Adjustment costs and labour supply: evidence from bunching at tax thresholds in the UK

Barra Roantree, Stuart Adam, James Browne, David Phillips

IIPF 2015, Dublin
Introduction

• Elasticity of taxable income crucial and controversial parameter

• Recent work has highlighted importance of optimising frictions
  – Chetty (2012): adjustment costs, inattention, and status quo biases can all drive wedge between estimated and true ‘structural’ parameter
  – Structural preference parameter what matters for long-term welfare and evaluating effects of a tax change in a different setting to that estimated

• This paper estimates ETI & provides evidence on frictions in the UK
  – Part of growing literature using bunching methods developed by Saez (2010), Chetty et al. (2011), and Kleven and Waseem (2013)
  – Exploits cross-sectional variation created by tax thresholds in the UK between 1978-2011
Thresholds in the UK tax system: 1978-2011

• Look at several kink points in income tax schedule
  – Higher-rate threshold (HRT): rate increases from 20% to 40% at ~£35k pa
  – Additional-rate threshold: rate increases from 40% to 50% at £150k pa
  – Withdrawal of tax-free personal allowance: 60% band at £100k pa

• Earnings also subject to National Insurance contributions (NICs)
  – Nominally paid by both employees and employers
  – Little link to benefit entitlement
  – 1978-85: notch at Lower Earnings Limit (LEL)
  – 1986-1999: small notch at LEL and three notches above
  – System simplified in 1999, with single kink at the LEL replacing all notches
Bunching at kink points in the tax system

- With smooth distribution of convex preferences, individuals should bunch sharply at (convex) kink points in the tax system
See some bunching at UK higher-rate threshold

Add note with years etc
Bunching at kink points in the tax system

• With smooth distribution of convex preferences, individuals should bunch sharply at (convex) kink points in the tax system
  – Amount of bunching proportional to size of compensated elasticity

• Saez (2010) derives method to estimate the excess mass (bunching) at a kink point and use this to compute the ETI

• But adjustment costs and optimisation frictions mean some individuals don’t bunch
  – Attenuate any estimate of the ETI obtained from bunching
  – Can’t distinguish low ETI from high adjustment costs

• Bunching at notches allows us to say more…
Creates dominated region no one should locate in

1. Bunching below threshold
2. Zero mass in dominated region
3. Gradual convergence back to no-notch density

Add note with years etc
And allows us to estimate unattenuated elasticity

1. Estimate no-notch counterfactual

2. Calculate highest no-notch earnings of buncher

3. Back out an elasticity using the estimated earnings response
Estimate ETI using large UK admin datasets

• Survey of Personal Incomes (SPI): 2003-2011
  – Sample of income tax administrative records (~700,000 observations)

• New Earnings Survey (NES): 1978-2008
  – Large mandatory employer survey (pseudo-admin data) targeting 1% random sample of civilian employees
  – Gives earnings in relevant period for NICs, but some issues:
    1. Incomplete sample below LEL: we might understate bunching
    2. Earnings reported for period around turn of fiscal year: not sure whether response is short/long-run, and which year’s threshold applies
Bunching at HRT mostly company owner-managers

Note: All figures in 2007–08 prices.
Source: 2003–04 to 2007–08 SPI.
… and implies very small elasticities

Table 3, Panel B

<table>
<thead>
<tr>
<th>Kink</th>
<th>All taxpayers</th>
<th>Self-employed</th>
<th>Company owner-managers</th>
<th>Other taxpayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher rate threshold</td>
<td>0.032***</td>
<td>0.058***</td>
<td>0.246***</td>
<td>0.015***</td>
</tr>
<tr>
<td>£100,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>£150,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 implies very small elasticities

Table 3, Panel B

<table>
<thead>
<tr>
<th>Kink</th>
<th>All taxpayers</th>
<th>Self-employed</th>
<th>Company owner-managers</th>
<th>Other taxpayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher rate threshold</td>
<td>0.032***</td>
<td>0.058***</td>
<td>0.246***</td>
<td>0.015***</td>
</tr>
<tr>
<td>£100,000</td>
<td>0.014***</td>
<td>0.020***</td>
<td>0.039***</td>
<td>0.007**</td>
</tr>
<tr>
<td>£150,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 implies very small elasticities

Table 3, Panel B

<table>
<thead>
<tr>
<th>Kink</th>
<th>All taxpayers</th>
<th>Self-employed</th>
<th>Company owner-managers</th>
<th>Other taxpayers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher rate threshold</td>
<td>0.032***</td>
<td>0.058***</td>
<td>0.246***</td>
<td>0.015***</td>
</tr>
<tr>
<td>£100,000</td>
<td>0.014***</td>
<td>0.020***</td>
<td>0.039***</td>
<td>0.007**</td>
</tr>
<tr>
<td>£150,000</td>
<td>0.022***</td>
<td>0.011</td>
<td>0.070***</td>
<td>0.015***</td>
</tr>
</tbody>
</table>

