

Individual Earnings Adjustment to Policy: Evidence from the Social Security Earnings Test

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Outline

Introduction

Model

Social Security Earnings Test

Data

Results 1: Responses by Age

Results 2: ET Elimination in 2000 for 66-69 year olds

Probing the Mechanisms

- ▶ Our project aims to:
 - ▶ Estimate the speed of earnings adjustment to policy changes
 - ▶ Assess whether the data are consistent with a model of fixed costs of adjustment
 - ▶ Specify a tractable model of fixed adjustment costs and estimate mean fixed cost and earnings elasticity simultaneously

Motivation

- ▶ Much exciting recent work in public finance has focused on how barriers to adjustment:
 - ▶ Guide a re-interpretation of existing empirical results on taxes and earnings (Chetty forthcoming *Econometrica*)
 - ▶ Drive responses to policy and heterogeneity in the elasticity of earnings with respect to taxes across contexts (Chetty, Friedman, Olsen, and Pistaferri *QJE* 2011; Chetty, Friedman, and Saez 2011; Altonji and Paxson *JHR* 1992)
 - ▶ Govern the welfare implications of taxes and other policies (Chetty, Looney, and Kroft *AER* 2009)
 - ▶ May help link micro and macro elasticities (Chetty, Guren, Manoli, and Weber *NBER Macro Annual* 2012)
- ▶ Examples of barriers: information, difficulty of finding a job with desired earnings

- ▶ Empirical work based on policy changes typically measures short-run earnings responses to policy
- ▶ Long-run responses could be substantially different than short-run responses
- ▶ To understand these issues, we must measure the dynamics of adjustment

- ▶ Feldstein (*JPE*, 1995, p. 570)

"If the long-run response to a change in marginal tax rates is greater than the short-run response . . . this analysis of only two years' experience after the 1986 tax rate changes may understate the long-run sensitivity of taxable income to changes in tax rates."

- ▶ Studies typically relate policy in a given year to individual's earnings in that year
 - ▶ For example: literature on effect of tax rates on taxable income, e.g. Lindsey (1987), Feldstein (1995), Navratil (1995), Auten and Carroll (1997), Sammartino and Weiner (1997), Saez (1999), Goolsbee (1999), Moffitt and Wilhelm (2000), Saez (2004), Kopczuk (2005), Hansson (2007), Giertz (2007), Heim (2009), Saez (2010), Chetty, Friedman, Olsen and Pistaferri (2011), and Singleton (2011)
- ▶ If reactions to policy are delayed, then these regressions are typically mis-specified

Our Context

- ▶ We study the dynamics of earnings adjustment to the Social Security Earnings Test
 - ▶ Creates large discontinuities in current marginal Social Security payments as current earnings vary
- ▶ We document how quickly individuals respond (or not) to changes in Earnings Test policy, both across ages and over time
- ▶ When a kink is created (disappears), we follow individuals over time from before to after the appearance (disappearance) of the kink
 - ▶ We assess whether individuals behave as if they face fixed costs of adjustment, i.e. individuals disproportionately come from (go to) "far" from the kink relative to "near" to the kink
- ▶ We specify a transparent model of earnings adjustment to policy and use the data to estimate mean fixed costs and elasticities in that model

- ▶ The Social Security Earnings Test is a particularly fruitful policy to study
 - ▶ Discuss later why ET acts like a tax
- ▶ Hard to find variation in taxes that allows for credible estimation of elasticities
 - ▶ Kinks in the tax schedule are helpful (Saez *AEJ* 2010)
 - ▶ Creates clear visual evidence of reaction that can be compared from year to year
 - ▶ However, there is little evidence in the U.S. of reaction to kinks other than among the self-employed, among whom the reaction is largely tax avoidance and evasion (Chetty, Friedman, and Saez 2011)
 - ▶ The Social Security Earnings Test creates one of few known kinks in the U.S. that affects the earnings decisions of the non-self-employed (as we show later)

- ▶ The Social Security Earnings Test is a particularly fruitful policy to study
 - ▶ Administrative panel data on earnings from the Social Security Administration are accurate and have a large sample size (e.g. 1% of Social Security numbers or Social Security beneficiaries), which allows precise and accurate estimates
 - ▶ Large changes in Earnings Test policy across groups and over time provide useful variation

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Probing the Mechanisms

Basic Model

- ▶ We model the earnings response to a kink following Saez (*AEJ*, 2010)
- ▶ This model provides a method of relating bunching to earnings elasticities

Basic Model

► Intuition:

1. Piecewise-linear taxation creates discontinuities in marginal tax rate schedule
2. At point of discontinuity, net-of-tax wage rate falls (in progressive schedule)
3. For many people, worth it to work more at the margin at the higher but not lower net-of-tax wage rate
4. This produces “bunching” in the earnings distribution at the discontinuity
5. More elastic earnings \rightarrow more people drawn to kink

Basic Model

- ▶ Quasi-linear, isoelastic utility:

$$u_n(c, z) = c - \frac{n}{1 + 1/e} \left(\frac{z}{n}\right)^{1+1/e}$$

- ▶ Arbitrary distribution of heterogeneity:

$$n \sim F(\cdot)$$

- ▶ Earnings supply function:

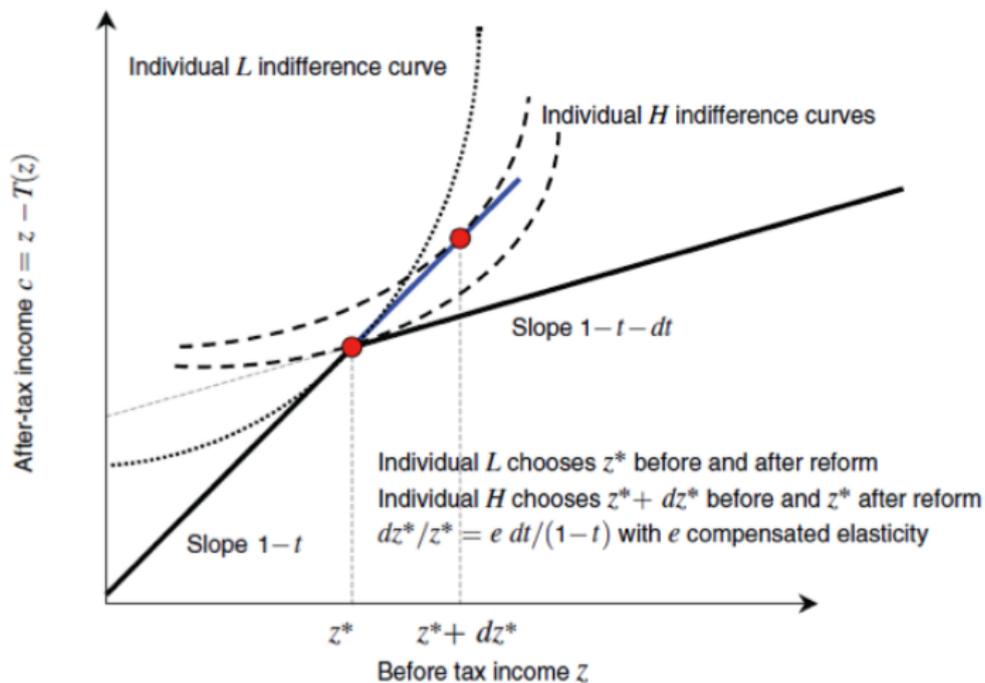
$$z_n(t) = (1 - t)^e n$$

Characterizing the earnings response

- ▶ Non-linear tax schedule: t_0 until z^* , t_1 after
- ▶ H_0 : earnings distribution absent the kink; density h_0
- ▶ H : earnings distribution in the presence of the kink; density h
- ▶ Individuals with initial earnings in $[z^*, z^* + \Delta z^*]$ locate at the kink, where

