bn in 2019-20 on income-tested programs (OBR)

Example: 1996 US Welfare Reform

1) Largest change in welfare policy

2) 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 of benefits (5 year max lifetime)
  c) Reducing phase out rate of benefits

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

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

Did welfare reform and EITC increase labor supply?
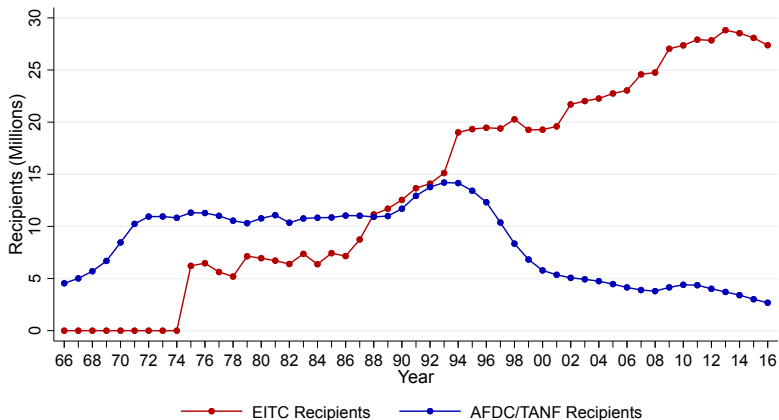
Source: Internal Revenue Service (EITC) and Department of Health and Human Services (AFDC/TANF).

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.

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 $1 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)
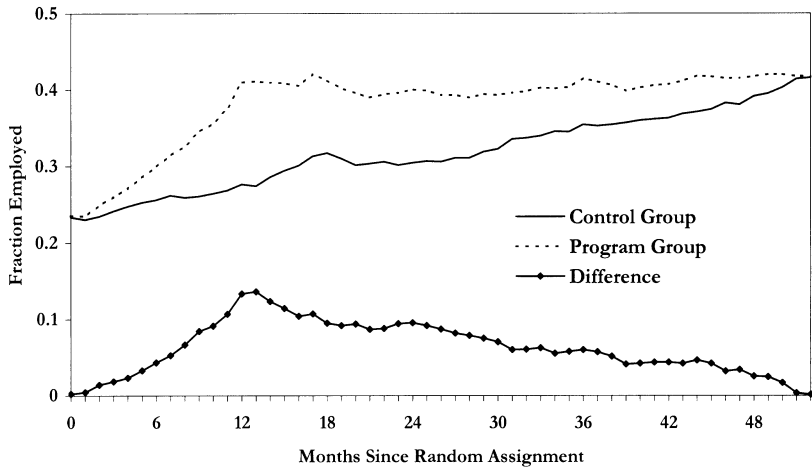
FIGURE 3.—Monthly employment rates.

Source: Card and Hyslop, 2005, p. 1734

Earned Income Tax Credit (EITC) program

The largest US means-tested cash transfer program [$75bn in 2019, 30m families recipients]. Started small in the 1970s but was expanded in 1986-88, 1994-96, 2008-09

1) Eligibility: families with kids and low earnings

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

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

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

EITC Schedule in 2017
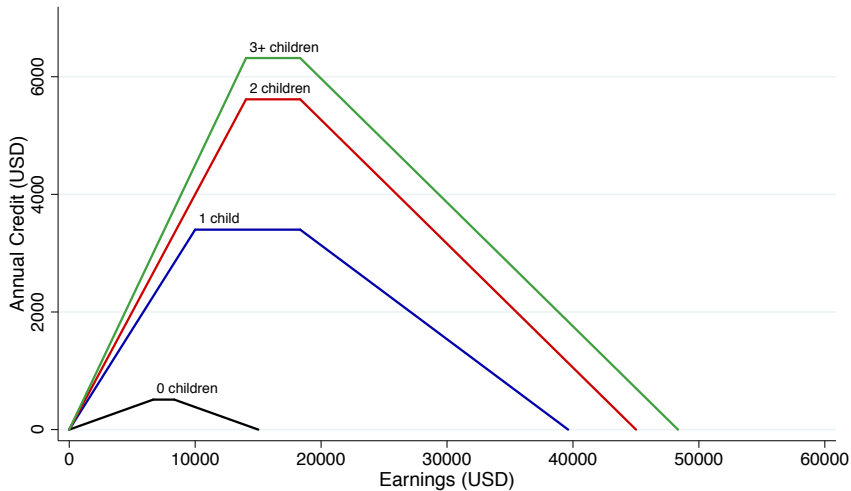
Theoretical Behavioral Responses to the EITC

Extensive margin: EITC makes work more attractive (relative to non-work) $\Rightarrow$ $(+)$ effect on Labor Force Participation

Intensive margin: earnings conditional on working:

1) <u>Phase in</u>: (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) <u>Plateau</u>: Pure income effect (no change in net wage)
   $\Rightarrow$ **Net effect**: work less

3) <u>Phase out</u>: (a) Substitution effect: work less, (b) Income effect: also work less
   $\Rightarrow$ **Net effect**: work less

EITC and intensive labor supply
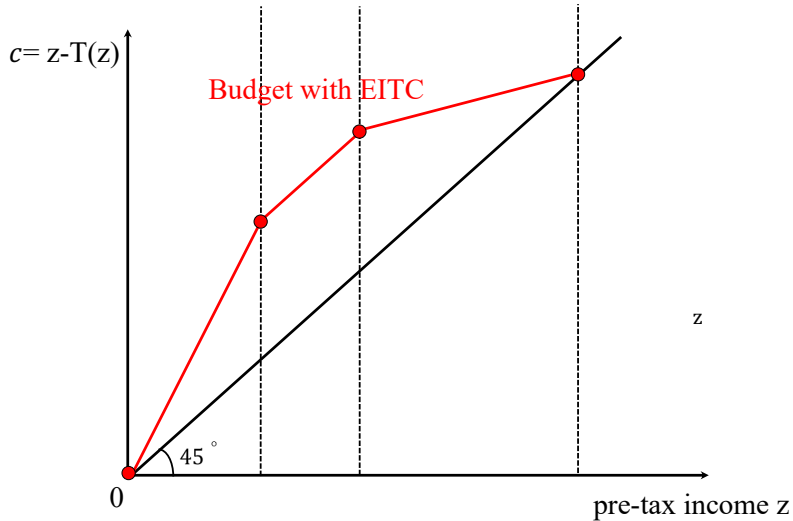
EITC and intensive labor supply
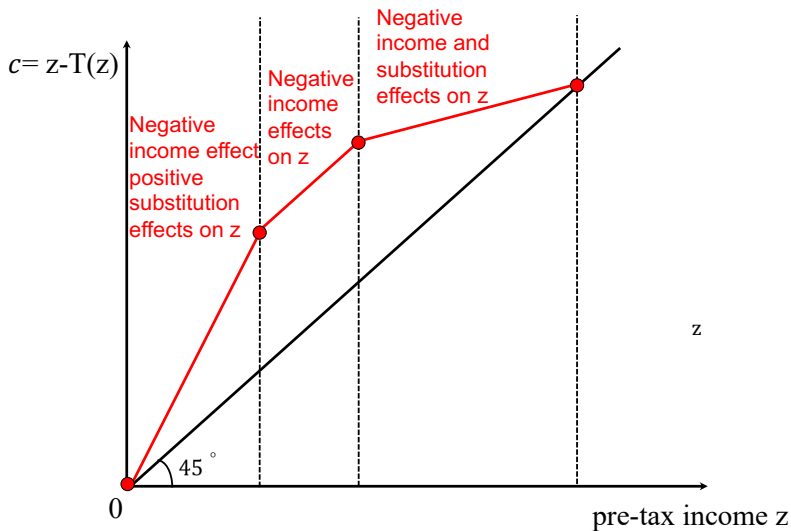
EITC Maximum Credit Over Time
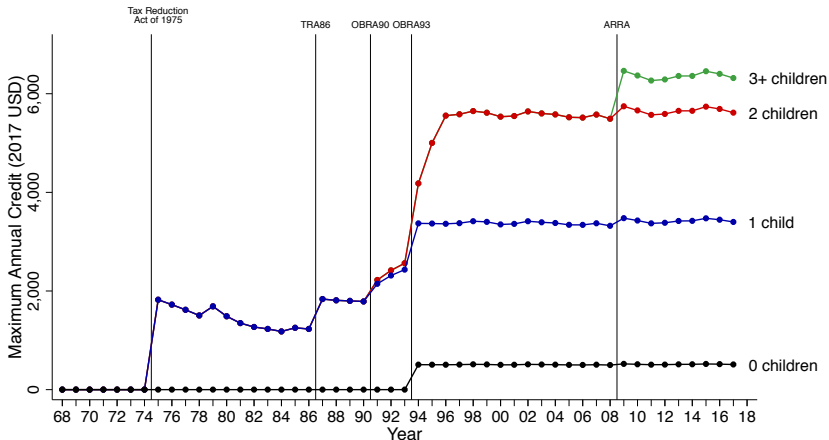
Source: Kleven (2019)

Welfare Reform and EITC Expansion: Labor supply

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

- 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
- Maybe a unique combination of EITC reform, welfare reform, economic upturn, and changing social norms lead to this shift

Bastian AEJ-EP'20: 1975 introd of the EITC ↑ maternal employment by 6% (~1m mothers; participation elasticity of 0.58)