Note: ** = statistically significant at 5%, *** = statistically significant at 1% level.
Source: Author’s calculations using 2003–04 to 2007–08 Survey of Personal Incomes.
Though adjustment costs could explain this:

- Estimates consistent with much larger elasticities if we allow for adjustment costs/optimisation frictions
  - Using Chetty (2012) approach, ‘all taxpayers’ estimate of 0.03 consistent with a ETI of up to 0.54 if adjustment costs = 1% income

- See no bunching at all at kink points in NICs schedule post-99
  - Smaller kink points so less incentive to bunch than at HRT
Do see bunching at the LEL over period 1978-85

Figure 8a

Source: Authors’ calculations using New Earnings Survey.
... which gets sharper between 1986-89

Source: Authors’ calculations using New Earnings Survey.
... and remains strong from 1990-99

Figure 8c

Source: Authors’ calculations using New Earnings Survey.
Can estimate unattenuated elasticity at this notch

Table 2, Panel A

<table>
<thead>
<tr>
<th>Time</th>
<th>Structural approach</th>
<th>Reduced-form approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Convergence method</td>
<td>Bunching-hole method</td>
</tr>
<tr>
<td>1978-85</td>
<td>0.3214 (0.0030)</td>
<td>0.4633 (0.0067)</td>
</tr>
<tr>
<td>1986-89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990-99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Bootstrapped standard errors in italics calculated drawing with-replacement from the observed distribution.
Source: Author’s calculations using New Earnings Survey, 1978-1999
Can estimate unattenuated elasticity at this notch

Table 2, Panel A

<table>
<thead>
<tr>
<th>Time</th>
<th>Structural approach</th>
<th>Reduced-form approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Convergence method</td>
<td>Bunching-hole method</td>
</tr>
<tr>
<td>1978-85</td>
<td>0.3214 (0.0030)</td>
<td>0.4633 (0.0067)</td>
</tr>
<tr>
<td>1986-89</td>
<td>0.5498 (0.0046)</td>
<td>0.5988 (0.0079)</td>
</tr>
<tr>
<td>1990-99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

© Institute for Fiscal Studies
Can estimate unattenuated elasticity at this notch

Table 2, Panel A

<table>
<thead>
<tr>
<th>Time</th>
<th>Structural approach</th>
<th>Reduced-form approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Convergence method</td>
<td>Bunching-hole method</td>
</tr>
<tr>
<td>1978-85</td>
<td>0.3214 (0.0030)</td>
<td>0.4633 (0.0067)</td>
</tr>
<tr>
<td>1986-89</td>
<td>0.5498 (0.0046)</td>
<td>0.5988 (0.0079)</td>
</tr>
<tr>
<td>1990-99</td>
<td>1.5683 (0.0121)</td>
<td>2.3906 (0.0742)</td>
</tr>
</tbody>
</table>

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 interpret these estimates with caution…

• Some estimates sensitive to way in which counterfactual drawn

• Data issues mean understate bunching

• Combination of methods gives wide range of estimates (not bounds)

• Local estimate for particular group from quite some time ago
Sub-groups

- Women (especially part-time) much more responsive than men
- Longer-tenured employees somewhat more responsive
- Bunching concentrated in certain sectors e.g. retail, hospitality
Don’t see any bunching at notches above LEL

• Suggests that adjustment costs could be substantial
  – Locating in dominated region => losses of 2-4% of total gross earnings for both employees and employers

• … that these notches are less salient than LEL notch

• Or maybe jump in admin costs lower than at LEL
Conclusions (1)

• See some bunching at the HRT, but implied elasticities very small
  – … except for company owner-managers (0.25) who drive the bunching
  – Probably attenuated by adjustment costs or frictions

• No real evidence of bunching at other kinks

• Some bunching at notch where NICs become payable
  – Allows us to estimate non-attenuated elasticities of order 0.20-0.60
  – … though method in places sensitive to particular specification + data

• No bunching at notches above LEL
  – Adjustment costs substantial for most employees (and firms)
  – Consistent with models that incorporate hour constraints?
Conclusions (2)

• Owner managers & part-time women most responsive
  – Owner-managers can easily change timing of dividend income
  – Part-time employees more easily able to adjust hours
  – Heterogeneous adjustment costs may help explain pattern of results in literature e.g. larger estimates of ETI for women?

• More bunching at post-85 despite smaller notch
  – Salience effect?

• Little bunching at 100k or 150k thresholds:
  – 60% rate less salient?
  – Both new: takes time for taxpayers to learn how to game the system?
Adjustment costs and labour supply: evidence from bunching at tax thresholds in the UK

Barra Roantree, Stuart Adam, James Browne, David Phillips

IIPF 2015, Dublin