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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
  - 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. Using bunching at tax thresholds to estimate the ETI
3. Data
4. Results
  - a) Bunching at kink-points
  - b) Bunching at notches
5. Conclusions

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# Thresholds in the UK personal tax system

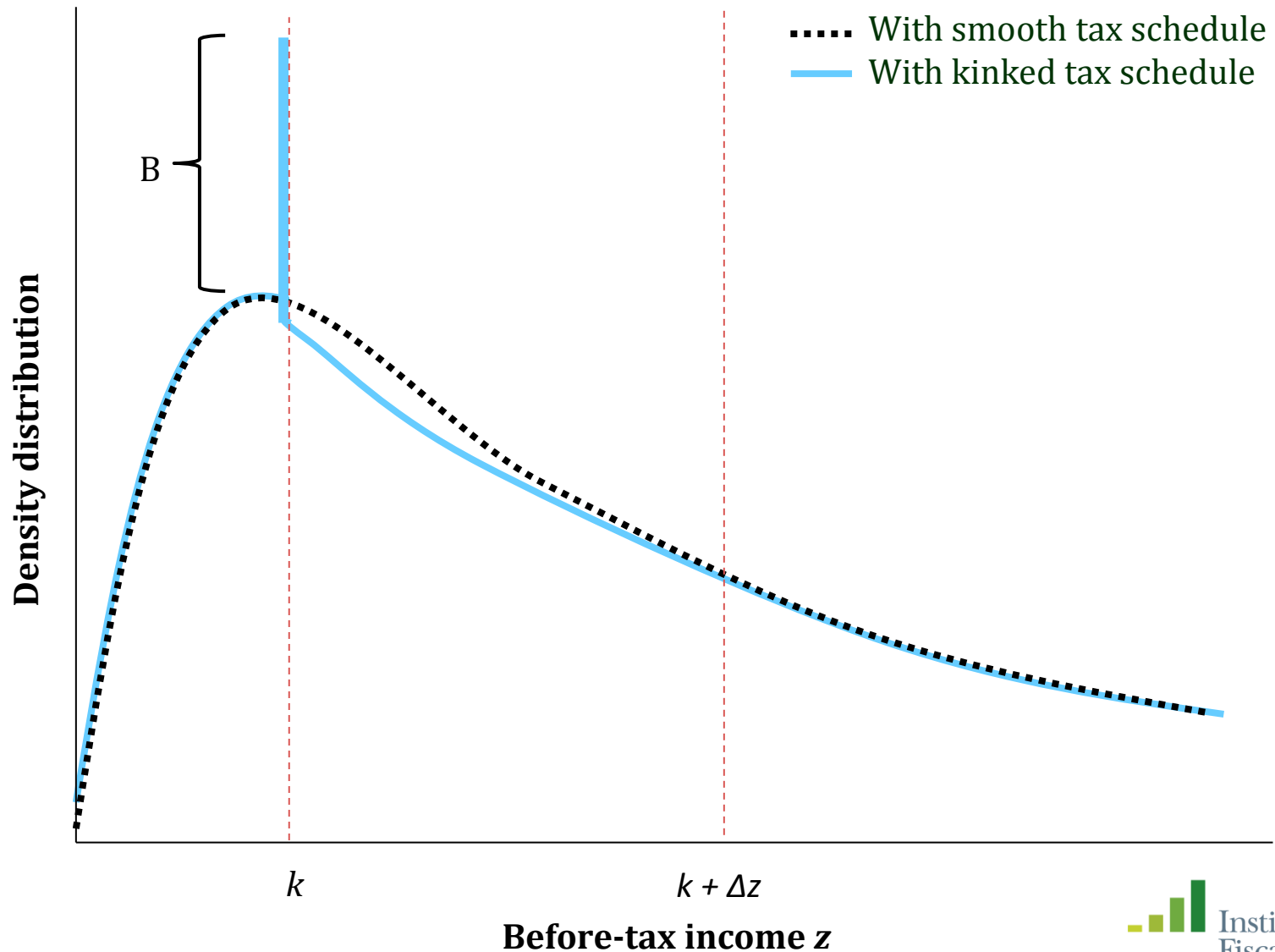
- UK has progressive income tax with several bands
  - Basic, higher & additional rates apply above ‘Personal Allowance’
  - Higher-rate threshold (HRT): rate rises from 20-40% ~£40k
  - Additional-rate threshold: rate rises from 40-50% at £150k
  - Personal Allowance withdrawn from £100k: rate rises from 40-60% at £100k and falls back from 60-40% ~£113k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
  - Kinks at Primary & Secondary Thresholds from 1998 onwards

