



Using Big Data to Solve Economic and Social Problems

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HARVARD
UNIVERSITY

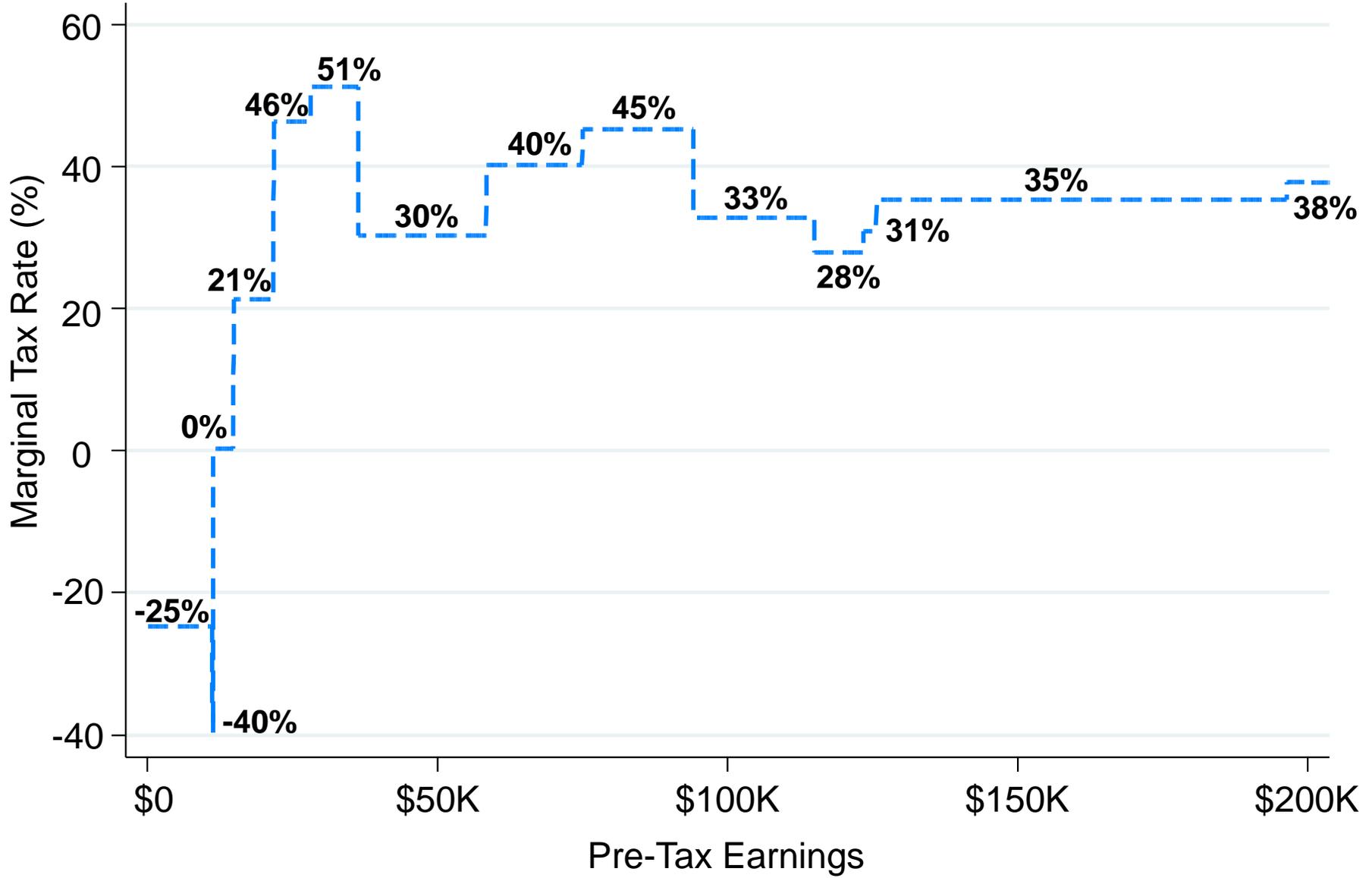


OPPORTUNITY
INSIGHTS

Behavioral Public Economics

- Traditional economic approach assumes that all individuals are fully aware of taxes that they pay and optimize perfectly in response
- Is this true in practice?
 - Do you know your marginal income tax rate?
 - Do you think about it when choosing a job? When deciding how much to save for retirement?

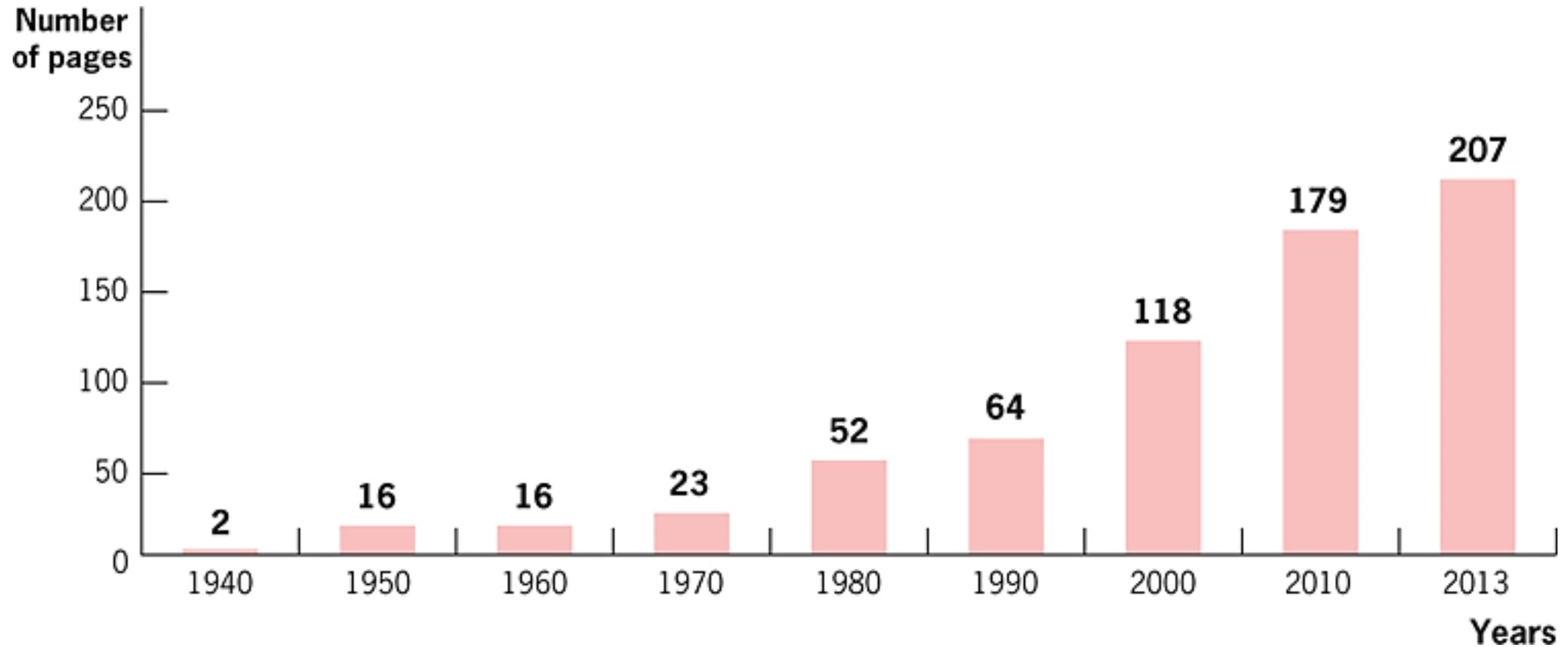
Federal Income Tax Rates for a Single Earner with 2 Children in 2006



Source: NBER Taxsim marginal tax rate calculator

Number of Pages of Instructions that Come with Form 1040

(Basic Individual Tax Form)



Source: Gruber 2016

Behavioral Public Economics Example 1: Sales Taxes

- Begin by considering one of the simplest taxes: sales taxes on purchases in grocery stores
- Chetty, Looney, Kroft (2009) test whether consumers are aware of and respond “rationally” to these simple taxes
- Sales taxes not included in posted prices in the U.S.
- Test whether this affects response to sales taxes using an experiment in a grocery store in Northern California



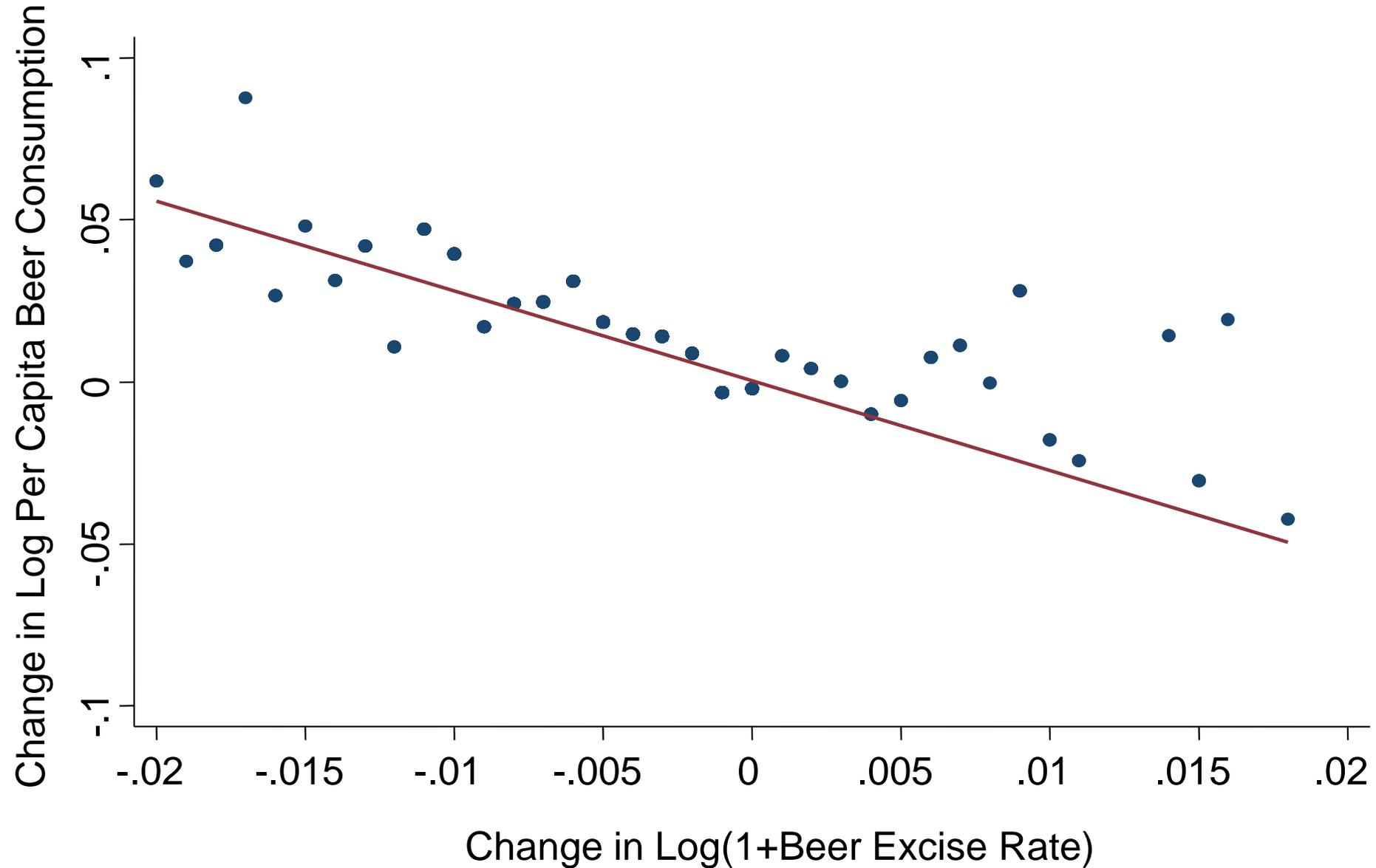
← Original Tag

← Experimental Tag

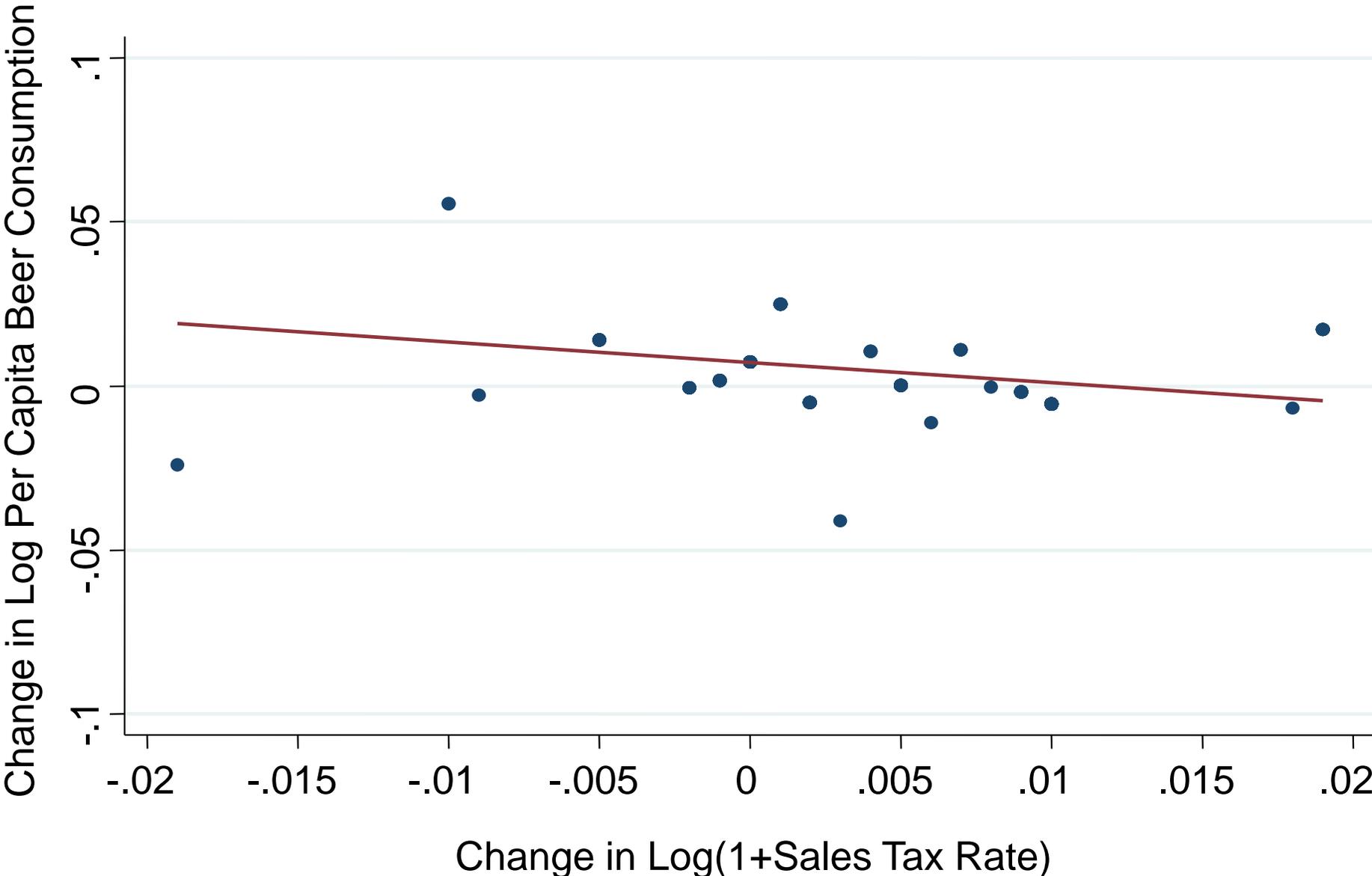
Effect of Posting Tax-Inclusive Prices: Mean Quantity Sold

TREATMENT STORE			
Period	<u>Control Categories</u>	<u>Treated Categories</u>	<u>Difference</u>
Baseline	26.48 (0.22)	25.17 (0.37)	-1.31 (0.43)
Experiment	27.32 (0.87)	23.87 (1.02)	-3.45 (0.64)
Difference over time	0.84 (0.75)	-1.30 (0.92)	DD_{TS} = -2.14 (0.64)
CONTROL STORES			
Period	<u>Control Categories</u>	<u>Treated Categories</u>	<u>Difference</u>
Baseline	30.57 (0.24)	27.94 (0.30)	-2.63 (0.32)
Experiment	30.76 (0.72)	28.19 (1.06)	-2.57 (1.09)
Difference over time	0.19 (0.64)	0.25 (0.92)	DD_{CS} = 0.06 (0.90)
		DDD Estimate	-2.20 (0.58)