Labor Force Participation of Single Women
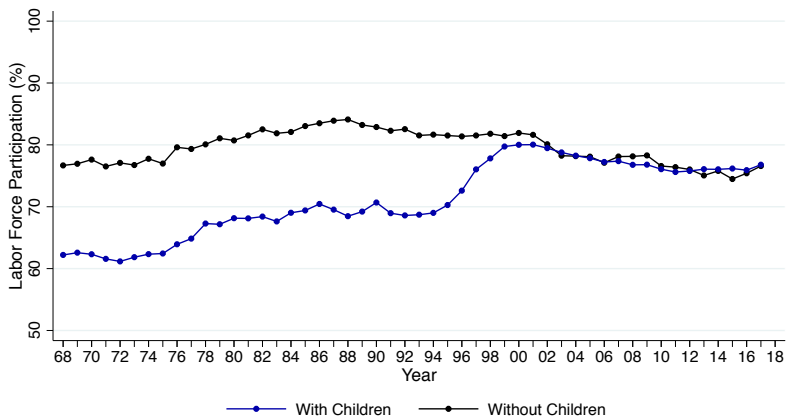
With and Without Children

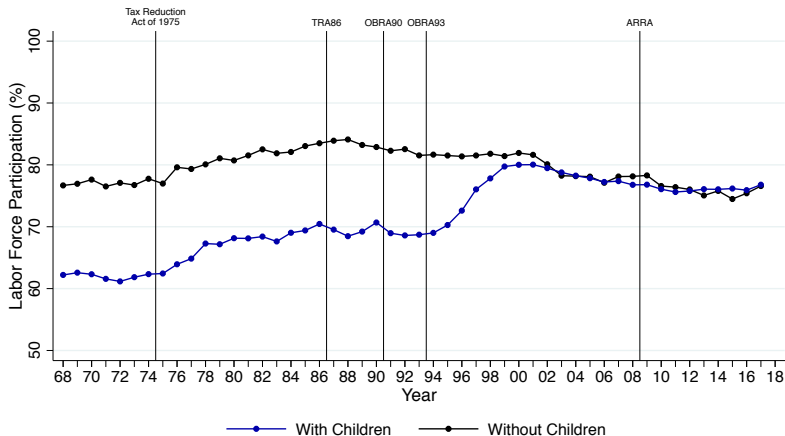Source: Kleven (2019)

Labor Force Participation of Single Women

With and Without Children

Source: Kleven (2019)

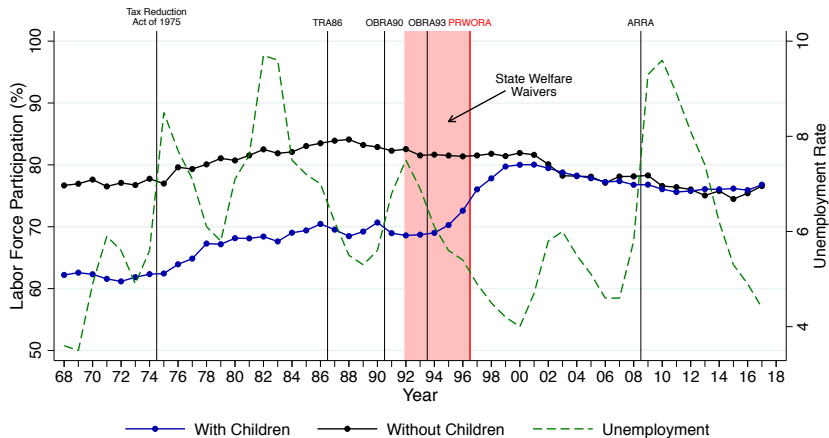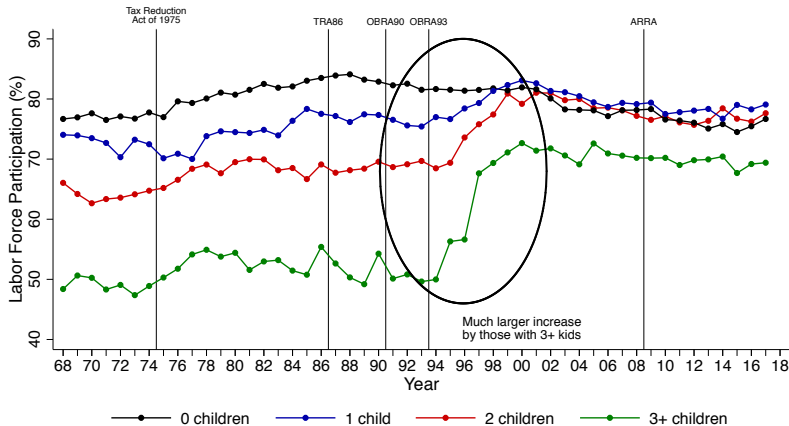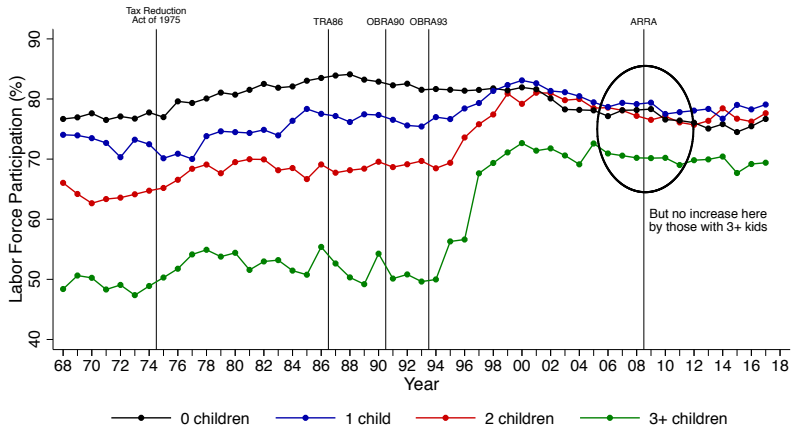# Labor Force Participation of Single Women
With and Without Children

Source: Kleven (2019)

Labor Force Participation of Single Women

With and Without Children

Source: Kleven (2019)

Labor Force Participation of Single Women

By Number of Children

Source: Kleven (2019)

Labor Force Participation of Single Women
By Number of Children

Source: Kleven (2019)

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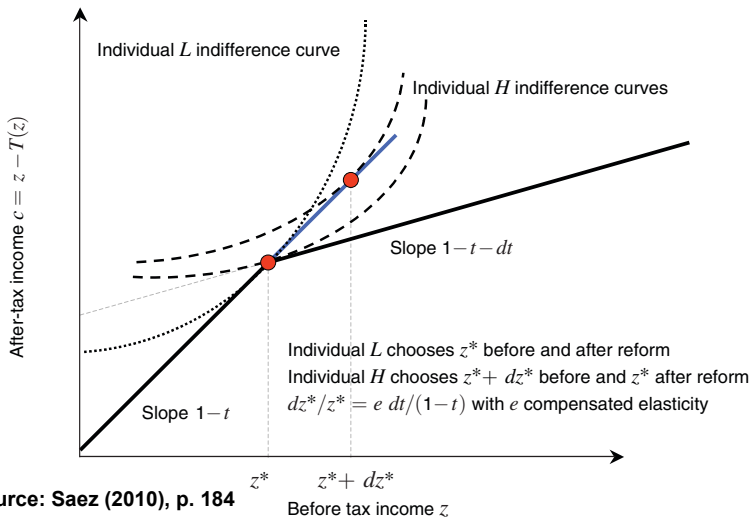
- Some individuals find it worthwhile to work more when subsidy rate is 40% (2 kids) but not when subsidy rate falls to 0% $\Rightarrow$ Utility maximizing labor supply is to be exactly at the kink

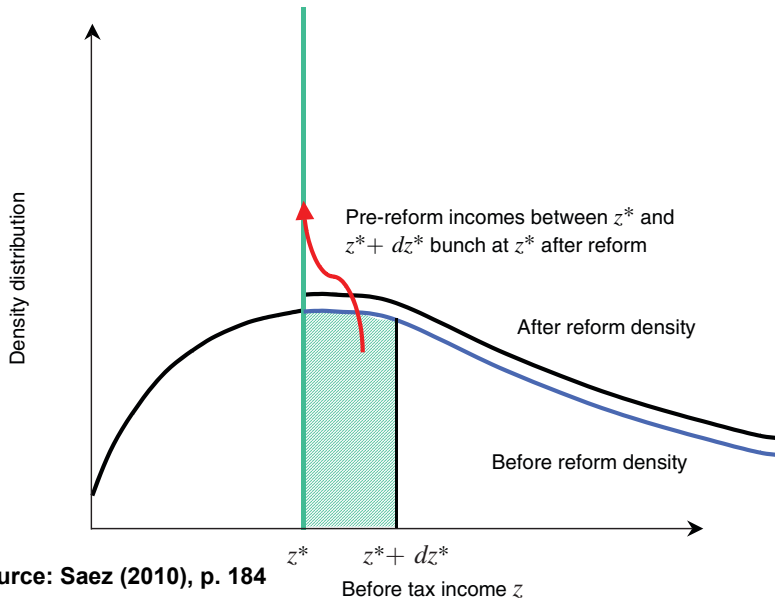2) Amount of bunching is proportional to compensated elasticity $\varepsilon^c = \frac{dz/z^*}{d\tau/(1-\tau)}$ (excess mass at kink / change in net-of-tax rate): if labor supply is inelastic, then kinks in the budget set are irrelevant and do not create bunching

- Saez AEJ-EP'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

Individual L indifference curve

Individual H indifference curves

After-tax income $c \equiv z - T(z)$

Slope $1-t-dt$

Individual L chooses z^* before and after reform
Individual H chooses $z^* + dz^*$ before and z^* after reform
$dz^*/z^* = e\, dt/(1-t)$ with e compensated elasticity