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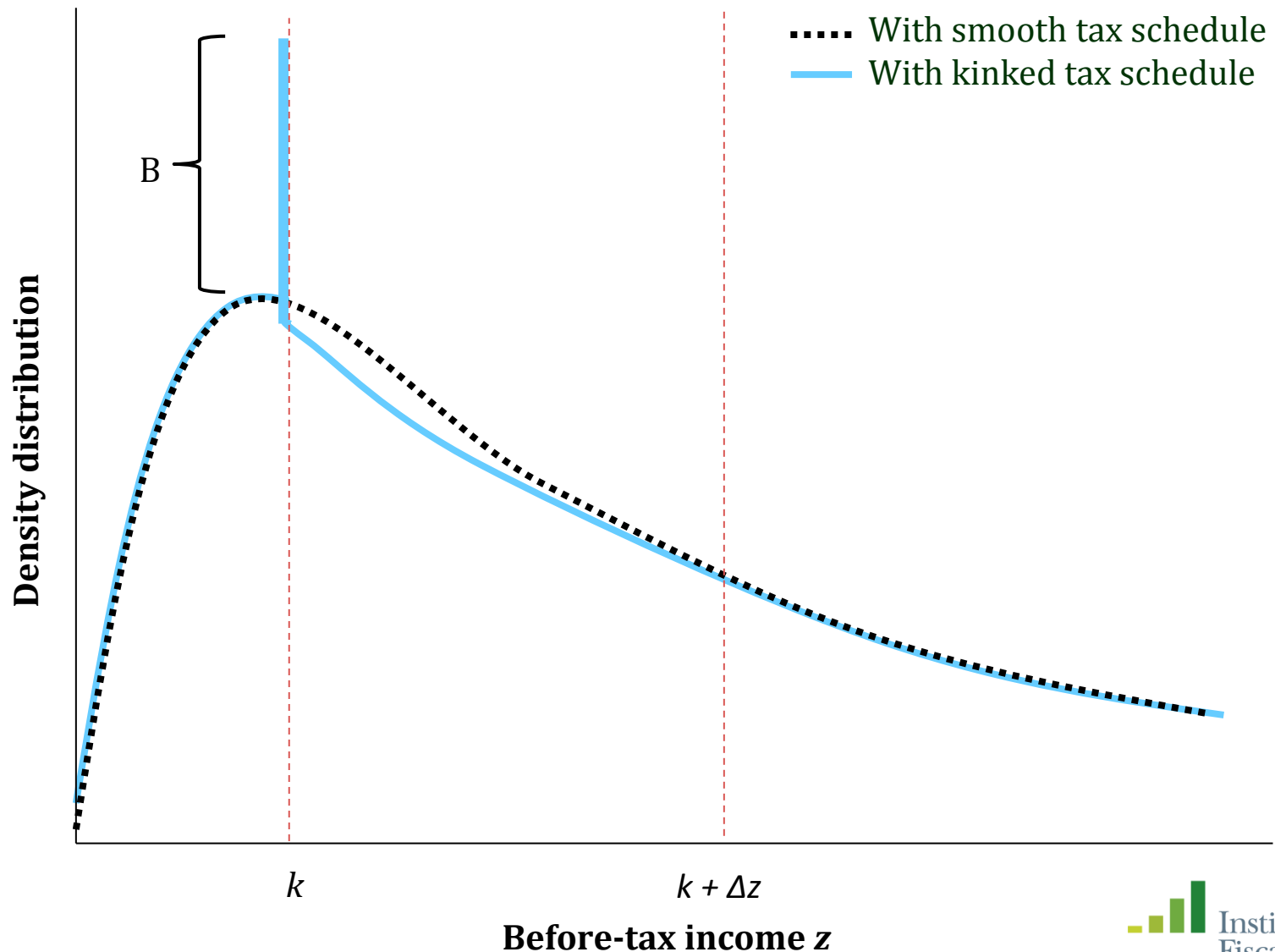
# Bunching at kink points

