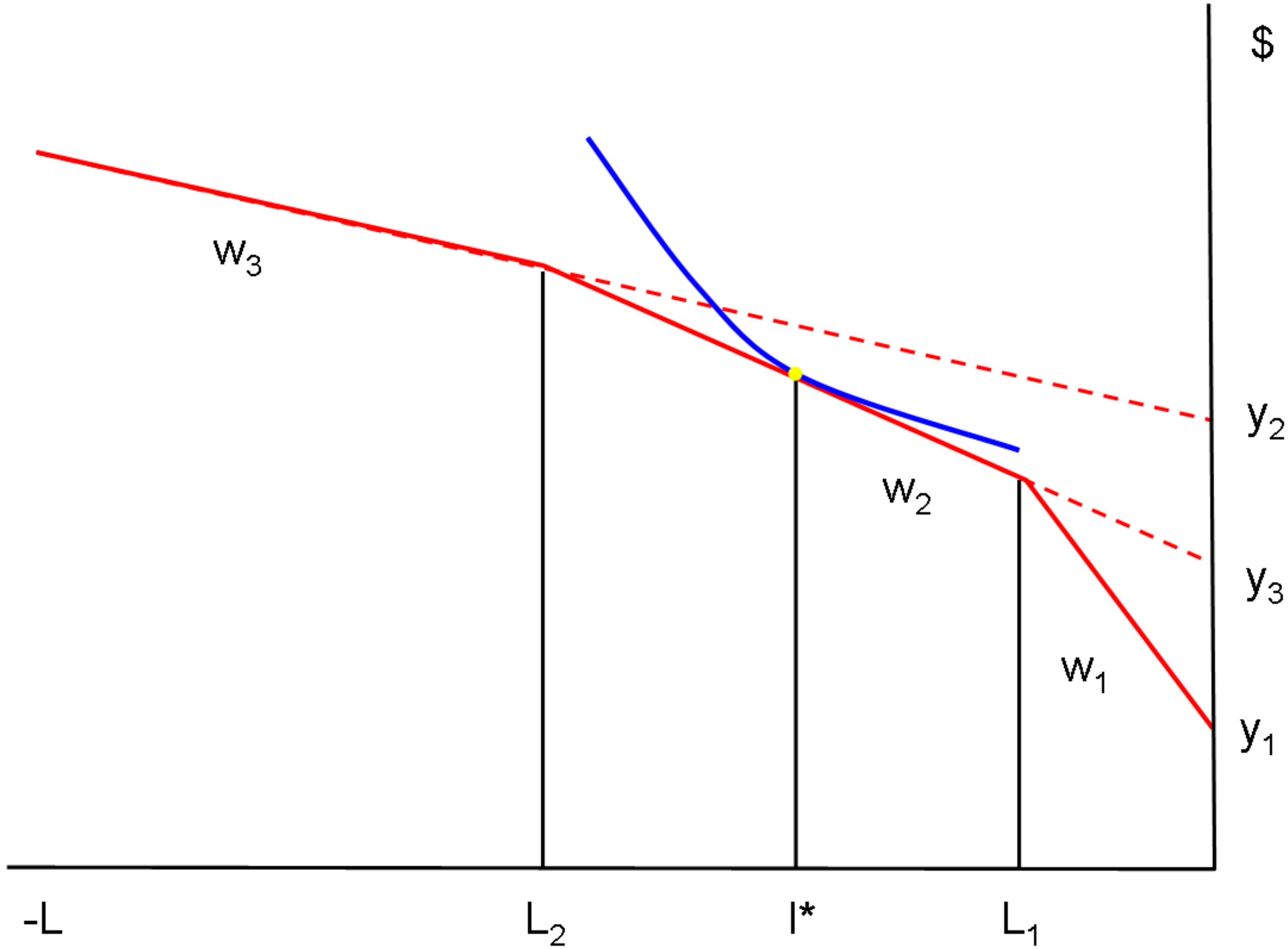
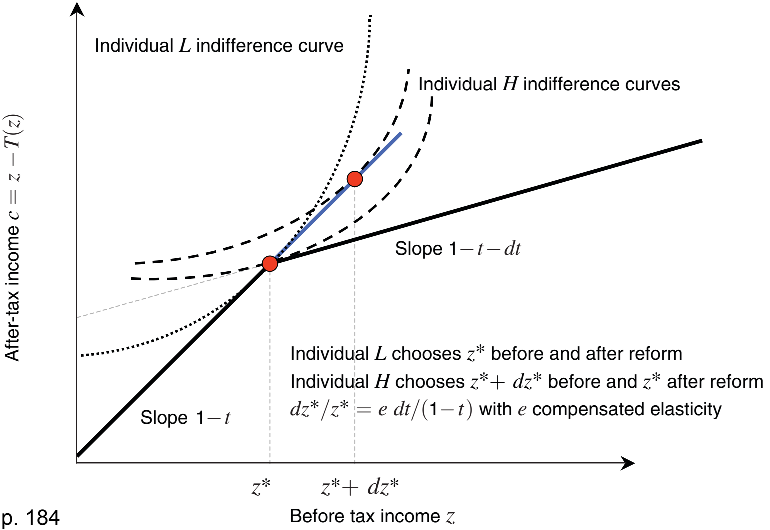
Non-Linear Budget Set Estimation: Virtual Incomes



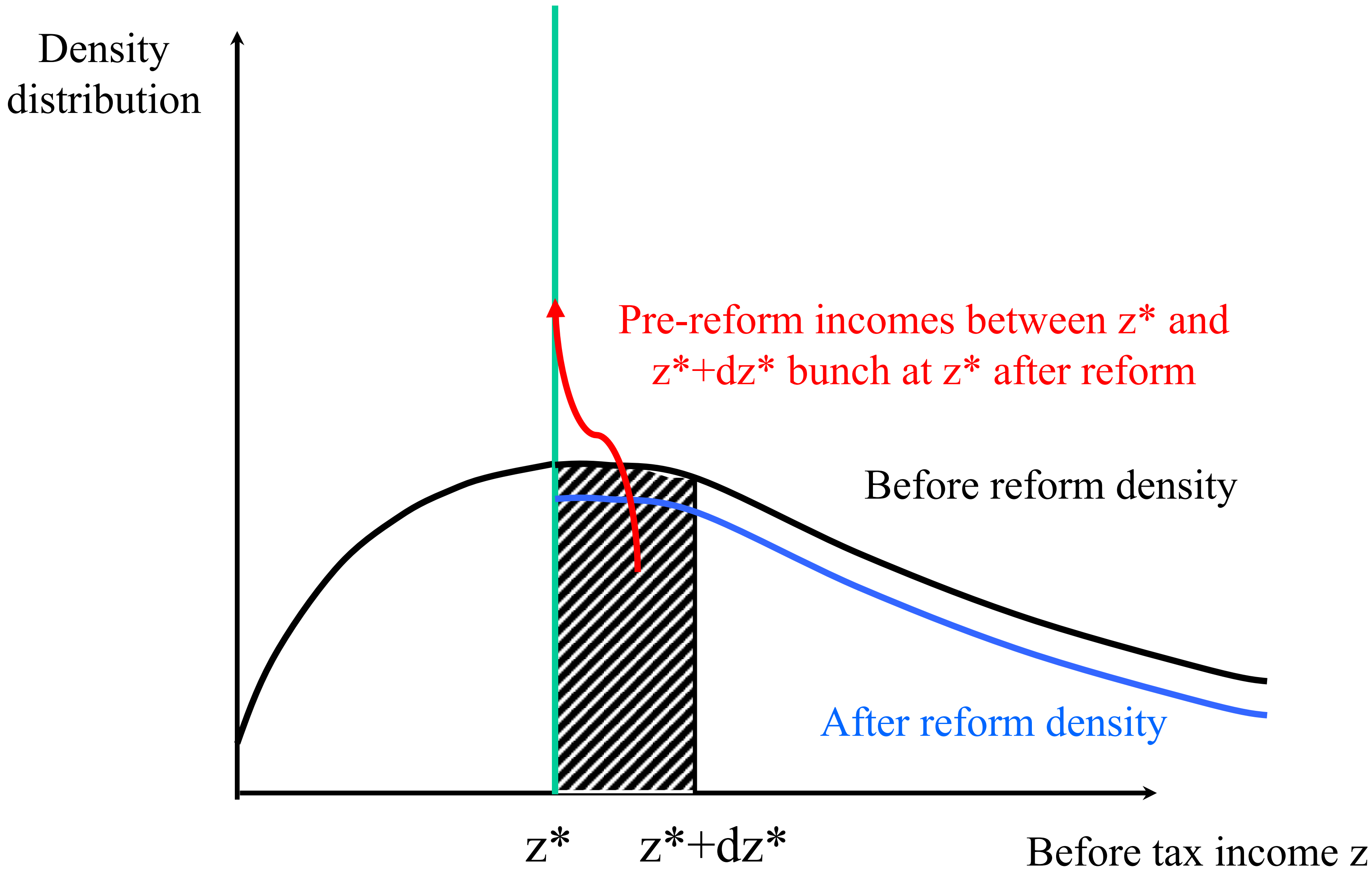
Source: Hausman (Hbk 1985)

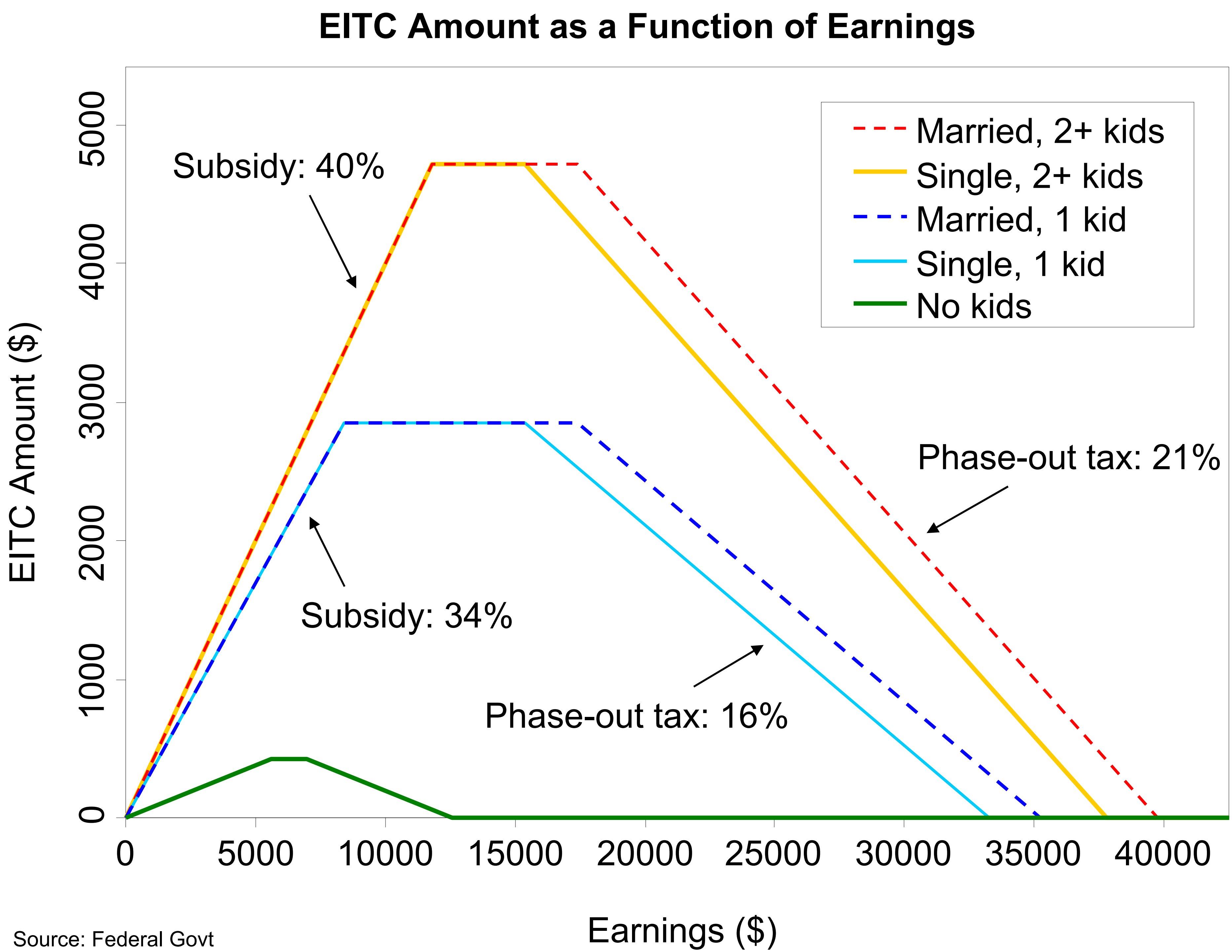
Panel A. Indifference curves and bunching



Source: Saez (2010), p. 184

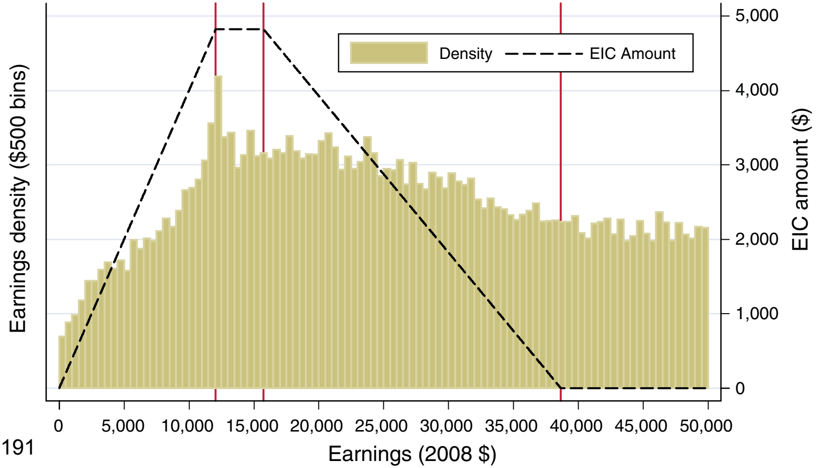
B. Density Distributions and Bunching





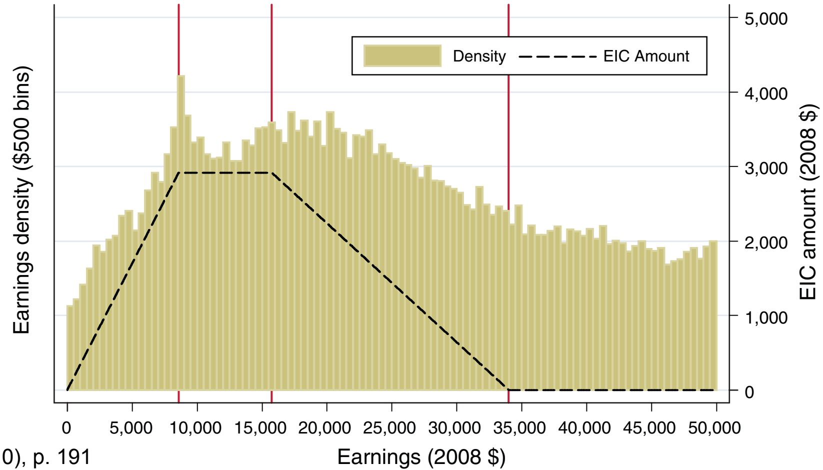
EITC Amount as a Function of Earnings
Married, 2+ kids
Single, 2+ kids
Married, 1 kid
Single, 1 kid
No kids
Subsidy: 40%
Subsidy: 34%
Phase-out tax: 21%
Phase-out tax: 16%
EITC Amount ($)
0
1000
2000
3000
4000
5000
0
5000
10000
15000
20000
25000
30000
35000
40000
Earnings ($)
Source: Federal Govt

B. Two children or more



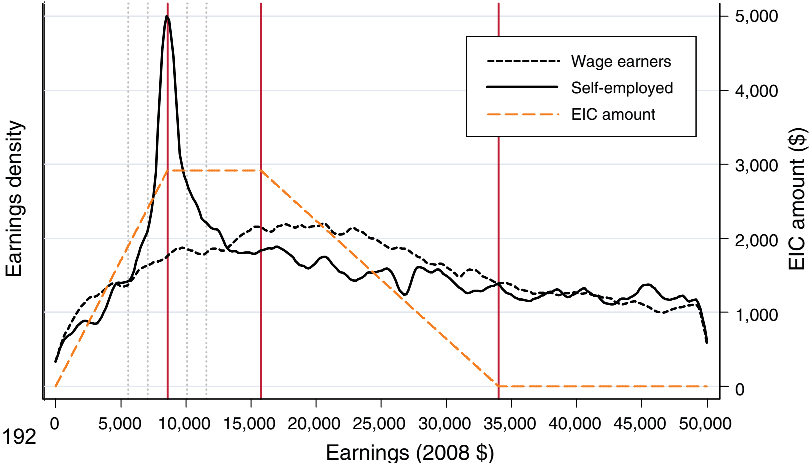
Source: Saez (2010), p. 191

Panel A. One child



Source: Saez (2010), p. 191

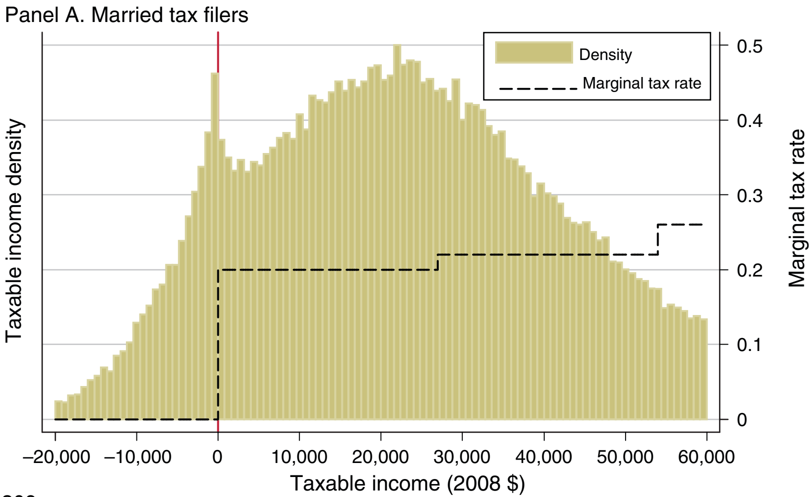
Panel A. One child



Source: Saez (2010), p. 192

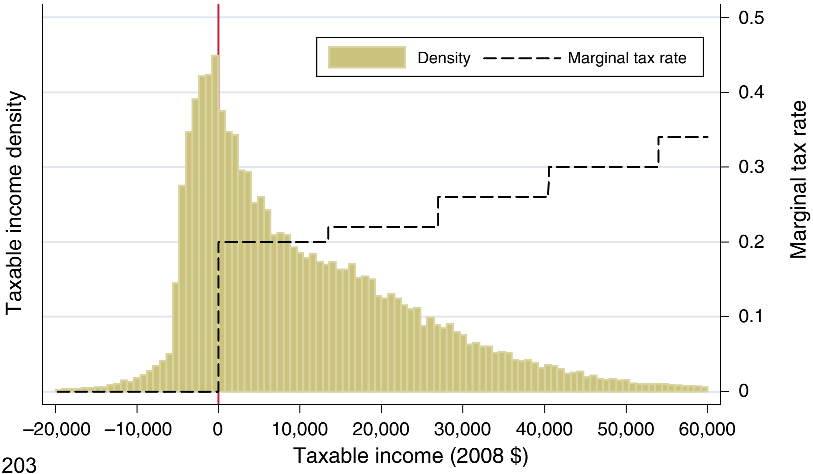
Panel B. Two or more children

Source: Saez (2010), p. 192



Source: Saez (2010), p. 203

Panel B. Single tax filers



Source: Saez (2010), p. 203

FIGURE 3-A.—EARNINGS DISTRIBUTION, 1980–81

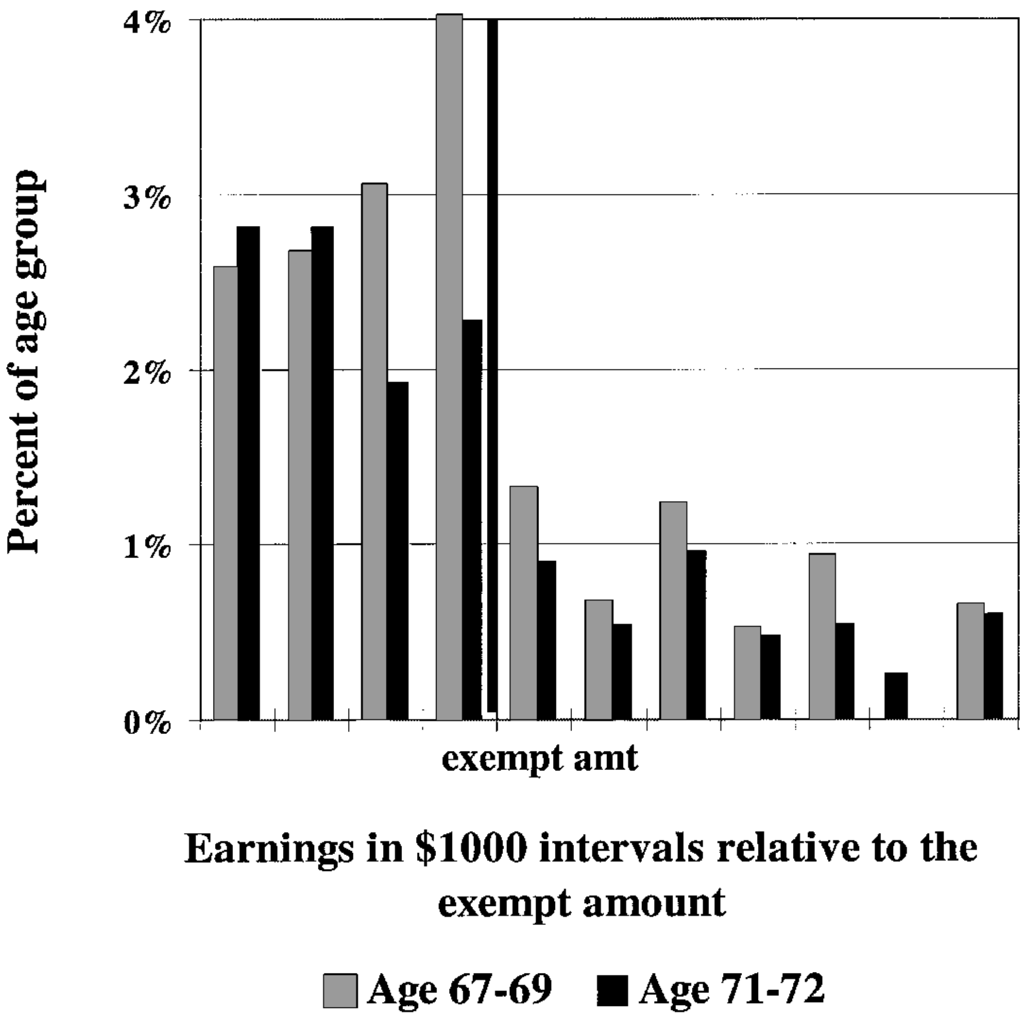
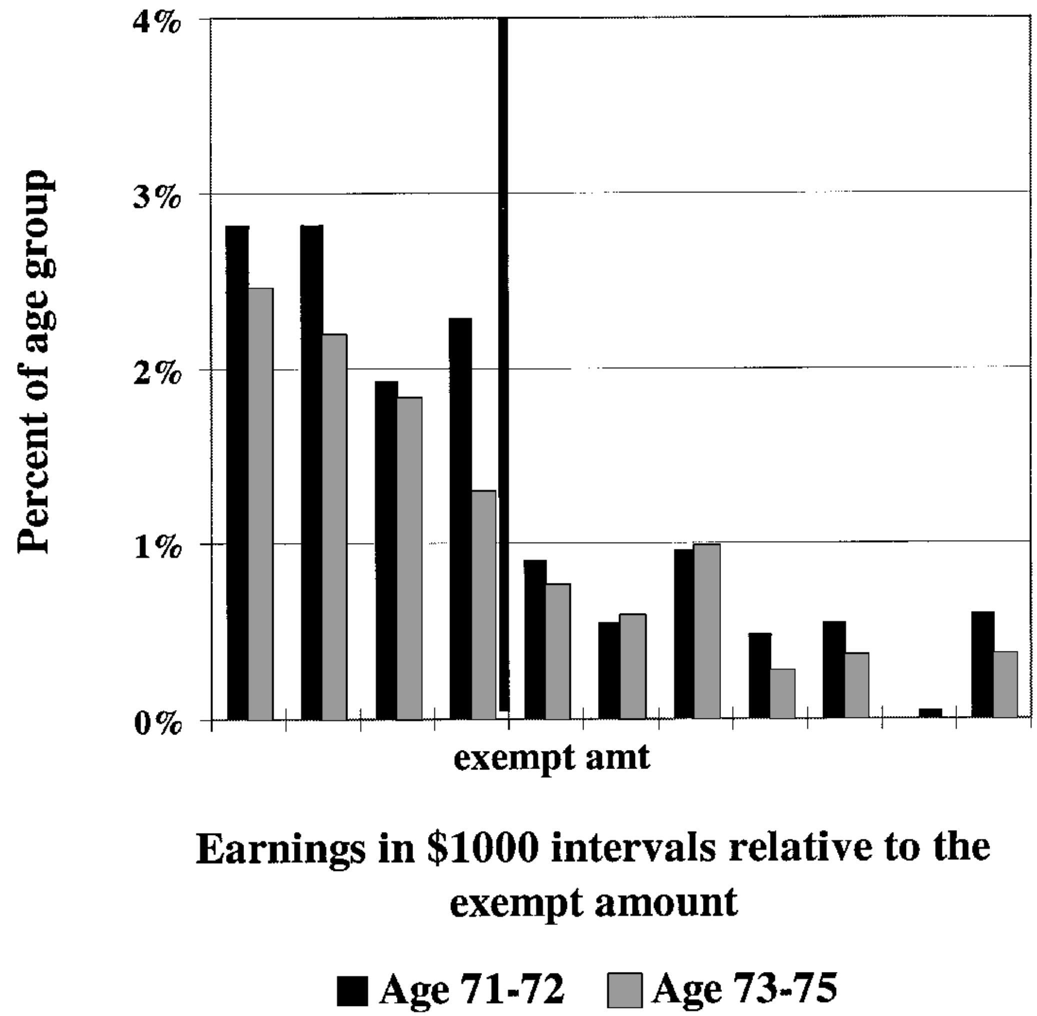


FIGURE 3-B.—EARNINGS DISTRIBUTION, 1980–81



Source: Friedberg (2000), p. 55

FIGURE 3-C.—EARNINGS DISTRIBUTION, 1984–86

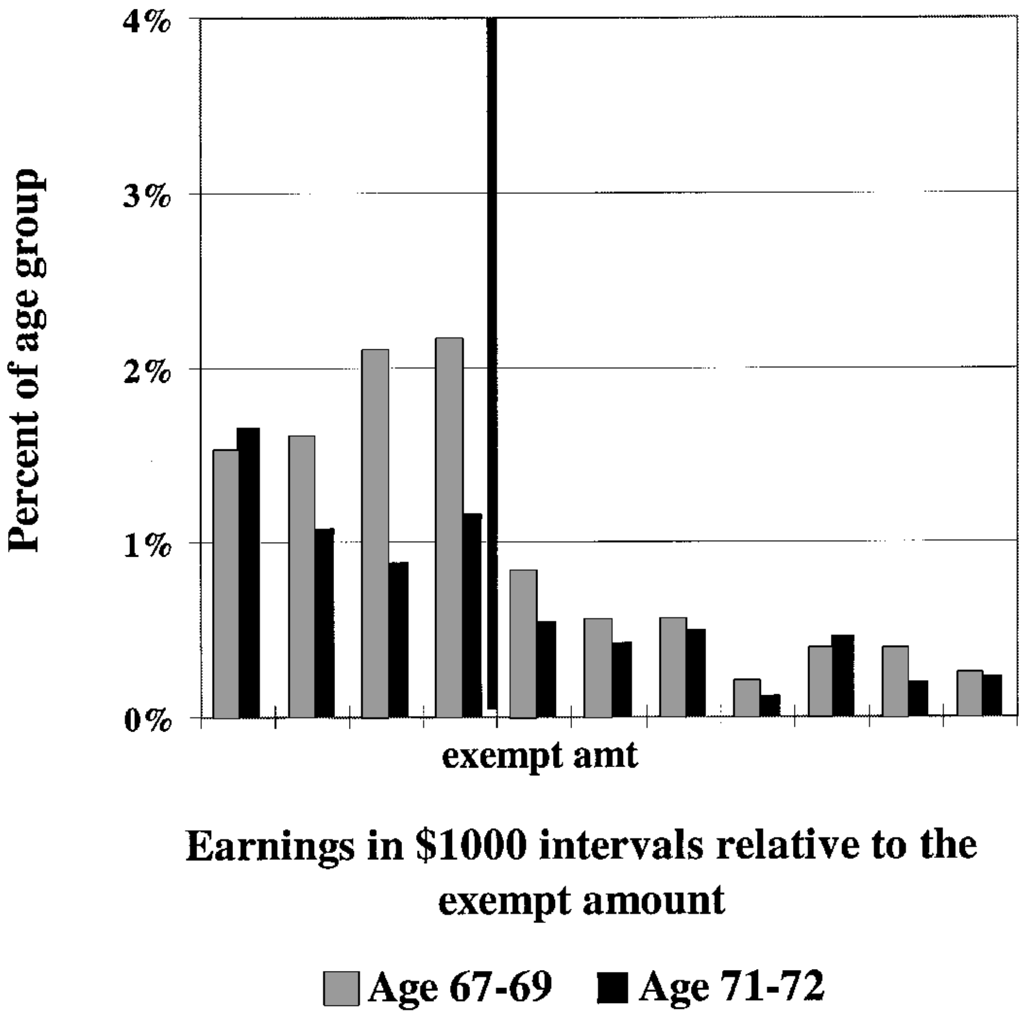
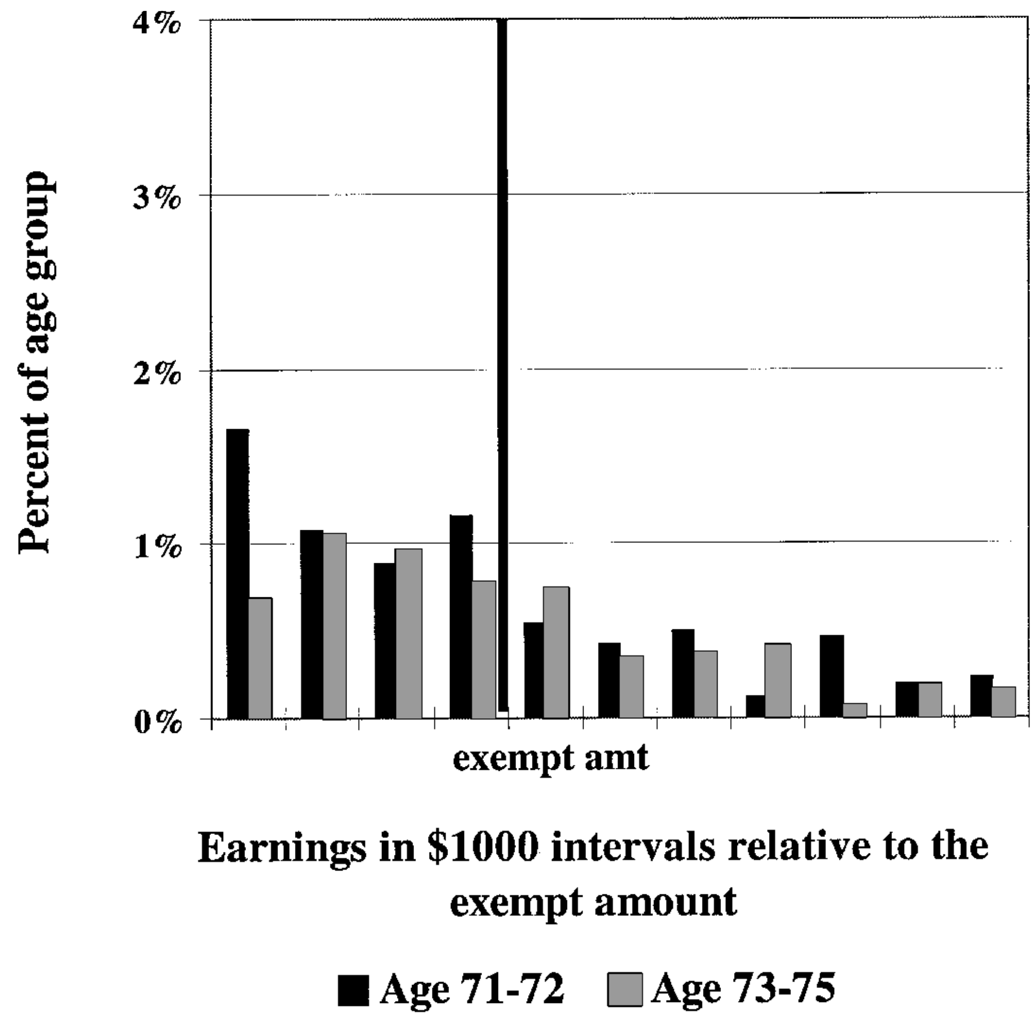


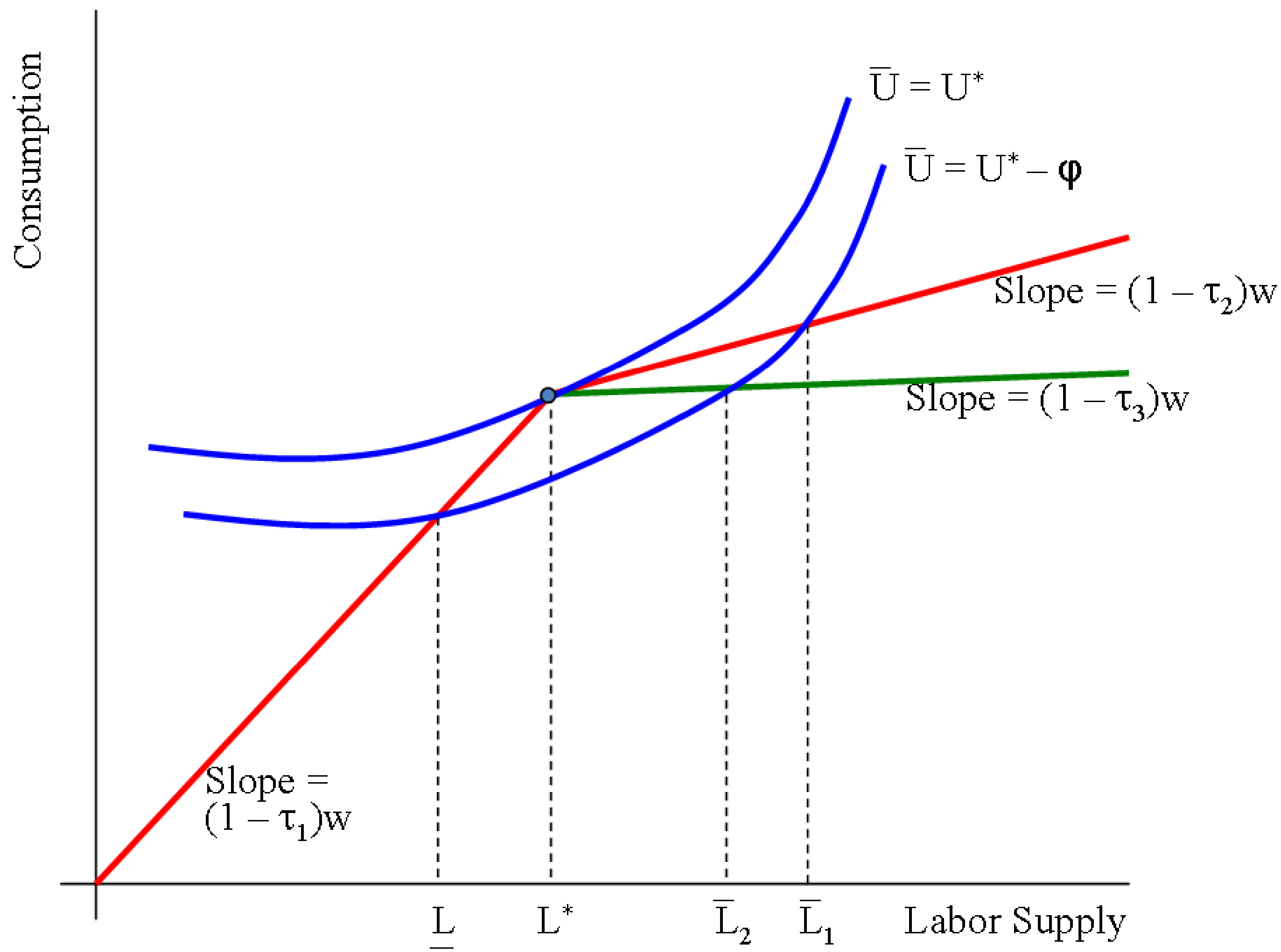
FIGURE 3-D.—EARNINGS DISTRIBUTION, 1984–86



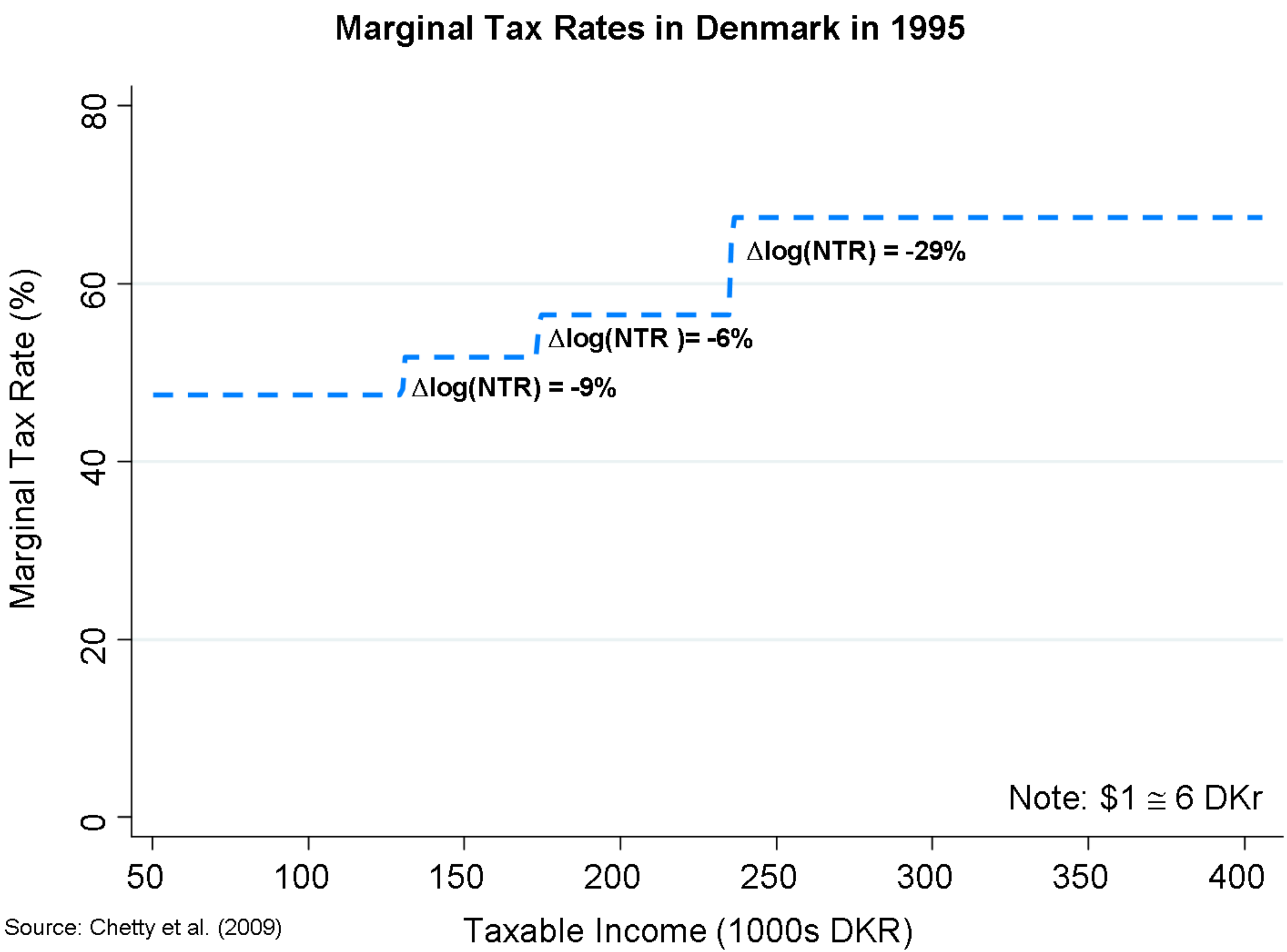
Note: In 1983 the earnings test was eliminated for 70–71 year olds (71–72 year olds in the following March CPS) but was not changed for 62–69 year olds. See Figure 2 note.

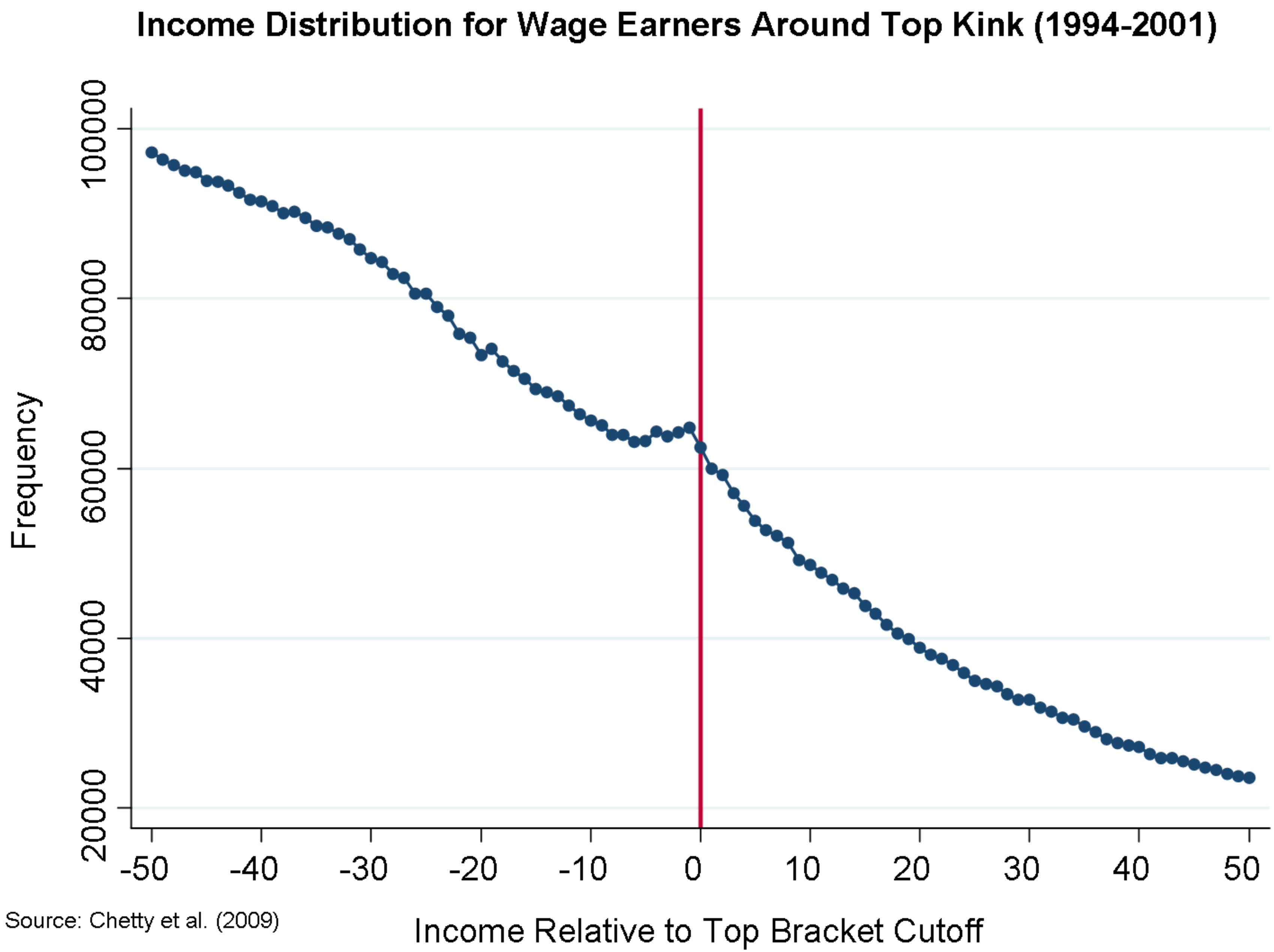
Source: Friedberg (2000), p. 56

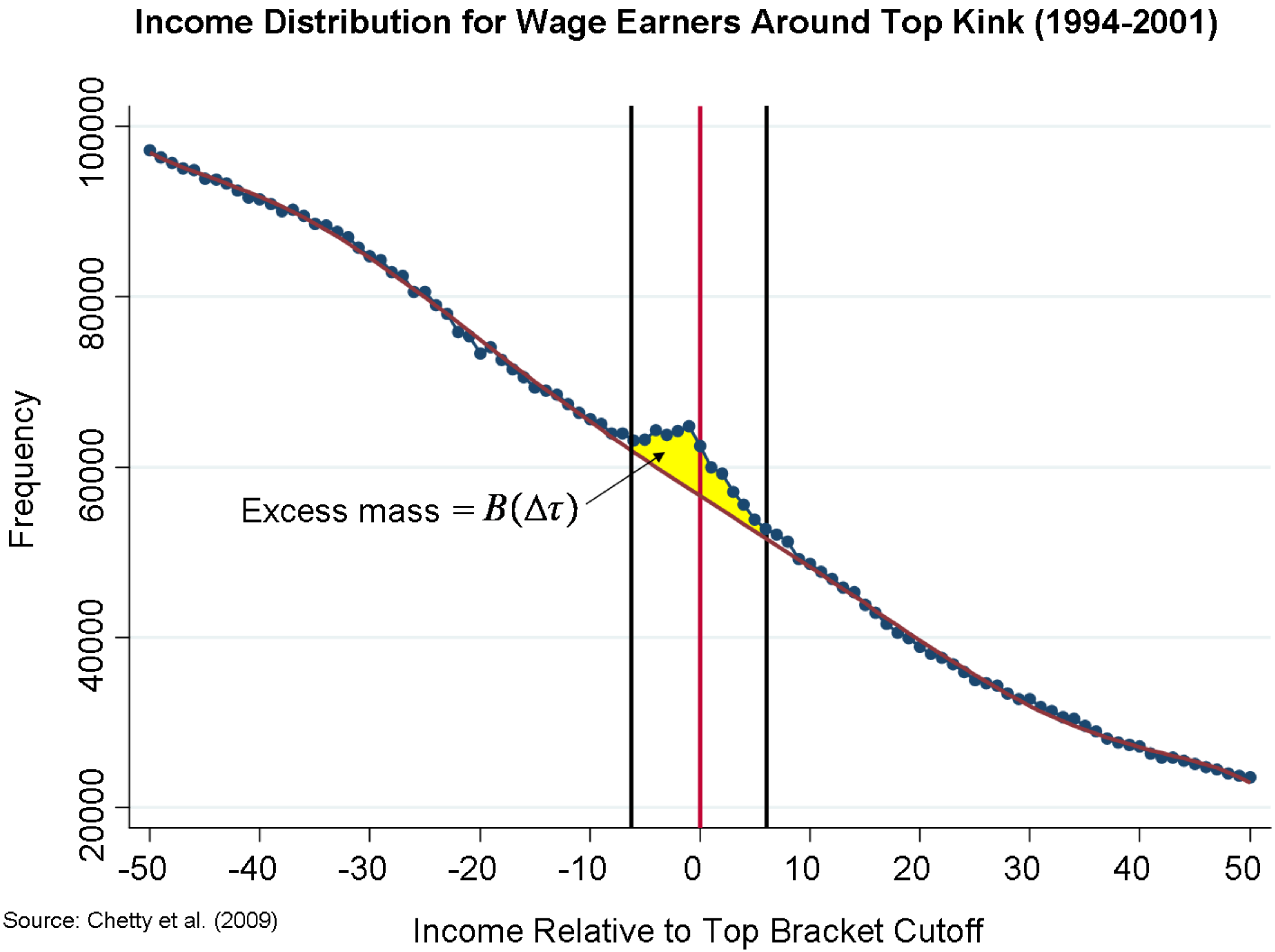
Cost of Bunching at Bracket Cutoff Points in Tax Schedule



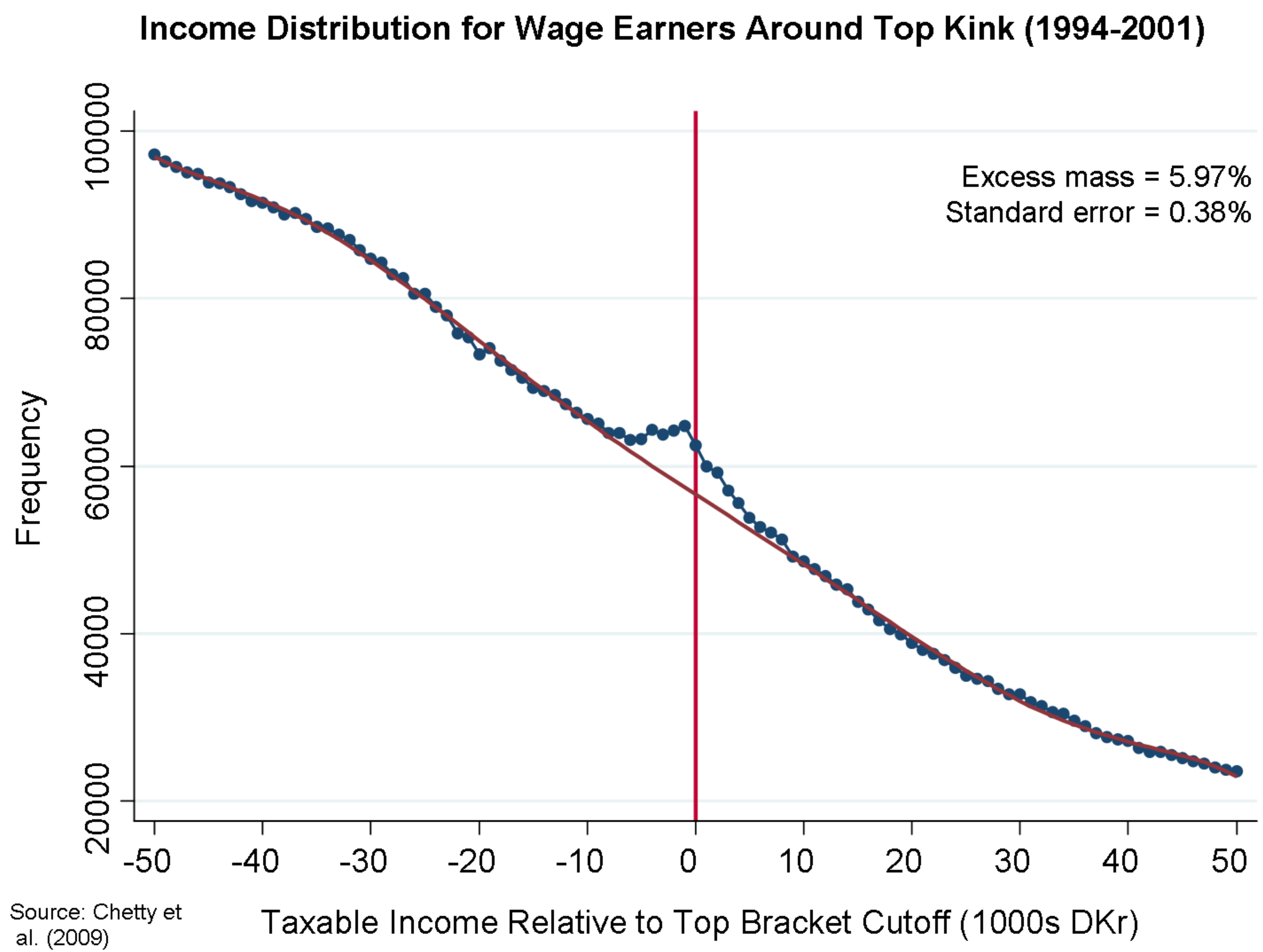
Source: Chetty et al. (2009)

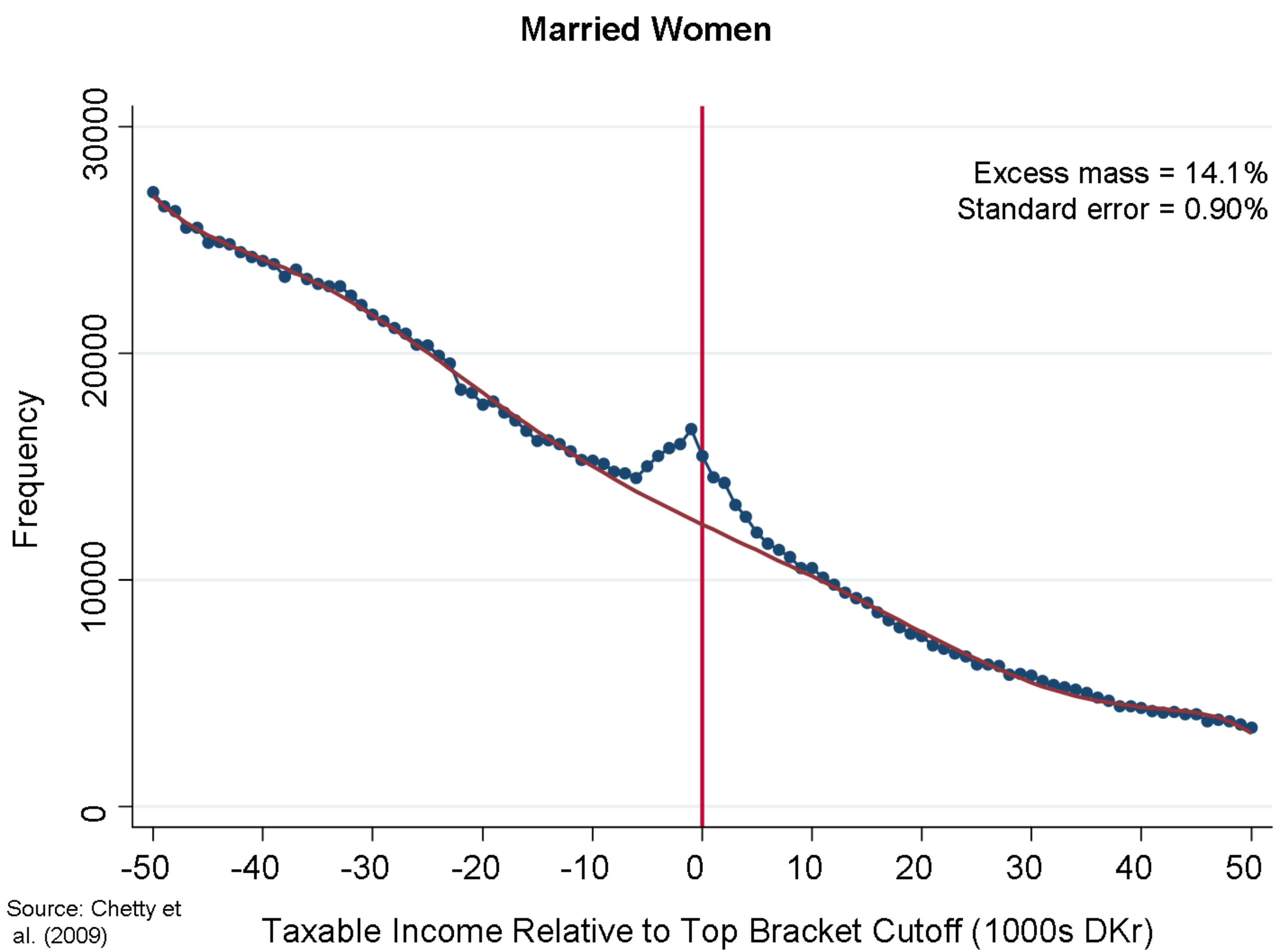

Marginal Tax Rates in Denmark in 1995
Marginal Tax Rate (%)
0
20
40
60
80
Δlog(NTR) = -29%
Δlog(NTR)= -6%
Δlog(NTR) = -9%
Note: $1 ≅ 6 DKr
50
100
150
200
250
300
350
400
Taxable Income (1000s DKR)
Source: Chetty et al. (2009)

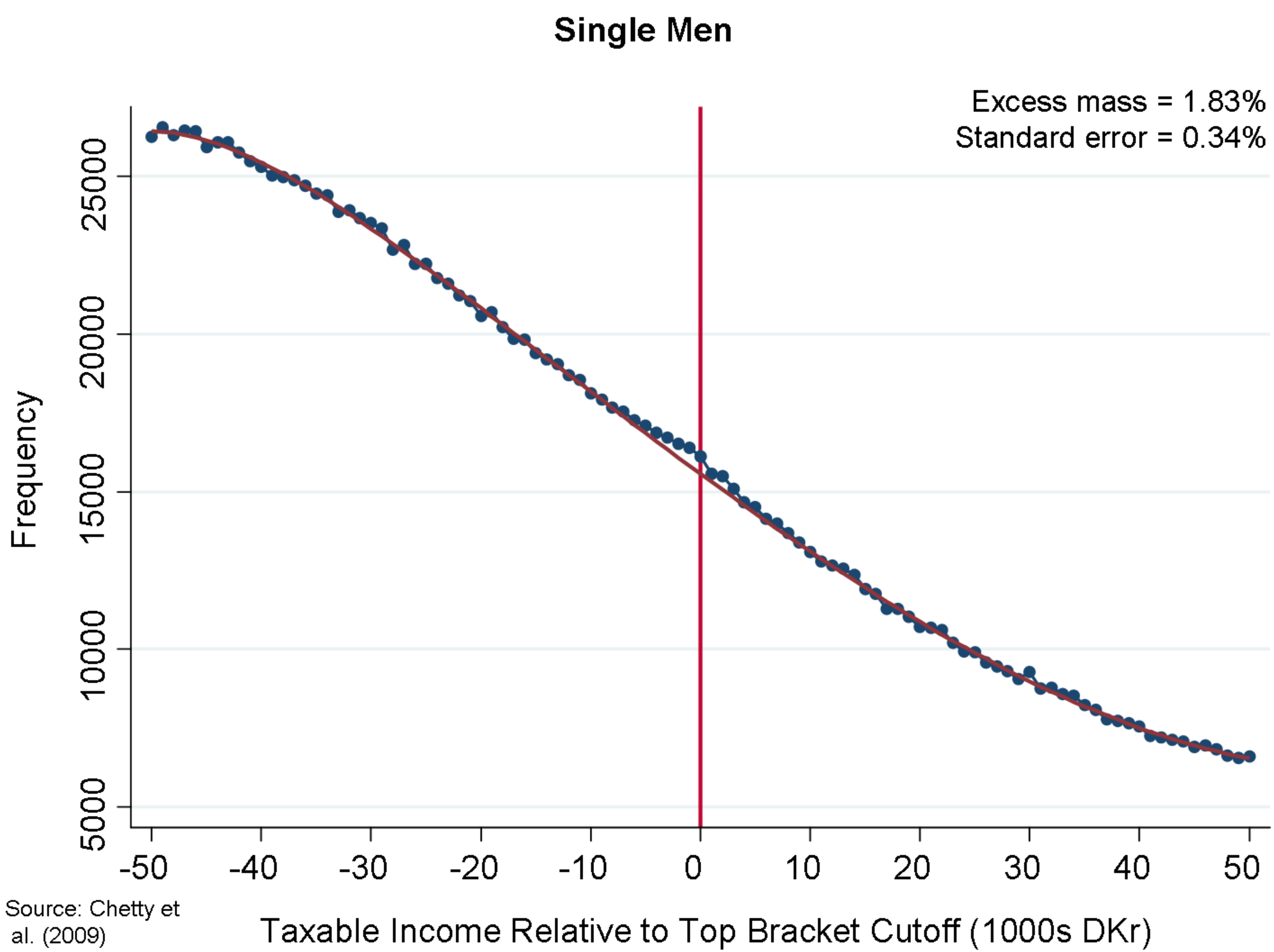

Income Distribution for Wage Earners Around Top Kink (1994-2001)
Frequency
100000
80000
60000
40000
20000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Income Relative to Top Bracket Cutoff
Source: Chetty et al. (2009)



