Tax and development: Lessons from recent empirical research

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Outline

How to evaluate the welfare costs of taxation?

- Developing countries and emerging markets need sufficient resources to finance public services and to reduce inequalities
- This must be made in a manner that is not too distortive for the economy
- We need reliable information about the distortionary costs of taxation
- This information can then be weighted againts the distributional goals
  - necessary in order to take a stand on the efficiency-equity trade off

Credible estimation of welfare costs

- In developed countries, the accepted standard of evidence is based on exogenous variation
  - E.g. tax reforms that divide taxpayers into a treatment group and a control group, enabling a difference-in-differences strategy
  - kink points and other discontinuities can also be used
- The impacts are typically evaluated using large taxpayer panels directly from revenue authorities
- For non-OECD countries, very little such credible evidence
- This lecture presents some of this recent work

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Elasticity of taxable income

- Traditionally, the welfare cost estimates have been based on labour supply elasticities
- However, hours of work is only one of the many margin how taxes can affect the economy
- Other margins include
  - the participation decision
  - effort (which is reflected in the hourly wage)
  - avoidance and evasion
- Feldstein (1999) shows how estimating the elasticity of taxable income is sufficient to evaluate the welfare costs of taxes

The basic setup

- Government levies linear tax t on reported taxable income
- Agent makes N labour supply choices: $l_1, .., l_N$
- Each choice has a disutility $\psi_i(l_i)$ and wage w_1
- Agents can shelter e of income from taxes by paying cost $g(e)$
- Taxable income (TI) is

$$TI = \sum_i w_i l_i - e$$

- Consumption is given by

$$c = (1 - t)\, TI + e$$

Taxable income formula

- Quasi-linear utility

$$u(c, e, l) = c - g(e) - \sum_i \psi_i(l_i)$$

- Social welfare

$$W(t) = \left\{ (1-t)TI + e - g(e) - \sum_i \psi_i(l_i) \right\} + tTI$$

- Differentiating and applying envelope conditions for l_i ($(1-t)w_i = \psi_i'(l_i)$) and e ($g'(e) = t$) implies

$$\frac{dW}{dt} = -TI + TI + t\frac{dTI}{dt} = t\frac{dTI}{dt}$$

- Intuition: marginal social cost of reducing earnings through each margin is equated at optimum => irrelevant what causes change in TI

Taxable income formula: critique

- Simplicity of identication in Feldstein's formula has led to a large literature estimating elasticity of taxable income
- However, there are caveats to the approach:
  - Chetty (2009) questions validity of assumption that $g'(e) = t$
    - Costs of some avoidance/evasion behaviors are transfers to other agents in the economy, not real resource costs
    - Ex: cost of evasion is potential fine imposed by government
  - Income shifting between tax bases: if one increases the tax on labour income, people may claim capital income instead. Part of the lost revenue is recouped from the increased capital income tax base
- => In the end, 'real' costs determined by the reaction of *total* income

An aside: link to optimal taxes

- The taxable income elasticity (e) for high income taxpayers can be used to obtain the revenue maximizing marginal tax rate in the top bracket (Saez, 2001):

$$t* = \frac{1}{1 + a * e}$$

- where a is the Pareto paramater if the right tail of the income distribution is Pareto distributed. It is a measure of the thinness of the top tail: the thicker is the tail the smaller is a
- Current top marginal tax rate at the top in S-A around 47 per cent [(0.40 + 0.14)/1.14], when the VAT rate is 14%
- Wittenberg (2015): Pareto parameter 1.8, earlier 2 was used

Implied optimal top marginal tax rates

	0.1	0.25	0.5
1.8	0.85	0.69	0.53
2	0.83	0.67	0.50

Table: Optimal top tax rates. Pareto parameter (rows) and ETI (columns)