Slope $1-t$

Source: Saez (2010), p. 184

z^* $z^* + dz^*$

Before tax income z

Panel B. Density distributions and bunching

Pre-reform incomes between z^* and $z^* + dz^*$ bunch at z^* after reform

Density distribution

After reform density

Before reform density

z^* $z^* + dz^*$

Before tax income z

Source: Saez (2010), p. 184

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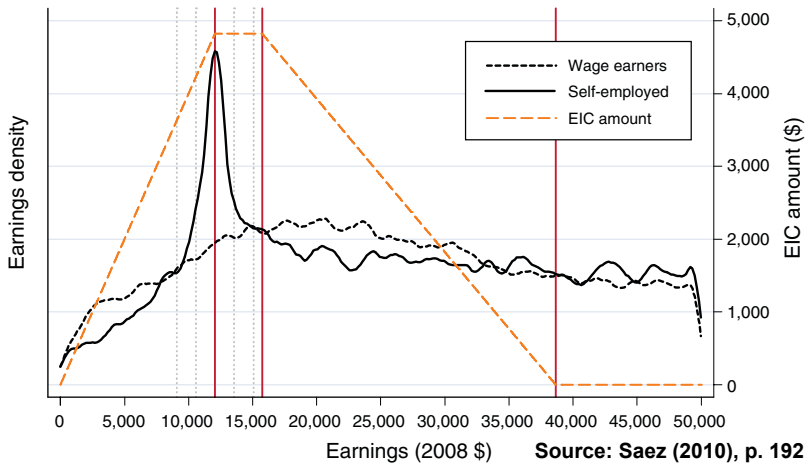
4) However, no bunching observed around all other kink points

B. Two children or more

Source: Saez (2010), p. 191

Panel A. One child

Source: Saez (2010), p. 191

Panel A. One child

Source: Saez (2010), p. 192
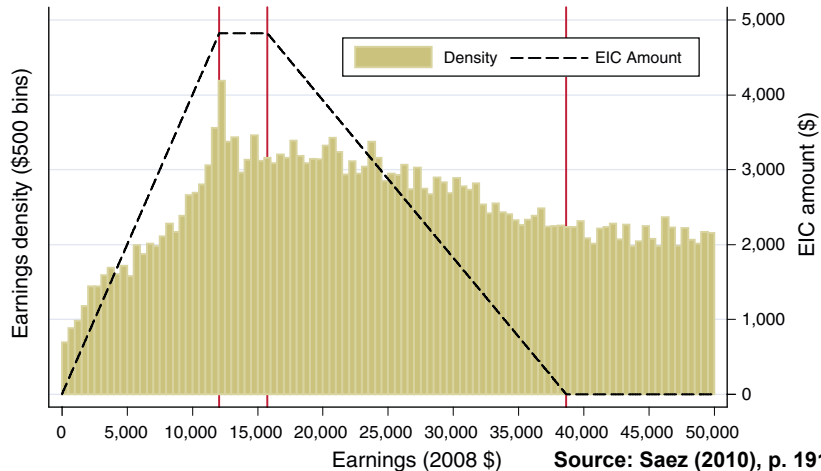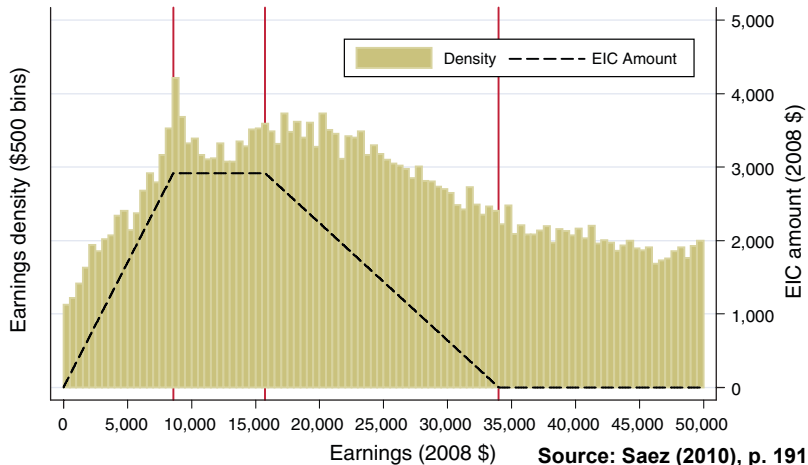
Panel B. Two or more children

Source: Saez (2010), 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, & Pistaferri QJE'11; Kostol & Myhre AER'21)

4) Information and salience: Chetty-Friedman-Saez AER'13 show how information about EITC affects bunching at kink point

Chetty, Friedman, Olsen, and Pistaferri QJE'11

1) If workers face adjustment costs, may not reoptimize in response to tax changes of small size and scope in short run

   (a) Search costs, costs of acquiring information about taxes

   (b) Institutional constraints imposed by firms (e.g. 40 hour week) that does not apply to the self-employed or workers with more flexibility (e.g. secondary earners)

2) Question: How much are elasticity estimates affected by frictions?

Chetty et al. QJE'11: Administrative data

Matched employer-employee panel data with admin tax records for full population of Denmark matching employee-employer information

Sample restriction: Wage-earners aged 15-70, 1994-2001

Approximately 2.42 million people per year

Important development in empirical micro in recent years: shift from survey data to administrative data (Card-Chetty-Feldstein-Saez '10 and Einav and Levin NBER'13]
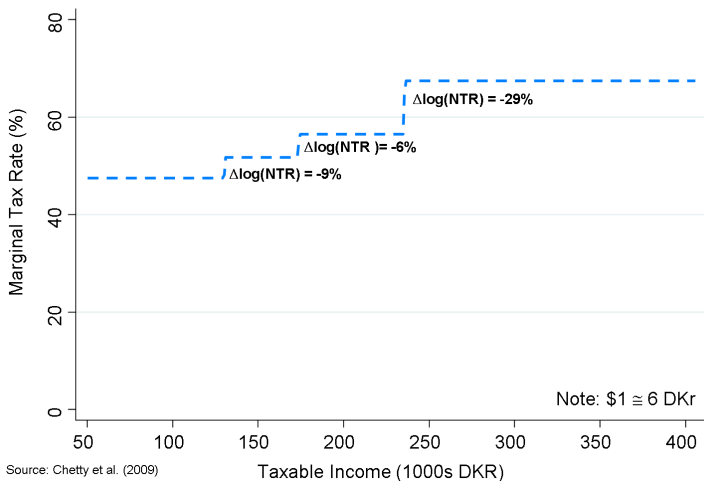
Value of Administrative data

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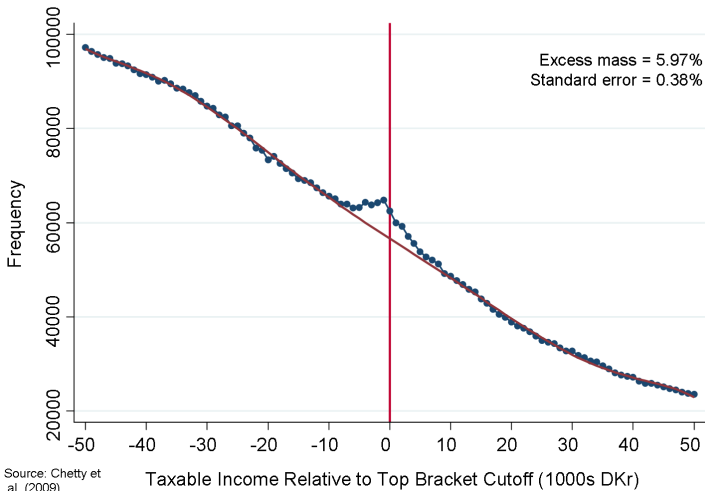
UK is lagging behind in terms of admin data access [hard to match across agencies]

Private sector also generates valuable **big data** (Google, Credit Bureaus, Personnel/health data from large companies)
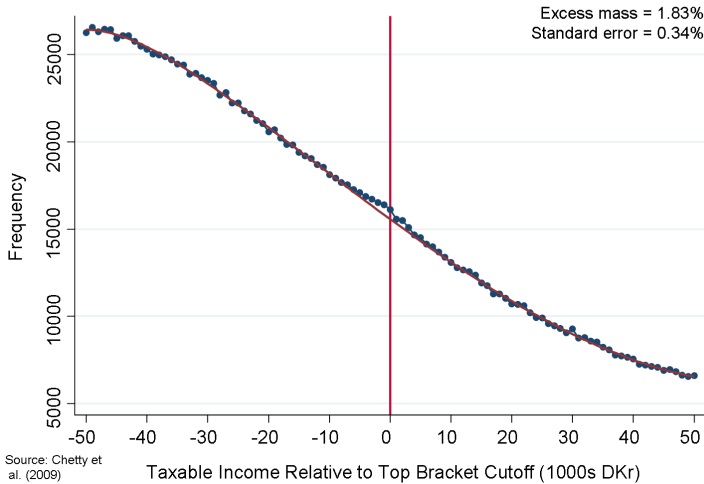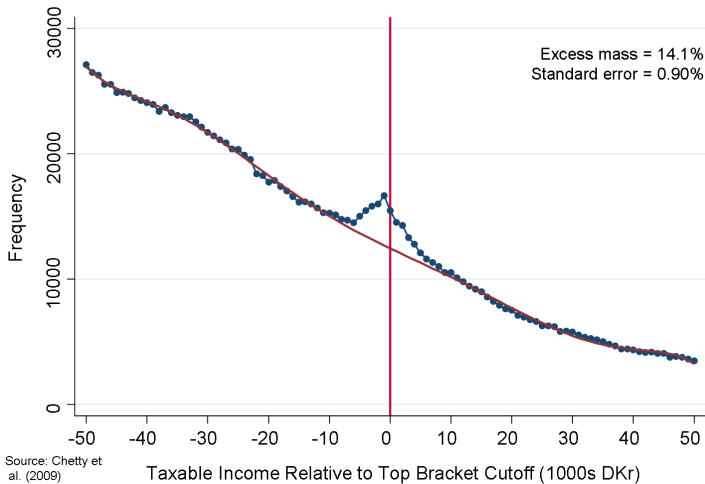
Marginal Tax Rates in Denmark in 1995

