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Frictions and the elasticity of taxable income: evidence from bunching at tax thresholds in the UK

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Introduction

- Large literature seeks to estimate responsiveness of agents to taxes
  - Key determinant of revenues from and efficiency costs of taxation
  - Under certain conditions, elasticity of taxable income (ETI) is a sufficient statistic that measures the excess burden of taxes (Feldstein, 1999)
  - But optimising frictions can attenuate reduced-form estimates of the elasticity of taxable income or labour supply (Chetty, 2012)

- Paper exploits cross-sectional variation created by tax thresholds in the UK to estimate the ETI and magnitude of frictions workers face
  - Increase in tax rate at threshold should create bunching that can use to estimate ETI (Saez, 2010; Kleven & Waseem, 2013)
  - Look at lots of thresholds, in many years, at different earnings levels and across groups to see where and when bunching happens (& by who)

Outline

1. Thresholds in the UK personal tax system

2. The economics and econometrics of bunching
   a) Bunching at kink-points (increase in marginal rate)
   b) Bunching at notches (increase in average rate)

3. Data

4. Results
   a) Bunching at kink-points
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5. Conclusions

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Thresholds in the UK personal tax system

- UK has progressive income tax with several bands
  - Basic, higher & additional rates apply above 'Personal Allowance'
  - Higher-rate threshold (HRT): rate rises from 20-40% ~£40k
  - Additional-rate threshold: rate rises from 40-50% at £150k
  - Personal Allowance withdrawn from £100k: rate rises from 40-60% at £100k and falls back from 60-40% ~£113k
- Earnings also subject to National Insurance contributions (NICs)
  - Nominally paid by both employees and employers
  - Very weak link to benefit entitlement unlike in rest of EU or US
  - Lower Earnings Limit (LEL): big notch 1978-85, reduced 1985 and 1989
  - Three notches above the LEL from 1986-1998
  - NICs capped at Upper Earnings Limit before 1985 (fall in marginal rate)
  - Kinks at Primary & Secondary Thresholds from 1998 onwards

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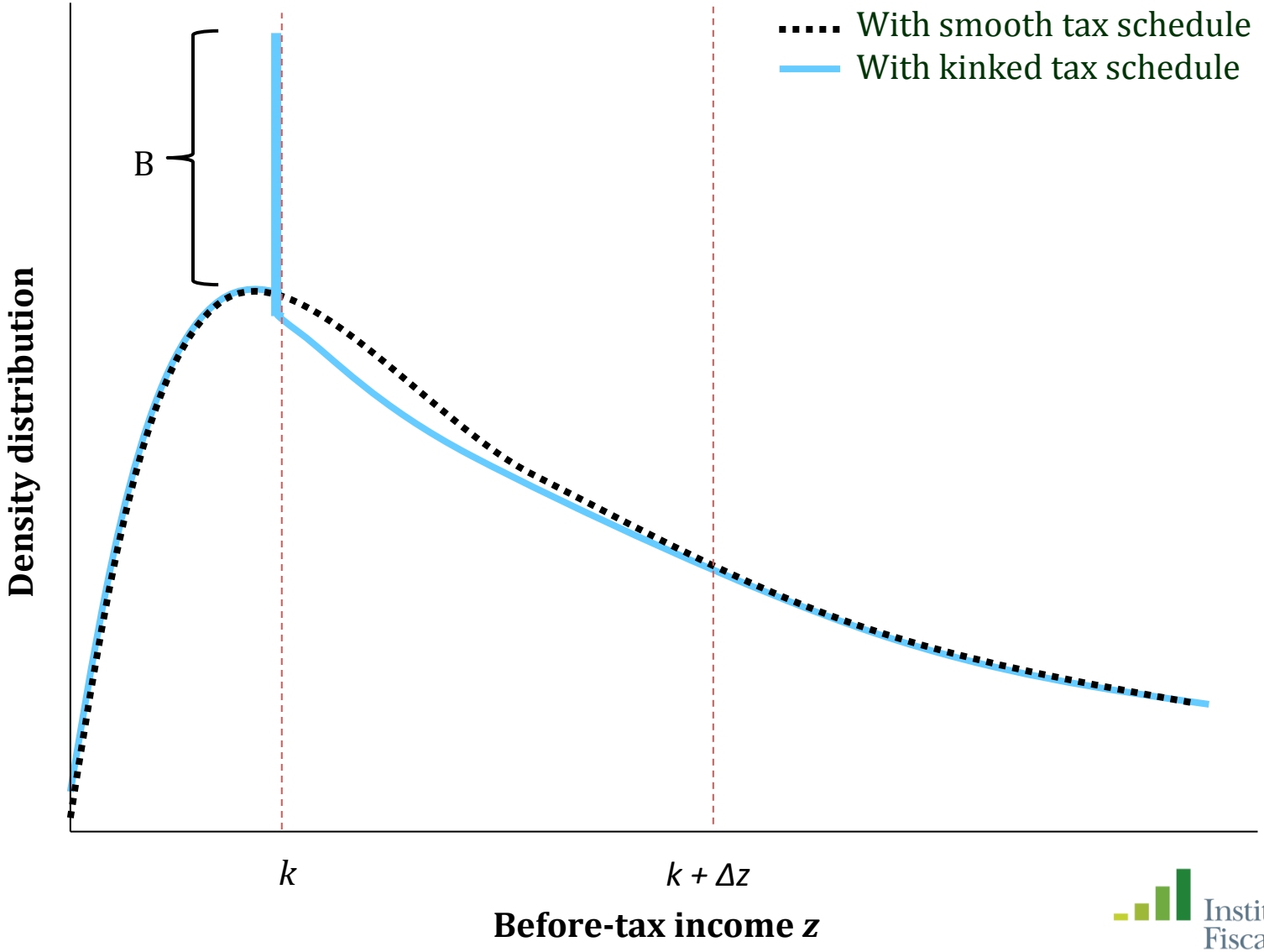
Bunching at kink points