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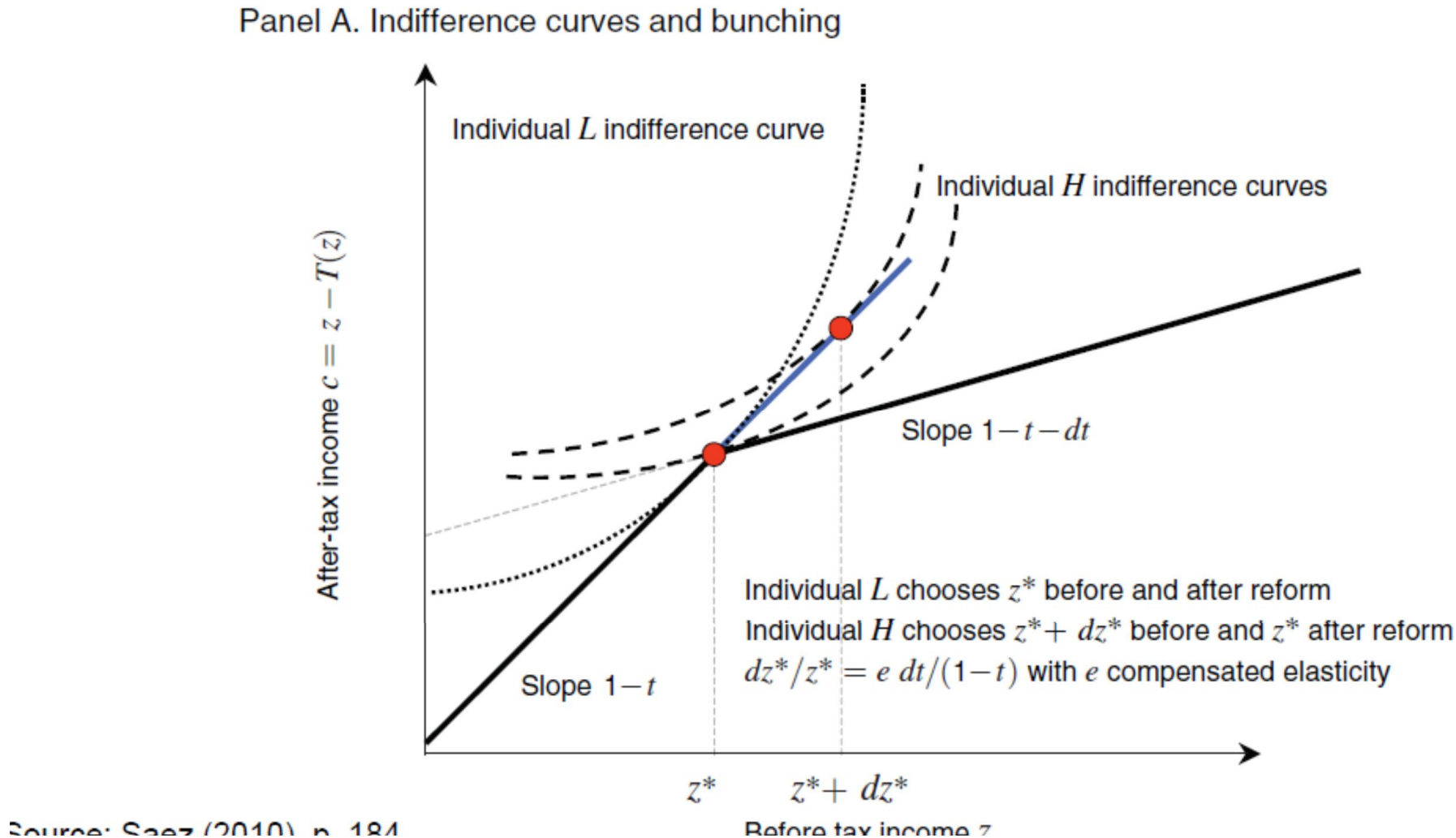
Empirical work using administrative data

- Unlike in the case for the evidence for the developed countries, there is extremely little evidence on tax responsiveness
  - for the long time, the exception was the work on Pakistan (Best, Brockmeyer, Kleven, Spinnewijn, and Waseem, 2015; Kleven and Waseem, 2013)
  - now, studies emerging also using data from other countries (Boonzaaier, Harju, Matikka, and Pirttilä, 2017; Bachas and Soto, 2015)
- A growing body of literature utilize admin data + field experiments
  - see Pomeranz (2015) for an example and Mascagni (2014) for a review
- Complementary approaches

Estimating ETI using bunching

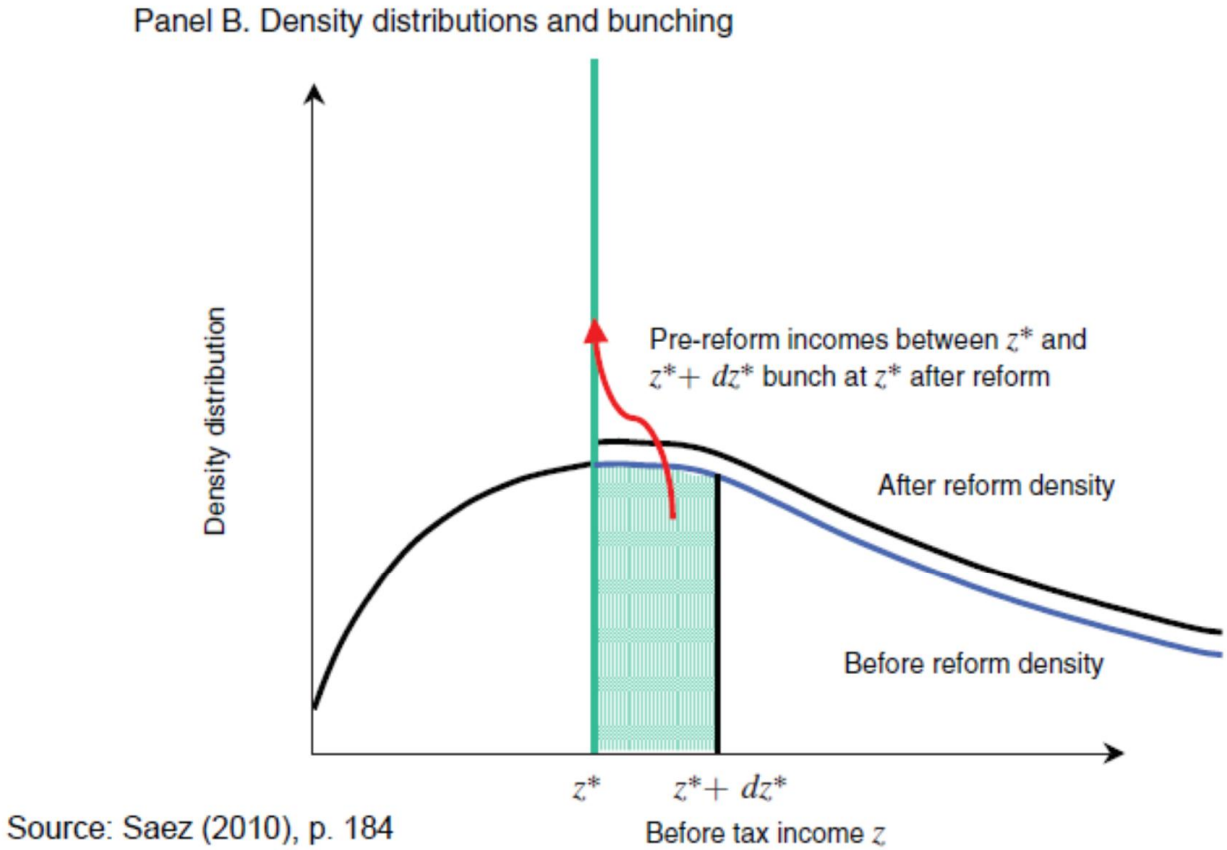
- Below, the approach by Boonzaaier et al. (2017) is presented in more detail
- They utilize the idea of Saez (2010) (for a survey, see (Kleven, 2016))
  - kink points in the tax schedules create incentives for taxpayers to locate just below the kinks
  - they can do so by lowering their taxable income
  - this creates excess mass below the kink point
  - the more excess mass there is, the greater is the elasticity of the tax base, and the higher are the distortions created by the system
- Devereux, Liu, and Loretz (2014) show how kink points in the corporate tax schedule can be used to estimate the elasticity of corporate tax base, and the elasticity is a sufficient statistic