Effects of Changes in State Beer Excise Taxes on Changes in Beer Consumption



Effects of Changes in State Sales Taxes on Changes in Beer Consumption



Source: Chetty, Looney, Kroft (2009)

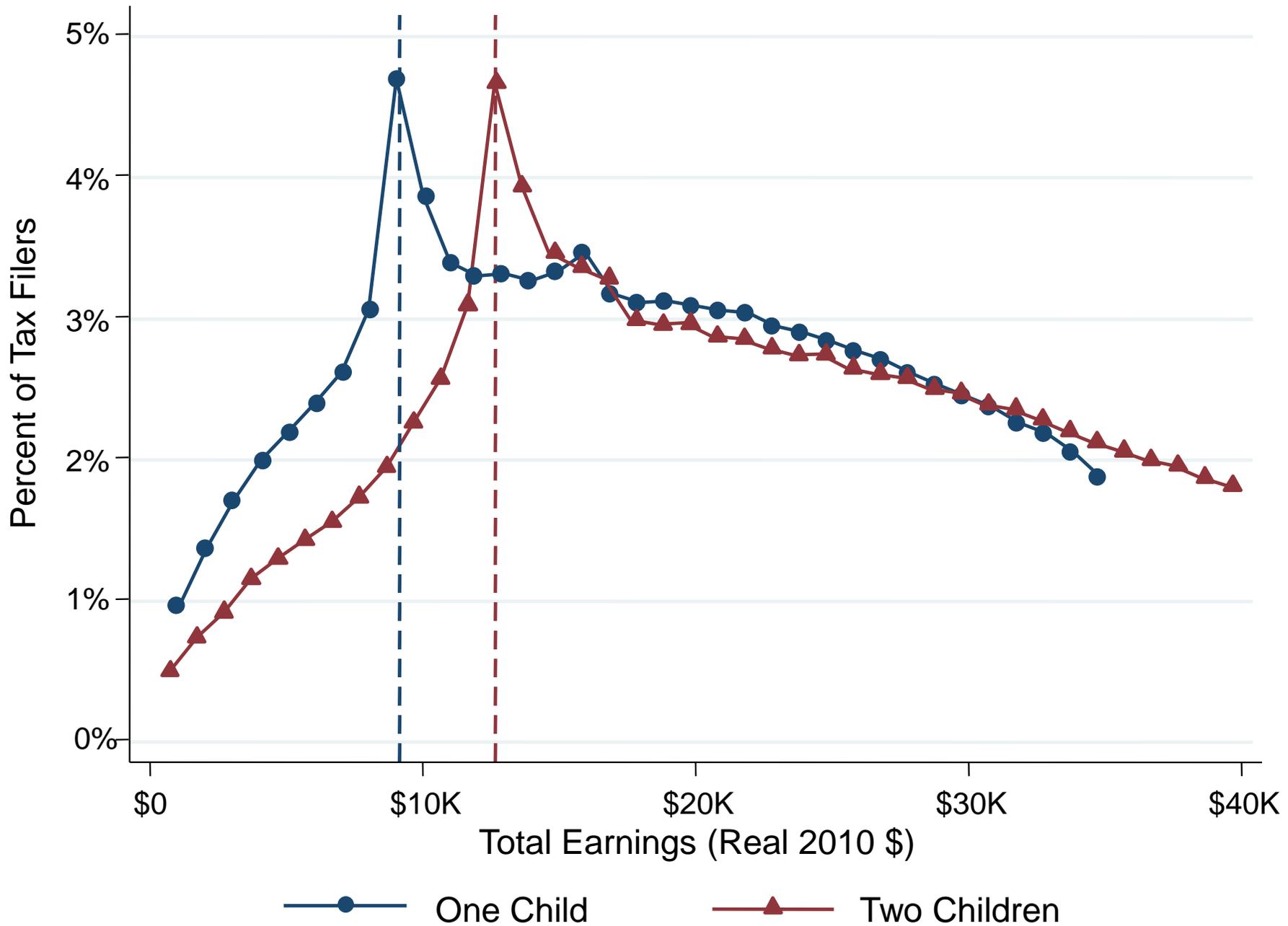
Behavioral Public Economics Example 2: Income Taxation

- Next, turn to the Earned Income Tax Credit: largest cash transfer anti-poverty program in the U.S.
 - \$70 billion spent per year, partly with goal of increasing work among low-income families
 - Is the EITC successful in achieving this goal?
- Chetty, Friedman, and Saez (2013) study this question, focusing on importance of knowledge and information about EITC

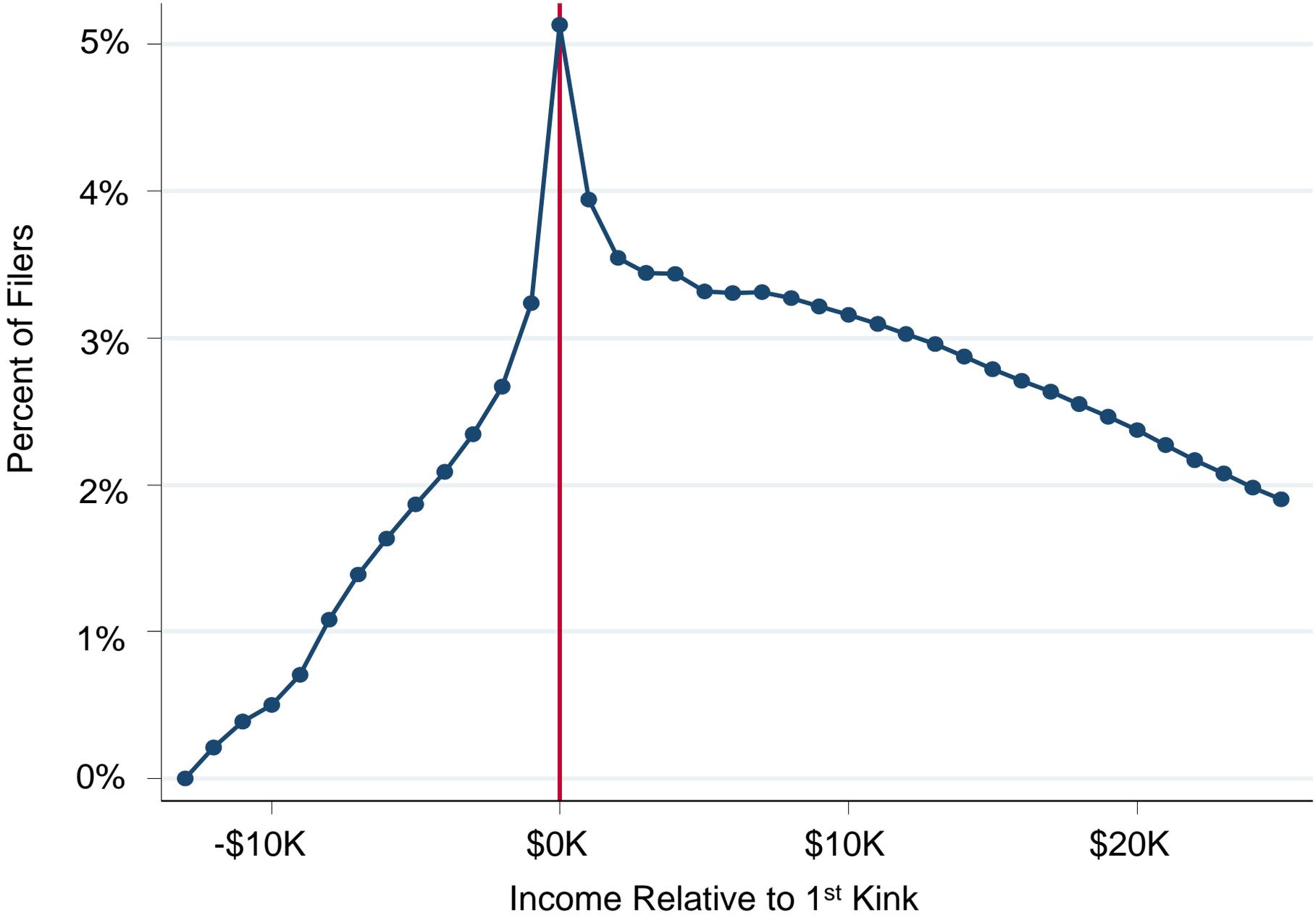
2008 Federal EITC Schedule for a Single Filer with Children



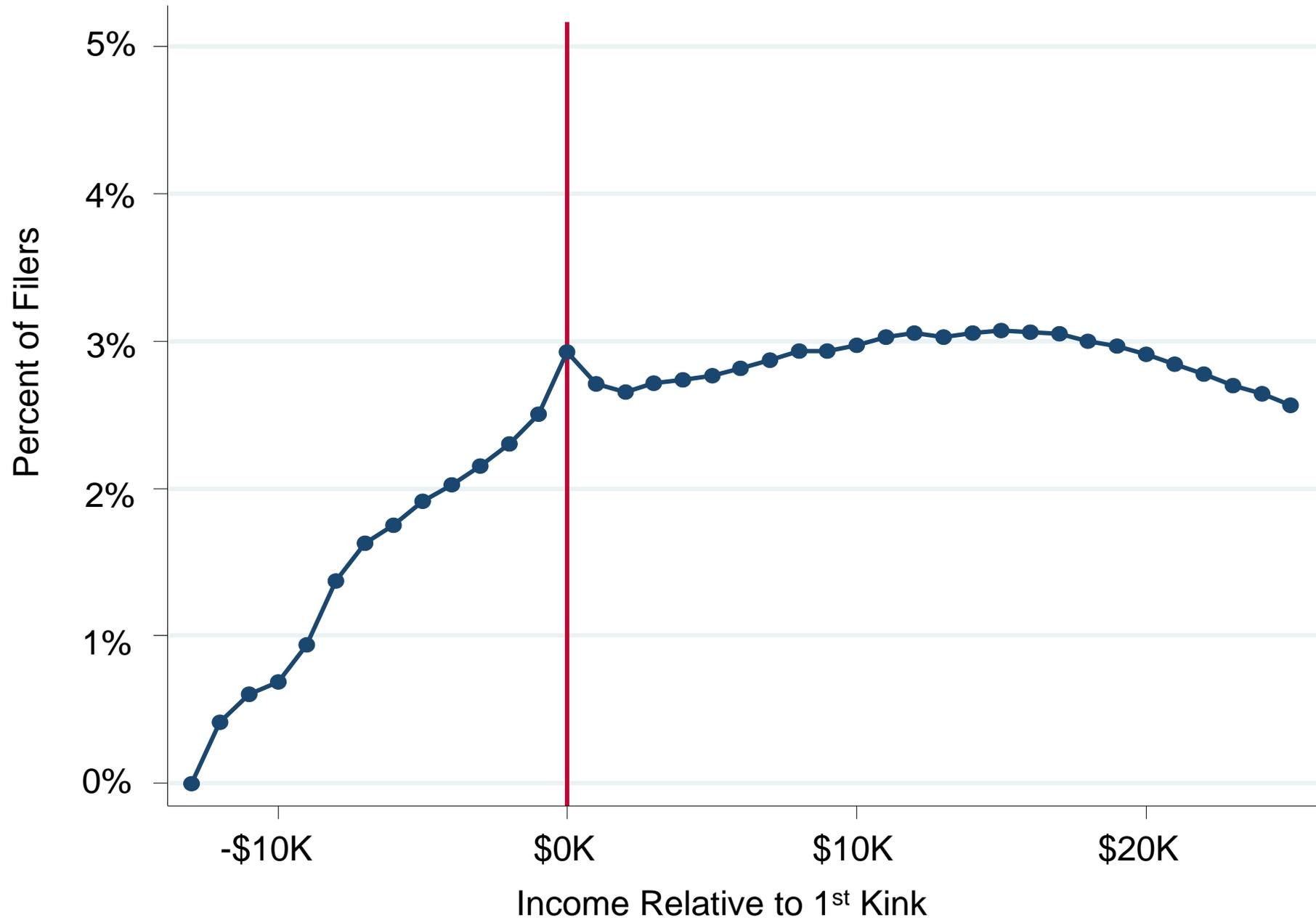
Income Distributions for Individuals with Children in 2008



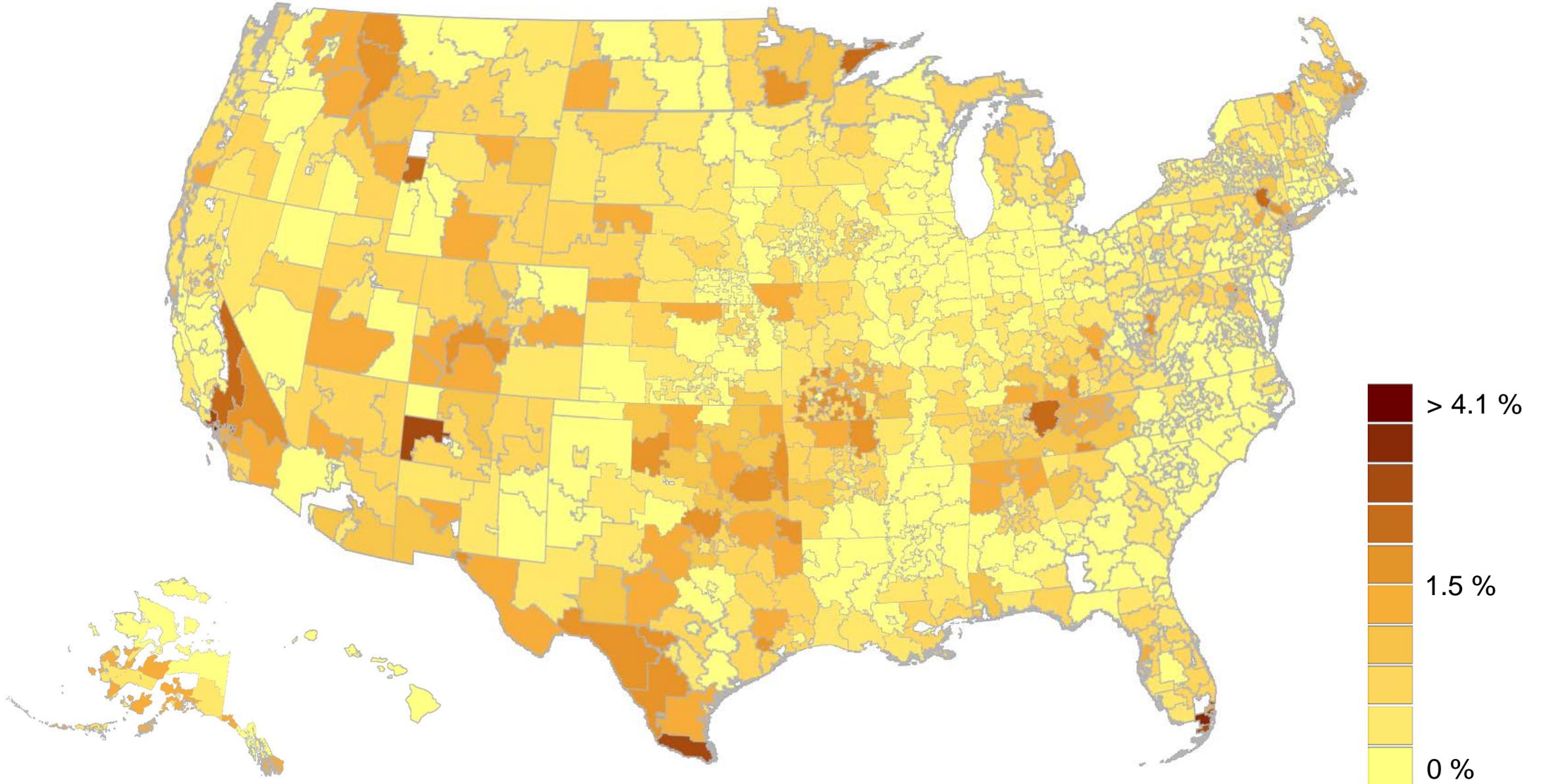
Earnings Distribution Around EITC-Maximizing Threshold in Texas