$$\frac{\Delta z^*}{z^*} = \left(\frac{1 - t_0}{1 - t_1} \right)^e - 1$$

Characterizing the earnings response



Bunching as a function of the elasticity

- ▶ The amount of bunching, B , will be:

$$\begin{aligned}
 B &= \int_{z^*}^{z^* + \Delta z^*} h_0(\zeta) d\zeta \\
 &\approx z^* \left(\left(\frac{1 - \tau_0}{1 - \tau_1} \right)^\varepsilon - 1 \right) \frac{h_-(z^*) + h_+(z^*)}{2} / \left(\frac{1 - \tau_0}{1 - \tau_1} \right)^\varepsilon
 \end{aligned}$$

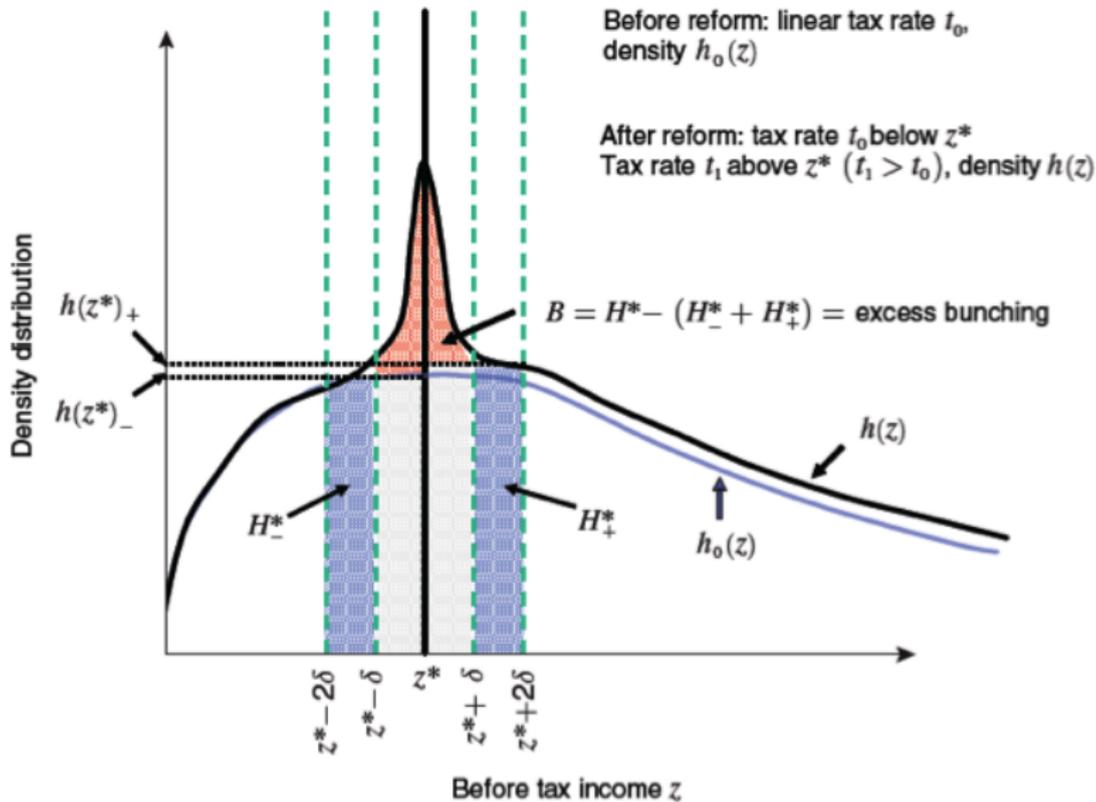
where $h_-(z^*)$ and $h_+(z^*)$ are the left and right limits of the ex post density of earnings at z^* .

Empirical Strategy

- ▶ Goal: Estimate B , $h_-(z^*)$ and $h_+(z^*)$
- ▶ Assume $h_0(z^*)$ constant over some small neighborhood $(z^* - 2\delta, z^* + 2\delta)$
- ▶ For a given bandwidth δ , compute:

$$B = \int_{z^*-\delta}^{z^*+\delta} h(\zeta) d\zeta - \int_{z^*-2\delta}^{z^*-\delta} h(\zeta) d\zeta - \int_{z^*+\delta}^{z^*+2\delta} h(\zeta) d\zeta$$

Empirical Strategy



Empirical Strategy

- ▶ We report the amount of bunching, normalized by the counterfactual share of earnings in a neighborhood of the kink:

$$\begin{aligned}
 & B \\
 & \frac{H_0(z^* + \delta) - H_0(z^* - \delta)}{\int_{z^* - \delta}^{z^* + \delta} h(\zeta) d\zeta - \int_{z^* - 2\delta}^{z^* - \delta} h(\zeta) d\zeta - \int_{z^* + \delta}^{z^* + 2\delta} h(\zeta) d\zeta} \\
 \approx & \frac{\int_{z^* - \delta}^{z^* - \delta} h(\zeta) d\zeta + \int_{z^* + \delta}^{z^* + 2\delta} h(\zeta) d\zeta}{}
 \end{aligned}$$

Estimating Adjustment Dynamics

- ▶ We estimate elasticities using the bunching methodology, using repeated cross sections occurring $y = 0, 1, 2, \dots$ years after change in policy that individuals face
 - ▶ Typically, bandwidth=\$500
- ▶ We look at how our estimated elasticities vary with y
 - ▶ Cleanest evidence probably from kinks disappearing, because we know that there should be no bunching and can measure the amount of time it takes to get to no bunching

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Probing the Mechanisms

Social Security Earnings Test

- ▶ Social Security beneficiaries may work, but. . .
- ▶ For each dollar earned above some threshold, benefits are reduced at a rate t
 - ▶ Sometimes multiple ET kinks; we typically look at first kink
- ▶ Reduction rate and exempt amount vary by age and year
- ▶ Labor supply response widely studied and debated (e.g. Burtless and Moffitt 1985; Friedberg 1998, 2000; Song and Manchester 2007)

