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**MSc**  
Economics

# Discrepancy in the Elasticity of Taxable Income

A litterature survey

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## Motivation

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The elasticity of **labour supply** with respect to the Marginal Tax Rate (MTR)

- Important for growth in the long run and to avoid bottlenecks in the short run
- Prone to misreporting and frictions

The **Elasticity of Taxable Income (EIT)** wrt. the MTR

- Better availability and preciseness in administrative data
- Captures several behavioral responses
  - Real responses of labour supply
  - Tax avoidance, tax evasion
  - Collective agreements and career choices

→ Good measure of overall efficiency

For efficiency analysis **total revenue** should be taken into account

- Tax avoidance can lead to fiscal externalities
  - Increase other tax bases due to income shifting towards capital or corporate income
  - Inter-temporal substitution within the personal income base

## The seminal paper

- Natural experiment: The U.S. Tax Reform Act '86
  - Reduced the marginal tax rate from 50 pct. to 28 pct. for high-earners
- Feldstein (1995) estimate the elasticity of taxable income to be greater than one
  - U.S. was on the wrong side of the Laffer curve prior to 1986
  - Reducing the tax rate should have *raised* the collected tax revenue
- However, Gruber and Saez (2002) estimate ETI to 0.6 for high-earners in the 80s



Surveying 5 studies of the EIT,  $\hat{\varepsilon}$

- A huge discrepancy is found in the estimates!
- Is a lower estimate due to better data availability and estimation methods?
- Or actual differences between tax reforms, institutional settings, and culture in the U.S. and Denmark respectively?

	$\hat{\varepsilon}$	Country
Feldstein (1995)	1.04	U.S.
Gruber & Saez (2002)	0.40-0.57	U.S.
Kleven & Schultz (2014)	0.05-0.3	DK
Chetty et al (2011)	0.00	DK
Kreiner et al (2016)	0.00-0.08	DK

## Difference in differences

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The ETI is estimated as the treatment effect around the implementation of the TRA86

$$\hat{\varepsilon} = \frac{\Delta \ln(z^H) - \Delta \ln(z^M)}{\Delta \ln(1 - \tau^H) - \Delta \ln(1 - \tau^M)} \quad (1)$$

Evaluating the the relative differences from 1985 to 1988 of

$z^H$  : Income for high-earners

$z^M$  : Income for medium-earners.

$\tau^H$  The MTR for high-earners.

$\tau^M$  The MTR for medium-earners.

Panel of 3,538 medium-earners and 197 high-earners → robust?



Panel are prone to bias from potential non-tax-related changes to income

## 1. Mean reversion

- Individuals might only be in the high-income group initially as a results of an income shock - thus, would revert towards the mean

→ Downward bias in the ETI estimate

## 2. Divergence in the income distribution

- Non-tax-related increases in inequality
- E.g. impacts of skill-biased technological change and globalization as observed in the U.S. in the 80s (Gruber and Saez, 2002)

→ Upward bias in the ETI estimate

## IV Panel Regressions

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Panel with ~60,000 individuals → changes in the MTR throughout 1980s

$$\underbrace{\ln\left(\frac{z_{it+k}}{z_{it}}\right)}_{\% \text{-change in income}} = \alpha_0 + \underbrace{\varepsilon \cdot \ln\left(\frac{1 - \hat{\tau}_{it+k}}{1 - \tau_{it}}\right)}_{\text{ETI}} + \underbrace{\sum_t \alpha_1 x_{it}}_{\text{married}} + \underbrace{\sum_t \alpha_2 \text{YEAR}_t}_{\text{year dummies}} + \underbrace{\alpha_3 \ln(z_{it}) + \sum_{d=1}^{10} \alpha_{4d} \text{SPLINE}_d(z_{it})}_{\text{controls for base year income}} + u_{it}, \quad k = 1, 2, \text{ or } 3 \quad (2)$$

Bias from **non-tax-related changes in inequality and mean reversion** is reduced by controlling for income in base year  $t$

$\alpha_3$  log-income level

$\alpha_4$  10 piece spline for decile of the income distribution

**Endogeneity problem:** An income shock  $u_{it} > 0 \rightarrow$  a mechanical rise in the MTR  $\rightarrow \text{corr}(\tau_{it}, u_{it}) > 0 \rightarrow$  downward bias of  $\varepsilon$

IV: Use  $\tau_{t+k}^h$  as an instrument for  $\tau_{it+k}$

$\tau_{t+k}^h$ : MTR that individual  $i$  would have paid in period  $t+k$  due to changes in the tax system only  $\rightarrow$  simulated using the NBER TAXSIM model.