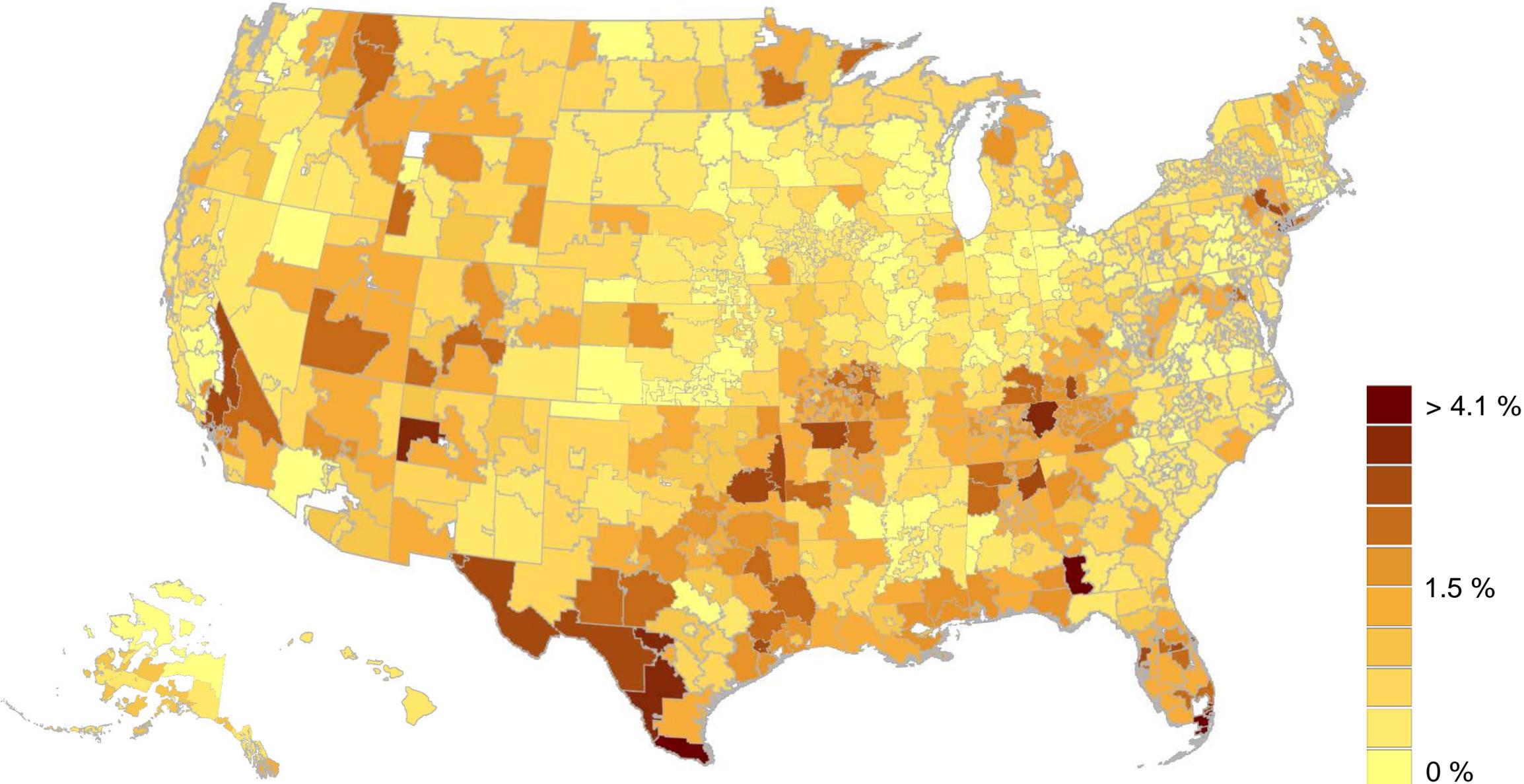
Earnings Distribution Around EITC-Maximizing Threshold in Kansas



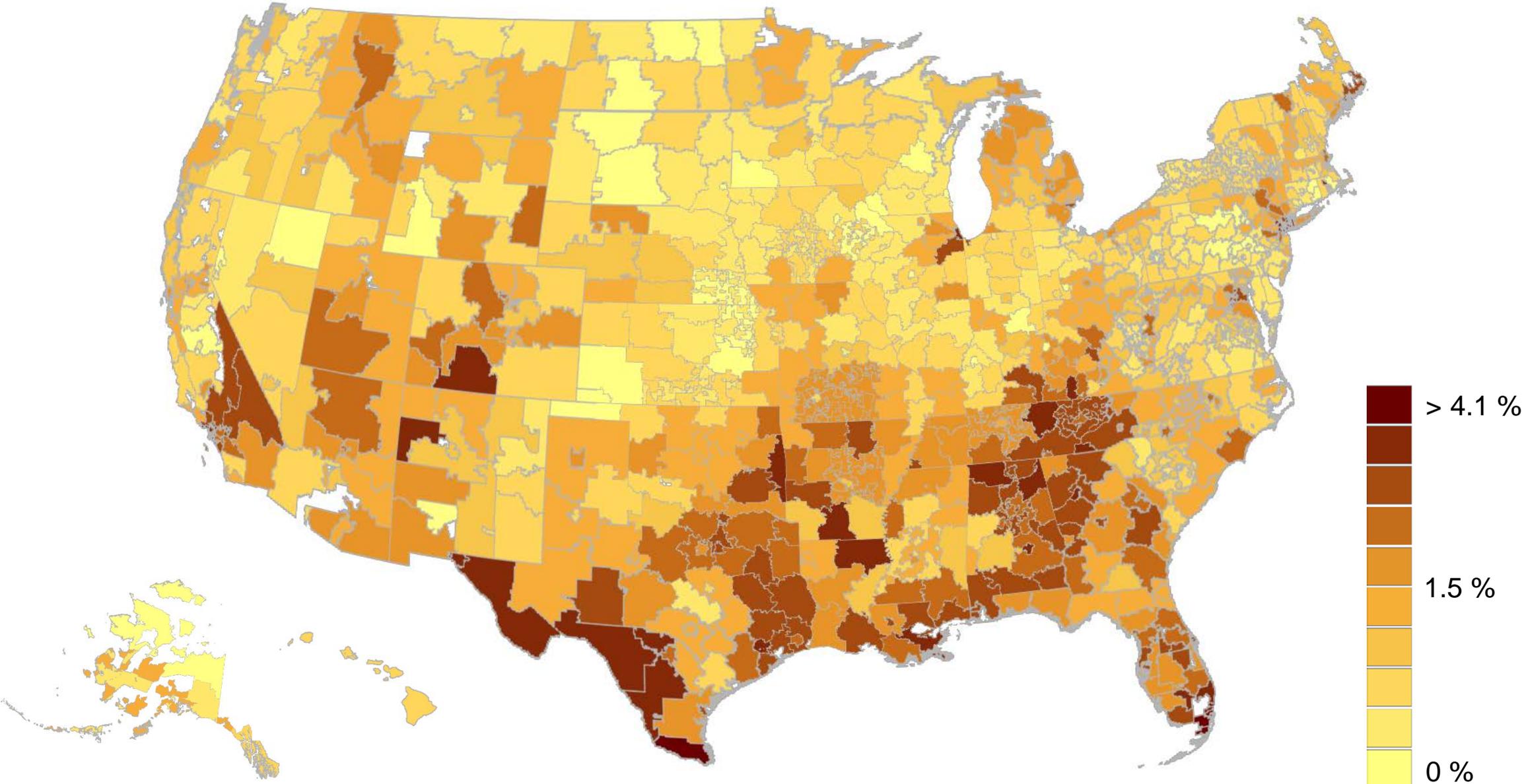
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 1996



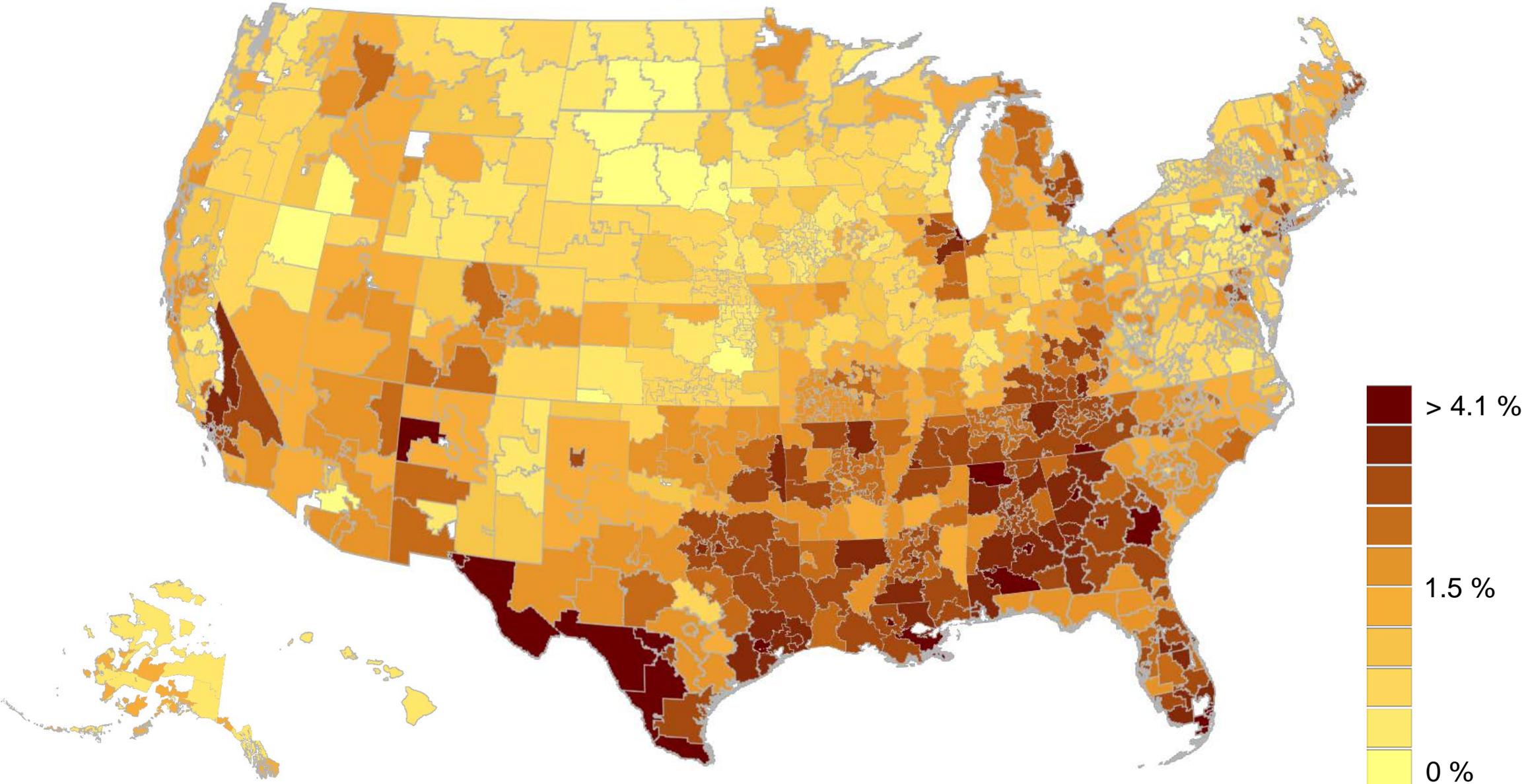
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 1999



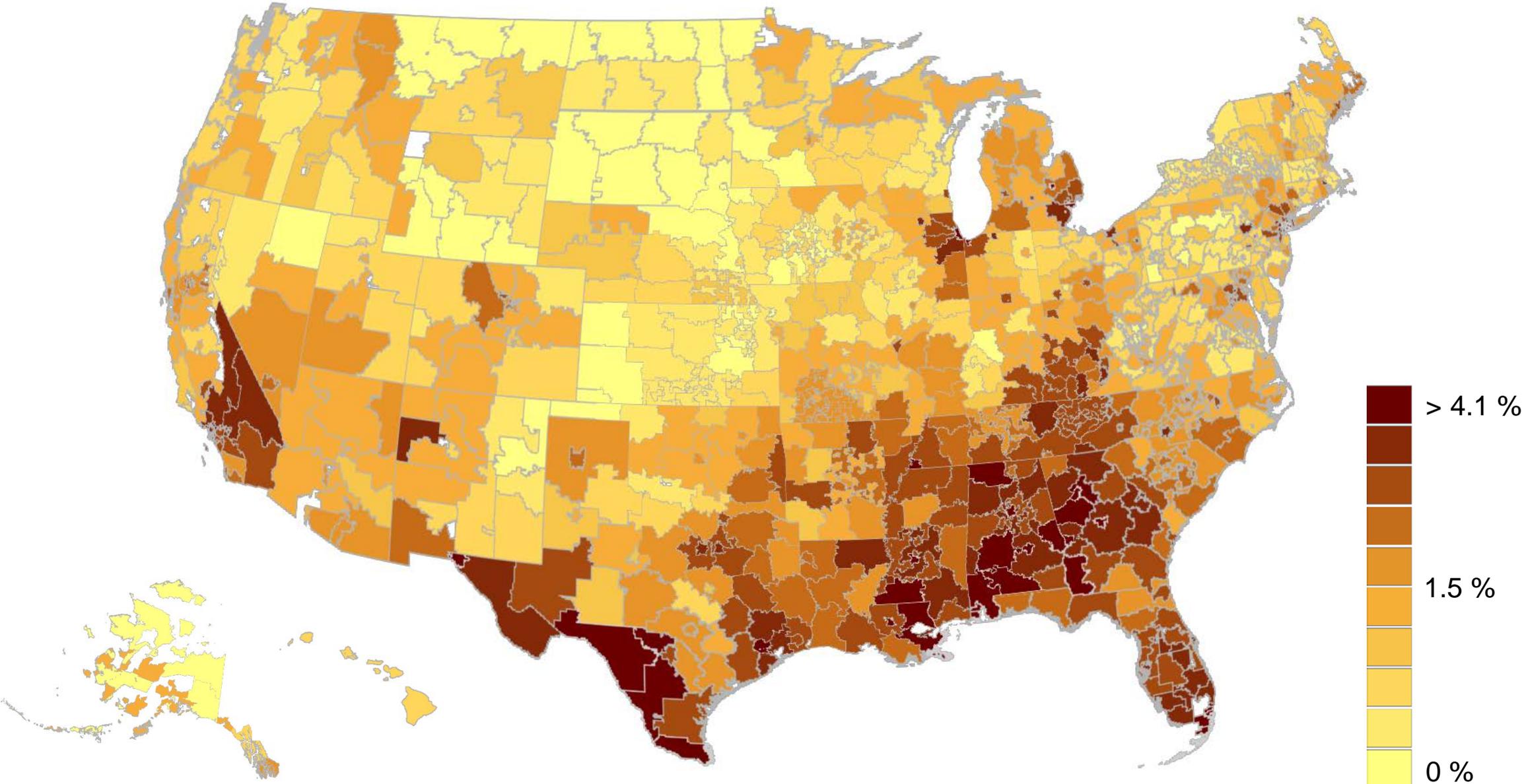
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 2002