Saez (2010) showed  $\propto$  to ETI locally



# Bunching at kink points

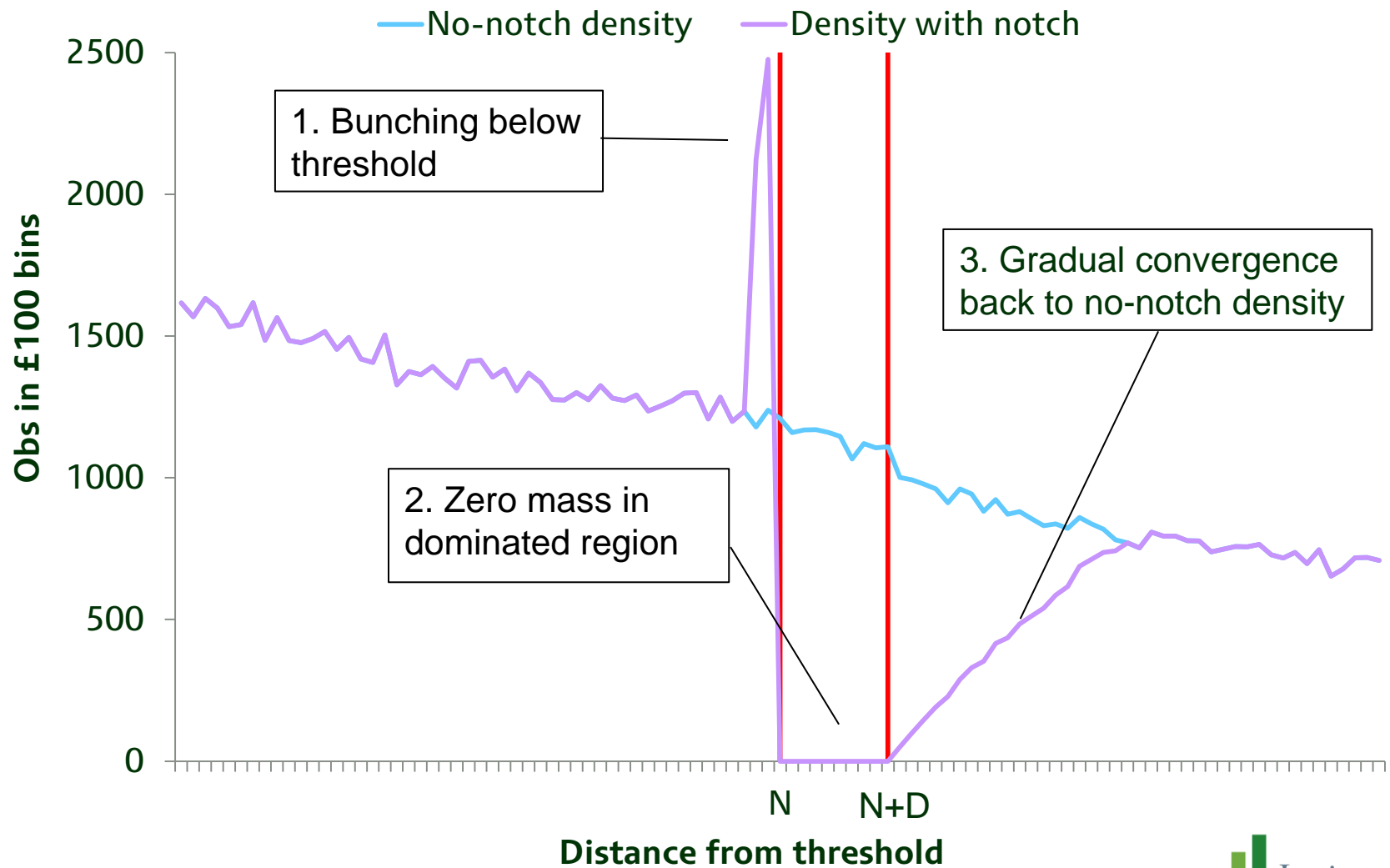
Saez (2010) showed  $\propto$  to ETI locally ... but frictions complicate things