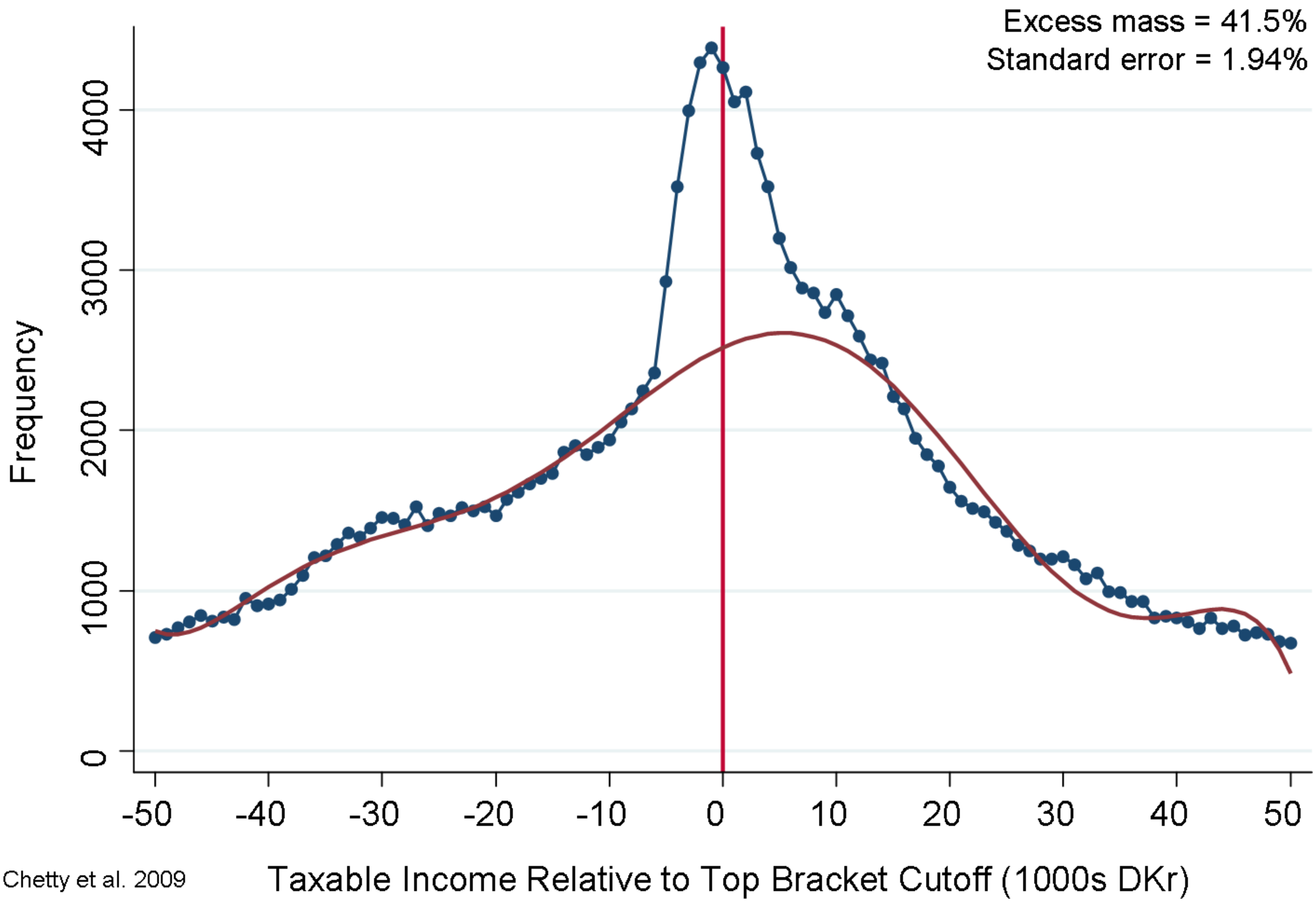
Source: Chetty et al. (2009)


Income Distribution for Wage Earners Around Top Kink (1994-2001)
Excess mass = 5.97%
Standard error = 0.38%
Frequency
100000
80000
60000
40000
20000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Source: Chetty et al. (2009)


Married Women
Excess mass = 14.1%
Standard error = 0.90%
Frequency
30000
20000
10000
0
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Source: Chetty et al. (2009)

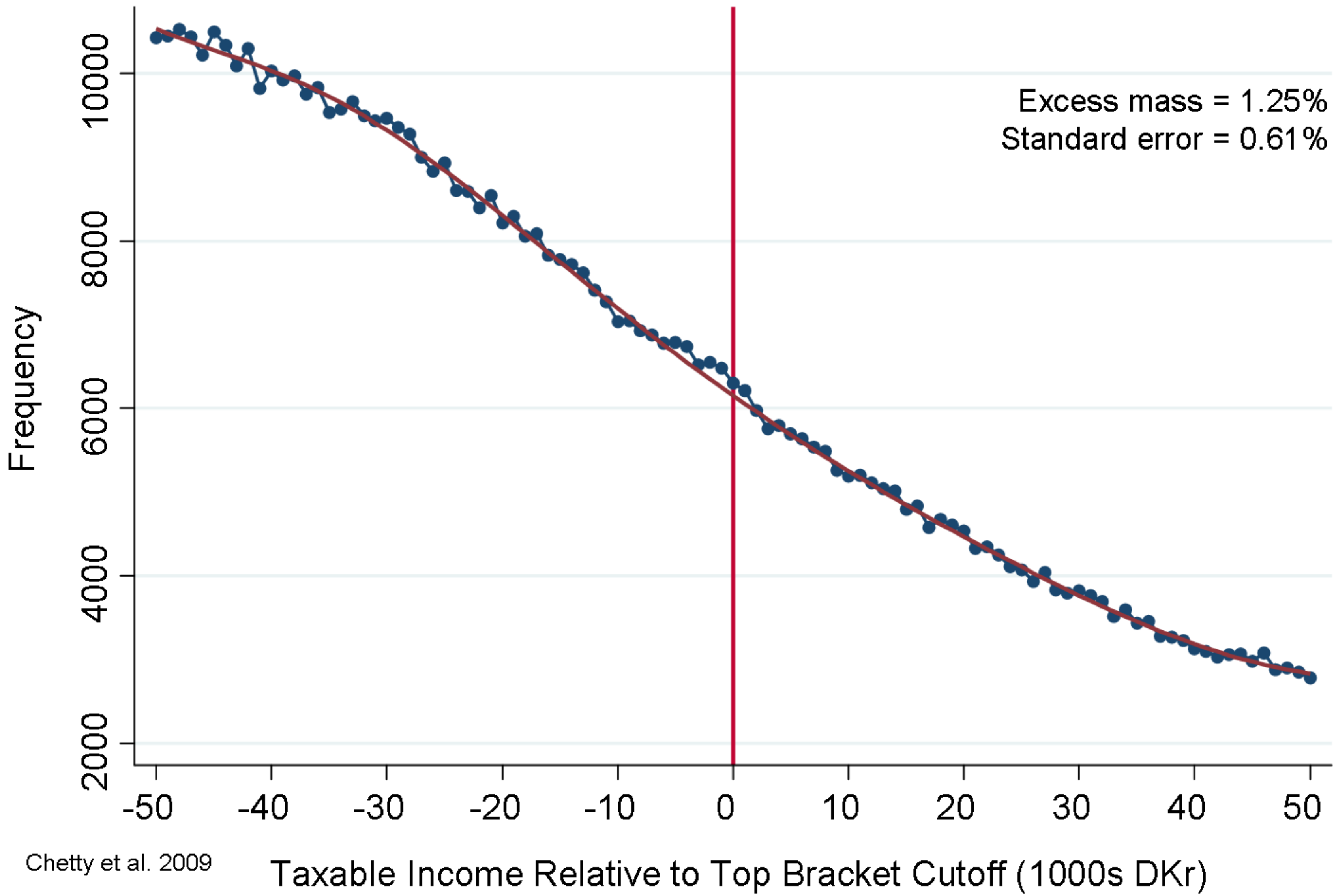

Single Men
Excess mass = 1.83%
Standard error = 0.34%
Frequency
5000
10000
15000
20000
25000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Source: Chetty et al. (2009)

Married Female Professionals with Above Median Experience



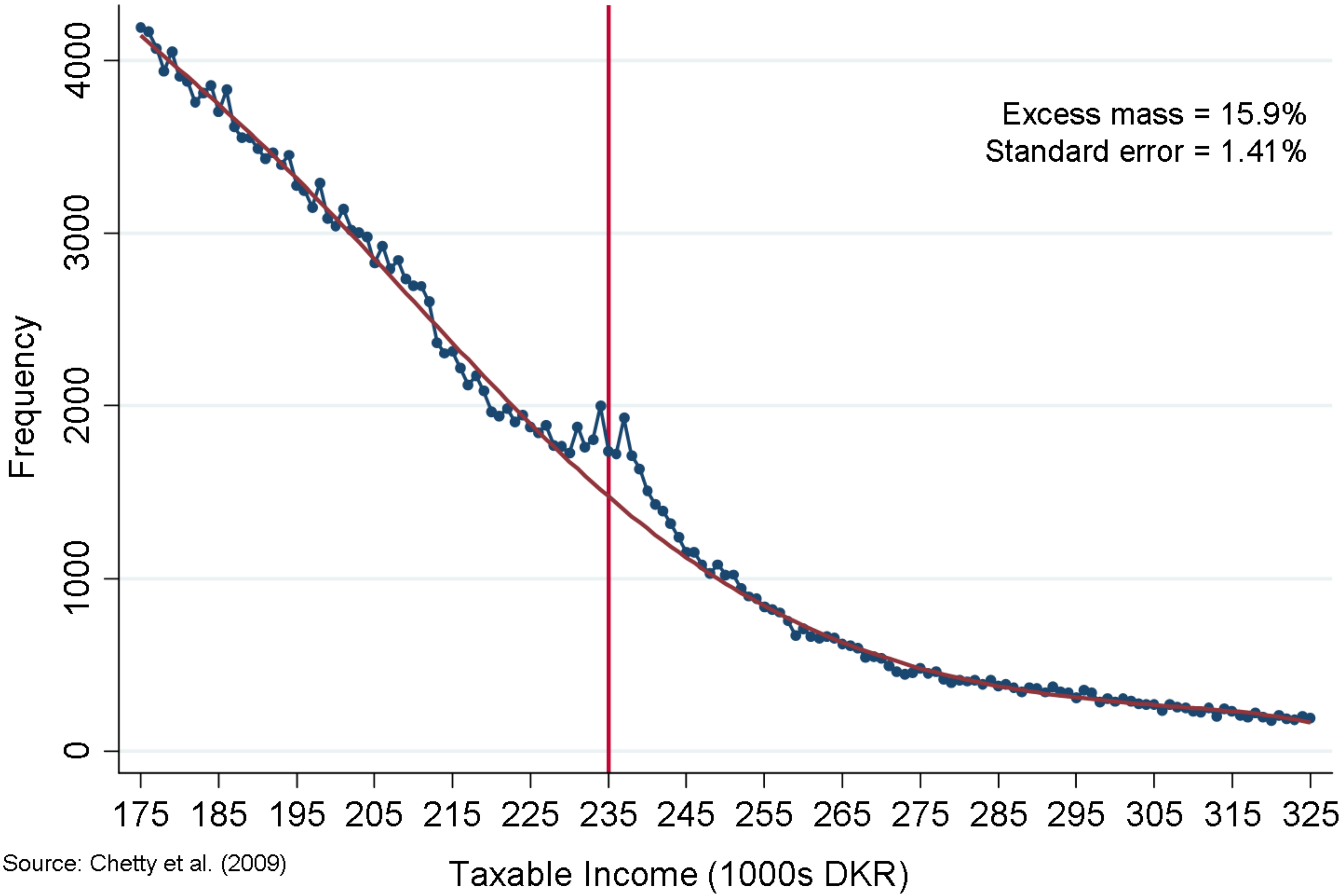
Chetty et al. 2009

Military

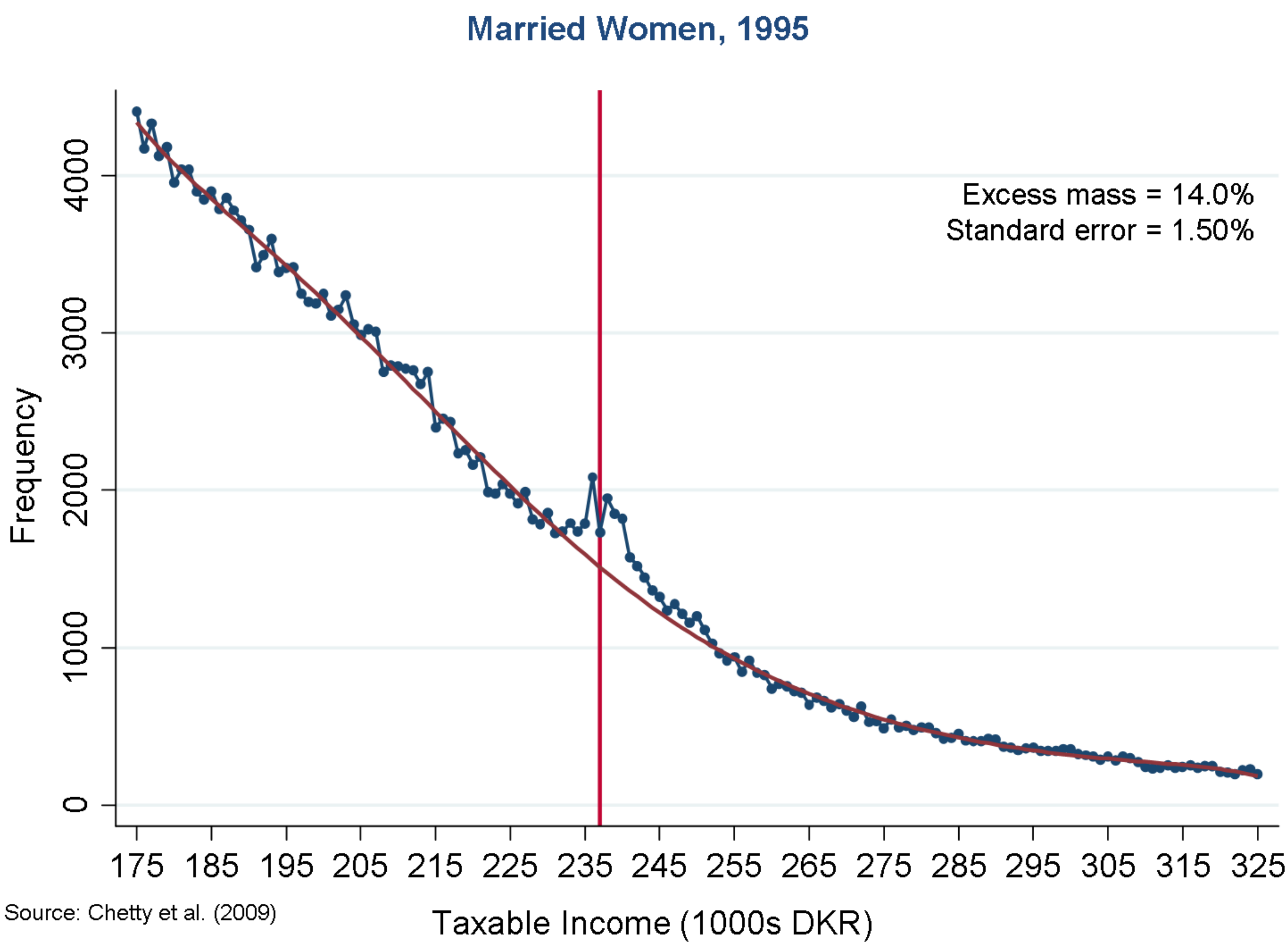


Chetty et al. 2009

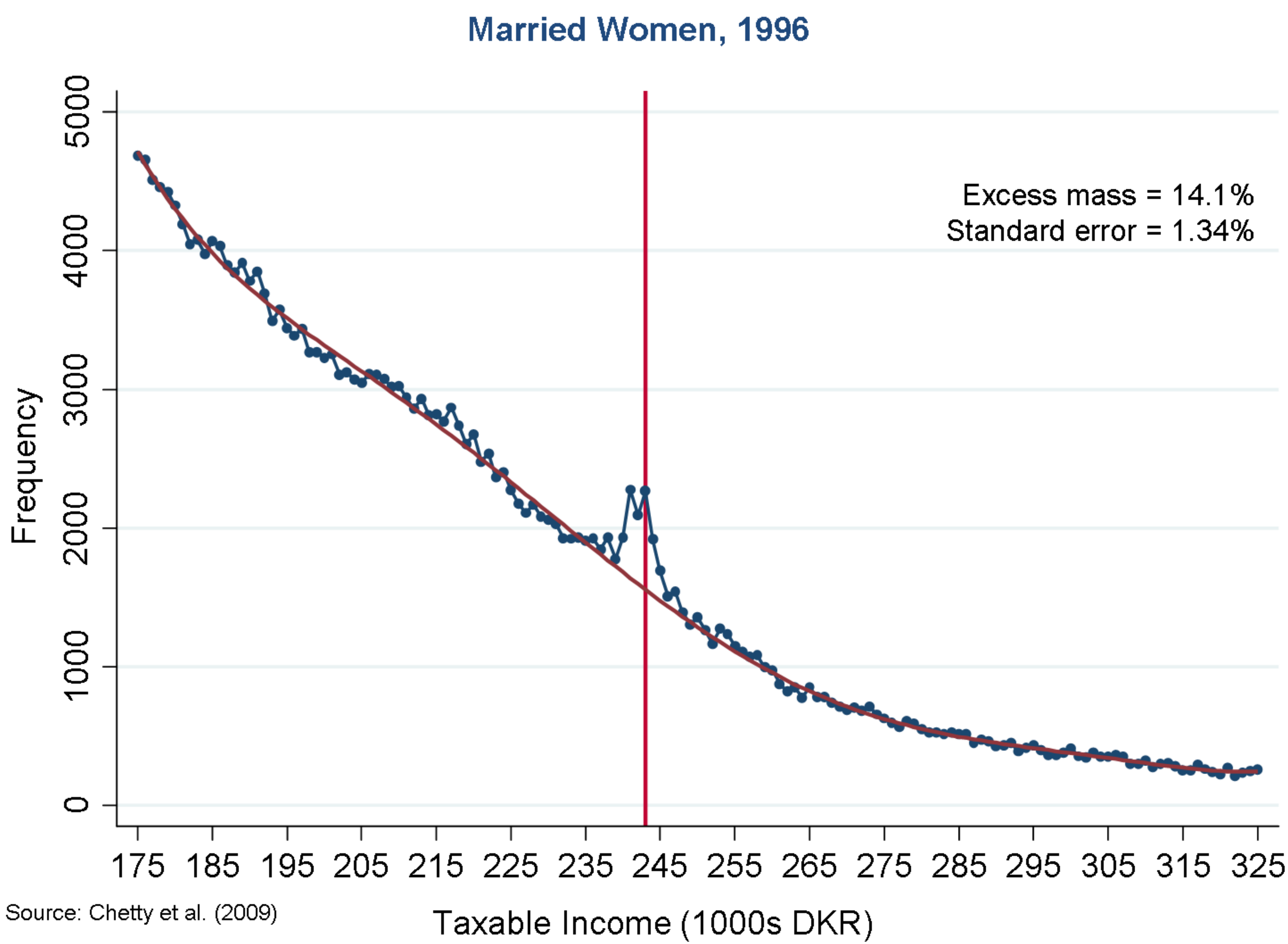
Married Women, 1994

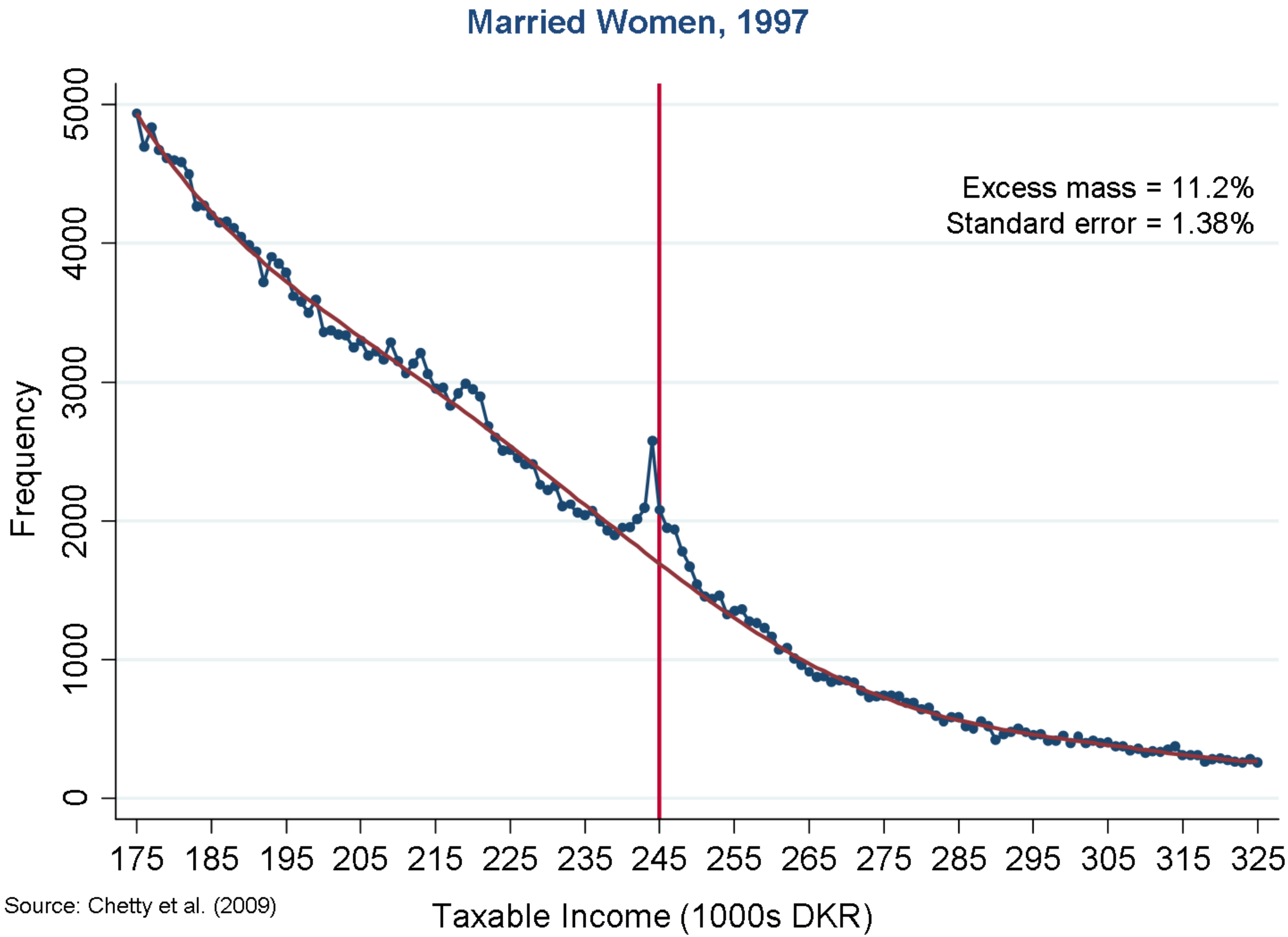


Source: Chetty et al. (2009)

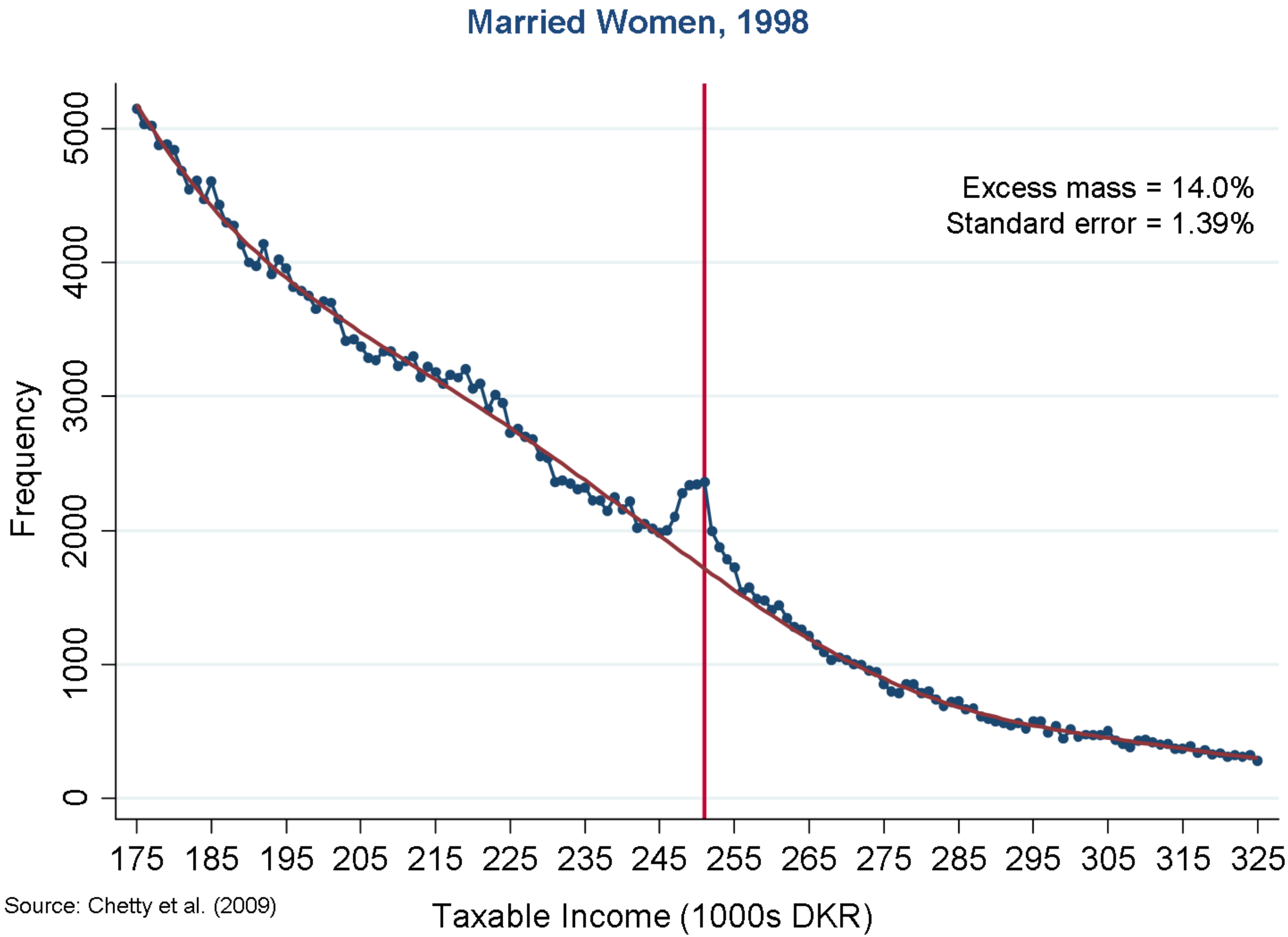


Married Women, 1995
Excess mass = 14.0%
Standard error = 1.50%
Frequency
0
1000
2000
3000
4000
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Taxable Income (1000s DKR)
Source: Chetty et al. (2009)


Married Women, 1996
Excess mass = 14.1%
Standard error = 1.34%
Frequency
0
1000
2000
3000
4000
5000
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Taxable Income (1000s DKR)
Source: Chetty et al. (2009)

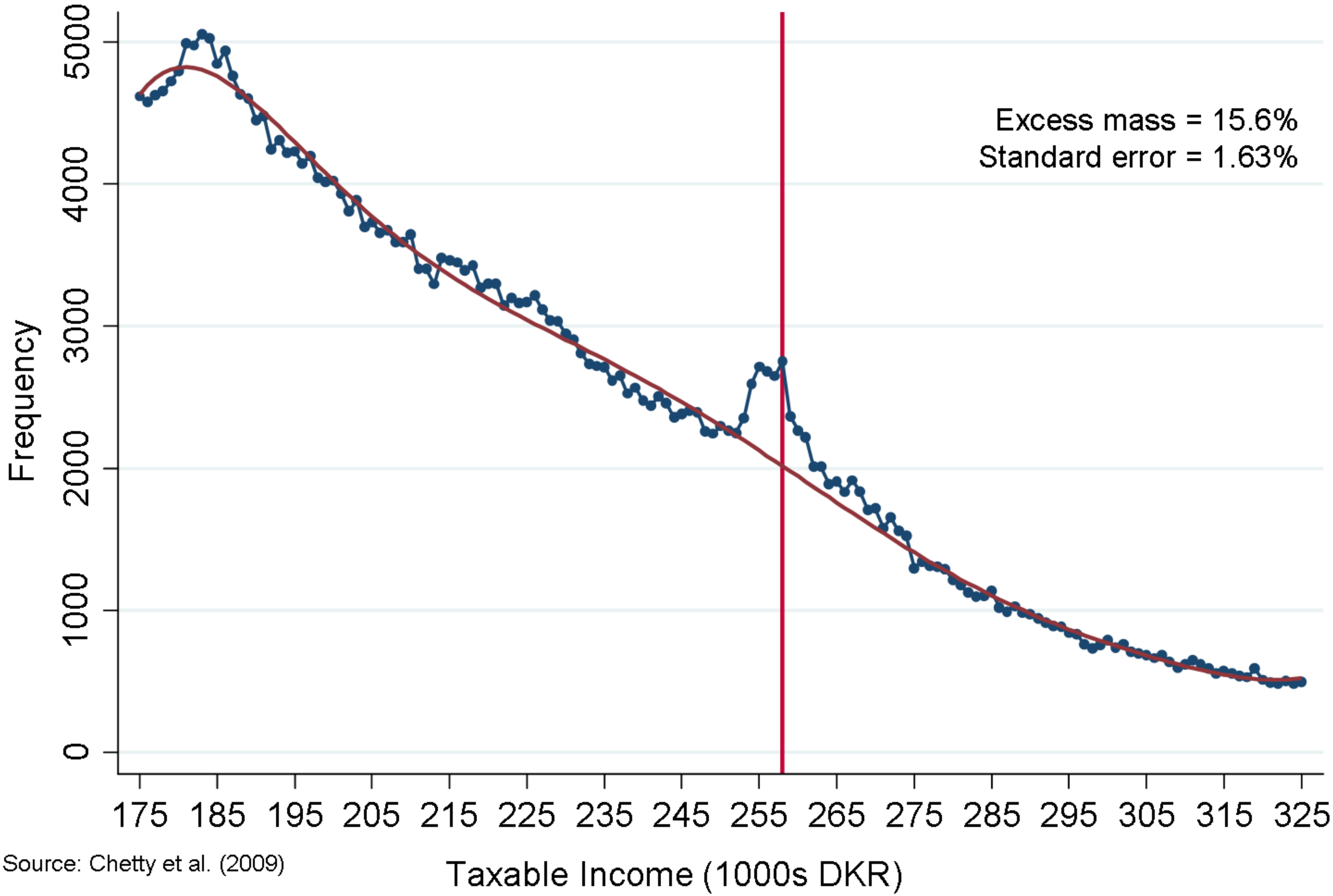


Source: Chetty et al. (2009)

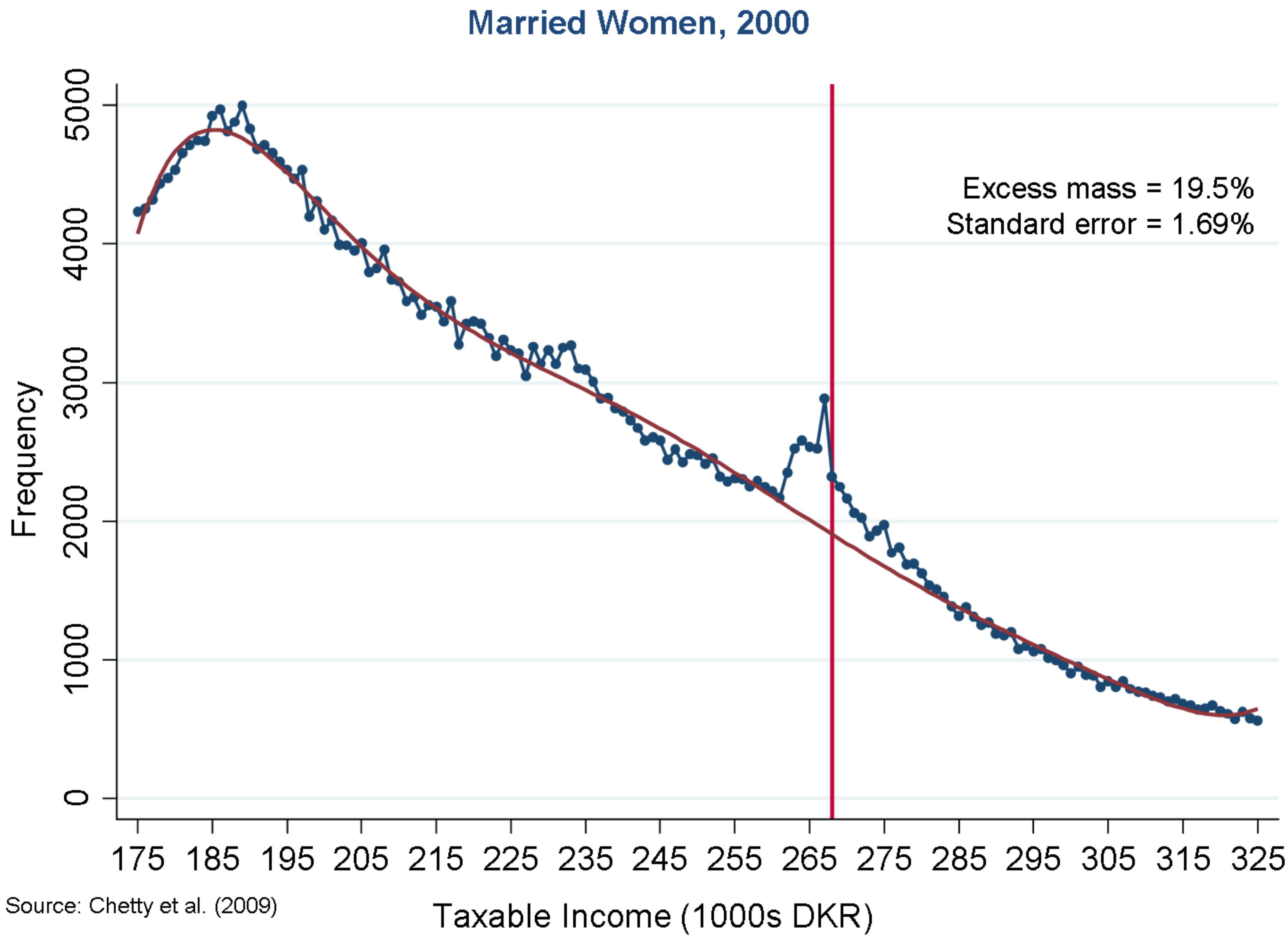


Married Women, 1998
Excess mass = 14.0%
Standard error = 1.39%
Frequency
0
1000
2000
3000
4000
5000
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Taxable Income (1000s DKR)
Source: Chetty et al. (2009)

Married Women, 1999

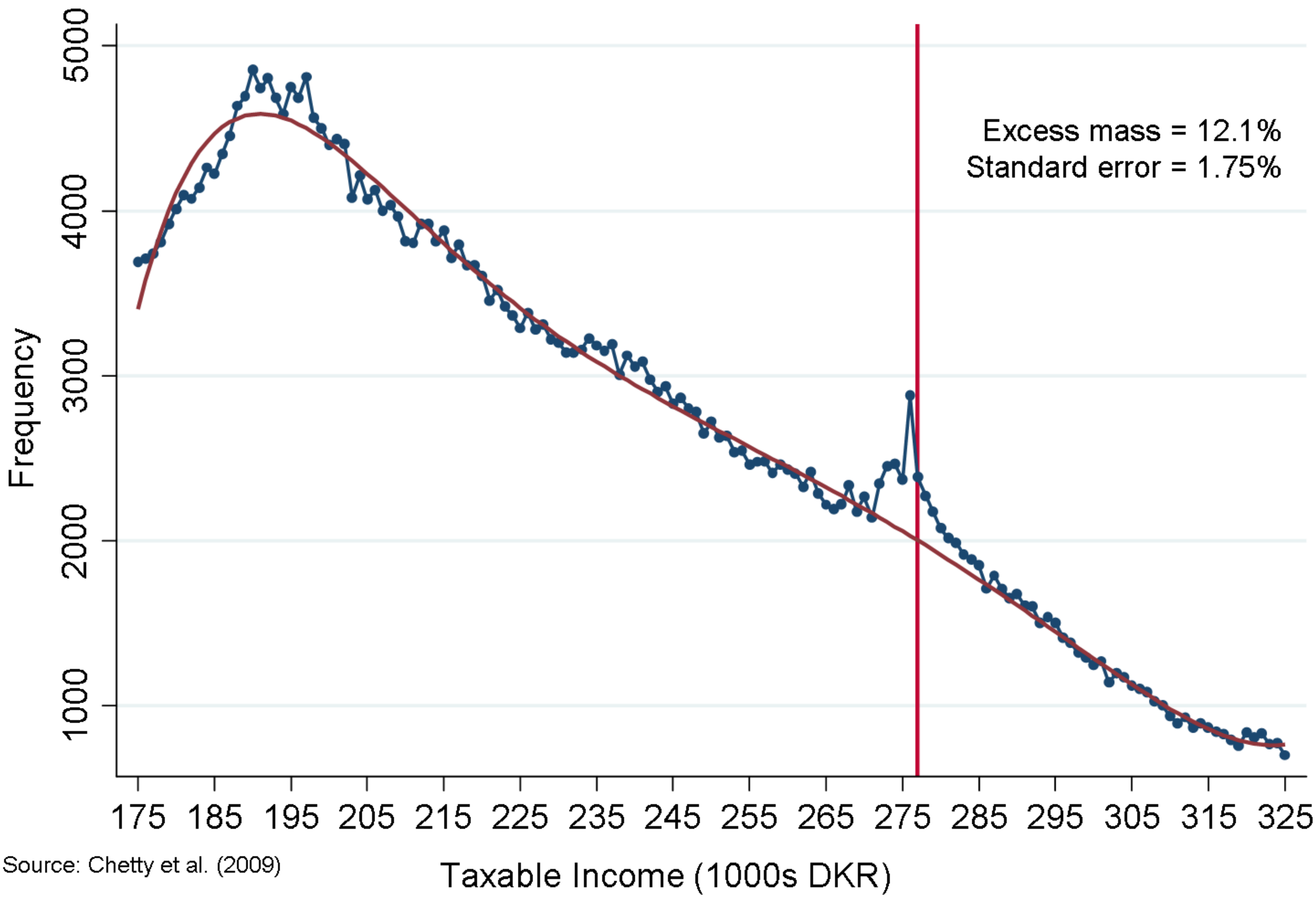


Source: Chetty et al. (2009)

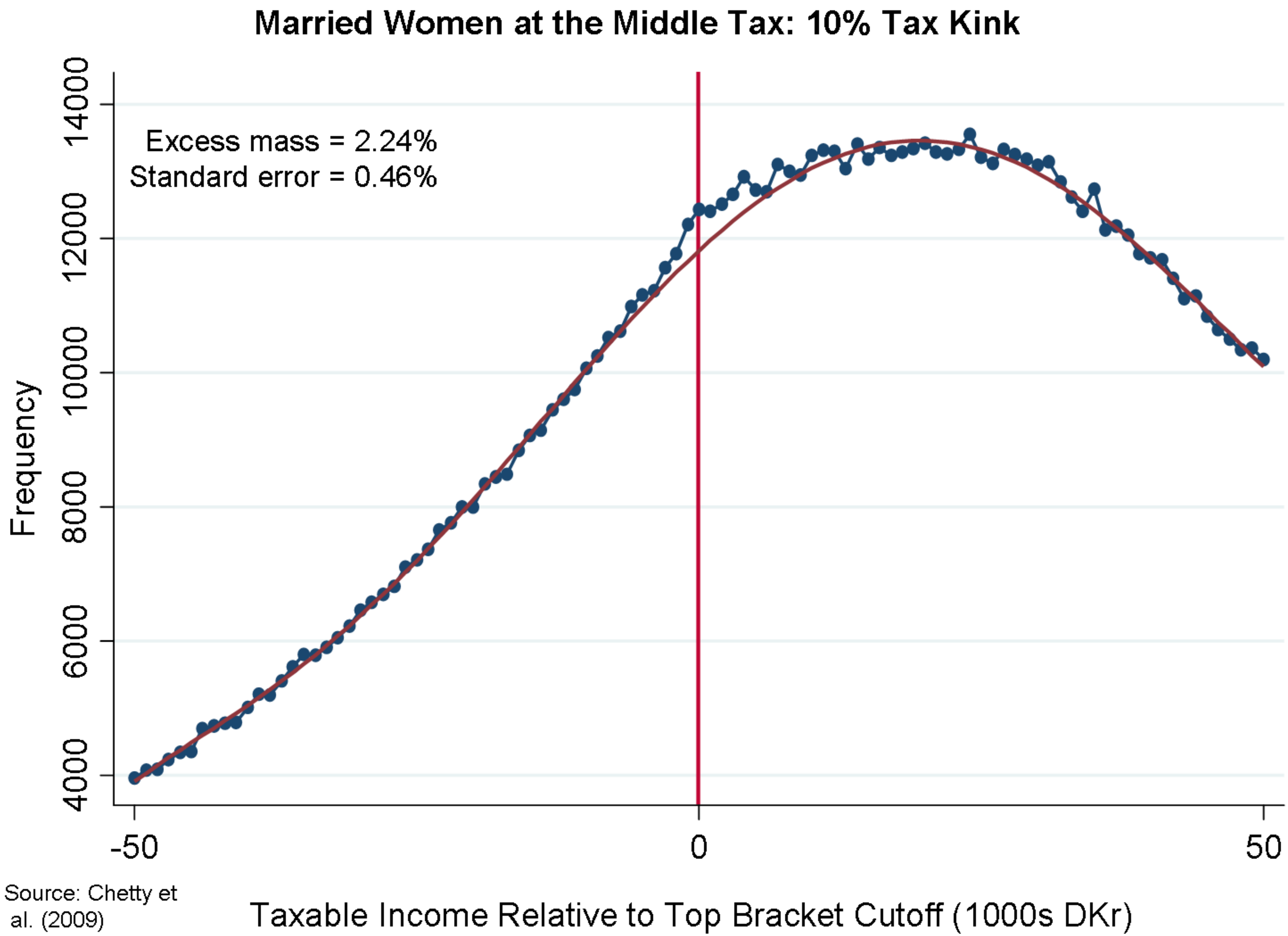


Source: Chetty et al. (2009)

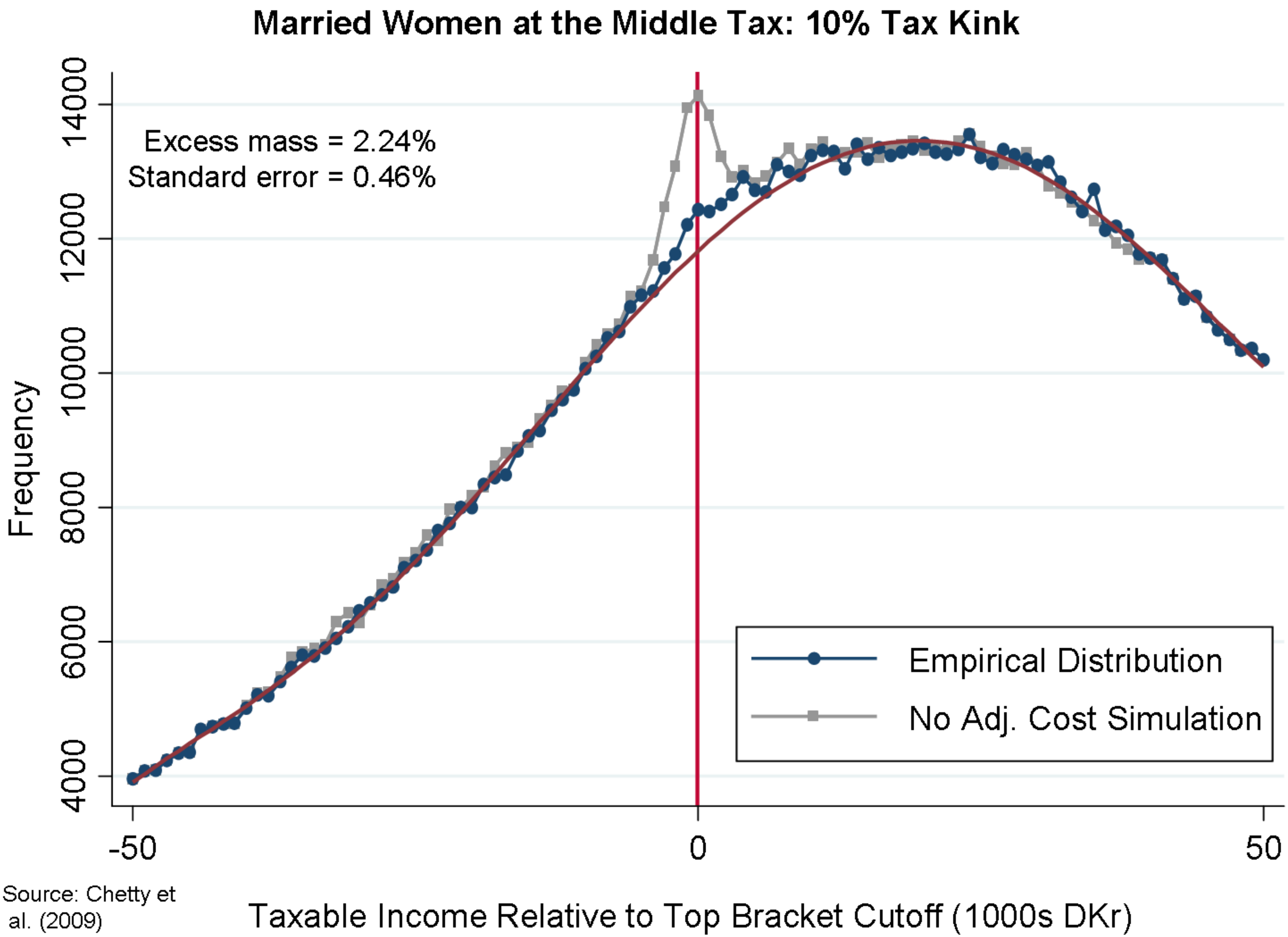
Married Women, 2001



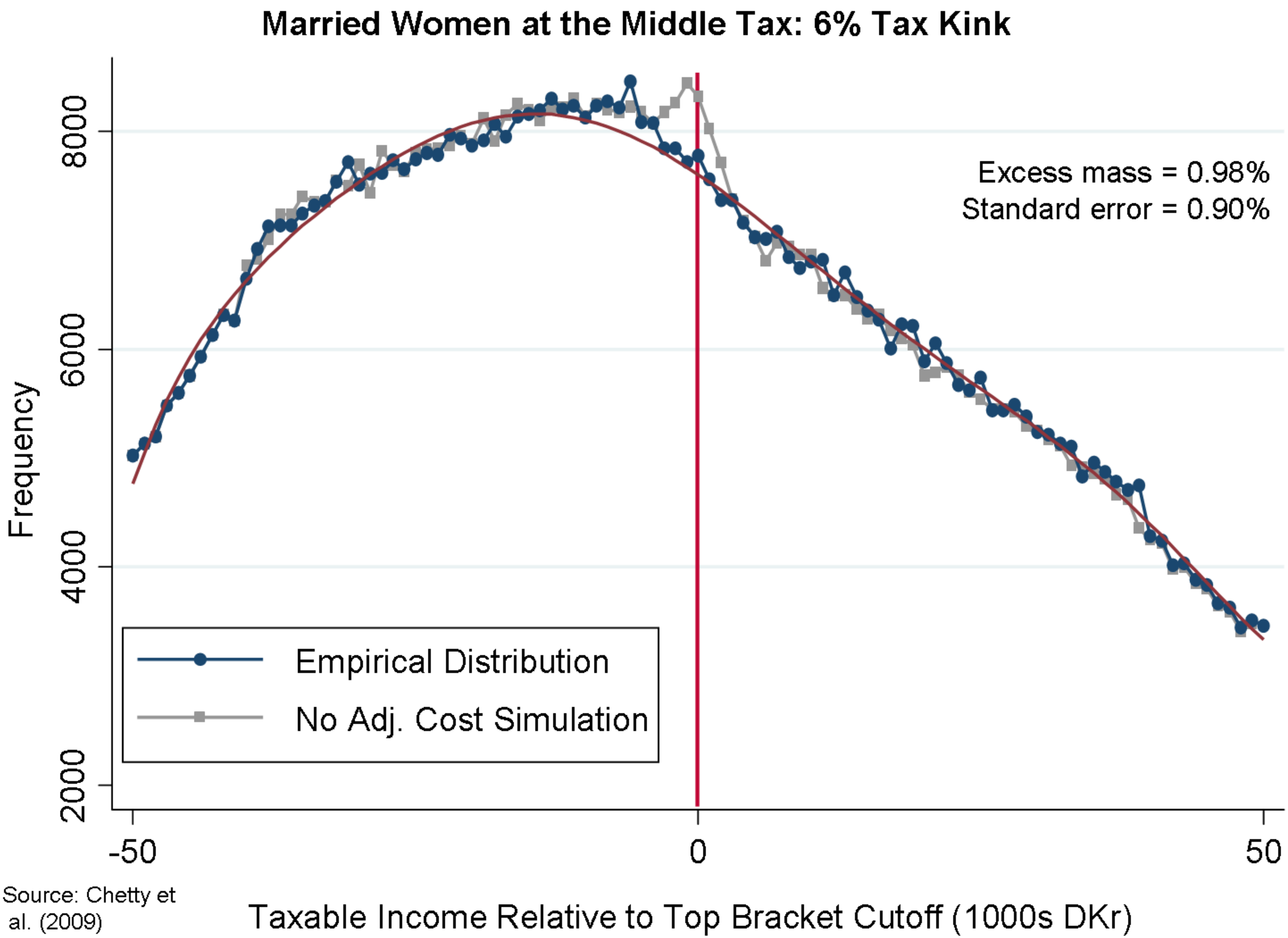
Source: Chetty et al. (2009)



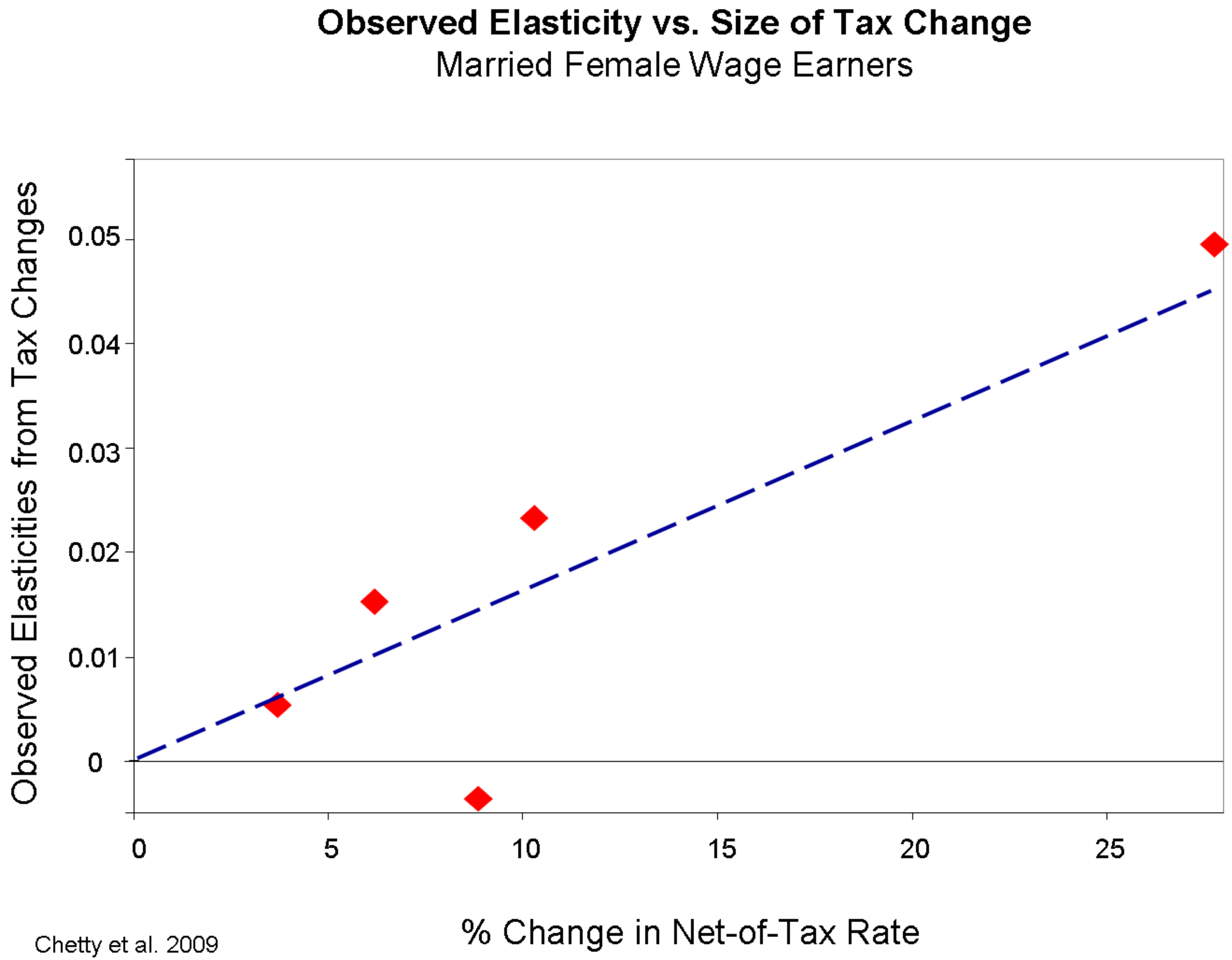
Married Women at the Middle Tax: 10% Tax Kink
Excess mass = 2.24%
Standard error = 0.46%
Frequency
4000
6000
8000
10000
12000
14000
-50
0
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Source: Chetty et al. (2009)



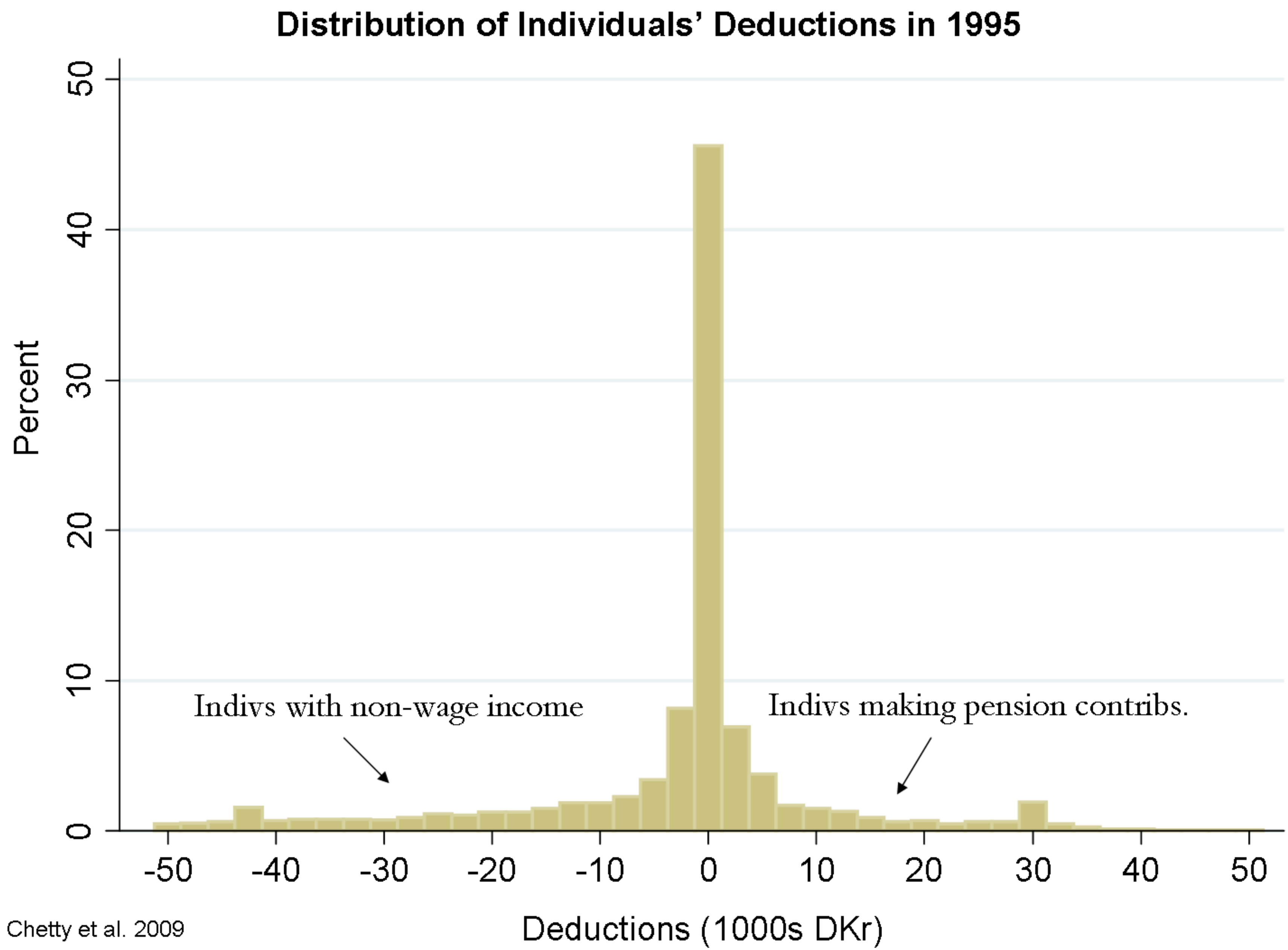
Source: Chetty et al. (2009)

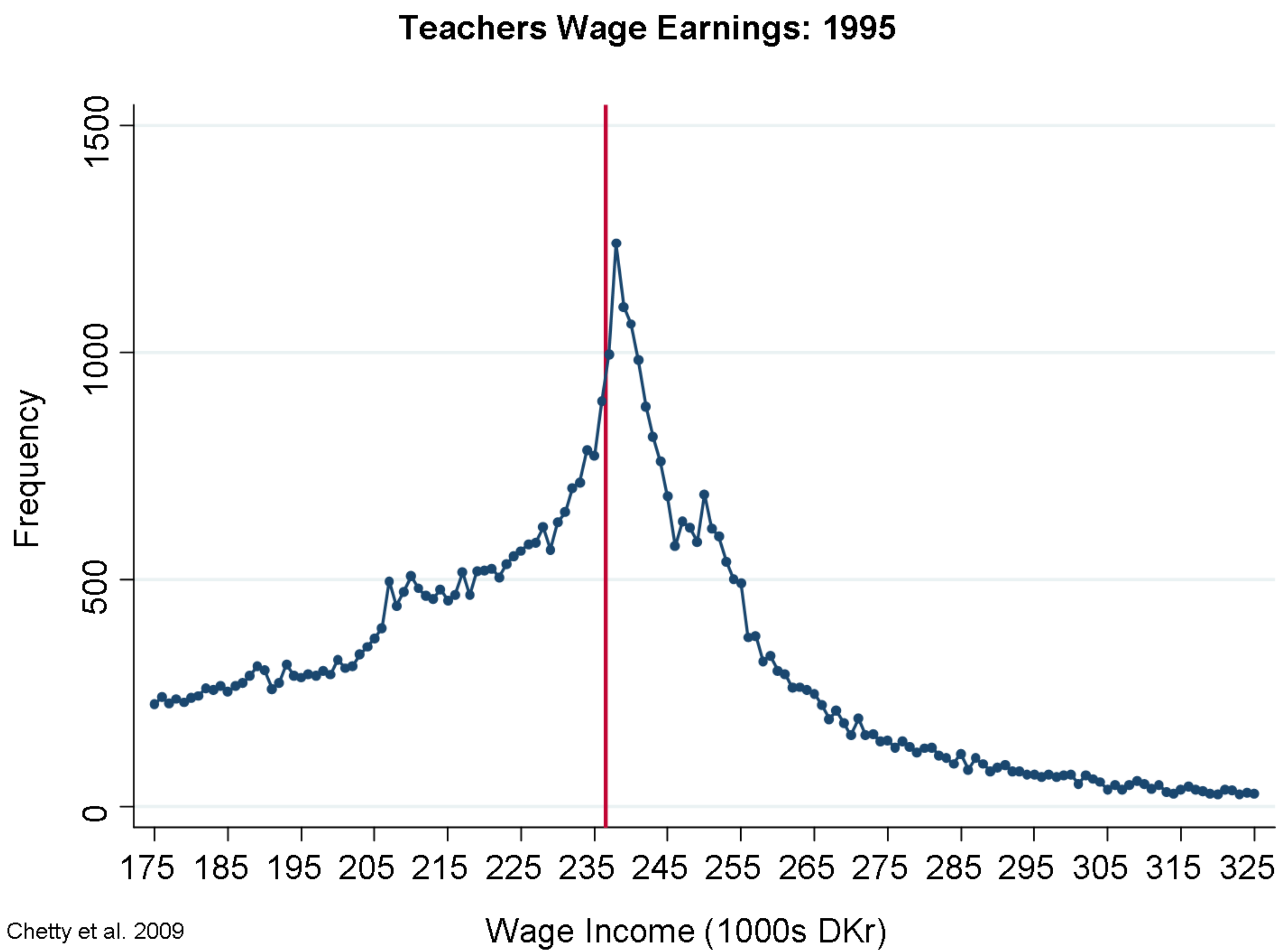


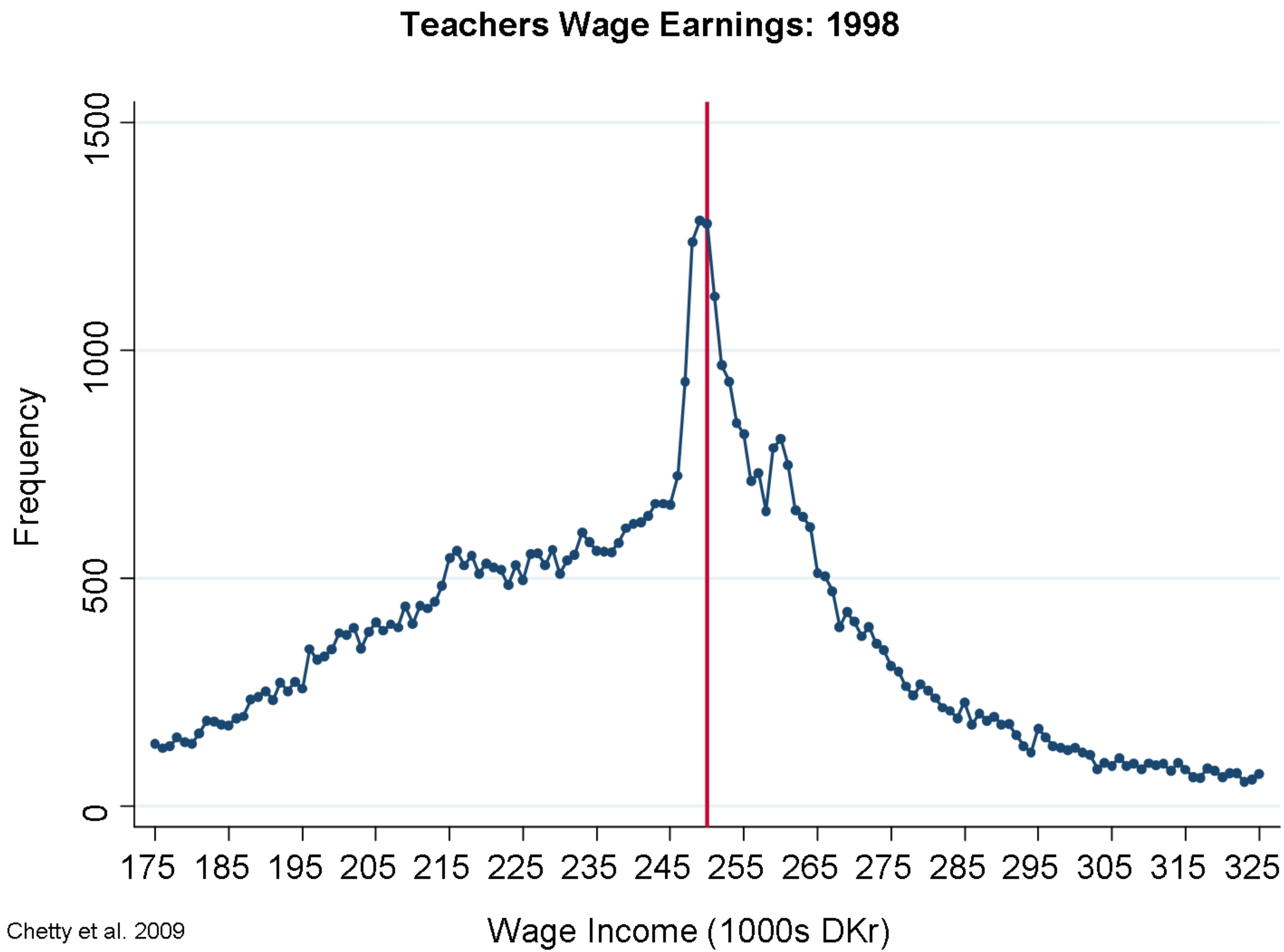
Source: Chetty et al. (2009)