Bunching graph 1



Source: Saez (2010), p. 184

Bunching graph 2



Source: Saez (2010), p. 184

Outline

The study by Boonzaaier et al. (2017)

- This paper offers evidence of the impact of a progressive corporate income tax on SME behavior
  - is a graduated, progressive tax rate schedule effective in increasing economic activity?
- We use population-wide administrative data from the South African Revenue Service (SARS)
  - bunching responses to CIT kinks
  - utilize reforms in the locations of the CIT kinks
- The paper contributes to the literature by
  - providing one of the first results using administrative data from Africa
  - adding to the scarce literature on the impacts of taxes on SME behavior
  - examining the anatomy behind the response: real vs. evasion

The taxation of SME profits

- If certain conditions are met AND turnover is below 20 million ZAR (1 USD≈13 ZAR)
  → Corporate profits are taxed according to a progressive schedule, *the SBC schedule*

Taxable income	Marginal tax rate
R1 – R59,750	0%
R59,751 – R300,000	10%
R300,001 and above	28%

- Outside the SBC schedule a flat rate of 28% is used

Changes in tax rate thresholds in 2010–2013

- The lower threshold increased on an annual basis by approximately 3,000 ZAR
  - from 54,000 to 63,500 ZAR in 2010–2013
- The upper threshold was increased by 17% in 2013
  - from 300,000 to 350,000 ZAR
  - no annual inflation adjustment of this threshold in 2010–2013
  - provides our main source of variation in terms of changes in incentives over time

Estimation

- As standard in the literature, we estimate a counterfactual distribution, $\hat{c}$, around the kink point using a polynominal function. Comparison of the actual distribution then gives an estimate of the excess bunching, $\hat{b}(TI^*)$, at the kink point CIT kinks
  - The elasticity of taxable income is given by

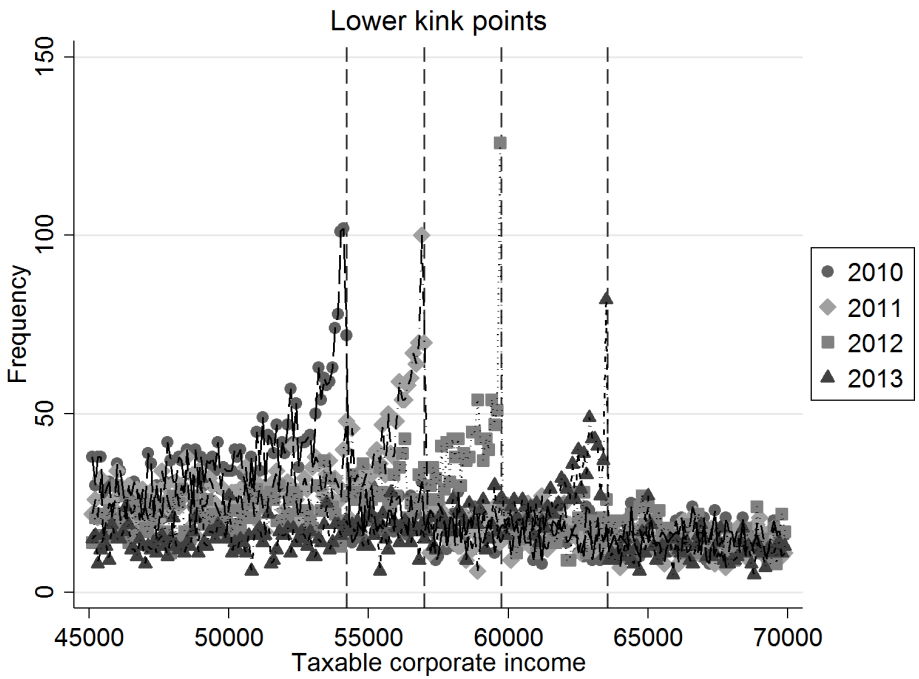
$$\varepsilon_{TI^*} = \frac{dTI}{d(1-\tau_p)} \frac{1-\tau_p}{TI} \simeq \frac{\hat{b}(TI^*)}{TI^* * \hat{c} * log\left(\frac{(1-\tau_P)}{(1-\tau_P-\triangle\tau_P)}\right)},$$