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Bunching at kink points

- With smooth distribution of (convex) preferences, people should bunch sharply at thresholds where marginal rate increases
  - Amount of bunching proportional to compensated ETI locally
  - Saez (2010) derived method to estimate the excess (bunching) mass at a kink-point and from this the compensated ETI
  - Should also see dip in distribution where marginal rate falls

- But optimisation frictions mean some individuals won't/can't bunch
  - e.g. adjustment costs, hours constraints, inattention,
  - Attenuates estimates of elasticity from bunching at kink-points
  - Fundamental problem that can't distinguish low ETI from high frictions

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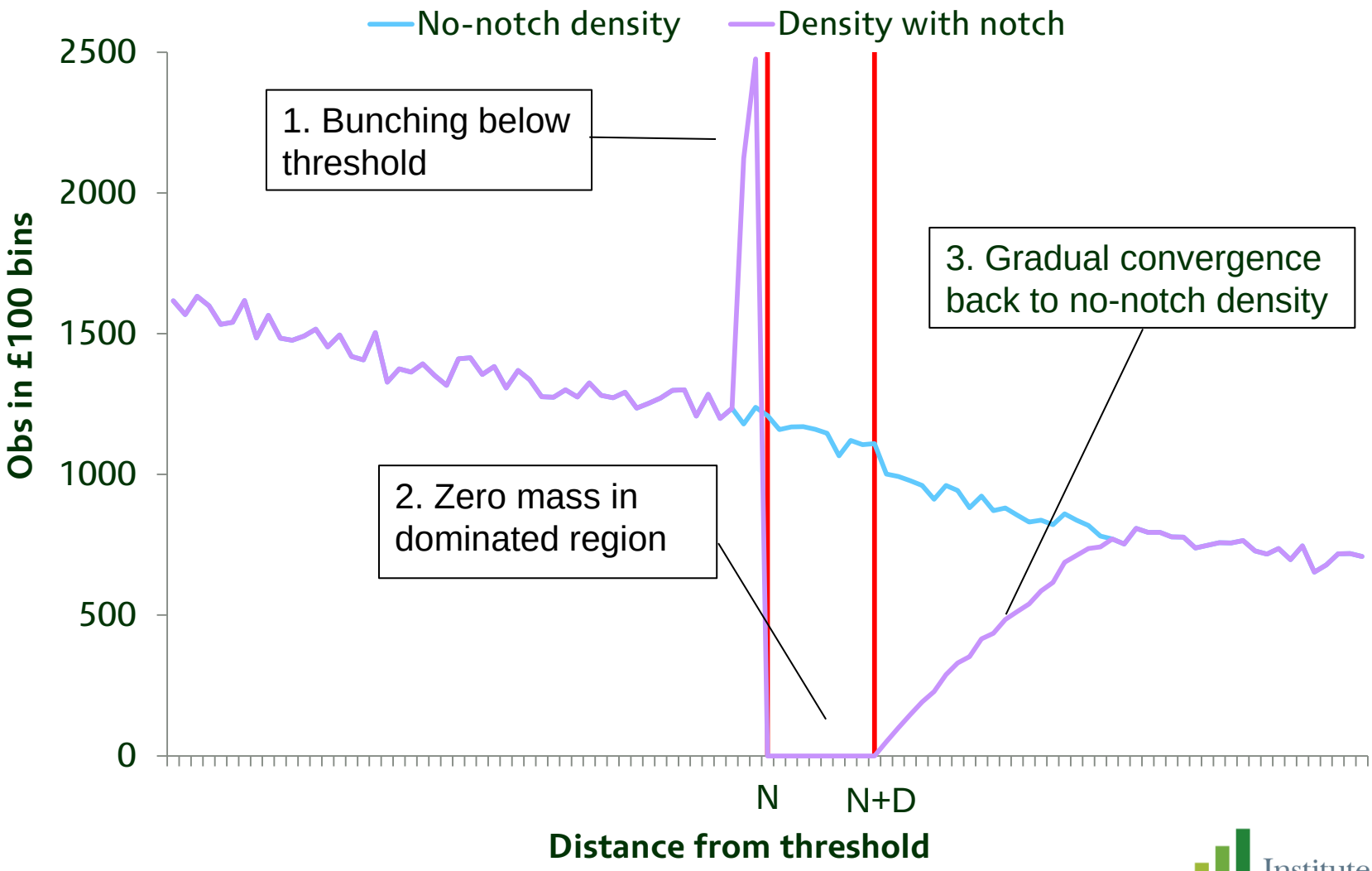
Bunching at notches