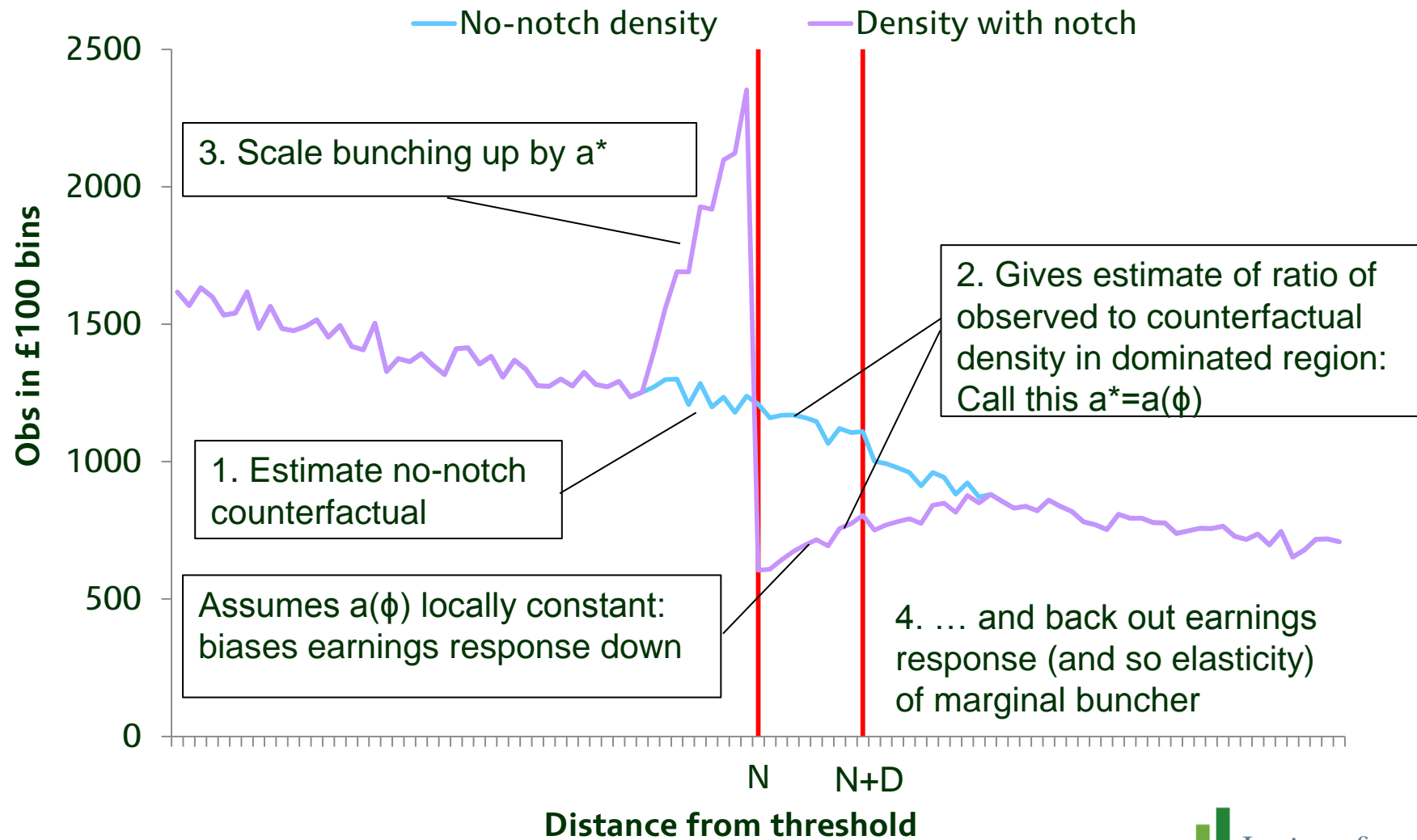
# Bunching at notches

Notches create dominated region no one should locate in...



# Bunching at notches

... which we can exploit to estimate unattenuated earnings elasticity  $\varepsilon$



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# Use large administrative data and employer survey

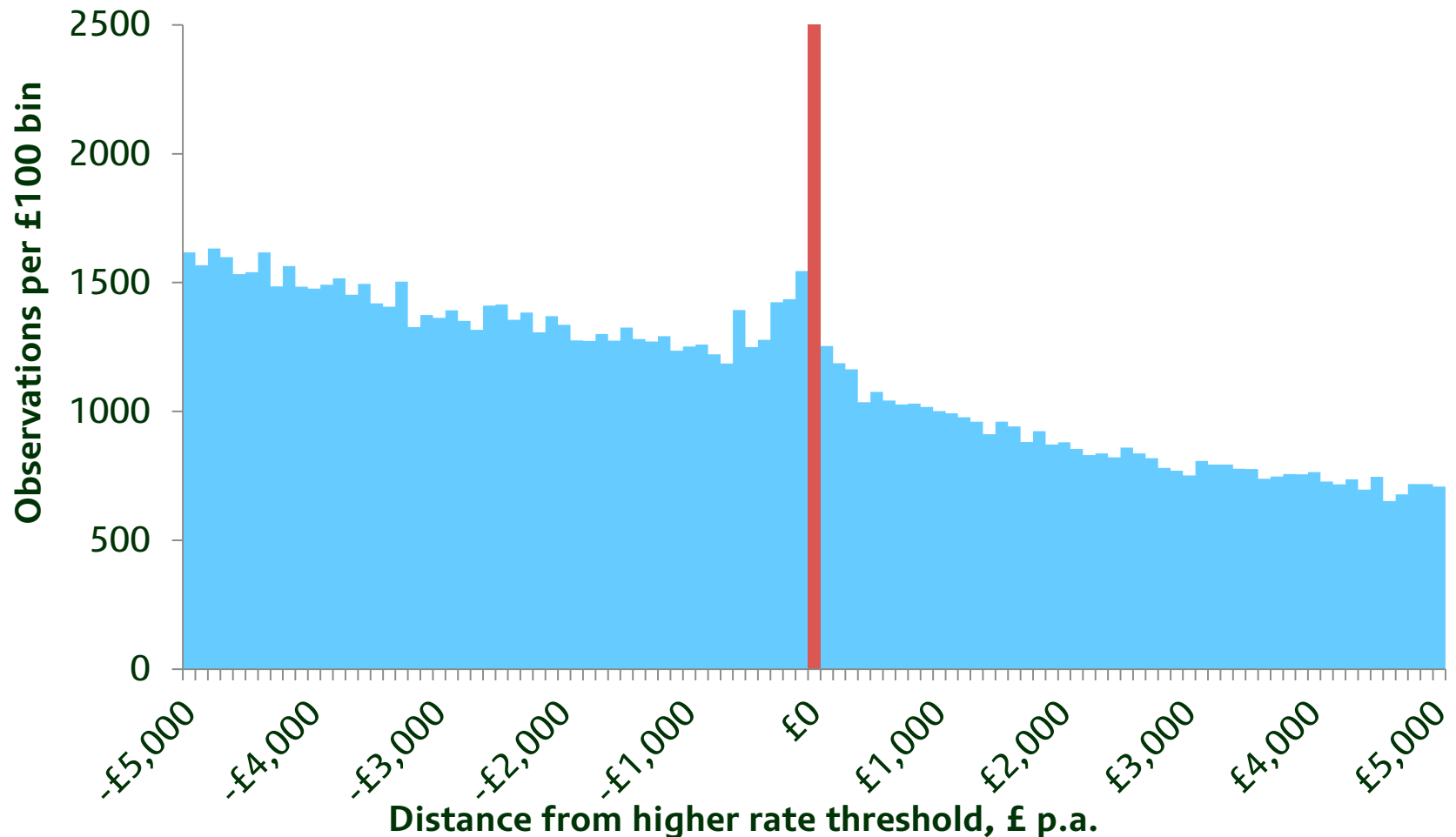
- Survey of Personal Incomes (SPI): 2003-2011
  - Sample of income tax administrative records (~700,000 observations)
- New Earnings Survey (NES): 1978-
  - Large mandatory employer survey
  - Targets 1% random sample of civilian employees using NI numbers
  - Little measurement error & gives earnings 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: pick up mixture of immediate and medium-run responses