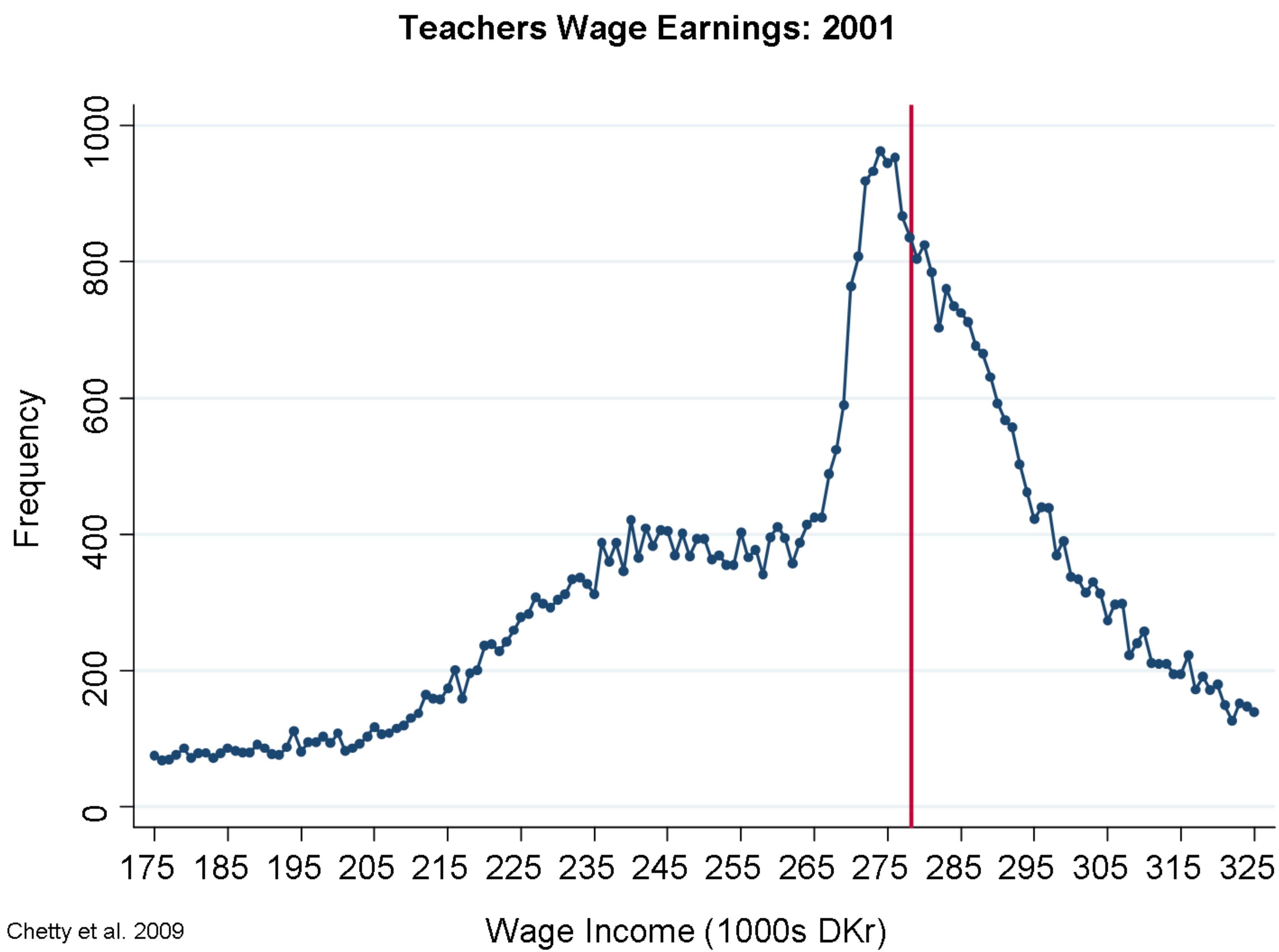


Chetty et al. 2009

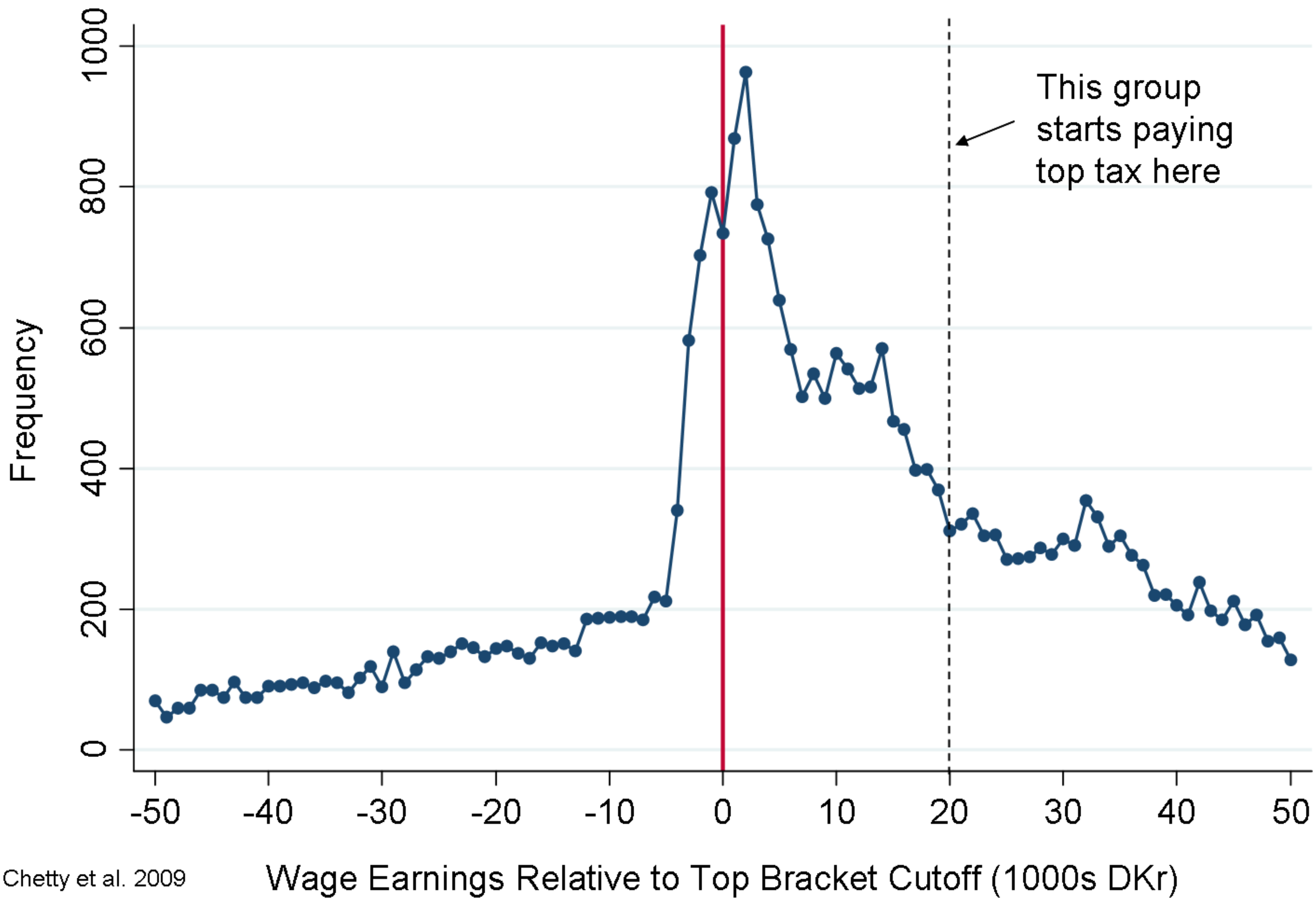

Distribution of Individuals' Deductions in 1995
Percent
0
10
20
30
40
50
Indivs with non-wage income
Indivs making pension contribs.
-50
-40
-30
-20
-10
0
10
20
30
40
50
Deductions (1000s DKr)
Chetty et al. 2009


Teachers Wage Earnings: 1995
Frequency
0
500
1000
1500
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Wage Income (1000s DKr)
Chetty et al. 2009

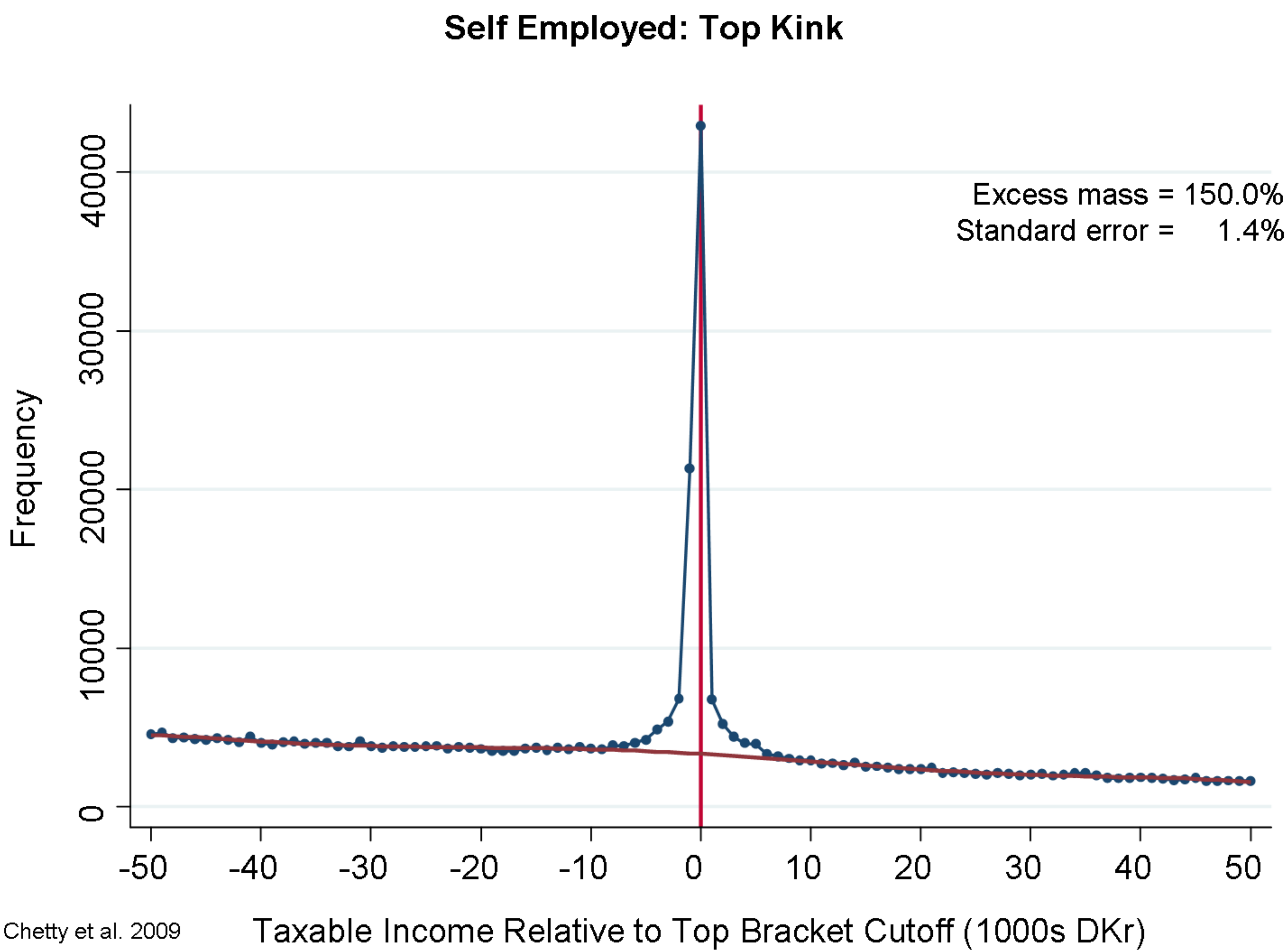

Teachers Wage Earnings: 1998
Frequency
1500
1000
500
0
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Wage Income (1000s DKr)
Chetty et al. 2009

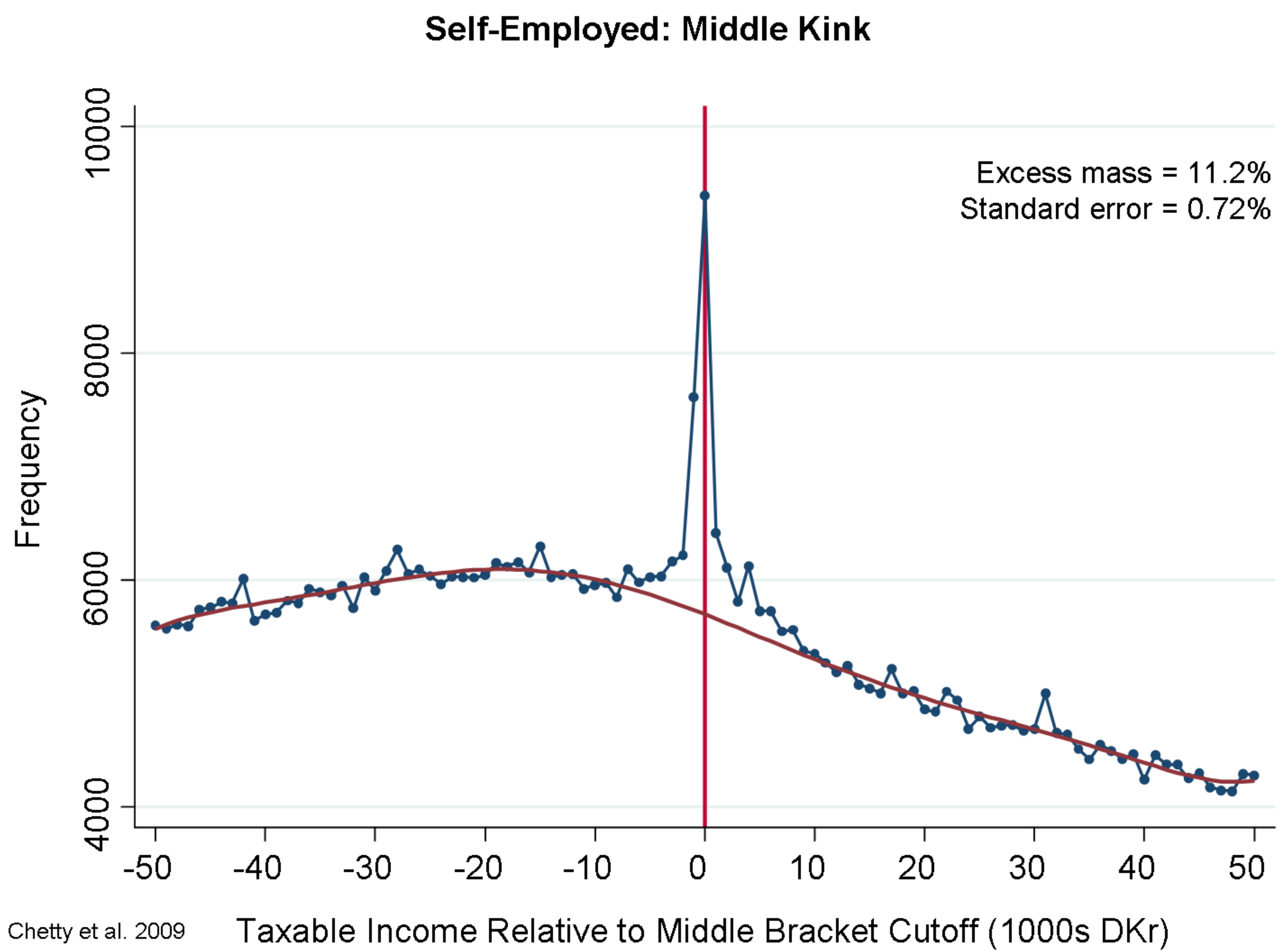

Teachers Wage Earnings: 2001
Frequency
0
200
400
600
800
1000
175
185
195
205
215
225
235
245
255
265
275
285
295
305
315
325
Wage Income (1000s DKr)
Chetty et al. 2009

Wage Earnings: Teachers with Deductions > DKr 20,000

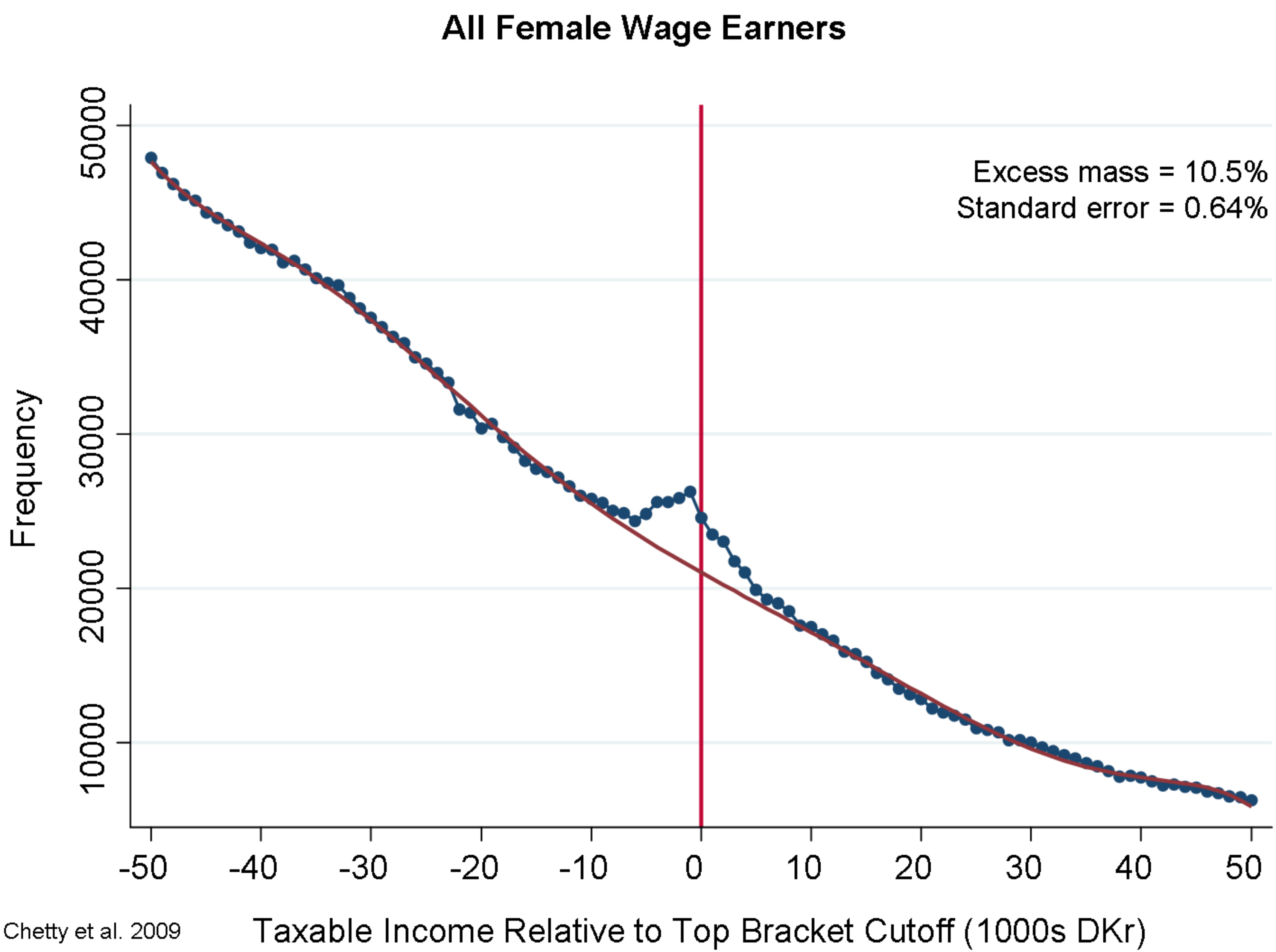


Chetty et al. 2009


Self Employed: Top Kink
Excess mass = 150.0%
Standard error = 1.4%
Frequency
0
10000
20000
30000
40000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Chetty et al. 2009



Self-Employed: Middle Kink
Excess mass = 11.2%
Standard error = 0.72%
Frequency
4000
6000
8000
10000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Chetty et al. 2009
Taxable Income Relative to Middle Bracket Cutoff (1000s DKr)


All Female Wage Earners
Excess mass = 10.5%
Standard error = 0.64%
Frequency
50000
40000
30000
20000
10000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Chetty et al. 2009

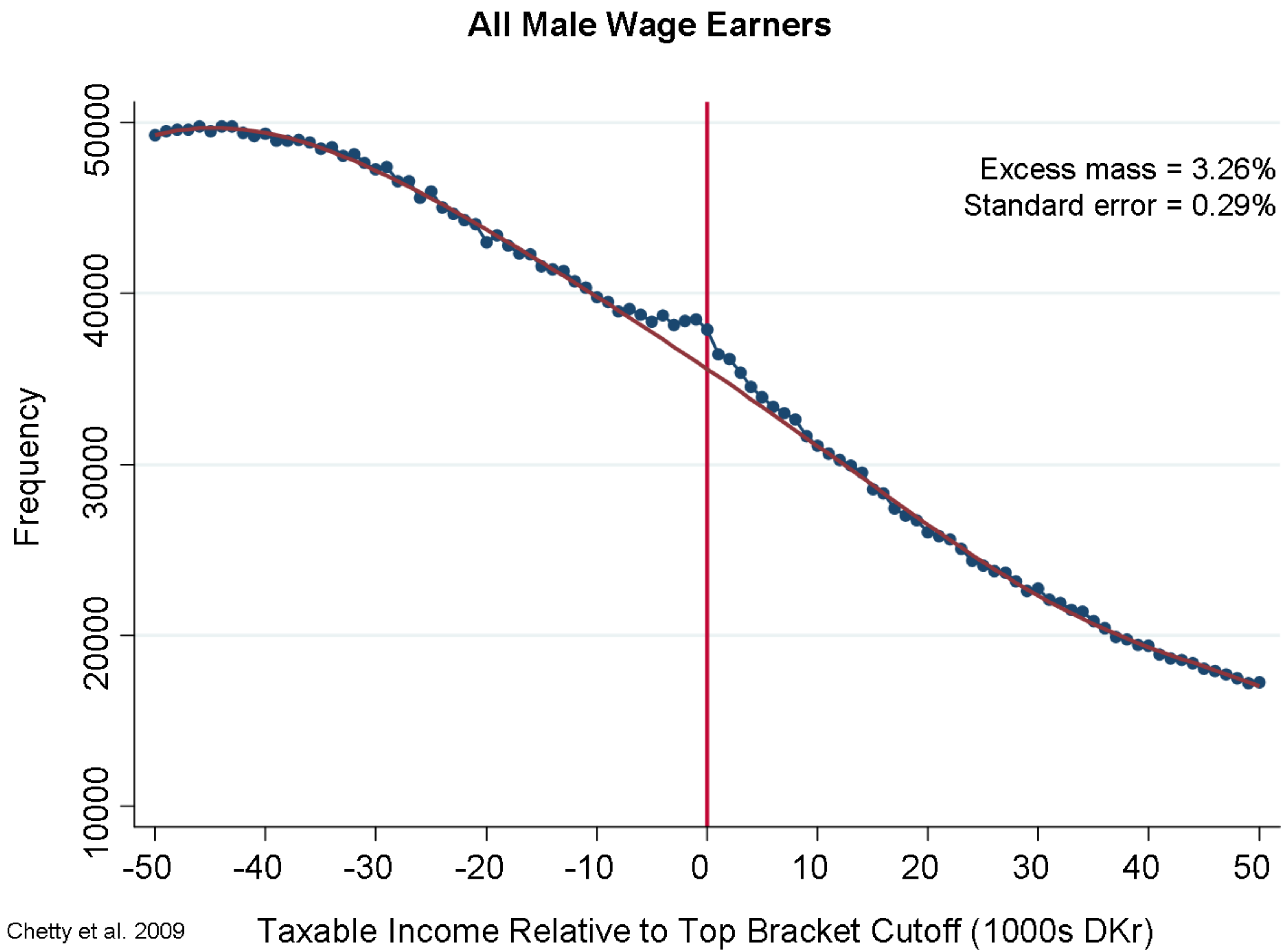

All Male Wage Earners
Excess mass = 3.26%
Standard error = 0.29%
Frequency
10000
20000
30000
40000
50000
-50
-40
-30
-20
-10
0
10
20
30
40
50
Taxable Income Relative to Top Bracket Cutoff (1000s DKr)
Chetty et al. 2009

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

Table 3
Experimental Payment minus Predicted Control Payment for 3-Year Dual-headed Experimental Families, Attrition Families Excluded (Standard Errors in Parentheses)

G ($)	τ	Declining Tax Rate	Preexperimental Payment ($)	Payments for Year of Experiment ($) 1	2	3	Postexperimental Payment ($)
3,800	.5	No	193.78	248.46	368.95*	389.24*	138.56
			(143.45)	(149.58)	(170.75)	(182.99)	(188.20)
3,800	.7	No	124.96	185.18	317.28	218.37	−47.85
			(223.77)	(237.91)	(252.99)	(325.57)	(314.66)
3,800	.7	Yes	−33.37	68.94	158.44	324.84	29.28
			(178.05)	(176.07)	(213.59)	(230.50)	(222.42)
3,800	.8	Yes	75.40	336.06	221.54	160.83	91.52
			(229.44)	(237.18)	(245.92)	(264.53)	(261.84)
4,800	.5	No	52.02	85.17	294.55	337.23	70.22
			(192.31)	(184.85)	(201.73)	(221.73)	(219.58)
4,800	.7	No	220.76	288.33	496.85*	543.25*	178.32
			(160.04)	(169.04)	(197.88)	(204.50)	(194.03)
4,800	.7	Yes	136.99	281.98*	423.30*	348.03*	23.96
			(127.36)	(137.19)	(157.51)	(162.38)	(140.58)
4,800	.8	Yes	−16.87	305.09	417.90	317.39	121.47
			(175.54)	(209.24)	(234.32)	(274.11)	(239.59)
5,600	.5	No	−163.12	200.75	664.41*	717.15*	124.93
			(252.05)	(258.13)	(283.28)	(280.65)	(287.04)
5,600	.7	No	−59.97	23.34	386.12	744.94*	267.69
			(164.95)	(156.41)	(200.59)	(263.80)	(259.45)
5,600	.8	Yes	−27.64	−51.03	117.85	273.44	121.53
			(121.47)	(126.67)	(138.52)	(157.96)	(169.26)

NOTE.—Terms are explained in text.
* Denotes mean is more than twice its standard error.

Source: Ashenfelter and Plant (1990), p. 405

Table 4
Experimental Payment minus Predicted Control Payment for 5-Year Dual-headed Experimental Families, Attrition Families Excluded (Standard Errors in Parentheses)

				Payment for Year of Experiment ($)					
G ($)	τ	Declining Tax Rate	Preexperimental Payment ($)	1	2	3	4	5	Postexperimenta Payment ($)
3,800	.5	No	102.24	345.68	526.02	110.30	390.07	169.82	229.70
			(185.55)	(221.42)	(241.53)	(265.28)	(307.01)	(286.76)	(309.06)
3,800	.7	No	81.16	23.30	−99.33	98.20	−16.42	−122.01	−406.46
			(309.85)	(316.06)	(330.14)	(383.52)	(388.07)	(352.95)	(314.40)
3,800	.7	Yes	6.99	490.00	176.14	23.22	324.70	−59.79	−598.09*
			(234.01)	(288.13)	(272.87)	(300.28)	(386.93)	(331.68)	(102.72)
3,800	.8	Yes	−130.30	349.73	189.80	329.94	1207.82*	1108.49*	307.38
			(271.23)	(286.56)	(280.63)	(365.58)	(463.10)	(487.83)	(453.29)
4,800	.5	No	−23.66	30.15	160.40	399.28	419.73	434.30	251.09
			(183.73)	(208.90)	(199.26)	(236.33)	(247.25)	(254.52)	(242.45)
4,800	.7	No	−129.98	25.71	−4.47	569.10	493.42	219.74	−38.46
			(185.46)	(208.14)	(211.44)	(314.73)	(357.32)	(340.60)	(228.01)
4,800	.7	Yes	75.66	224.96	387.66	340.71	−130.10	34.61	189.49
			(234.21)	(280.43)	(367.56)	(404.05)	(308.90)	(445.67)	(491.52)
4,800	.8	Yes	467.89	325.17	599.43*	398.62	537.21	506.95	346.28
			(252.40)	(276.31)	(274.39)	(280.50)	(365.56)	(351.98)	(337.43)
5,600	.5	No	−224.97	560.51	723.08*	782.53*	592.40	313.82	−53.07
			(286.39)	(298.21)	(306.90)	(327.39)	(366.88)	(387.31)	(325.66)
5,600	.7	No	−158.74	500.18	1194.68*	890.38*	825.39	435.01	588.91
			(239.17)	(311.24)	(416.25)	(391.61)	(467.76)	(609.49)	(510.52)
5,600	.8	Yes	−6.48	193.54	617.29*	906.13*	888.72	877.71	75.21
			(175.15)	(199.51)	(255.89)	(315.98)	(337.38)	(398.38)	(216.12)

NOTE.—Terms are explained in text.
* Denotes mean is more than twice its standard error.

Source: Ashenfelter and Plant (1990), p. 407

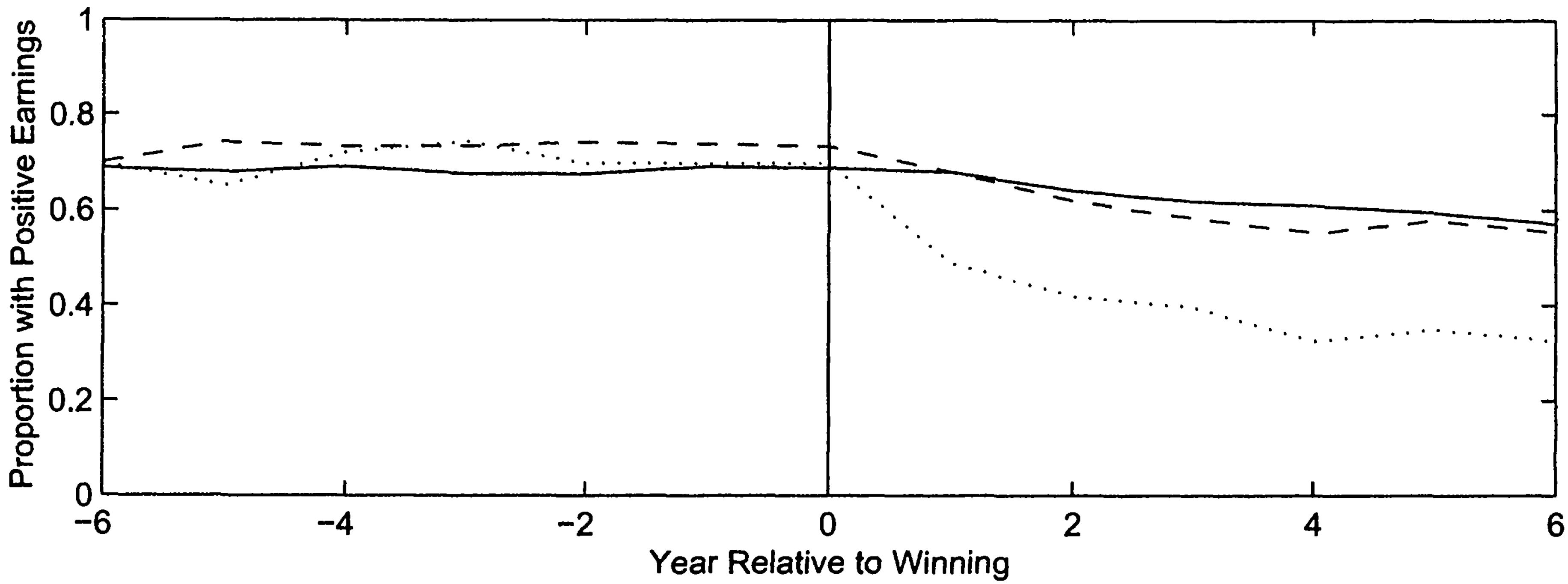


FIGURE 2. PROPORTION WITH POSITIVE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

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

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

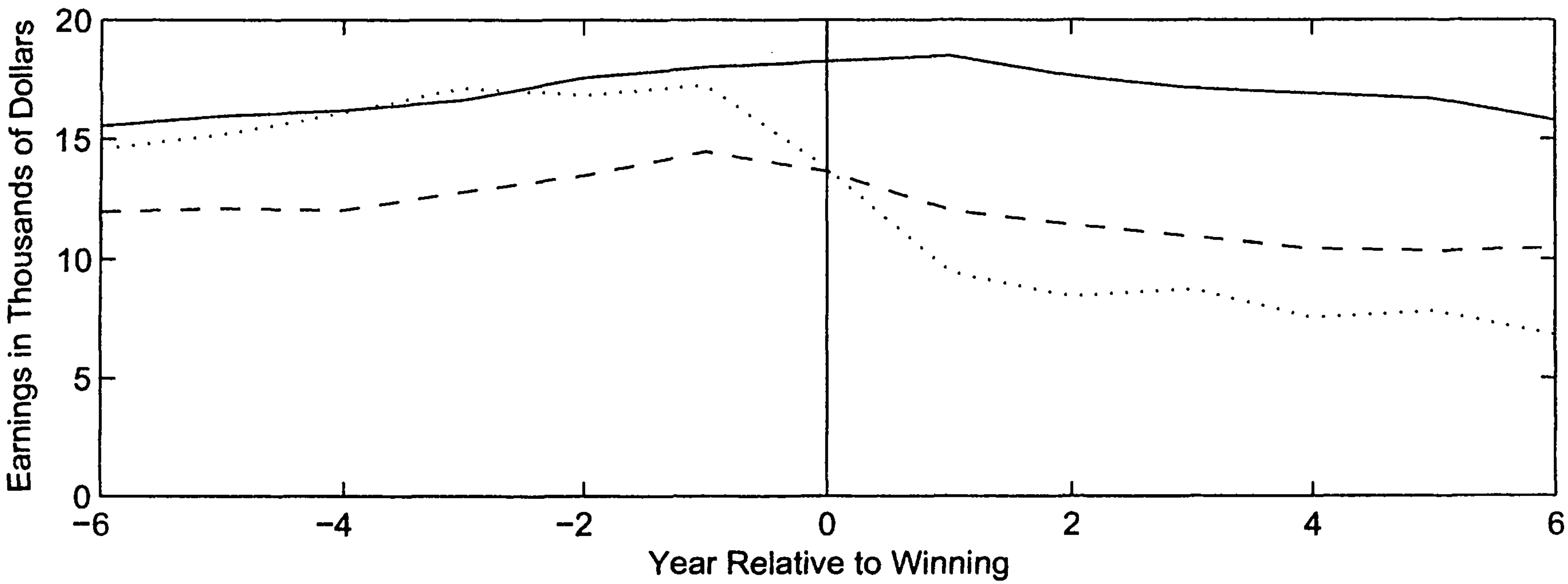
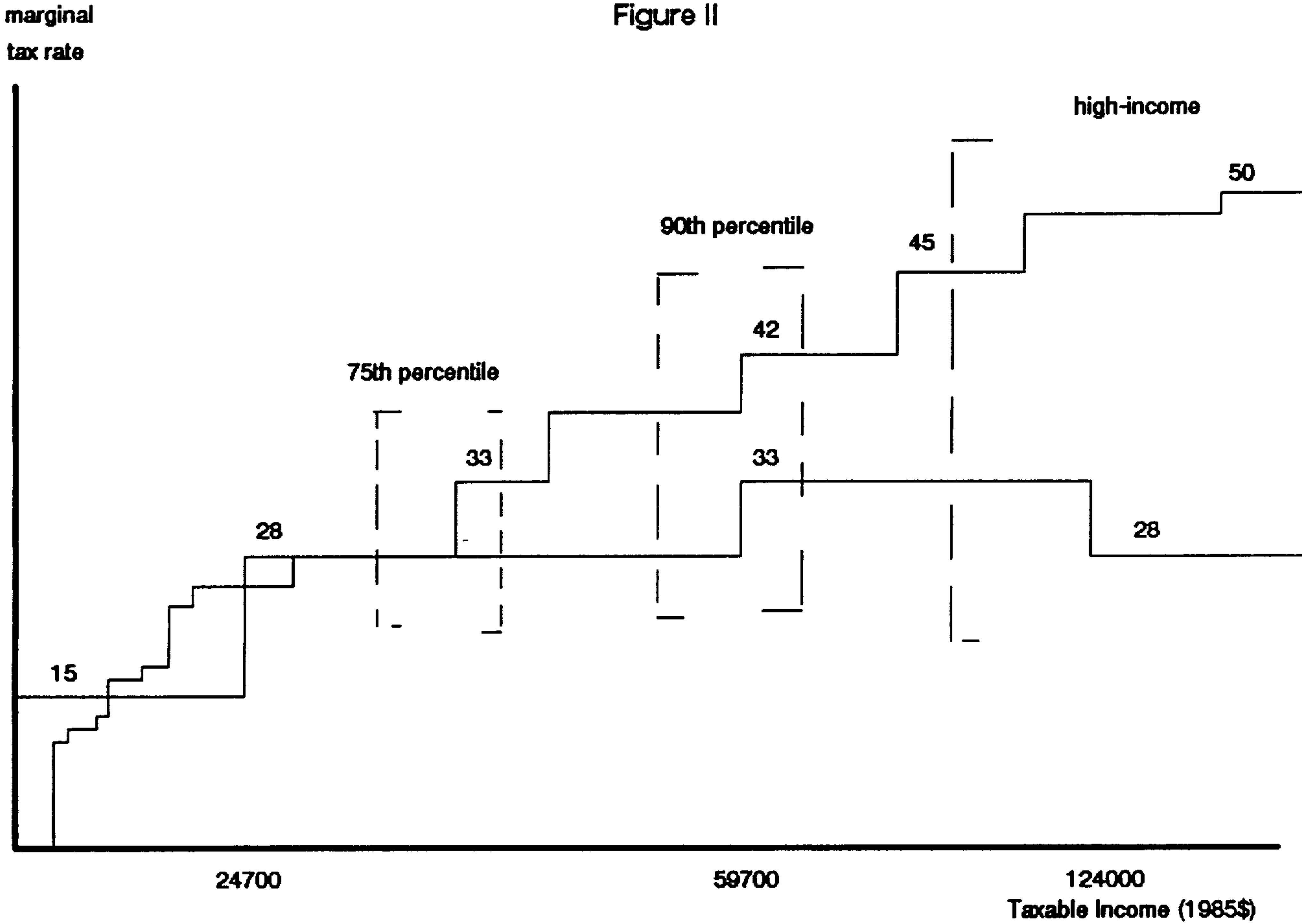


FIGURE 1. AVERAGE EARNINGS FOR NONWINNERS, WINNERS, AND BIG WINNERS

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

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

Figure II



Source: Federal Govt

Table IIa
Marginal Tax Rate

Group	Before TRA86	After TRA86	Change	Relative Change
High	.521 (.002)	.382 (.001)	-.139 (.002)	
75^{th} Percentile	.365 (.001)	.324 (.001)	-.041 (.001)	**-.098** **(.002)**
90^{th} Percentile	.430 (.001)	.360 (.001)	-.07 (.001)	**-.069** **(.002)**

The marginal tax rate is calculated using family wage and salary, self-employment, interest, dividend, farm and social-security income. I assume all couples file jointly, and that all itemize their deductions. Itemized deductions and capital gains are imputed using Statistics of Income data. These figures include the secondary earner deduction, as well as social security taxes. Standard errors are in parentheses. Before TRA86 is tax years 1983-1985; After TRA86 is tax years 1989-1991.

Source: Eissa 1995

Table III
Differences-in-Differences Estimates
CPS Married Women Before and After TRA86

A: Labor Force Participation

Group	Before TRA86	After TRA86	Change	Difference-in-Difference
High	0.464 (.018) [756]	0.554 (.018) [718]	0.090 (.025) {19.5%}	
75^{th} Percentile	0.687 (.010) [3799]	0.740 (.010) [3613]	0.053 (.010) {7.2%}	**0.037 (.028) {12.3%}**
90^{th} Percentile	0.611 (.010) [3765]	0.656 (.010) [3584]	0.045 (.010) {6.5%}	**0.045 (.028) {13%}**

Source: Eissa 1995

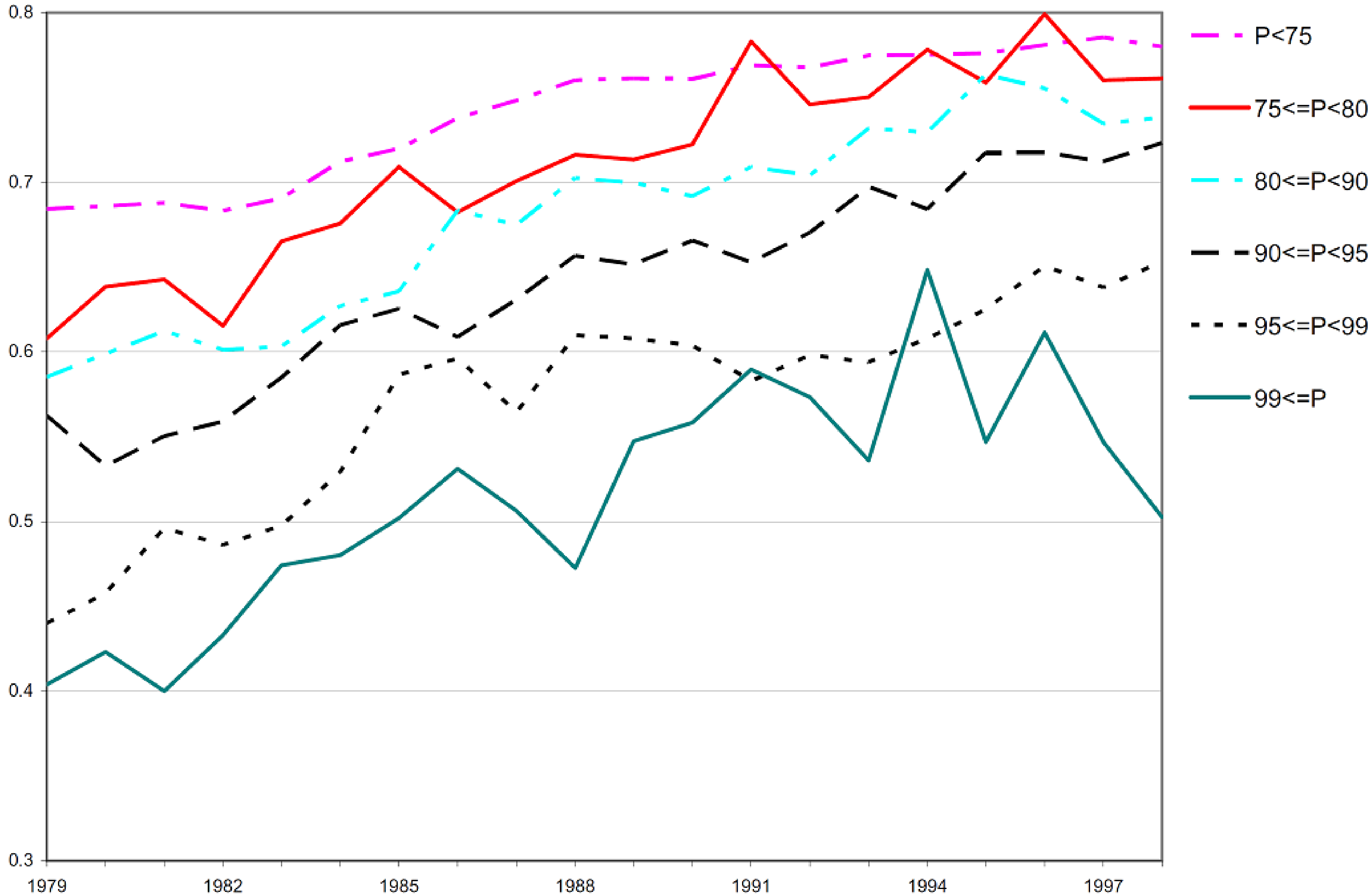
B: Hours Conditional on Employment

Group	Before TRA86	After TRA86	Change	Difference-in-Difference
High	1283.0 (46.3) [351]	1446.3 (41.1) [398]	163.3 (61.5) {12.7%}	
75^{th} Percentile	1504.1 (14.3) [2610]	1558.9 (13.9) [2676]	54.8 (20.0) {3.6%}	**108.6 (65.1) {9.4%}**
90^{th} Percentile	1434.1 (16.4) [2303]	1530.1 (15.9) [2348]	96.0 (22.8) {6.8%}	**67.3 (64.8) {6.2%}**

Each cell contains the mean for that group, along with standard errors in (), number of observations in [], and % increase in {}. Means are unweighted.

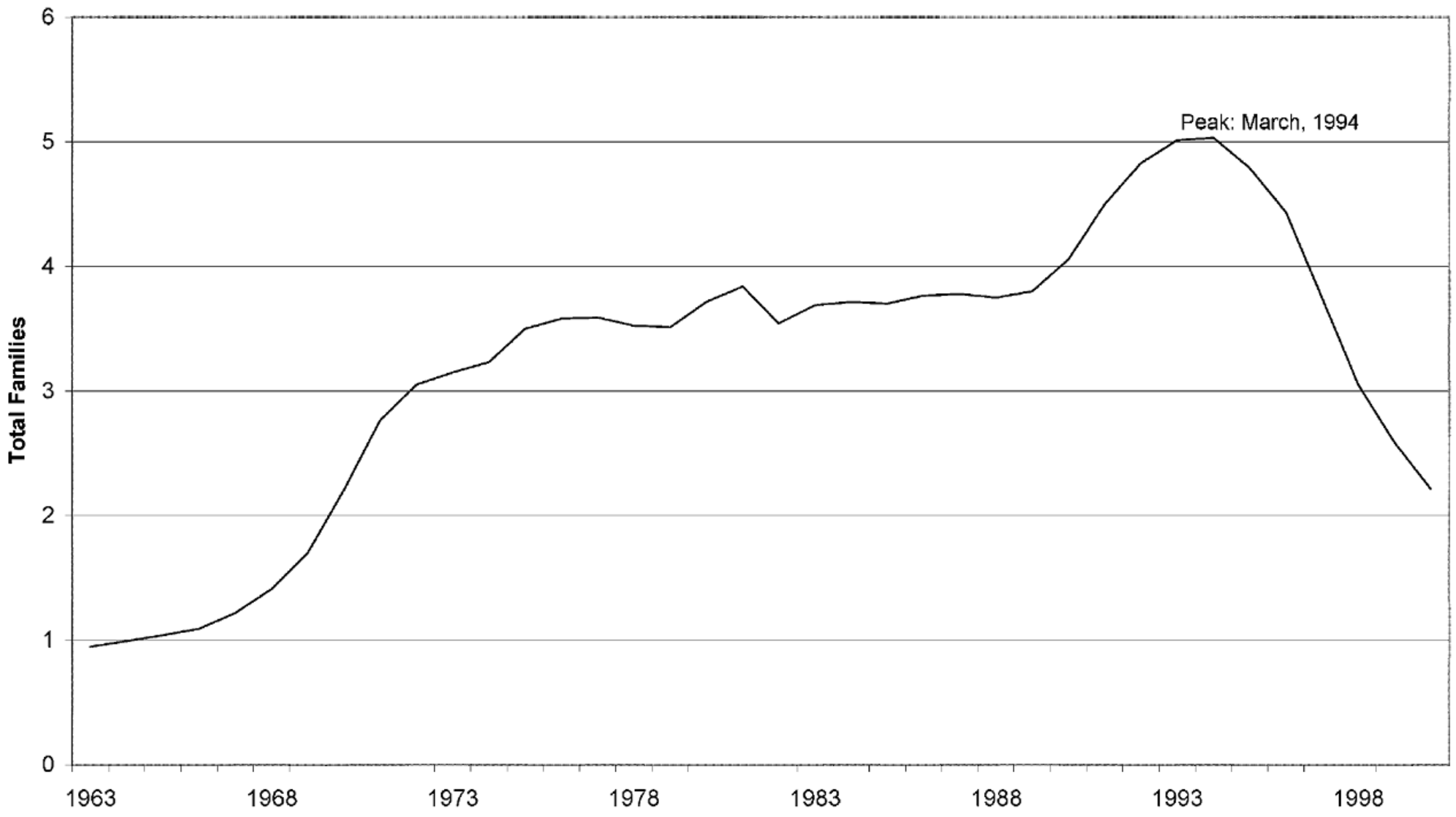
Source: Eissa 1995

Figure 10
Fraction of Married Women with Positive Annual Earnings by Income Group in March CPS



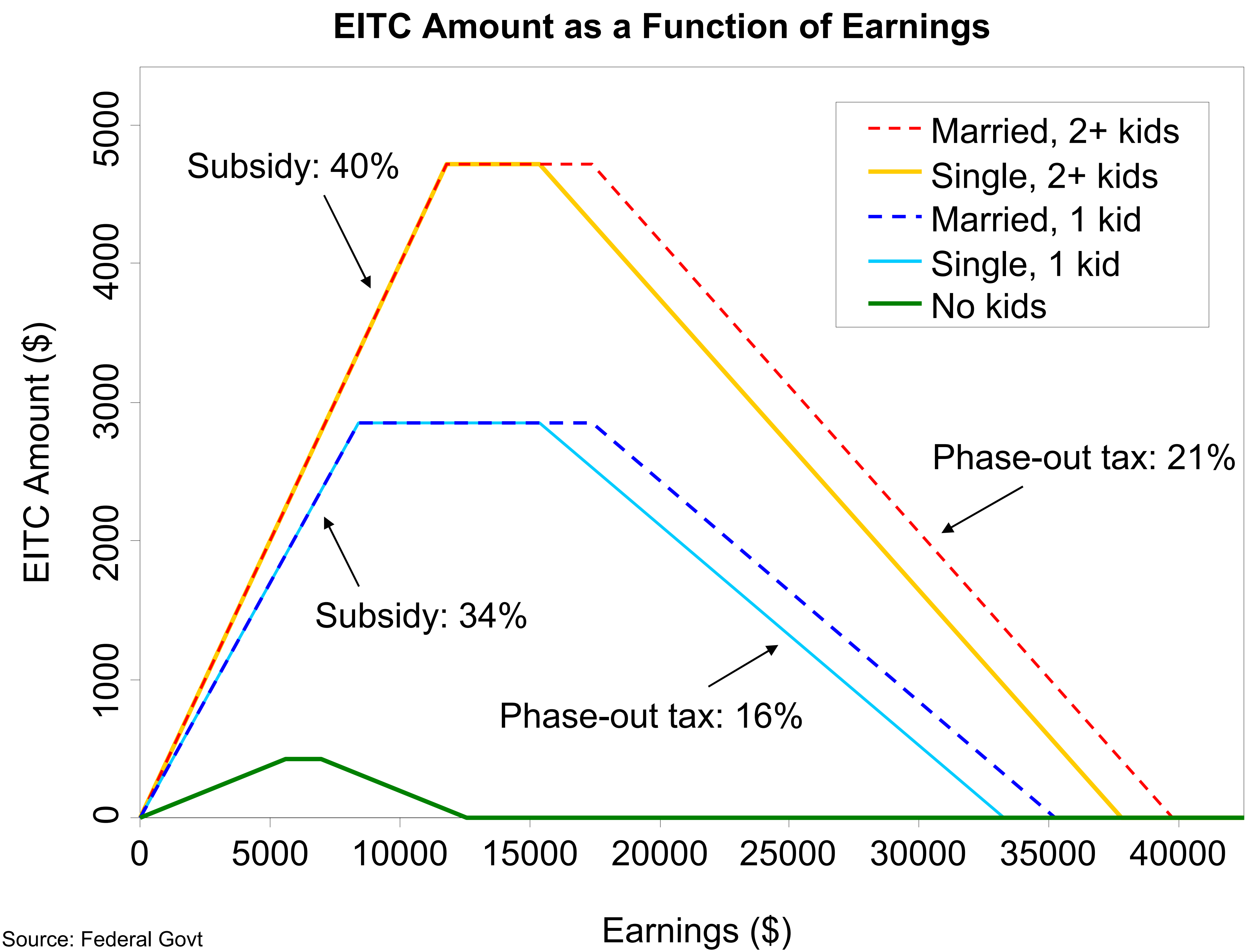
Notes: Groups are based on other household income (husband's earnings plus asset income) as described in Eissa (1995). Group 1 <=75th percentile. Group 75 is >75th percentile and <= 80th percentile. Group 80 is >80th and <=90th. Group 90 is >90th and <=95th. Group 95 is >95th and <=99th. Group 99 is >99th.

Source: Liebman and Saez (2006)

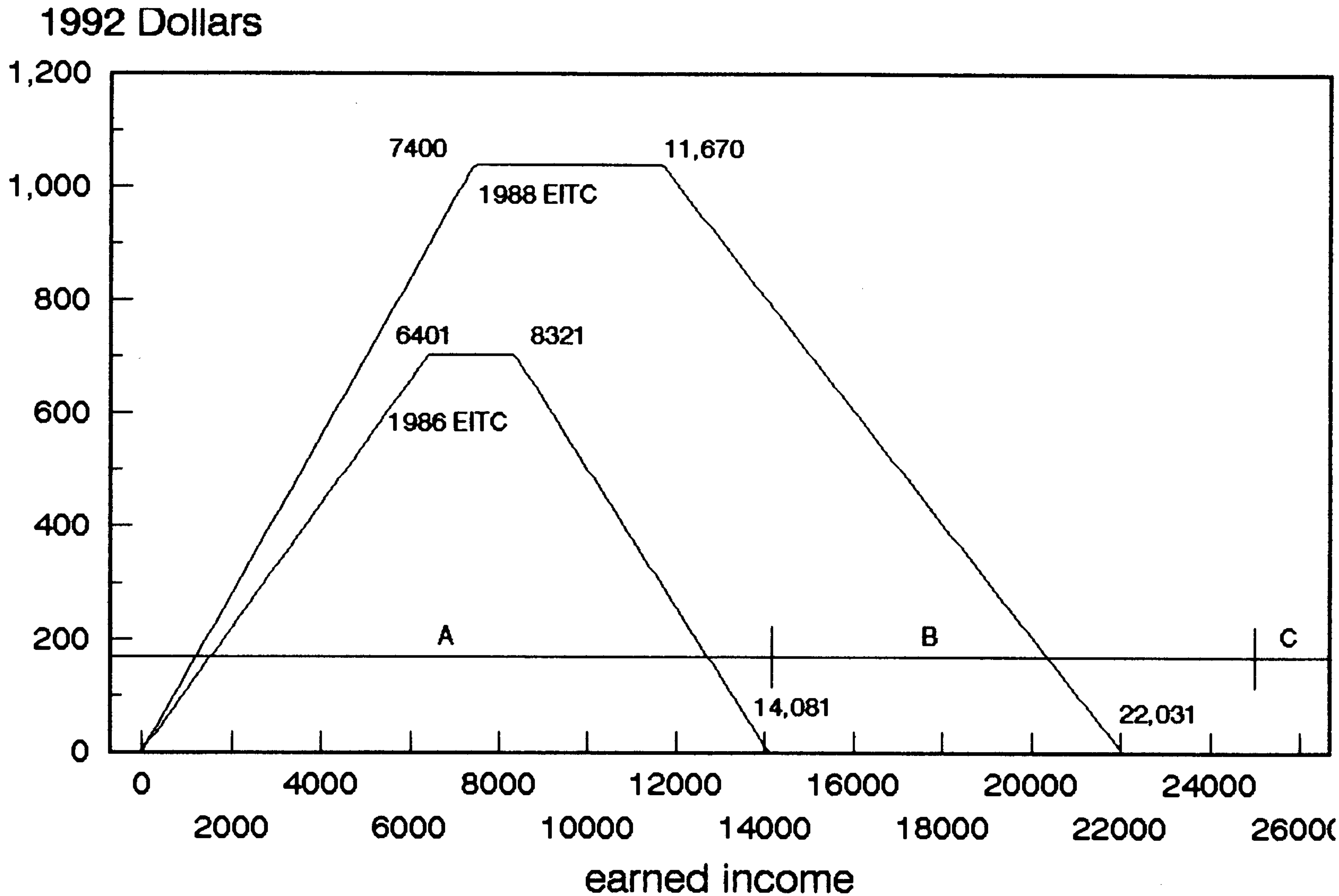


Source: Meyer and Sullivan (2004), p. 1391

Fig. 1. Average monthly AFDC/TANF caseloads (1963–2000) (in millions).