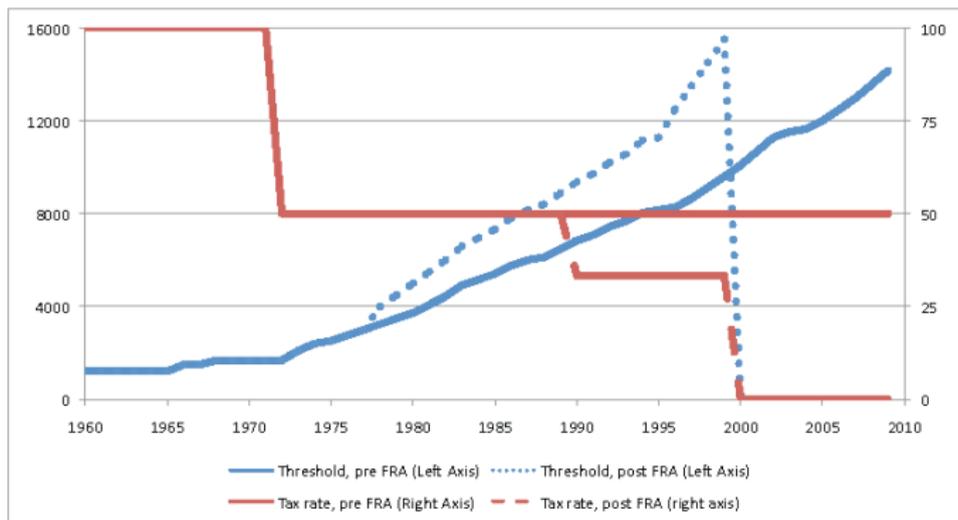
Actuarial Adjustment

- ▶ Since 1972, benefits lost due to the earnings test result in an increase in monthly benefits, upon full retirement (“benefit enhancement”)
- ▶ Benefit enhancement increased over time
 - ▶ Approximately actuarially fair only since late 1990s.
 - ▶ As we show later (time allowing), find little convincing evidence of response to changes in actuarial adjustment (e.g. introduction of actuarial adjustment in 1972 amendments).

Actuarial Adjustment

- ▶ Literature effectively assumes/finds that individuals respond to ET as a tax (meaning benefit reduction is equivalent to a tax)
 - ▶ Those individuals who face short expected lifespan or liquidity constraints should respond to ET as a tax
 - ▶ People could also misperceive ET as a tax
 - ▶ In the period prior to 1972, the ET was effectively a tax

Earnings Test Changes



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Probing the Mechanisms

Dataset 1 (BEPUF)

Benefit and Earnings Public Use File: Social Security Administrative File

- ▶ A 1% extract of SS beneficiaries in 2004
- ▶ Contains information on SS benefits, plus complete longitudinal yearly earnings history
- ▶ Relevant covariates: sex, year of birth, year claiming began
- ▶ Since 1978, ET has been assessed on earnings in each calendar year, which is the same time frame (i.e. calendar year) as earnings are observed in our data

Dataset 2 (EPUF)

Earnings Public Use File: Social Security Administrative File

- ▶ A 1% extract of all SSNs issued before 2006
- ▶ Complete earnings history of calendar year earnings for each SSN in sample (for years with positive earnings); no information on who is receiving benefits
- ▶ Sex and year of birth only covariates
- ▶ Over 90% of men claiming by age 65 (Song and Manchester 2007), so in the 65+ age range, changes across ages in claiming rates are unlikely to be responsible for major changes in amount of bunching across ages
 - ▶ Can address this issue by using SSA restricted-access data
 - ▶ Find extremely similar bunching estimates for those ages 65+ in BEPUF and EPUF

Data: Pros and Cons

Pros:

1. Basically free from measurement error
2. Very large sample sizes
3. Earnings are subject to little manipulation (short of outright tax evasion)

Cons:

1. No information on hours or amenities
2. Few covariates
3. No benefits information in EPUF

Sample Selection

- ▶ Pool men and women
 - ▶ We find similar results for each group separately
- ▶ Focus on ages 59-75 (but sometimes look at other ages)
- ▶ Receiving benefits (sometimes look at non-beneficiaries)
- ▶ Positive earnings (necessary in EPUF)
- ▶ For results by age, look within a policy regime (e.g. 1983-1989, 1990-1999, 2000-2003)

Limitations

- ▶ Do not take into account other choices that could respond over the long run, such as human capital accumulation (but less important for older workers)
- ▶ Model based on static framework (in dynamic framework, we measure Frisch elasticity in each year)
- ▶ Other incentives e.g. SSDI, Medicaid notch, income and other taxes (addressed somewhat)
- ▶ Extensive margin choices/selection

Limitations

- ▶ Do not examine claiming decision (addressed somewhat)
- ▶ Ignore smaller changes in actuarial adjustment over time (addressed somewhat)
- ▶ Don't distinguish between reasons for response to Earnings Test (misperceptions vs. liquidity constraints vs. mortality expectations; addressed somewhat)
- ▶ Only observe people still alive in BEPUF (addressed somewhat)
- ▶ Results may not generalize outside the particular context of the Social Security Earnings Test

Summary Statistics: BEPUF Sample

- ▶ Ages 59-75, born in 1915 or later
- ▶ 4,443,383 observations of 369,129 individuals
- ▶ 39% have positive earnings
- ▶ Average earnings including zeros: \$10,900 (SD: \$21,300)
- ▶ 58% female

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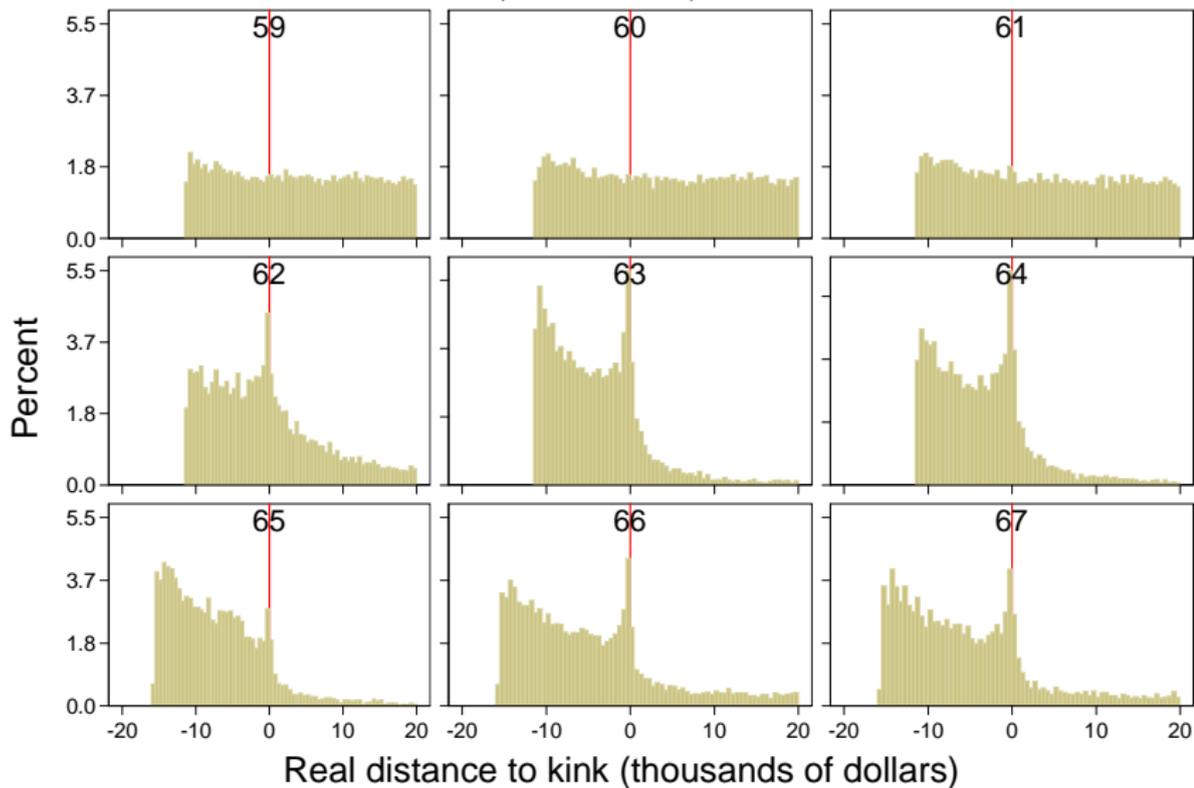
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Probing the Mechanisms