Notches create dominated region no one should locate in…



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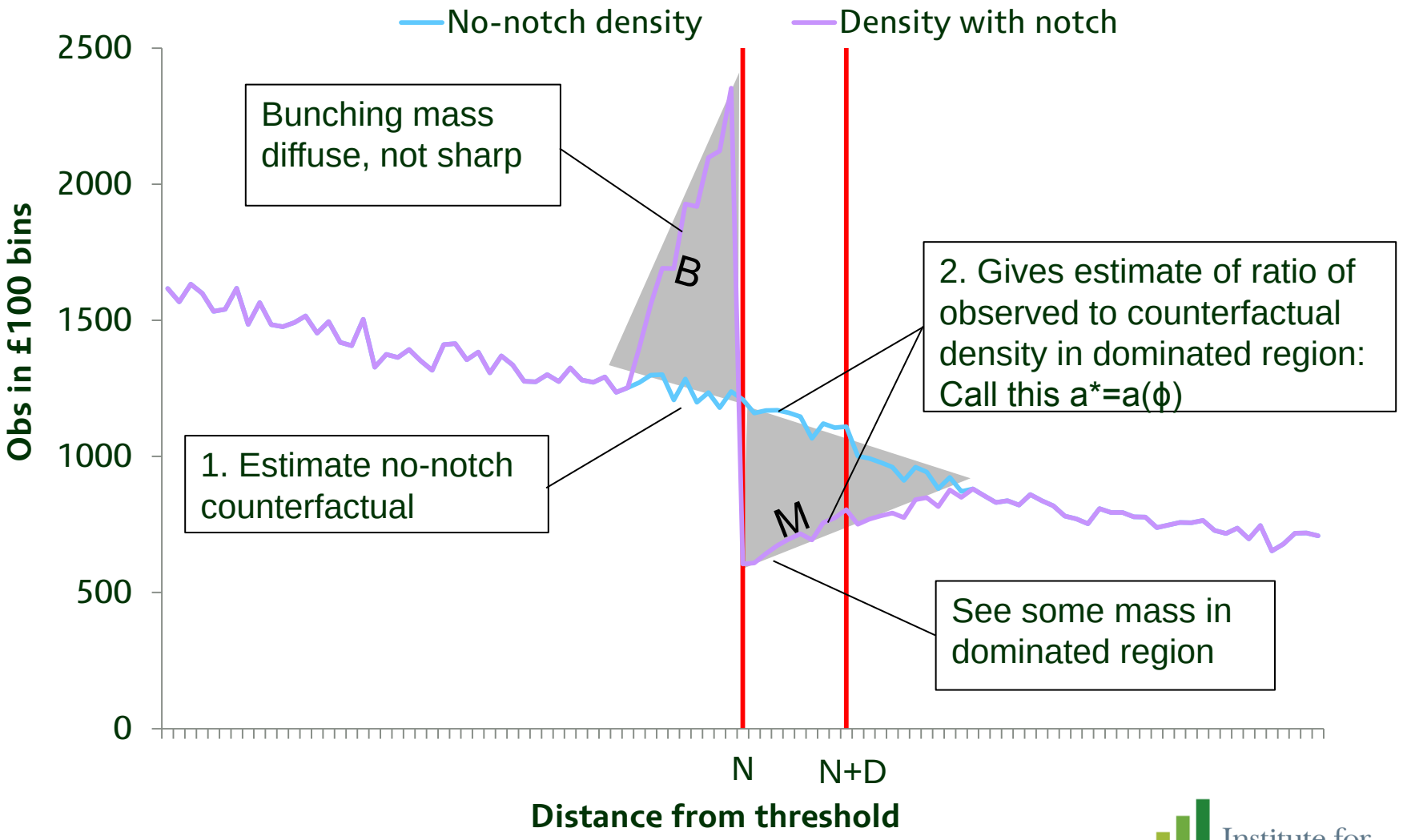
Bunching at notches

… unless they face substantial frictions



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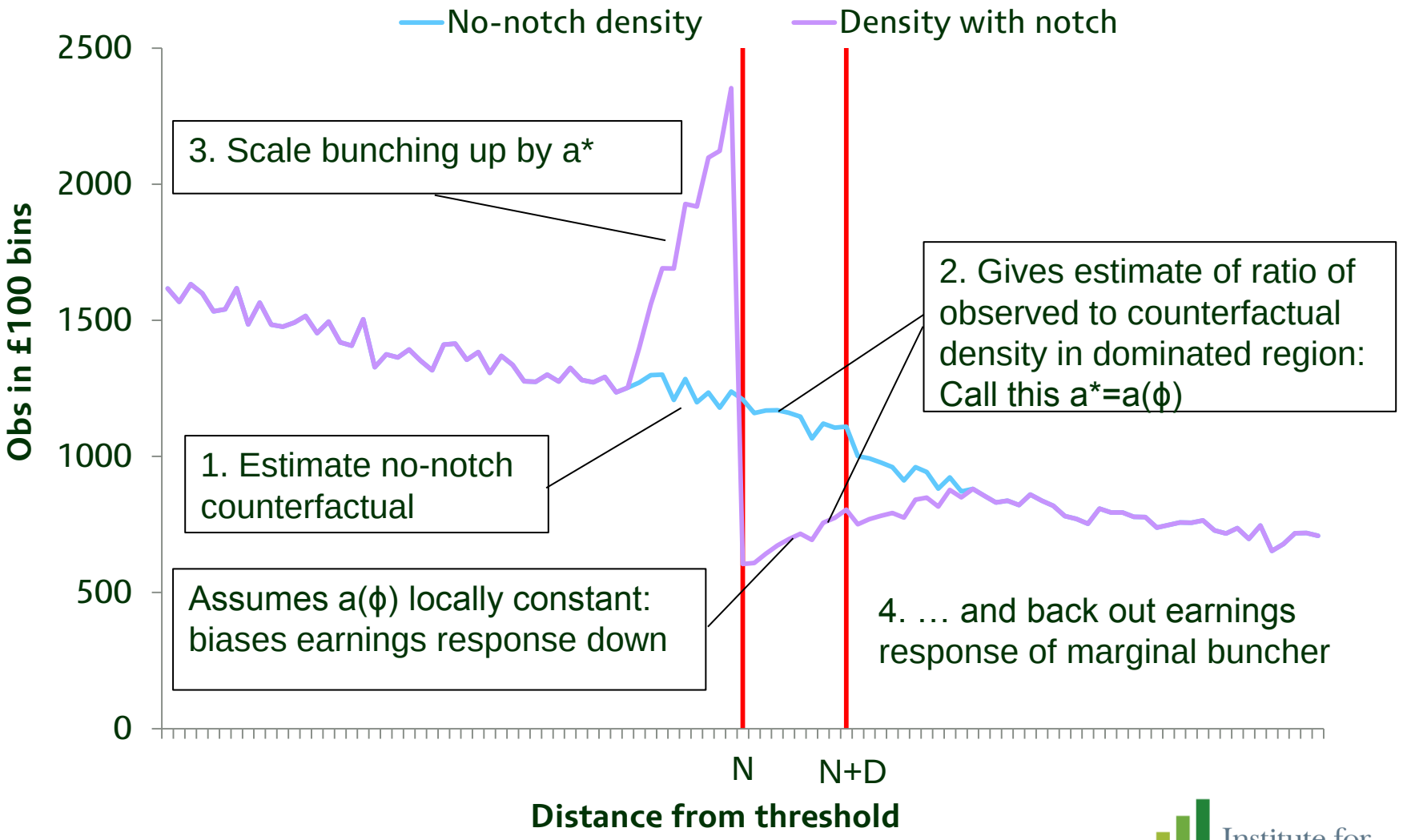
Bunching at notches