Source: Federal Govt



Source: Eissa and Liebman (1996), p. 631

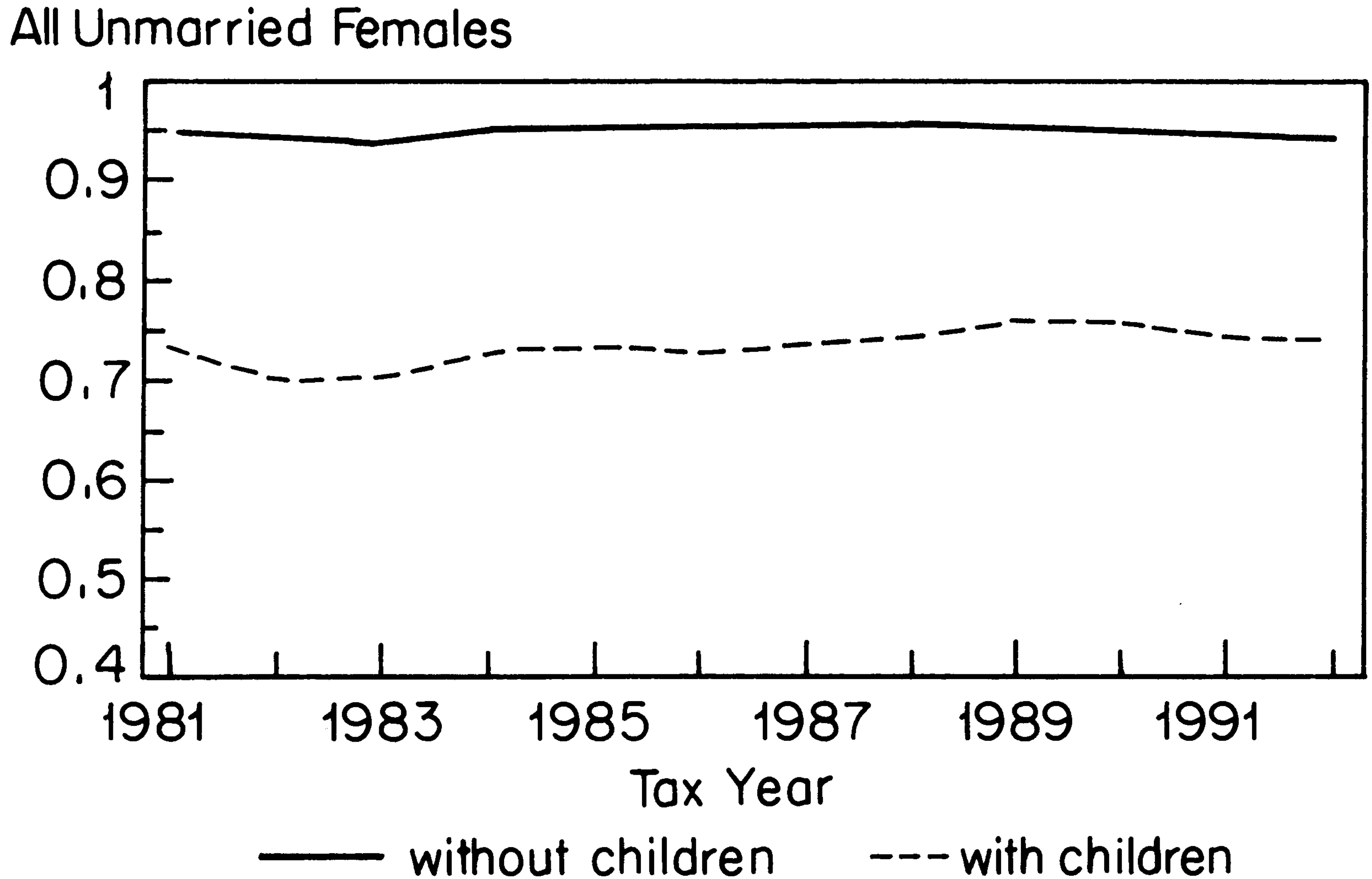
FIGURE IV
1986 and 1988 Earned Income Tax Credit

TABLE II
LABOR FORCE PARTICIPATION RATES OF UNMARRIED WOMEN

	Pre-TRA86 (1)	Post-TRA86 (2)	Difference (3)	Difference-in-differences (4)
A. *Treatment group:*				
With children [20,810]	0.729 (0.004)	0.753 (0.004)	0.024 (0.006)	
Control group:				
Without children [46,287]	0.952 (0.001)	0.952 (0.001)	0.000 (0.002)	*0.024 (0.006)*
B. *Treatment group:*				
Less than high school, with children [5396]	0.479 (0.010)	0.497 (0.010)	0.018 (0.014)	
Control group 1:				
Less than high school, without children [3958]	0.784 (0.010)	0.761 (0.009)	−0.023 (0.013)	*0.041 (0.019)*
Control group 2:				
Beyond high school, with children [5712]	0.911 (0.005)	0.920 (0.005)	0.009 (0.007)	*0.009 (0.015)*
C. *Treatment group:*				
High school, with children [9702]	0.764 (0.006)	0.787 (0.006)	0.023 (0.008)	
Control group 1:				
High school, without children [16,527]	0.945 (0.002)	0.943 (0.003)	−0.002 (0.004)	*0.025 (0.009)*
Control group 2:				
Beyond high school, with children [5712]	0.911 (0.005)	0.920 (0.005)	0.009 (0.007)	*0.014 (0.011)*

Data are from the March CPS, 1985–1987 and 1989–1991. Pre-TRA86 years are 1984–1986. Post-TRA86 years are 1988–1990. Labor force participation equals one if annual hours are positive, zero otherwise. Standard errors are in parentheses. Sample sizes are in square brackets. Means are weighted with CPS March supplement weights.

Source: Eissa and Liebman (1996), p. 617



Source: Eissa and Liebman (1996), p. 624

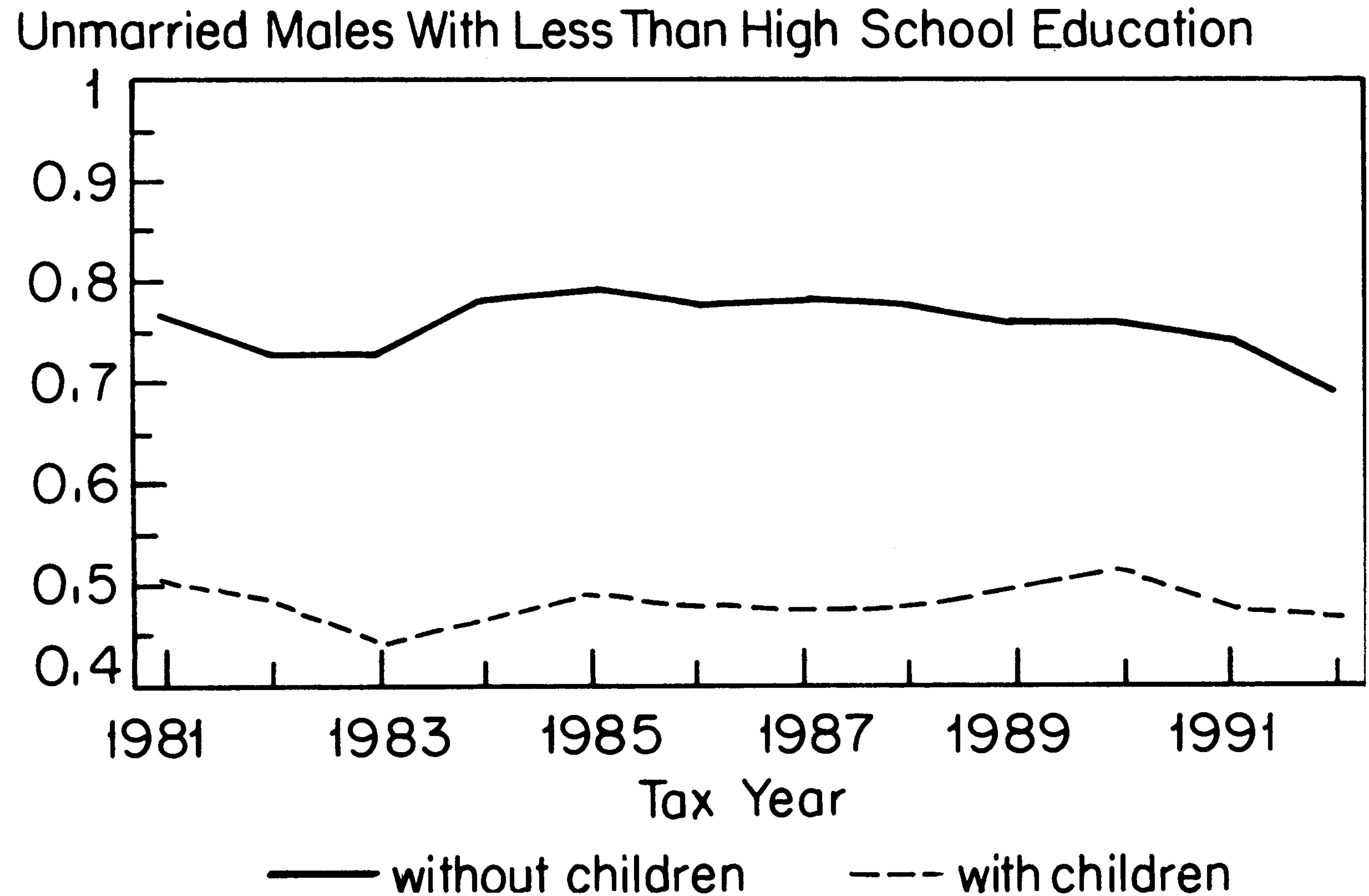
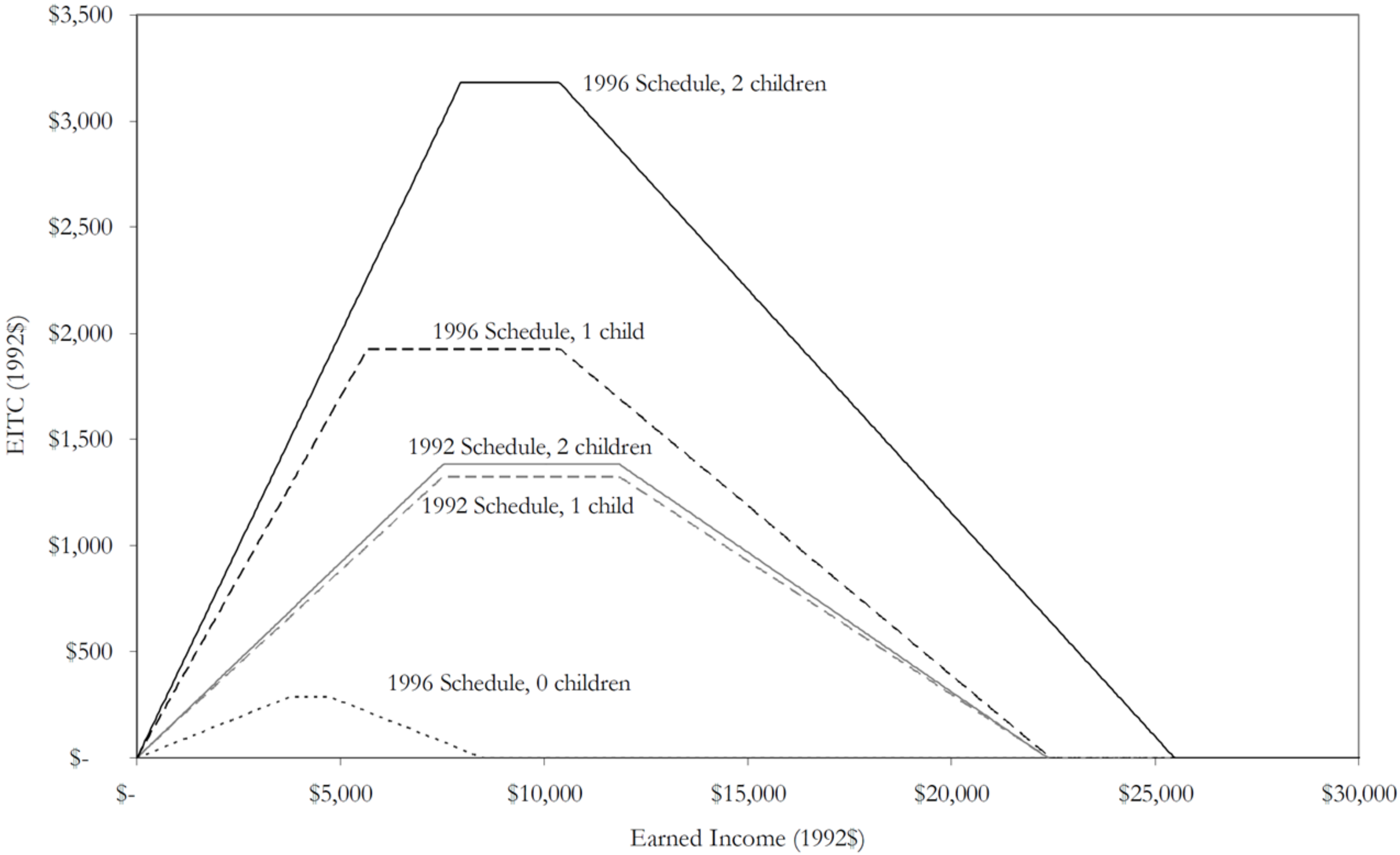


FIGURE II

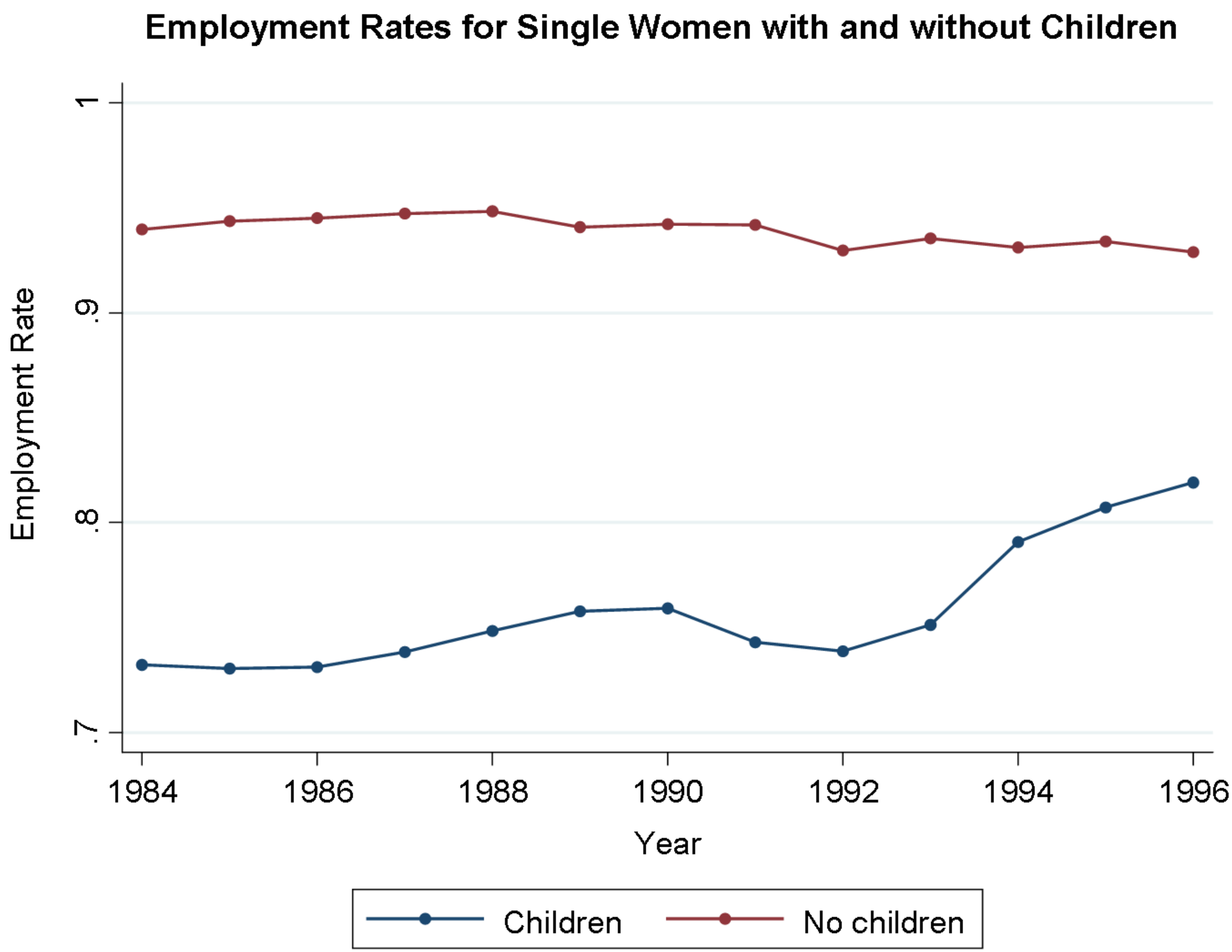
Labor Force Participation Rates 1981 to 1992, Unmarried Females Ages 16–44

Source: Eissa and Liebman (1996), p. 624

Figure 1. EITC Schedule, 1992 and 1996 by number of children

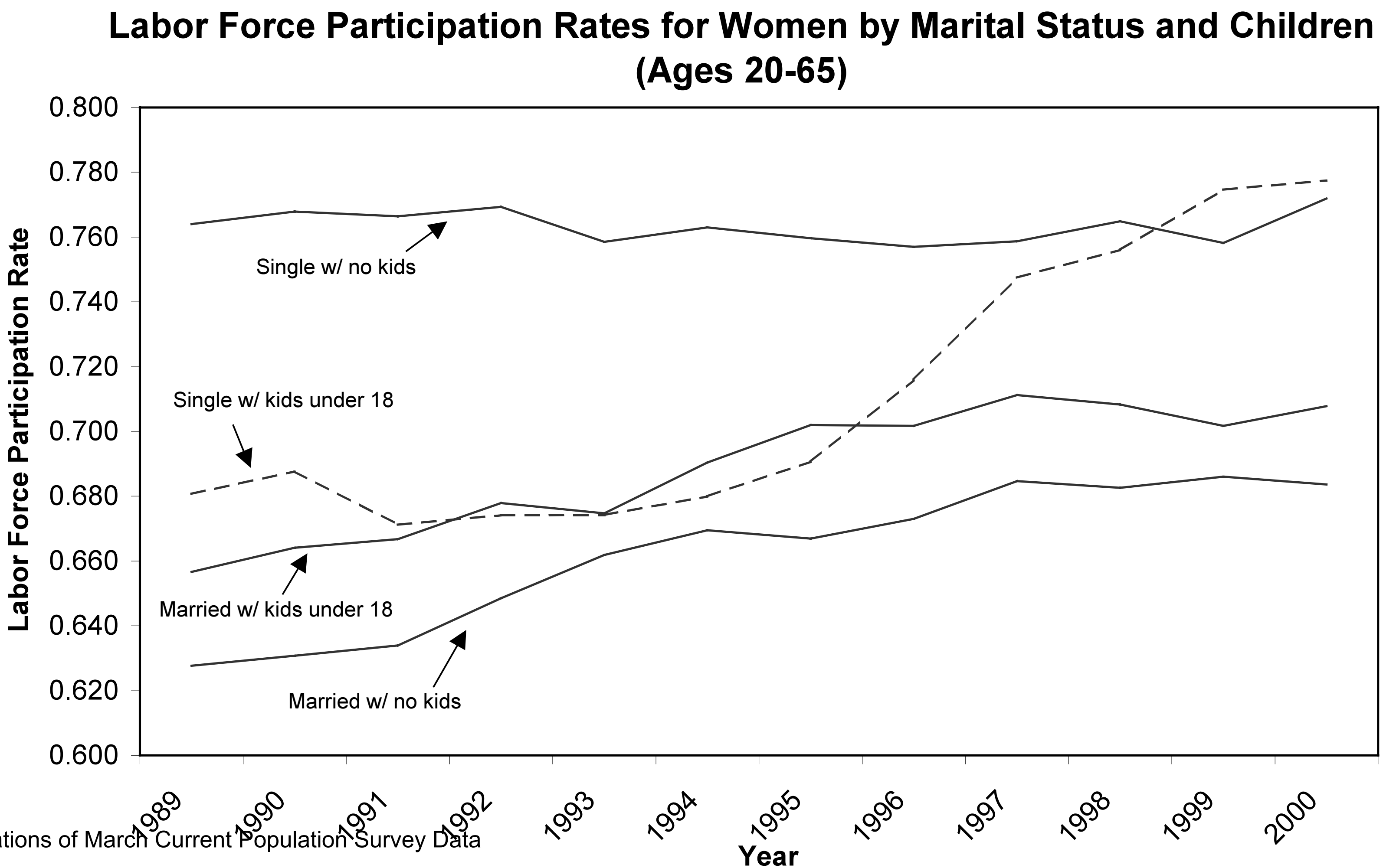


Source: Rothstein 2005



Source: Meyer and Rosenbaum 2001

Figure 4



Source: Tabulations of March Current Population Survey Data

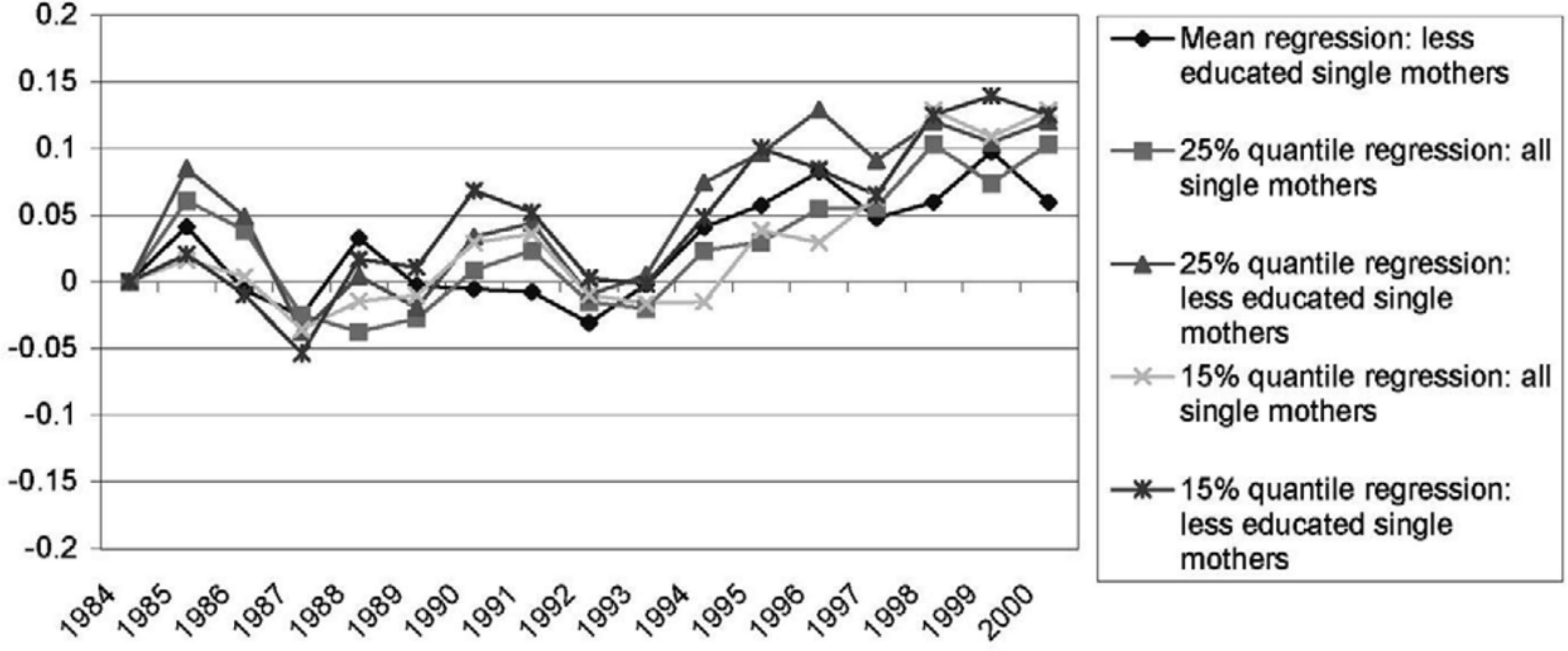


Fig. 2. Total consumption: single mothers, 1984–2000.

Source: Meyer and Sullivan (2004), p. 1407

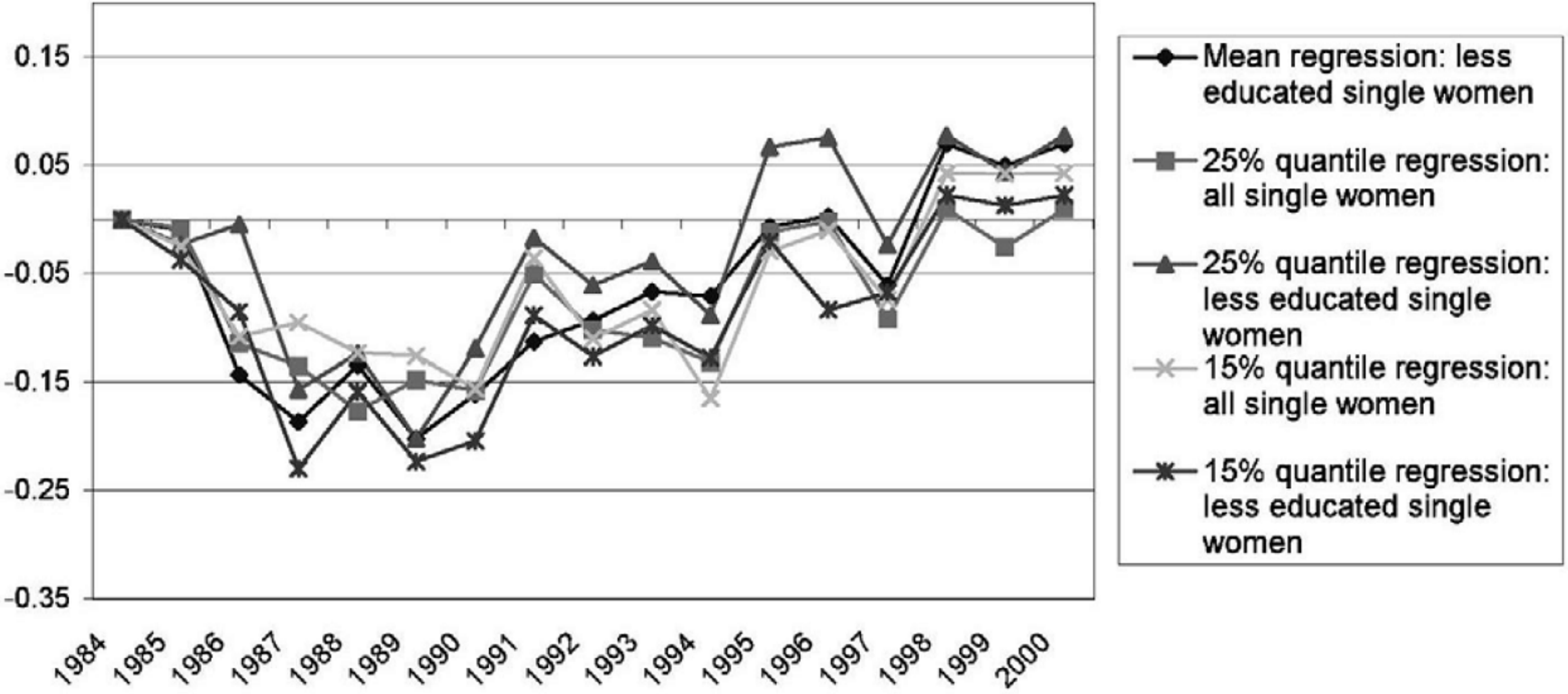


Fig. 3. Relative total consumption: single mothers vs. single women without children, 1984–2000.

Source: Meyer and Sullivan (2004), p. 1414

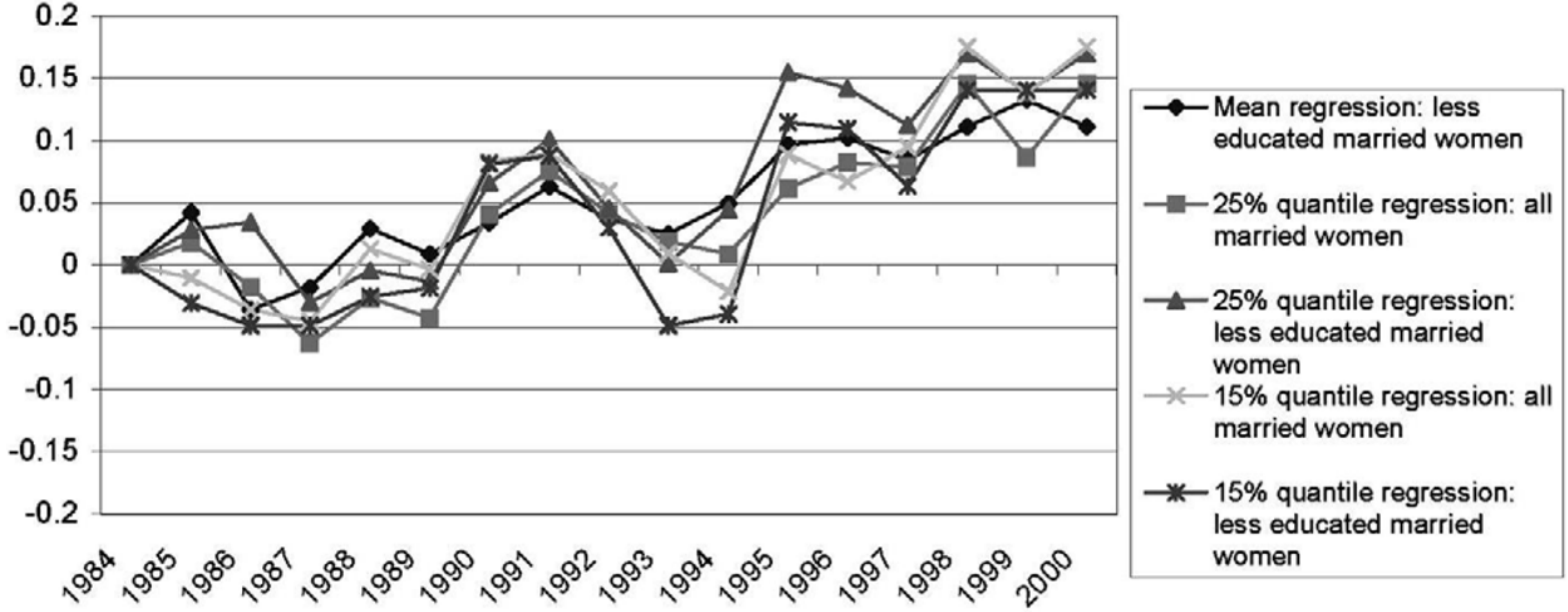


Fig. 4. Relative total consumption: single mothers vs. married mothers, 1984–2000.

Source: Meyer and Sullivan (2004), p. 1414

Explaining EIC: 4 steps

Single With Two or More Children

The EIC (Earned Income Credit) is a tax refund that gives families as much as $4,500 per year.

We want to explain how the **EIC** works to help you decide how much to work and earn this year.

In 2006, you made $ 10,000 → you are getting an **EIC** of $ 4,000 in your refund.

- Your earnings this year (in 2007) will determine the size of your **EIC** refund next year
- The **EIC** has 3 ranges: 1) Increasing, 2) Peak, 3) Decreasing

1. Fill in earnings, EIC amount

2. Explain and dot graph

4. Take-home Message

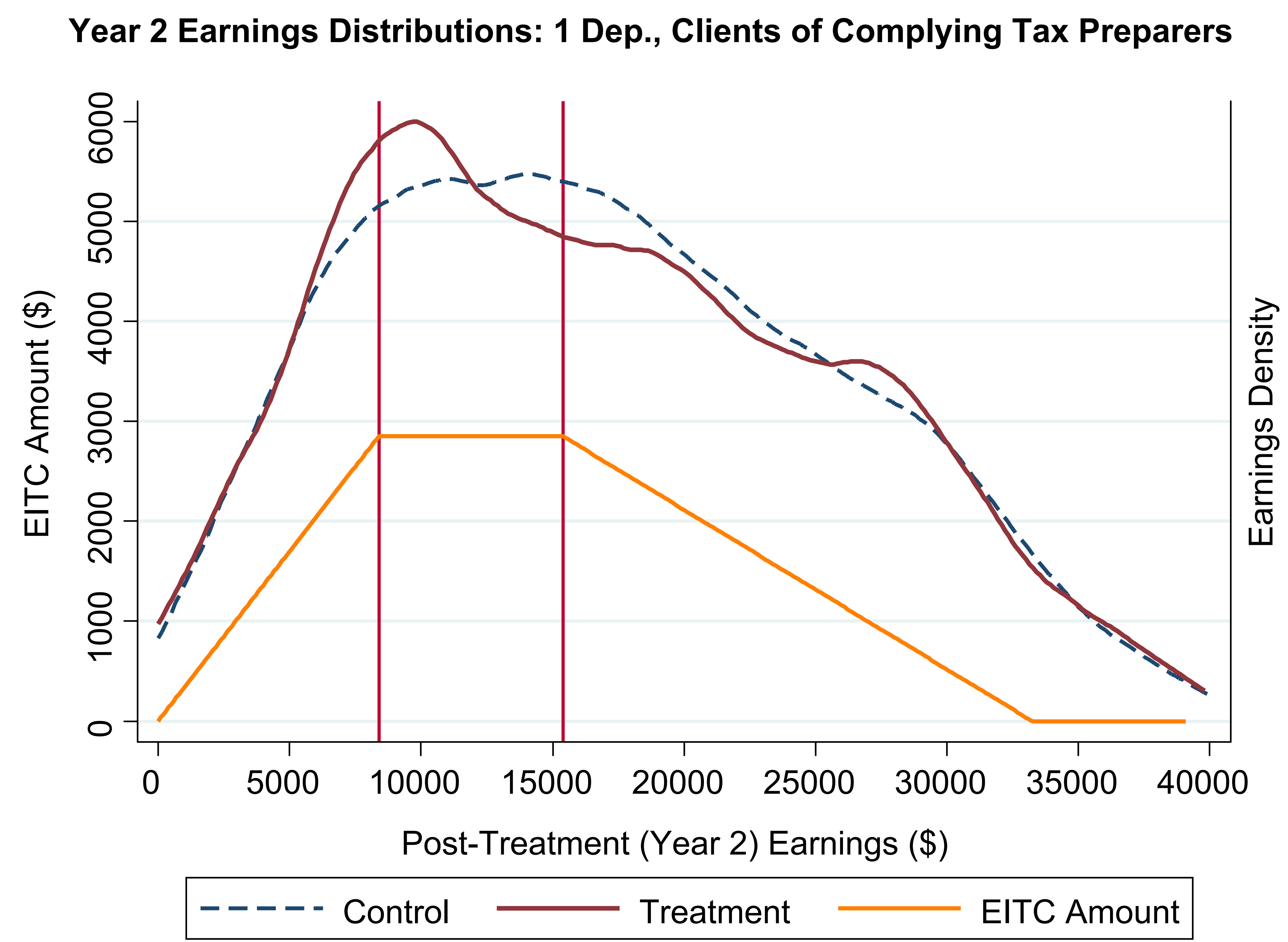
You are in the increasing range of the **EIC**. *Think about it like this:*

- (increasing) Suppose you earn $10 an hour, then you are really making $14.00 an hour.
- (peak) Your earnings are maxing-out the **EIC** amount
- (decreasing) If you earn $10 more, your **EIC** is reduced by $2.10

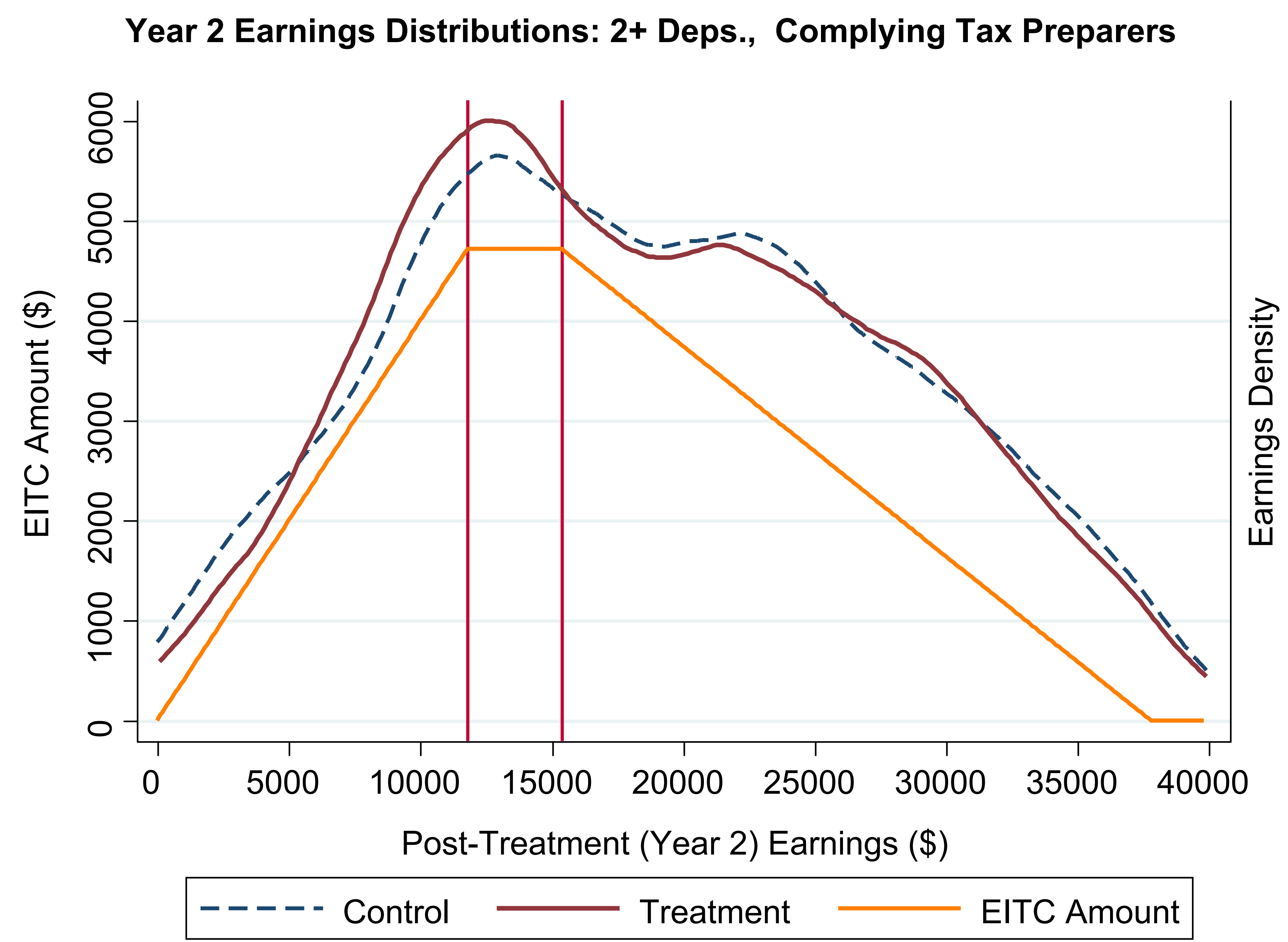
3. Table

EIC Range	If you earn between	EIC refund will be	If you earn $10 more, the EIC...
Increasing	$0-$11,790	$0 up to $4,716	Increases by $4
Peak	$11,790-$15,390	$4,716	Stays the same
Decreasing	$15,390-$37,780	$4,716 down to $0	Decreases by $2.10

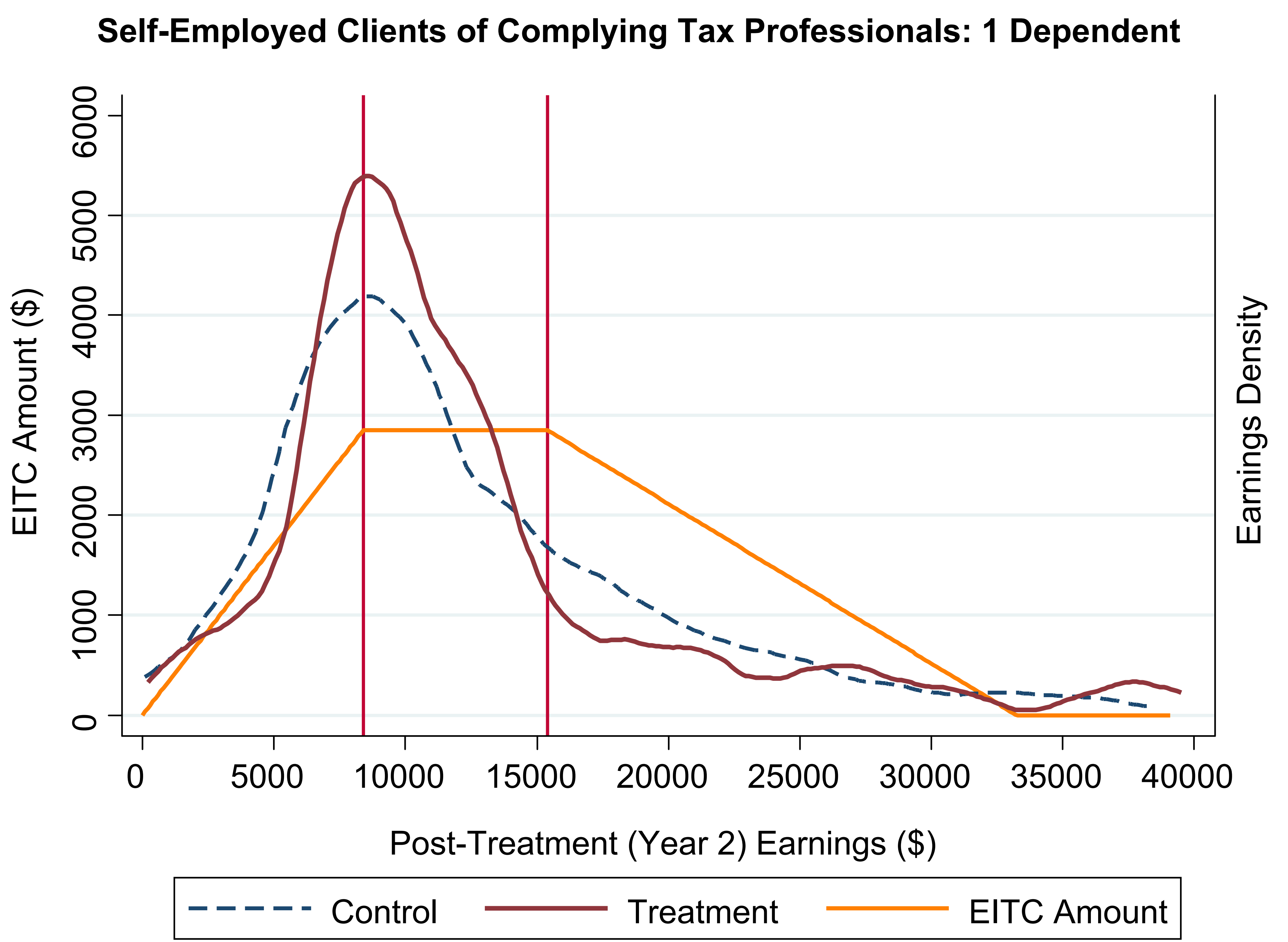
Source: Chetty and Saez (2009)



Source: Chetty and Saez (2009)

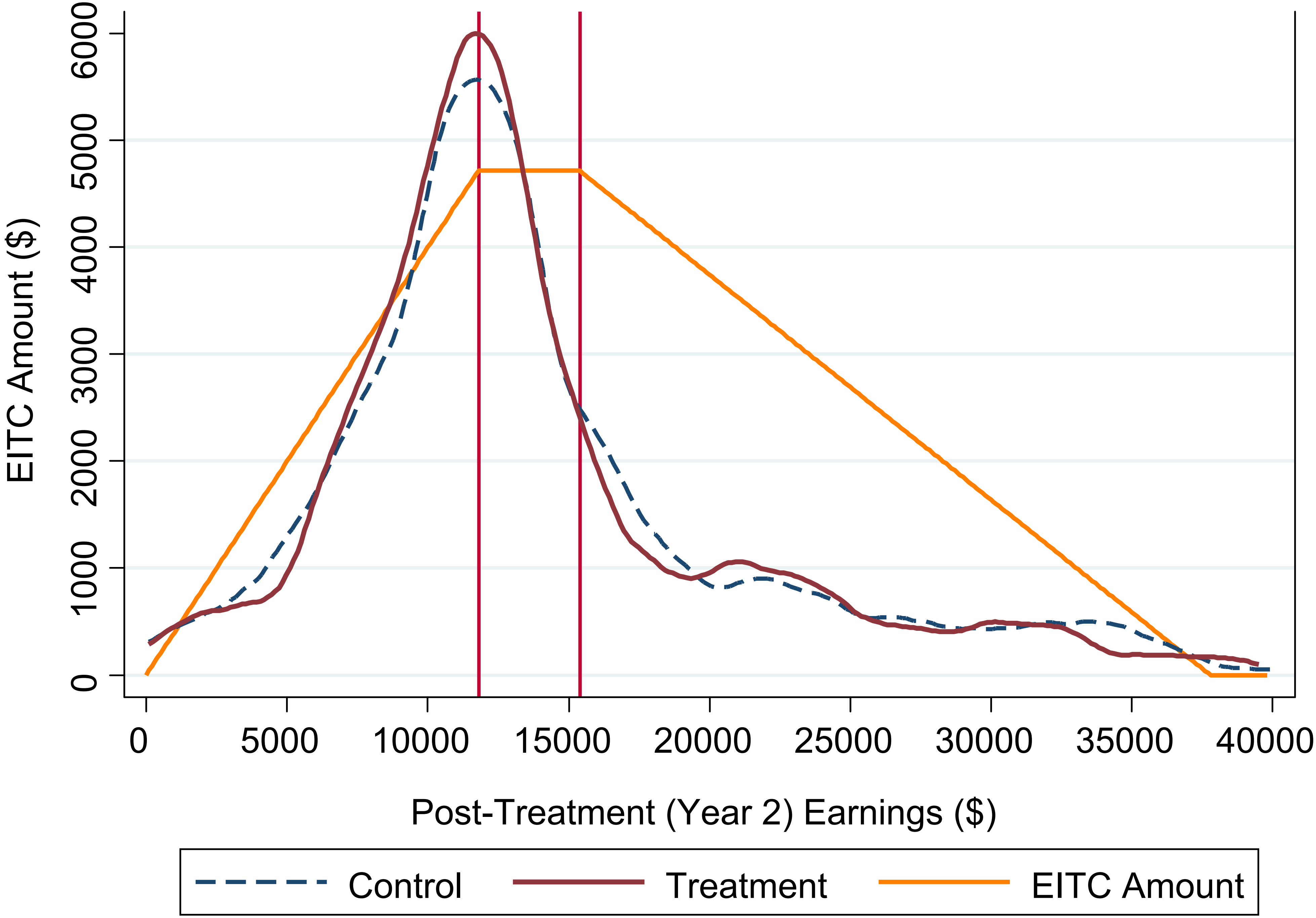


Source: Chetty and Saez (2009)

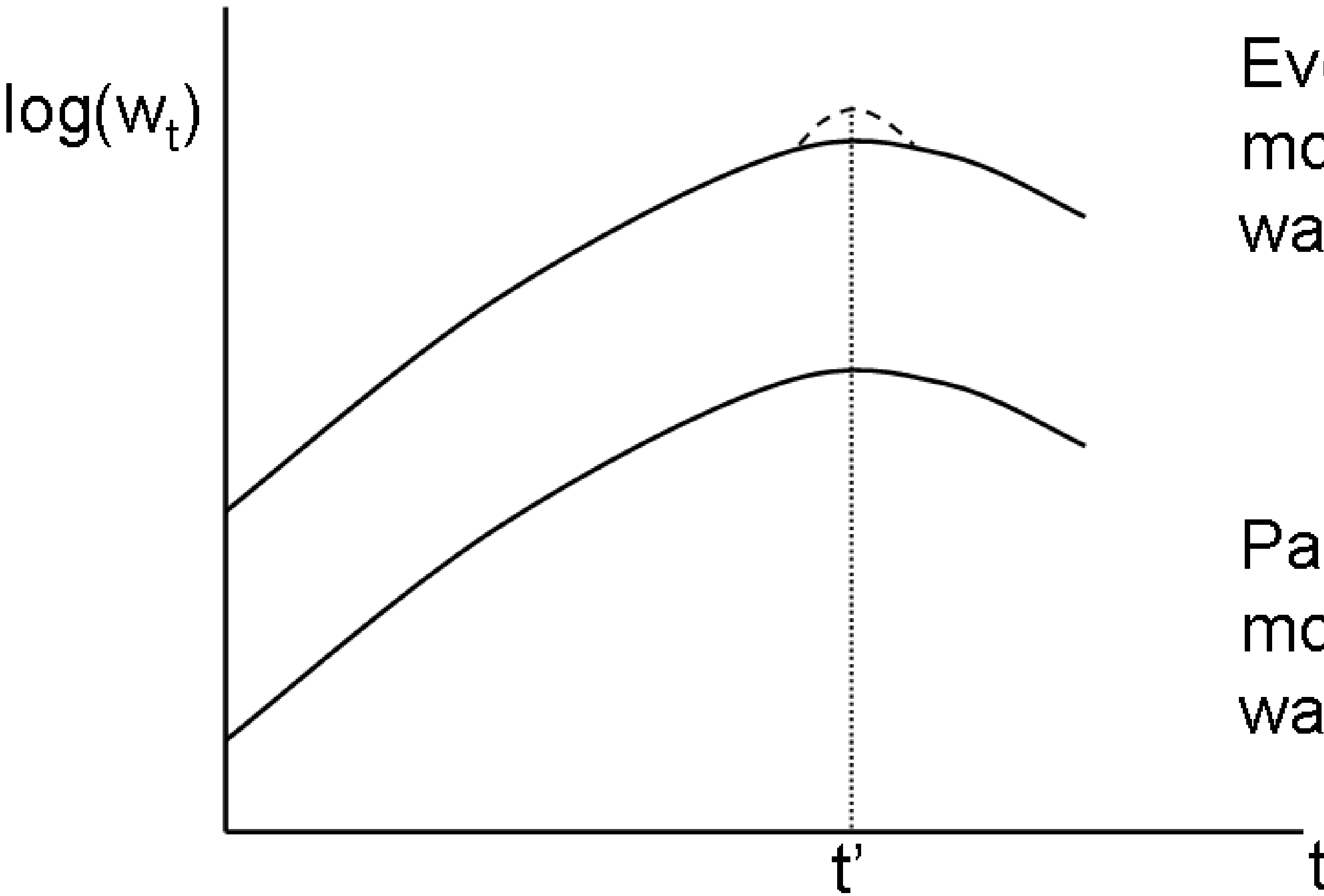


Source: Chetty and Saez (2009)

Self-Employed Clients of Complying Tax Professionals: 2+ Dependents



Source: Chetty and Saez (2009)



Evolutionary shift: movements along a wage profile

Parametric shift: movements from one wage profile to another

Source: MaCurdy (1981), p. 1070

TABLE IV

ELASTICITIES: GROUPING INSTRUMENTS: COHORT AND EDUCATION

	Wage	Compensated Wage	Other Income	Group Means: Hours	Wage	Income
No Children	0.140	0.140	0.000	32	2.97	88.63
	(0.075)	(0.088)	(0.041)			
Youngest Child 0–2	0.205	0.301	−0.185	20	3.36	129.69
	(0.128)	(0.144)	(0.104)			
Youngest Child 3–4	0.371	0.439	−0.173	18	3.10	143.64
	(0.150)	(0.159)	(0.139)			
Youngest Child 5–10	0.132	0.173	−0.102	21	2.86	151.13
	(0.117)	(0.127)	(0.109)			
Youngest Child 11 +	0.130	0.160	−0.063	25	2.83	147.31
	(0.107)	(0.117)	(0.084)			

Note: Asymptotic standard errors in parentheses.

Source: Blundell et al. (1998), p. 846

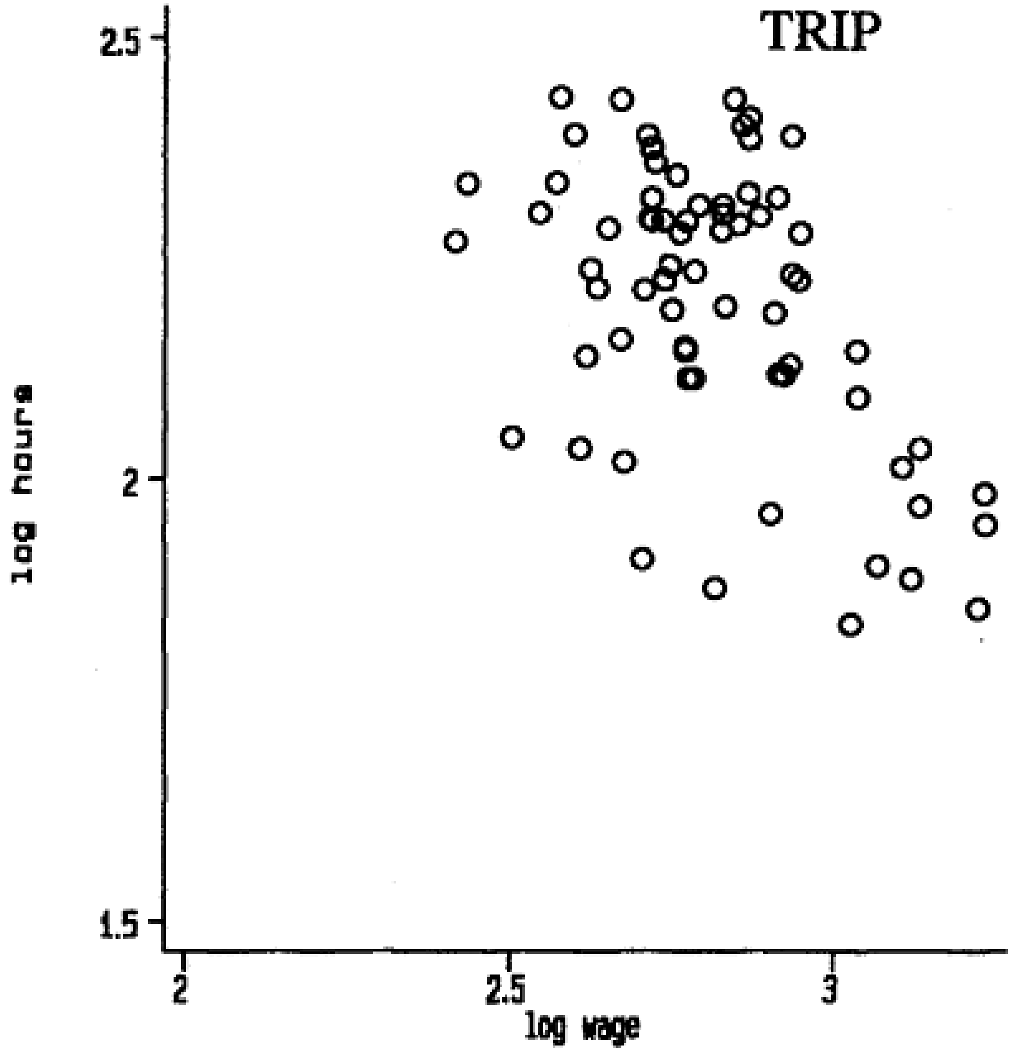


FIGURE I
Hours-Wage Relationships

Source: Camerer et al. (1997), p. 418

TABLE II
OLS LOG HOURS WORKED EQUATIONS

Sample	TRIP		TLC1		TLC2
Log hourly wage	−.411	−.186	−.501	−.618	−.355
	(.169)	(.129)	(.063)	(.051)	(.051)
High temperature	.000	−.000	.001	.002	−.021
	(.002)	(.002)	(.002)	(.002)	(.007)
Shift during week	−.057	−.047	−.004	.030	—
	(.019)	(.033)	(.035)	(.042)	
Rain	.002	.015	—	—	−.150
	(.035)	(.035)			(.062)
Night shift dummy	.048	−.049	−.127	−.294	−.253
	(.053)	(.049)	(.034)	(.047)	(.038)
Day shift dummy	—	—	.000	.053	—
			(.028)	(.045)	
Fixed effects	No	Yes	No	Yes	No
Adjusted R^2	.243	.484	.175	.318	.146
Sample size	70	65	1044	794	712
Number of drivers	13	8	484	234	712

Dependent variable is the log of hours worked. Standard errors are in parentheses and are corrected for the nonfixed effects estimates in coulmns 1 and 3 to account for the panel structure of the data. Explanatory variables are described in Appendix 1.

Source: Camerer et al. (1997), p. 419

Table 2

Actual and Predicted Labor Supply

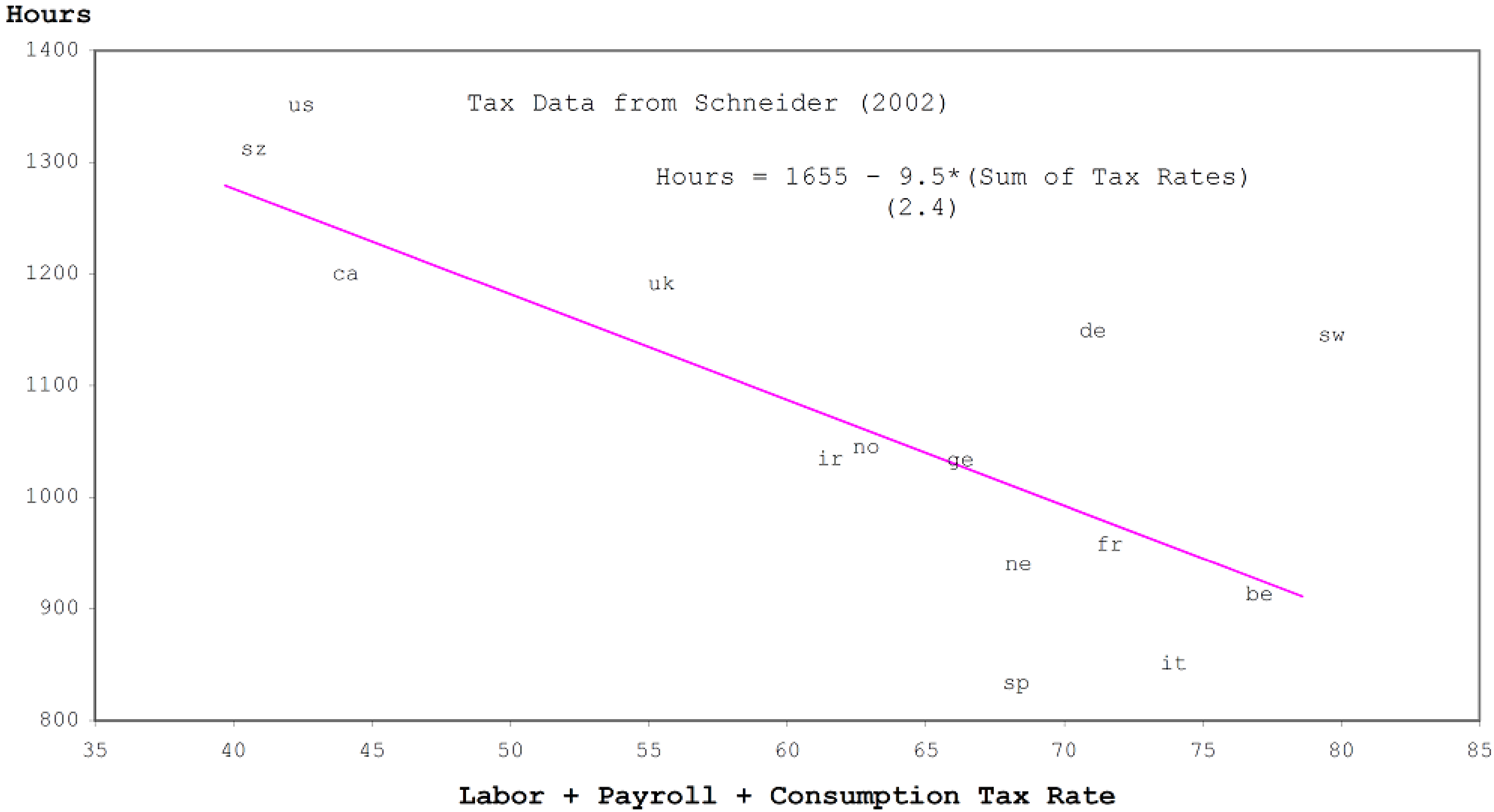
In Selected Countries in 1993–96 and 1970–74

Period	Country	Labor Supply*		Differences (Predicted Less Actual)	Prediction Factors	
		Actual	Predicted		Tax Rate τ	Consumption/ Output (c/y)
1993–96	Germany	19.3	19.5	.2	.59	.74
	France	17.5	19.5	2.0	.59	.74
	Italy	16.5	18.8	2.3	.64	.69
	Canada	22.9	21.3	–1.6	.52	.77
	United Kingdom	22.8	22.8	0	.44	.83
	Japan	27.0	29.0	2.0	.37	.68
	United States	25.9	24.6	–1.3	.40	.81
1970–74	Germany	24.6	24.6	0	.52	.66
	France	24.4	25.4	1.0	.49	.66
	Italy	19.2	28.3	9.1	.41	.66
	Canada	22.2	25.6	3.4	.44	.72
	United Kingdom	25.9	24.0	–1.9	.45	.77
	Japan	29.8	35.8	6.0	.25	.60
	United States	23.5	26.4	2.9	.40	.74

*Labor supply is measured in hours worked per person aged 15–64 per week.
Sources: See Appendix.