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



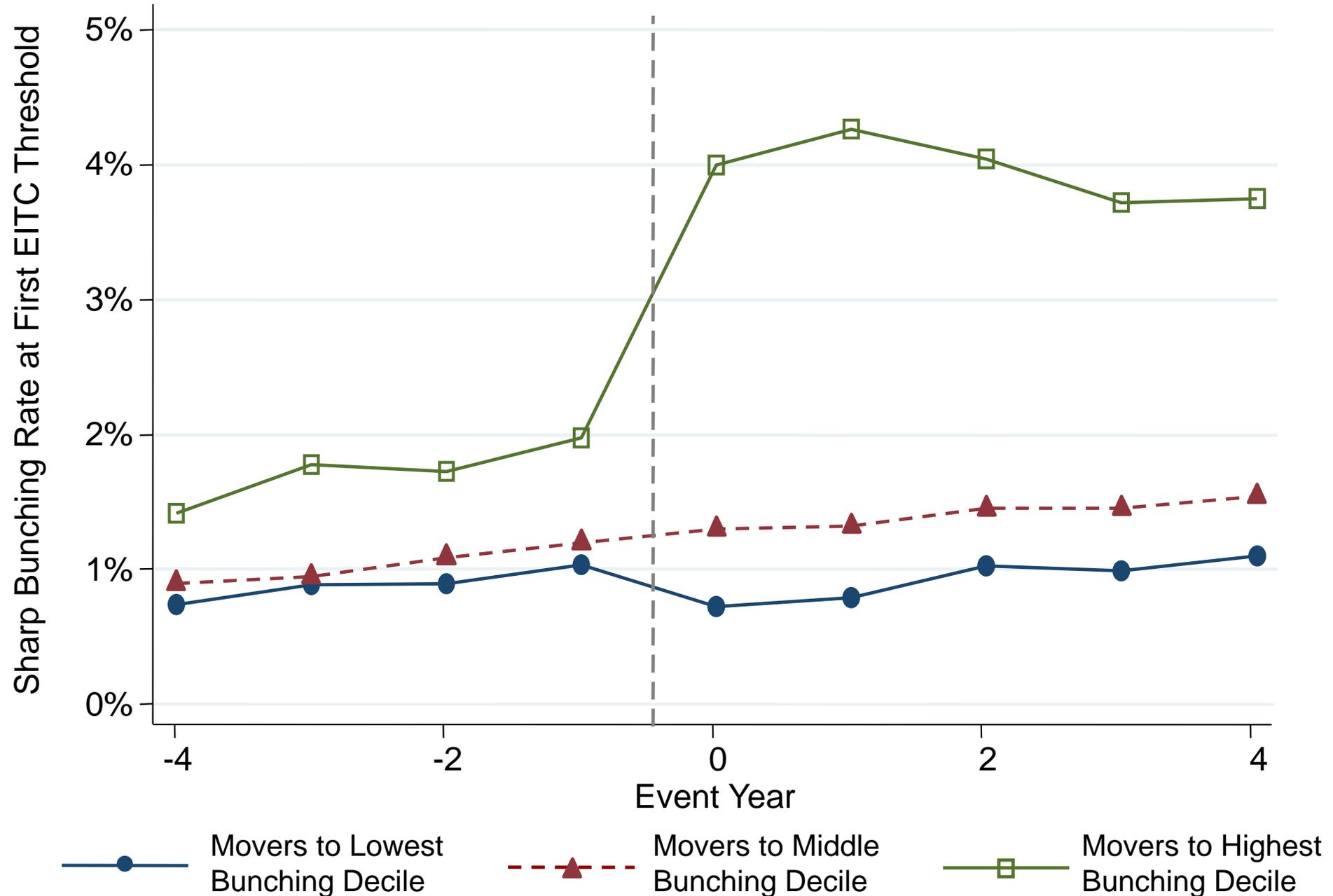
Fraction of Tax Filers Who Report Income that Maximizes EITC Refund in 2008



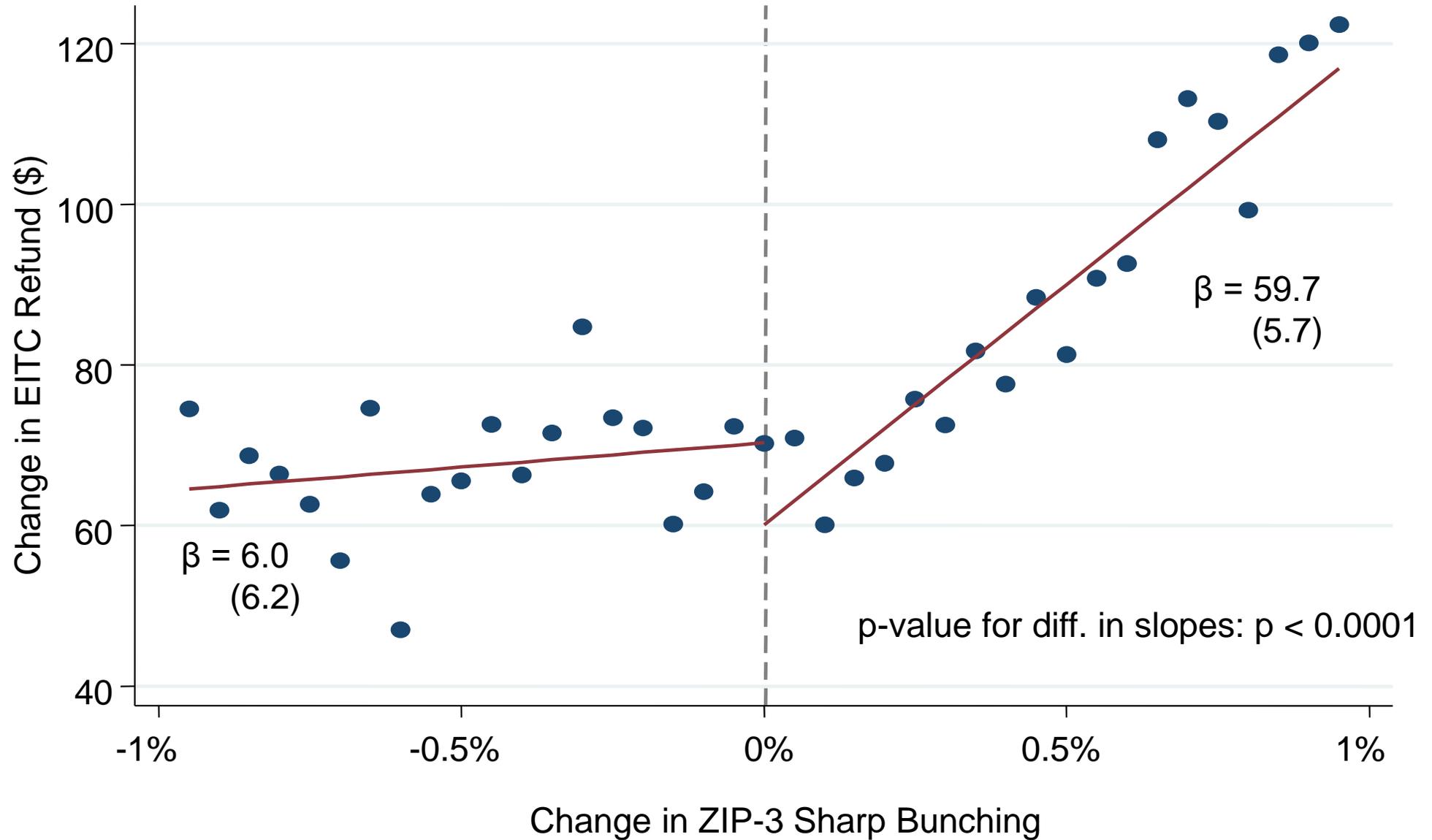
Is the Spatial Variation Driven by Differences in Knowledge About the EITC?

- Is the spatial variation in EITC response driven by differences in knowledge or other factors, such as differences in tax compliance?
- Knowledge explanation makes a very specific prediction: **asymmetric impact** of moving
 - Moving to a higher-bunching neighborhood should increase responsiveness to EITC as people learn
 - But moving to a lower-bunching area should not affect responsiveness

Event Study of Sharp Bunching Around Moves



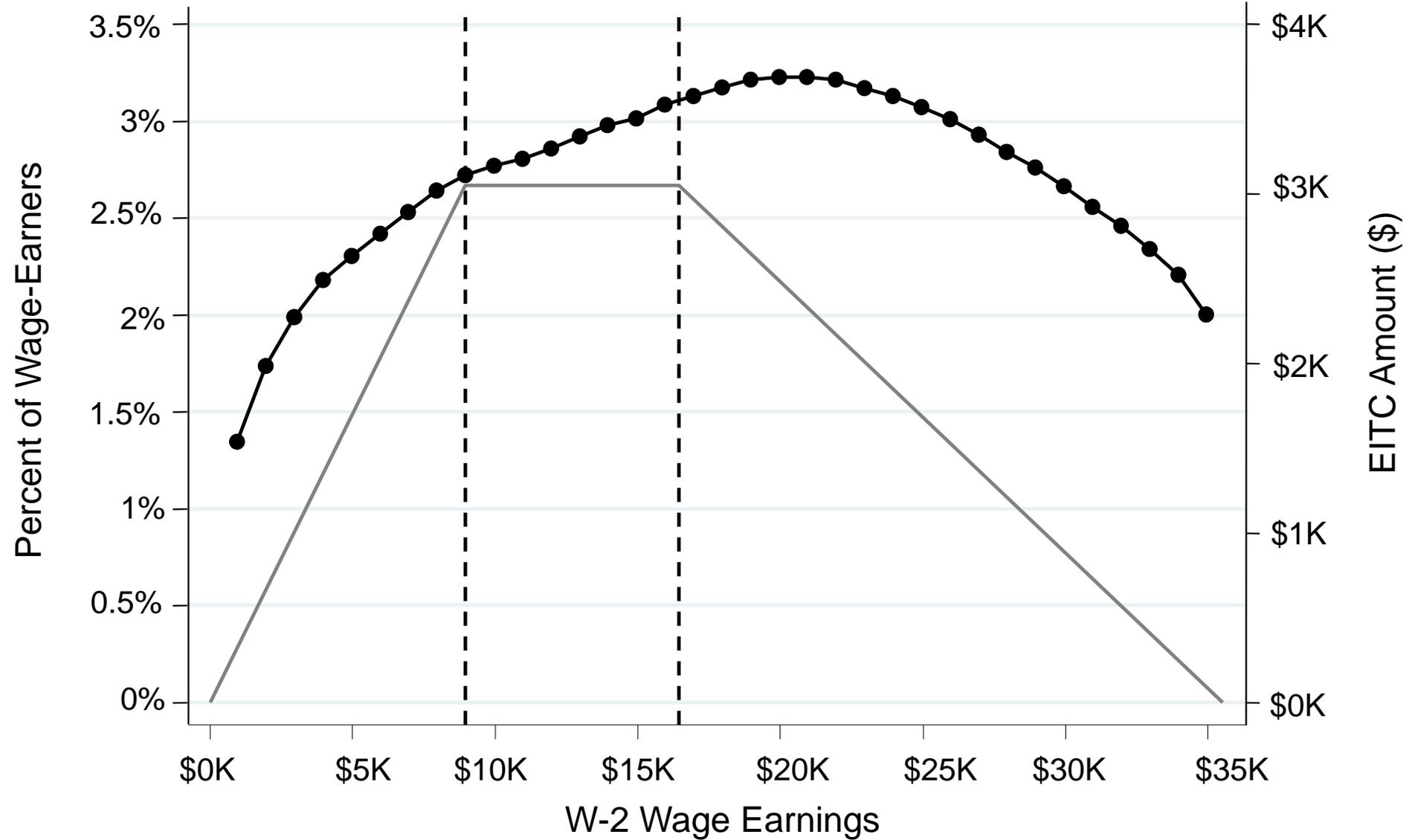
Change in EITC Refunds vs. Change in Sharp Bunching for Movers



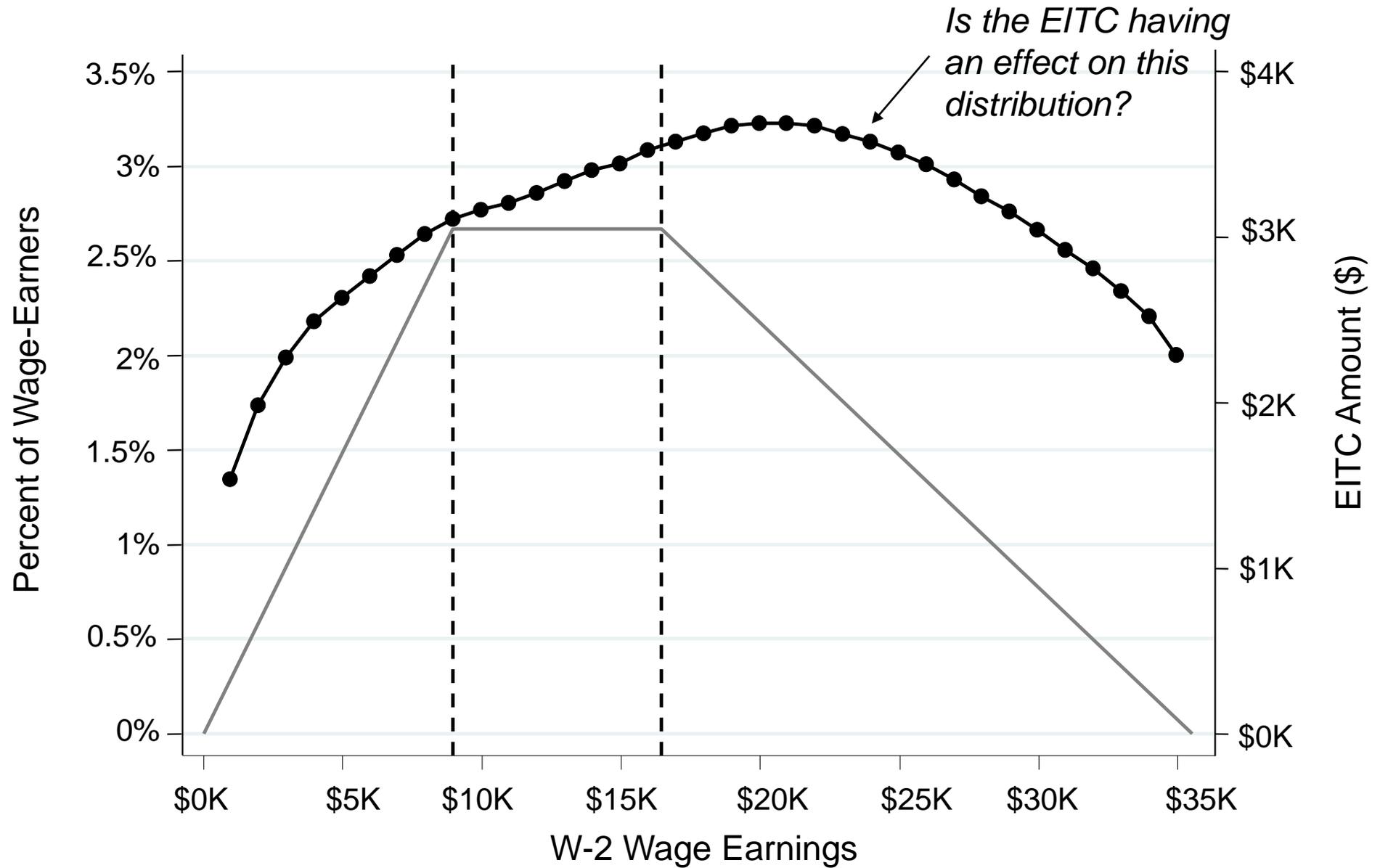
Reporting vs. Real Responses

- Audit studies reveal that sharp bunching at EITC refund maximizing threshold is partly due to misreporting of self-employment income
- To isolate real work responses, focus on wage earnings reported on W-2 firms directly by employers