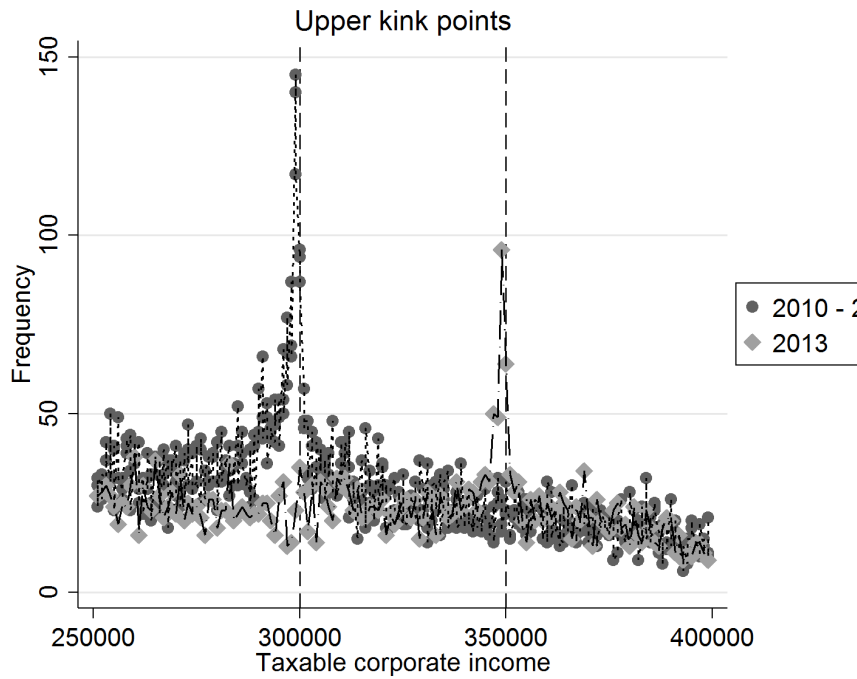
- The elasticity tends to be the greater when
  - excess bunching is large
  - there are less firms around the kink point
  - one sees a big change in behaviour relative to a small change in tax incentives

Data

- Data from a pilot project in cooperation with UNU-WIDER, South African Revenue Service (SARS), and National Treasury
- Tax return data for 2010–2013
  - directly from the e-filing system of SARS
  - micro-level data including all firms (with firm pseudo-ID's)
- The sample: firms that are eligible for the progressive income tax (SBC panel)
- The data has been subject to substantial cleaning work and has now been used by a number of research groups
  - SARS views that data prior to 2010 is not sufficiently reliable