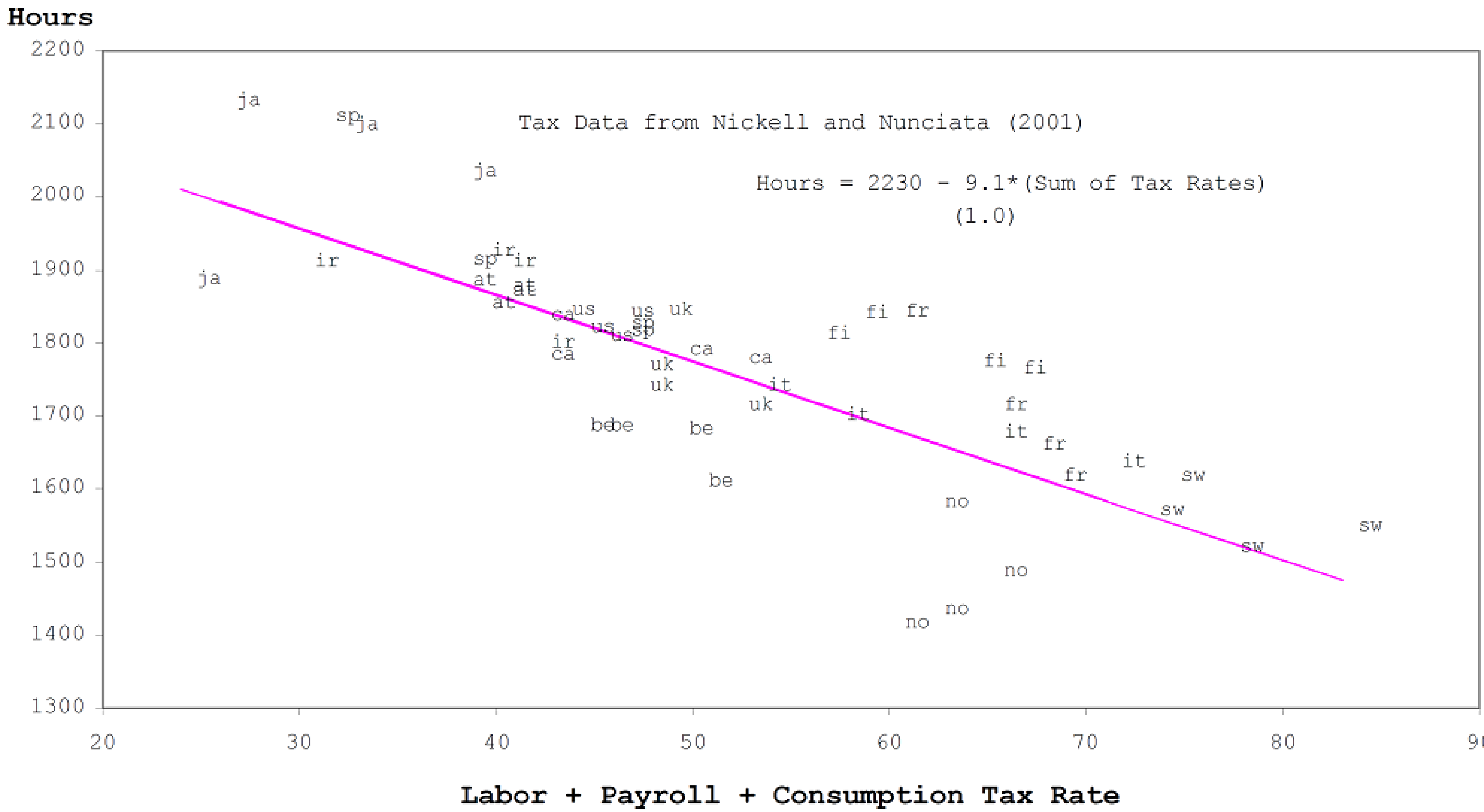
Source: Prescott (2004)

Figure 1: Tax Rates and Annual Work Hours Per Adult
Sample D: 14 Countries in 1995



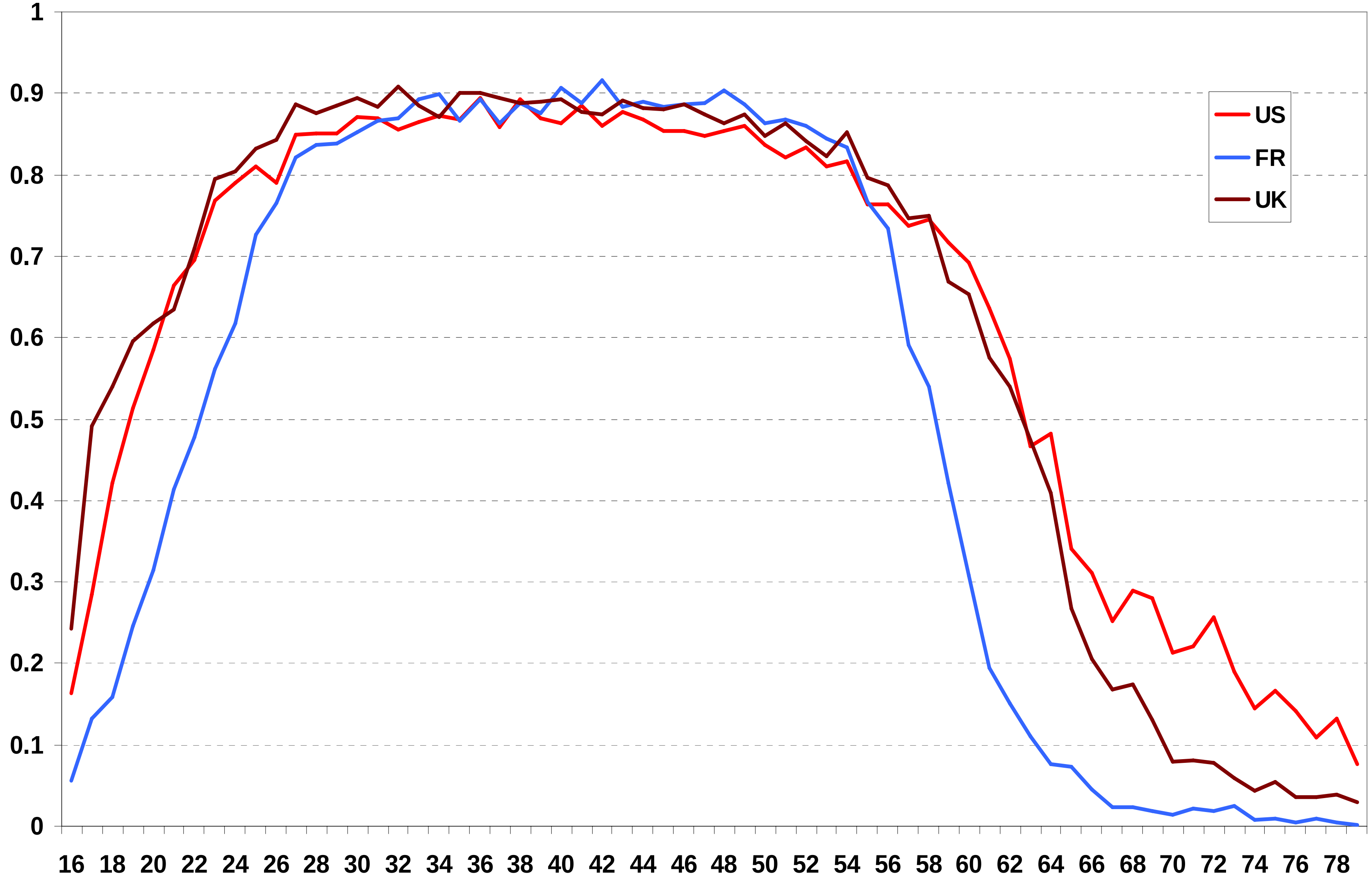
Source: Davis and Henrekson 2005

Figure 2: Tax Rates and Annual Hours Per Employed Person
Sample A: 13 Countries with Data for 1977, 1983, 1990 and 1995



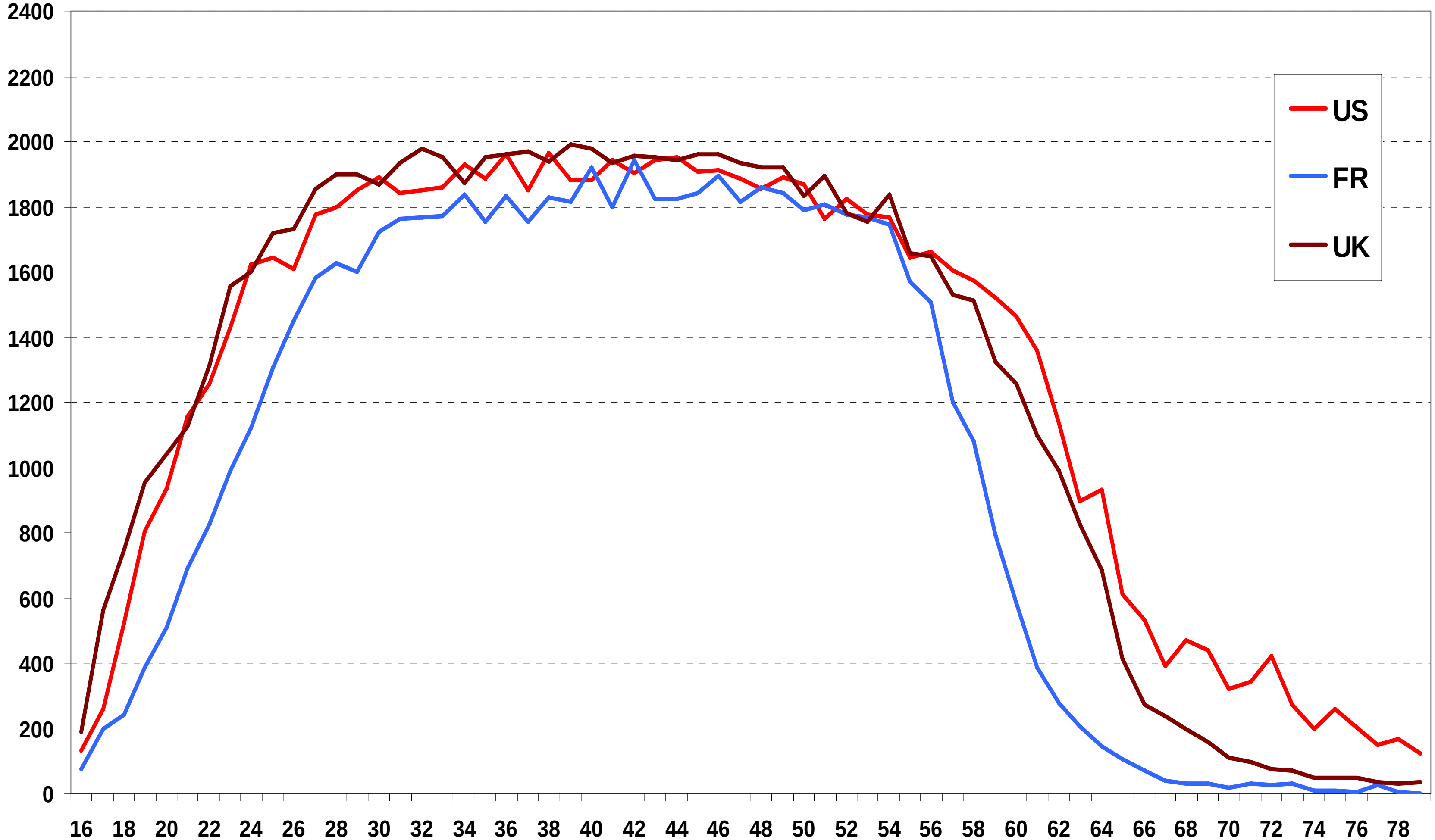
Source: Davis and Henrekson 2005

Male employment by age – US, FR and UK 2005



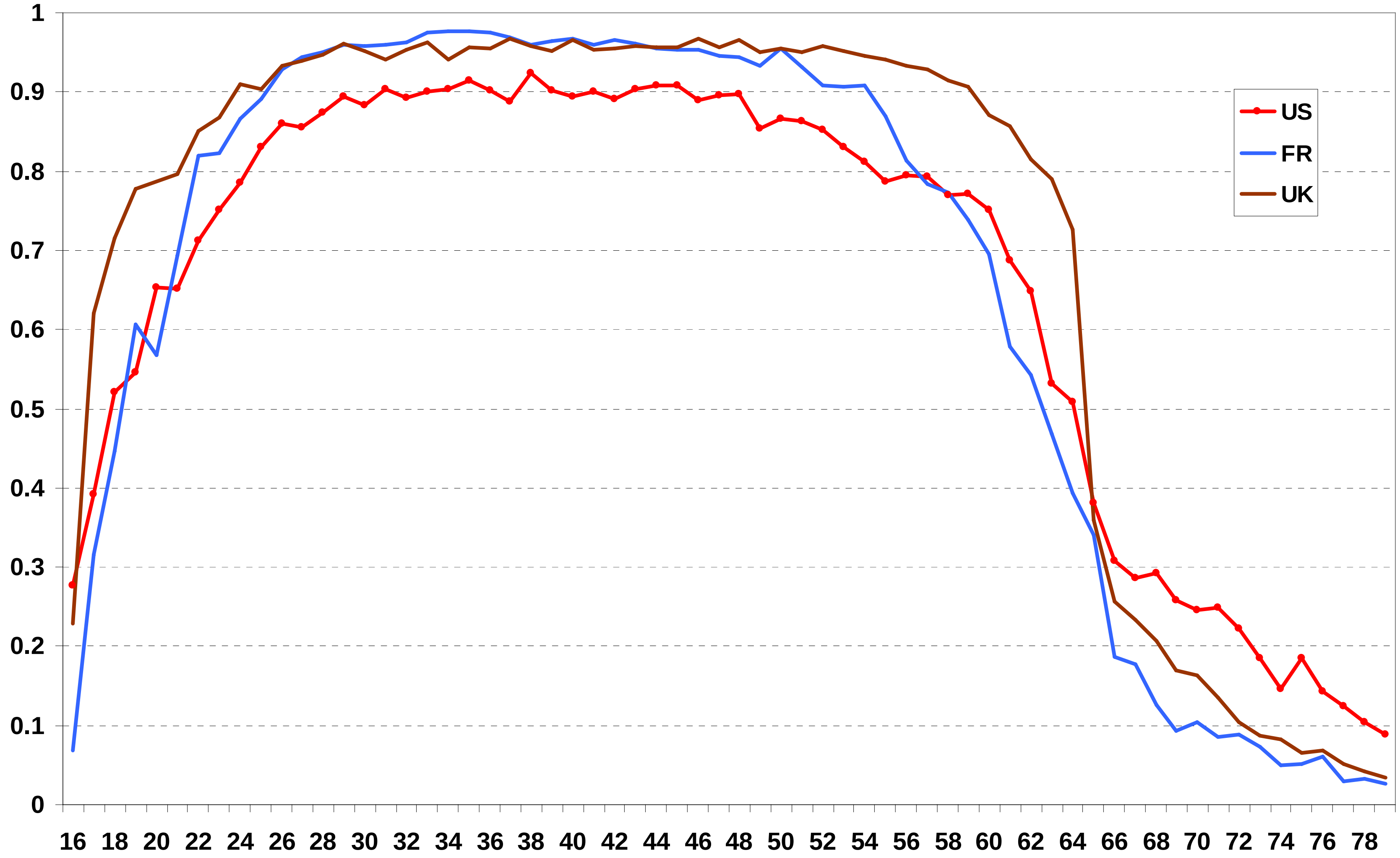
Source Blundell (2009), Mirrlees Review

Male Hours by age – US, FR and UK 2005



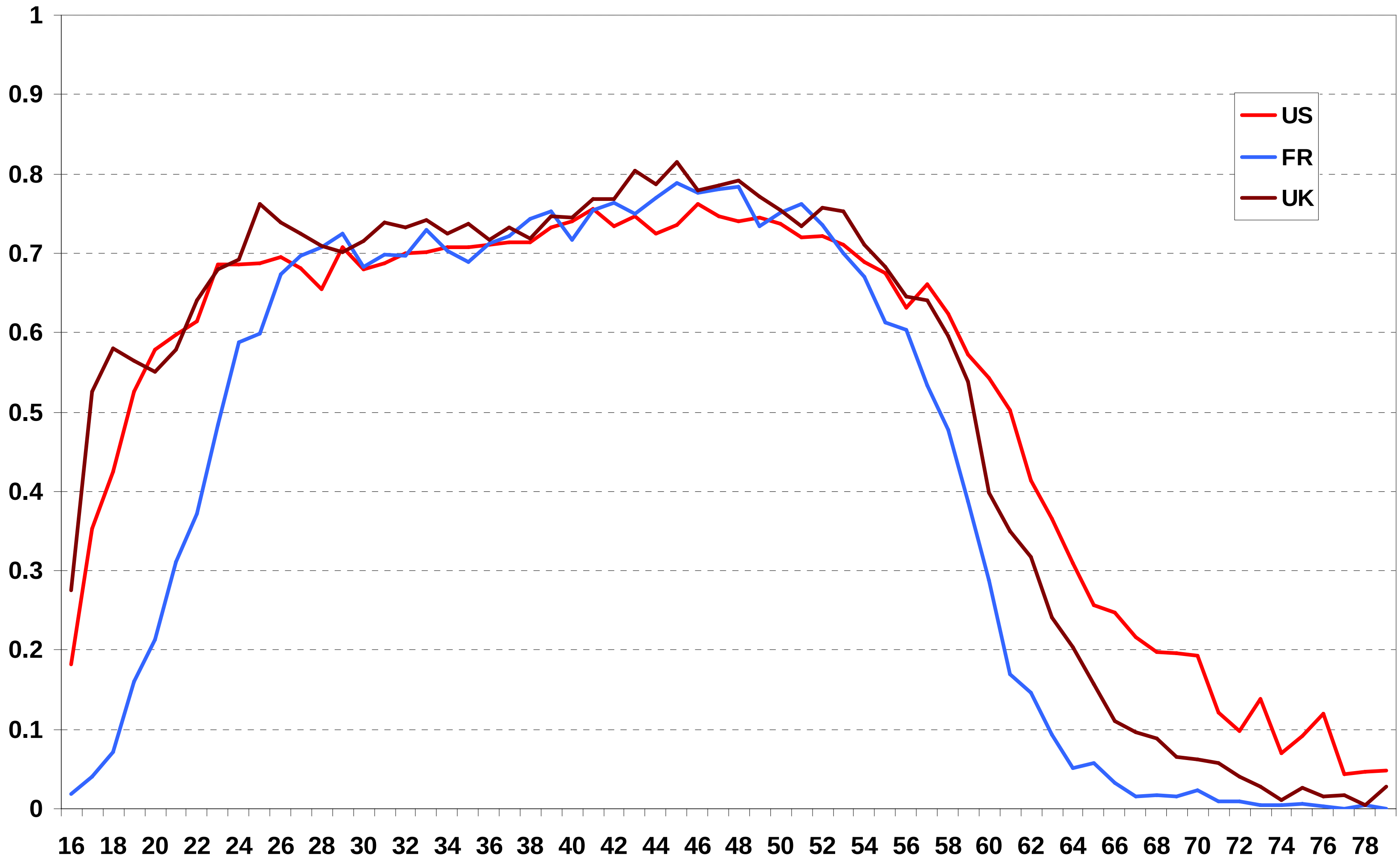
Source Blundell (2009), Mirrlees Review

Male employment by age – US, FR and UK 1975



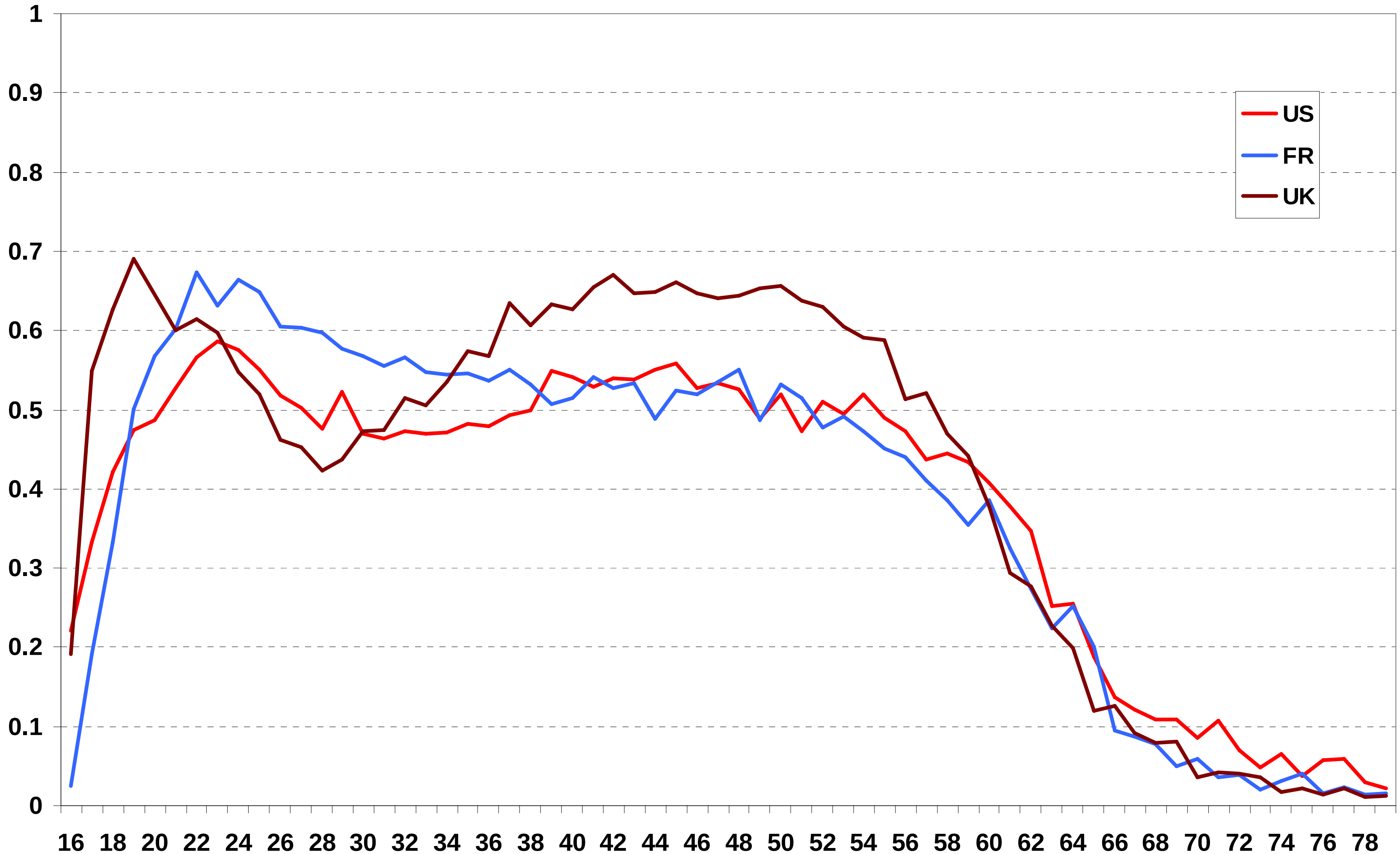
Source Blundell (2009), Mirrlees Review

Female Employment by age – US, FR and UK 2005



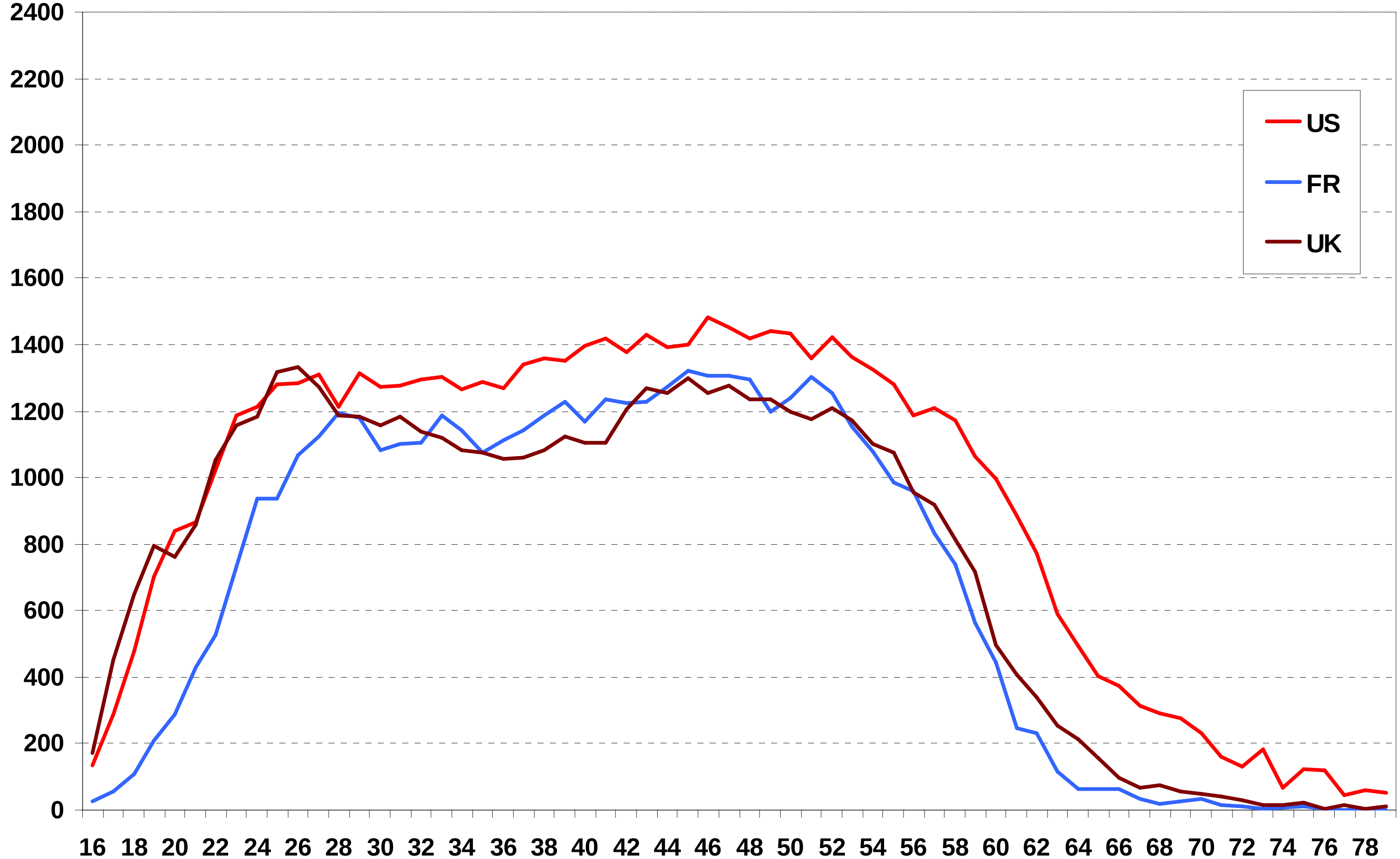
Source Blundell (2009), Mirrlees Review

Female Employment by age – US, FR and UK 1975



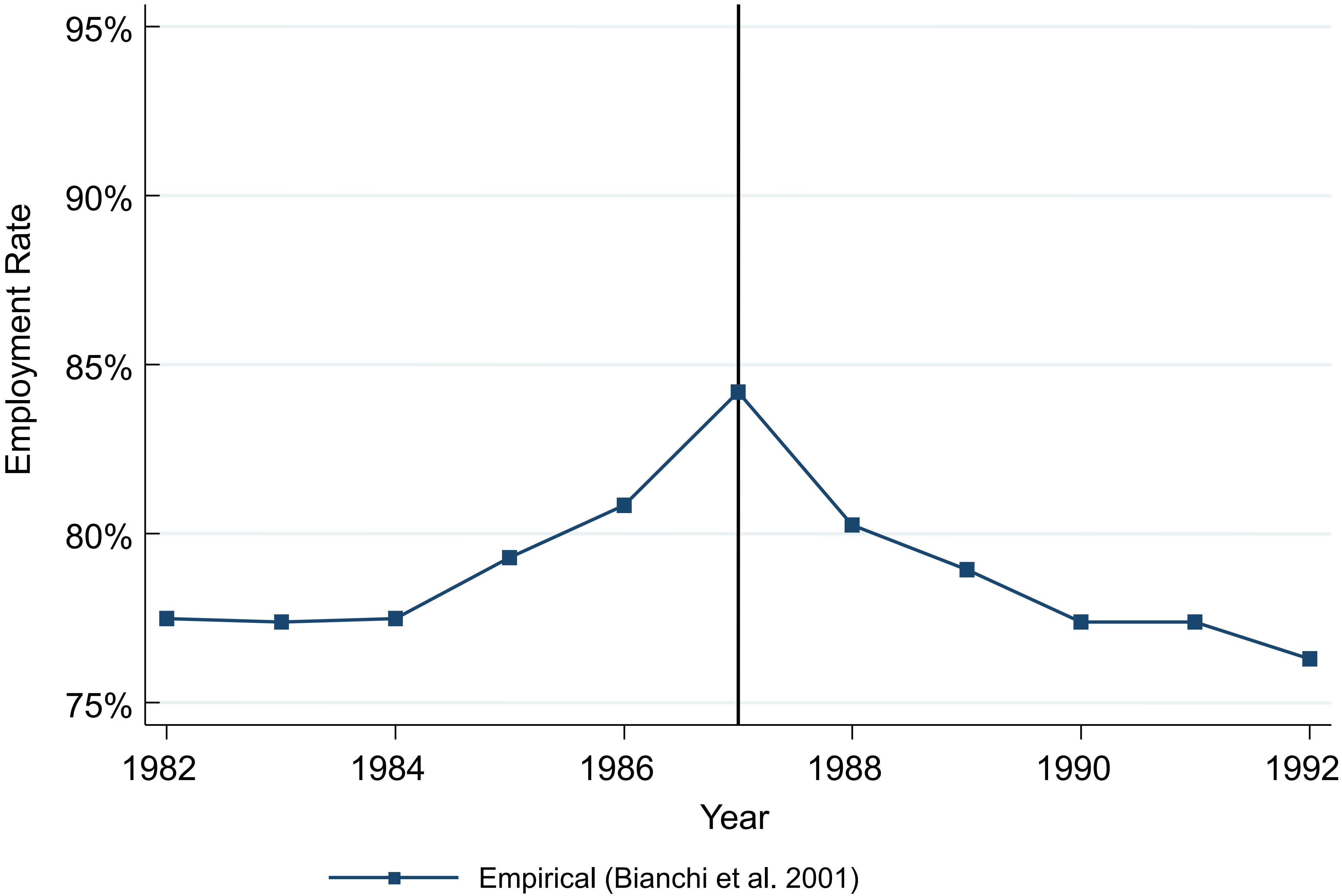
Source Blundell (2009), Mirrlees Review

Female Hours by age – US, FR and UK 2005



Source Blundell (2009), Mirrlees Review

Figure 1a: 1987 Tax Holiday in Iceland



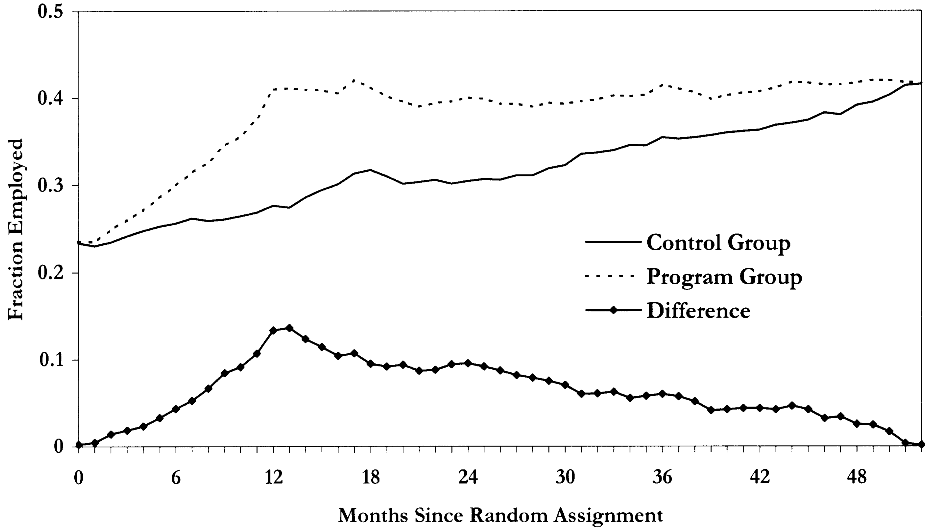
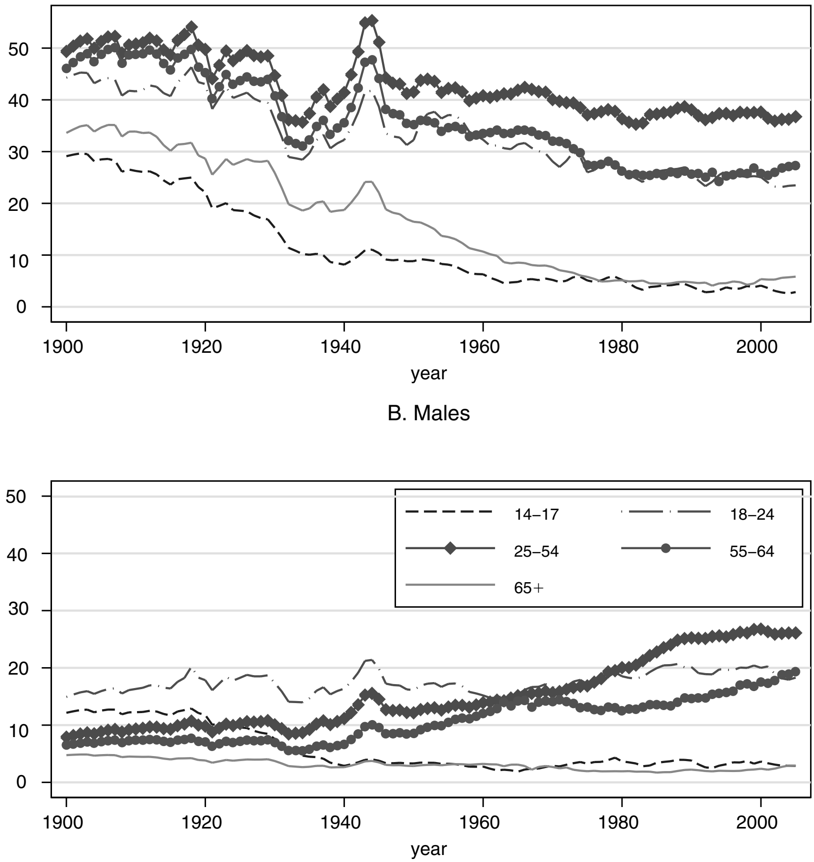


FIGURE 3.—Monthly employment rates.

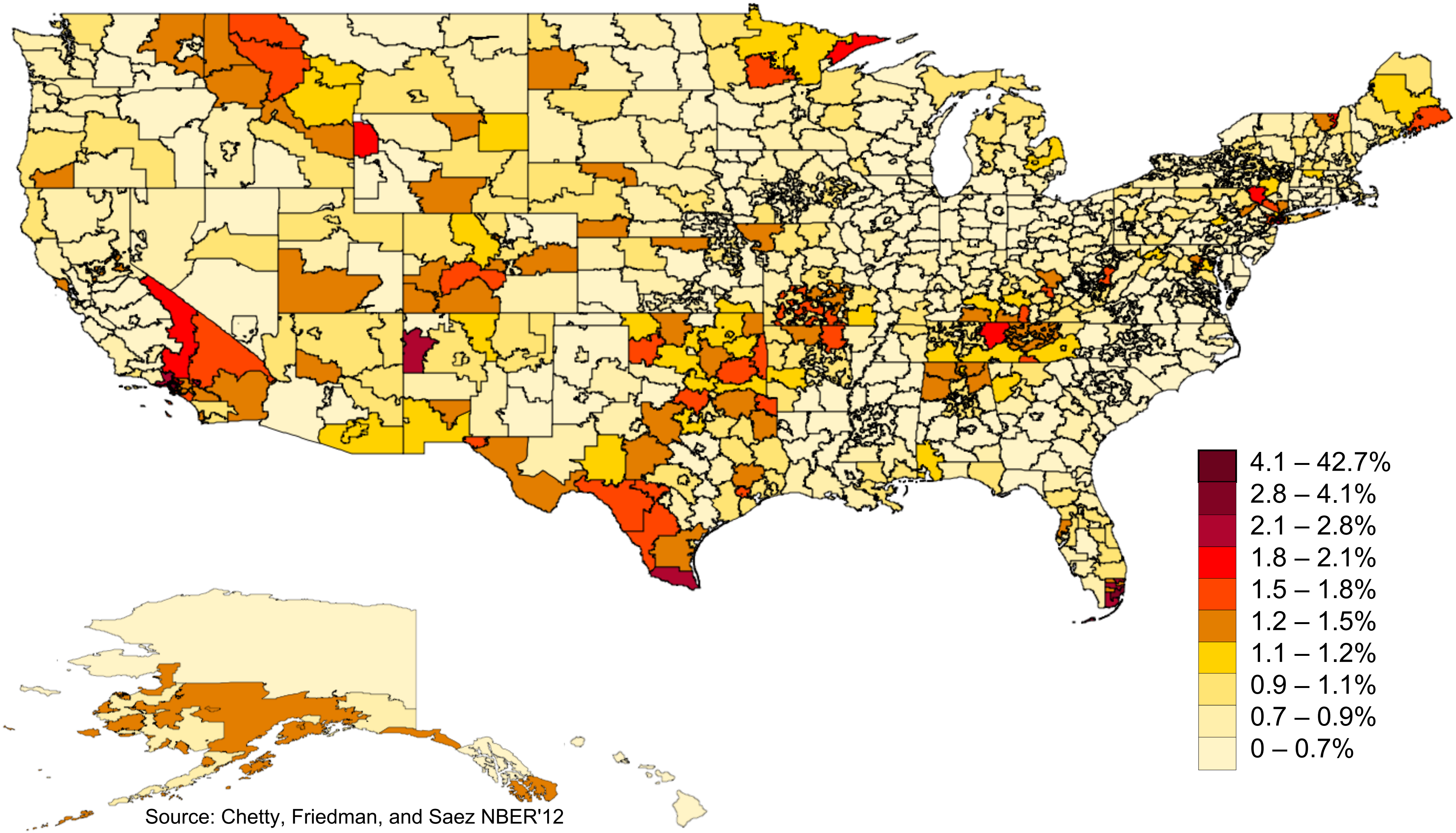
Source: Card and Hyslop, 2005, p. 1734



Ramey and Francis AEJ'09 C. Females

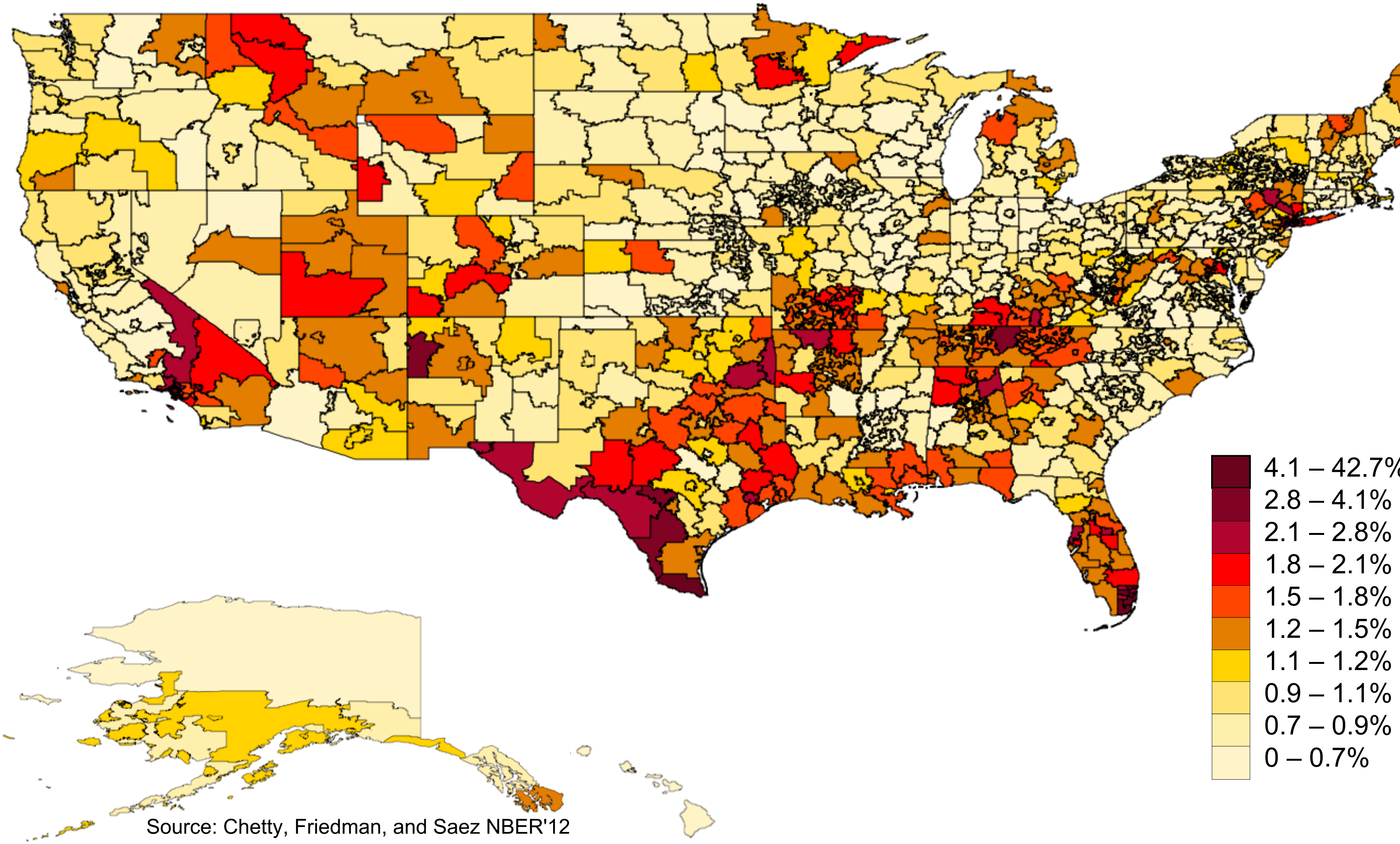
FIGURE 2. AVERAGE WEEKLY HOURS WORKED PER PERSON, BY AGE GROUP

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



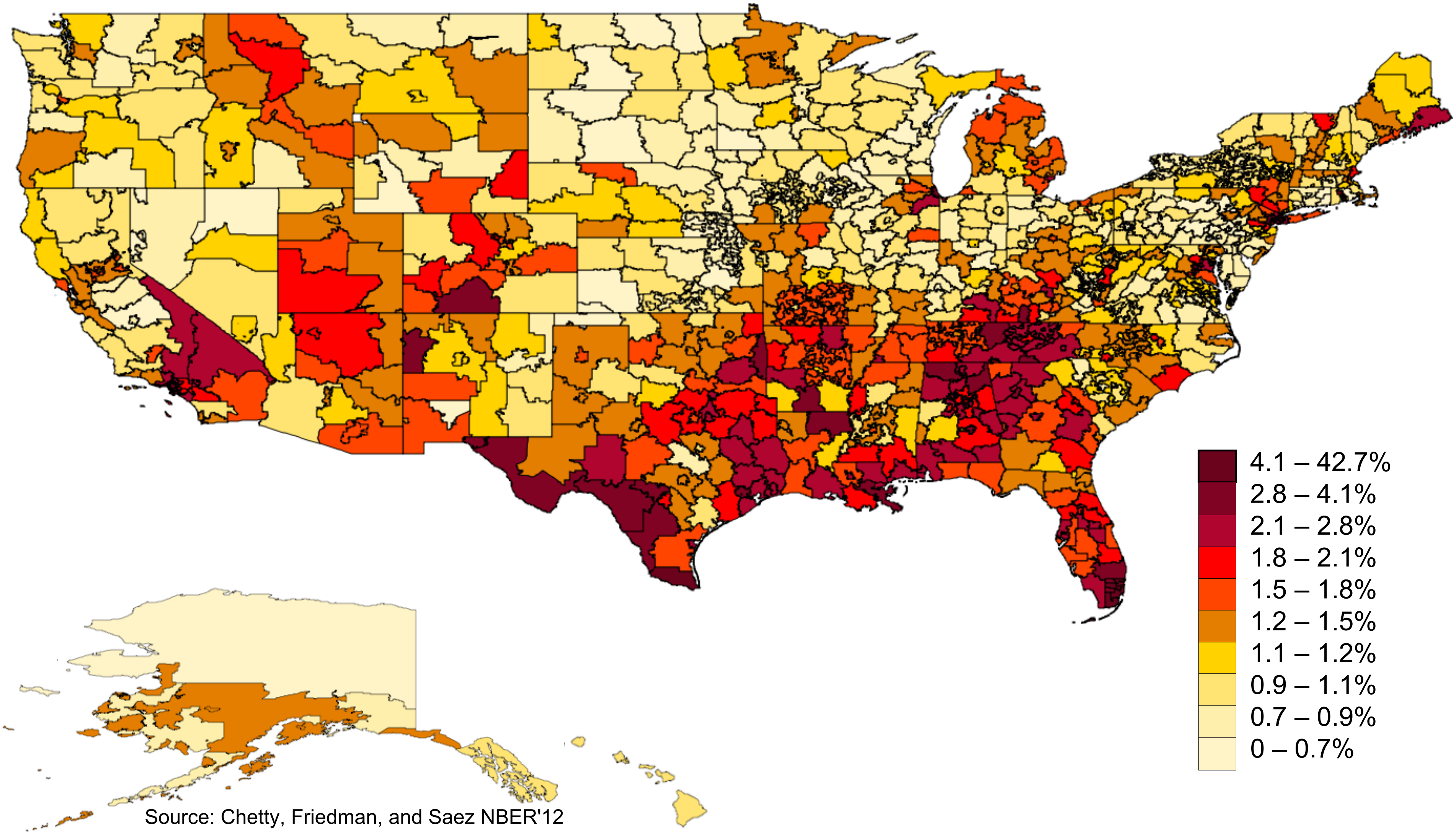
Source: Chetty, Friedman, and Saez NBER'12

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



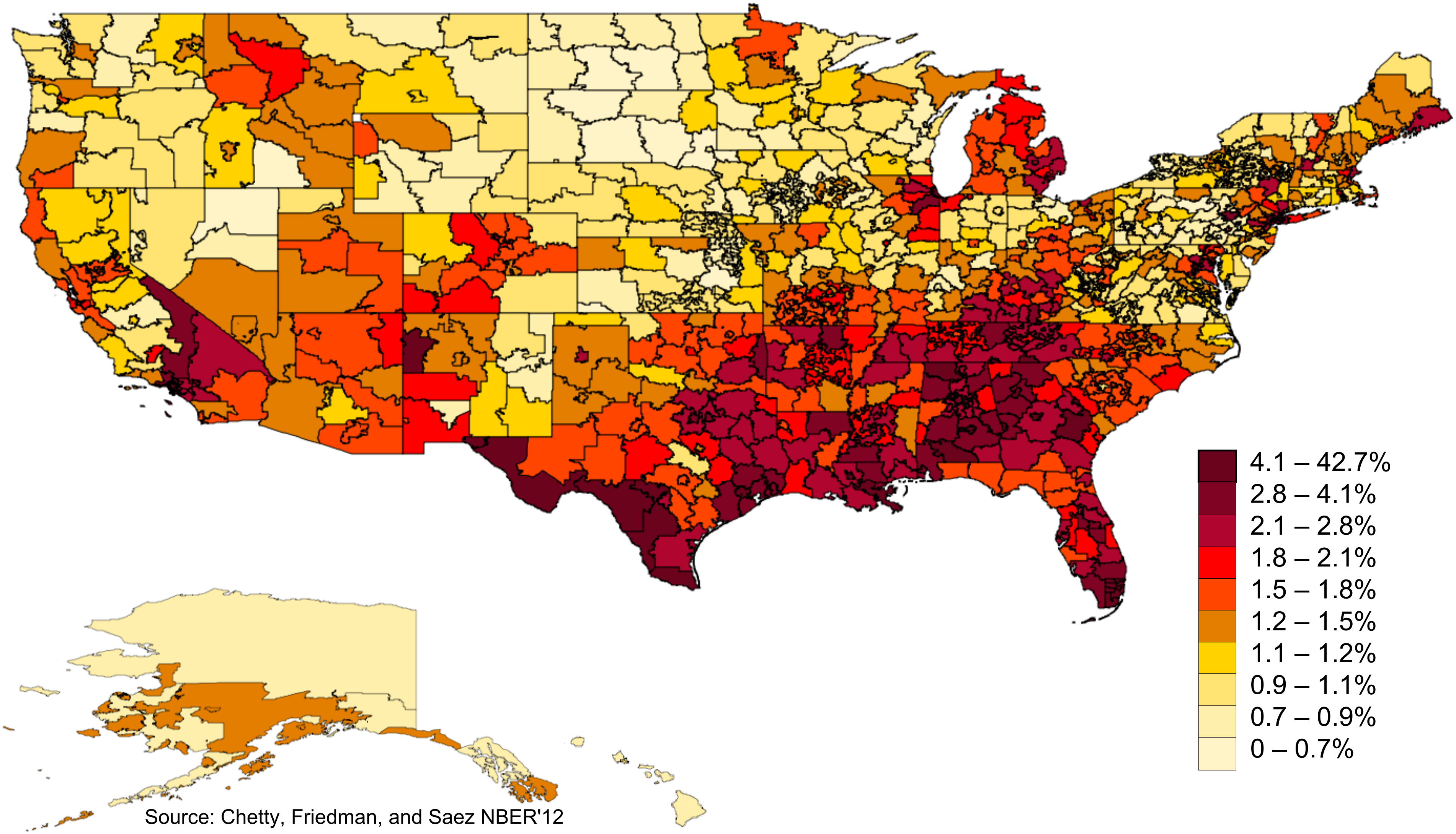
Source: Chetty, Friedman, and Saez NBER'12

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



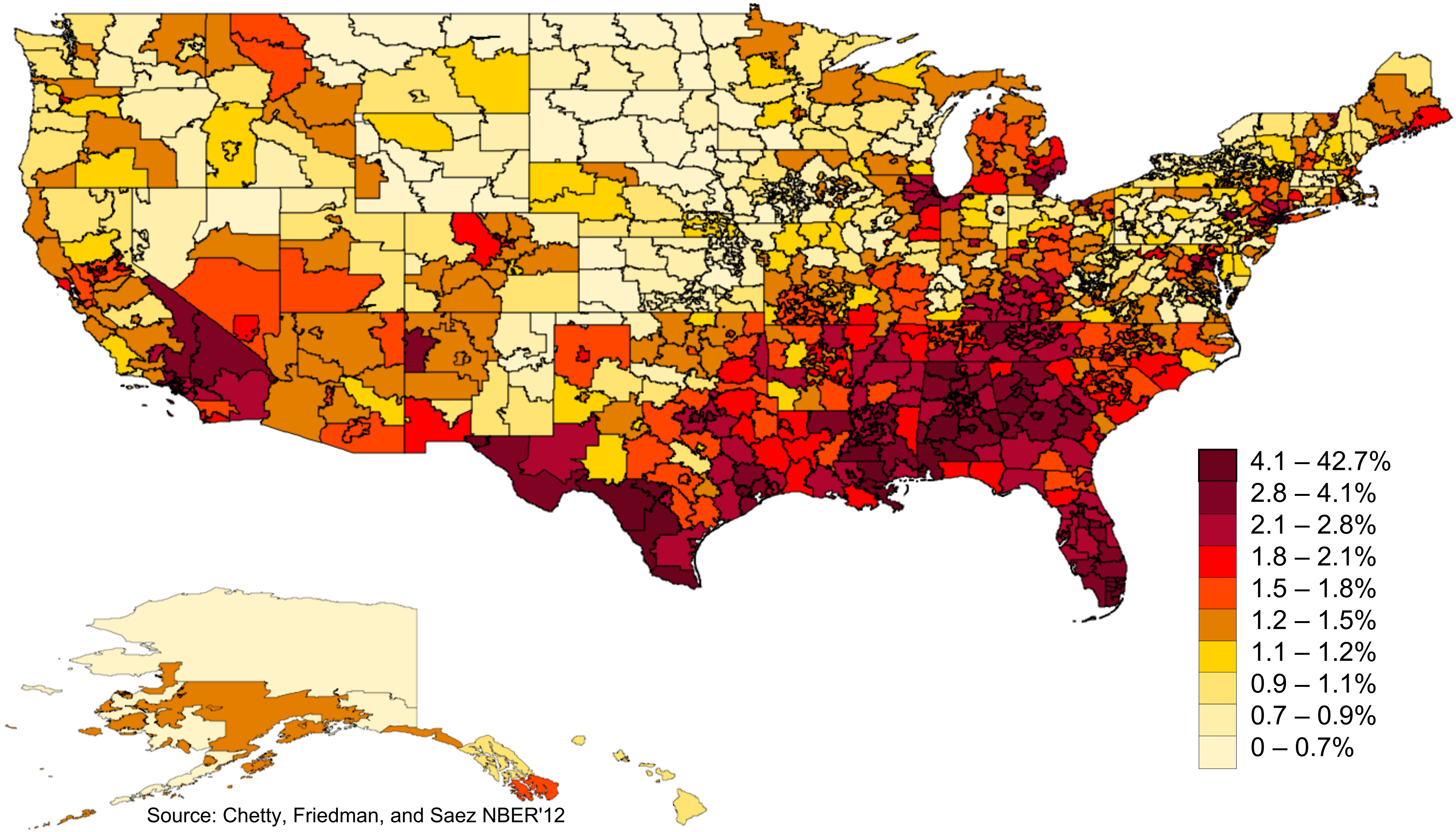
Source: Chetty, Friedman, and Saez NBER'12

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

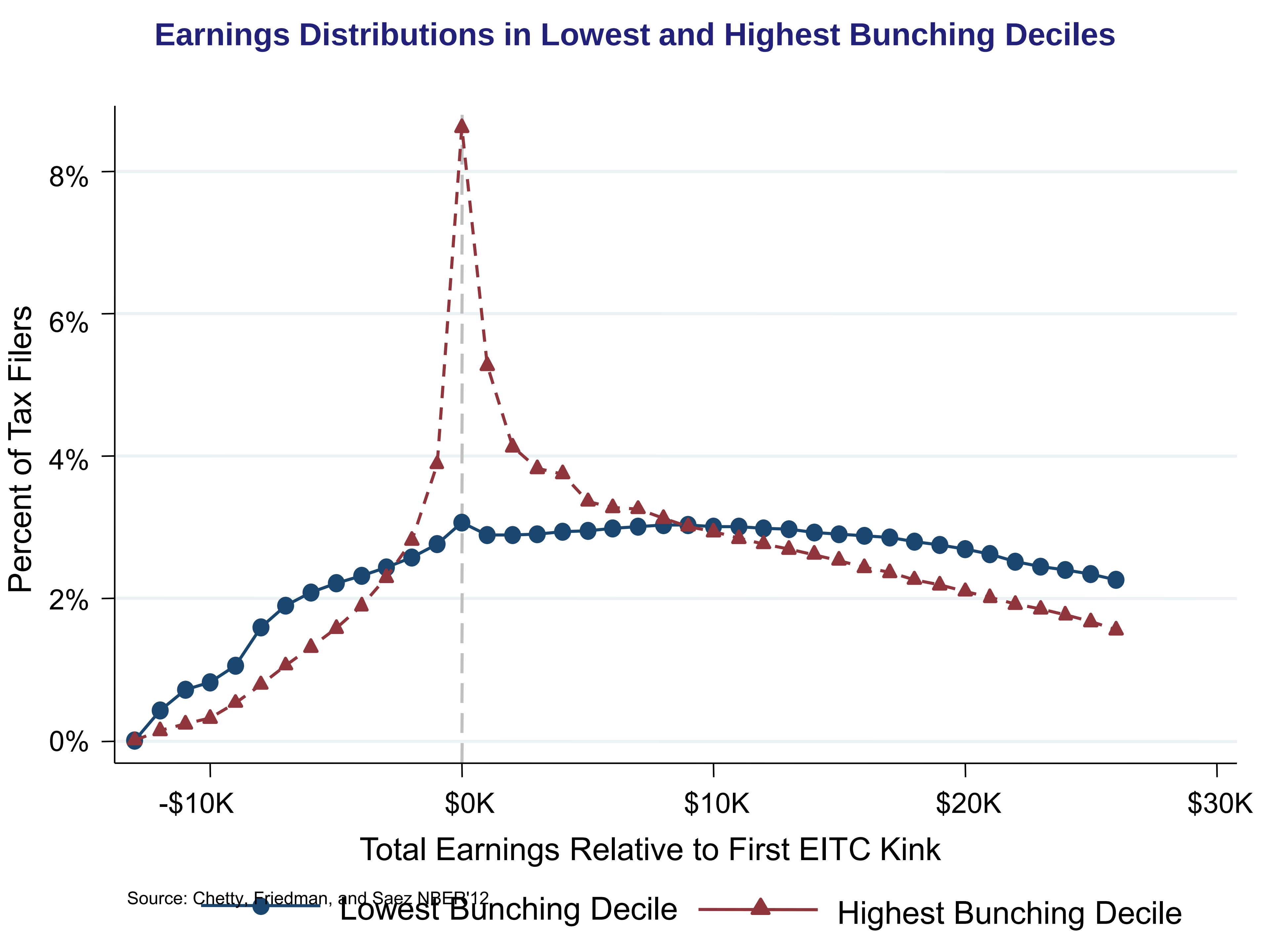


Source: Chetty, Friedman, and Saez NBER'12

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

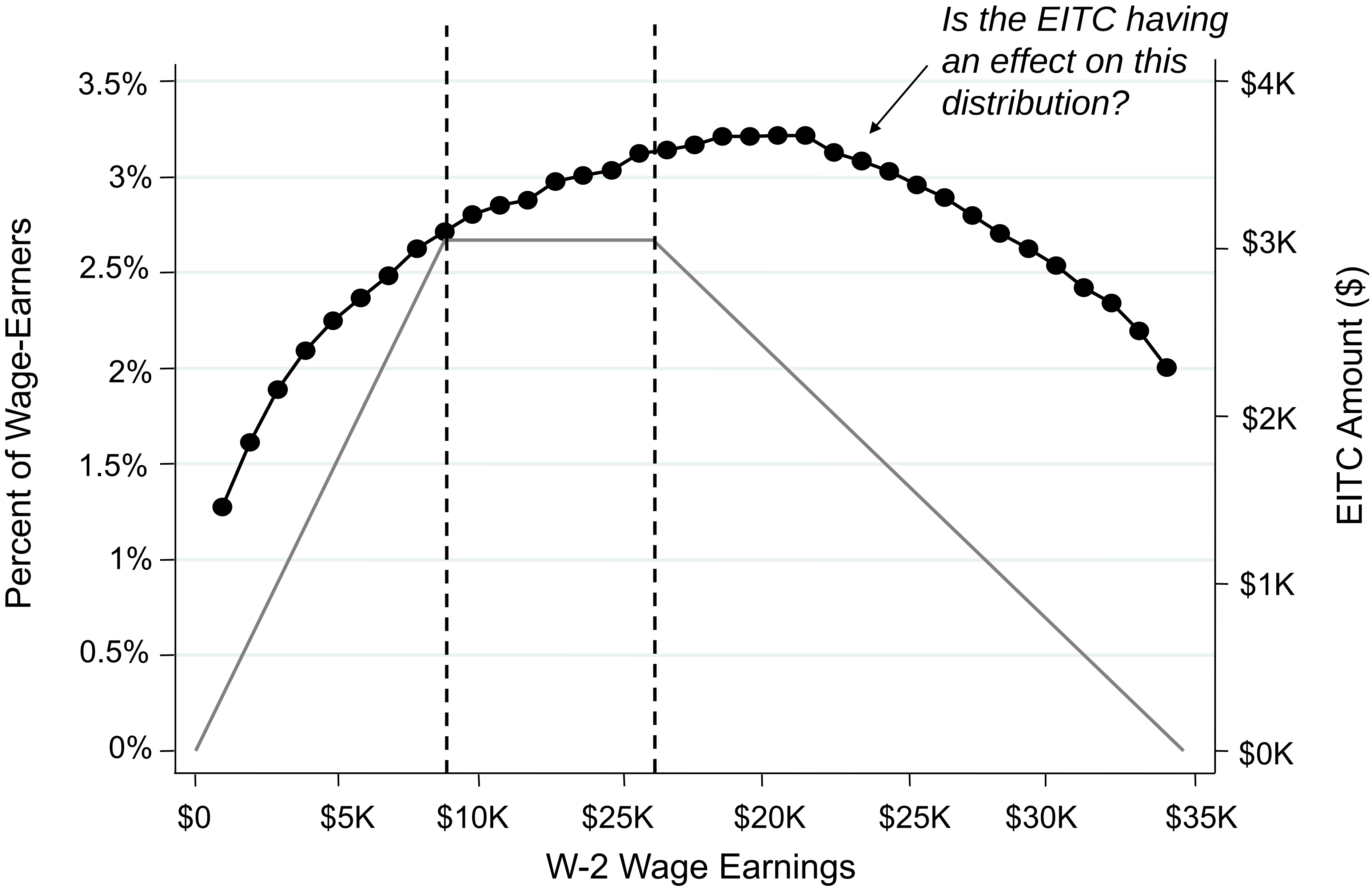


Source: Chetty, Friedman, and Saez NBER'12



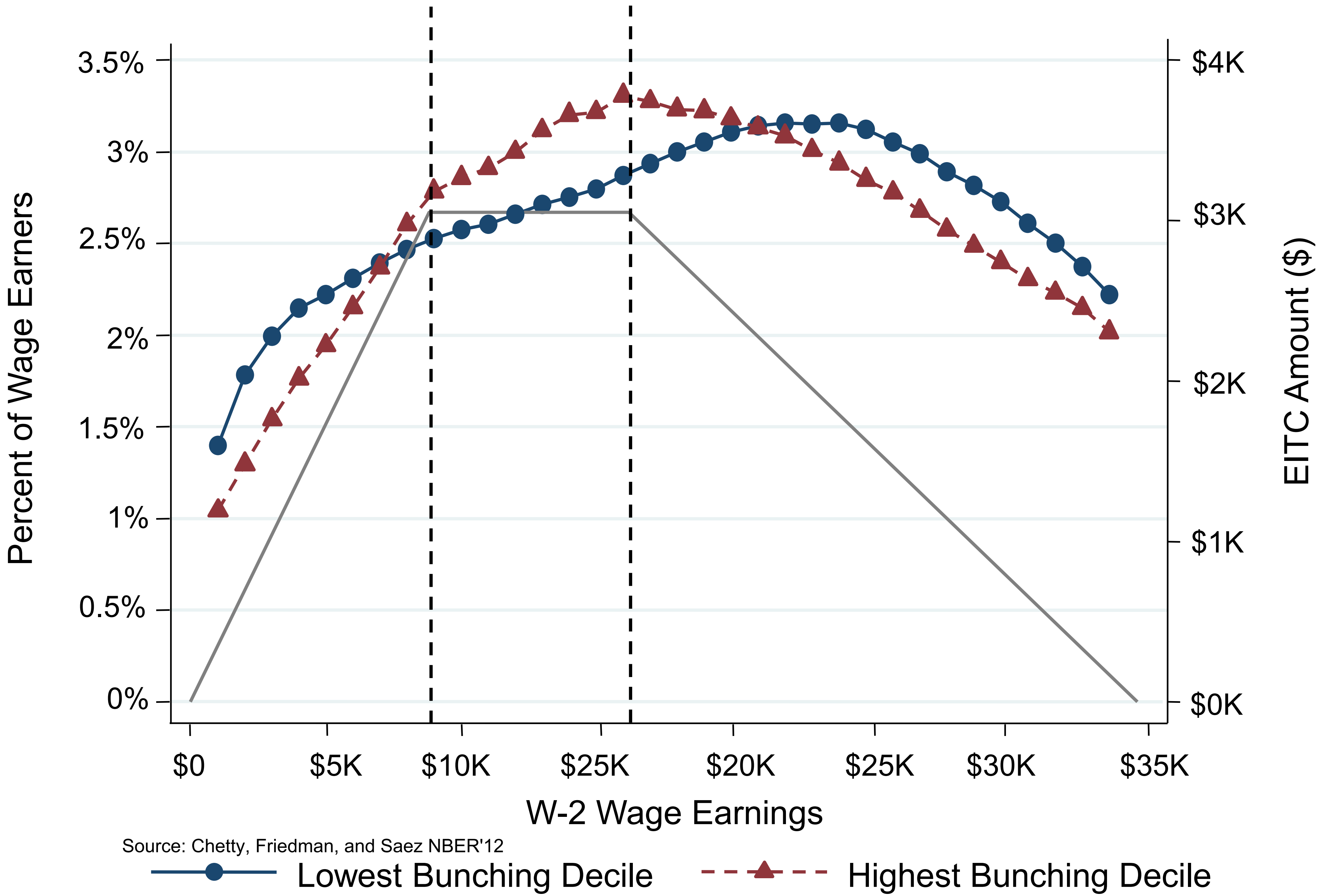
Earnings Distributions in Lowest and Highest Bunching Deciles
Percent of Tax Filers
8%
6%
4%
2%
0%
-$10K
$0K
$10K
$20K
$30K
Total Earnings Relative to First EITC Kink
Source: Chetty, Friedman, and Saez NBER'12
Lowest Bunching Decile
Highest Bunching Decile