Δlog(NTR) = -29%

Δlog(NTR)= -6%

Δlog(NTR) = -9%

Note: $1 ≅ 6 DKr

Source: Chetty et al. (2009)

Taxable Income (1000s DKR)

Marginal Tax Rate (%)

Income Distribution for Wage Earners Around Top Kink (1994-2001)

Excess mass = 5.97%
Standard error = 0.38%

Source: Chetty et al. (2009)

Single Men

Excess mass = 1.83%
Standard error = 0.34%

Source: Chetty et al. (2009)

Taxable Income Relative to Top Bracket Cutoff (1000s DKr)

Married Women

Excess mass = 14.1%
Standard error = 0.90%

Frequency

Taxable Income Relative to Top Bracket Cutoff (1000s DKr)

Source: Chetty et
al. (2009)

Married Women at the Middle Tax: 10% Tax Kink

Excess mass = 2.24%
Standard error = 0.46%

Empirical Distribution
No Adj. Cost Simulation

Frequency

Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
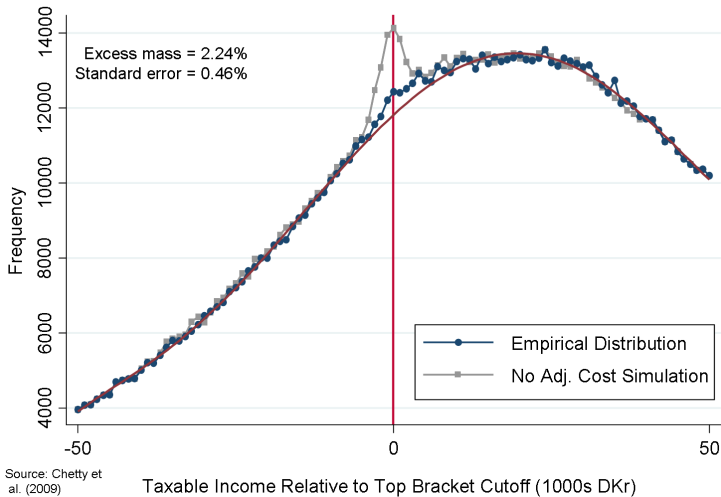
Source: Chetty et al. (2009)

Observed Elasticity vs. Size of Tax Change
Married Female Wage Earners
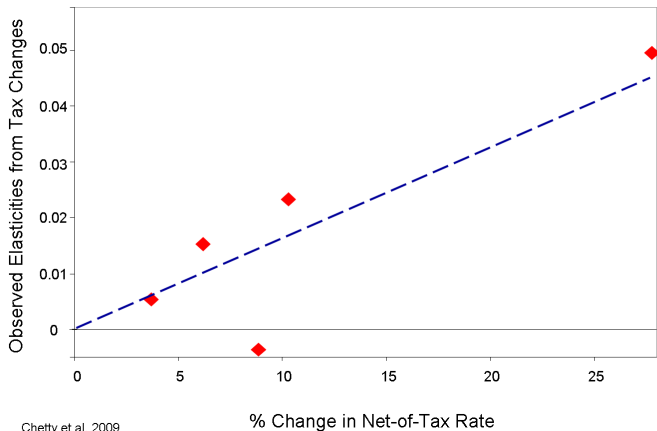
Chetty et al. 2009

Self Employed: Top Kink

Excess mass = 150.0%
Standard error =   1.4%

Frequency

Chetty et al. 2009

Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
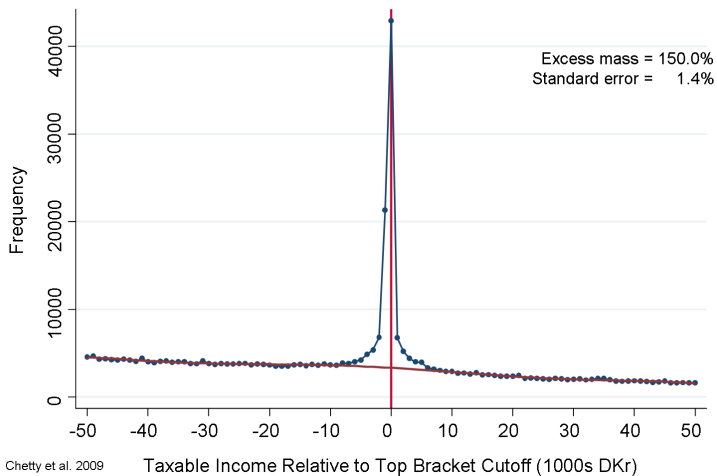
Self-Employed: Middle Kink

Excess mass = 11.2%
Standard error = 0.72%

Chetty et al. 2009

Taxable Income Relative to Middle Bracket Cutoff (1000s DKr)

Frequency
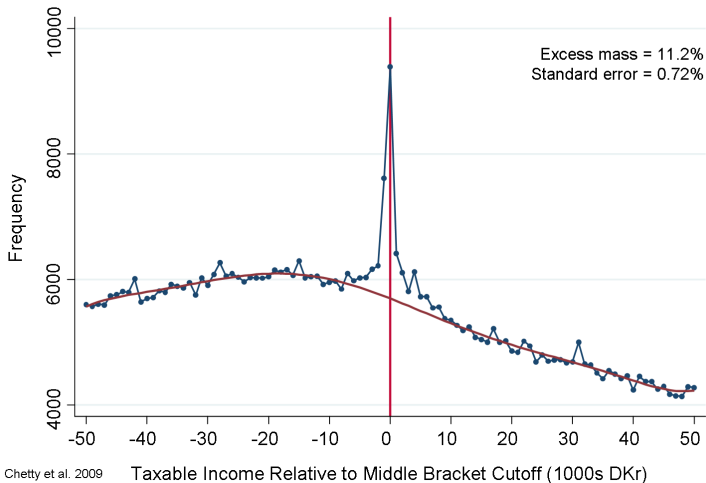
Chetty et al. QJE'11: Results

1) Search costs attenuate observed behavioral responses substantially: find larger elasticities around large kink points

2) Groups with more flexibility respond more (secondary earners, self-employed)

3) Overall elasticities estimated from bunching are small in magnitude (perhaps because frictions prevent full response)

⇒ Bunching methods are good to detect behavioral responses but not necessarily to pin down magnitude of a long-run response to a large tax reform

EITC Empirical Studies

Some evidence of response along extensive margin but little evidence of response along intensive margin (except for self-employed)

⇒ 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

Confusion might be good for the govt as EITC induces work along participation margin without discouraging work along intensive margin (Liebman-Zeckhauser '04, Rees-Taubinsky '16)

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

⇒ Information about EITC varies across areas

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

⇒ 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
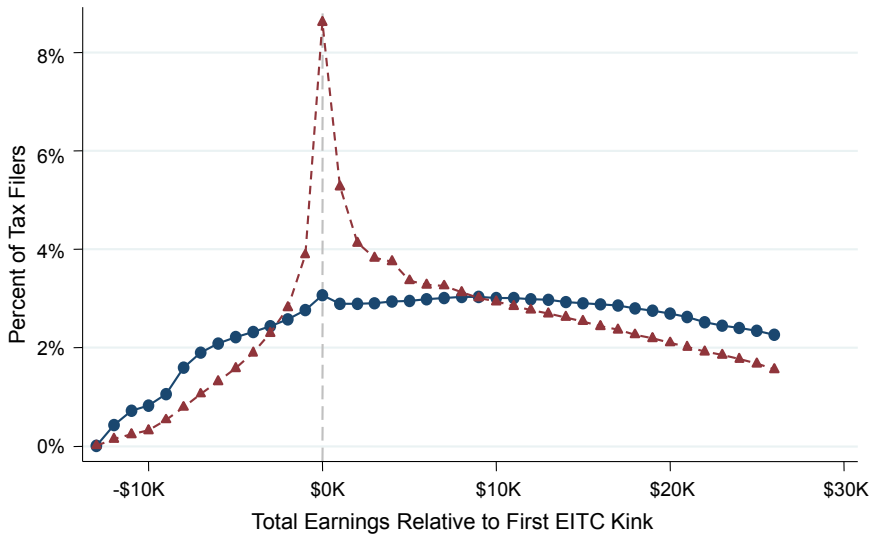
Source: Chetty, Friedman, and Saez NBER'12
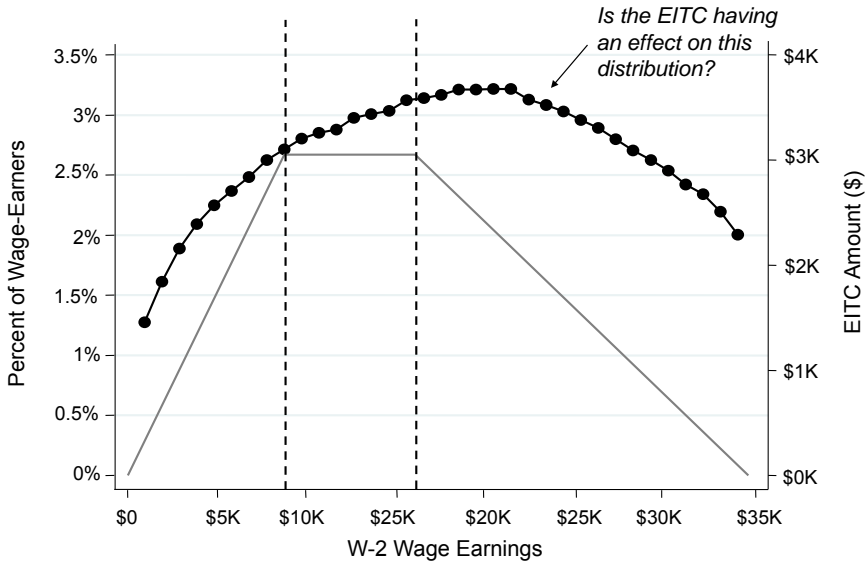
Lowest Bunching Decile   Highest Bunching Decile