Income Distribution For Single Wage Earners with One Child

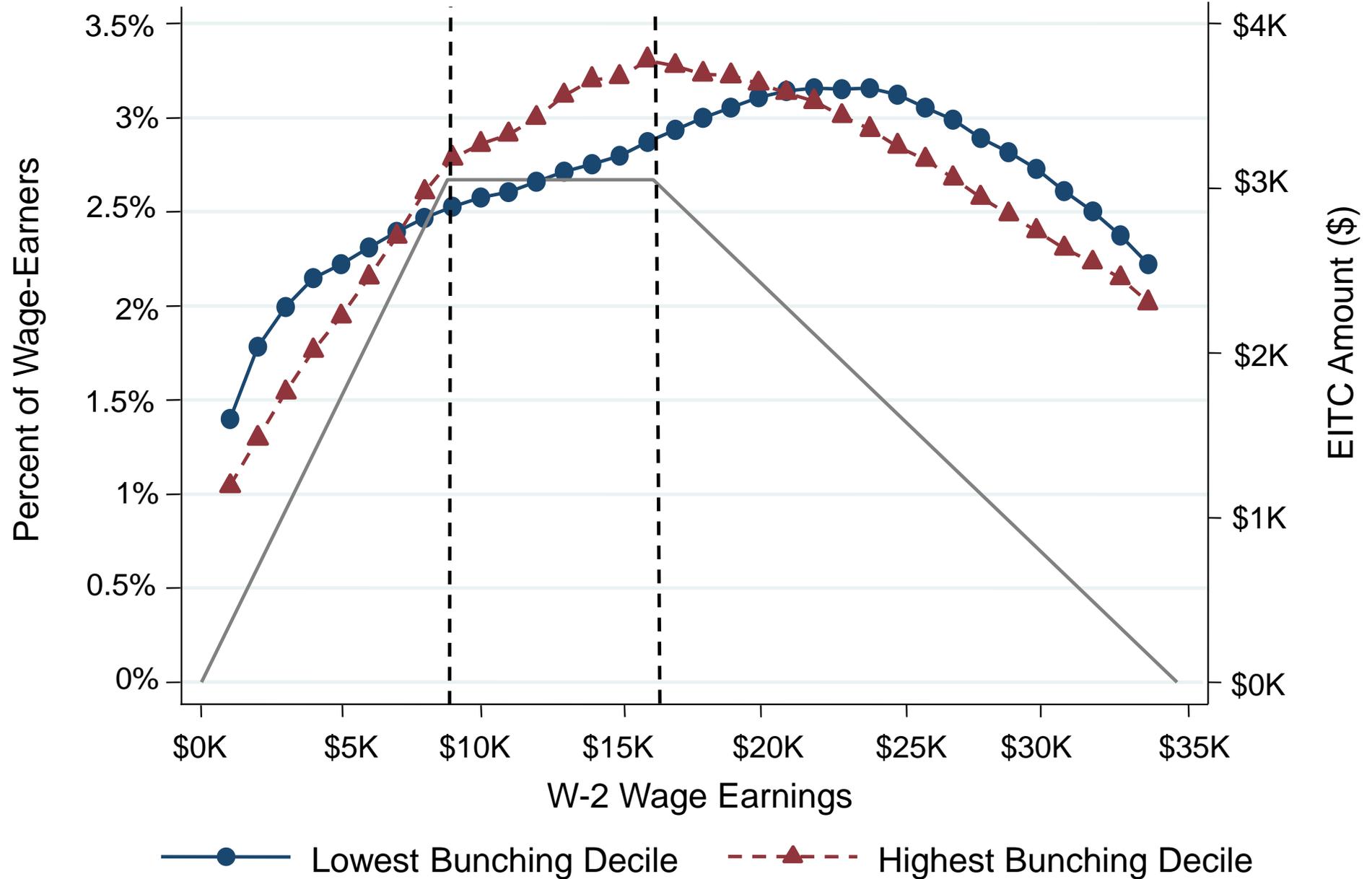


Income Distribution For Single Wage Earners with One Child

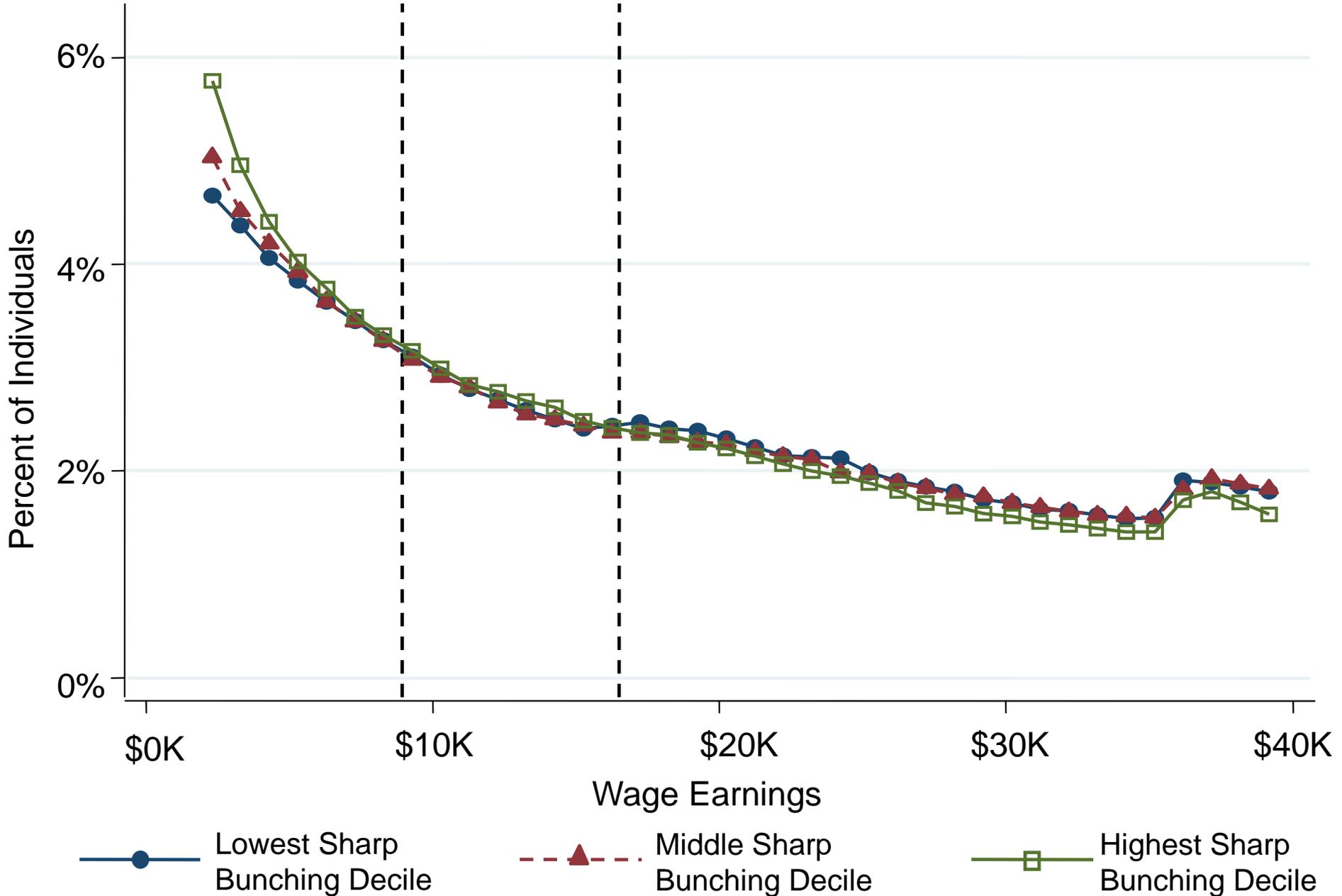


Income Distribution For Single Wage Earners with One Child

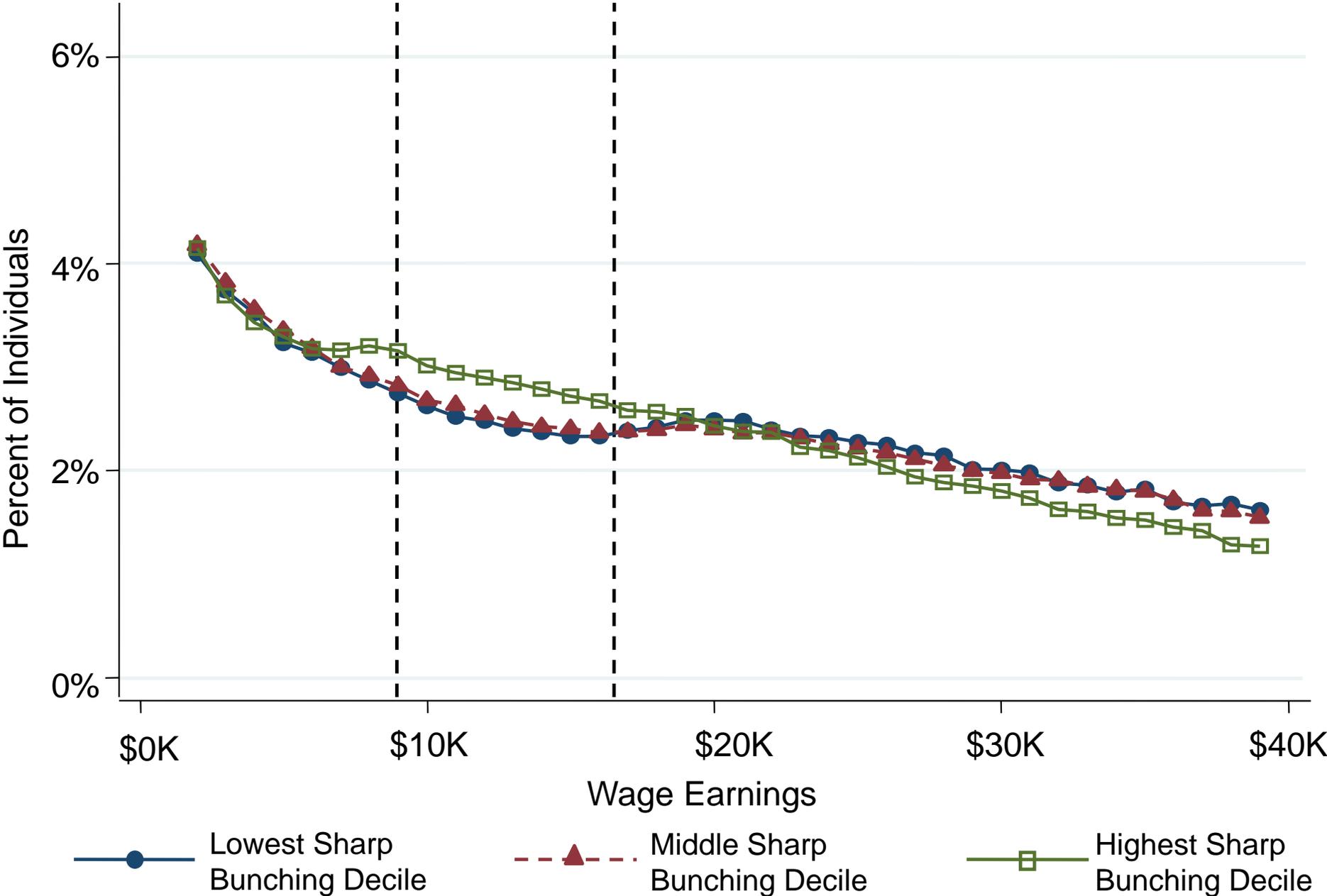
High vs. Low Bunching Areas



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



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



Implications for Design of Earned Income Tax Credit

- EITC has significant impacts on labor supply of low-income families with kids
- But knowledge about the program plays a big role in determining its impacts
 - If we want to amplify impacts of EITC on labor supply, may be more effective to increase awareness (or include in pre-tax wage) than change credit amount

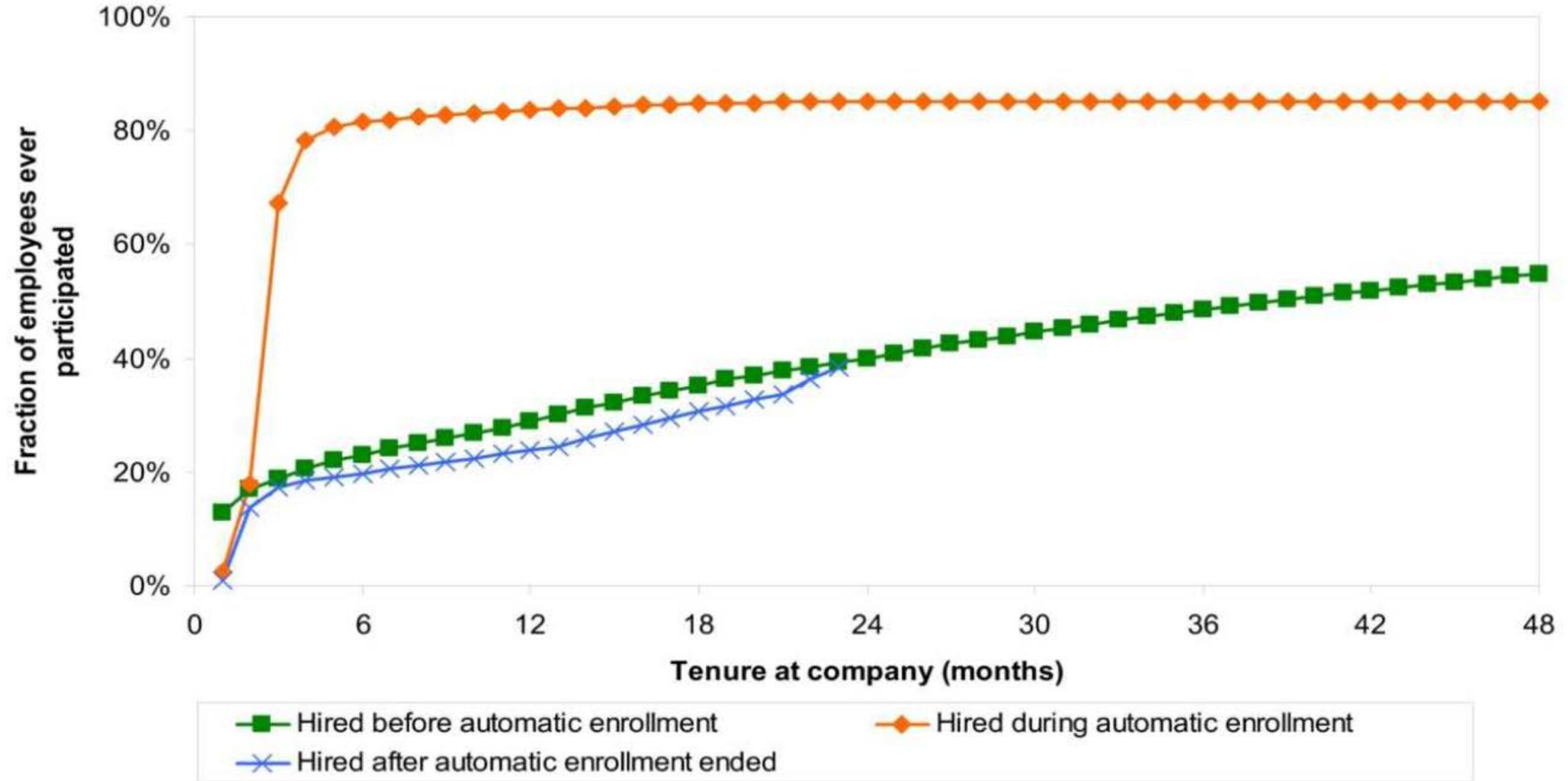
Behavioral Public Economics Example 3: Retirement Savings

- Widespread concern that many families are not saving enough for retirement
- U.S. government effectively spends \$100 billion on programs to increasing saving for retirement
 - Subsidies for retirement savings accounts such as IRAs and 401(k)s
- Is this an effective way to increase retirement saving?
- Are there other policy instruments that may be more effective?
- Insights from behavioral economics has shifted policy approaches to increasing saving significantly in the past 15 years

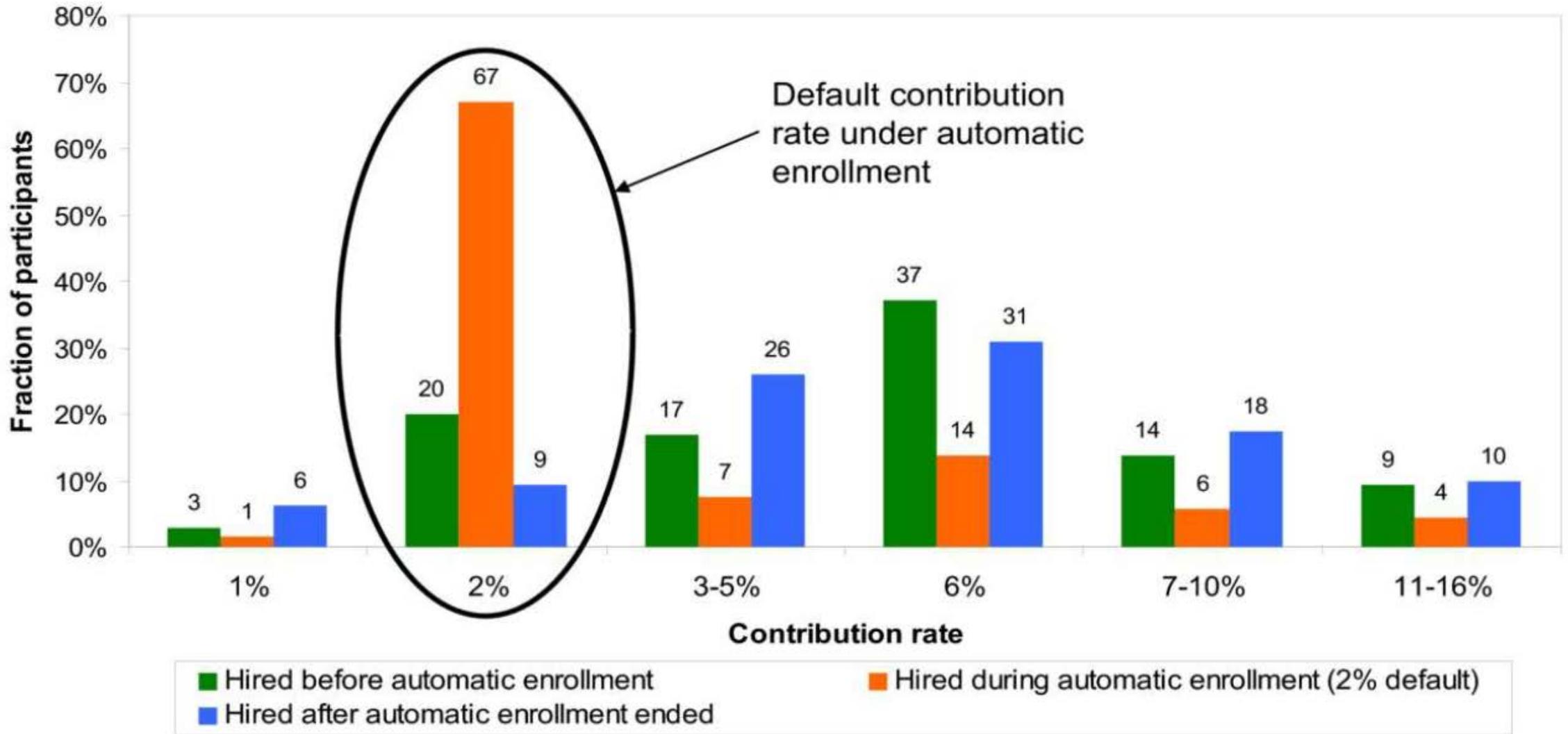
The Power of Defaults

- Madrian and Shea (2001) analyze impacts of employer **defaults** on individuals' 401(k) retirement account contributions
- Defaults just change whether employees opt-in or opt-out of retirement saving
- Do not change actual incentives to save, so should have no impact under traditional economic model