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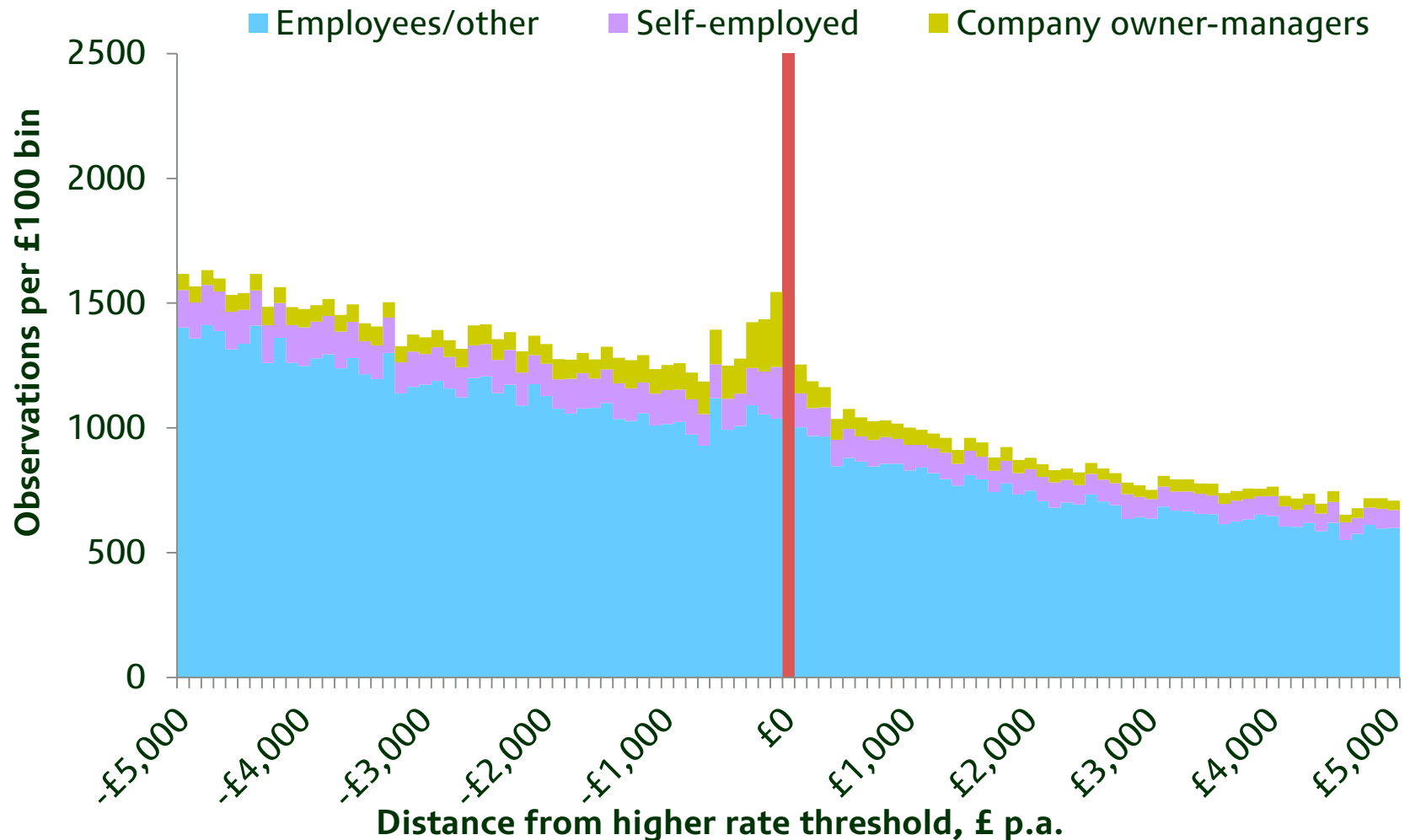
# Do we see bunching at the higher-rate threshold