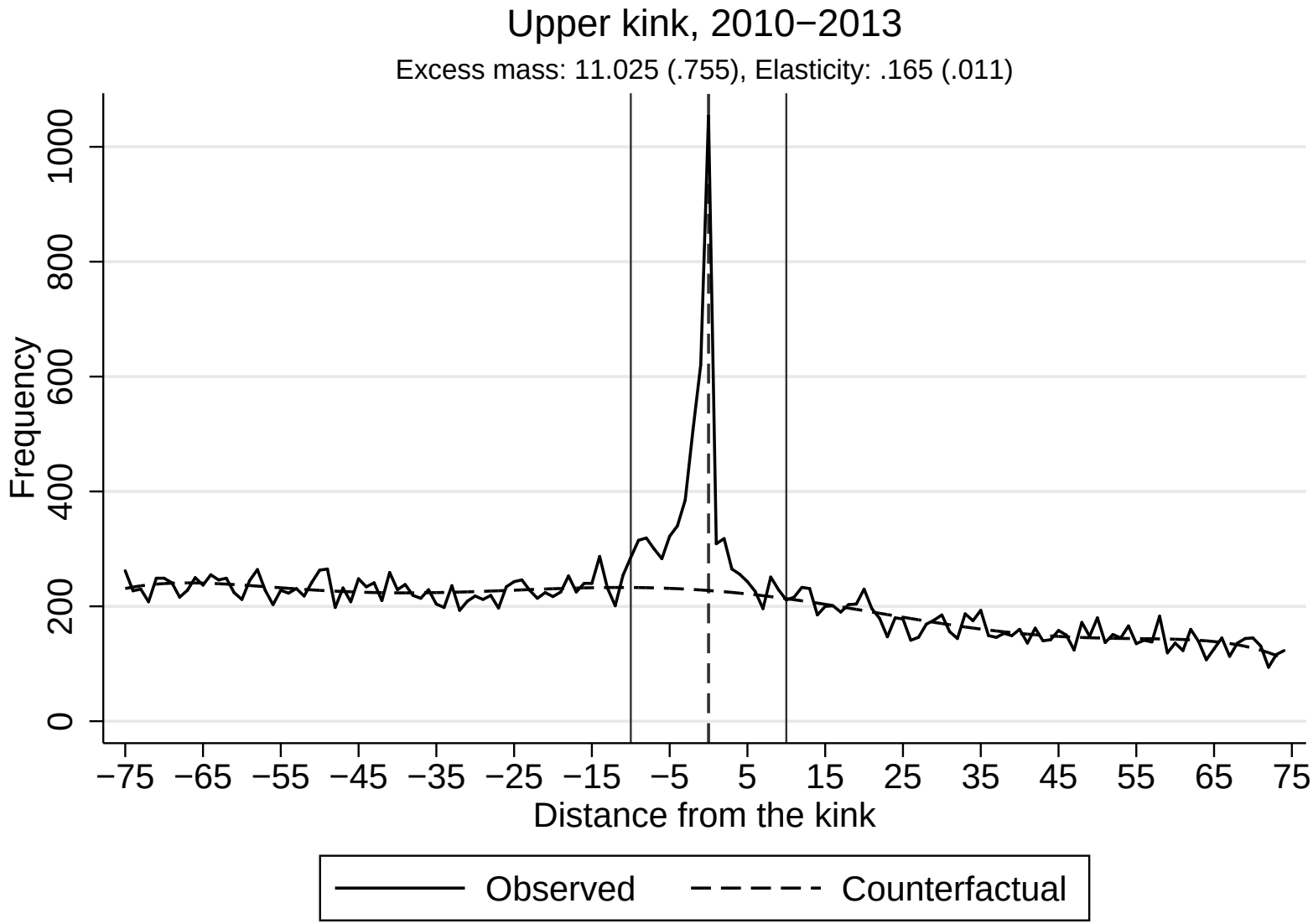
Data


Lower kink points
Frequency
0
50
100
150
45000
50000
55000
60000
65000
70000
Taxable corporate income
2010
2011
2012
2013

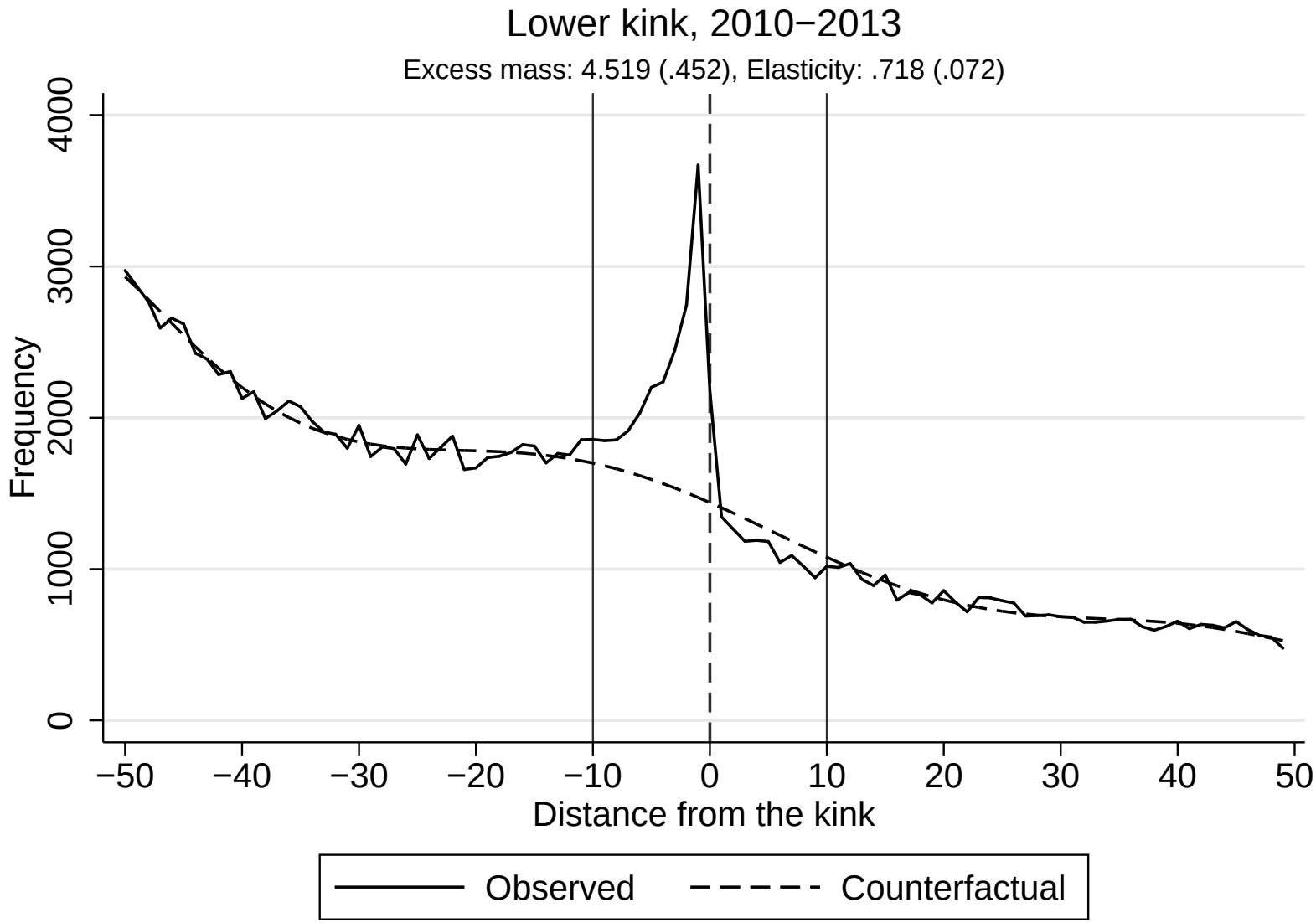

Upper kink points
Frequency
0
50
100
150
250000
300000
350000
400000
Taxable corporate income
2010 -
2013