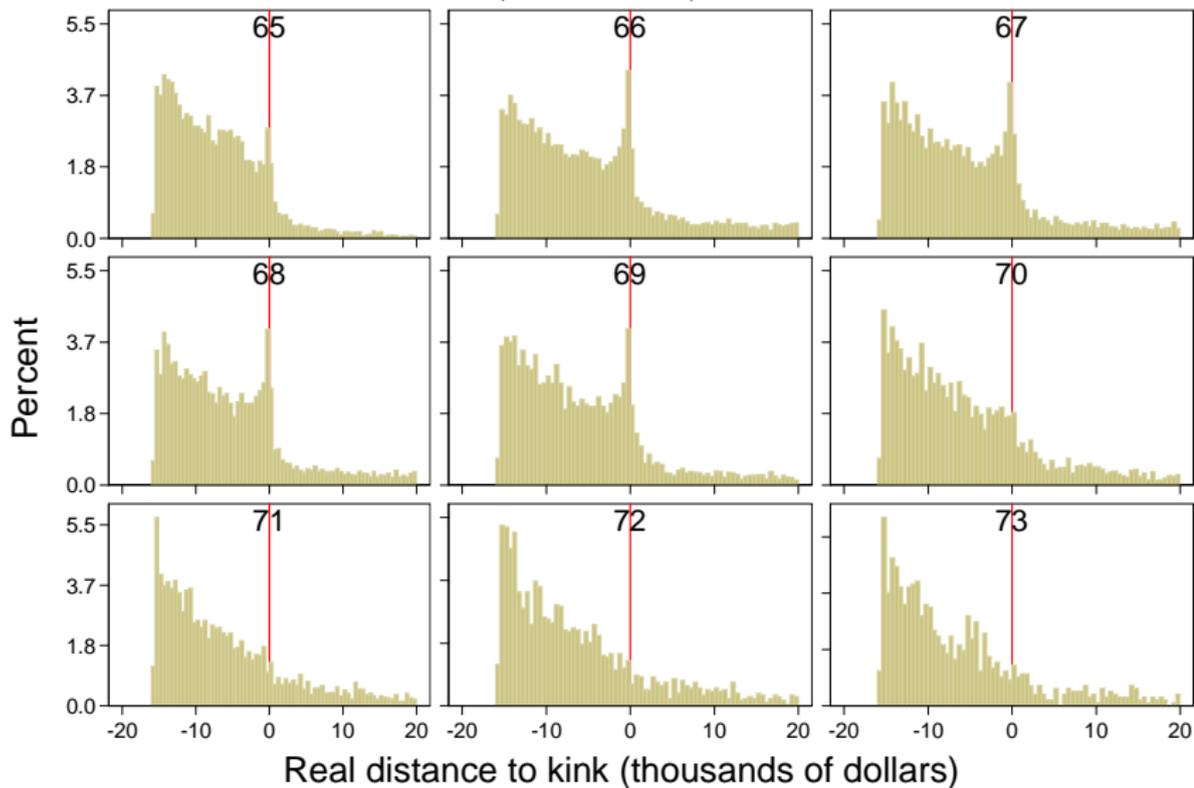
Distribution of earnings, 59-67 year olds

BEPUF, 1983-1989, BW = 500



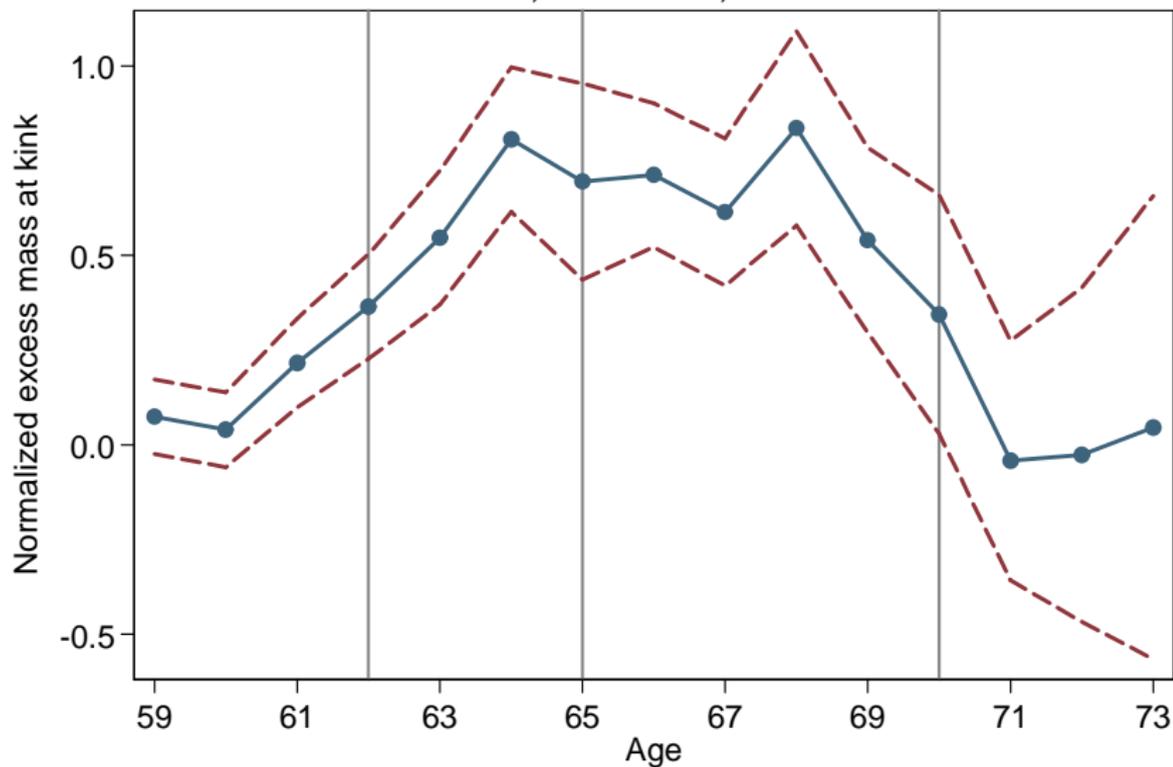
Distribution of earnings, 65-73 year olds