SPI data from 2003-04 to 2007-08



# ... but driven by company owner-managers

SPI data from 2003-04 to 2007-08



## ... 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.

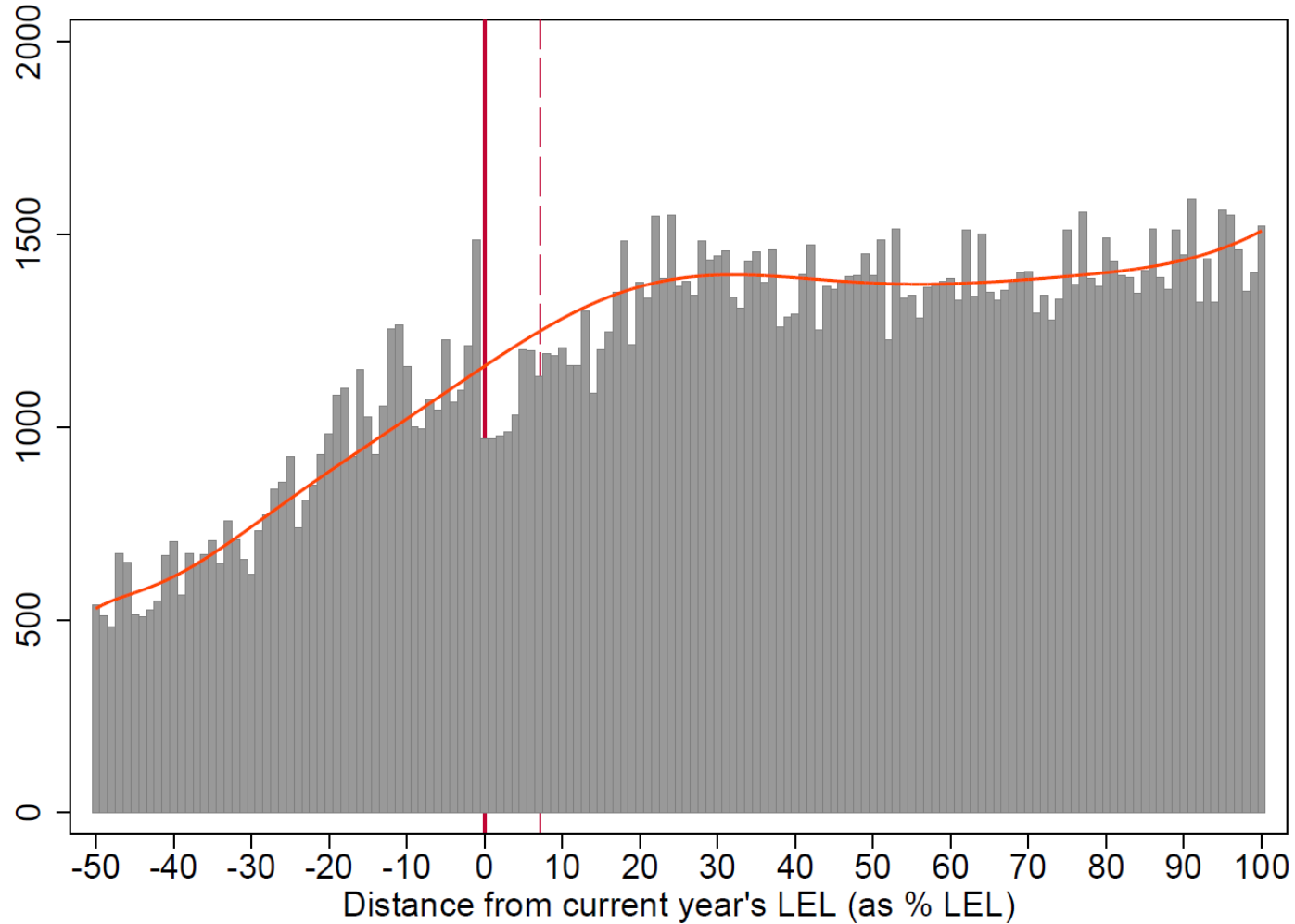
# Frictions could explain results at kinks