Effects of Automatic Enrollment on 401(k) Participation



Effects of Automatic Enrollment on Distribution of 401(k) Contribution Rates



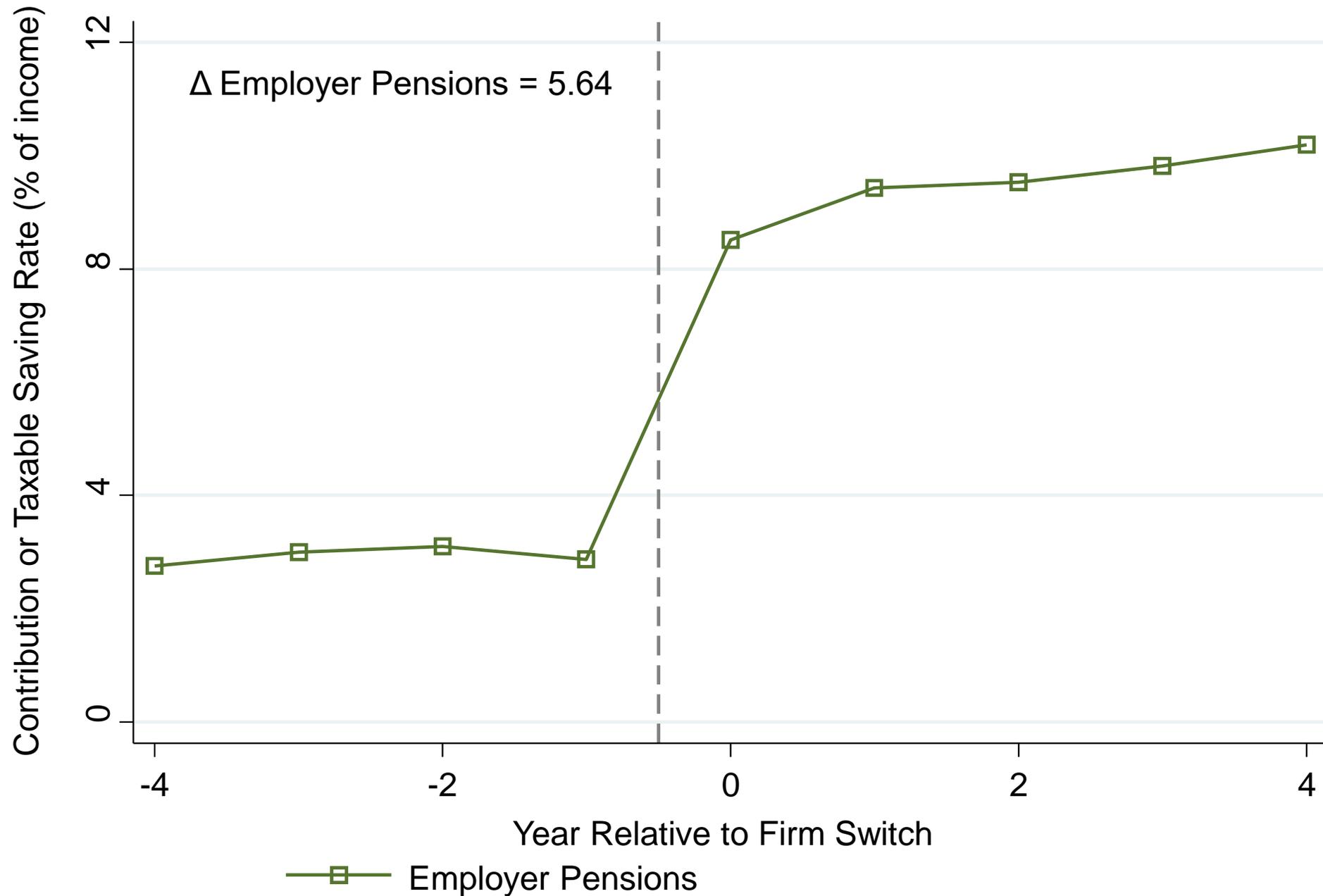
Crowdout in Retirement Savings Accounts

- Do defaults increase **total savings** or just lead to shifting of assets from non-retirement to retirement accounts?
- Impacts of defaults on total saving not obvious despite Madrian and Shea evidence
 - Even inattentive individuals still have to satisfy budget constraint by cutting consumption or savings in non-retirement accounts
- Chetty et al. (2014) analyze this question using third-party reported data on all financial wealth for population of Denmark

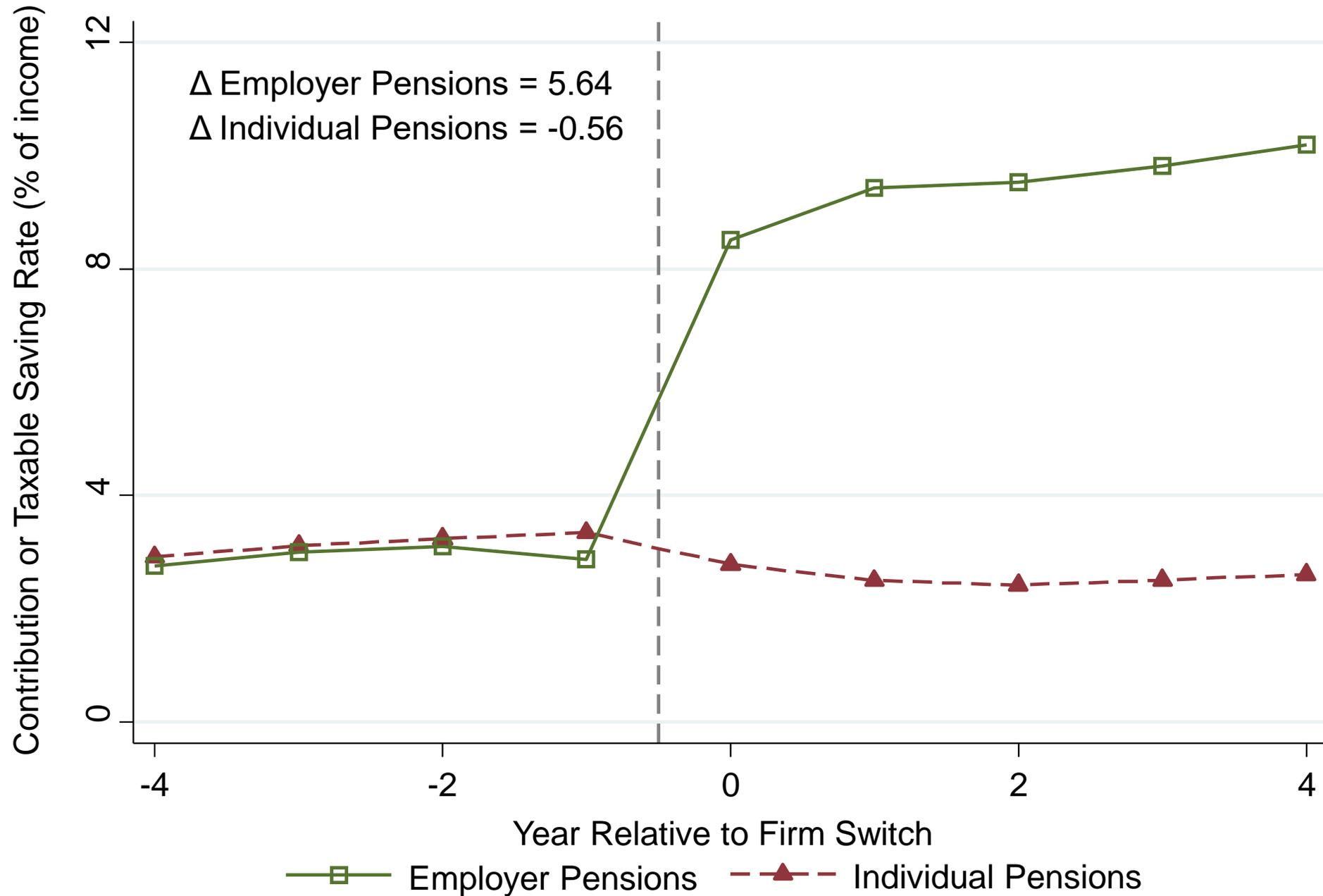
Impacts of Defaults in Denmark

- Employers make pension contributions on workers behalf automatically
- Contributions vary substantially across employers
- Research design: event study when workers switch firms
 - Retirement savings rate can change sharply when workers switch firms
 - Do workers offset these changes in their own private savings?

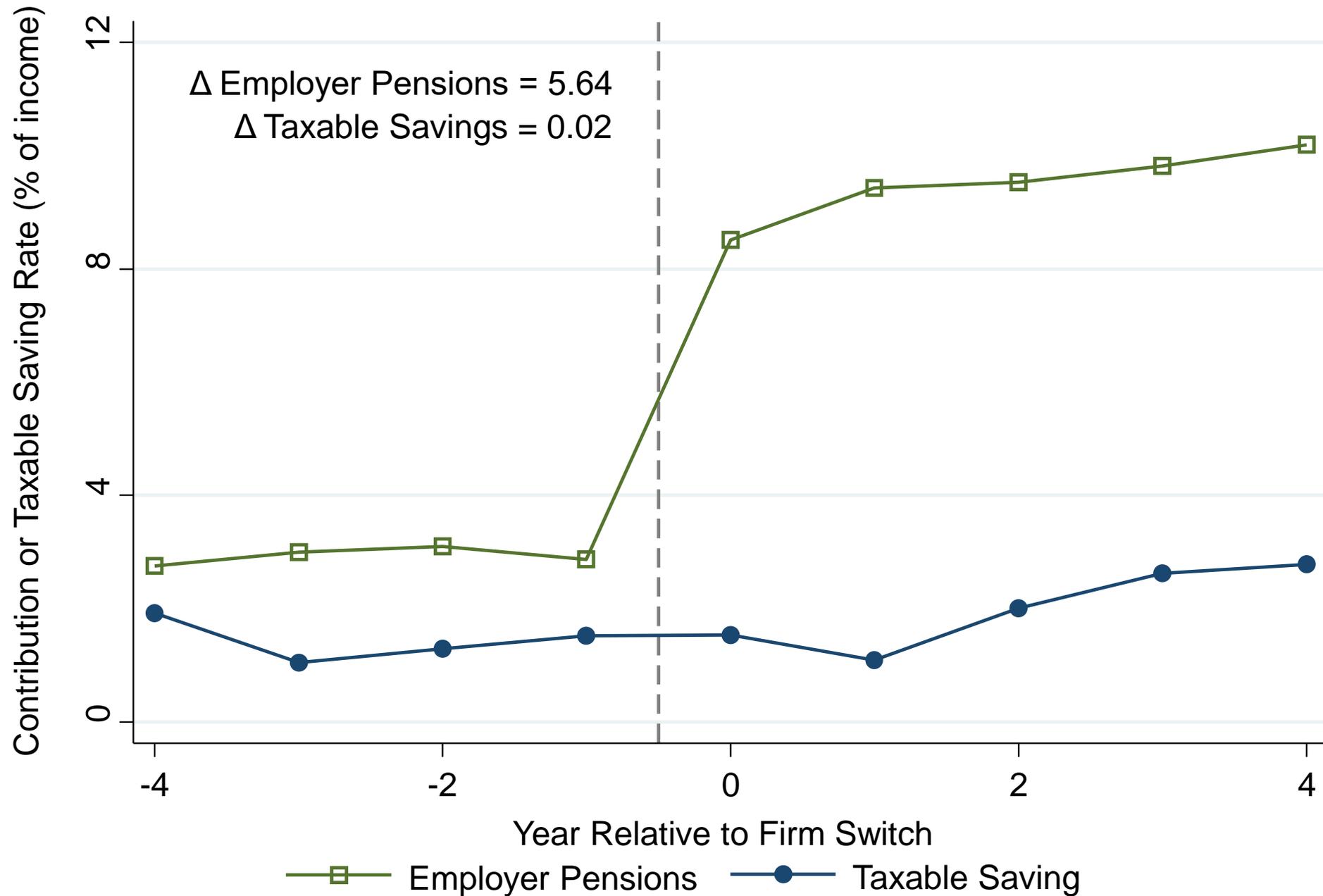
Event Study around Switches to Firm with >3% Increase in Employer Pension Rate