BEPUF, 1983-1989, BW = 500



Normalized excess mass at kink, by age

BEPUF, 1983-1989, BW = 500



1983 - 1989

- ▶ Substantial bunching from 63-69
 - ▶ Treating ET as pure tax, the amount of bunching implies an elasticity of earnings with respect to the net-of-tax share of around 0.1
- ▶ Bunching intermediate at ages 62 and 70
 - ▶ Adjustment takes up to two years
- ▶ Complete adjustment by age 71+
- ▶ Some evidence of pre-adjustment among 61- and 69-year-olds
- ▶ These patterns hold true looking within each period 1983-1989, 1990-1999, and 2000-2003

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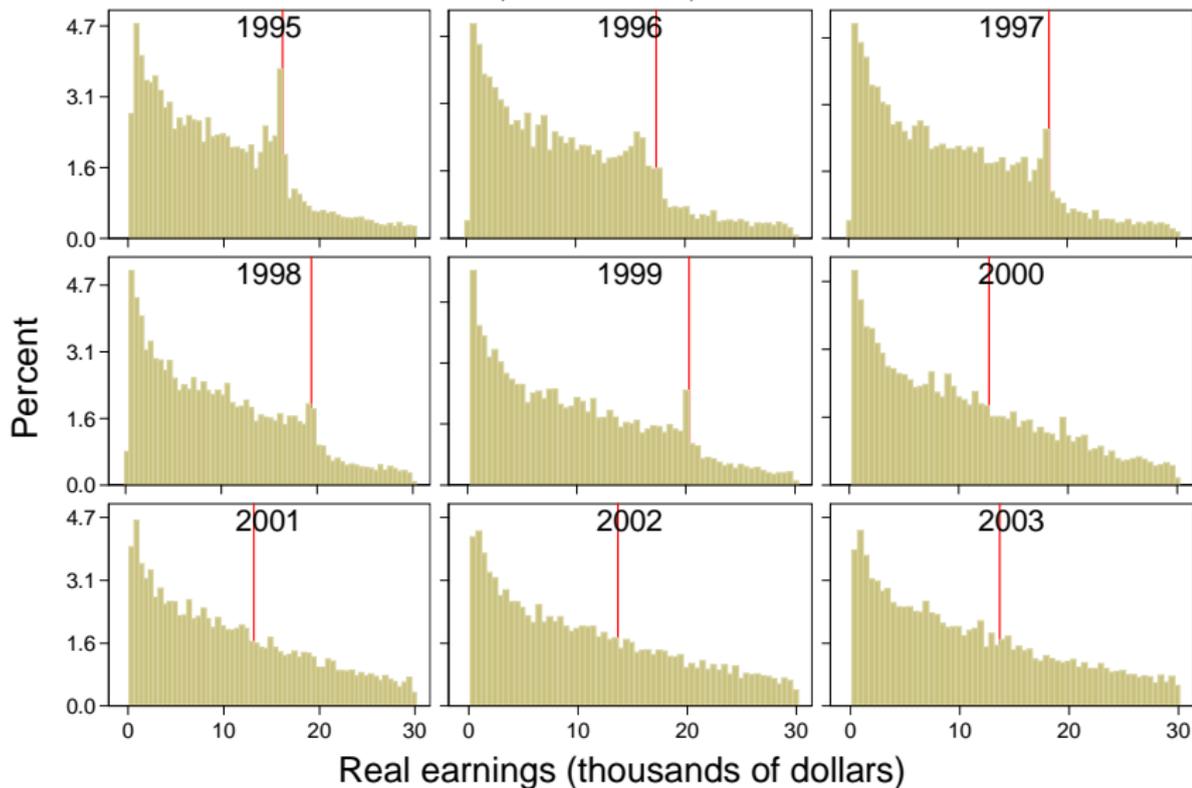
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Probing the Mechanisms

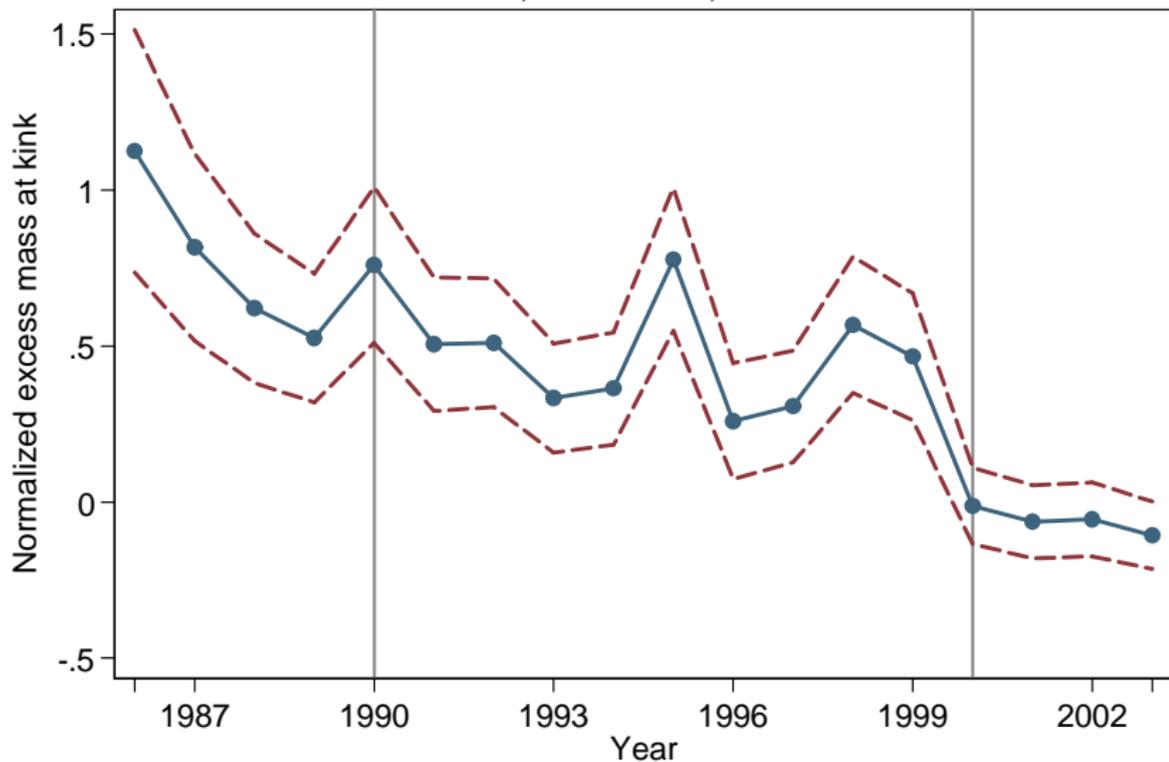
Distribution of Earnings, 66-69 year olds