Outline

Baseline results: SBC tax kinks (Upper kink)



Baseline results: SBC tax kinks (Lower kink)



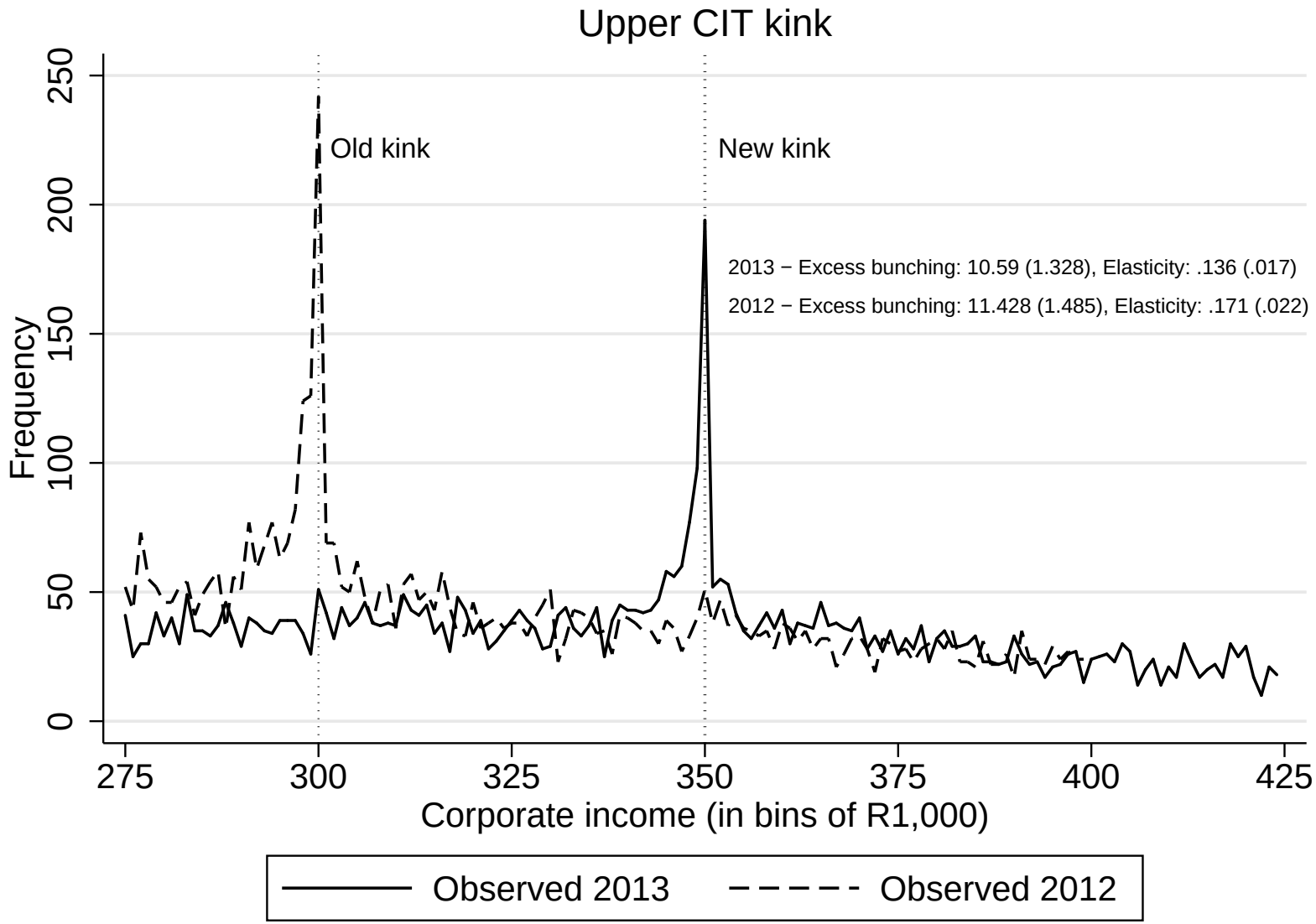
Baseline bunching results

- Firms respond very strongly to the SBC tax schedule
  - Large and distinctive excess bunching at both kink points
  - No significant differences between industries etc.
- Local elasticities at SBC kinks are relatively high
  - Particularly among smaller firms around the lower kink point
  - Nevertheless, a large incentive change at the upper threshold implies a rather moderate elasticity
- More scattered response to the lower kink
  - behavioural story (?): increased incentives to avoid positive tax payments? (tax rate 0% $\rightarrow$10%)