Event Study around Switches to Firm with >3% Increase in Employer Pension Rate



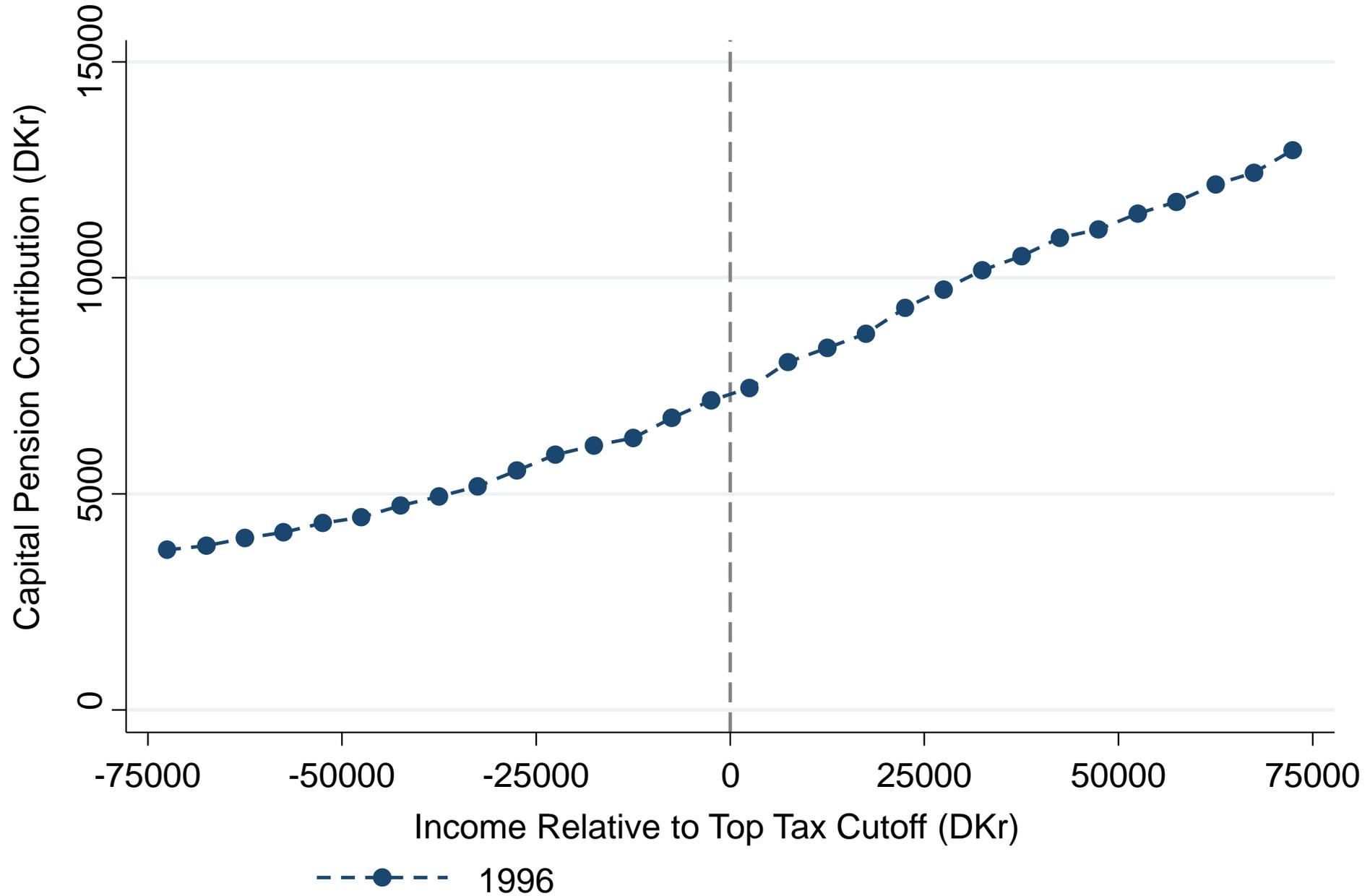
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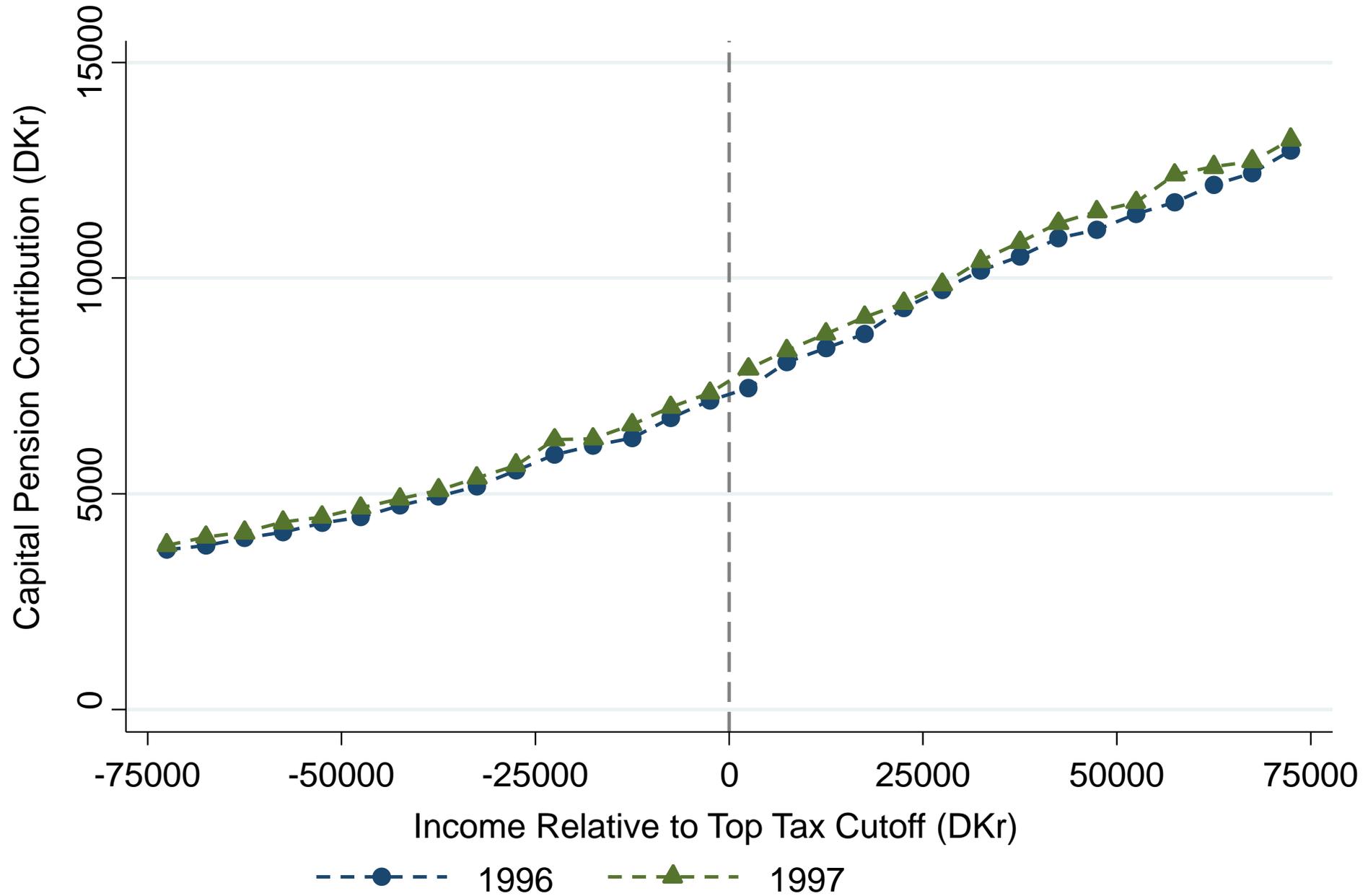
Impacts of Retirement Savings Subsidies

- Next, compare these effects to impacts of standard tax incentives for retirement saving
- Denmark subsidizes individual's contributions to retirement accounts, analogous to 401(k)'s in the U.S.
- Reform in 1999 in Denmark lowered subsidy for saving in pension accounts by 12 cents per DKr for individuals in top income tax bracket
- Ask two questions analogous to those above:
 1. How did this reform affect contributions to pension accounts?
 2. How much money was shifted to other non-retirement accounts?

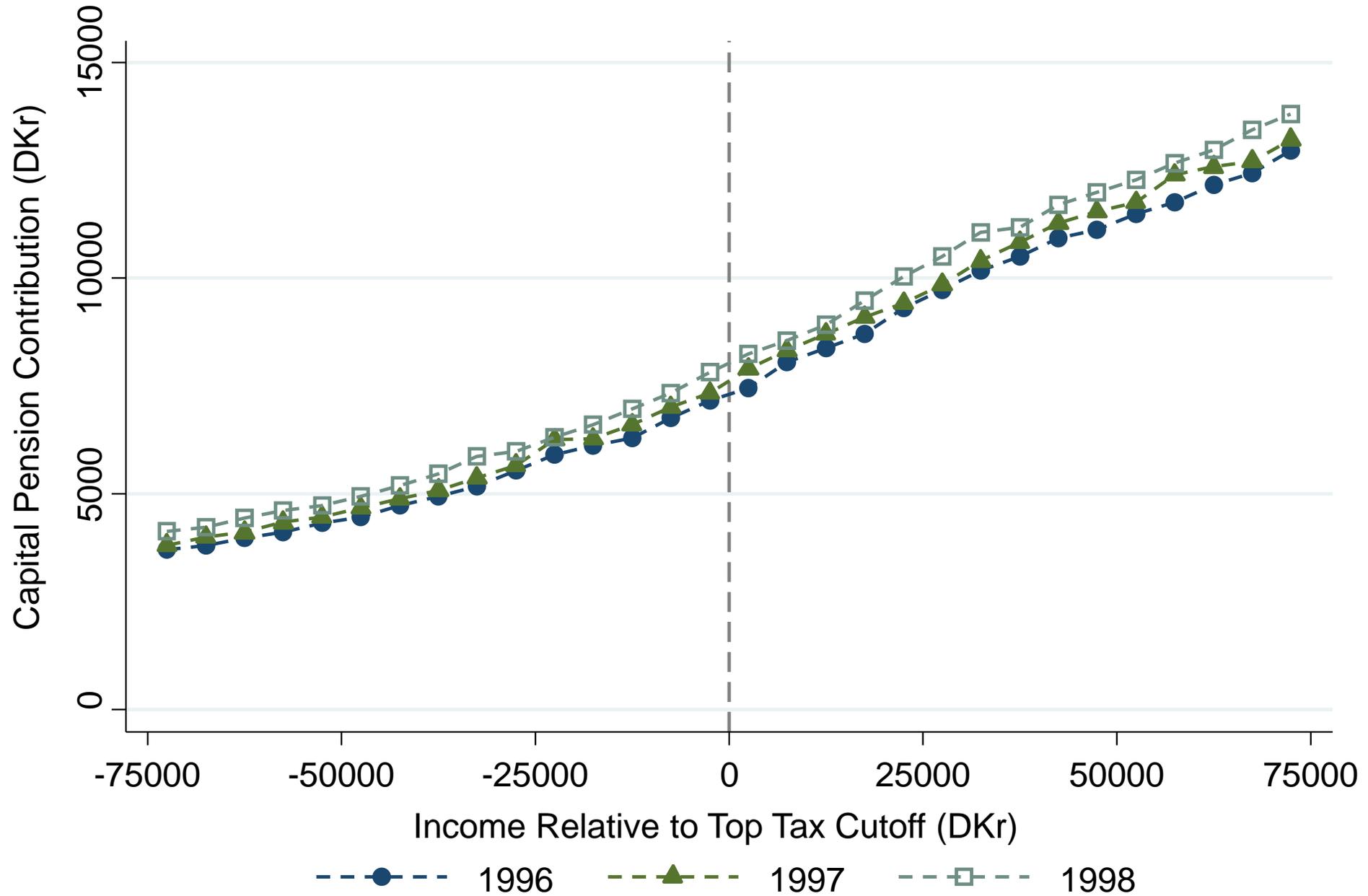
Impact of 1999 Pension Subsidy Reduction On Pension Contributions