BEPUF, 1995-2003, BW = 500



Normalized excess mass at kink, 66-69 year olds

BEPUF, 1986-2003, BW = 500



Summary

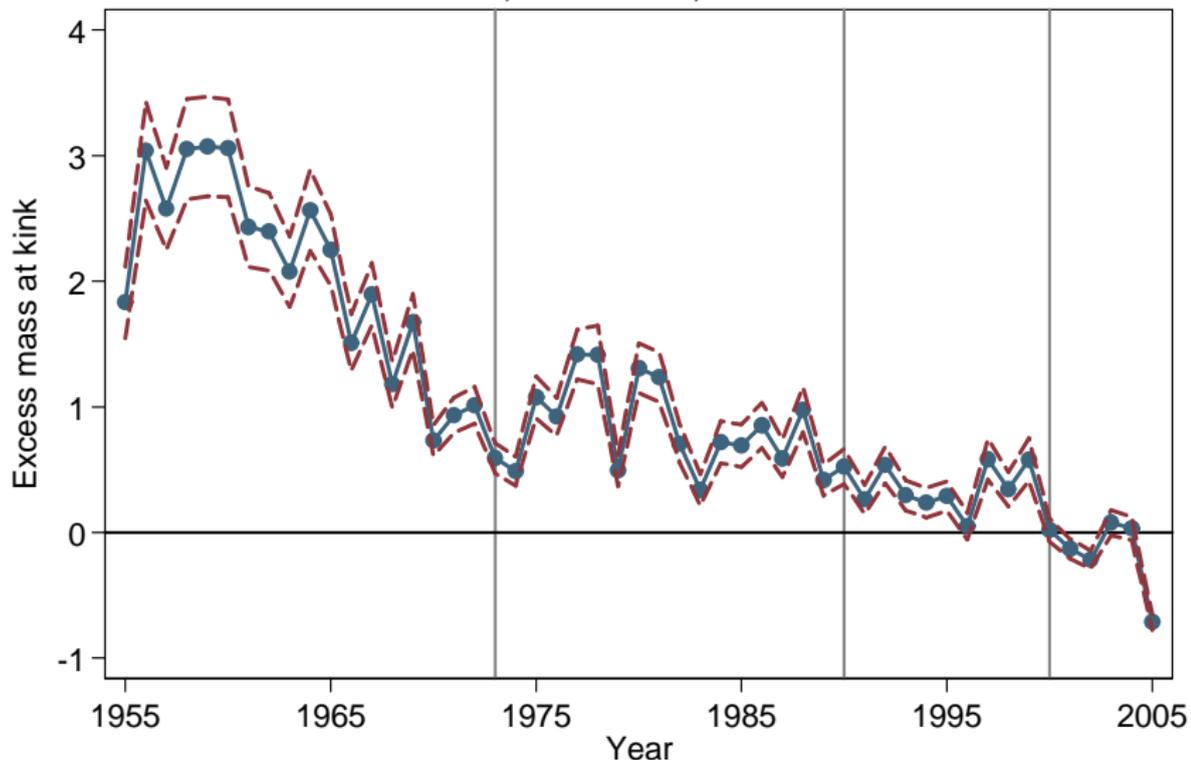
- ▶ After the 2000 elimination of the earnings test, 66-69 year olds show no bunching (react within at most one year; can rule out substantial subsequent bunching)

Pre-actuarial adjustment

- ▶ Little evidence of reaction to introduction of actuarial adjustment in 1973

Excess mass at kink, by year, 66-69 year olds

EPUF, 1955-2005, BW = 817



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Probing the Mechanisms

Is the adjustment process consistent with a fixed cost of adjustment?

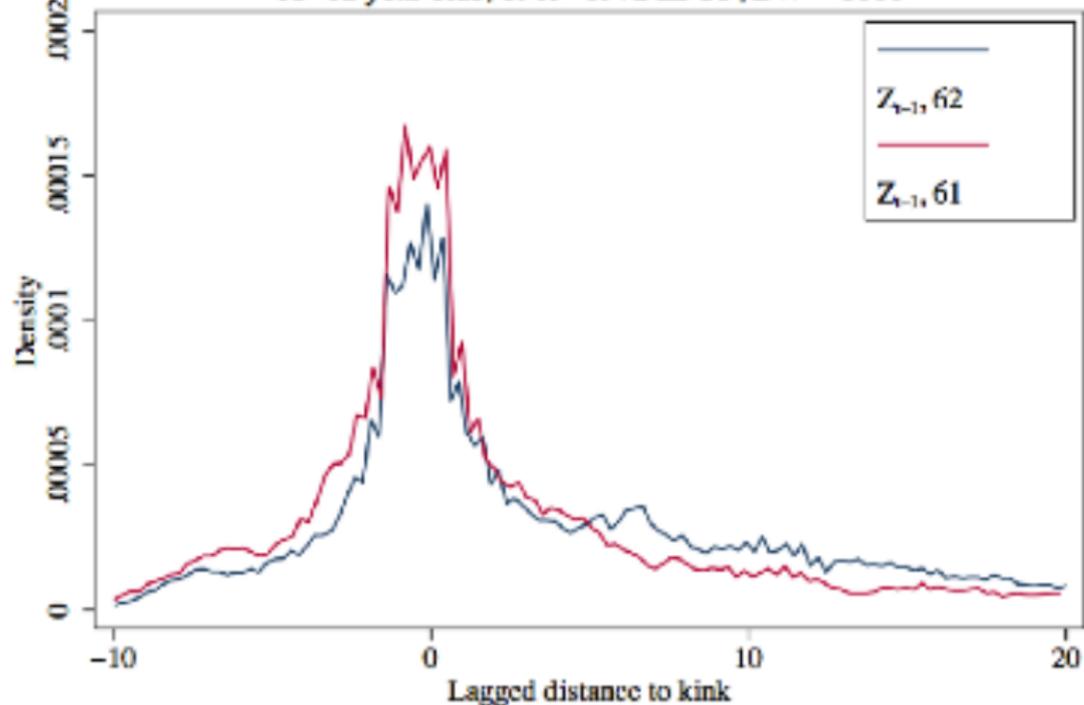
- ▶ Chetty, Friedman, Olsen, and Pistaferri (2011): fixed cost of adjusting to taxes
 - ▶ Predicts that when a kink appears, probability of moving to kink should be increasing in initial distance from kink (with earnings elasticity that is uncorrelated with income)
 - ▶ Predicts that when a kink disappears, individuals previously locating at kink should disproportionately go farther from kink rather than closer (with earnings elasticity that is uncorrelated with income)
- ▶ Where do people "come from" when they end up at a kink that newly appears?