Nature of the response & bunching

- Sharp bunching response is an indication of reporting responses
  - Real responses would entail more scattered responses around the kink points
  - The response at the upper kink is very sharp $\rightarrow$ first piece of evidence of avoidance/evasion
- Similarly, large and immediate responses to changes in the locations of the kinks suggest reporting behavior
  - Real responses would require adjustments along multiple margins (sales, costs, demand side etc.)
  - Real response margins likely to be affected by various frictions $\rightarrow$ more sluggish responses to relocation of kink points
- Our main evidence comes from the 17% increase in the upper CIT kink
  - from R300,000 to R350,000 in 2013

Changes in kink points: results



Characterizing reporting behavior

- The above evidence suggest that reporting responses explain the response
- In general, various types of responses could be involved:
  - avoidance, evasion and real responses
- We turn to the detailed tax return data to look for these mechanisms
  - how reported items respond to the CIT kink point relocation?
  - how firm-level factors evolve around the kink?

Responses of relocating firms vs. others

Bunchers in 2013 and 2012

△2013–2012	△Sales	△Cost of sales	△Expenses	△CTI	△Equity	△Cash
Mean	**.145**	.089	**.052**	**.154**	**.472**	**.351**
SE	.024	.068	.050	.001	.147	.149

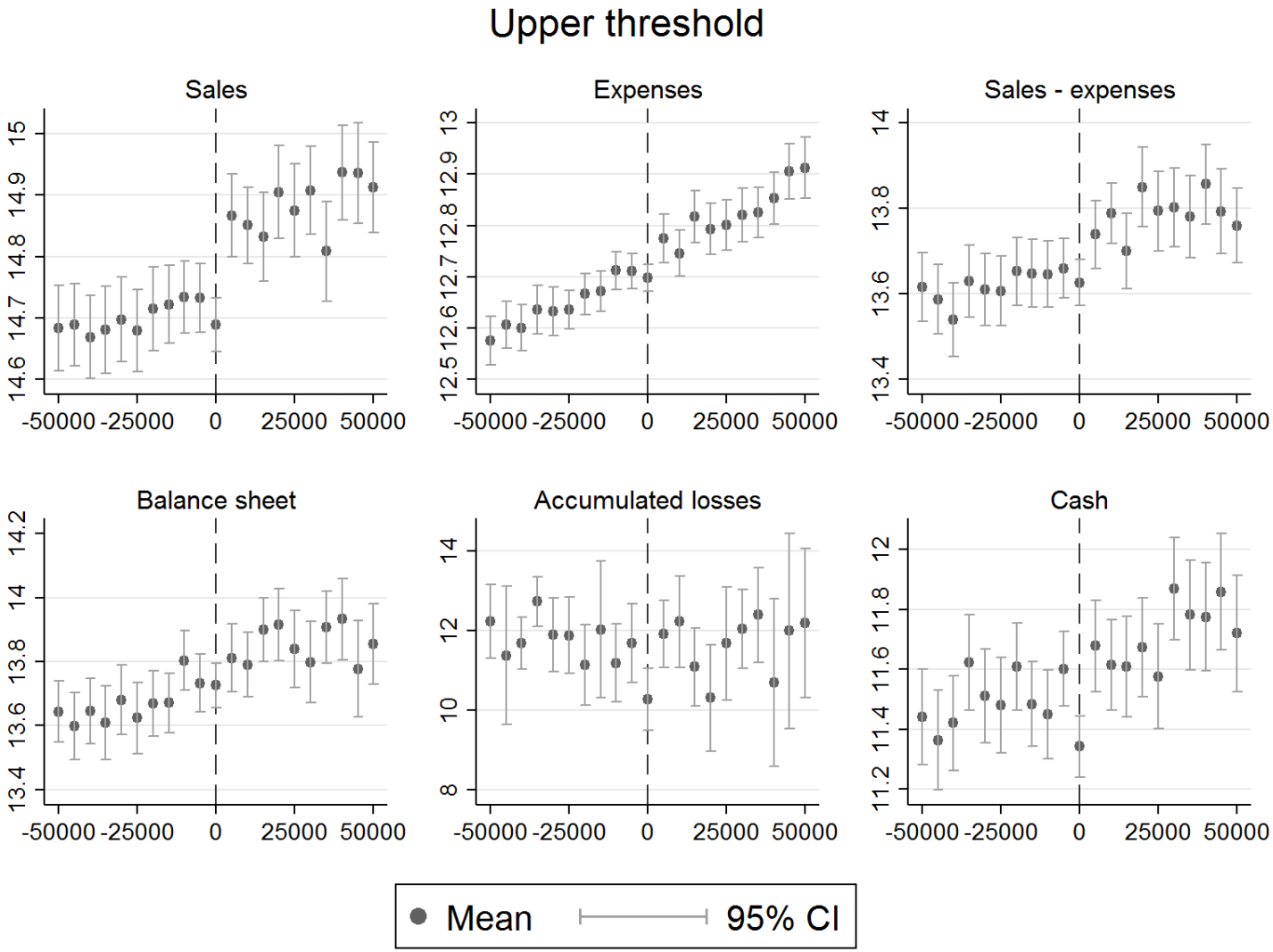
CTI>150 & CTI<250 in 2012

△2013–2012	△Sales	△Cost of sales	△Expenses	△CTI	△Equity	△Cash
Mean	.090	.101	.166	.015	.338	.063
SE	.009	.018	.011	.006	.0287	.038