Income Distribution For Single Wage Earners with One Child

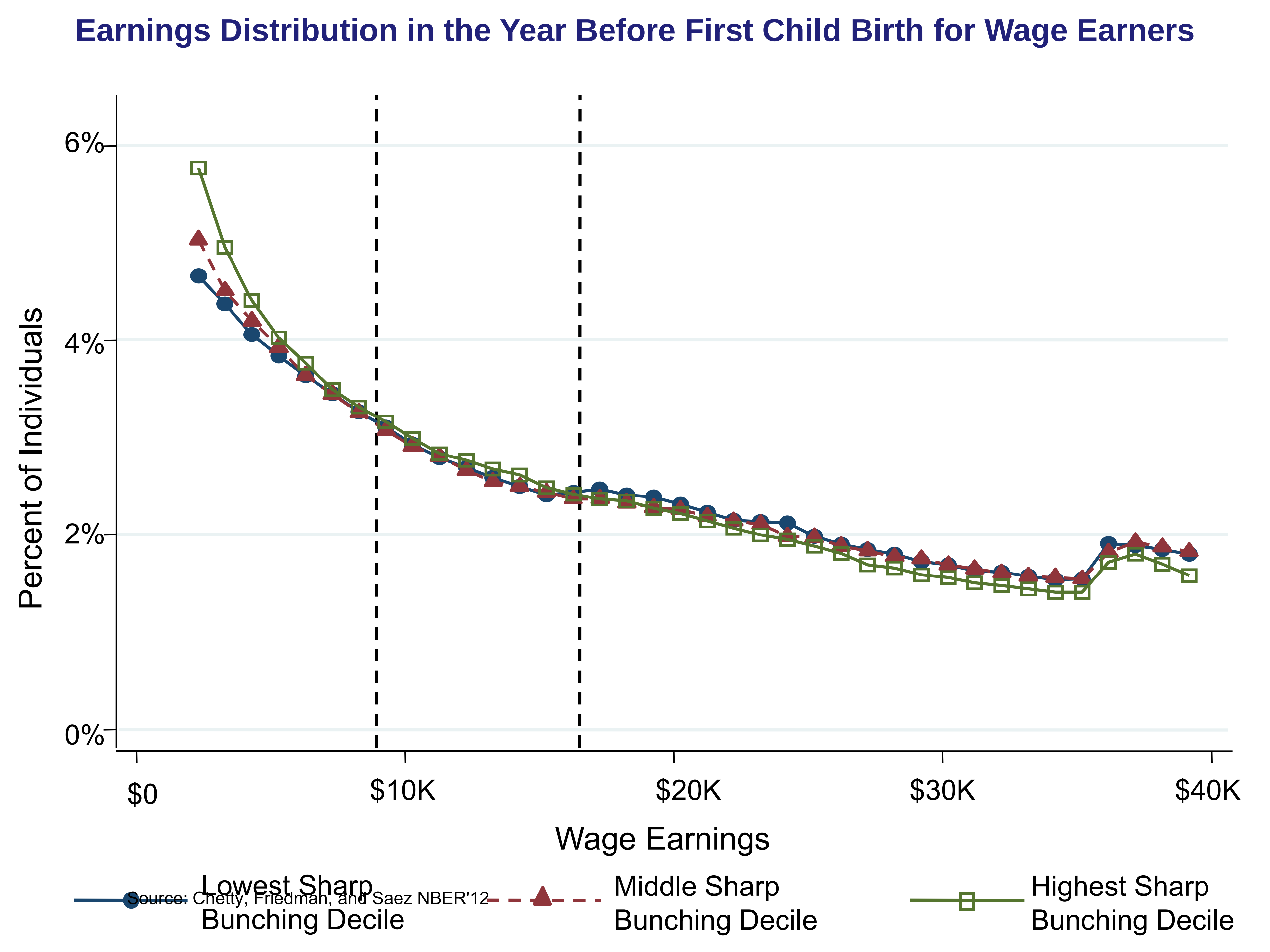


Source: Chetty, Friedman, and Saez NBER'12

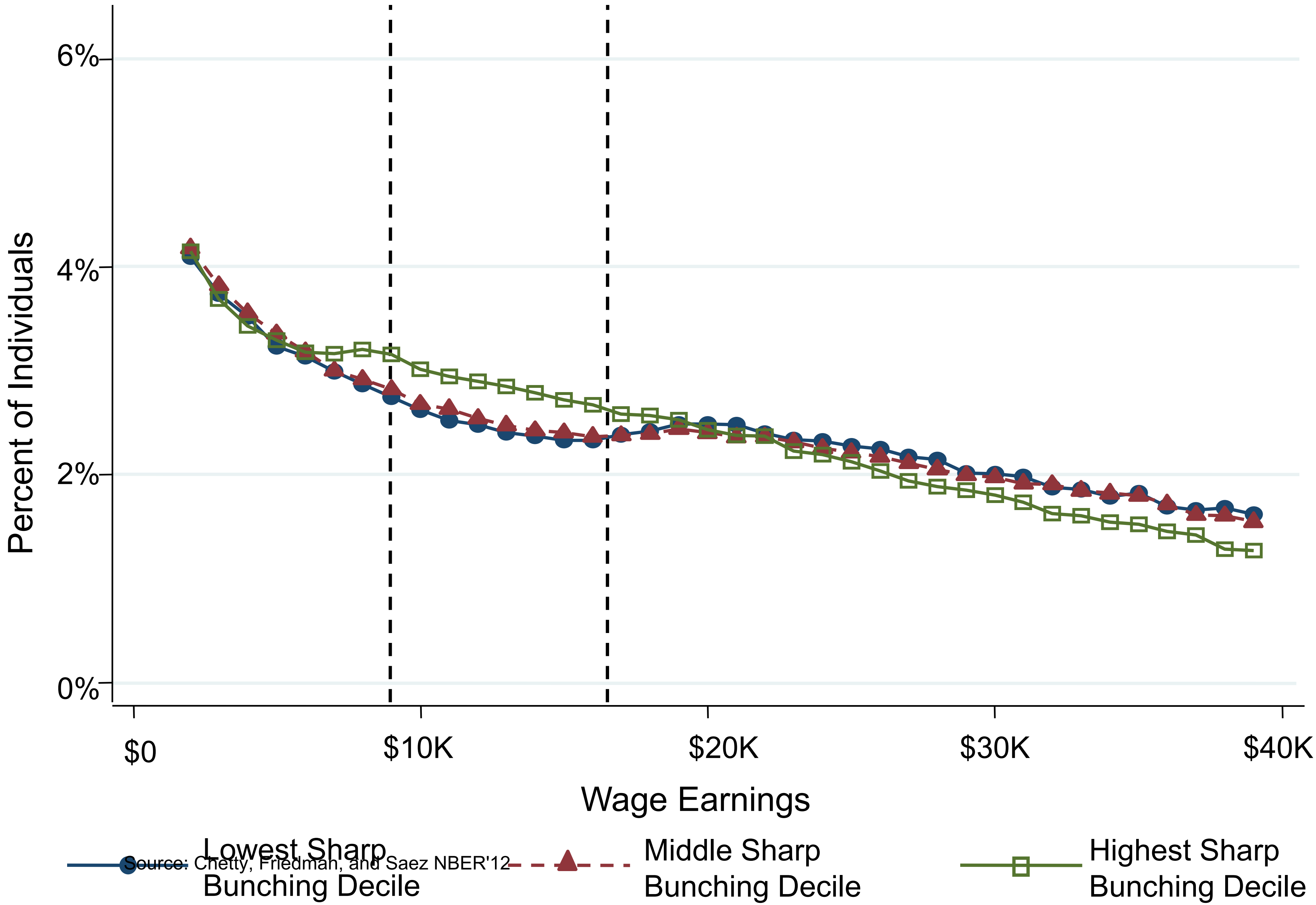
Income Distribution For Single Wage Earners with One Child
High vs. Low Bunching Areas



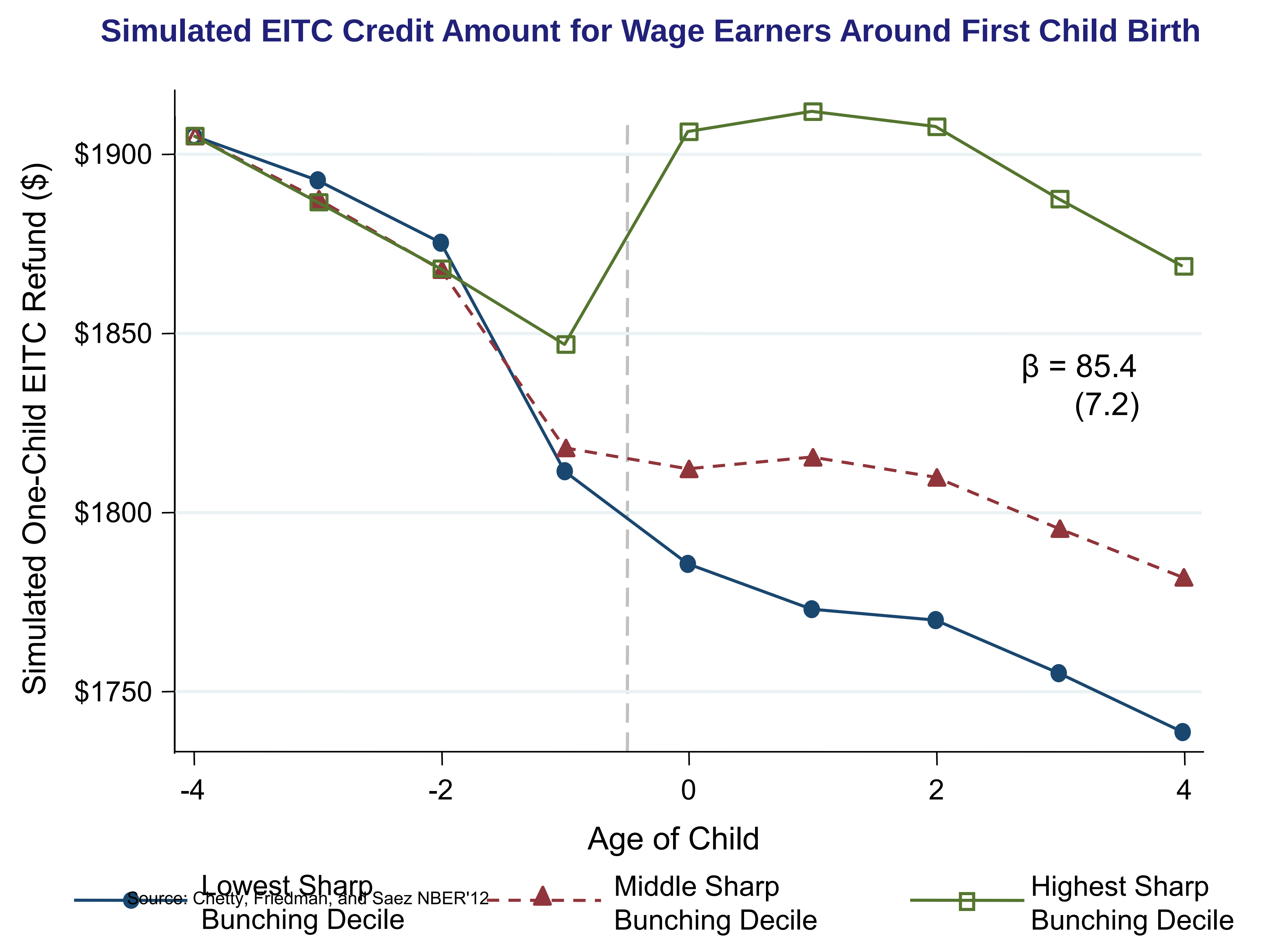
Source: Chetty, Friedman, and Saez NBER'12

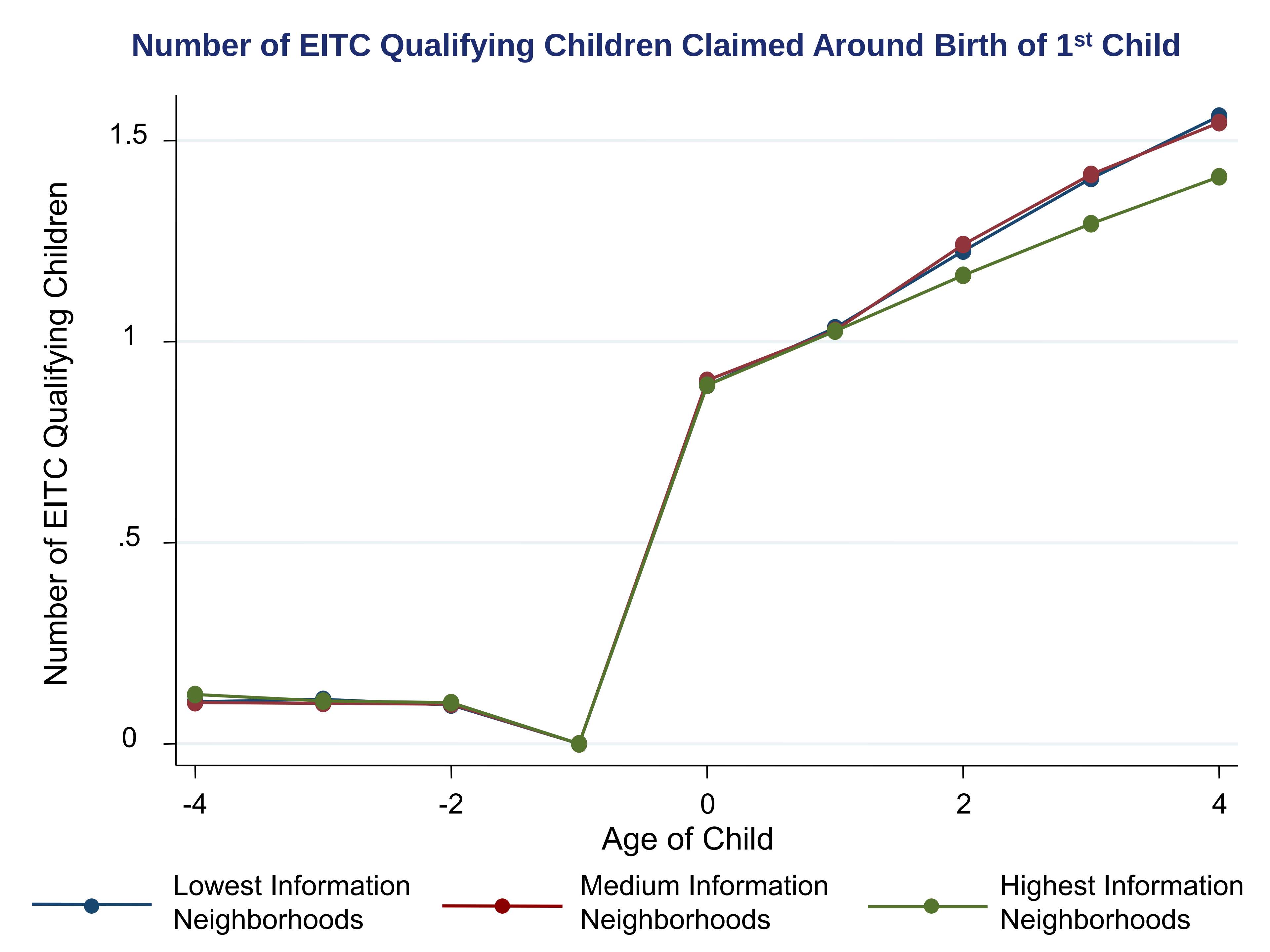

Earnings Distribution in the Year Before First Child Birth for Wage Earners
Percent of Individuals
6%
4%
2%
0%
$0
$10K
$20K
$30K
$40K
Wage Earnings
Lowest Sharp Bunching Decile
Middle Sharp Bunching Decile
Highest Sharp Bunching Decile
Source: Chetty, Friedman, and Saez NBER'12

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



Source: Chetty, Friedman, and Saez NBER'12


Simulated EITC Credit Amount for Wage Earners Around First Child Birth
Simulated One-Child EITC Refund ($)
$1900
$1850
$1800
$1750
-4
-2
0
2
4
Age of Child
β = 85.4
(7.2)
Lowest Sharp Bunching Decile
Middle Sharp Bunching Decile
Highest Sharp Bunching Decile
Source: Chetty, Friedman, and Saez NBER'12

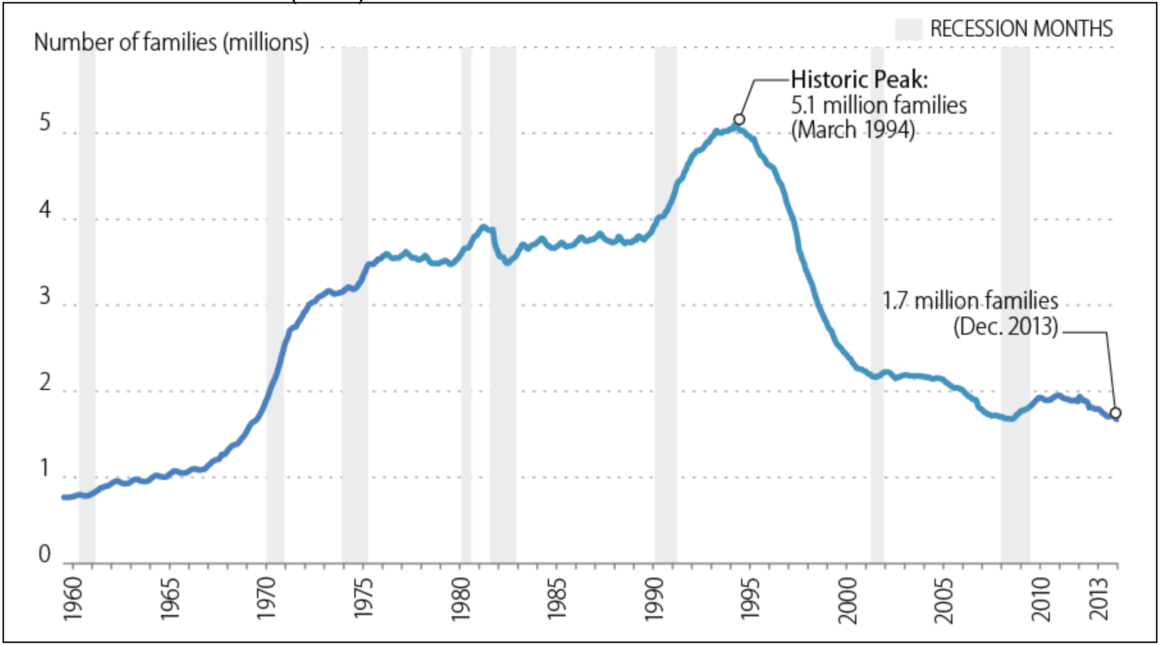


Number of EITC Qualifying Children Claimed Around Birth of 1st Child
Number of EITC Qualifying Children
1.5
1
.5
0
-4
-2
0
2
4
Age of Child
Lowest Information Neighborhoods
Medium Information Neighborhoods
Highest Information Neighborhoods

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

(Families in millions)

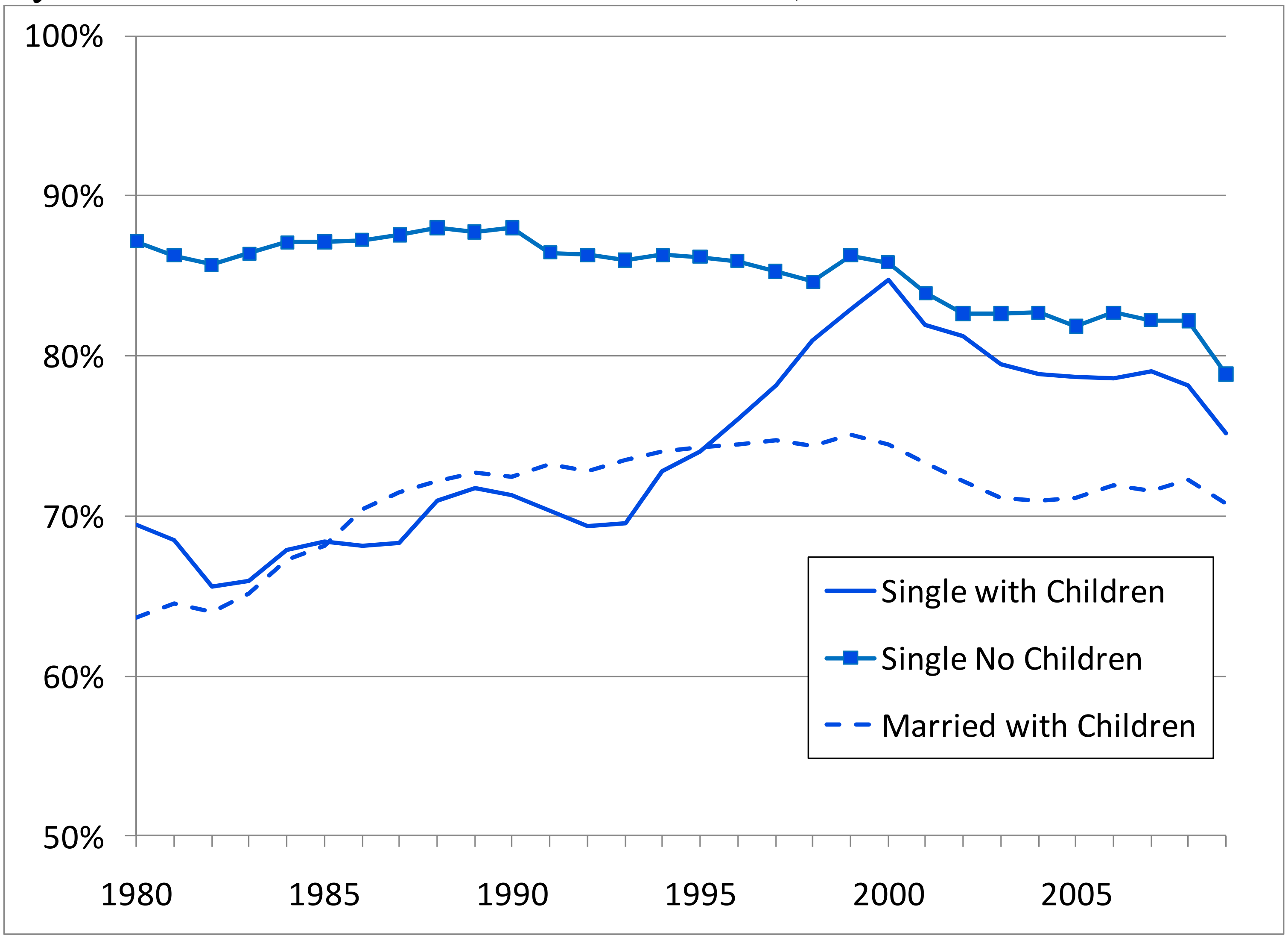
Source: Falk (2016)



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).

Annual Employment Rates for Women
By Marital Status and Presence of Children, 1980-2009



Source: Bitler and Hoynes, Brookings Papers on Economic Activity, 2011.

The landscape providing assistance to poor families with children has changed substantially

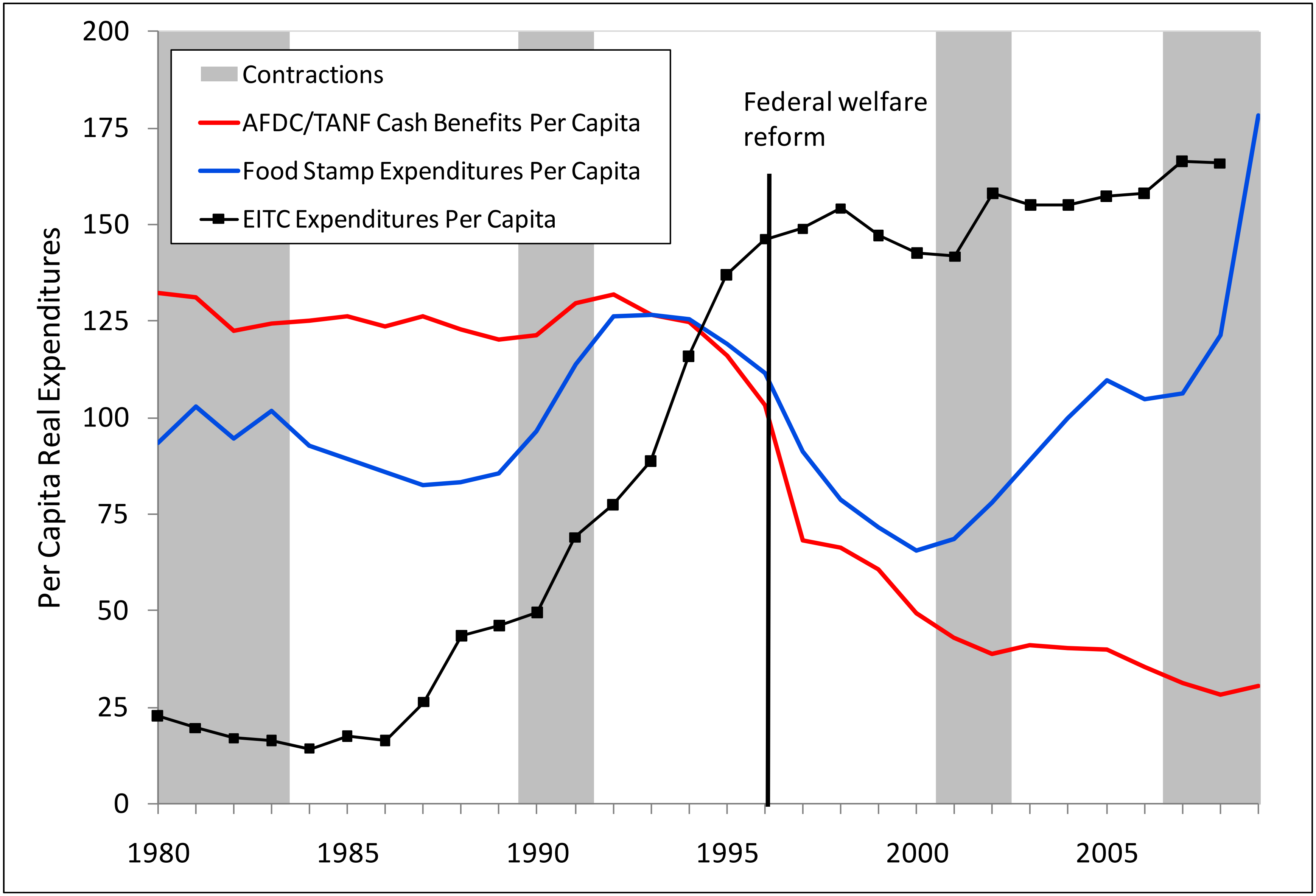
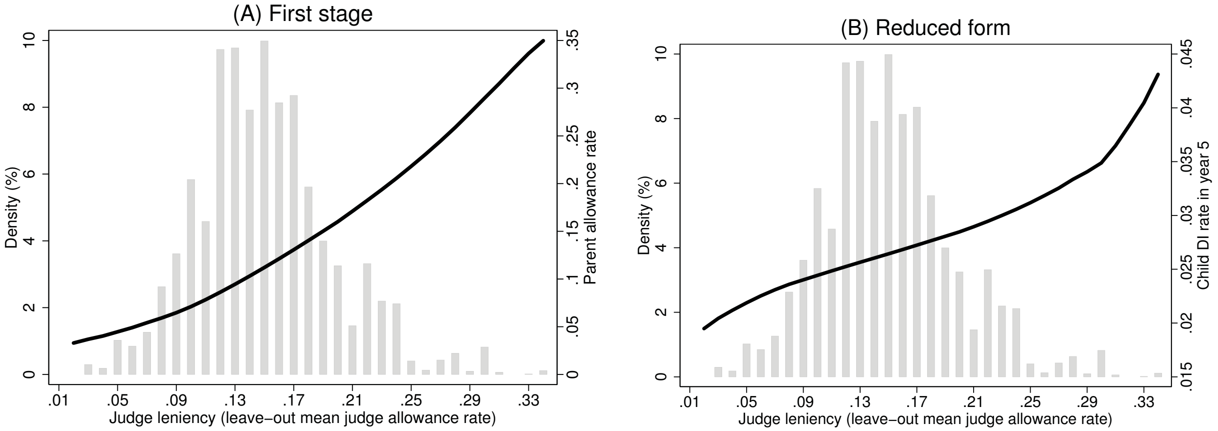


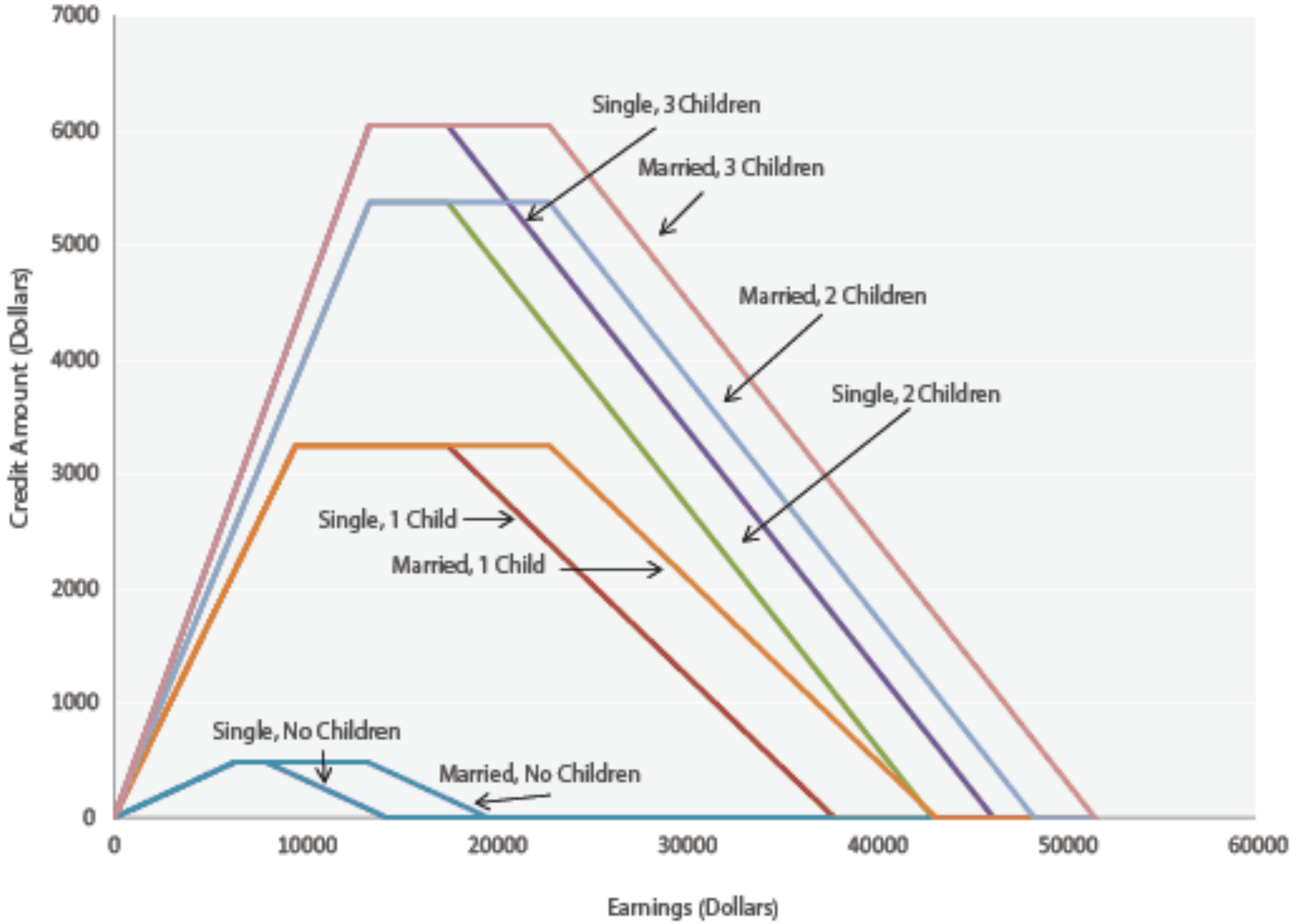
Figure 3: Effect of Judge Leniency on Parents (First Stage) and Children (Reduced Form).



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)

Figure 1: Earned Income Tax Credit by Number of Children and Filing Status, 2013

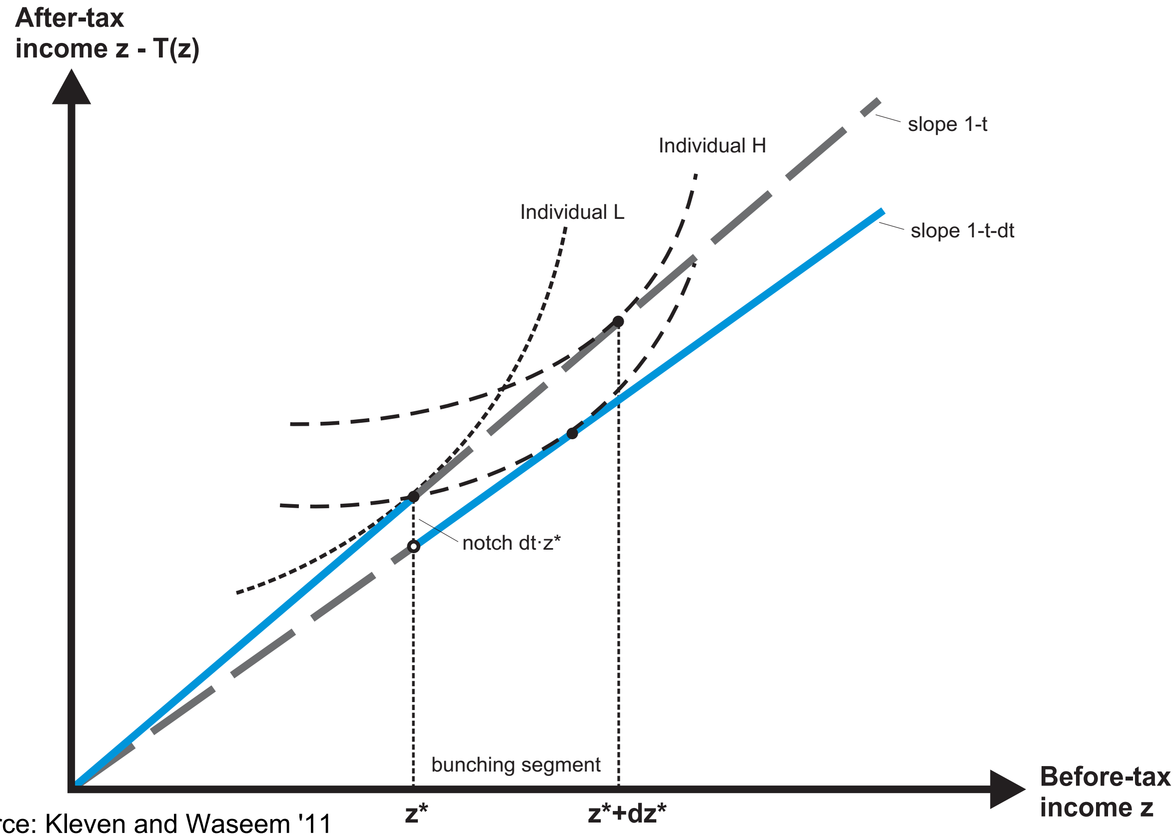


Source: 2013 EITC parameters taken from http://www.taxpolicycenter.org/taxfacts/displayafact.cfm?Docid=36

FIGURE 1

Effect of Notch on Taxpayer Behavior

Panel A: Bunching at the Notch

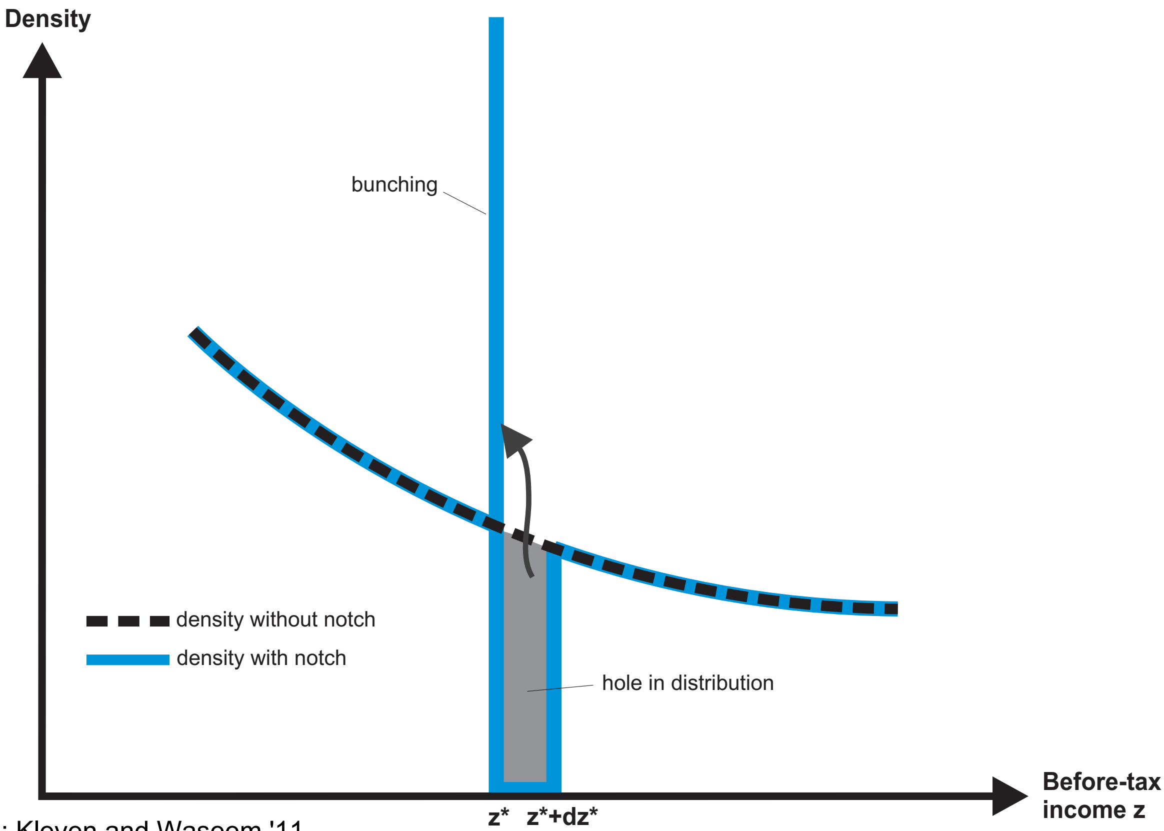


Source: Kleven and Waseem '11

FIGURE 2

Effect of Notch on Density Distribution

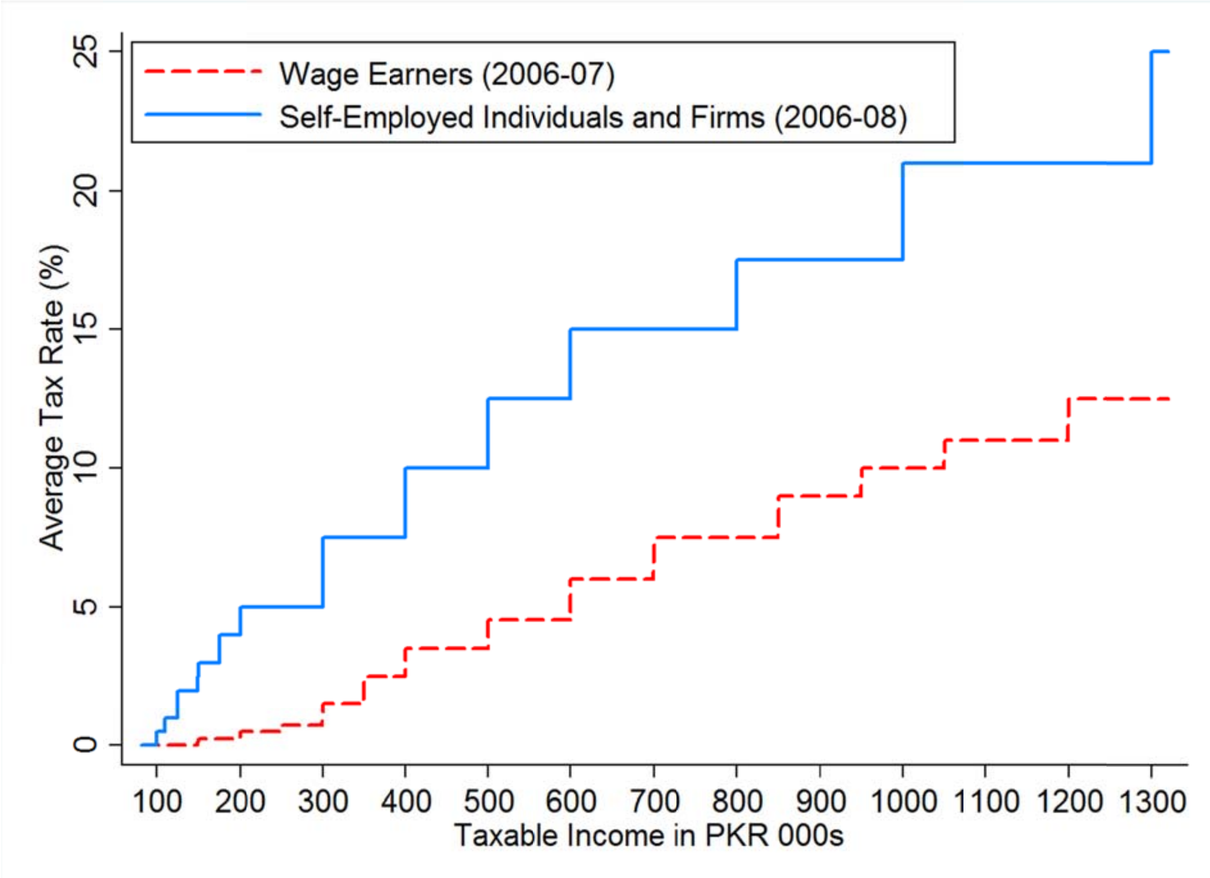
Panel A: Theoretical Density Distributions



Source: Kleven and Waseem '11

FIGURE 3

Personal Income Tax Schedules in Pakistan

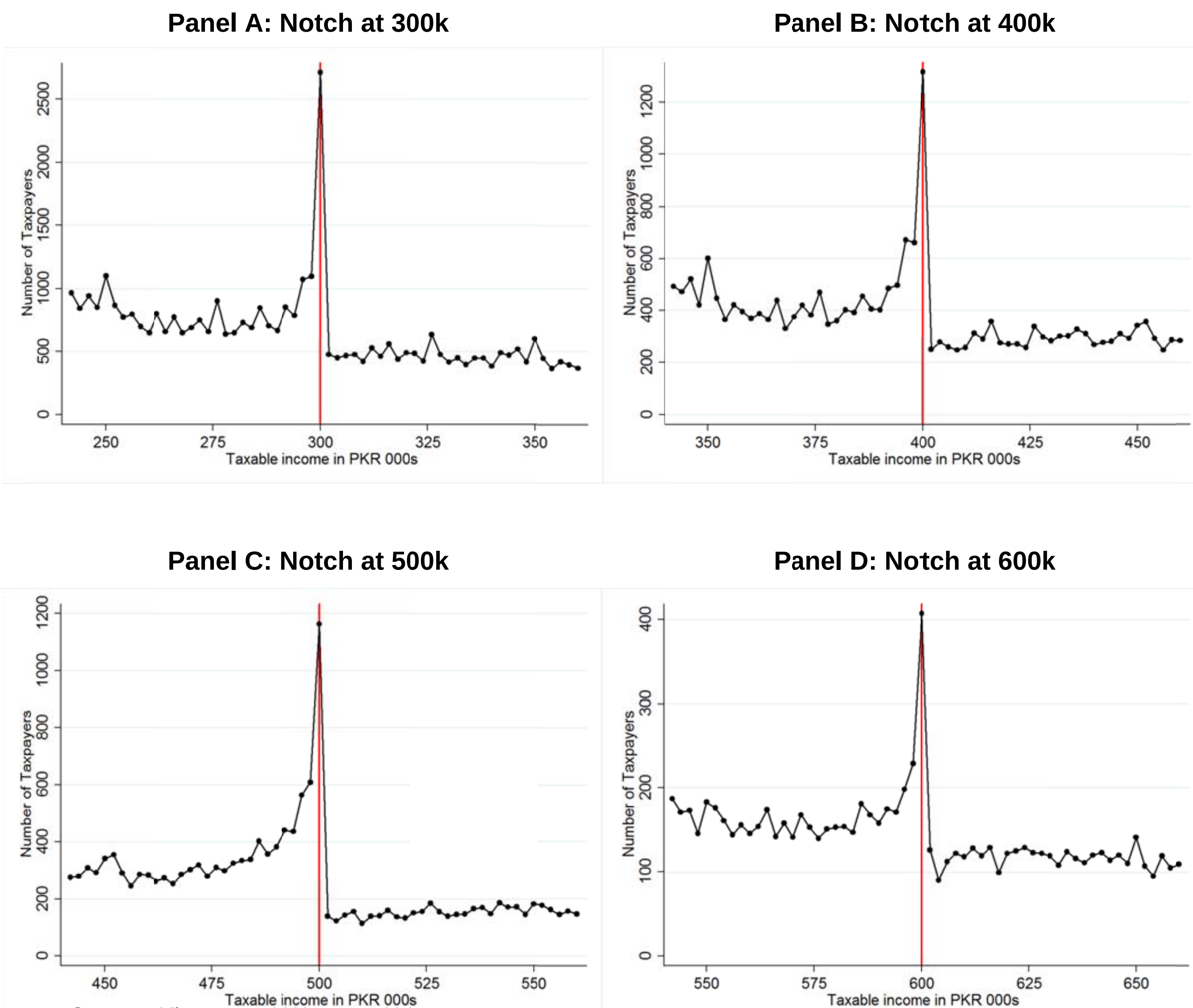


Notes: the figure shows the statutory (average) tax rate as a function of annual taxable income in the personal income tax schedules for wage earners (red dashed line) and self-employed individuals and unincorporated firms (blue solid line), respectively. Taxable income is shown in thousands of Pakistani Rupees (PKR), and the PKR-USD exchange rate is around 85 as of April 2011. The schedule for the self-employed applies to the full period of this study (2006-08), while the schedule for wage earners applies only to 2006-07 and was changed by a tax reform in 2008. The tax system classifies individuals as either wage earners or self-employed based on whether income from wages or self-employment constitute the larger share of total income, and then taxes total income according to the assigned schedule. The tax schedule for self-employed individuals and firms consists of 14 brackets, while the tax schedule for wage earners consists of 21 brackets (the first 14 of which are shown in the figure). Each bracket cutoff is associated with a notch, and the cutoff itself belong to the tax-favored side of the notch.

Source: Kleven and Waseem '11

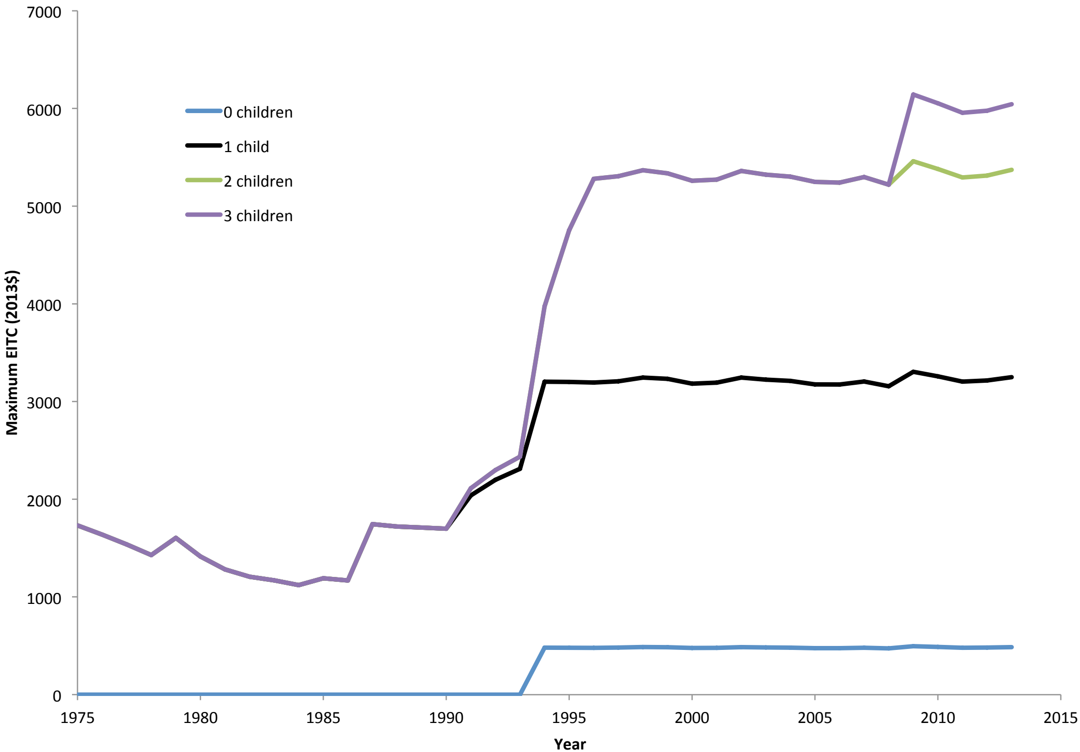
FIGURE 5

Density Distribution around Middle Notches:
Self-Employed Individuals and Firms (Sophisticated Filers)



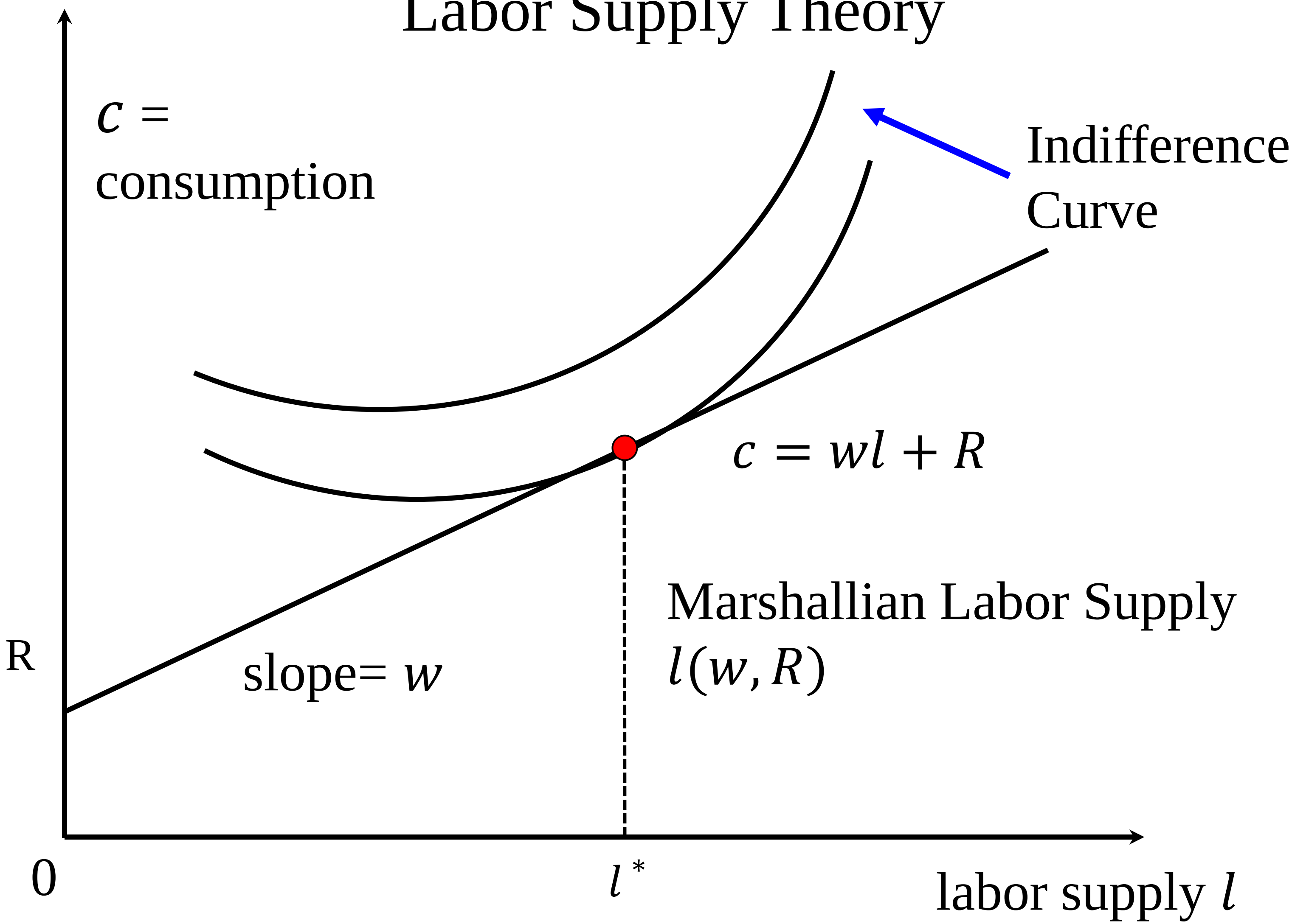
Source: Kleven and Waseem '11

Figure 2. Maximum credit over time, constant 2013 dollars, by number of children

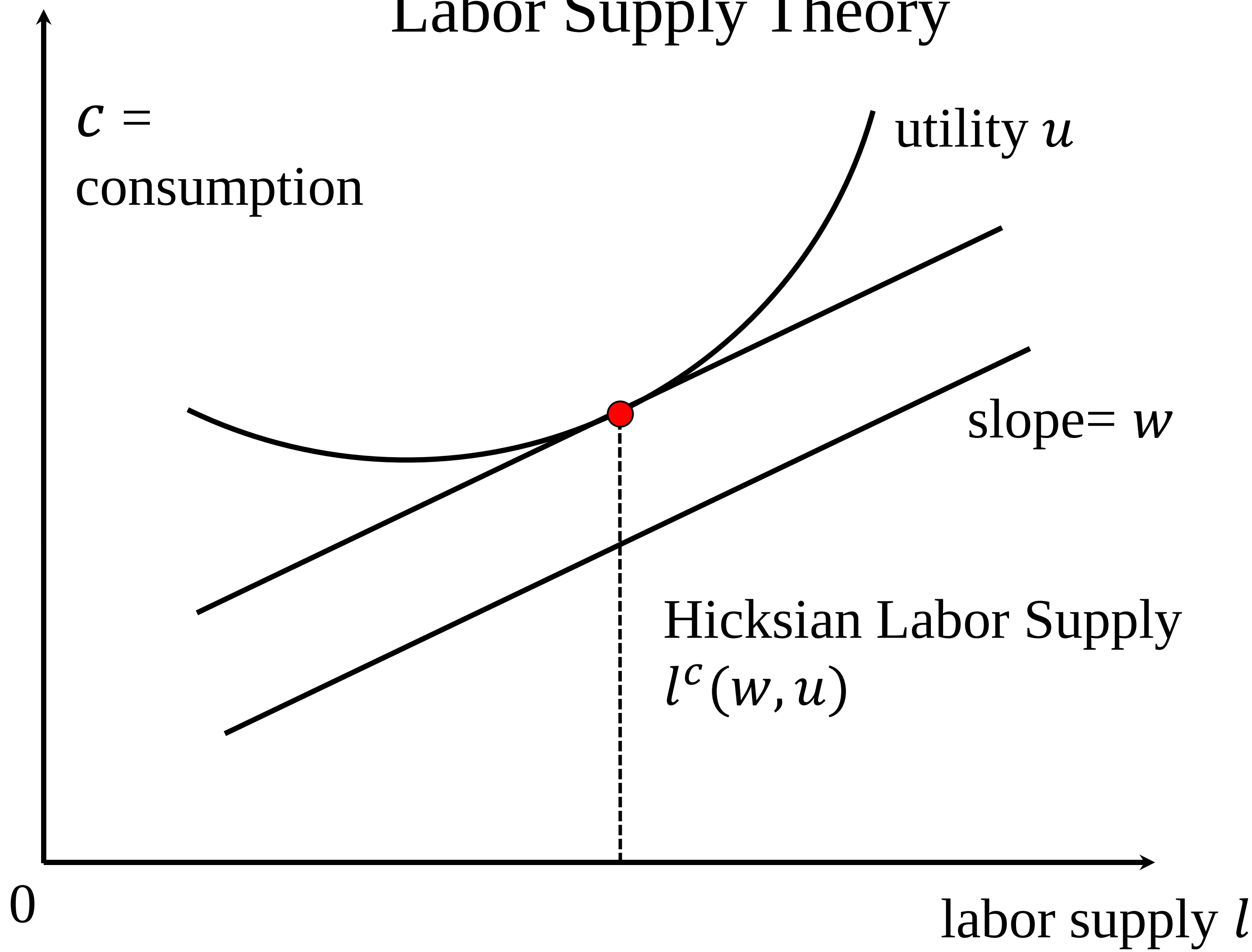


Source: Nichols and Rothstein (2015)