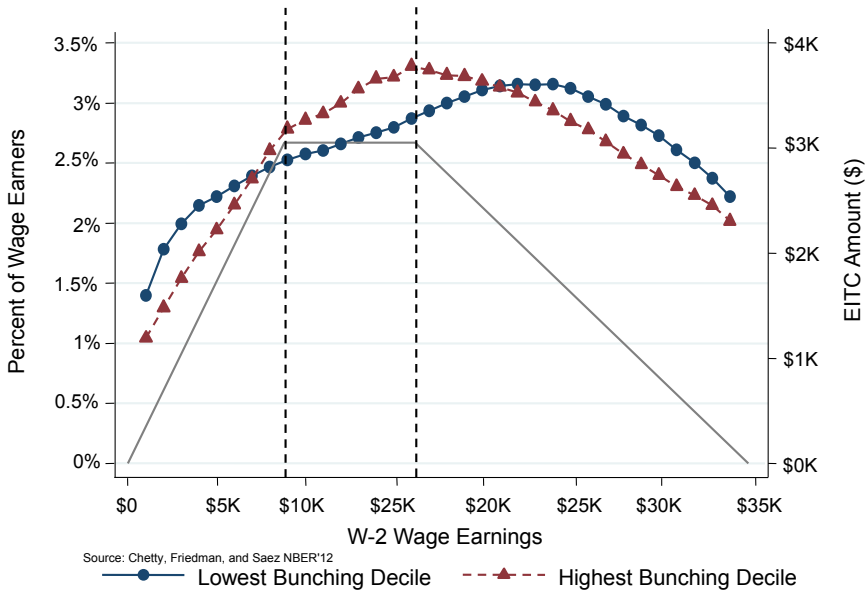# Fraction of Tax Filers Who Report SE Income that Maximizes EITC Refund in 2008
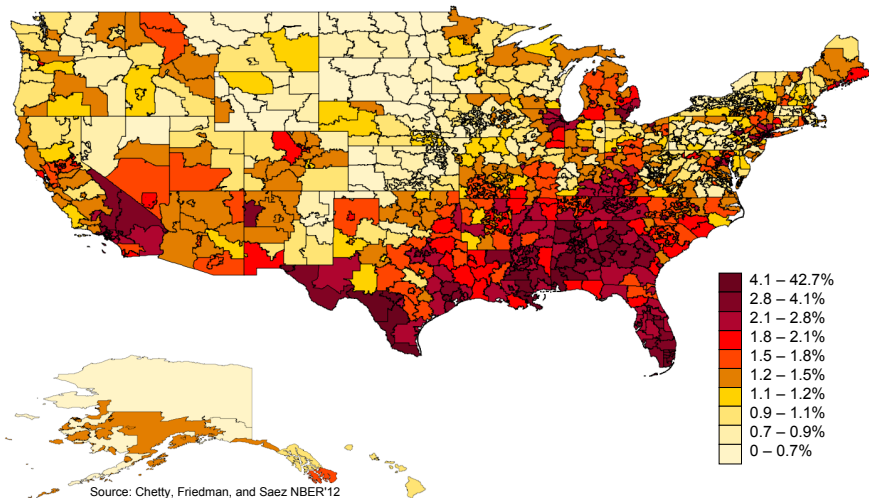
■	4.1 – 42.7%
■	2.8 – 4.1%
■	2.1 – 2.8%
■	1.8 – 2.1%
■	1.5 – 1.8%
■	1.2 – 1.5%
■	1.1 – 1.2%
■	0.9 – 1.1%
■	0.7 – 0.9%
■	0 – 0.7%

Source: Chetty, Friedman, and Saez NBER'12

Income Distribution For Single Wage Earners with One Child

Is the EITC having an effect on this distribution?

Percent of Wage-Earners (left axis): 0%, 0.5%, 1%, 1.5%, 2%, 2.5%, 3%, 3.5%

EITC Amount ($) (right axis): $0K, $1K, $2K, $3K, $4K

W-2 Wage Earnings: $0, $5K, $10K, $25K, $20K, $25K, $30K, $35K

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

Lowest Bunching Decile ● — ● Highest Bunching Decile ▲ - - ▲

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

Source: Chetty, Friedman, and Saez NBER'12

Legend:
- Lowest Sharp Bunching Decile
- Middle Sharp Bunching Decile
- Highest Sharp Bunching Decile
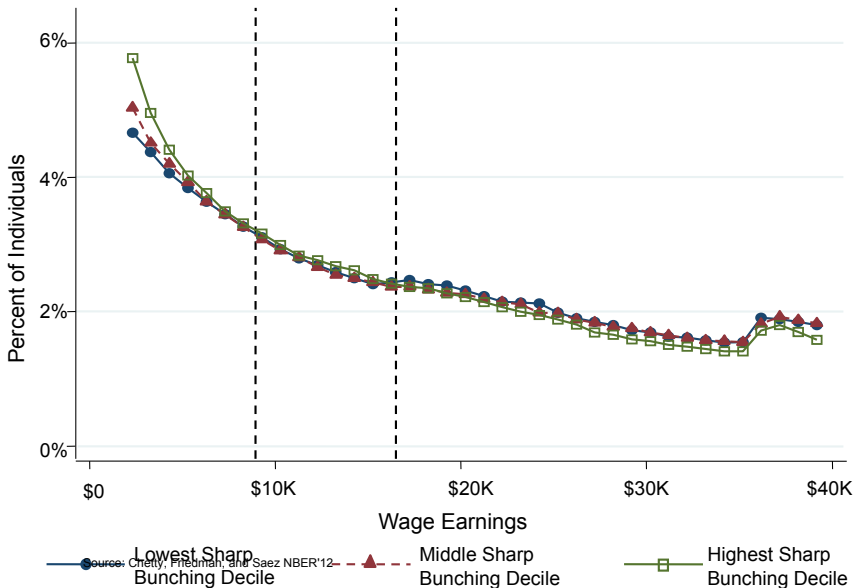
Earnings Distribution in the Year of First Child Birth for Wage Earners

Source: Chetty, Friedman, and Saez NBER'12

45 / 56
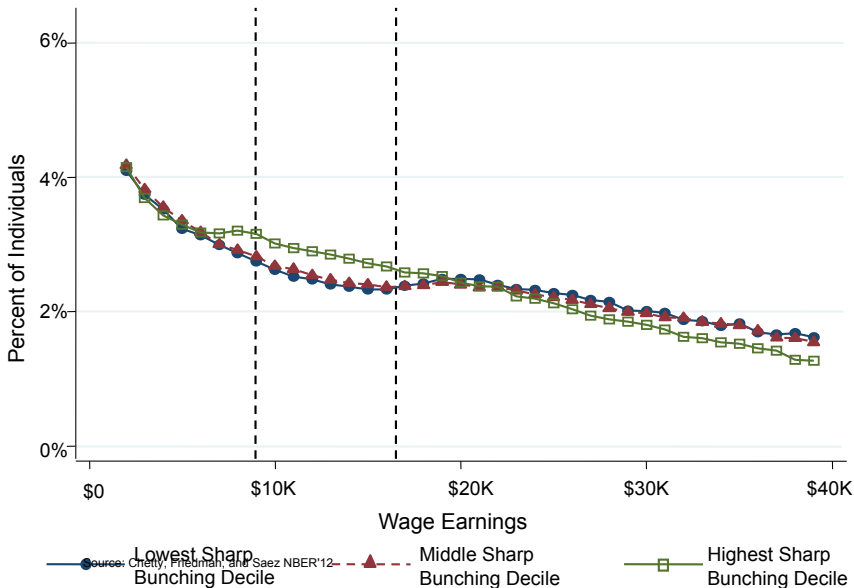
Bunching at Notches

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

Average Tax Rate ↑ discretely: if you earn/report £1 more above the notch, you face the tax rate on your entire income (rather than on the marginal £1 above the threshold, as with MTR)

Such discontinuities should create bunching below the notch and gap in density just above the notch

Kleven and Waseem QJE'13 pioneered tax notch analysis in the case of the Pakistani income tax

Find evidence of bunching (primarily among self-employed) but size of the response is quantitatively small

Large fraction of taxpayers are unresponsive to notch likely due to lack of information

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 (Tazhitdinova '15 on UK)
- Corporate tax (Devereux-Liu-Loretz '14 on UK, 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 '17 on UK)

General findings:

- Clear bunching when info is salient and outcome easily manipulable. Bunching comes often from avoidance/evasion rather than real behavior
- Bunching almost always small relative to conventional elasticity estimates

Bunching in the UK
Adam et al (2020)

Use UK admin & firm survey data since 1975 (SPI & NESPD)

Exploit kinks and notches in the UK personal tax schedule (income tax and NICs) over a 40-year period

$\Rightarrow$ Nice recap of Δ in income tax and NICs schedule (read section 2)