Earnings distribution at $t-1$ conditional on locating at kink at t

- ▶ Look at earnings distribution of $t-1$ among people locating at the kink at age t .
- ▶ Consistent with theory, individuals bunching at age 62 “come from” right of kink at age 61
- ▶ Consistent with fixed cost of adjustment, individuals disproportionately “come from” far to the right of the kink
 - ▶ Compare lagged earnings distribution conditional on locating at kink at age 62, to placebo: lagged earnings distribution, conditional on locating at “placebo kink” at age 61
 - ▶ Those at age 62 come from farther to the right of the kink than those at age 61

Lagged earnings distribution | at kink

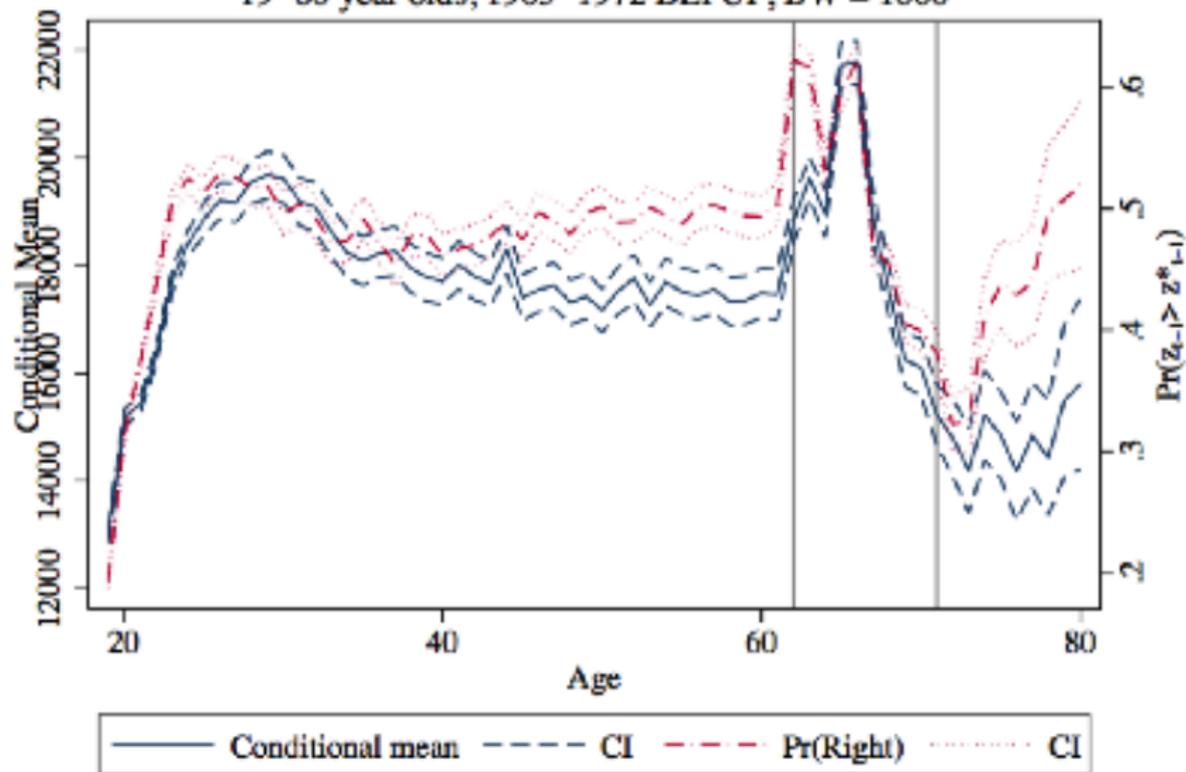
61–62 year olds, 1969–1972 EPUF, BW = 1000



Earnings distribution at $t-1$ conditional on locating at kink at t

- ▶ Consistent with fixed cost of adjustment, individuals disproportionately "come from" far to the right of the kink
 - ▶ Probability of coming from the right of the kink spikes right at age 62, compared to age 61 and prior ages
 - ▶ Mean of earnings last year conditional on locating at the kink this year, spikes right at age 62, compared to age 61 and prior ages

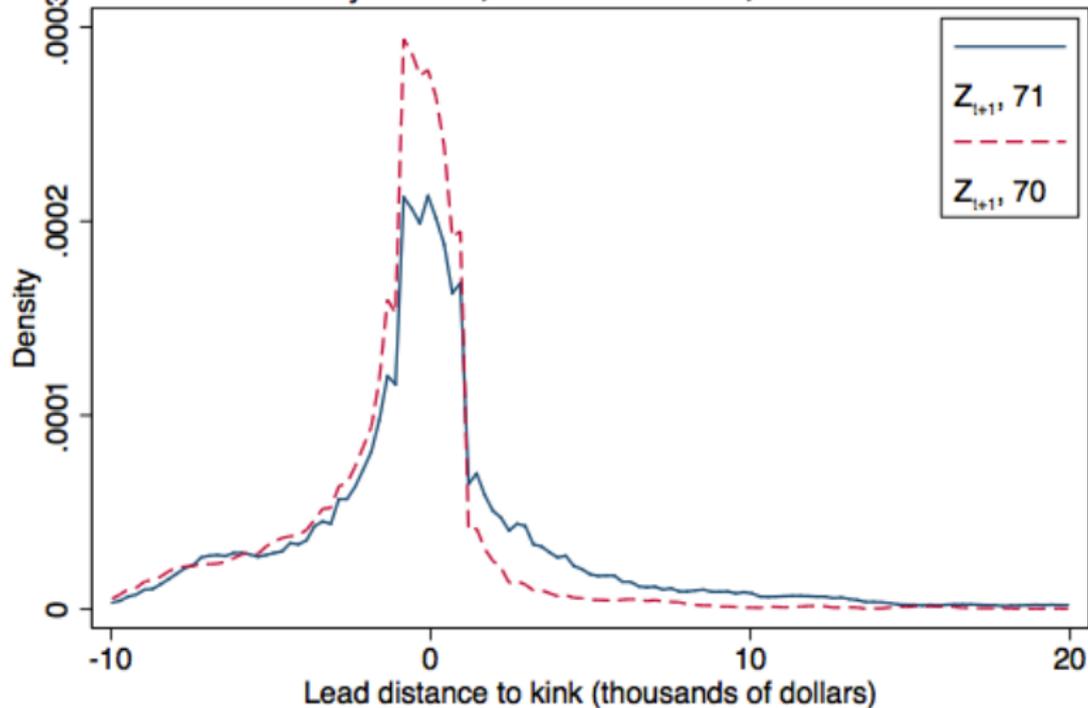
Statistics of lag earnings l at kink
 19–80 year olds, 1963–1972 BEPUF, BW = 1000