Use estimate of frictions a* to get unattenuated response Δz



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Bunching at notches

… and so the unattenuated elasticity ε

- Kleven and Waseem (2013) propose two ways to get unattenuated elasticity ε from this earnings response Δz

1. 'Structural approach'
   - Specifying a functional form for utility yields expression that links % earnings response, % change in net-of-tax rate, and elasticity
   - Use quasi-linear utility specification: ignores income effects and get mixture of compensated and uncompensated elasticity

2. 'Reduced-form approach'
   - Use implicit marginal tax rate created by notch between N and N+Δz
   - … but the notch generates larger earnings response than hypothetical kink, so will overstate the compensated elasticity

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Use large admin and employer survey datasets

- Survey of Personal Incomes (SPI): 2003-2011
  - Sample of income tax administrative records (~700,000 observations)
  - But doesn't include non-taxpayers (e.g. those below Personal Allowance)

- New Earnings Survey (NES): 1978-
  - Large mandatory employer survey
  - Targets 1% random sample of civilian employees using NI numbers
  - Little measurement error & gives earnings in correct period for NICs
  - But some problems:
  1. Incomplete sample below LEL: we might understate bunching
  2. Earnings reported for period around turn of fiscal year: could face one of two thresholds & means will pick up mixture of responses

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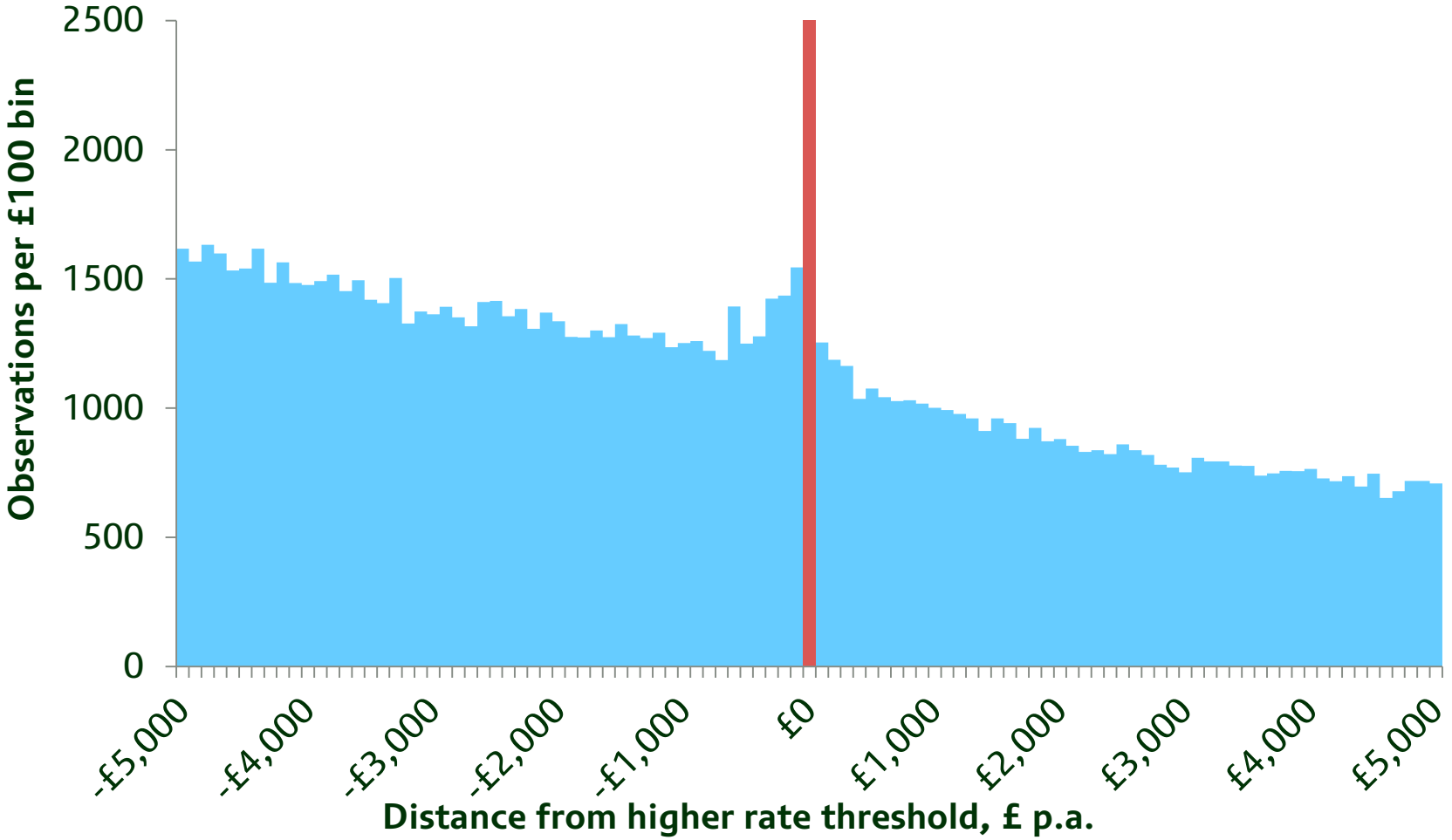
Do see bunching at the higher-rate threshold