- 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
- Could be that underlying responsiveness small
  - ... but estimates seem implausibly small
- Estimates are consistent with larger elasticities if allow for frictions:  
e.g. with fixed adjustment cost = 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

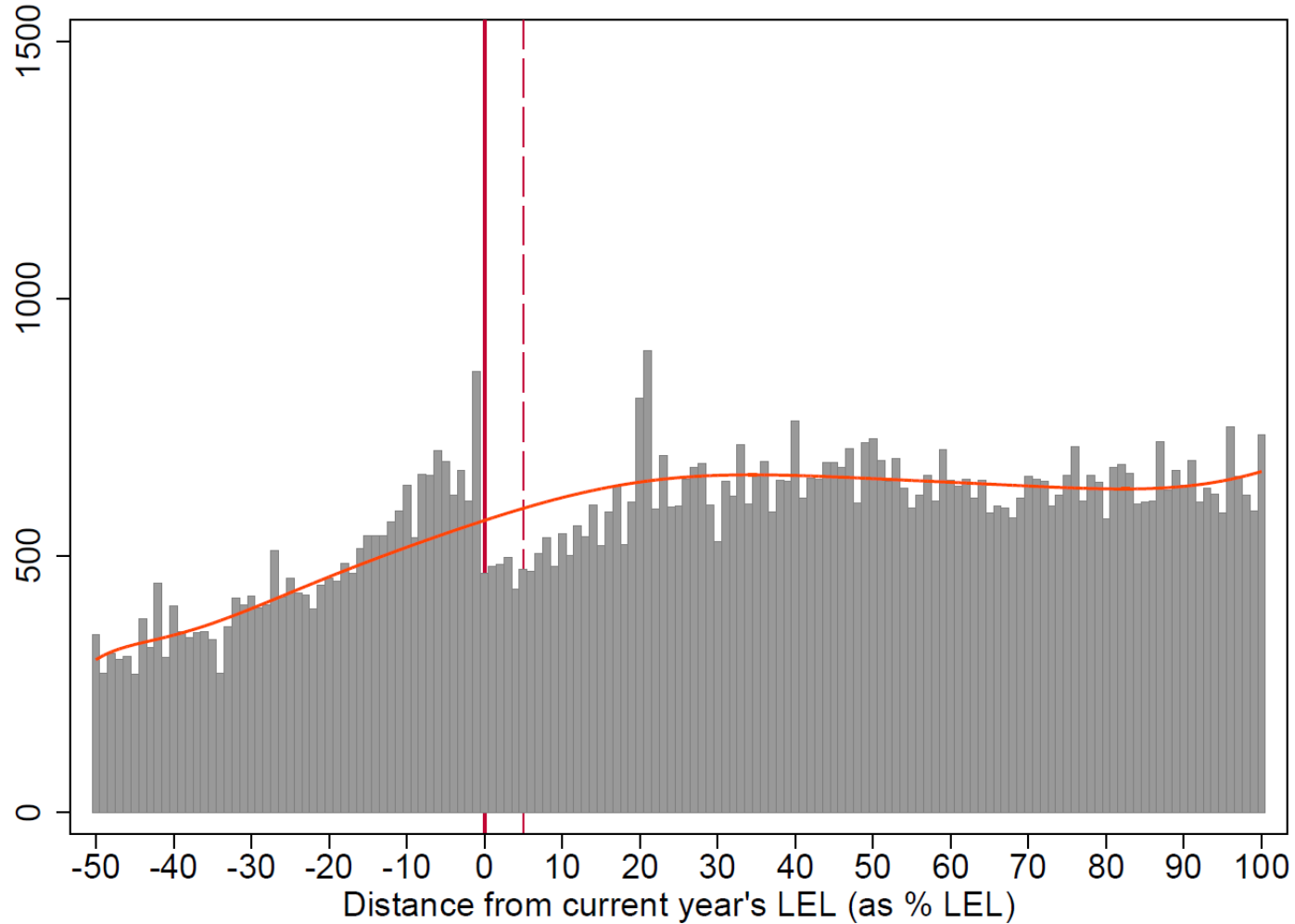
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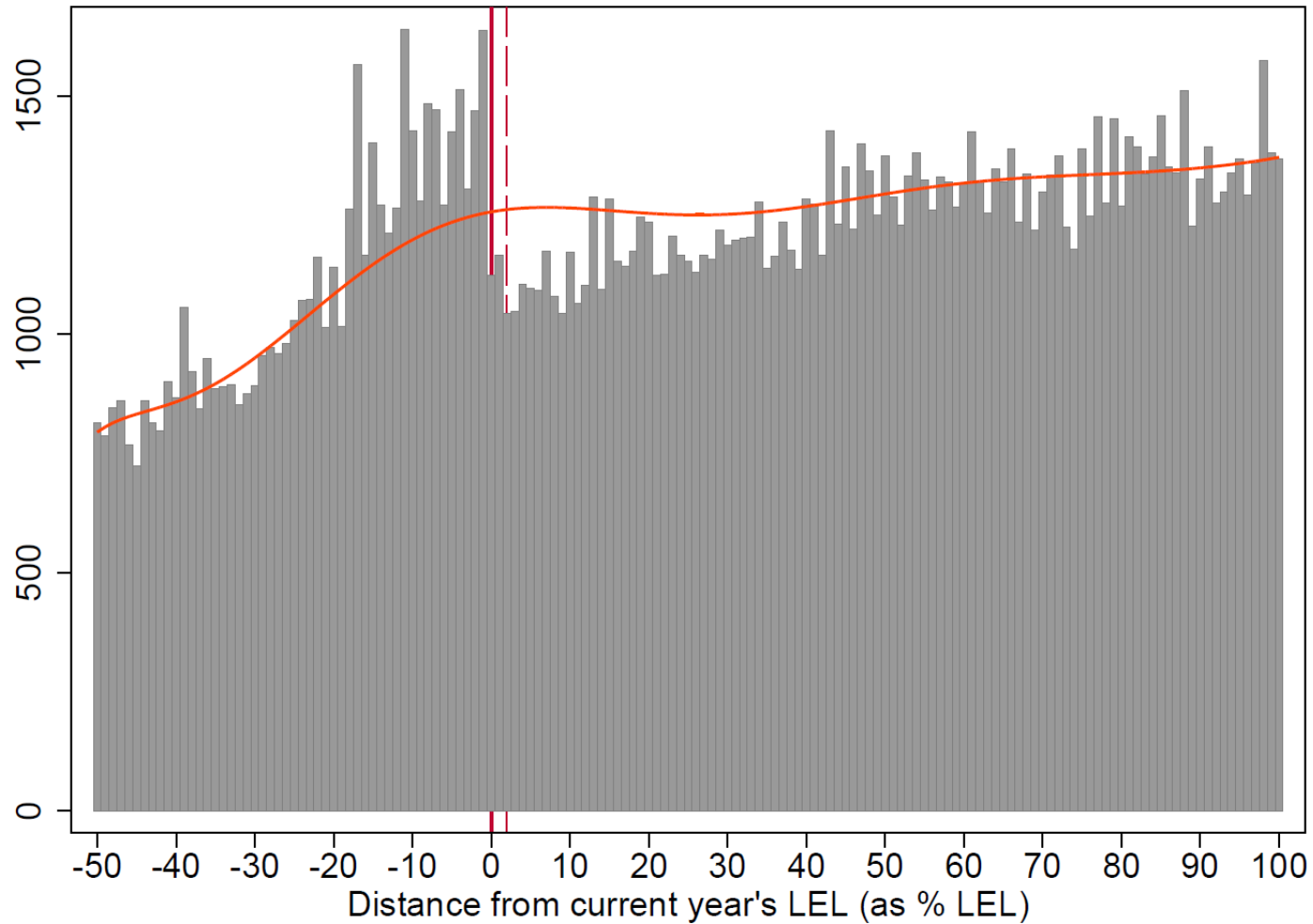
## See some bunching at LEL notch from 1978–85



... sharper bunching between 1986 and 1989



... & sharper again between 1990–99



# Implies modest unattenuated elasticities

	1978-85	1986-89	1990-99
<b>Reduced-form approach</b>			
Bunching-hole method	0.0965	0.3210	0.6891
<i>s.e.</i>	<i>(0.0014)</i>	<i>(0.0046)</i>	<i>(0.0210)</i>
<b>Structural approach</b>			
Bunching-hole method	0.0430	0.2221	0.5403
<i>s.e.</i>	<i>(0.0009)</i>	<i>(0.0036)</i>	<i>(0.0186)</i>
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: Bootstrapped standard errors in italics calculated drawing with-replacement from the observed distribution.

Source: Author's calculations using New Earnings Survey, 1978-1999



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

- Frictions significantly attenuate reduced form estimates of ETI
  - 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