Earnings distribution at $t+1$ conditional on locating at kink at t

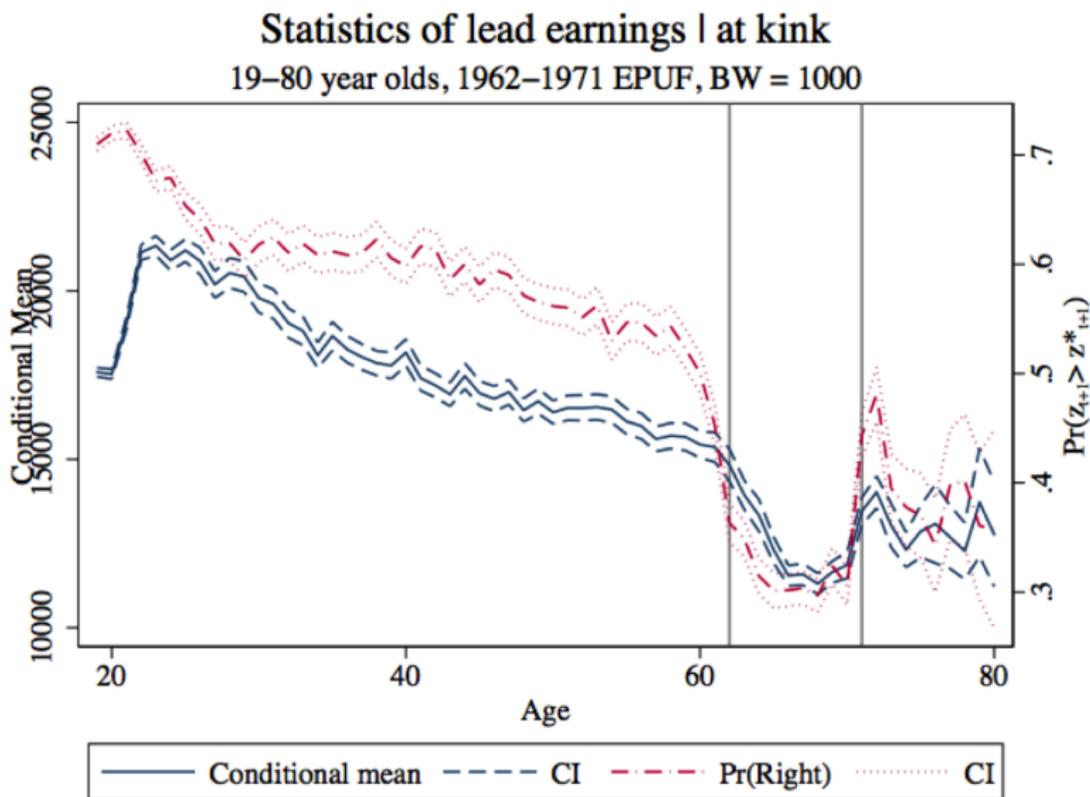
- ▶ Where do people "go to" when a kink they were locating at disappears?
- ▶ Look at earnings distribution of $t+1$ among people locating at the kink at age t .
- ▶ During 1969-72, Earnings Test applied until age 71
- ▶ Consistent with theory, individuals bunching at age 71 "go to" right of kink at age 72
- ▶ Consistent with fixed cost of adjustment, individuals disproportionately "go to" far to the right of the kink
 - ▶ Compare lead earnings distribution conditional on locating at kink at age 71, to placebo: lead earnings distribution, conditional on locating at "placebo kink" at age 70
 - ▶ Those at age 71 go farther to the right of the kink than those at age 70

Lead earnings distribution I at kink
70-71 year olds, 1961-1970 EPUF, BW = 1000



Earnings distribution at $t+1$ conditional on locating at kink at t

- ▶ Consistent with fixed cost of adjustment, individuals disproportionately “go to” far to the right of the kink
 - ▶ Probability of going to the right of the kink spikes right at age 71, compared to age 70 and prior ages (the Earnings Test no longer applies starting at age 72 during this period)
 - ▶ Mean of earnings next year conditional on locating at the kink this year, spikes right at age 71, compared to age 70 and prior ages



Estimating Elasticity and Adjustment Costs: Methodology

- ▶ We introduce a fixed cost of adjustment to the baseline model
 - ▶ Individuals must incur a cost of ϕ^* in order to change earnings
- ▶ Utility function is general (no assumption of quasilinearity necessary)
- ▶ Bunching is now attenuated
 - ▶ Individuals near the kink do find it worthwhile to relocate to the kink, given the fixed cost
- ▶ The adjustment cost now dictates the lowest ability buncher as per the following:

$$\phi^* = u_n((1 - t_1) z^* + R_1, z^*) - u_n((1 - t_1) \underline{z}_1 + R_1, \underline{z}_1)$$

where \underline{z}_1 are the ex ante earnings for the lowest buncher

Estimating Elasticity and Adjustment Costs: Methodology

- ▶ Using a first-order approximation, we solve for \underline{z}_1 :

$$\underline{z}_1 \approx z_1 + \frac{\phi}{d\tau}$$

where $\phi = \phi^* / \lambda$ is the dollar value of the adjustment cost and λ is the lagrange multiplier on the budget constraint

- ▶ Bunching will now be:

$$B = \int_{z^* + \phi/d\tau}^{z^* + \Delta z^*} h(\zeta) d\zeta$$

- ▶ Using the left rectangle approximation for the integral, we have:

$$B/h(z^*) \approx z^* \frac{dt_1}{1 - t_0} e - \frac{1}{dt_1} \phi$$

Estimating Elasticity and Adjustment Costs: Methodology

$$b_k = z_k \frac{dt_k}{1 - t_k} e - \frac{1}{dt_k} \phi$$

- ▶ With two kinks, we have two variables to estimate (e and ϕ) and two equations (specifying the amount of bunching with each kink as a function of e and ϕ), where $b_k = B_k / h(z_k)$ is the scaled bunching at a kink point at z_k , t_k is the tax rate to the left of the kink and dt_k is the tax rate jump at the kink
- ▶ Intuition: amount of bunching increases in the elasticity but decreases in the adjustment cost
- ▶ With more than two kinks, we are overidentified, and a regression approach may be used

Estimating Elasticity and Adjustment Costs: Methodology

- ▶ We can generalize this formula to a case with heterogeneity in elasticities and adjustment costs: n, e, ϕ are jointly distributed according to $f(n, e, \phi)$
- ▶ Under the assumption that ability is independent of the elasticity and ability is independent of the adjustment cost, the formula above generalizes and can be conveniently expressed in terms of the mean population elasticity \bar{e} and the mean population adjustment cost $\bar{\phi}$:
- ▶ Intuition: amount of bunching increases in the elasticity but decreases in the adjustment cost

$$b_k = z_k \frac{dt_k}{1 - t_k} \bar{e} - \frac{1}{dt_k} \bar{\phi}$$

- ▶ Again, with two kinks, we have two variables to estimate (\bar{e} and $\bar{\phi}$) and two equations (specifying the amount of bunching with each kink as a function of e and ϕ)

Estimating Elasticity and Adjustment Costs: Data

- ▶ We use data on 62-year-olds from 1961-1971
 - ▶ Prior to actuarial adjustment, so Earnings Test represents a “real” tax
- ▶ Earnings Test real exempt amount changes considerably 1961-1971, allowing us to estimate the equations above using data on yearly bunching.
 - ▶ Elasticity = 0.83; adjustment costs \$3,500
 - ▶ If we assumed away adjustment costs, would estimate elasticity of 0.17

Summary and Discussion

- ▶ One of first studies to attempt to measure how long earnings takes to respond to policy changes
- ▶ Evidence for delayed adjustment in some contexts
- ▶ Adjustment takes different amounts of time across contexts but is always fairly fast (two years or less)
- ▶ Little evidence of decrease in bunching after changes in actuarial adjustment
- ▶ Evidence consistent with fixed cost of adjustment

Summary and Discussion

- ▶ Specify a transparent model of earnings adjustment to policy and use the data to estimate mean fixed costs and elasticities in that model
- ▶ In period 1961-1971, prior to introduction of actuarial adjustment of benefits:
- ▶ Elasticity = 0.83; adjustment costs \$3,500
- ▶ If we assumed away adjustment costs, would estimate elasticity of 0.17
- ▶ Next step: SSA restricted-access data