SPI data from 2003-04 to 2007-08



Note: All figures in 2007–08 prices. Source: 2003–04 to 2007–08 SPI.

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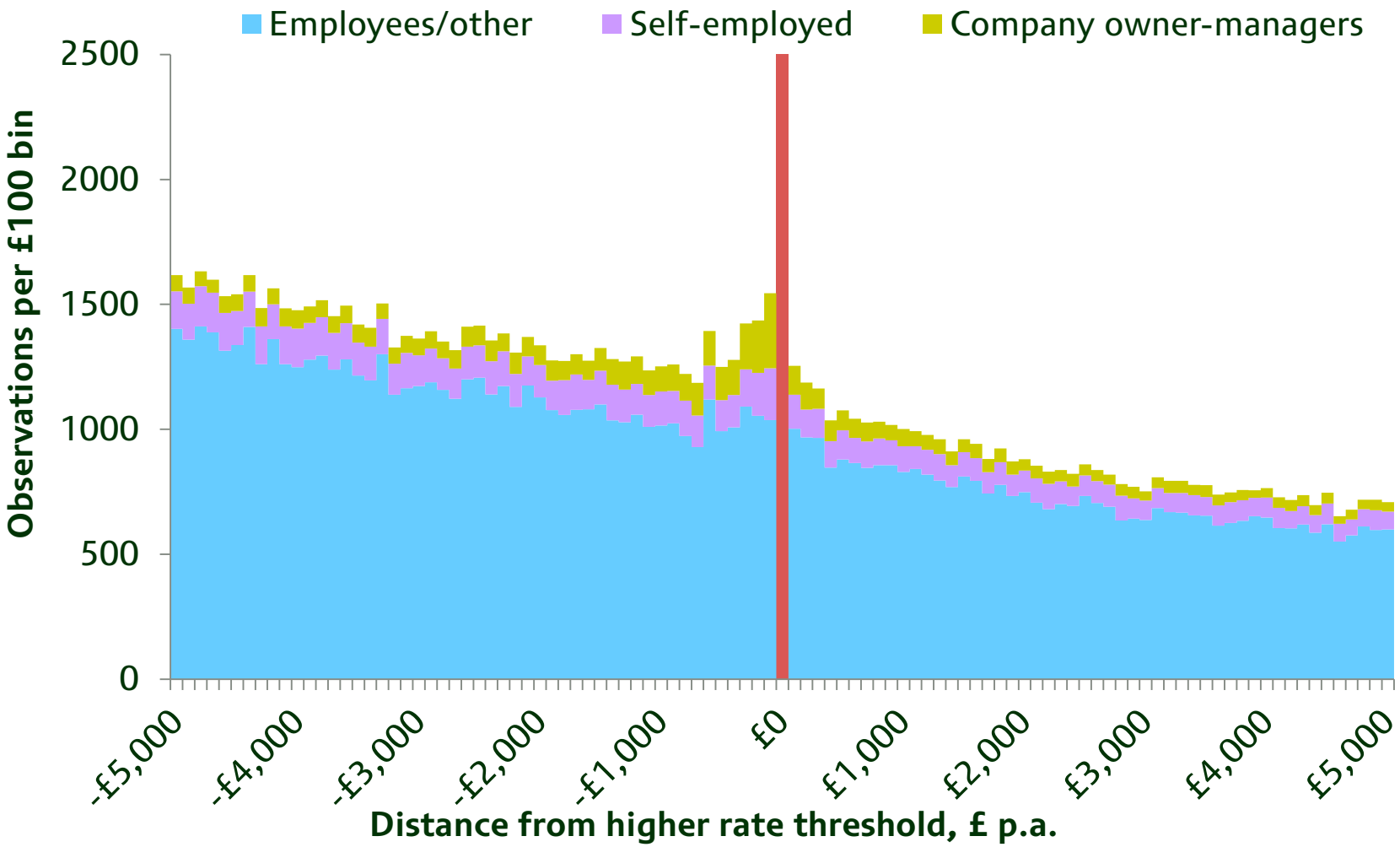
… but driven by company owner-managers

SPI data from 2003-04 to 2007-08



Note: All figures in 2007–08 prices. Source: 2003–04 to 2007–08 SPI.