1) At **kinks** (MTRs rise): bunching by company owner-managers and the self-employed, but not employees

$\Rightarrow$ Lack of bunching among employees might reflect a low underlying behavioural elasticity, or frictions that attenuate the response

2) At **notches** (ATRs rise): some bunching below LEL threshold and a dip above it (part-time workers); no bunching or dip at other notches higher up the earnings distribution

$\Rightarrow$ Wage earners face substantial frictions to optimize labour choice

$\Rightarrow$ Can't tell whether it's due to adjustment costs (fixed pay structures, search/matching costs), inattention, lack of info, optimisation errors

Fig. 1 National Insurance Contribution schedules
(a) *Employee contributions*

(a) *Basic rate threshold*

Result: no bunching

(b) *Higher rate threshold*

Result: more pronounced bunching

Taxable income relative to threshold (£ per year, 2015-16 prices)
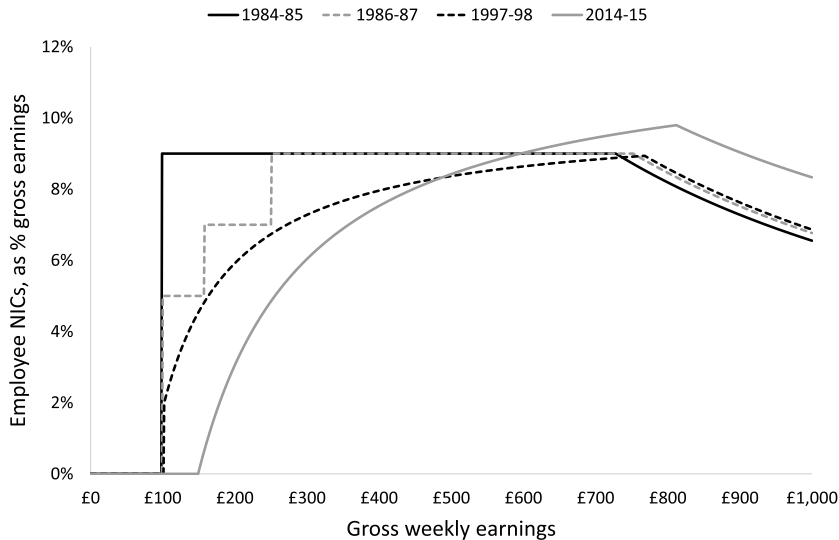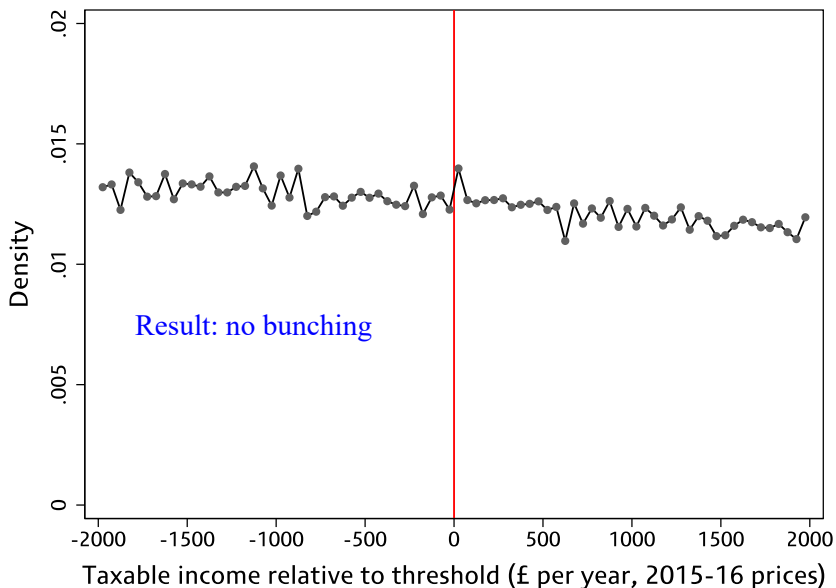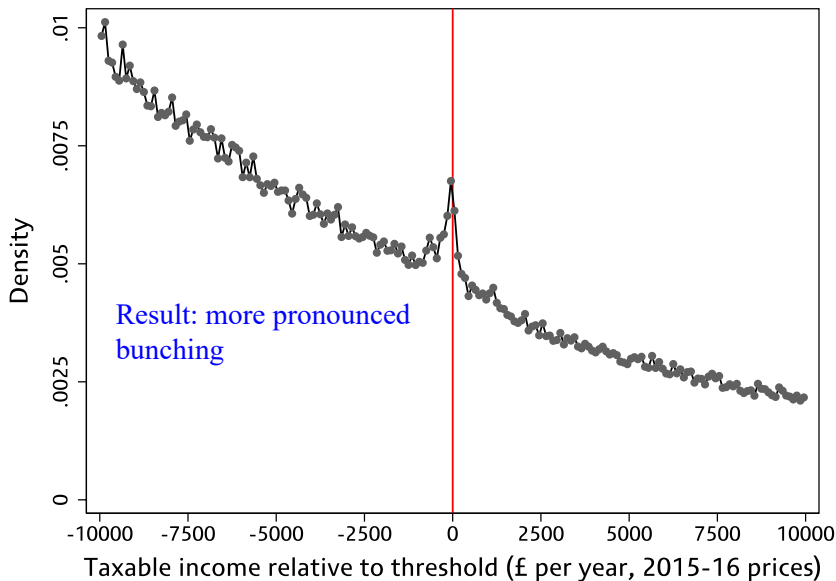
(c) £100,000 & £150,000 thresholds

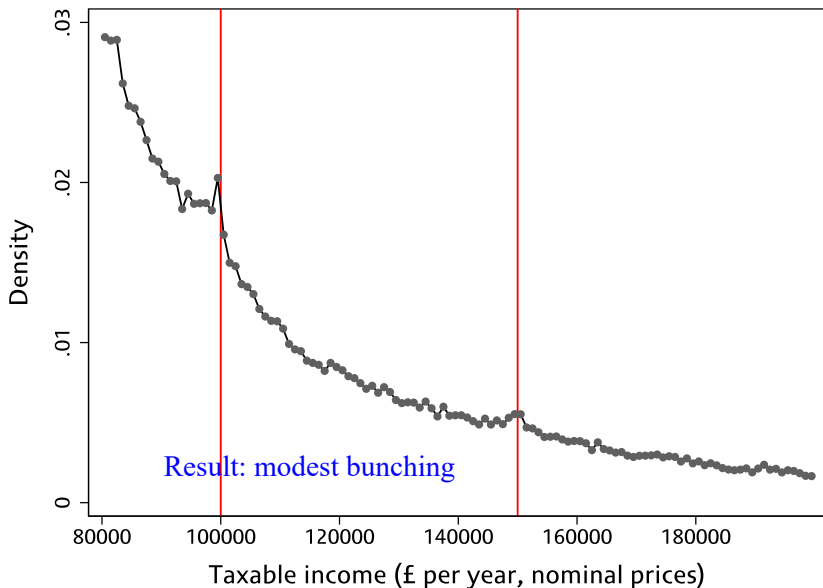Result: modest bunching

Taxable income (£ per year, nominal prices)

Density

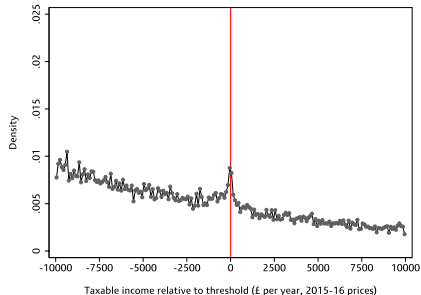# Fig. 3 Bunching at the income tax higher-rate threshold, by taxpayer type.

(a) *Employees*
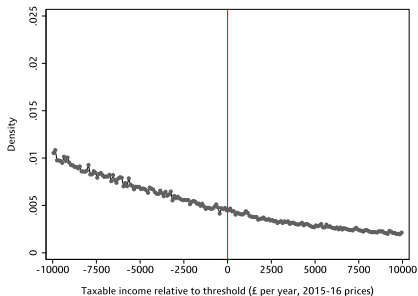
(b) *Company owner-managers*
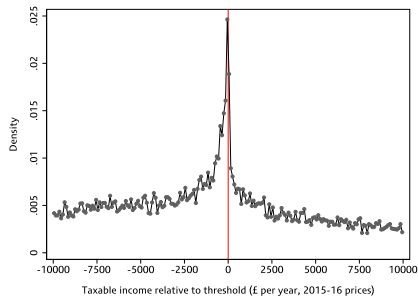
(c) *Self-employed*