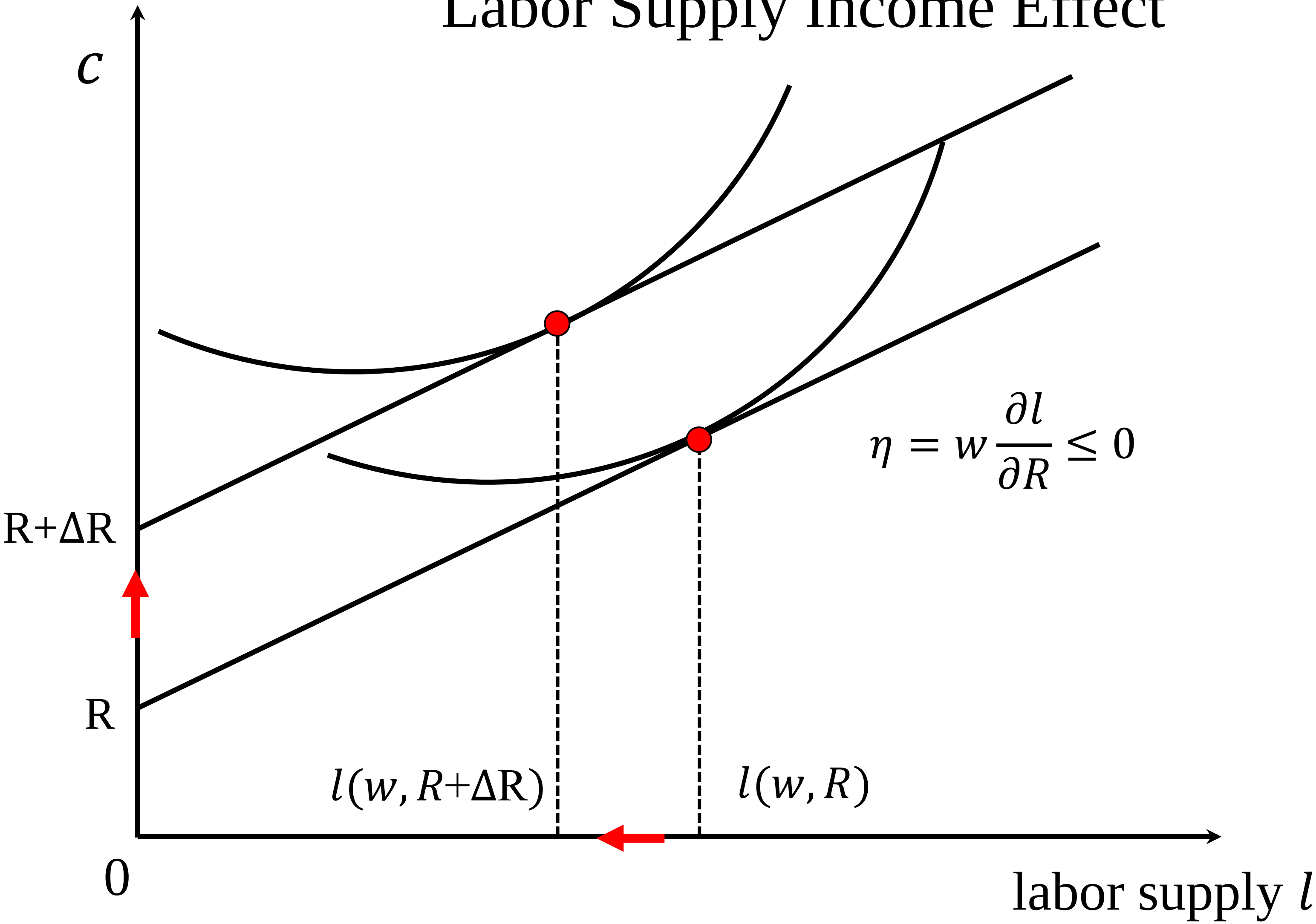
Labor Supply Theory



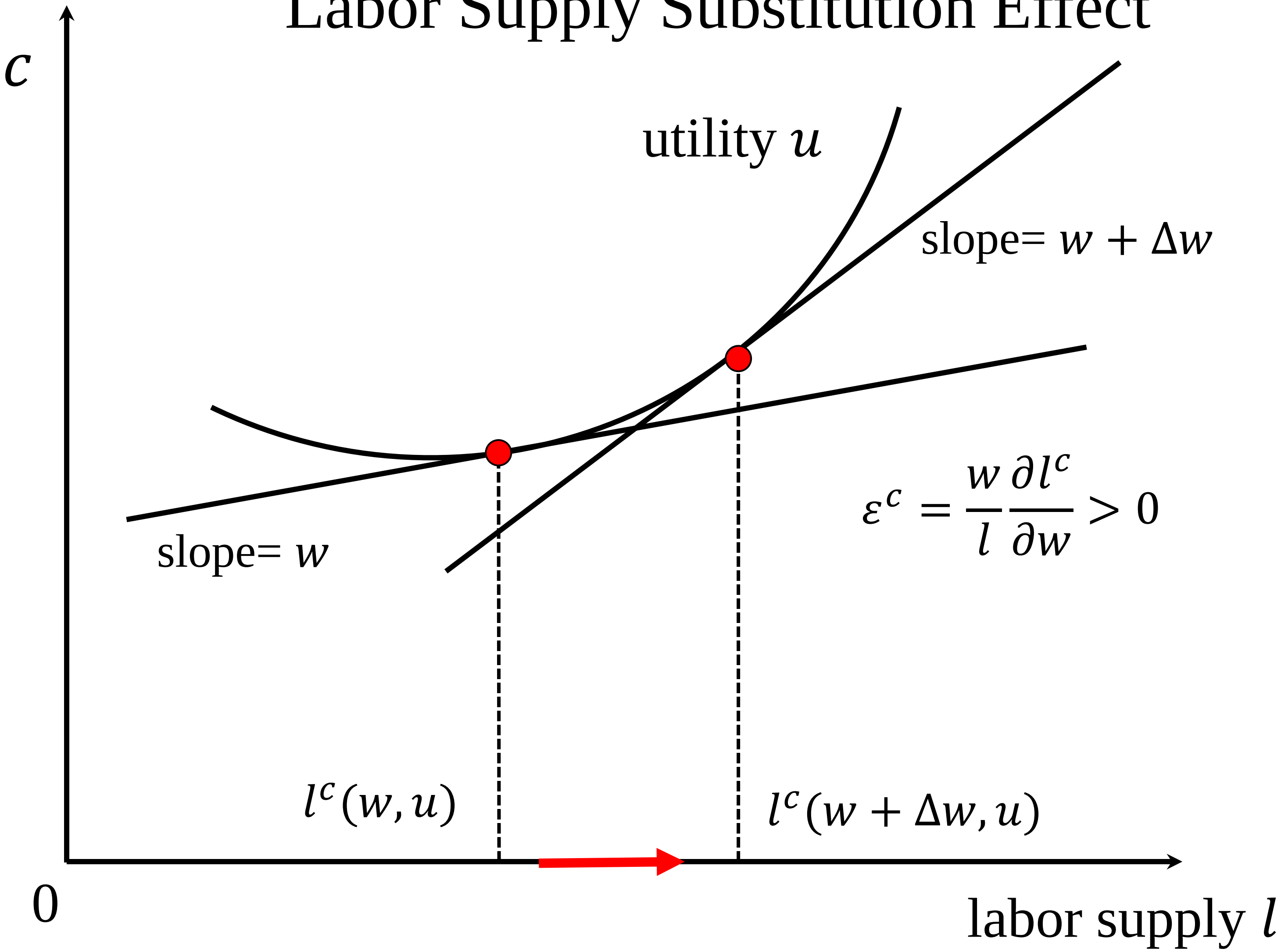
Labor Supply Theory



Labor Supply Income Effect



Labor Supply Substitution Effect



Uncompensated Labor Supply Effect

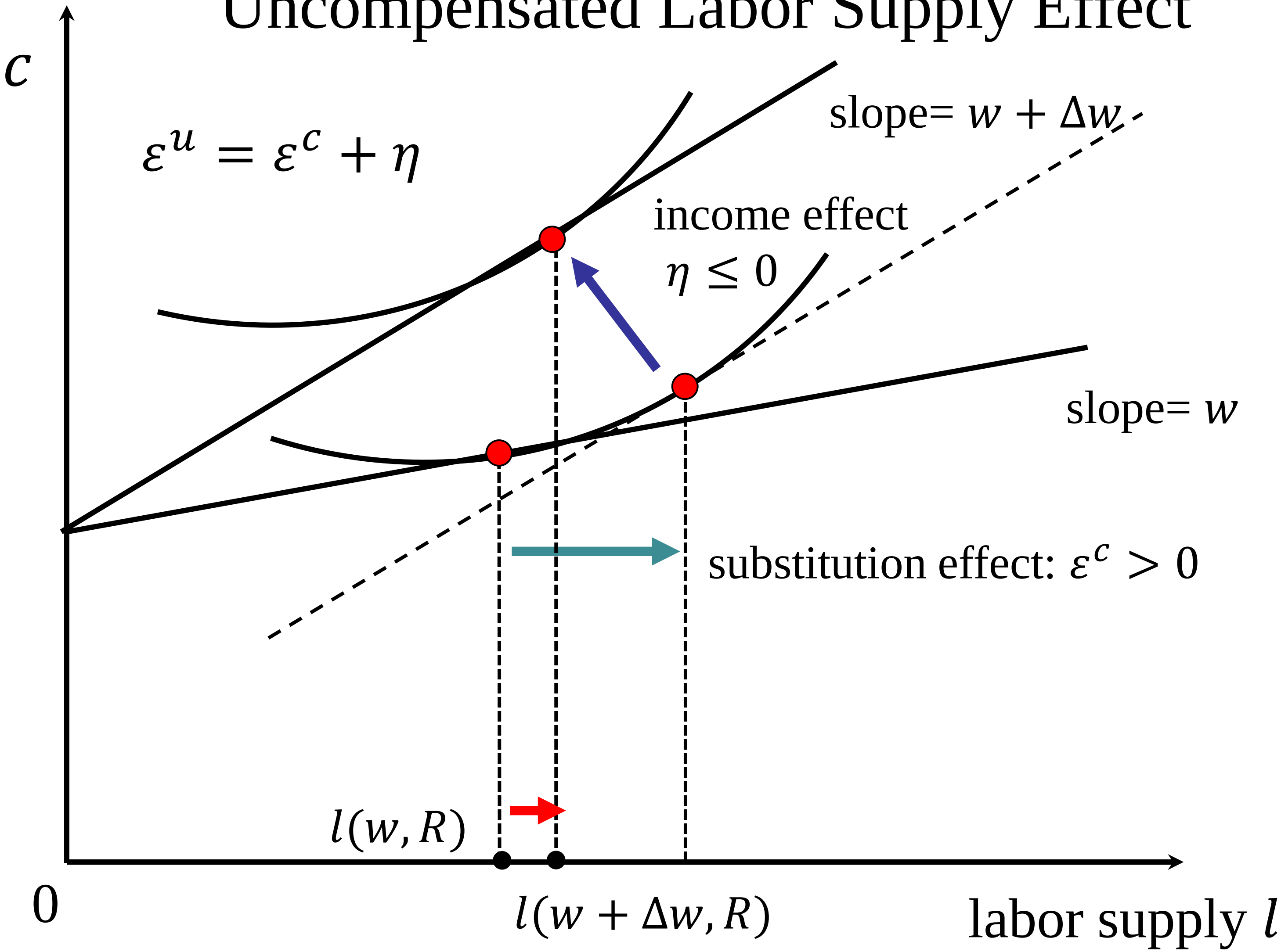


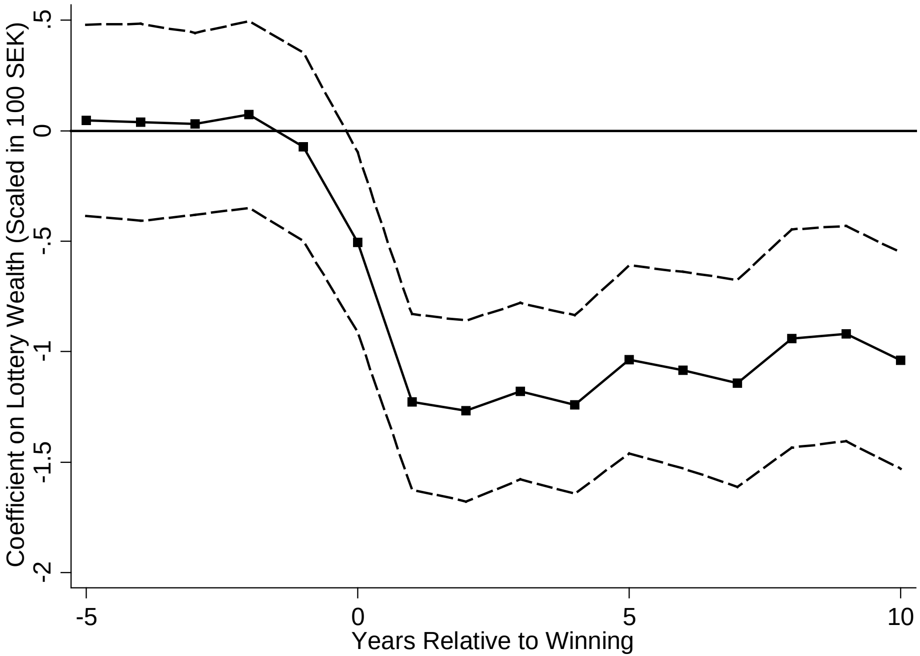
Table 1. Distribution of Prizes

	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

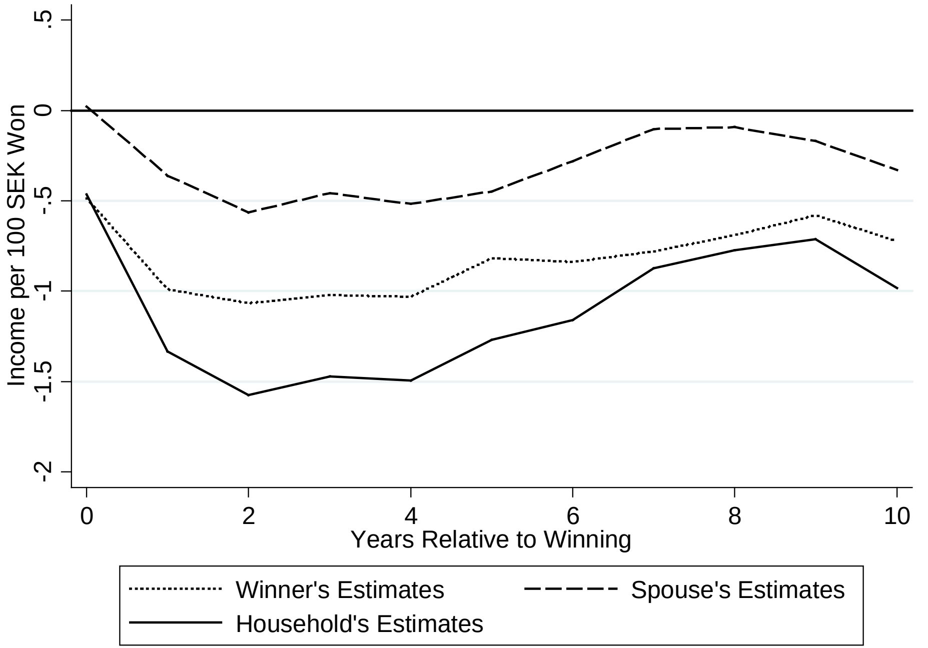
Figure 1: Effect of Wealth on Individual Gross Labor Earnings



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.

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

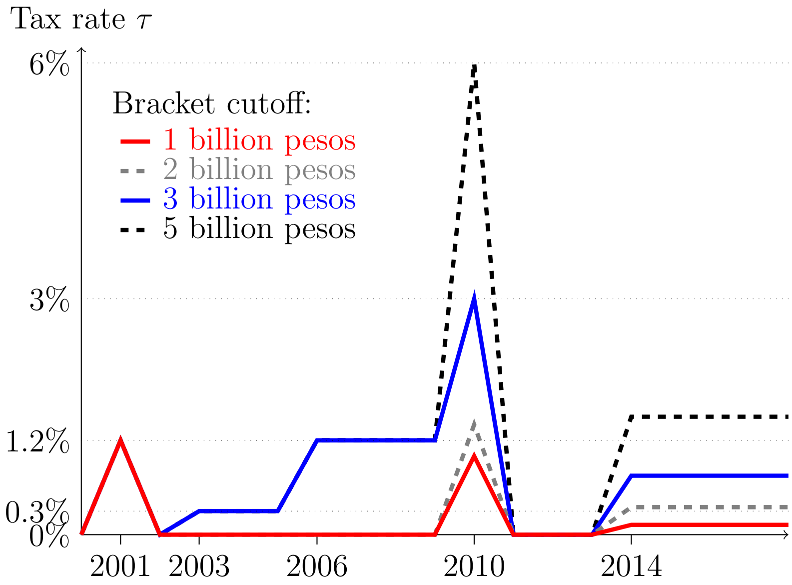
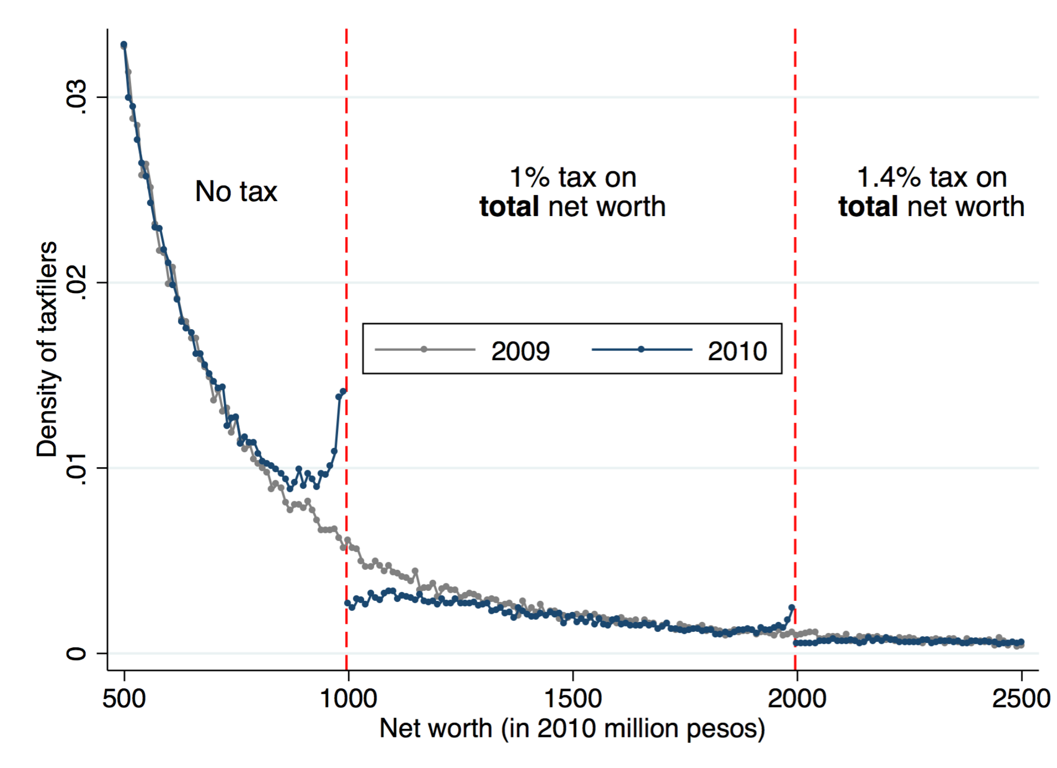


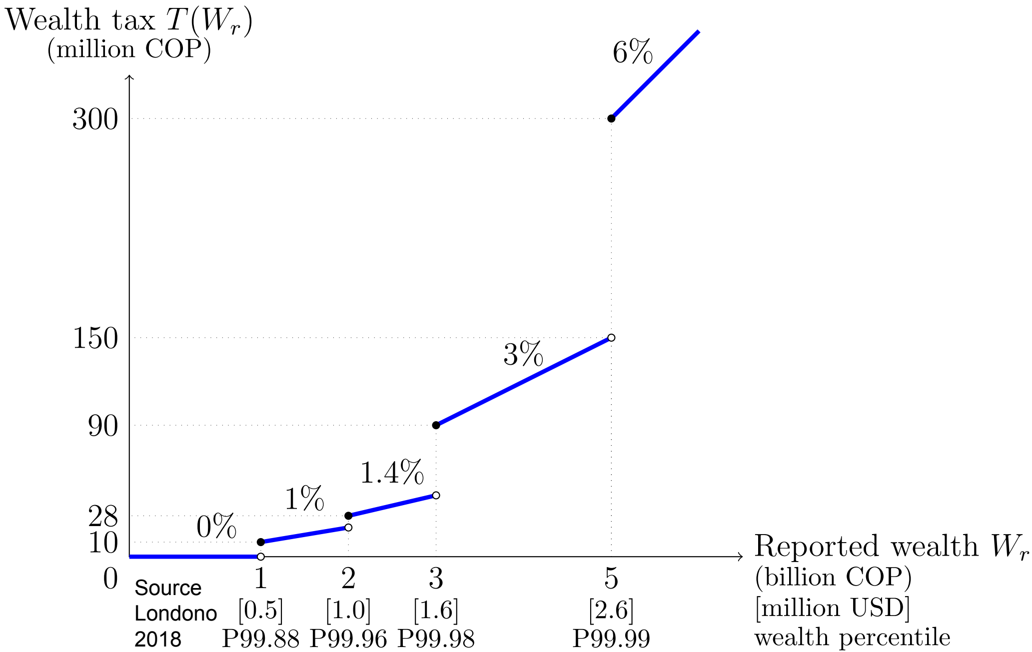
Figure 2: Distribution of Reported Net Worth in 2009 (Before Reform) and 2010 (After Reform)



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

Figure 1: The Personal Wealth Tax Schedule in Colombia

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



Source: Bachas and Soto (2018)

Figure 1: Costa Rica's Corporate Tax Schedule

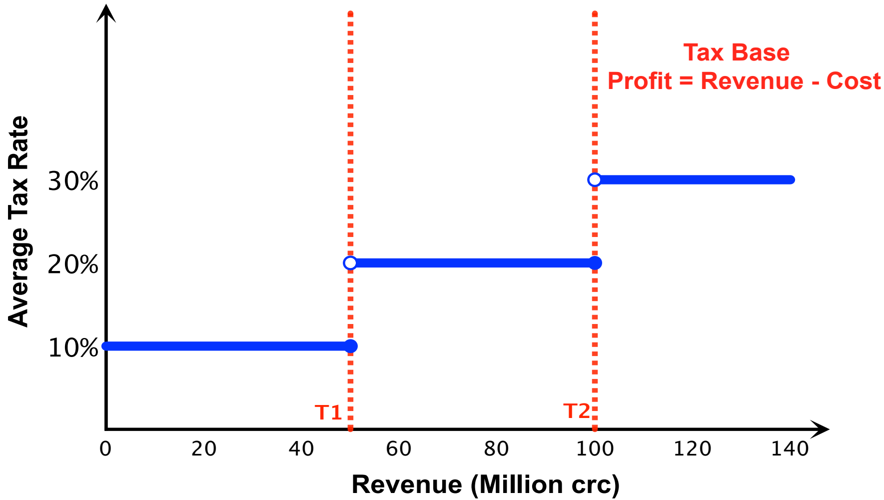
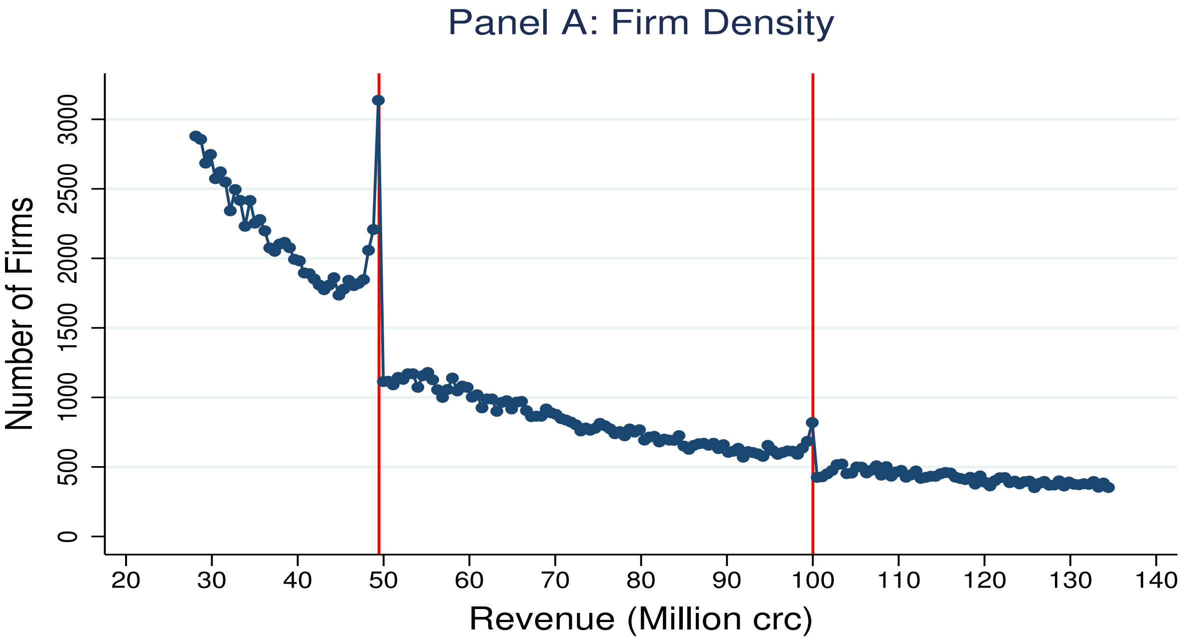
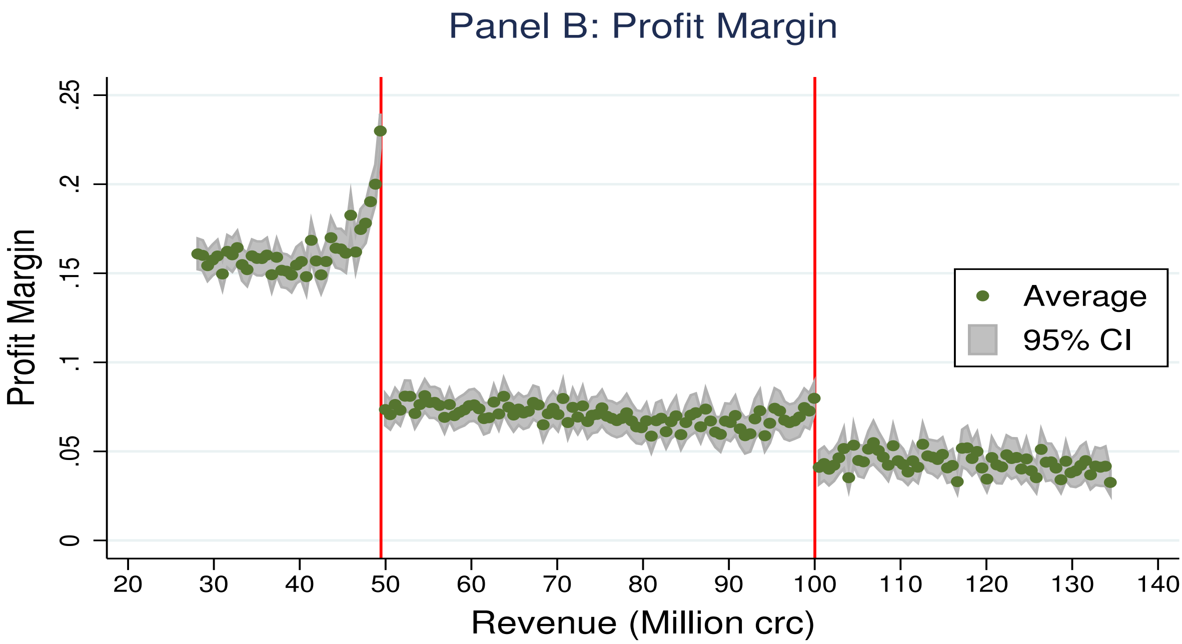


Figure 1 shows the design of the corporate income tax in Costa Rica, as discussed in section 2.1. Firms face increasing *average* tax rates on their profits (revenue minus cost) as a function of their revenue. When revenue exceeds the first threshold, the average tax rate jumps from 10% to 20% and from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

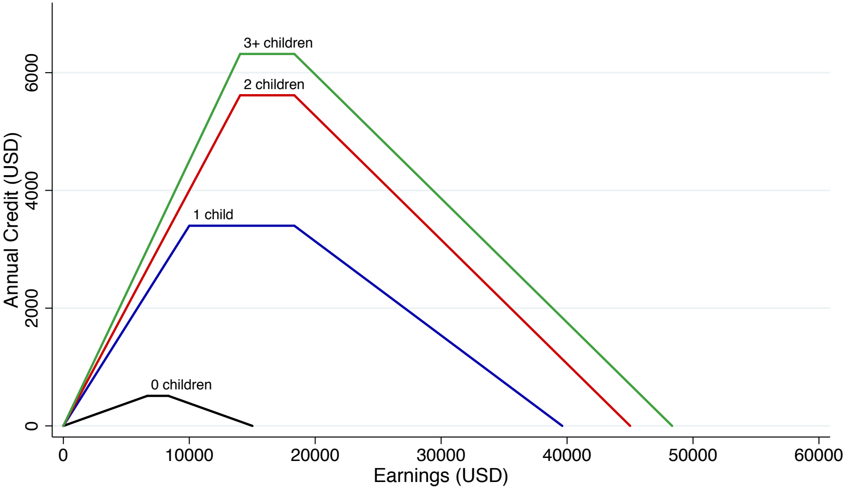
Figure 3: Firm Density and Average Profit Margin



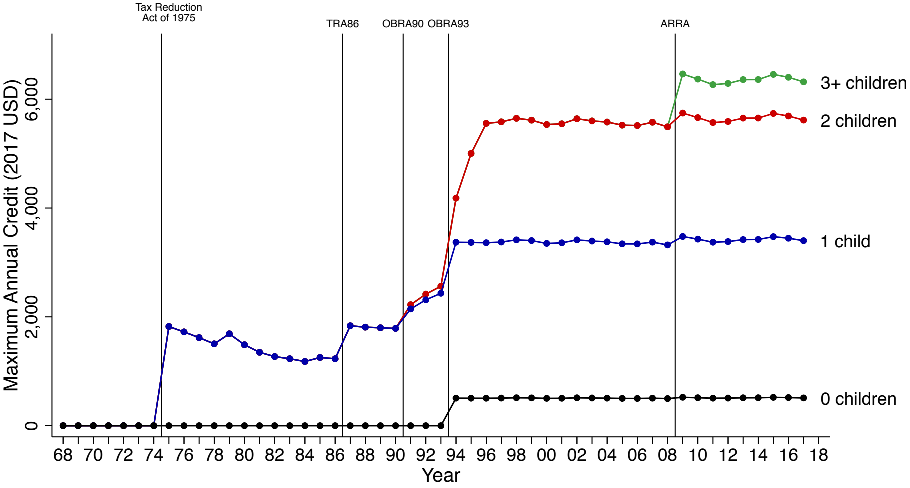


Source: Administrative data from the Ministry of Finance 2008-2014.
Figure 3 presents the key patterns of the corporate tax data, discussed in Section 3.1. The figure pulls together data from years 2008 to 2014. Panel A shows the density of firms by revenue. Panel B displays the average profit margin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

EITC Schedule in 2017



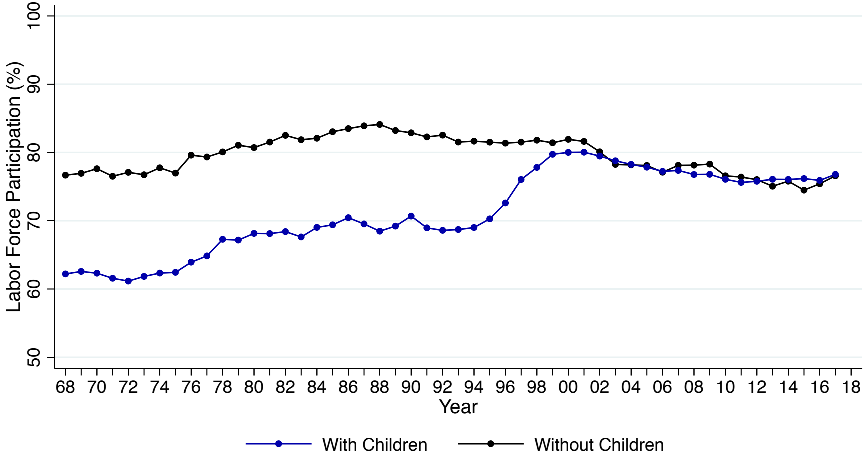
EITC Maximum Credit Over Time



Source: Kleven (2018)

Labor Force Participation of Single Women

With and Without Children

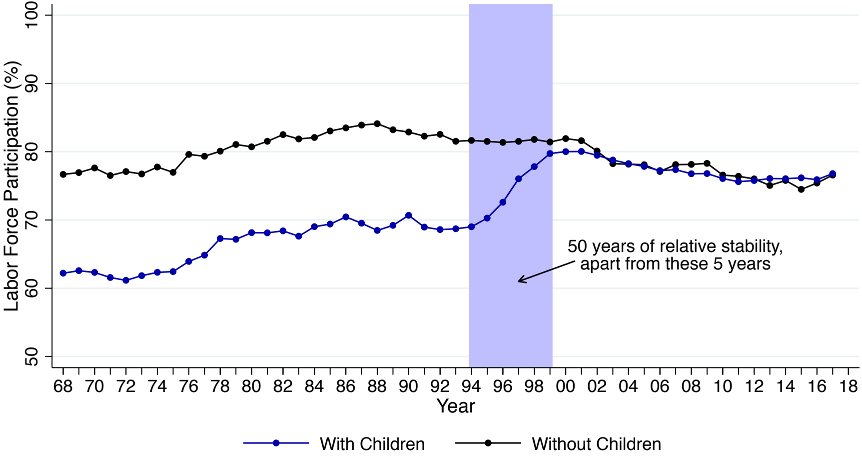


Source: Kleven (2018)

Annual Employment Low Education

Labor Force Participation of Single Women

With and Without Children

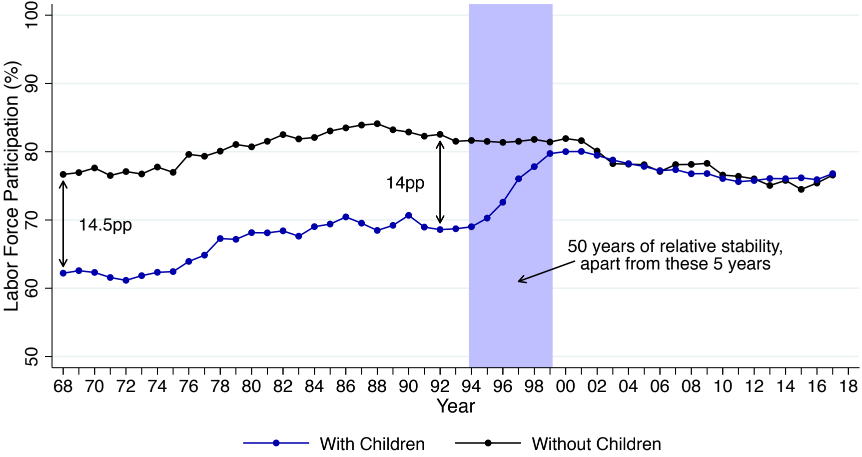


Annual Employment Low Education

Source: Kleven (2018)

Labor Force Participation of Single Women

With and Without Children

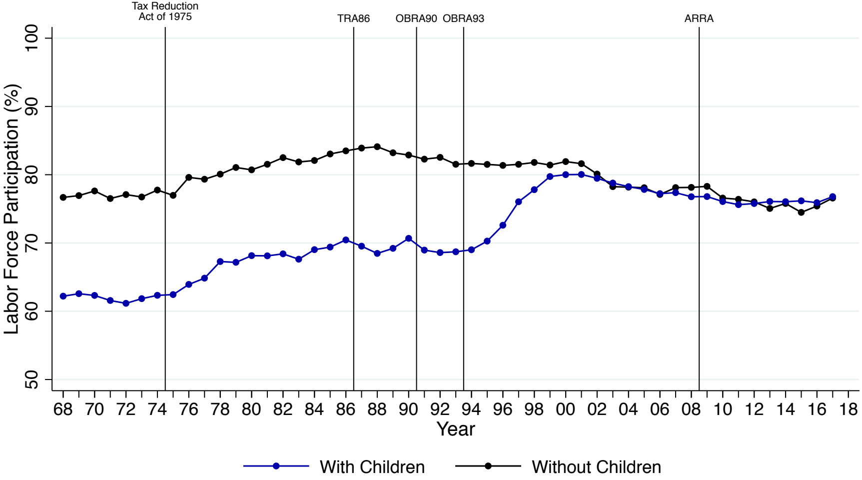


Source: Kleven (2018)

Annual Employment | Low Education

Labor Force Participation of Single Women

With and Without Children

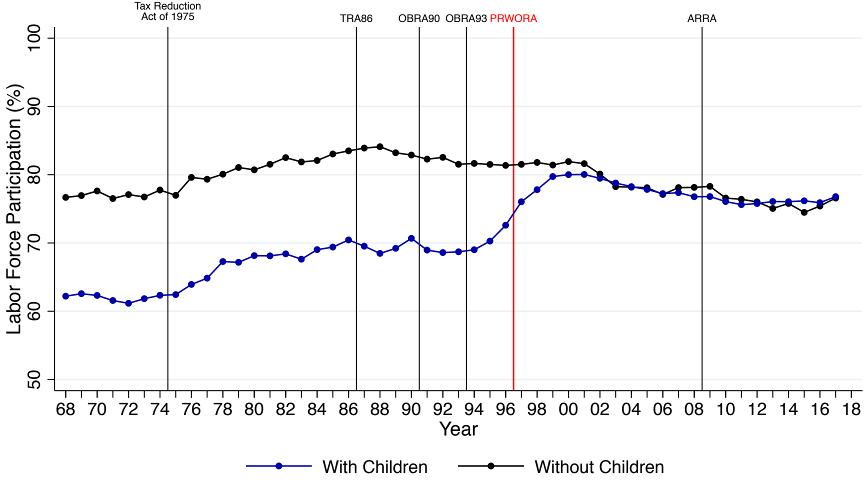


Annual Employment | Low Education

Source: Kleven (2018)

Labor Force Participation of Single Women

With and Without Children



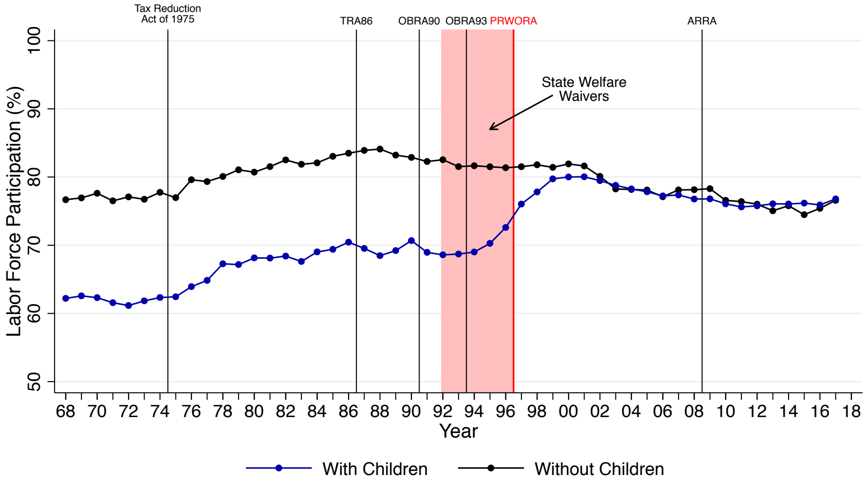
Source: Kleven (2018)

Annual Employment

Low Education

Labor Force Participation of Single Women

With and Without Children

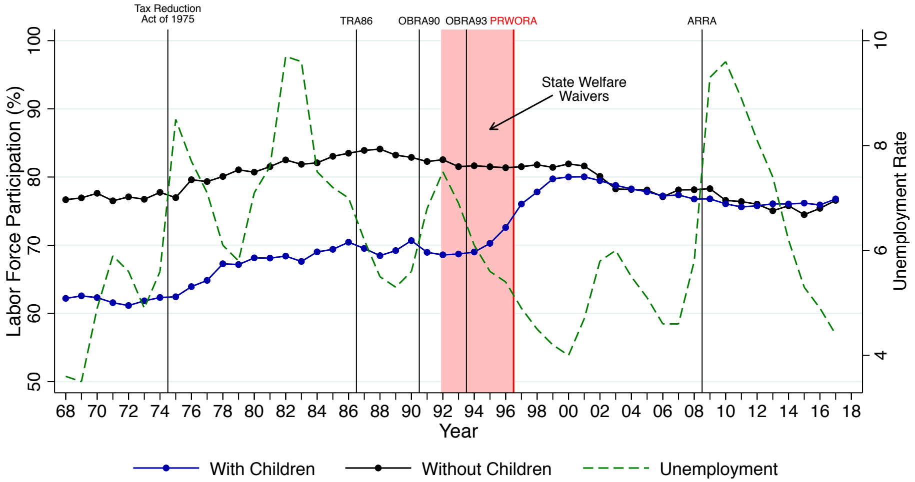


Annual Employment Low Education

Source: Kleven (2018)

Labor Force Participation of Single Women

With and Without Children

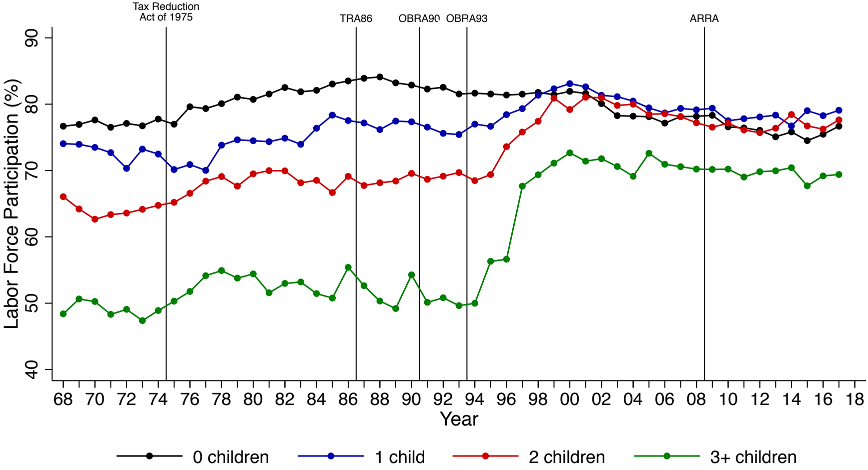


Annual Employment | Low Education

Source: Kleven (2018)

Labor Force Participation of Single Women

By Number of Children

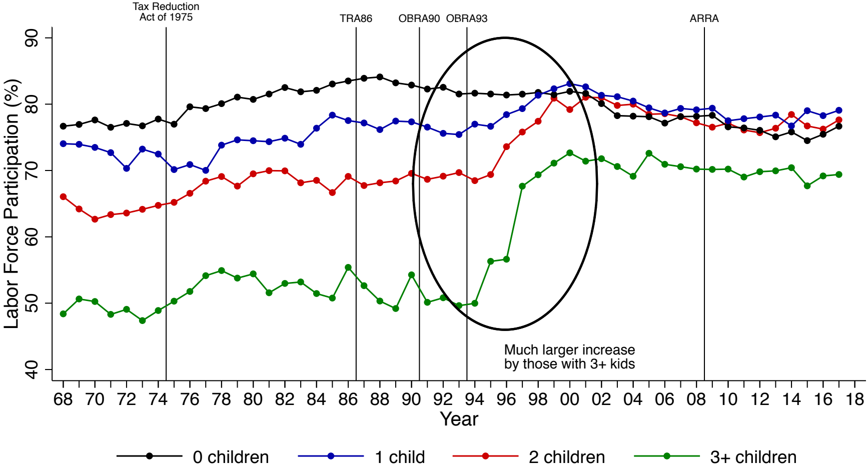


Source: Kleven (2018)

Annual Employment
Low Education

Labor Force Participation of Single Women

By Number of Children

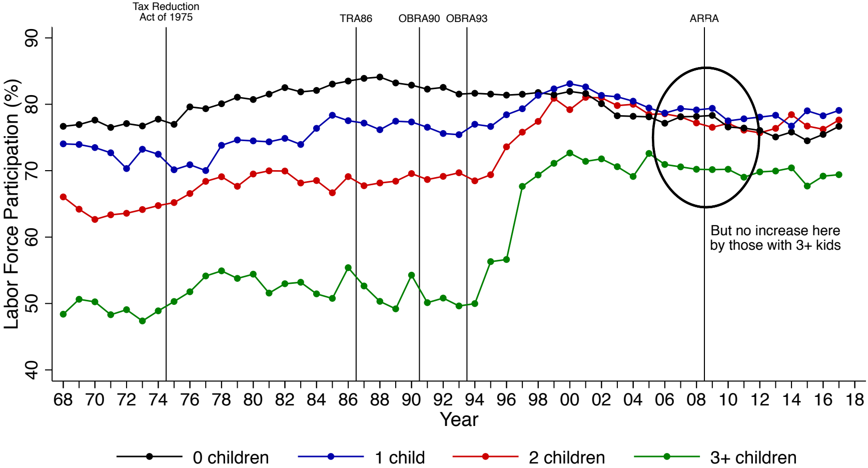


Source: Kleven (2018)

Annual Employment | Low Education

Labor Force Participation of Single Women

By Number of Children



Source: Kleven (2018)

Annual Employment   Low Education

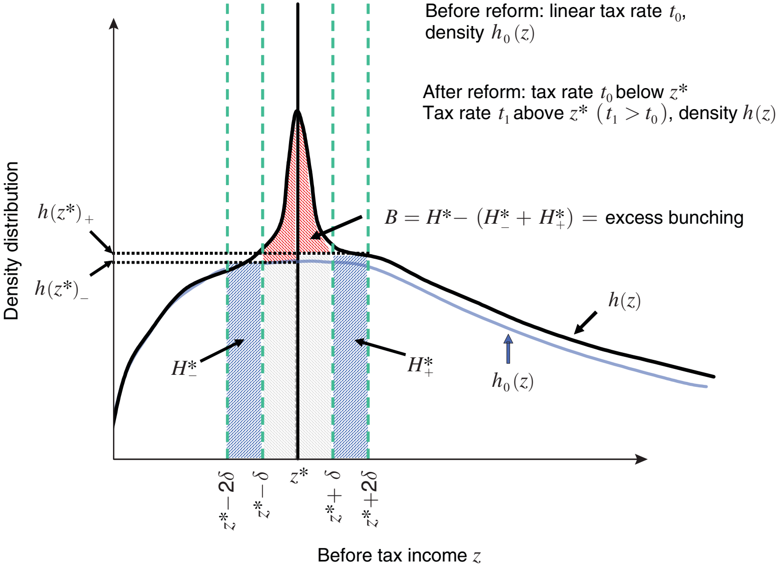


FIGURE 2. ESTIMATING EXCESS BUNCHING USING EMPIRICAL DENSITIES

1990s Income Tax Reform in Switzerland

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

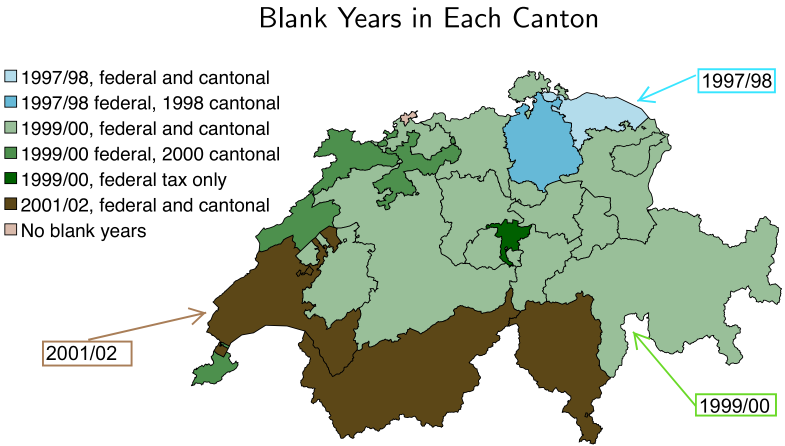
- Reasons: modernizing, simplifying and harmonizing
- Side effect: incomes earned during the two years prior to the change remained untaxed (blank years, tax holiday)

untaxed incomes!

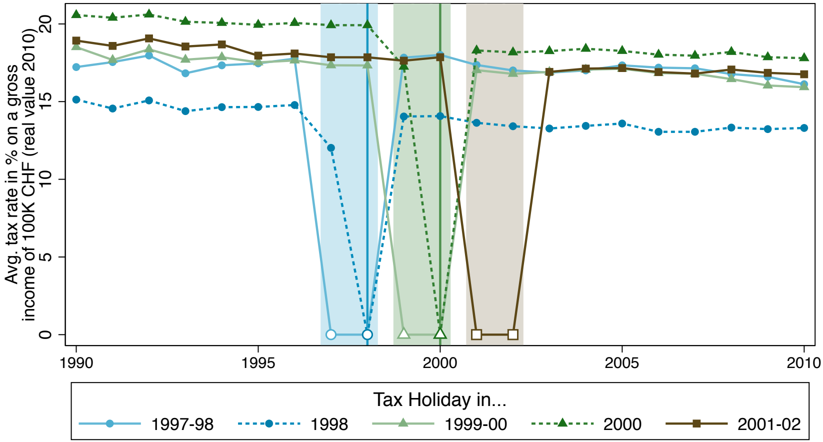
Year X	1993 1994	1995 1996	1997 1998	1999	2000
Tax base for assessment period X	Incomes realized in 1991 + 1992	Incomes realized in 1993 + 1994	Incomes realized in 1995 + 1996	Income realized in 1999	Income realized in 2000
Payment of tax liability owed for year X	During 1993 and 1994	During 1995 and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

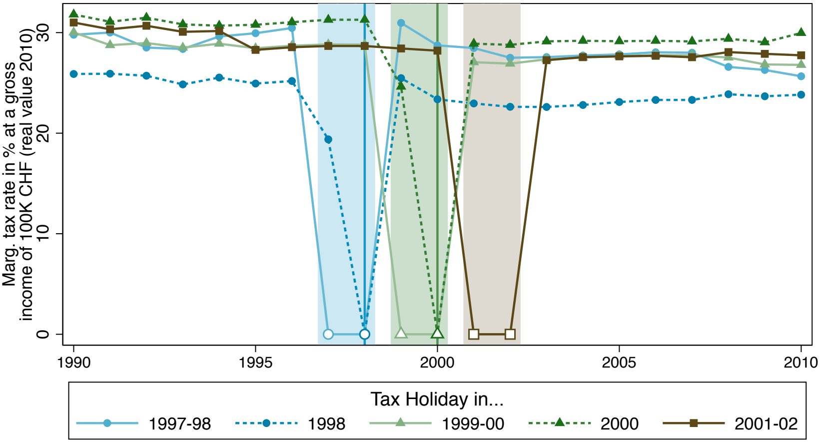


Average Income Tax Rates over Time



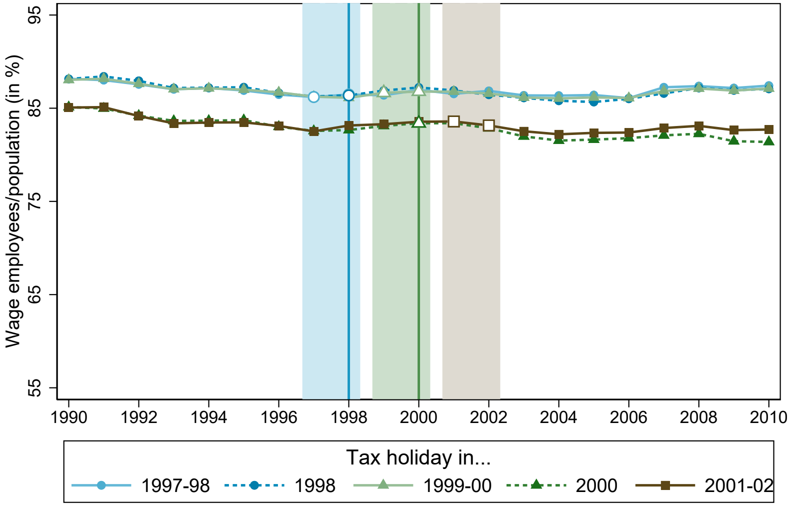
Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

Marginal Income Tax Rates over Time



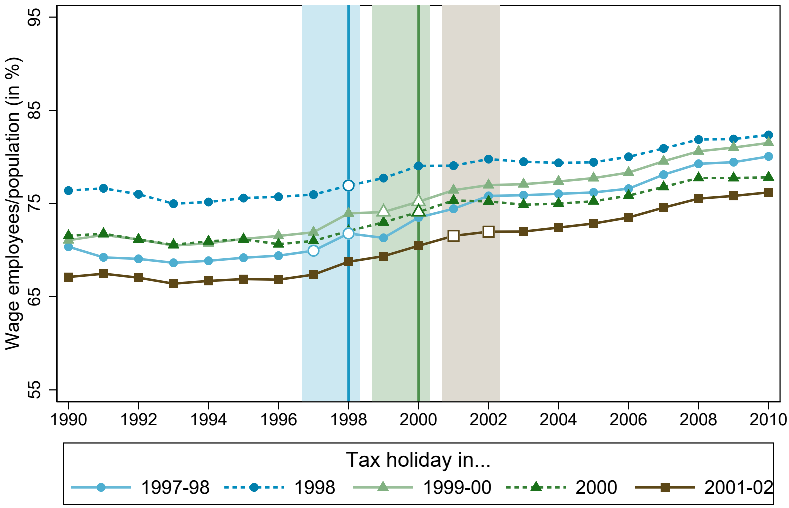
Total federal, cantonal and municipal tax, single taxpayer; weighted by municipality population.

Employment Rate: Men (age 20-60)



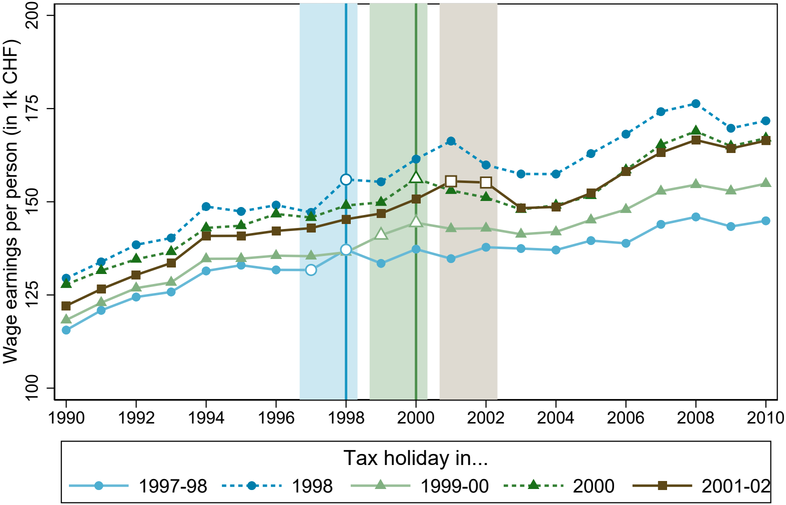
Data source: AHV-STATPOP

Employment Rate: Women (age 20-60)



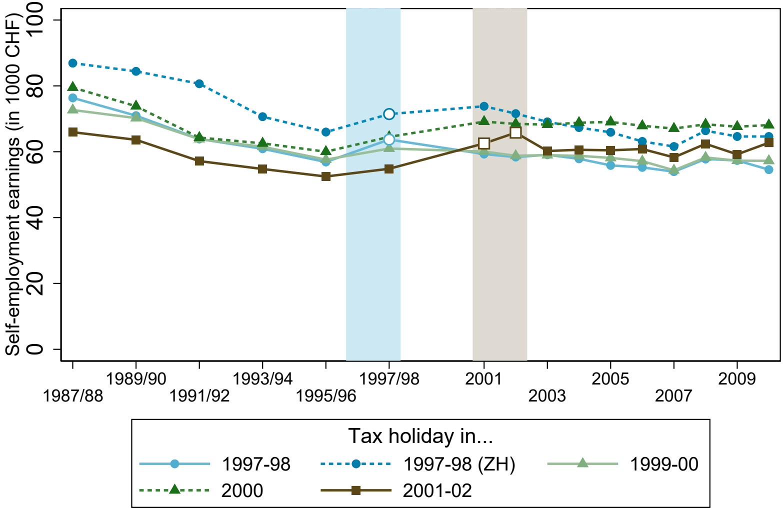
▸ unemployment rate

Average Wage Earnings: High-income Employees



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

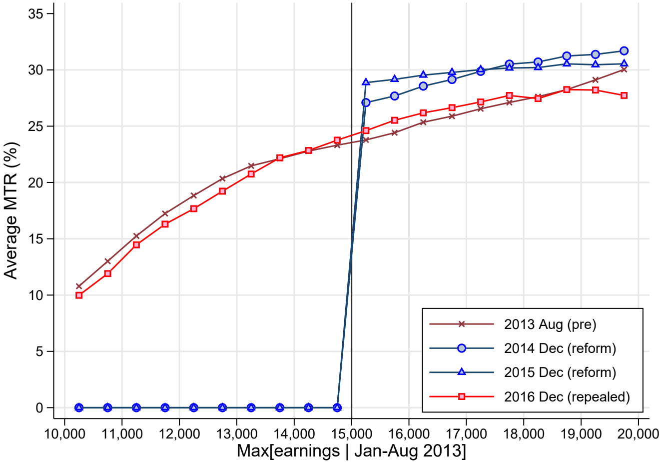
Mean Self-employment Earnings (excluding zeros)



Data source: AHV-STATPOP

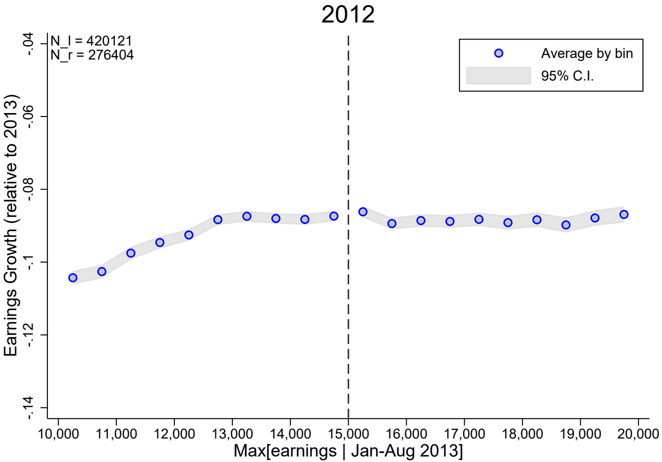
Empirical first stage

Marginal Tax Rates
single workers without children Married



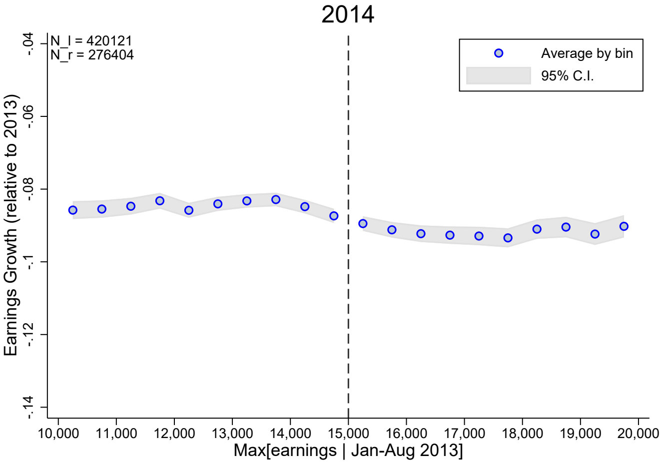
Note: Computed using own tax calculator (similar to the TAXSIM in the U.S.).

Earnings growth w.r.t. 2013



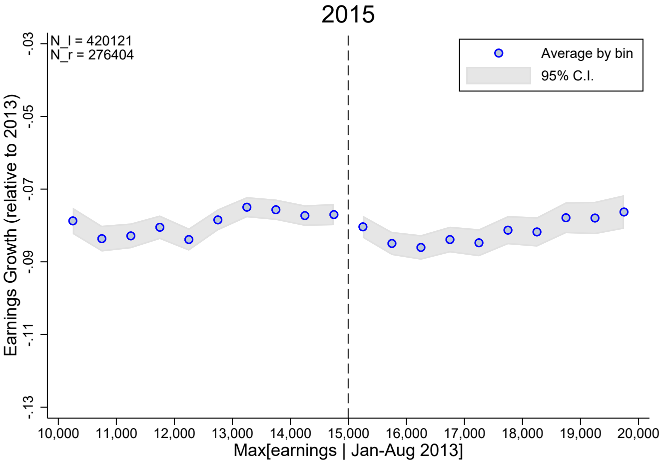
Note: average growth of (real) annual earnings w.r.t. 2013 within equally spaced bins of AR$ 500.
Sample: private sector wage earners. Growth winsorized at p99. Inflation: 19%, 39%, 27% and 36%.

Earnings growth w.r.t. 2013



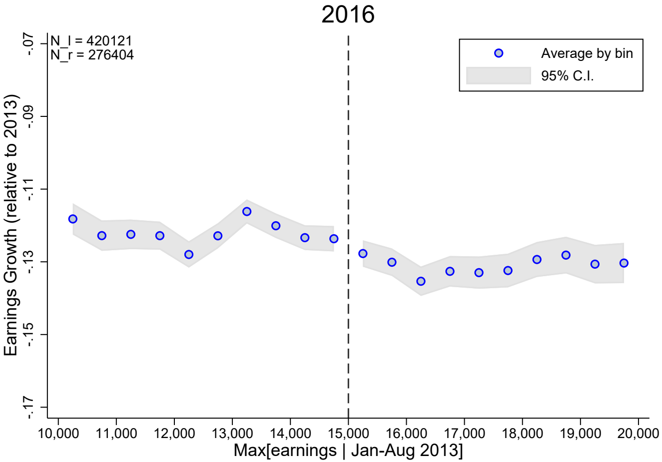
Note: average growth of (real) annual earnings w.r.t. 2013 within equally spaced bins of AR$ 500. Sample: private sector wage earners. Growth winsorized at p99. Inflation: 19%, 39%, 27% and 36%.

Earnings growth w.r.t. 2013



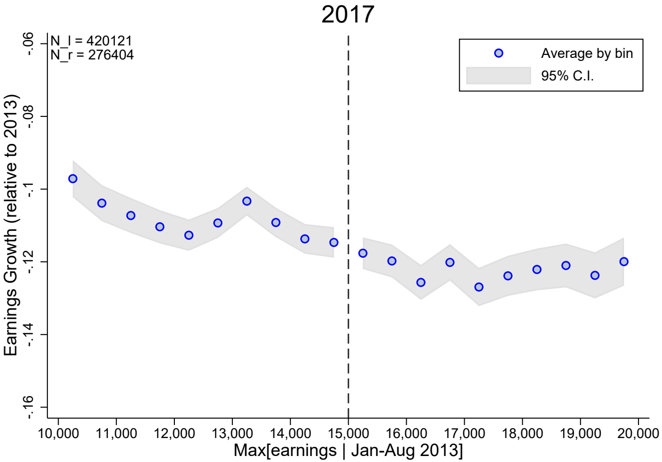
Note: average growth of (real) annual earnings w.r.t. 2013 within equally spaced bins of AR$ 500. Sample: private sector wage earners. Growth winsorized at p99. Inflation: 19%, 39%, 27% and 36%.