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… and implies very small elasticities

Table 2

Kink	All taxpayers	Self-employed	Company owner managers	Other taxpayers
Higher rate threshold	0.032***	0.058***	0.246***	0.015***
£100,000				
£150,000				

Note: ** = statistically significant at 5%, *** = statistically significant at 1% level.
Source: Author's calculations using 2003–04 to 2007–08 Survey of Personal Incomes.

… as does bunching at the 100k threshold

Table 2

Kink	All taxpayers	Self-employed	Company owner managers	Other taxpayers
Higher rate threshold	0.032***	0.058***	0.246***	0.015***
£100,000	0.014***	0.020***	0.039***	0.007**
£150,000				

Note: ** = statistically significant at 5%, *** = statistically significant at 1% level.
Source: Author's calculations using 2003–04 to 2007–08 Survey of Personal Incomes.

… and the 150k threshold

Table 2

Kink	All taxpayers	Self-employed	Company owner managers	Other taxpayers
Higher rate threshold	0.032***	0.058***	0.246***	0.015***
£100,000	0.014***	0.020***	0.039***	0.007**
£150,000	0.022***	0.011	0.070***	0.015***

Note: ** = statistically significant at 5%, *** = statistically significant at 1% level.
Source: Author's calculations using 2003–04 to 2007–08 Survey of Personal Incomes.

But frictions could explain results at kinks

- Little bunching at income tax kinks, implying small elasticities
  - … even for the self-employed & company owner-managers
- No bunching at kinks in NICs schedule from 1998 where rate rises
  - … nor any dip at thresholds where income tax/NICs rate falls
- Could be that underlying responsiveness small
  - … but estimates seem implausibly small
- Estimates are consistent with larger elasticities if allow for frictions: with adjustment cost of 1% net earnings:
  - @100k: all taxpayers estimate of 0.01 could be = 0.49
  - @HRT: company owner-manager estimate of 0.25 could be = 1.58
  - @150k: self-employed estimate of 0.01 could be = 2.35

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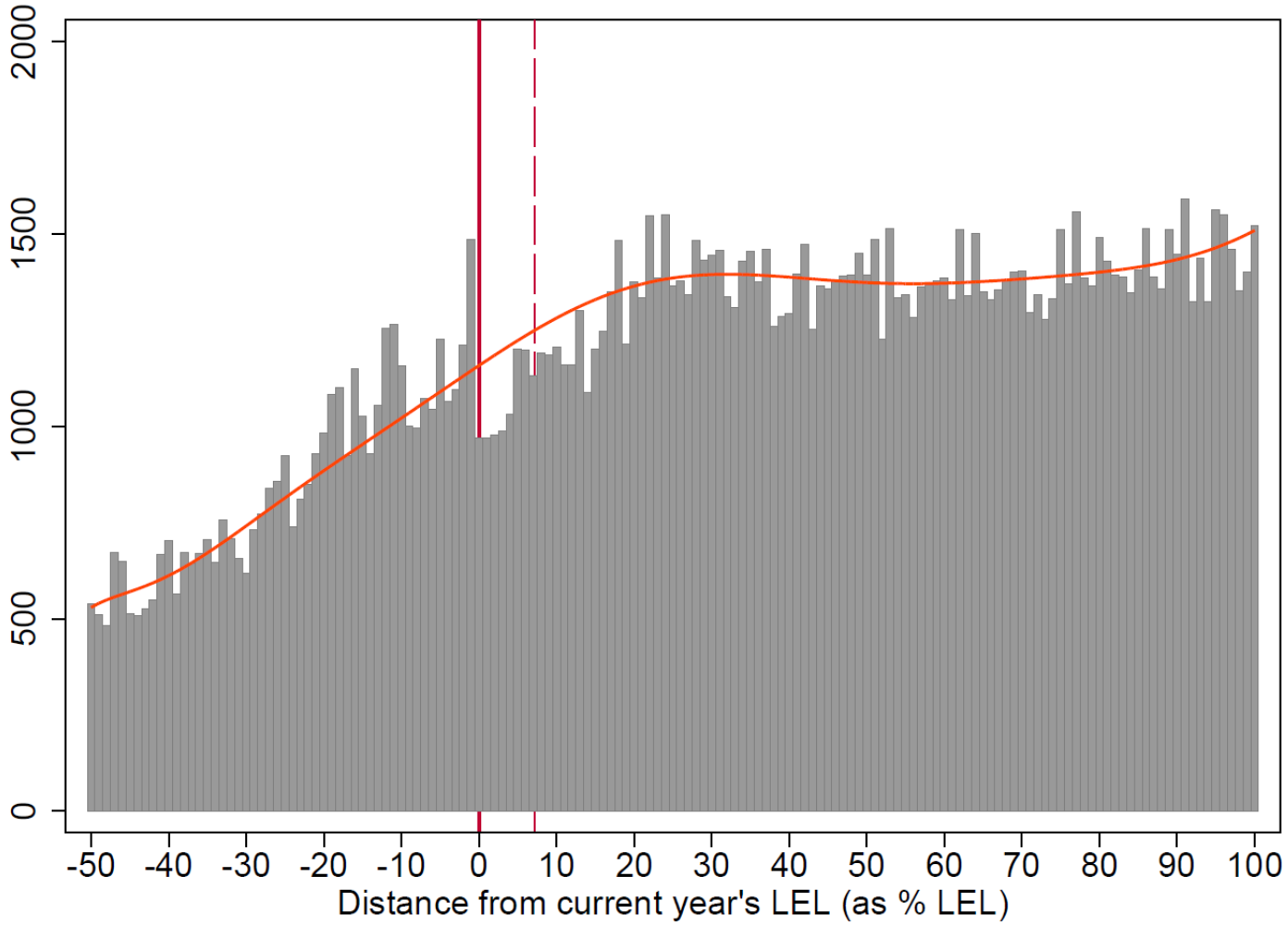
See some bunching at LEL notch from 1978–85