(d) *Other taxpayers*
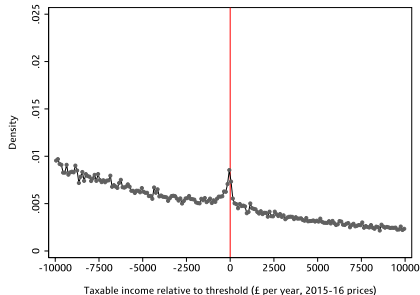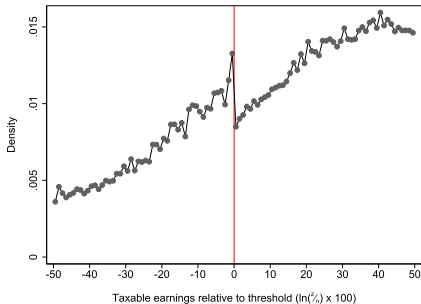
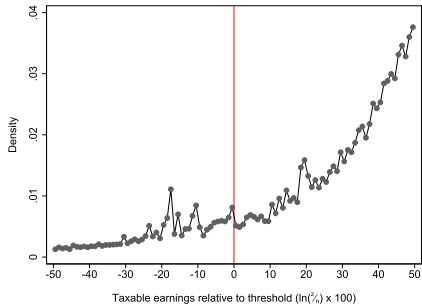Fig. 5 Bunching at the NICs Lower Earnings Limit (notch)
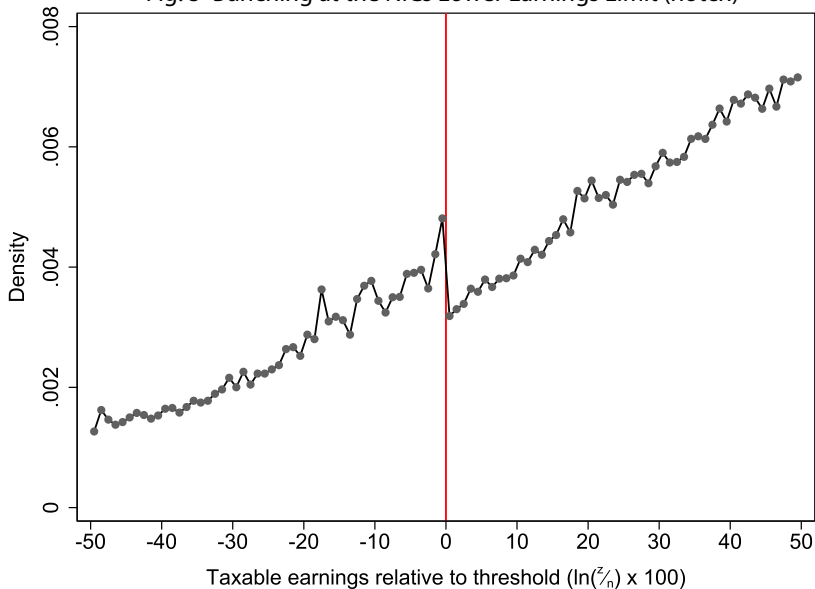
Fig. 6 Bunching at the NICs Lower Earnings Limit: by subgroup

(a) *Part-time*   (b) *Full-time*

Bunching at the UK lower end

Tax credit reforms in the UK:
- FC before 2000, expanded in early 1990s
- WFTC reform in 2000
- WTC and CTC reform in 2004
- UC since 2016 (integration of tax credits and other benefits)

Do we see bunching at the **minimum weekly hours-of-work requirement**? (are these *kinks* or *notches*?)
Originally at 24+ hs; ↓ to 16+ hs in April 1992; additional credit at 30+ hours in 1995; WFTC ↑ generosity at 16hs in October 1999

Some evidence of hours responses at this notches (Blundell and Shephard, 2012): Look at single women (aged 18-45), with and without children, in 1991, 1995, 2002. Placebo: single childless women were ineligible ⇒ absence of bunching
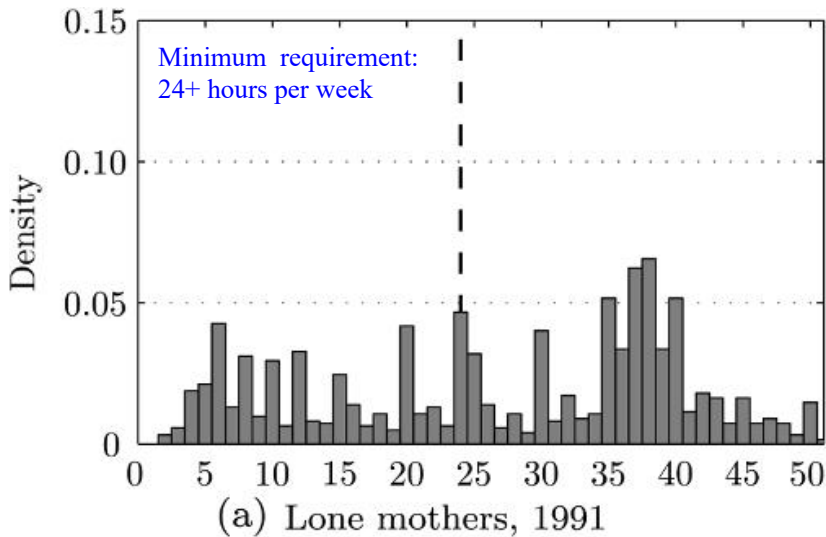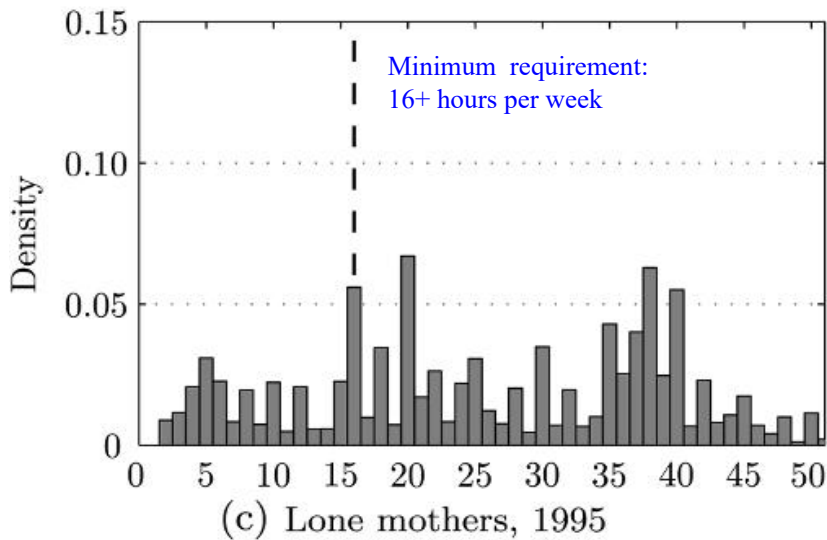
Is this *real* or *reporting* behavior?

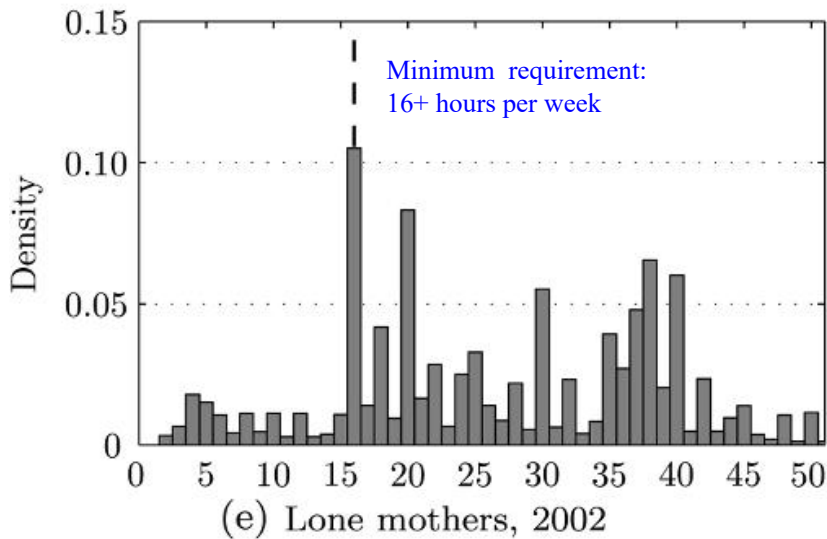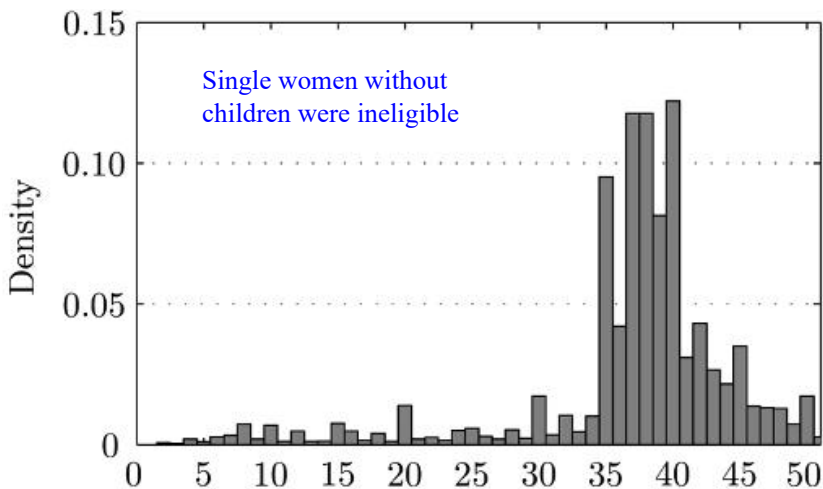# Budget constraint for single parent in the UK 2012
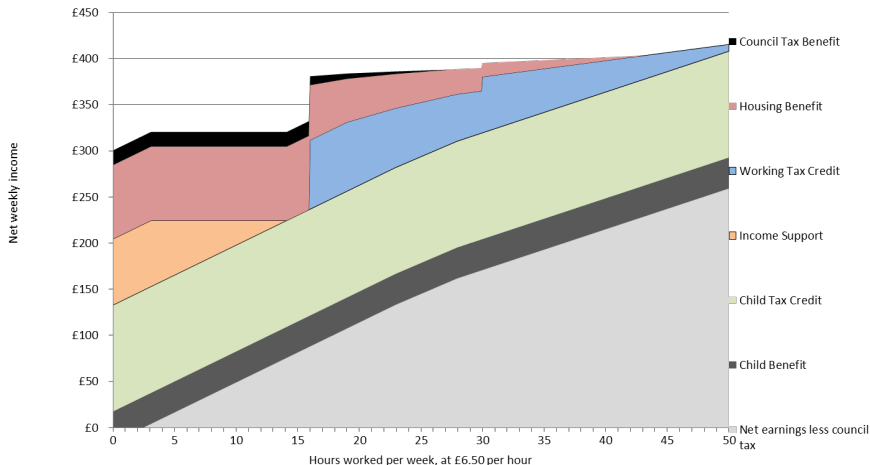
Source: Blundell (2011)