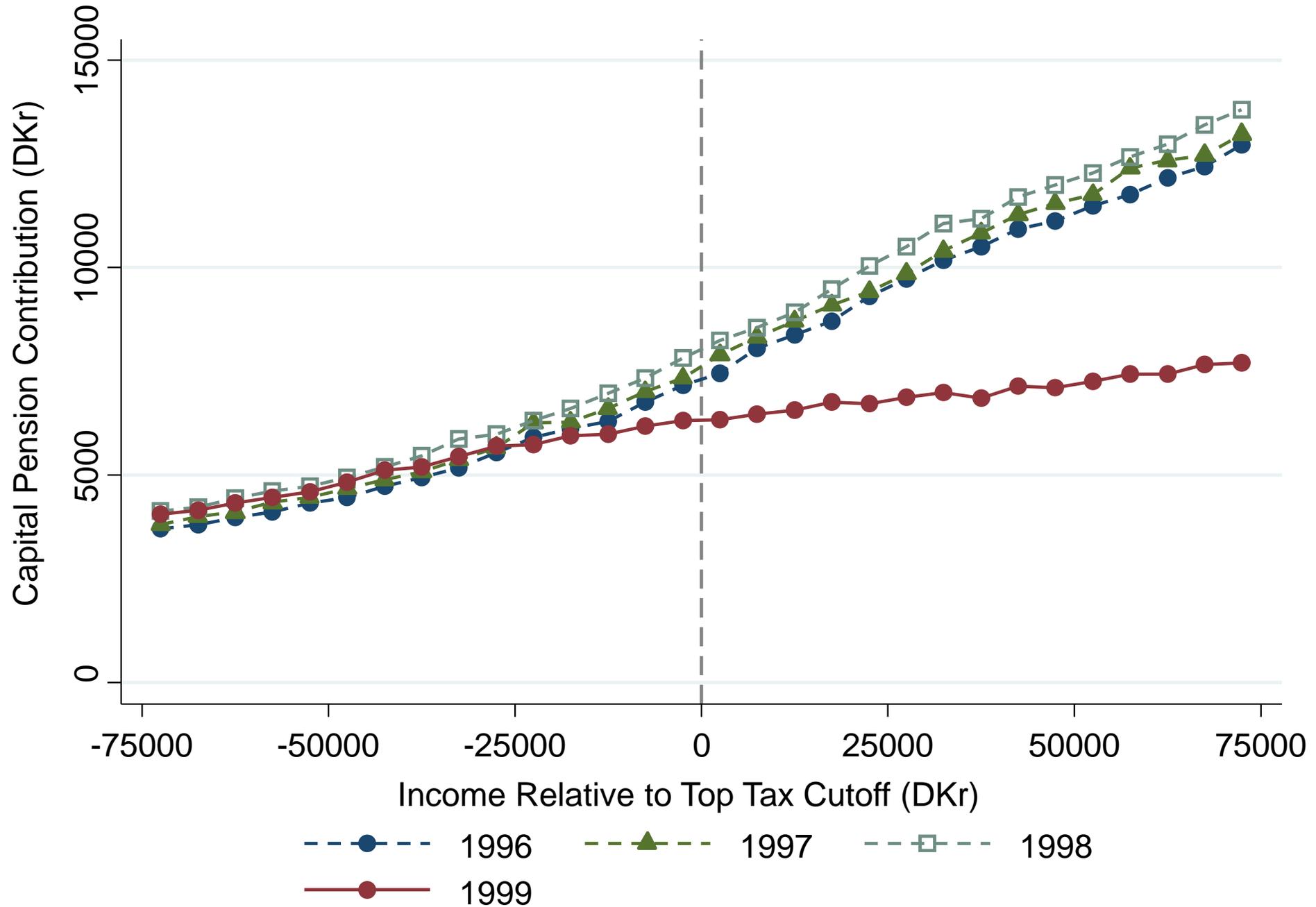
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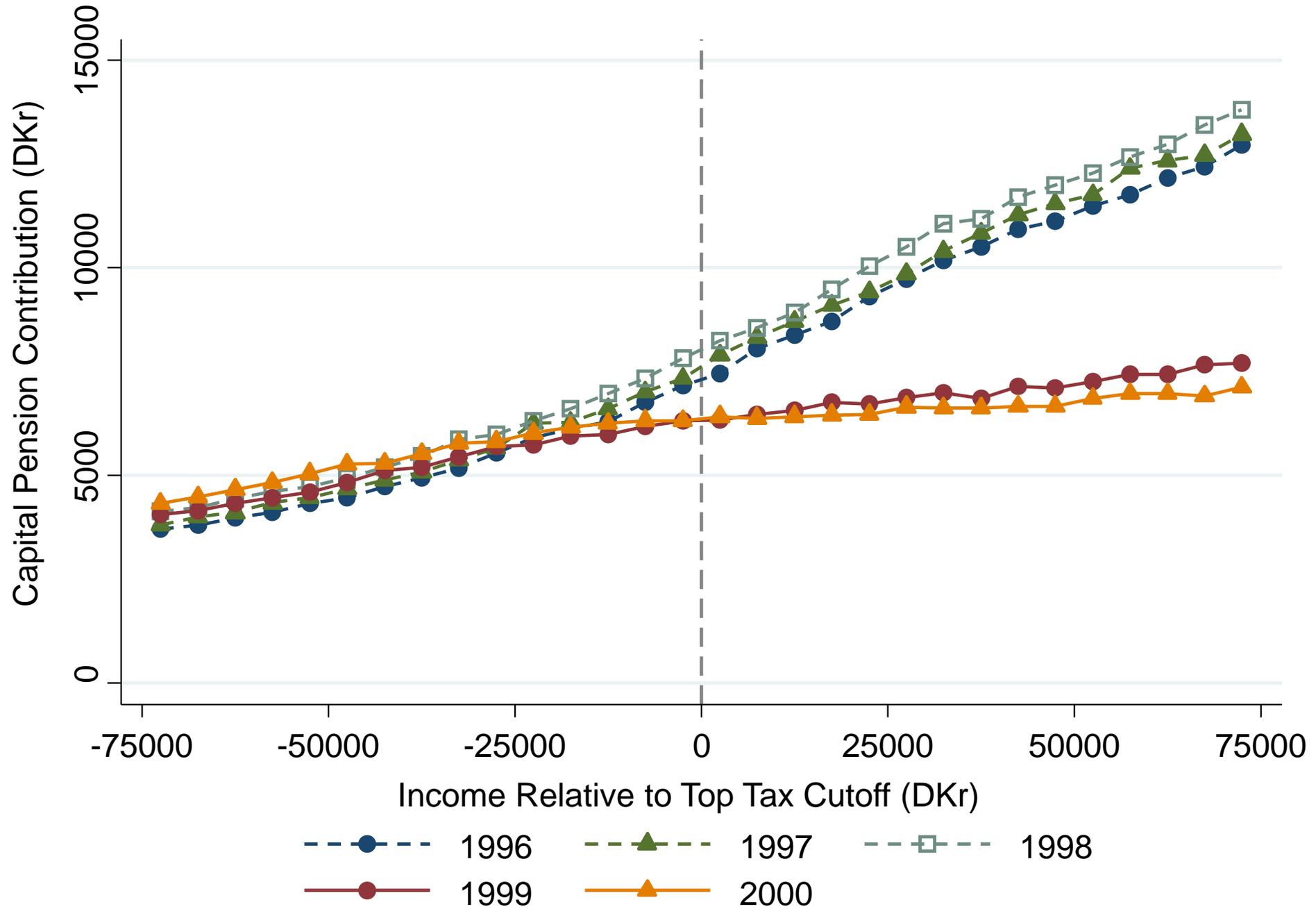
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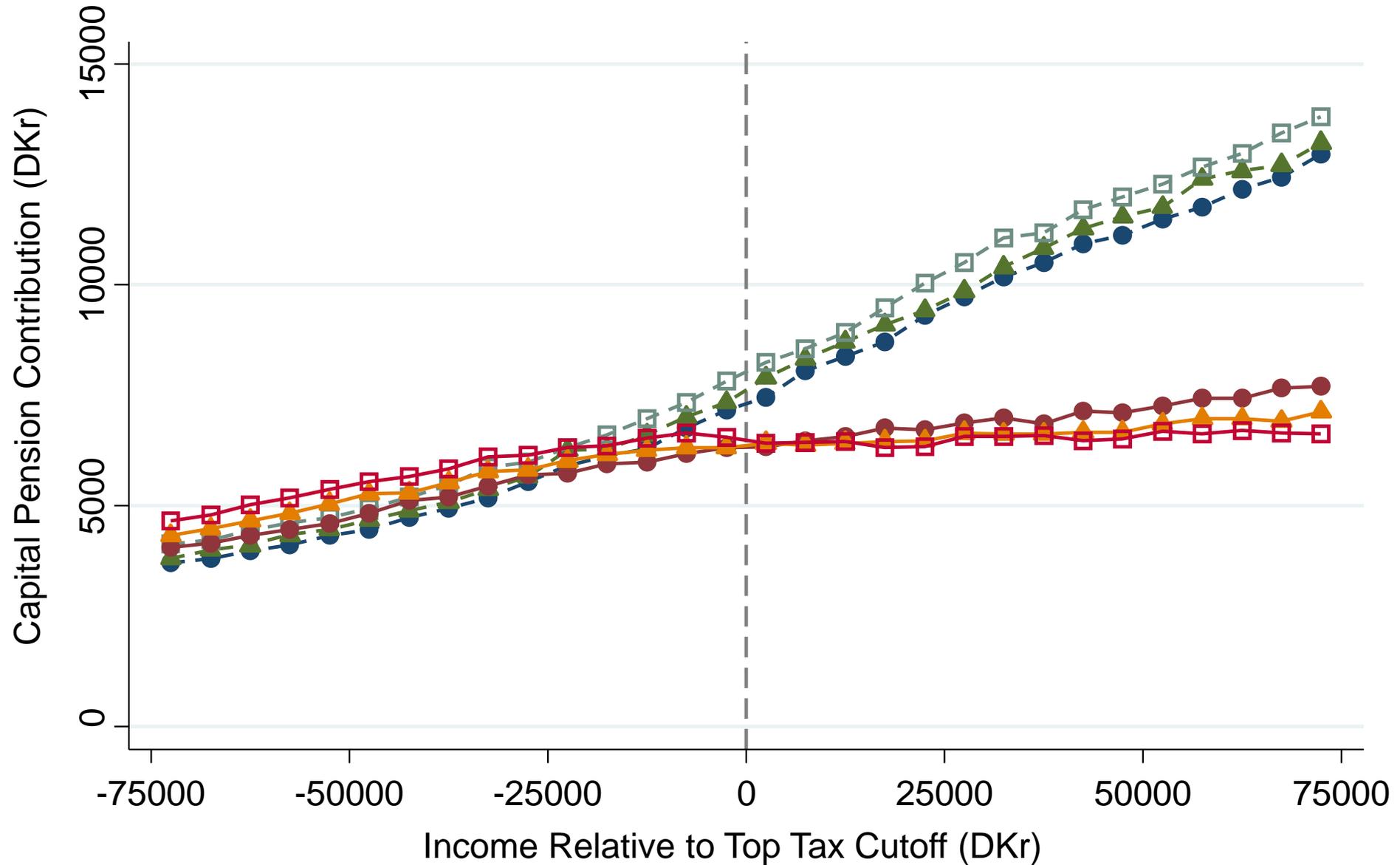
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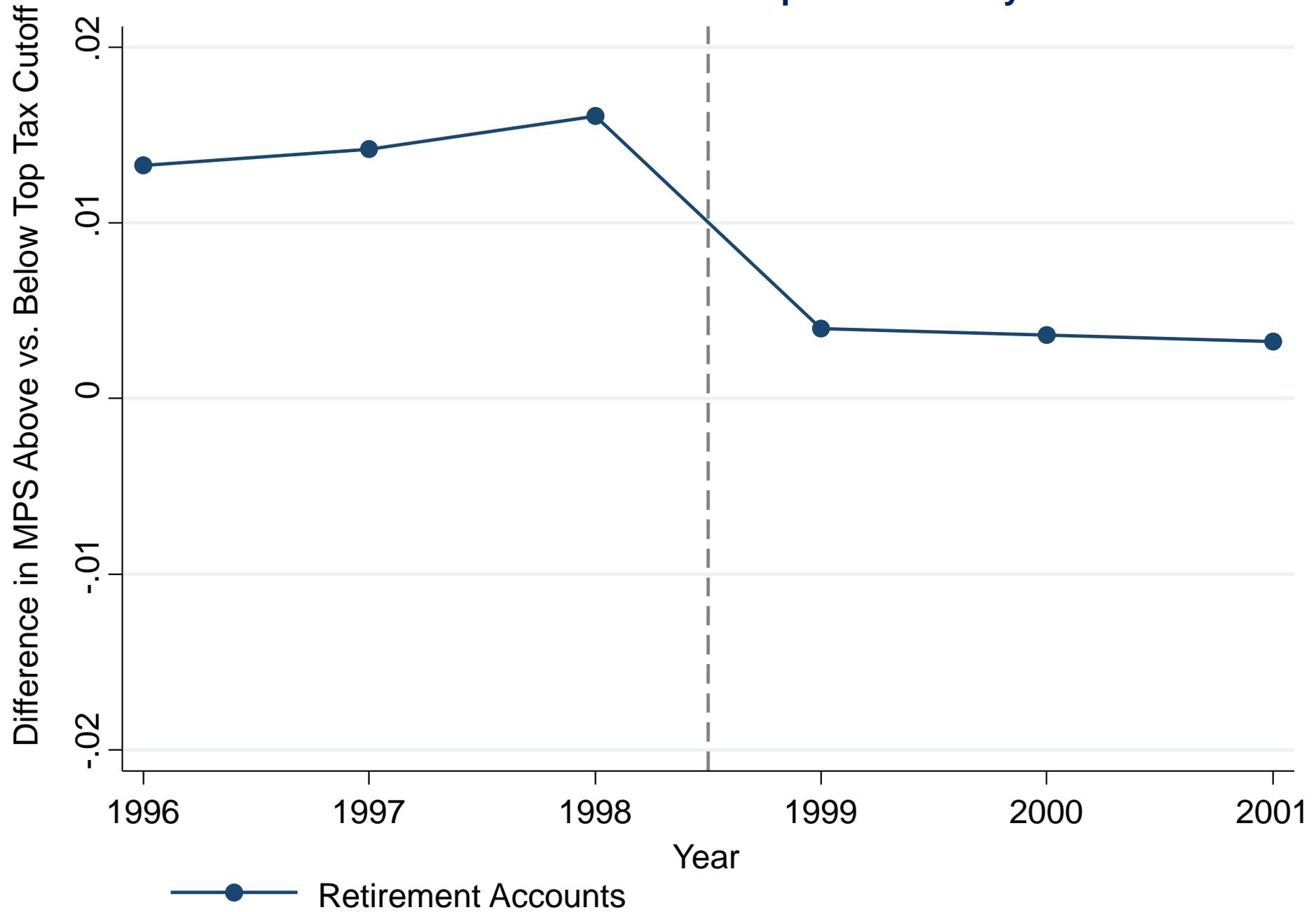
Impact of 1999 Pension Subsidy Reduction On Pension Contributions



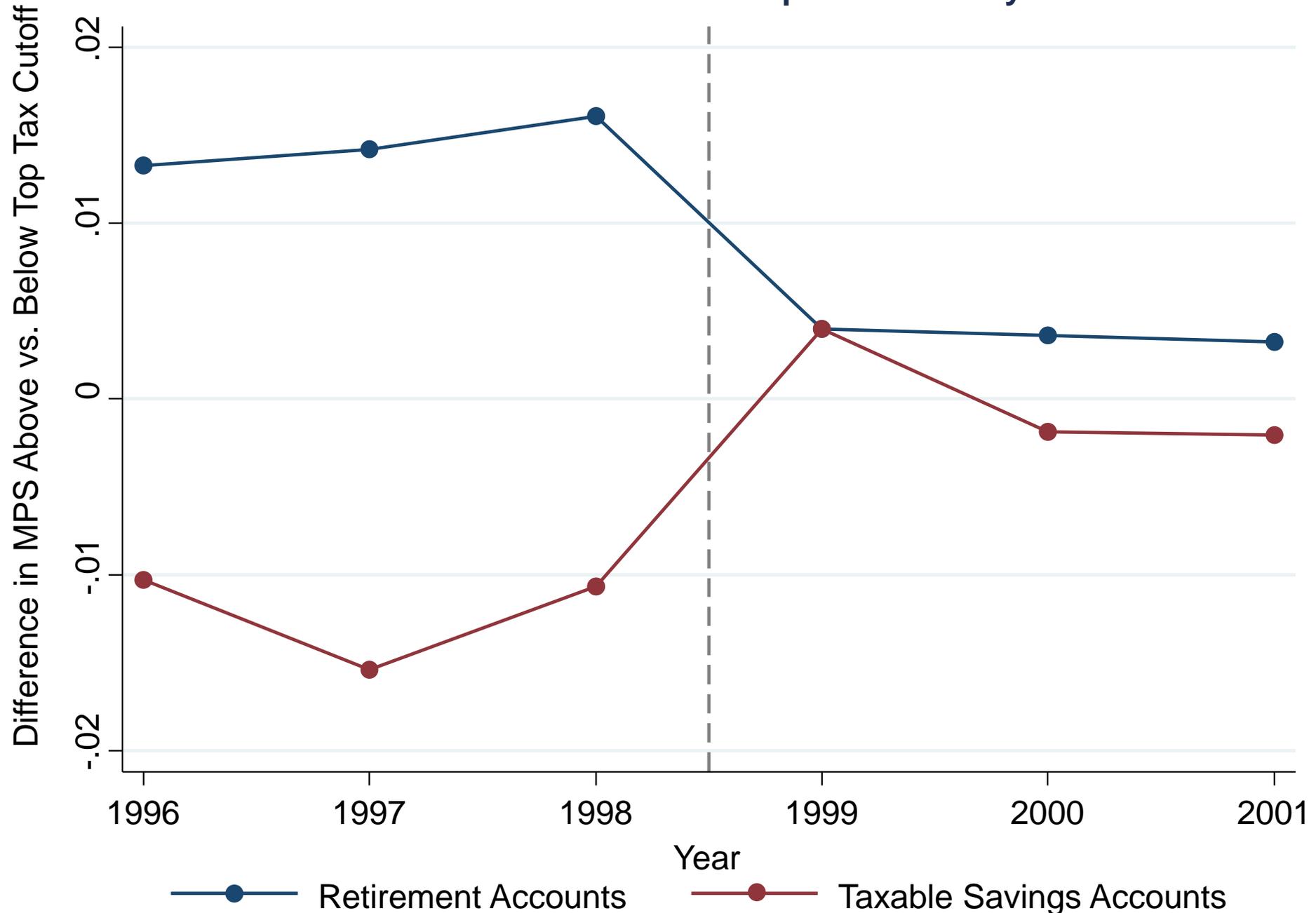
Impact of 1999 Pension Subsidy Reduction On Pension Contributions



Change in Marginal Propensity to Save in Retirement vs. Non-Retirement Accounts at Top Tax Cutoff by Year



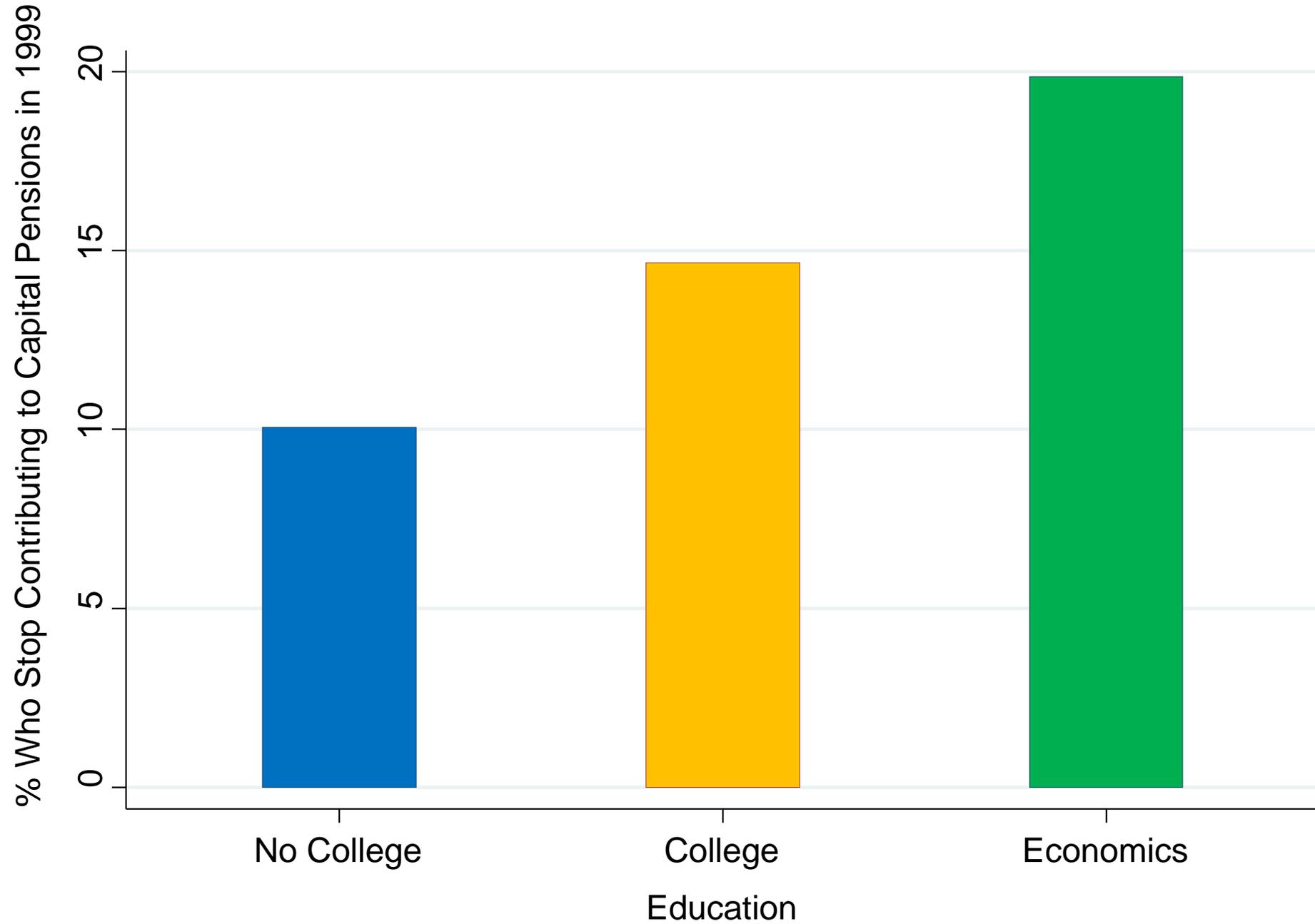
Change in Marginal Propensity to Save in Retirement vs. Non-Retirement Accounts at Top Tax Cutoff by Year



Active vs. Passive Savers

- 15% of people account for entire reduction in pension contributions following reform (“active savers”)
 - But these people simply shift money from retirement account to other accounts, with essentially no net change in total saving
- 85% of people do not respond to incentives at all (“passive savers”)
 - These people are heavily influenced by defaults and increase total saving in response

Heterogeneity in Responses to Subsidies by Educational Attainment



Implications for Retirement Savings Policies

- Tax incentives for retirement saving have little impact on total savings because they simply induce active savers to switch accounts
 - \$1 of expenditures by government on retirement savings incentives generates only 1 cent of additional saving
- Automatic contributions/defaults have much larger impacts because they influence the behavior of passive savers
- Behavioral economics perspective calls for shift toward automatic enrollment plans and reductions in existing 401(k)-style incentives