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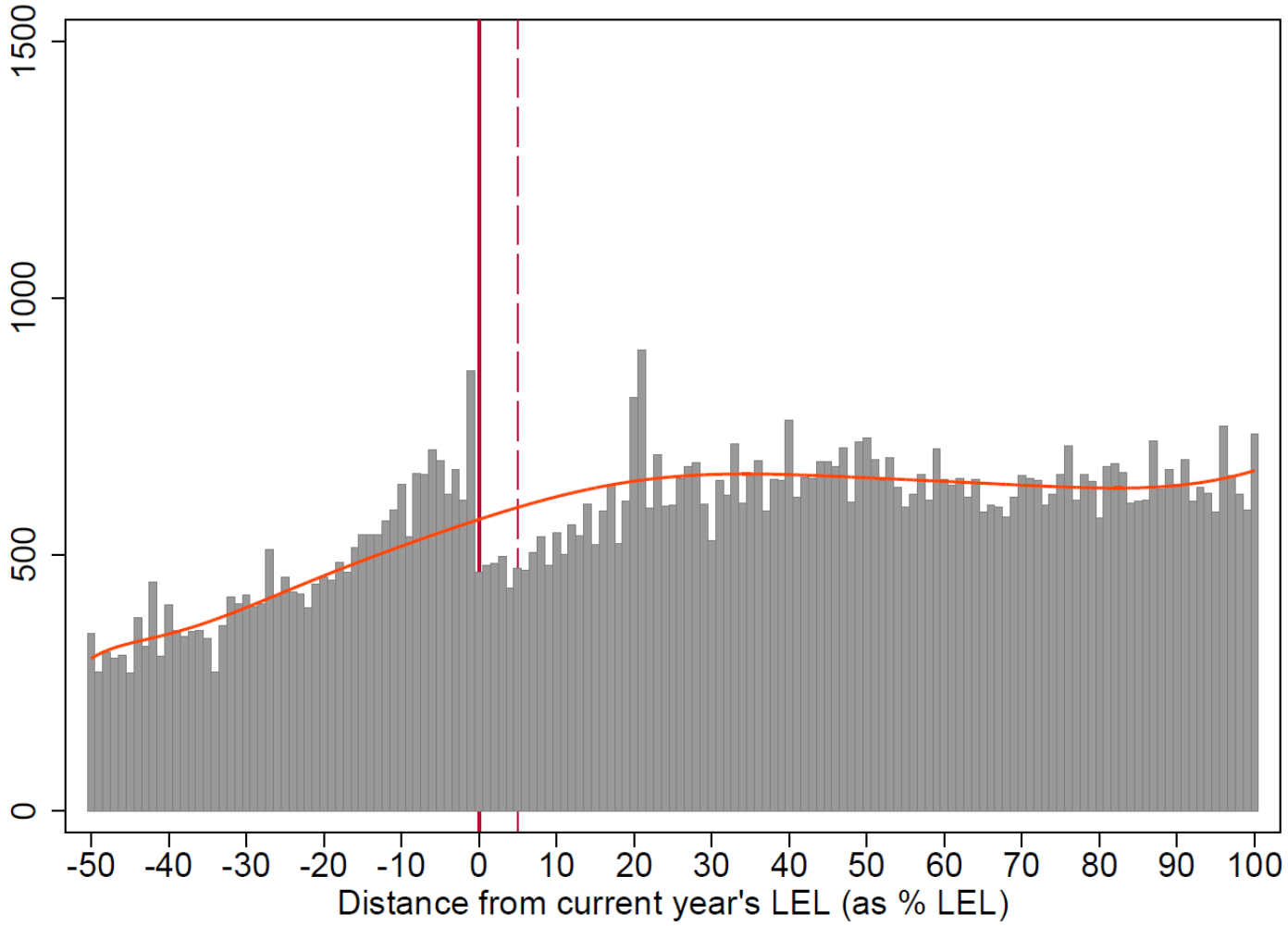
… sharper bunching between 1986 and 1989