Notes: wage £6.50/hr, 2 children, no other income, £80/wk rent. Ignores council tax and rebates

(a) Lone mothers, 1991

(c) Lone mothers, 1995

Minimum requirement:
16+ hours per week

(e) Lone mothers, 2002

(b) Single women, 1991

Single women without children were ineligible

Single women without
children were ineligible

(d) Single women, 1995

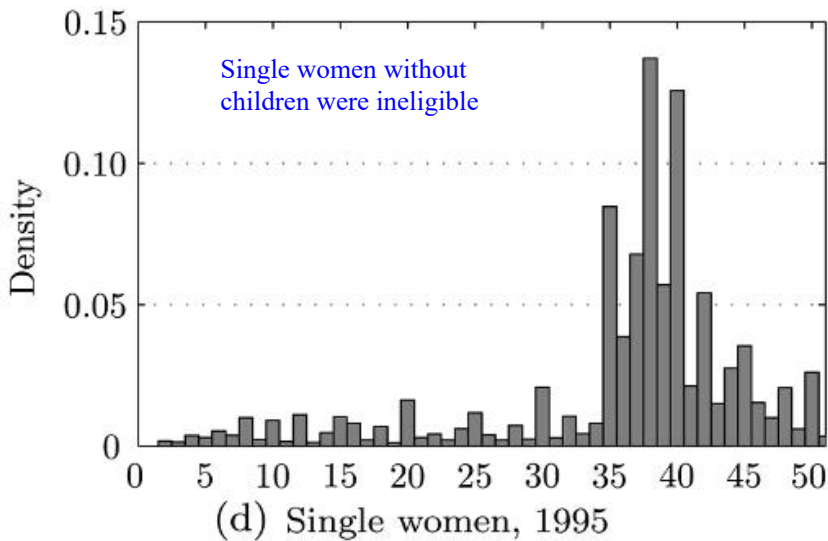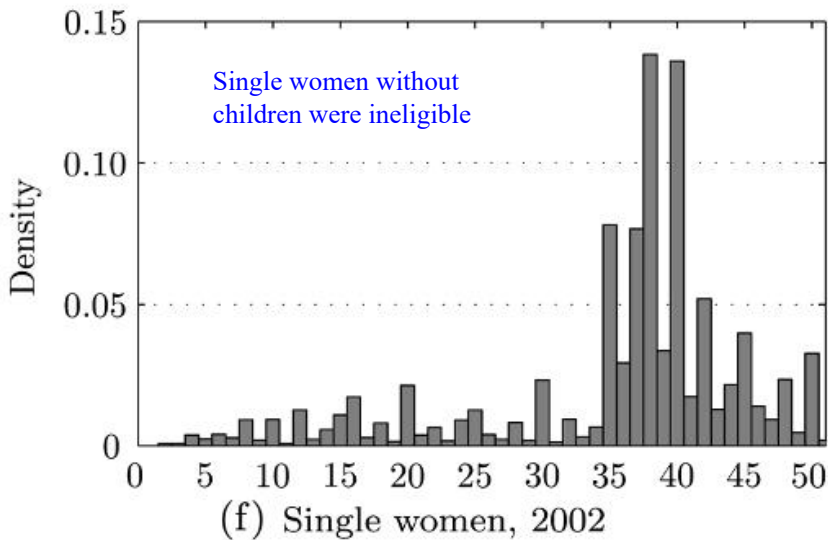Single women without
children were ineligible

(f) Single women, 2002

Social Determinants of Labor Supply

Strong evidence that labor supply $l(w, R)$ is not purely an individual decision based on standard invariant utility $u(c, l)$

Social norms play large role. So, women's market labor supply responses to taxes and transfers likely affected by social norms

US female labor force participation during World War II: 50% increase from '40 to '45 (2/3 reversed afterwards)

Child penalties in female earnings vary a lot across countries (Kleven et al. AEA PP'19) and are not due solely to monetary incentives but also to norms about working moms

US female labor force participation, age 16-64

Source: Saez AEA-PP'21

25% increase in 1943-1945 during WW2 planned economy

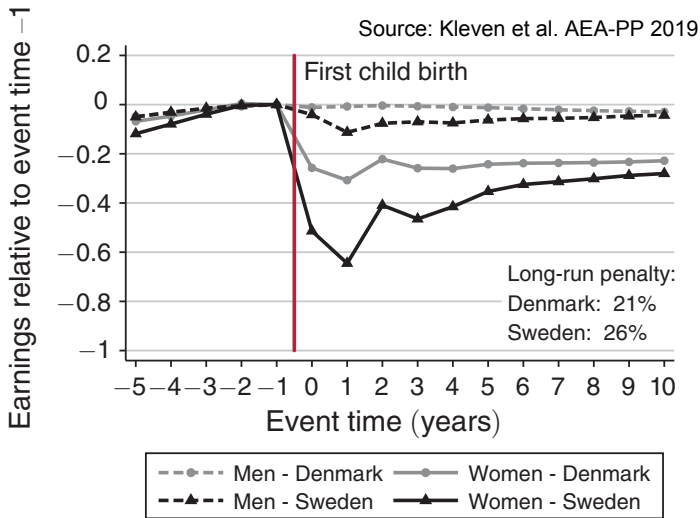**Source**: Historical Statistics of the United States (Current Population Reports).

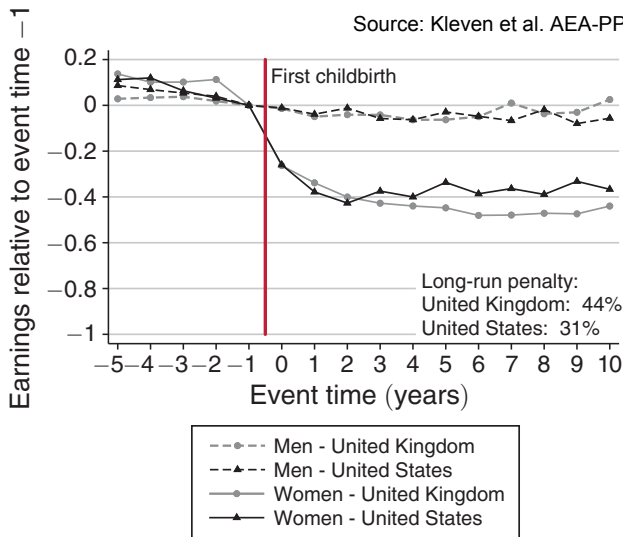FIGURE 1. CHILD PENALTIES IN EARNINGS IN SCANDINAVIAN COUNTRIES

FIGURE 2. CHILD PENALTIES IN EARNINGS IN ENGLISH-SPEAKING COUNTRIES
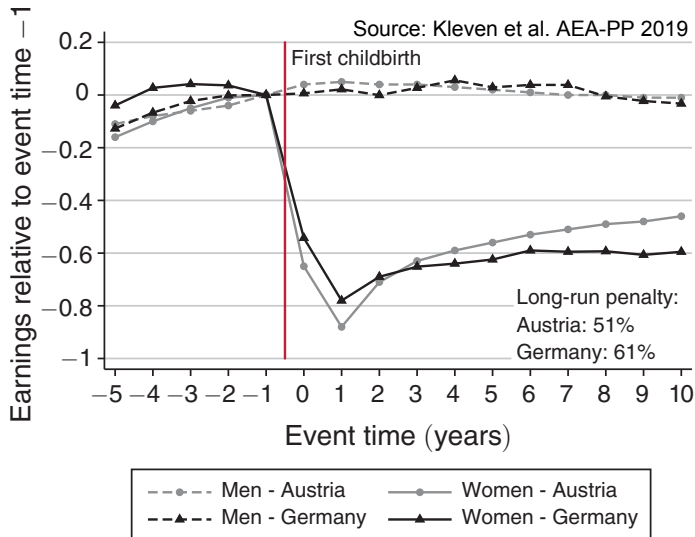
FIGURE 3. CHILD PENALTIES IN EARNINGS IN GERMAN-SPEAKING COUNTRIES

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Appendix

Make sure you master the key technical concepts:
Extensive vs intensive margin responses, elasticities, substitution vs income effects, Negative Income Tax (NIT) vs in-work transfers (e.g., EITC), phase-in vs phase-out rates, bunching, kinks vs notches.

Main takeaways:

⋆ Empirical methods: simple OLS, randomized experiments, DD, bunching at kinks and notches

⋆ Slides 12-13: how incentives from NIT operate (Aside: when is NIT optimal (lecture 2)?)

⋆ Slides 30-32: how incentives from low-income in-work transfer programs operate? and out-of-work benefits?

⋆ Findings: from cross-section studies and NIT experiments (male vs female workers), lotteries (income effects). Overall small labor supply elasticities (aka earnings elasticity), larger for married women, larger extensive margin responses (aka participation responses) (Canadian SSP); relatively small income effects; secondary jobs are more responsive (Germany). Low-income programs (Kleven's 2019 critique); bunching of wage earners, self-employed, other groups; reasons for lack of bunching. The role of social norms.

- Tutorial #2 in week 8

- Practice essay for the final exam (forthcoming...)