Earnings growth w.r.t. 2013



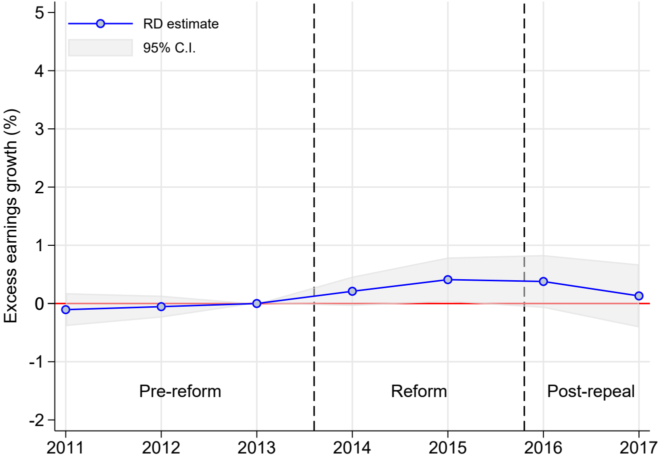
Note: average growth of (real) annual earnings w.r.t. 2013 within equally spaced bins of AR$ 500. Sample: private sector wage earners. Growth winsorized at p99. Inflation: 19%, 39%, 27% and 36%.

Earnings growth w.r.t. 2013



Note: average growth of (real) annual earnings w.r.t. 2013 within equally spaced bins of AR$ 500. Sample: private sector wage earners. Growth winsorized at p99. Inflation: 19%, 39%, 27% and 36%.

Evolution of RD estimates, 2011-2017

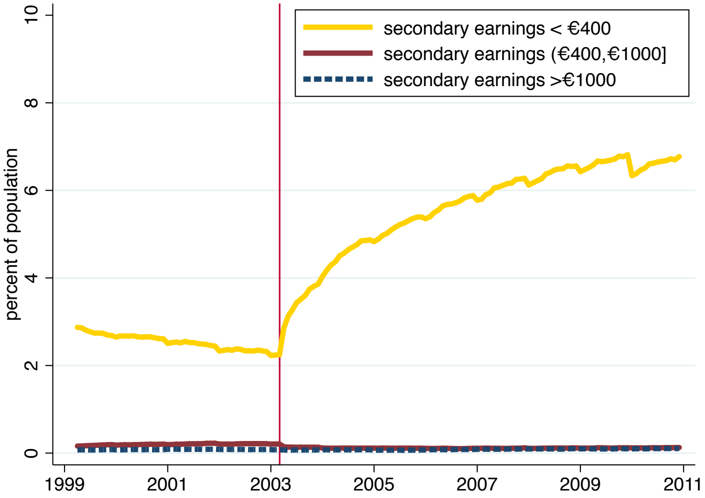


Note: with $e = 0.3$ (thought experiment), excess earnings growth would be 7.5%.

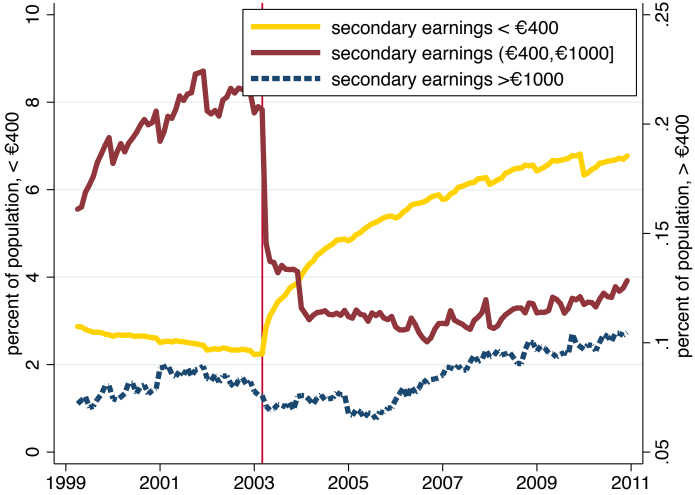
Remain employed

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

(a) same axis

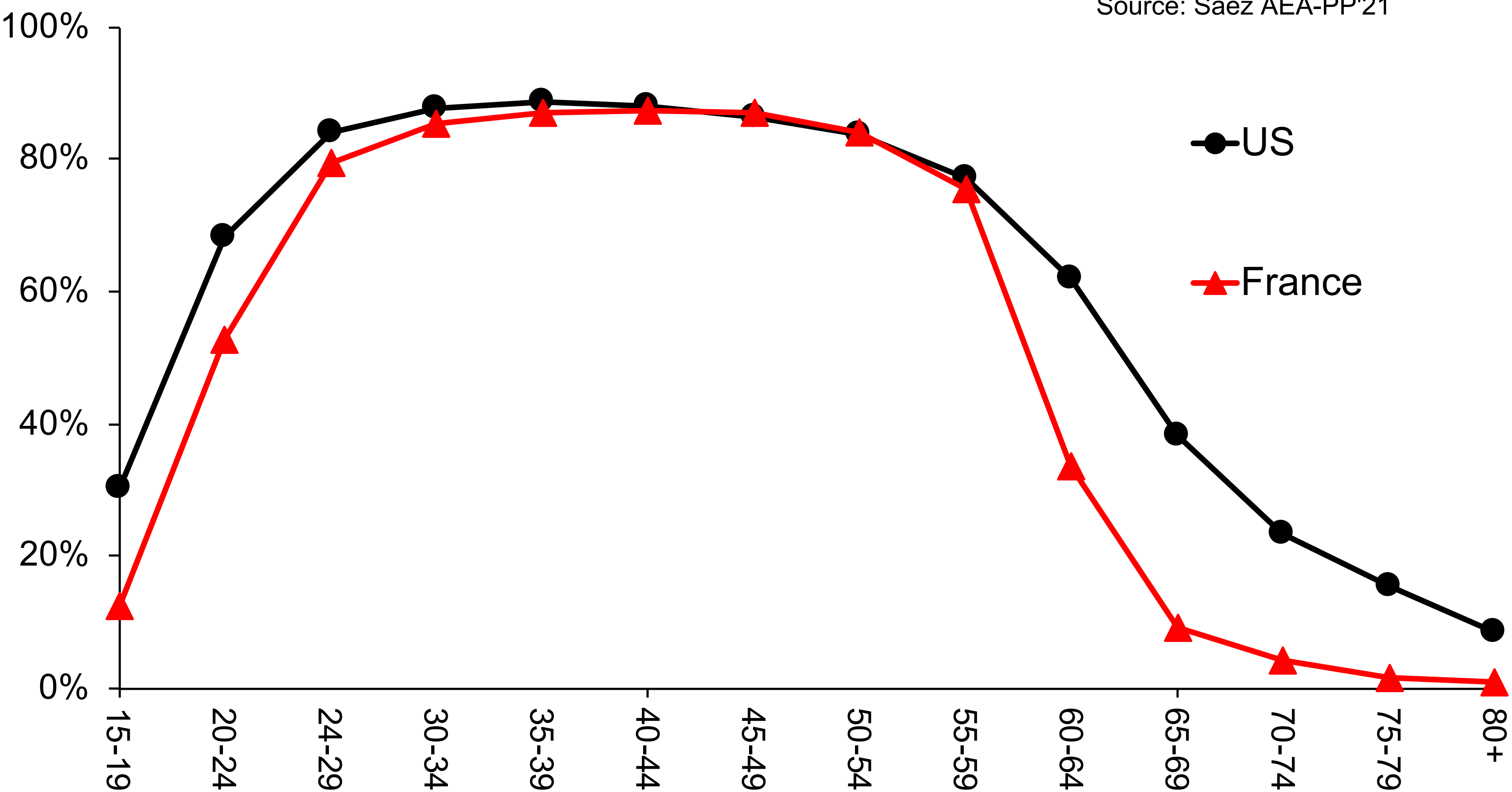


(b) different axis

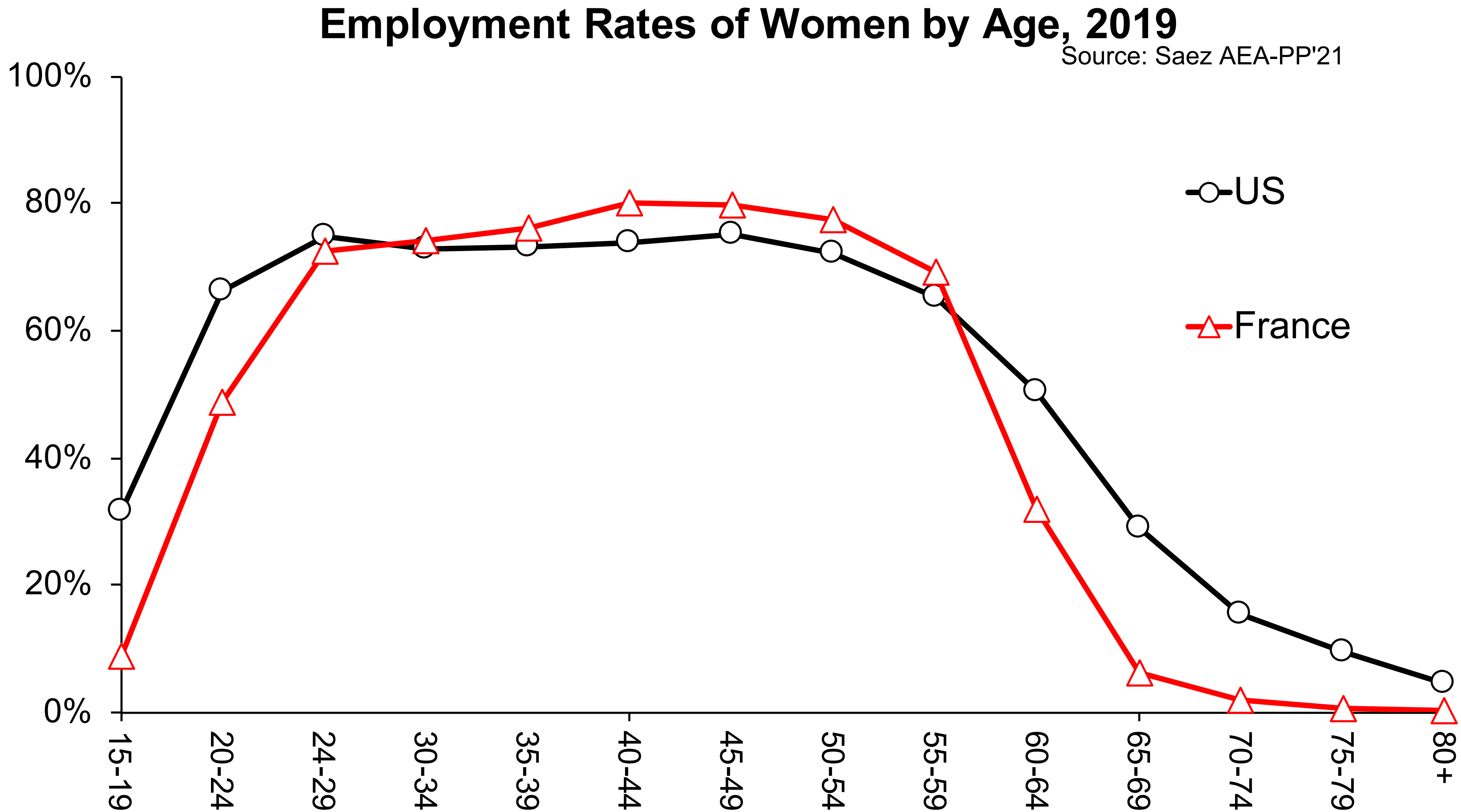


Notes: This figure shows the share of individuals with secondary jobs paying less than €400 per month, paying between €400 and €1000, or more than €1000 per month. The vertical red line identifies the 2003 tax reform. *Source*: Sample of Integrated Labour Market Biographies (SIAB) 1975 - 2010, Nuremberg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

Employment Rates of Men by Age, 2019

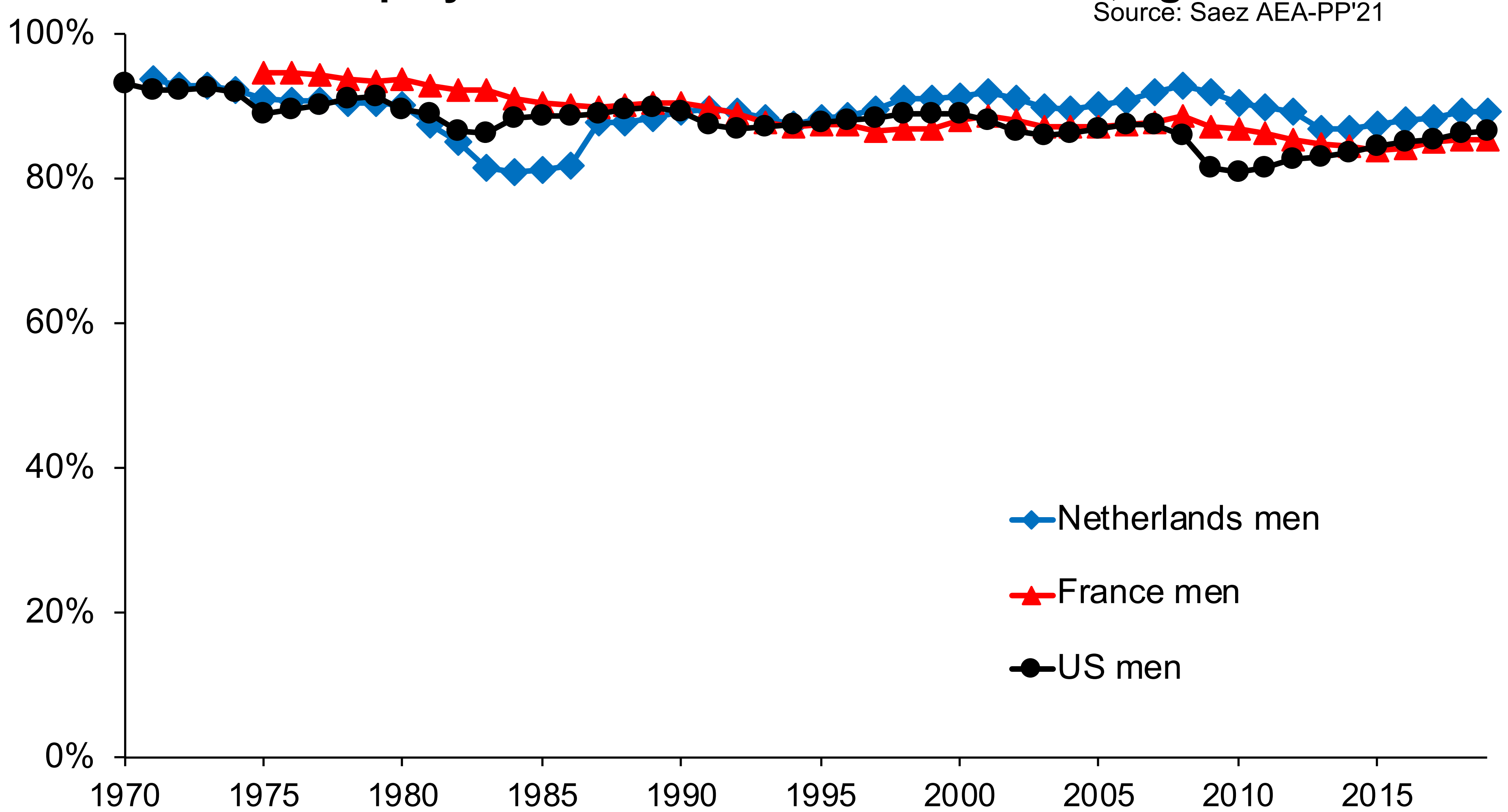


Source: OECD database online. Employment to population ratios.



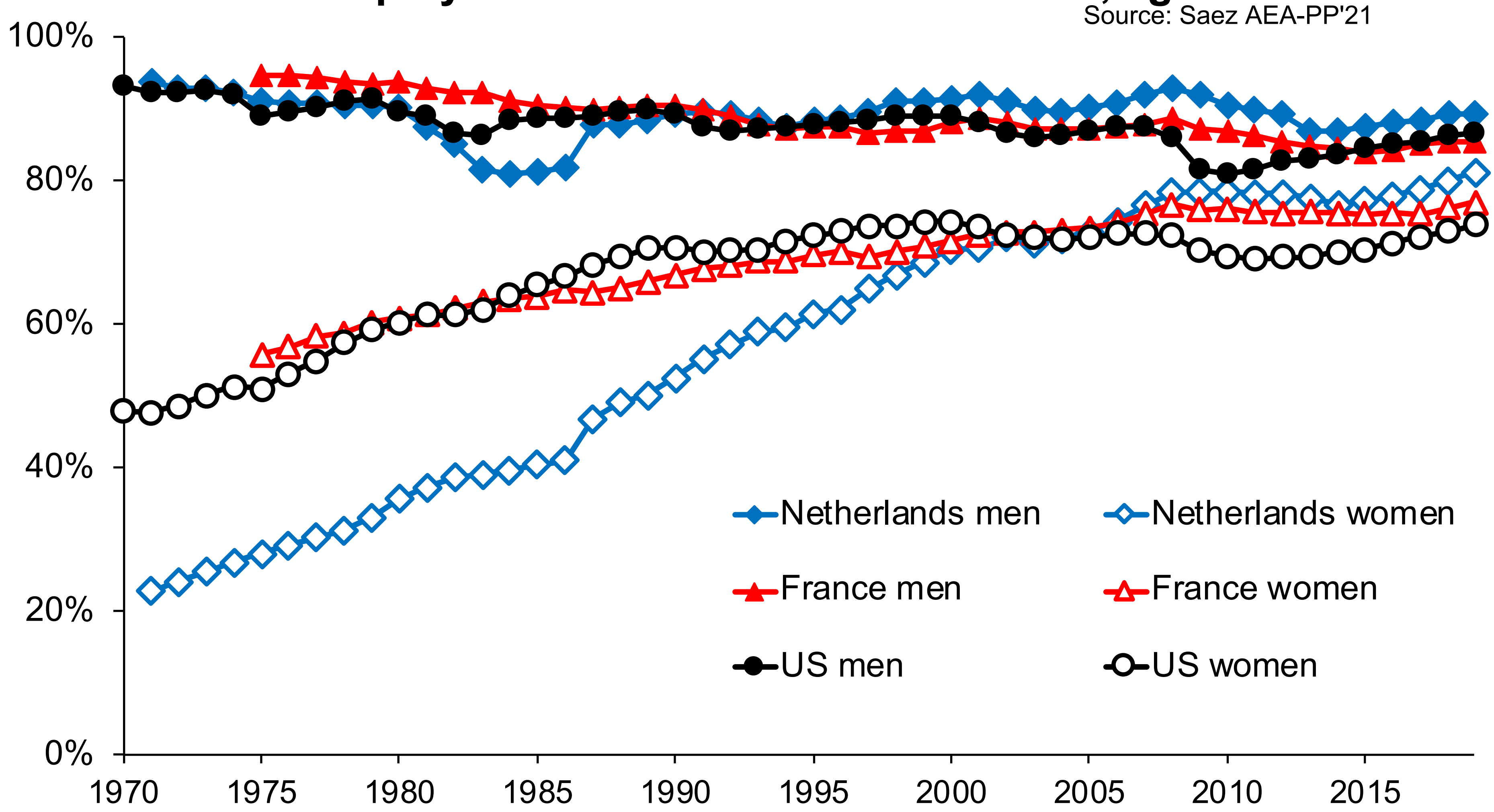
Source: OECD database online. Employment to population ratios.

Employment Rates of Men and Women, aged 25-54

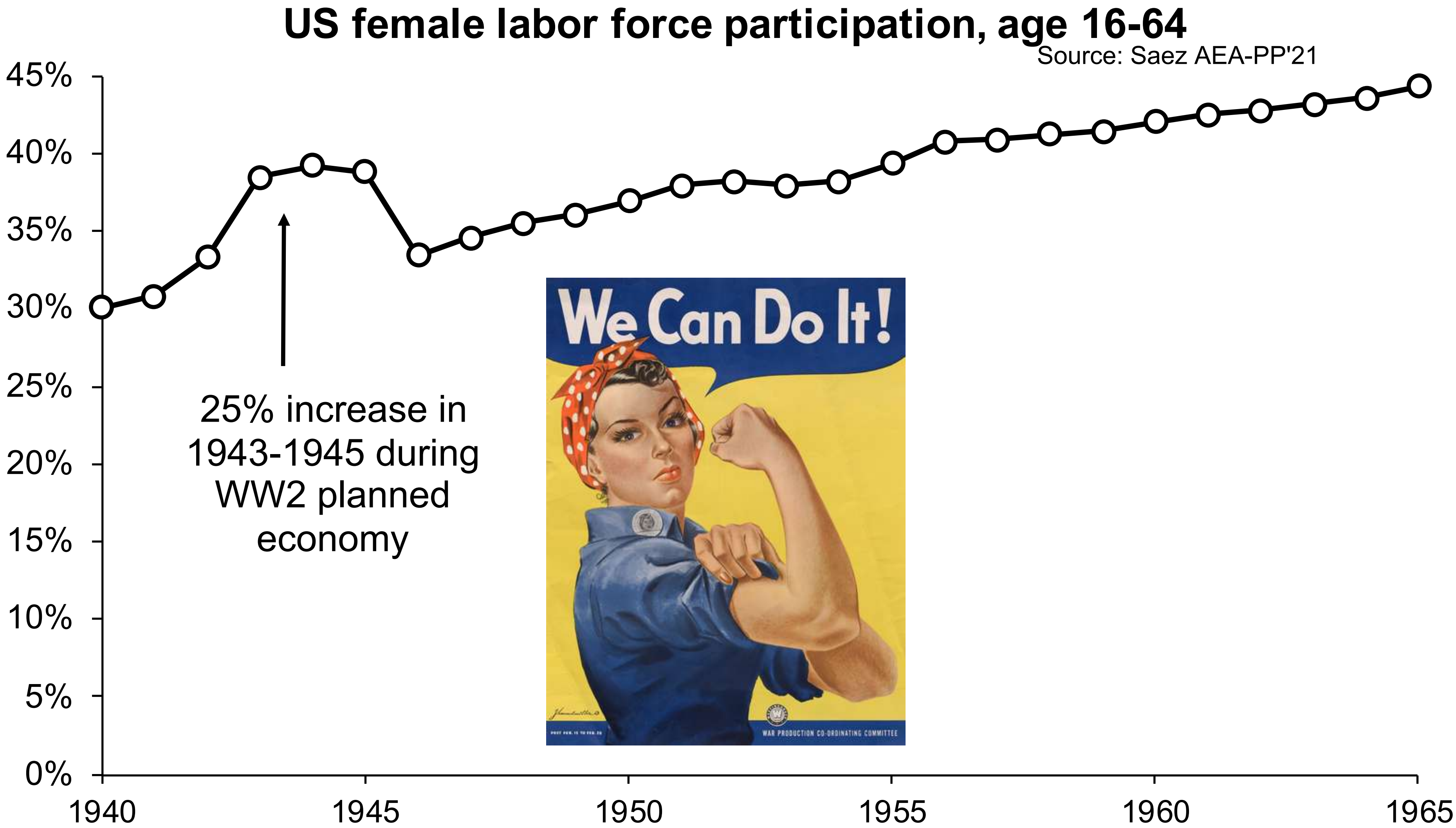


Source: OECD database online.

Employment Rates of Men and Women, aged 25-54

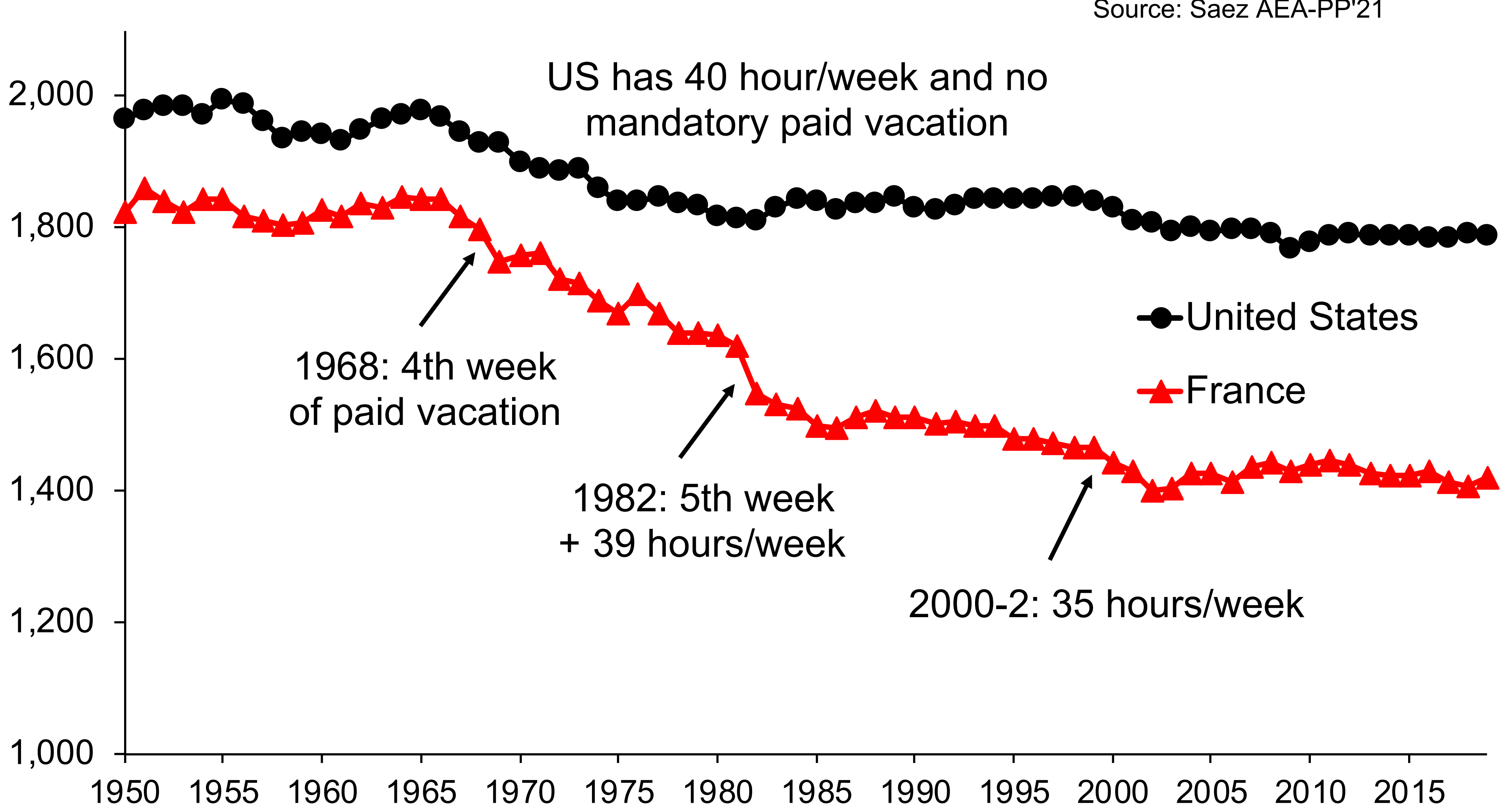


Source: OECD database online.



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.

Starting from a Means-Tested Program

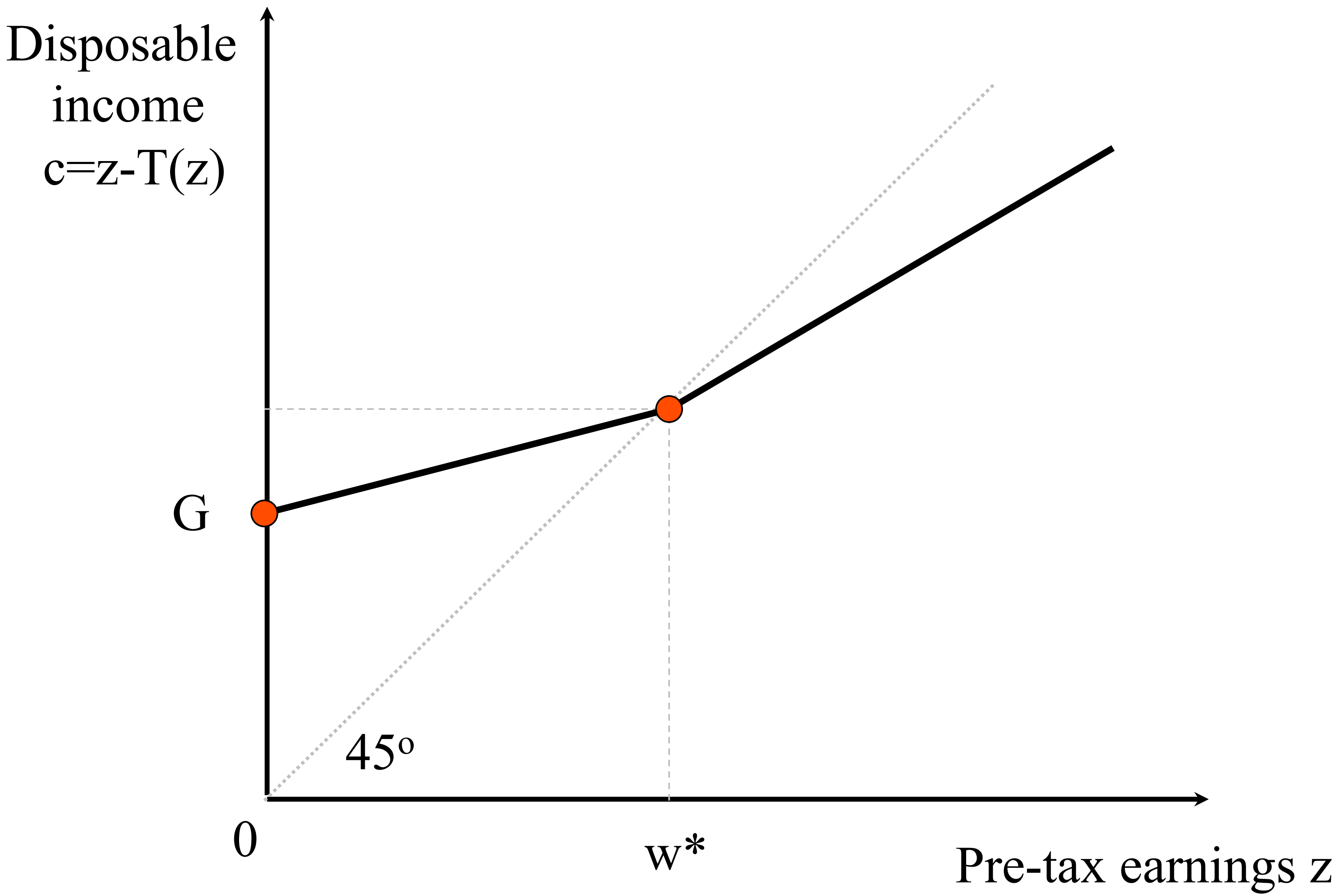
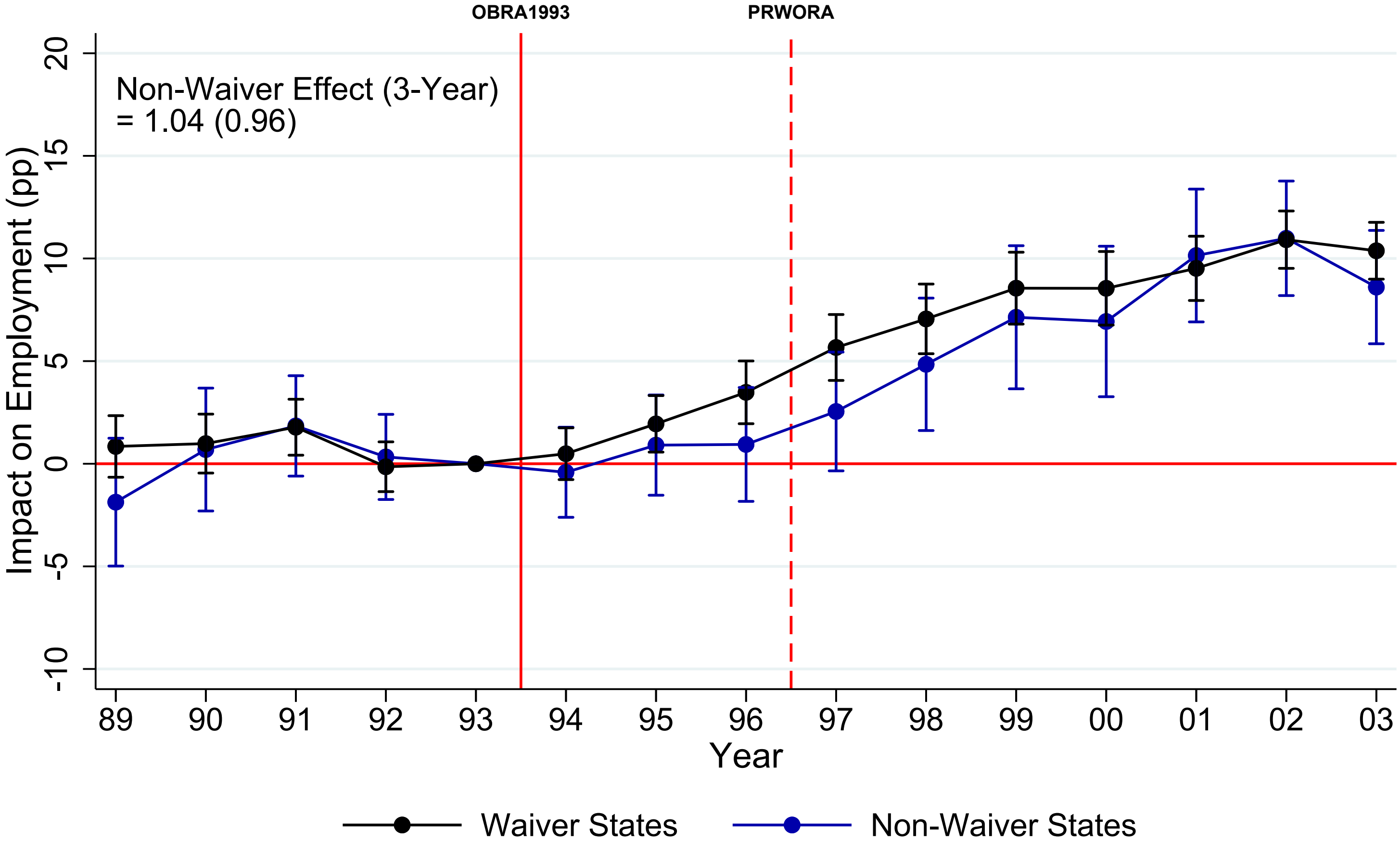
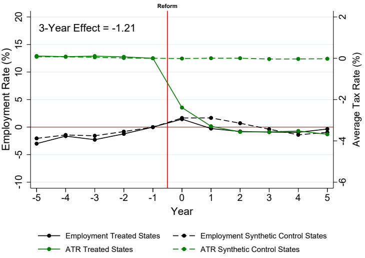


FIGURE 16: HOW MUCH CAN BE EXPLAINED BY WELFARE WAIVERS?
ALL SINGLE WOMEN, WEEKLY EMPLOYMENT



Notes: This figure shows DiD event studies of the 1993 reform for waiver states (black series) and non-waiver states (blue series). Specifically, the series show estimates of the DiD coefficient γ_t from specification (2), implemented separately on states that ever approved statewide waiver legislation and those that did not. Both series include controls for demographics and unemployment. From Table A.3 in the appendix, there were 13 states without any statewide waiver legislation: Alabama, Alaska, District of Columbia, Kansas, Kentucky, Louisiana, Nevada, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, and Wyoming. The extensive margin outcome is weekly employment. The sample includes single women aged 20-50 using the March and monthly CPS files combined. The 95% confidence intervals are based on robust standard errors clustered at the individual level.

Difference-in-Differences:
Treated vs Control States (With Kids)



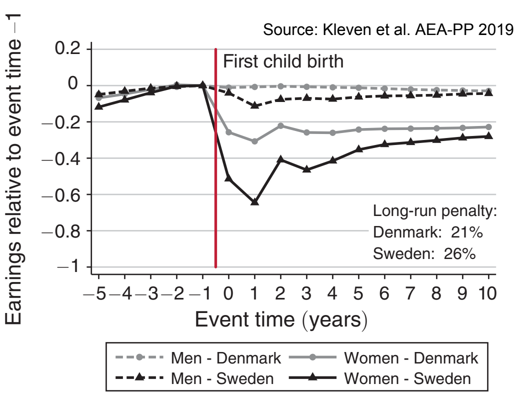


FIGURE 1. CHILD PENALTIES IN EARNINGS IN SCANDINAVIAN COUNTRIES

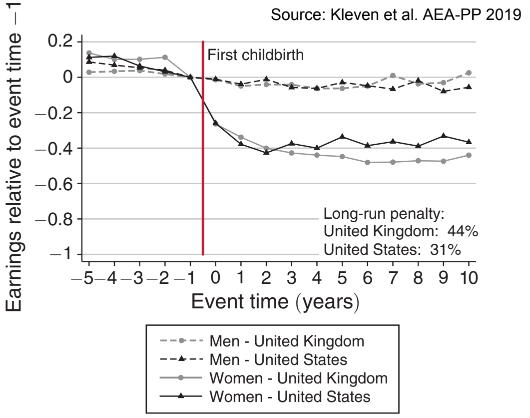


FIGURE 2. CHILD PENALTIES IN EARNINGS IN ENGLISH-SPEAKING COUNTRIES

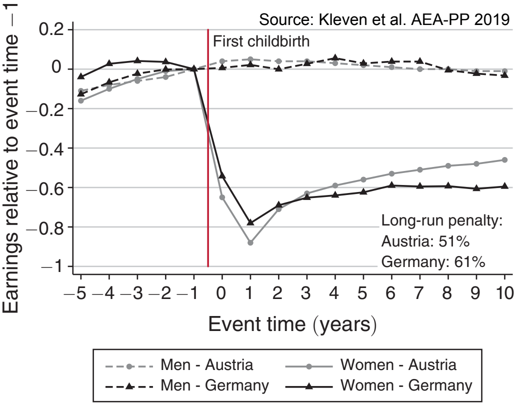


Figure 3. Child Penalties in Earnings in German-Speaking Countries

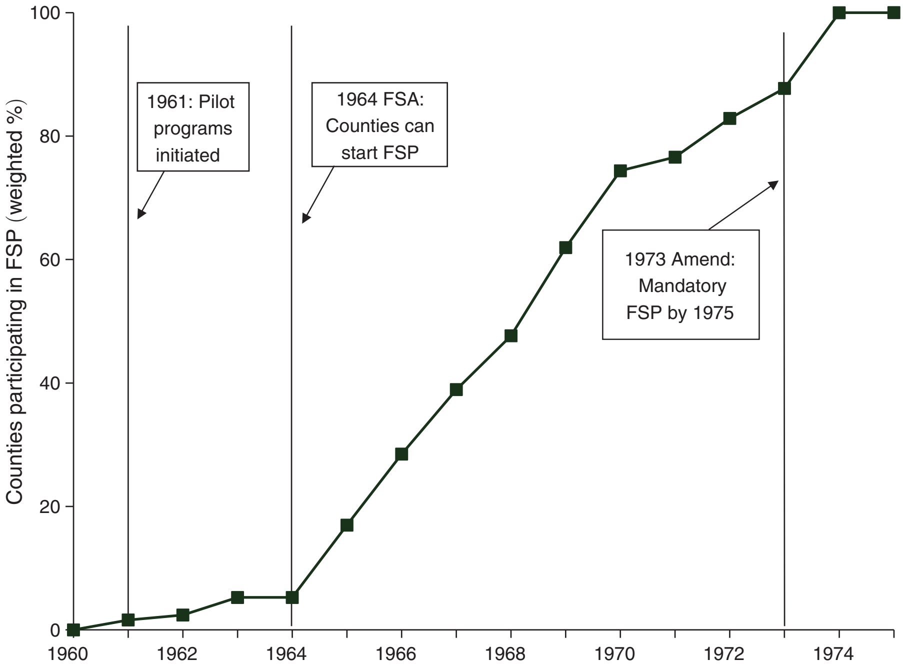


FIGURE 1. WEIGHTED PERCENT OF COUNTIES WITH FOOD STAMP PROGRAM, 1960–1975

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

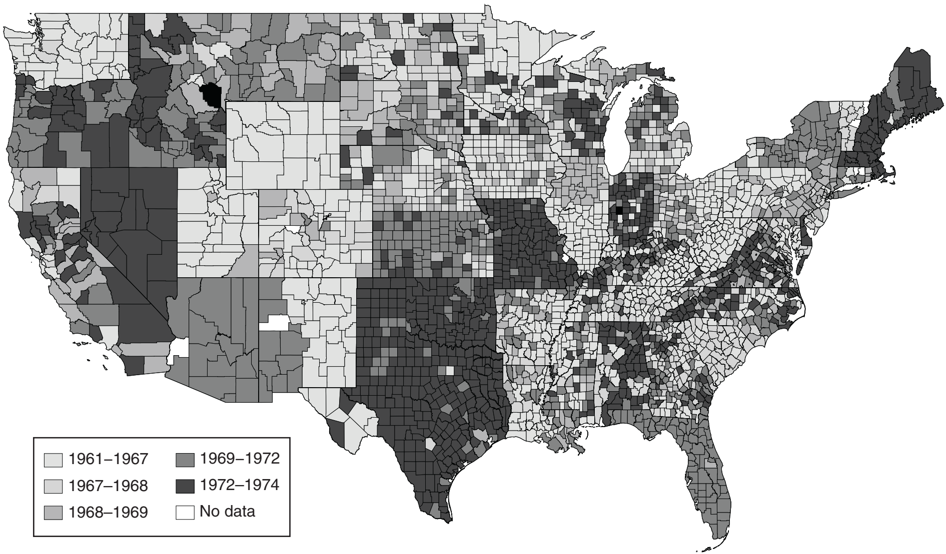


Figure 2. Food Stamp Program Start Date, by County, 1961–1974

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.

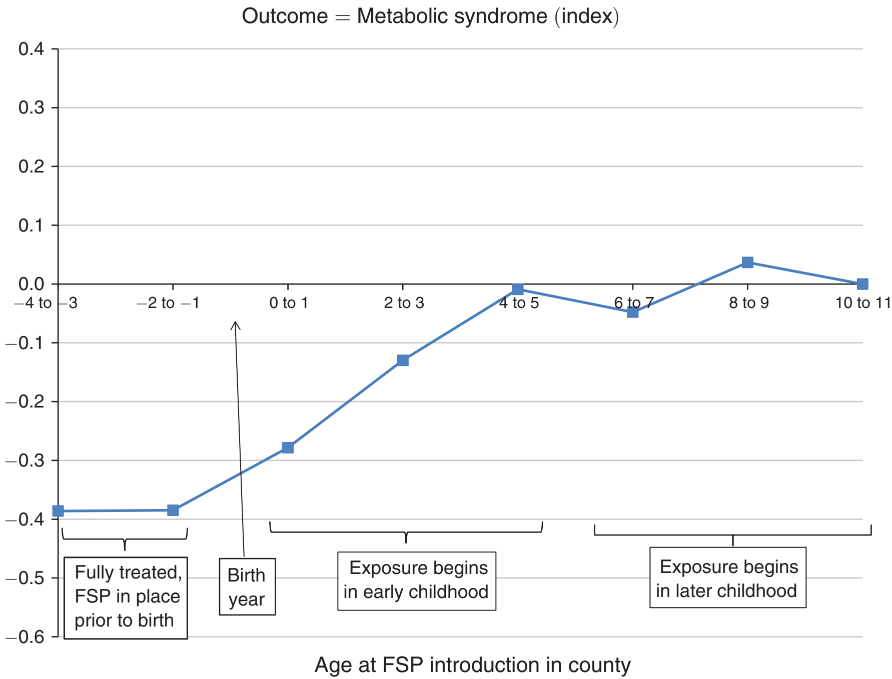


Figure 3. Event Study Estimates of the Impact of FSP Exposure on Metabolic Syndrome Index (*High Participation Sample*)

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.

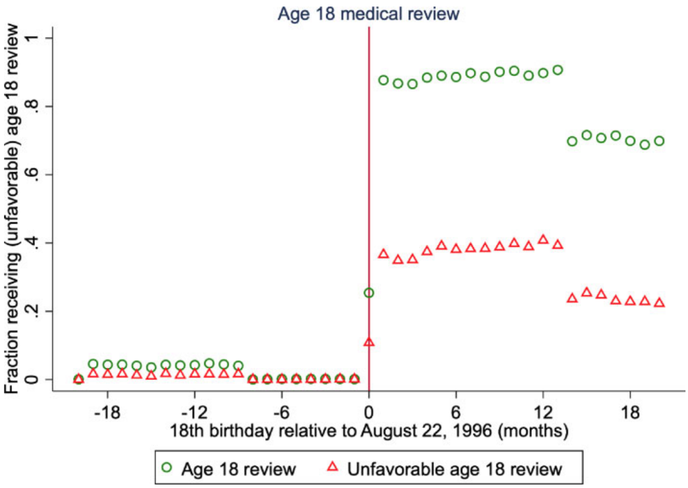


FIGURE II

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

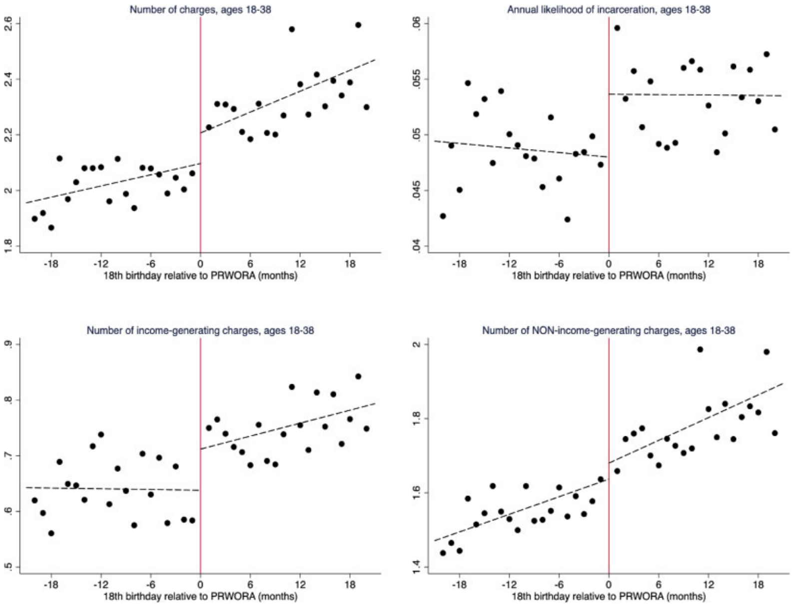
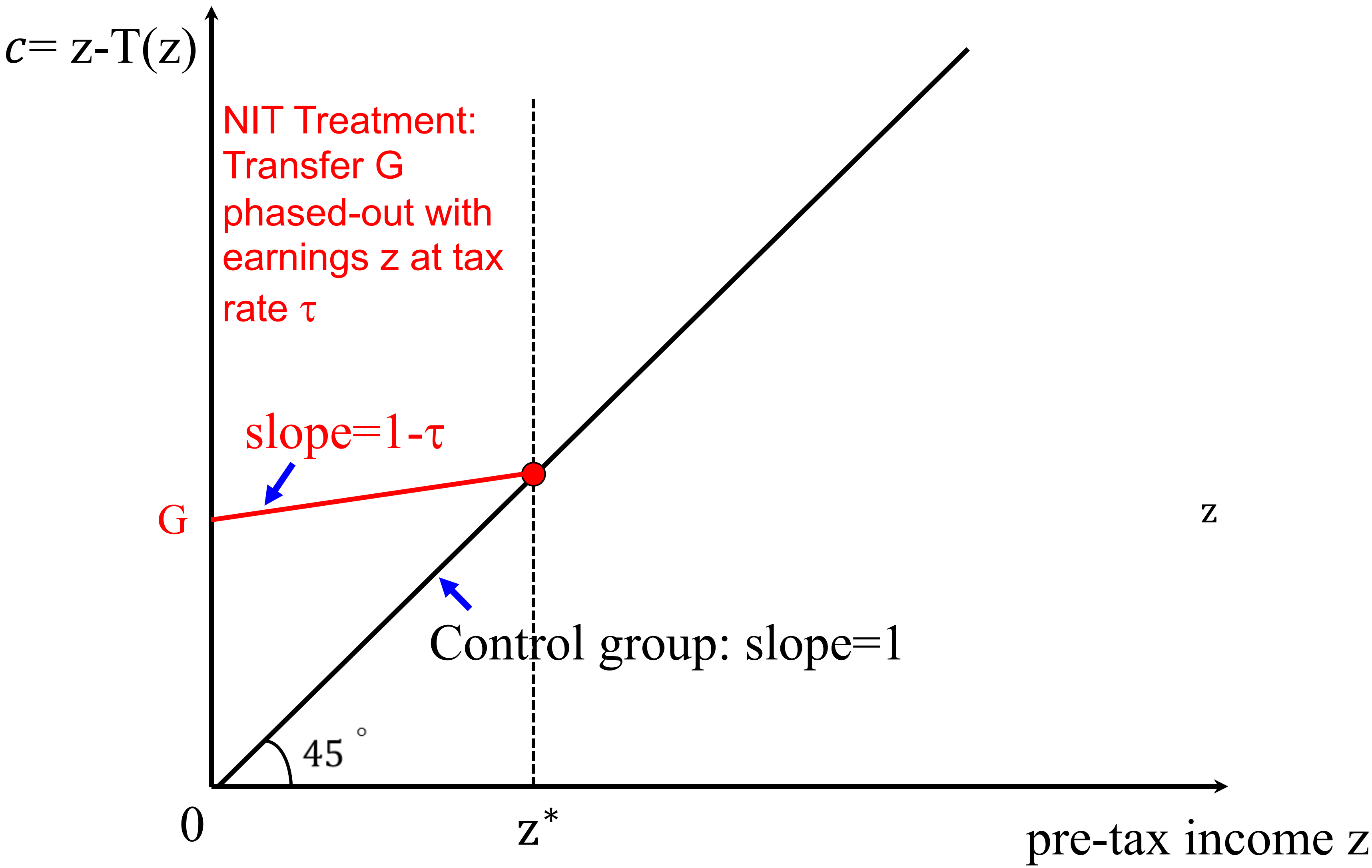


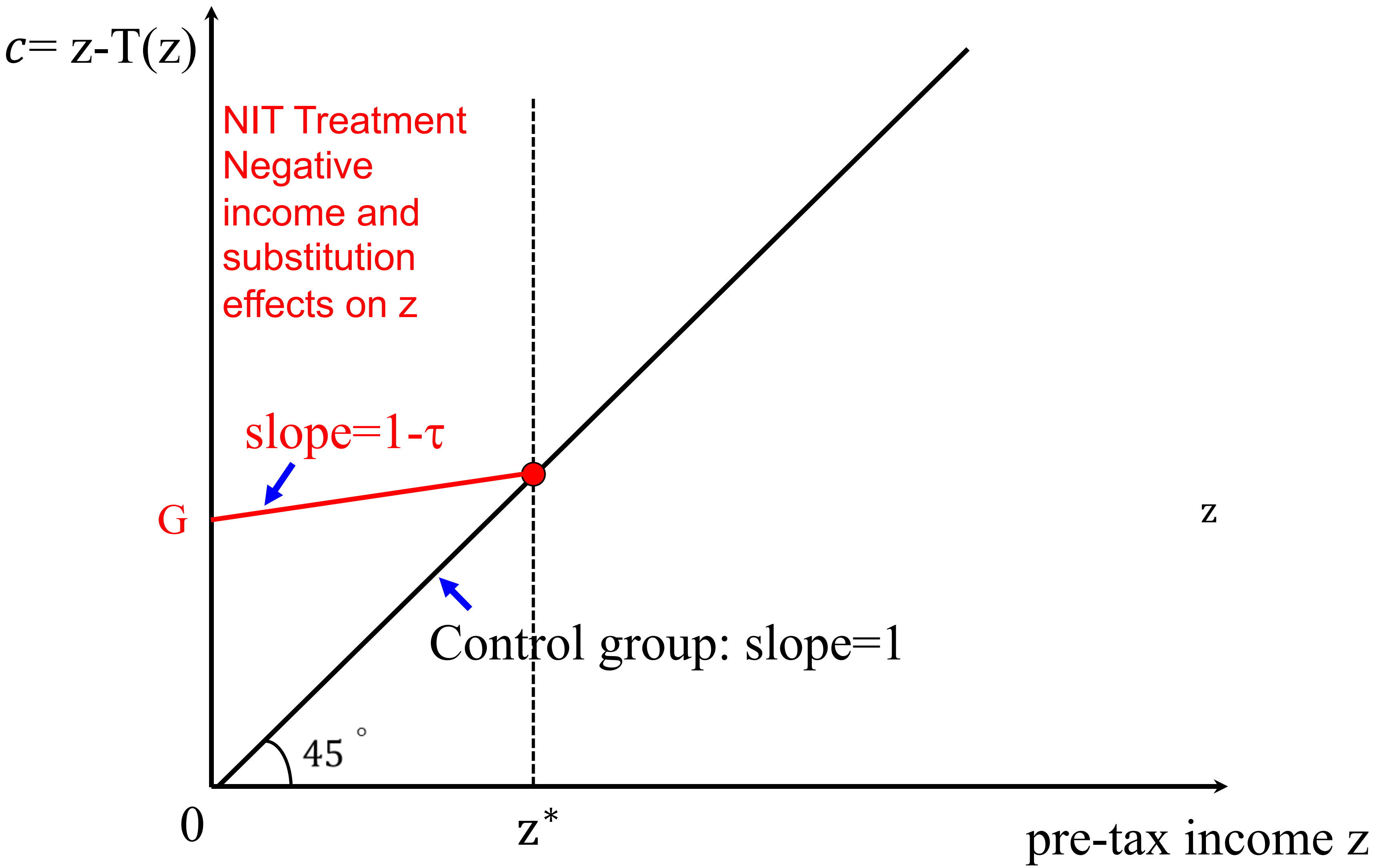
FIGURE III

Reduced Form: Criminal Justice Outcomes across Cutoff

Negative Income Tax Experiment



Negative Income Tax Experiment



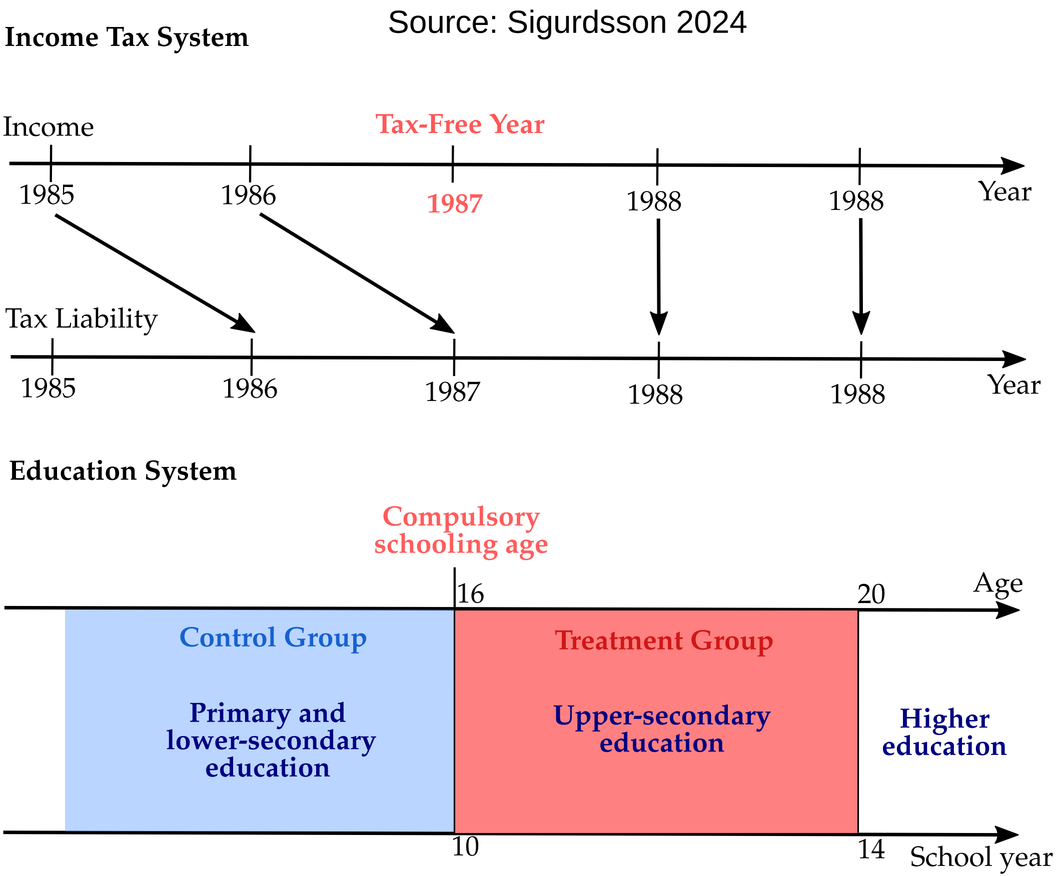
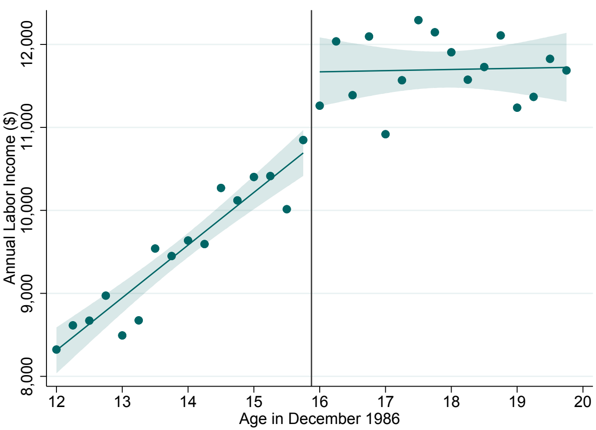
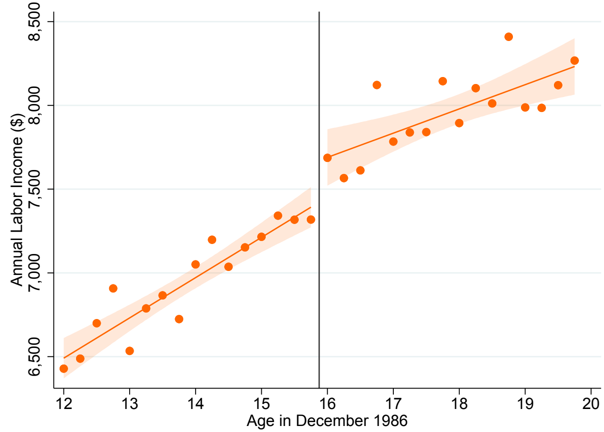


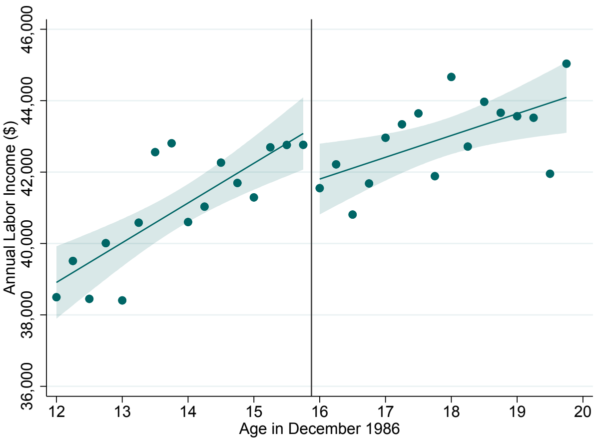
Figure 3: Research Design: Tax-free Year and Compulsory Schooling Age



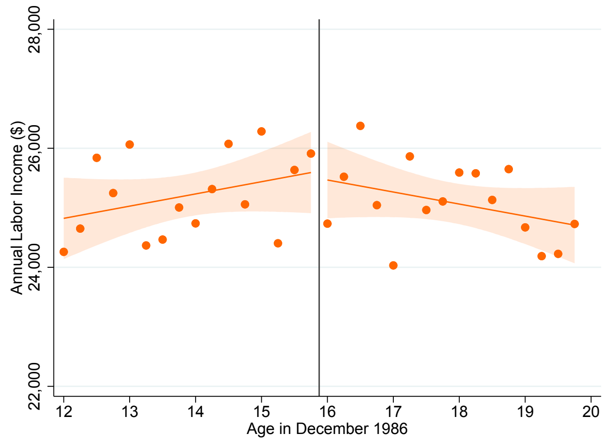
(a) Men at Upper-Secondary School Age



(b) Women at Upper-Secondary School Age



(c) Men at Prime Age



(d) Women at Prime Age

Figure 6: Labor Income at Upper-Secondary School Age and Prime Age

Notes: The figure reports the effect of the tax-free year on labor income. Panels (a) and (b) plot the average annual labor income at upper-secondary school age (16-20) around the compulsory schooling age threshold for men and women, respectively. Panels (c) and (d) plot the average annual labor income at prime age (31-40) around the compulsory schooling age threshold for men and women, respectively. The vertical line denotes the compulsory schooling age threshold. Dots are four-