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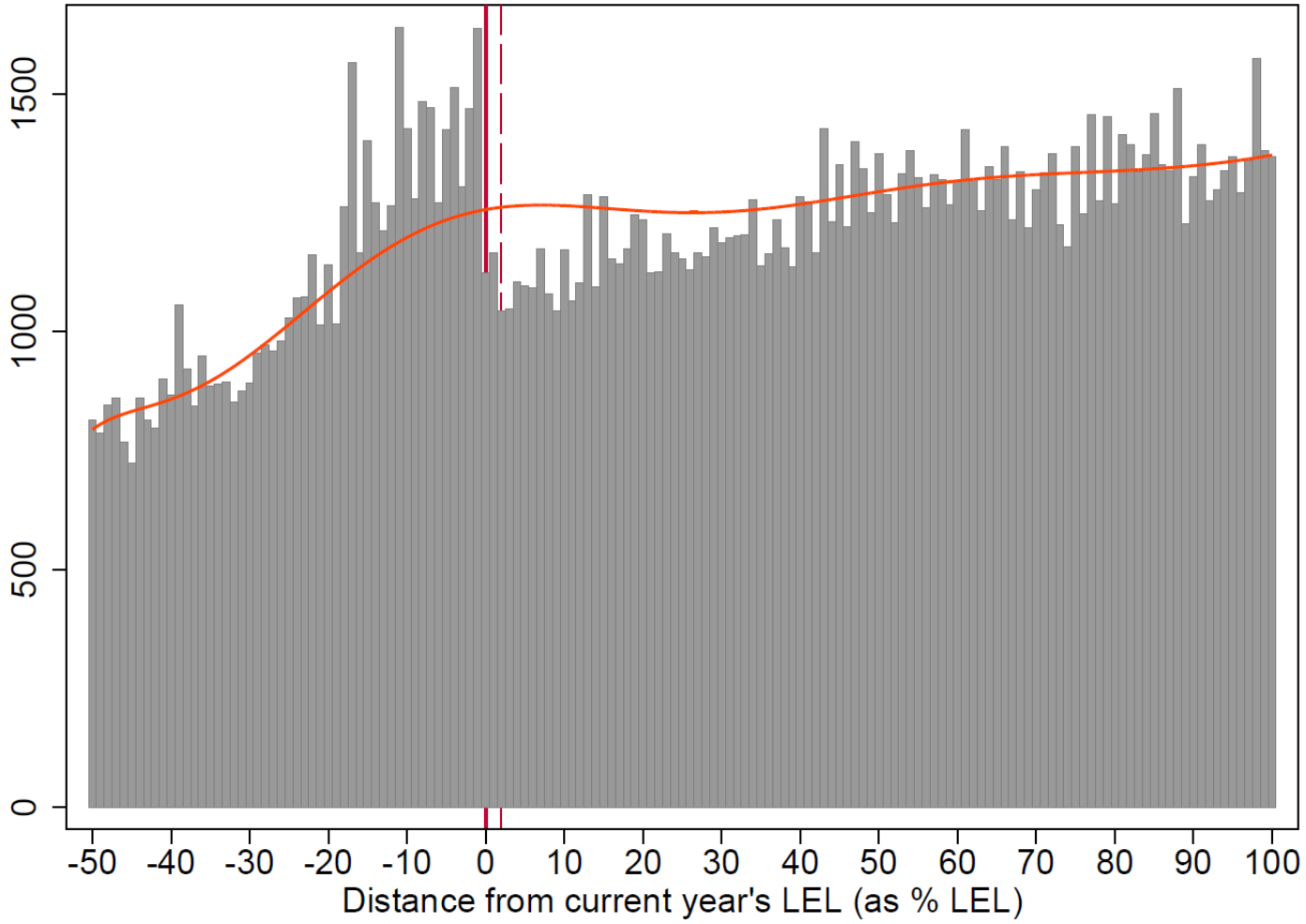
… & sharper again between 1990–99



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Implies modest unattenuated elasticities

	1978-85	1986-89	1990-99
Reduced-form approach			
Bunching-hole method	0.0965	0.3210	0.6891
s.e.	*(0.0014)*	*(0.0046)*	*(0.0210)*
Structural approach			
Bunching-hole method	0.0430	0.2221	0.5403
s.e.	*(0.0009)*	*(0.0036)*	*(0.0186)*

Note: Bootstraped standard errors in italics calculated drawing with-replacement from the observed distribution.
Source: Author's calculations using New Earnings Survey, 1978-1999

Implies modest unattenuated elasticities

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Reduced-form approach			
Bunching-hole method	0.0965	0.3210	0.6891
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Structural approach			
Bunching-hole method	0.0430	0.2221	0.5403
s.e.	*(0.0009)*	*(0.0036)*	*(0.0186)*
b: Actual/counterfactual density in bunching region	1.0904	1.1468	1.1493
a*: Actual/counterfactual density in dominated region	0.8737	0.8257	0.8932

Note: Bootstraped standard errors in italics calculated drawing with-replacement from the observed distribution.
Source: Author's calculations using New Earnings Survey, 1978-1999

… but some caveats on these estimates

- Data problems
  - Might understate bunching below threshold
  - Picking up mix of immediate and medium-run responses
- Even with ~1% sample data quite noisy
  - Makes identifying bunching region & estimating counterfactual difficult
- Local estimate for particular group from quite some time ago
  - Low-earning employees in the 1980s & 1990s

Yet clear evidence frictions large for most workers

- Observe large mass in dominated region above LEL:
  - => frictions large enough to prevent most employees relocating just below threshold in where taxes up to 17% of earnings lower
- Complete absence of bunching at notches higher up distribution:
  - locating in dominated region at third notch in 1989 => additional tax wedge of ~£500 on earnings of ~£18k per year (April 2012 prices)
  - Notches at dense part of earnings distribution effecting many workers: e.g. in 1989 at 0.8, 1 and 2 times median earnings
- Also find interesting heterogeneity in frictions faced across groups:
  - At LEL see no missing mass for FT employees => very high frictions
  - But plenty for PT employees => lower frictions (mostly women)
  - Employees in retail/hospitality sector also face lower frictions

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- Frictions significantly attenuate ETI estimates based on micro data
  - Accounting for these important: can yield much larger ETIs
- Women/PT workers face smaller frictions than Men/FT workers
  - This heterogeneity in frictions corresponds to variation in elasticity estimates documented in wider public/labour economics literature
  - Does the literature estimate differences in preferences or frictions? Important for optimal design of tax policy
- Notches have no place in sensible tax design
  - Highly distortionary & result in large welfare losses, especially for those constrained by employers from reducing hours
  - Irish tax schedule deserving of attention here: PRSI & USC notches