- Panels of all Danish taxpayers in all **three year periods** from 1984-2005.
- Merge individual level **administrative data** containing rich information about tax types, labour market, education, and sociodemographics.
- Danish setting: income **inequality more stable** over the 22-year period than even in other Nordic countries
  - Bias from non-tax related changes to inequality and mean reversion is likely to be much less than in prior studies

Baseline specification: differences at time  $t$  are the differences between  $t$  and  $t + 3$ .

$$\Delta \ln z_{it} = \varepsilon \cdot \Delta \ln(1 - \hat{\tau}_{it}) + \eta \cdot \Delta \ln y_{it} + \Delta \gamma_t^c \mathbf{x}_i^c + \gamma^v \cdot \Delta \mathbf{x}_{it}^v + \Delta u_{it} \quad (3)$$

Similar to equation (2) (Gruber and Saez, 2002) with a few additions

$\mathbf{x}_i^c$  : Time-invariant individual characteristics for which the effect  $\gamma_t^c$  is allowed to change over time

$\Delta \mathbf{x}_{it}^v$  : Difference in time-variant individual characteristics for which the effect  $\gamma^v$  is constant over time

$\Delta \log y_{it}$  : Difference in log virtual income (the sum of non-labour incomes)

→ controls for **income shifting** towards capital or corporate income

Look at all Danish wage earners during the smaller reforms of 1994-2001.

Specification similar to equation (3) (Kleven and Schultz, 2014) with a few exceptions

- Merging employer and employee data → Adds occupation FE and region FE
- Fewer controls overall though

Main contribution:

- **Clear frictions** due to the Danish labour market being highly unionized

## Inter-temporal shifting

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## The Danish 2010 Tax Reform

- The marginal tax rate was reduced by 7.5 pct. points
  - Agreed upon as early as 1<sup>st</sup> of March 2009 and passed in parliament by late May
- Self-employed were able to plan and employers to negotiate with their employees

Using Danish monthly administrative data the short-run ETI is estimated using the panel regression:

$$\underbrace{w_{y,m,i}}_{\text{wage income}} = \beta_0 + \varepsilon \cdot \underbrace{\frac{1 - \tau_{y,i}}{1 - \tau_{2009,i}}}_{\text{ETI}} + \underbrace{\beta_1 \cdot d_{y,i}^{2010}}_{\text{2010 dummy}} + \underbrace{\beta_2 \cdot d_i^T}_{\text{treatment dummy}} + u_{y,m,i} \quad (4)$$

Evaluate the treatment group of 219,179 individuals against a control group of 109,500 individuals with weak or no incentives to shift their income due to the tax reform

- **Substantial shifting:** Estimate  $\hat{\varepsilon}$  is 0.80 for D09-J10
- Omitting N09-J10 to estimate the short-run ETI without inter-temporal shifting



## Results

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	$\hat{\epsilon}$	Income group	Method	N	Period	Country
Feldstein (1995)	1.04	~ \$100,000	DD	3,792	1985-1988	U.S.
Gruber & Saez (2002)	0.40	> \$10,000	IV Panel Reg.	~60,000	1979-1990	U.S.
—  —	0.57	> \$100,000	—  —	—  —	—  —	—  —
Kleven & Schultz (2014)	0.05	wage earners	IV Panel Reg.	29,668,870	1984-2005	DK
—  —	0.09	self-employed	—  —	1,646,270	—  —	—  —
—  —	0.11	all taxpayers	—  —	11,799,628	1984-1990	—  —
—  —	0.2-0.3	—  —	IV DD	~3,000,000	1986-1989	—  —
Chetty et al (2011)	0.00	wage earners	IV Panel Reg.	8,302,905	1994-2001	DK
Kreiner et al (2016)	0.08	highest quartile	Panel Reg.	328,679	2009-2010	DK
—  —	0.00	—  —	—  —	—  —	2009-2010*	—  —

**Table 1:** Estimated elasticity of taxable income in different studies. \*excl. N09, D09 & J10.

Most other reliable studies also find the ETI to be in the range 0.12-0.40 for the U.S. (Saez et al., 2012)

## Conclusion

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## Concluding remarks

- Differences-in-differences estimation is a simple way to analyze effects in the proximity of a substantial tax reform
  - But it can be difficult to completely exclude effects from non-tax-related changes to inequality and mean reversion
  - Availability of controls as well as 2SLS panel regression over a period with a variety of tax system changes can reduce these biases.
- U.S.: Most newer studies estimate a significant ETI of 0.12-0.40
- Denmark: Find modest effects  $\rightarrow 0$  when omitting intertemporal income-shifting or self-employed
- Discrepancy can partly be explained
  - By higher frictions and less options for tax avoidance in Denmark
  - But estimates have also decreased with richer better data availability allowing for more controls.

### Implications for the U.S.

- $\rightarrow$  Future studies might also find estimates closer to zero for the U.S., come richer data availability
- $\rightarrow$  There might exist a revenue and efficiency loss from gaps in the U.S. tax law.

## References

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