Bunchers in 2013, not bunching in 2012

△2013–2012	△Sales	△Cost of sales	△Expenses	△CTI	△Equity	△Cash
Mean	.138	.134	.179	.121	.349	.086
SE	.024	.036	.031	.012	.067	.090

Firm-level factors around the upper kink point



Bulk of evidence towards reporting responses

- Several factors point to the direction that reporting is responsible for a large bulk of the response
  - sharp bunching
  - sharp and immediate responses to relocation of the kink point
  - the observed sales responses for moving firms not consistent without allowing for significant reporting effects
    - or that these firms were unrealistically productive
  - suggestive evidence of both sales underreporting and tax planning activities – showing more profits now when it has become more tax favourabl

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Conclusion

- Conducting good tax policies requires evidence base
- There is not much of it, but it is expanding
- ETI is a useful framework, but there are issues
- Real elasticities typically smaller than reporting behaviour changes
- How to reduce avoidance:
  - wide tax base
  - extensive third party reporting
  - tax authority capacity

References I

Bachas, P., and M. Soto (2015): "Not(ch) your average tax system: corporate taxation under weak enforcement," Mimeo, University of Berkeley.

Best, M. C., A. Brockmeyer, H. J. Kleven, J. Spinnewijn, and M. Waseem (2015): "Production versus Revenue Efficiency with Limited Tax Capacity: Theory and Evidence from Pakistan," *Journal of Political Economy*, 123(6), 1311–1355.

Boonzaaier, W., J. Harju, T. Matikka, and J. Pirttilä (2017): "How do small firms respond to tax schedule discontinuities? Evidence from South African tax registers," Discussion Paper VATT Working Papers 85.

Chetty, R. (2009): "Is the Taxable Income Elasticity Sufficient to Calculate Deadweight Loss? The Implications of Evasion and Avoidance," *American Economic Journal: Economic Policy*, 1(2), 31–52.

References II

Devereux, M. P., L. Liu, and S. Loretz (2014): "The Elasticity of Corporate Taxable Income: New Evidence from UK Tax Records," *American Economic Journal: Economic Policy*, 6(2), 19–53.

Feldstein, M. (1999): "Tax Avoidance and the Deadweight Loss of the Income Tax," *The Review of Economics and Statistics*, 81(4), 674–680.

Kleven, H. (2016): "Bunching," *Annual Review of Economics*, 8, 435–464.

Kleven, H. J., and M. Waseem (2013): "Using Notches to Uncover Optimization Frictions and Structural Elasticities: Theory and Evidence from Pakistan," 128(2), 669–723.

Mascagni, G. (2014): "A Review of Tax Experiments: from the Lab to the Field," Evidence report 97, Institute for Development Studies.

References III

Pomeranz, D. (2015): "No Taxation without Information: Deterrence and Self-Enforcement in the Value Added Tax," *American Economic Review*, 105(8), 2539–69.

Saez, E. (2001): "Using Elasticities to Derive Optimal Income Tax Rates," *The Review of Economic Studies*, 68(1), 205.

——— (2010): "Do Taxpayers Bunch at Kink Points?," *American Economic Journal: Economic Policy*, 2(3), 180–212.

Wittenberg, M. (2015): "The top tail of South Africa's earnings distribution 1994-2011," Mimeo, University of Cape Town.

Chetty transfer cost model setup

- Individual chooses e (evasion/avoidance) and l (labour supply) to max $u = c - \psi(l)$ s.t.

$$c = y + (1-t)(wl - e) + e - z(e)$$

- Social welfare is now

$$W(t) = \{y + (1-t)(wl - e) + e - z(e) - \psi(l)\} + z(e) + t(wl - e)$$

- Difference: $z(e)$ now appears twice in SWF, with different signs

Excess burden with transfer cost

- Let $LI = wl$ be the total (pretax) earned income and $TI = wl - e$ denote taxable income
- The FOC:

$$\begin{aligned}\frac{dW}{dt} &= -(wl-e)+(wl-e)+\frac{dz}{de}\frac{de}{dt}+t\frac{d(wl-e)}{dt}\\ &= t\frac{dTI}{dt}+\frac{dz}{de}\frac{de}{dt}\\ &= t\frac{dLI}{dt}-t\frac{de}{dt}+\frac{dz}{de}\frac{de}{dt}\end{aligned}$$

- FOC for individual's choice of e: $t = {}^{dz}/_{de}$. =>

$$\frac{dW}{dt} = t\frac{dLI}{dt}$$

- Now welfare costs depend on real economic decisions only
- Std ETI would overestimate the welfare costs

Chetty (2009) formula

- With both transfer cost $z(e)$ and resource cost $g(e)$ of evasion:

$$\begin{aligned}\frac{dW}{dt} &= t\frac{dLI}{dt} - g'(e)\frac{de}{dt} \\ &= t\left\{\mu\frac{dTI}{dt} + (1-\mu)\frac{dLI}{dt}\right\} \\ &= -\frac{t}{1-t}\left\{\mu\, TI\varepsilon_{TI} + (1-\mu)wl\varepsilon_{TI}\right\}\end{aligned}$$

- Excess burden depends on weighted average of taxable income (ε_{TI}) and earned income (ε_{LI}) elasticities
- Important to know the composition of income response
- Often one only finds relatively indirect evidence for μ